

**EMOTION AND IMITATION IN EARLY INFANT-PARENT
INTERACTION: A LONGITUDINAL AND CROSS-CULTURAL STUDY**

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**Ph.D. Thesis
The University of Edinburgh
1998**



DECLARATION

I declare that this thesis is composed by me
and that this work is my own

Signature.

ACKNOWLEDGEMENTS

Essential assistance and encouragement of many people contributed in the accomplishment of this thesis. Here, I would like to thank, particularly, the following:

My supervisors, Professor Colwyn Trevarthen and Associate Professor Giannis Kugiumutzakis, for their invaluable advice, personal support and encouragement at all stages of the thesis. In addition, I would like to thank adjunct assistant professor Vasilis Vasdekis for his statistical advice.

The research of this thesis was funded by the Vardinogiannio Foundation (1993-1994), the Alexander S. Onasis Foundation (1994-1996) and the Institute of Mediterranean Studies (1996-1998). I am grateful to these foundations for their financial support.

I thank Dr. Bronwen Burford and Dr. Hamish Macleod for their precious practical support on the matter of microanalysis, and for the provision of the Video-Logger Event Recorder Program.

The obstetricians Drs. Fanourgakis and Koundounarakis for their assistance to overcome the difficulties of subject recruitment, in Rethymnon, Greece, and Dr Livingstone of the Royal Infirmary Hospital of Edinburgh, who assisted in the recruitment of subjects, in Edinburgh, Scotland.

I am grateful to all the postgraduate students and friends in the Laboratory of Developmental Psychology at the University of Edinburgh and in the Laboratory of Cognitive, Experimental and Developmental Psychology at the University of Crete for the useful discussions concerning issues of the thesis and psychological support.

Above all, I am deeply indebted to the infants and their families for offering their time, cooperation and patience to participate in the study, and for welcoming me to their homes with friendship, humour and warmth, both in Edinburgh and in Rethymnon.

This thesis is dedicated to my family, and particularly to my parents- my father, Stamatis, who I wish was here, and my mother, Stella. They supported me with all their love, and taught me how to cope with difficult circumstances.

ABSTRACT

Following a brief introduction to the diverse views on the motives for imitation, a review of the literature is presented covering the following topics: early theories and observations concerning the origin and development of human imitation in infancy; recent theoretical models that have emerged from experimental studies of infant imitation and from naturalistic studies of imitation in infant-mother communication; and traditional and recent theoretical and empirical approaches to imitative phenomena in infant-father interaction. This review leads to the following conclusions:

- a) The failure of attempts to confirm certain ideas, hypotheses and suggestions built into the theories and strategies of earlier studies does not detract from their great contribution, which set the foundations upon which recent research is carried forward.
- b) Despite the different theoretical frameworks and the lack of a consensus as to the best method for investigating early imitative phenomena in experimental settings, neonatal imitation is now accepted as a fact.
- c) Imitative phenomena found in empirical studies focusing on infant-father interaction, as well as the relevant theoretical interpretations, are characterised by a contradiction; theory predicts bidirectional regulations, but studies employ an empirical approach that favours the view that regulation is only on the parental side.

In this investigation, observations were made of thirty infants, fifteen from Greece and fifteen from Scotland. All were seen every 15 days interacting with their mothers and with their fathers at home, from the 8th to the 24th week of life. A total of 540 home recordings were made. Units of interaction that contained imitative episodes were subjected to microanalysis with the aid of specialized software, in a multi-media system that provides the capability for detection, recording, timing and signal analysis of the variables under consideration to an accuracy of 1/25th of a second.

The main findings may be summarised as follows:

- a) Imitation was evident, as early as the 8th week, irrespective of the country, the parent or the infant's sex.
- b) Cultural differences, reflecting the predominance of non-vocal and vocal imitative expressive behaviour in the two countries, were found.
- c) The developmental course of early imitative expressive behaviours was typically non-linear.
- d) Turn-taking imitative exchanges predominated over co-actions.
- e) Parents were found to imitate their infants more than vice versa.
- f) Regulation of emotion, either in the sense of emotional matching or of emotional attunement, proved to be the underlying motivating principle for both parental and infant imitations.

The implications of these findings for understanding universal intersubjective nature of early imitation in infant-father and infant-mother interactions are discussed.

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INTRODUCTION

Most recent research concerning imitation has concentrated on the investigation of the phenomenon within experimental settings. With no intention to underestimate the value of these methods, it can be recognised that no set of experiments in artificial situations can yield an adequate explanation of such a polymorphic and complex phenomenon as neonatal and early infant imitation. This thesis was designed to test a naturalistic approach to the study of the interpersonal motives for communication that underlie imitative exchanges between young infants and their parents in two cultures. However, before the aims and findings of the present study are presented, prevailing views on motivations for imitation will be reviewed.

1. Theories of the Motivating Structures of Imitation

Concepts of how imitation is motivated have emerged from four sources: a) classical theories and observations on the origin and the development of early human imitation; b) theoretical models generated from experimental studies of infant imitation in the past 25 years; c) recent models based on naturalistic or descriptive studies of early human imitation in infant-mother communication; and, more rarely, from d) traditional and recent theories and empirical approaches to imitative phenomena in infant-father interaction. This history may be summarised as follows.

In the older studies of infant psychology, the views of Baldwin (1894), Valentine (1930), Lewis (1936), Piaget (1962) and Guillaume (1971), provide, directly or indirectly, interpretations of the motivating structures for imitation.

Kohlberg's view (1969), that the child's tendencies to engage in shared activities and to imitate constitute the motivational basis for social reinforcement, apparently coincides with that of Baldwin. Valentine (1930) did not raise the matter of motivation directly, but there are many examples in his pioneering observations that demonstrate the support of how imitative performance is supported by emotions of interest and pleasure. Lewis (1936) suggested that both internal and external factors in infants' psychological activity give "incentive" to imitative performance, and he also claimed that these factors undergo modification in the course of time.

In Piaget's theory, the "incentive" for imitation is considered to be "immanent" in the action, or part of the cause of action. The motivating factors that regulate infant imitation are assumed by him to be: a) an intrinsic need for acting and knowing; b) a desire to reproduce actions that differ from familiar schemata; and c) appreciation of the esteem in which the model is held by others (Kugiumutzakis, 1983). Certain changes that Piaget noted in the source of interest in actions, giving the incentive to reproduce them, were related to the form of these actions, and their degree of familiarity to the subject, rather than to any internal emotional or cognitive reorganizations that may accompany them. For Piaget the "interest" of the later development of a behaviour is ". . . a continuation of the earliest interests . . ." (Piaget, 1962, p. 50), rather than something new. Piaget's explanation of imitation differs from that of Guillaume who proposed that, since imitation is not an instinctive performance, the "incentive" that makes the child imitate is to be found in interests external to the imitation itself, in the environmental effects of imitating.

Modern experimental work begins with the work of Maratos (1973). She adopts Piaget's view that the "incentive" of imitation is in the activity itself. Meltzoff and Moore (1992) developed a cognitive theory of the motive for imitation, according to which the mismatch between perception and representation motivates the infant to imitate. In the framework of ethological theory, Abravanel, Levan-Goldschmidt and Stevenson (1976) considered that after the sixth month, an element of motivation exhibited as interest, forms an integral part of the imitative performance.

Heimann, Nelson and Schaller (1989) seem to recognise the existence of a motivation for imitation as one factor which may determine individual differences in the performance of imitation, but these researchers do not specify the nature of this motivation. Kugiumutzakis (1998b, in press) suggests that neonatal imitation "...involves concrete kinds of shared experience between the two partners, that it is motivated by two emotions or kinds of motive . . .". The emotions of "interest" and "enjoyment" are proposed to constitute infants' motives to imitate.

According to the third perspective, more recent descriptive studies include that of Uzgiris (1981), who initially adopted Moscovici's views on the motivation for

imitation; that is, there are two kinds of motivation corresponding to the two functions of imitation, the cognitive and the social. Later, Uzgiris (1984) gives more emphasis to the interpersonal meaning of imitations as an “incentive” for early imitation in infant-mother communication. Newson (1978) claimed that imitation is motivated by the mother’s desire to create a degree of shared understanding with her baby. Stern (1985) does not refer directly to the motivating power for imitation, though he describes, “. . . the feeling state that gave rise to the overt behaviour.” (ibid, p. 139). Papousek and Papousek (1989), however, claim that the infant possesses “. . . an intrinsic motivation to imitate.” (ibid, p. 150). The nature of this motivation is not further clarified, but if it coincides with the “powerful mechanism of intrinsic motivation” that is involved in the “fundamental system of adaptive functions”, then it approximates to a,

“. . . ‘need’ to acquire knowledge, to solve problems, to be in active mental rapport with the environment and with one’s self.” (Papousek, Papousek and Harris, 1987, manuscript).

In addition, these authors appear to include motivational functions in their interpretations of expressions of emotionality.

Nadel, while not clarifying the nature of the motives involved, adopts Wallon’s theory that positive emotional sharing, in which interest and attention seem to dominate, generates a behavioural identification that allows young children to sustain interactions (Nadel and Fontaine, 1989; Nadel, 1993).

Motivation is the center in Trevarthen’s theory. Generated within an Innate Motive Formation, emotions express the “central energy and the self-regulating quality of motives” (Trevarthen, 1993b). Within this theoretical framework, with particular reference to imitation, Trevarthen, Kokkinaki and Fiamenghi (1998) claim,

“. . . endogenous motives or ‘images of action’, which are at the source of all intentions and of the cognitive processes, that assimilate perceptions to guide and regulate what is done, must be taken in directly, and reciprocated and ‘reflected back’, for sympathetic mimesis to begin.” (ibid, in press).

Kugiumutzakis (1993, 1994, 1998b) proposed that the neonatal imitative episodes are preceded, supported and followed by interactions of contrasting emotions, “Both interest and pleasure motivate the intersubjective, imitative game...” (Kugiumutzakis, 1998b, in press).

In Freud's theory, the father has a primary role in development of a young child's self-representation or ego. For males, the motive for resolution of the Oedipal complex is assumed to be fear; for females it is the loss of mother's love (Lynn, 1974). In Kohlberg's terms (1969), the "thought processes" in identification are conceived to be "magical", in the sense that what is involved is not similarity between the distinct self and the other, but "incorporation" or "absorption" of the latter. Lynn's and Kohlberg's discussions both give support to the "pathological" aspect of the nature and quality of motives, and the "strong deficit-state of motivation" that is presented to explain identification in psychoanalytic and neo-psychoanalytic theories.

In his social learning theory, Mowrer (1950) considers developmental identification to be, ". . . powered by biologically given drives . . .", while defensive identification is powered by, ". . . socially inflicted discomforts. . .". In Mowrer's terms, frustration is the motive for identification. Sears (Sears, Rau and Alpert, 1965) views the "motivational system" as a generator of "dependency", ambiguous "expression of love", in the sense of various degrees of provision and withdrawal, making the motive for identification stronger. In this theory, the negative nature of the motive is manifested in a rather indirect way.

Kohlberg's Cognitive-developmental theory incorporates the "motivating conditions for imitation", referring rather to those conditions that lead to the reproduction of an interesting behaviour pattern than to a special imitative motive. The motivation for imitation coincides with the motivation of social attachment. In this, Kohlberg's theory goes far beyond the Freudian interpretation of the motive as "pathological" recognising the positive social affordances of imitation, under normal circumstances.

It is evident that considerations of the nature of motivating structures for imitation have generated perpetual controversy along several dimensions. Some theoreticians focus on the origin of the motive ("innate" or "learned", "internal" or "external" to imitated activity), others address its psychological nature ("cognitive" or "emotional"), while still others discuss the developmental changes that affect the

imitative motive, and the attribution of developmental modifications to various factors, intrinsic or extrinsic.

2. The Aim of This Research

Given the confusion regarding the cause and nature of imitative behaviours, this thesis was designed to make a systematic study, in a naturalistic setting, of the intersubjective nature of early infant imitations. It was decided to study the imitations of mothers and fathers with infants from the 8th-24th week of life in Greece and in Scotland. The following topics were selected for attention: a) the emotions displayed in imitative exchanges; b) the duration of elements in these exchanges; c) developmental changes of imitative expressive behaviours; d) the intersubjective timing of imitative exchanges; e) the direction of imitations; and f) the forms of imitative expressive behaviours. Each of these topics will be considered in correlation with the culture, the sex of the infant or parent, to determine the influence of these variables or any combination of them. The impact of age on imitations will also be determined.

3. Overview of Thesis

Chapter 1 reviews classic theories and observations on the origin and development of early human imitation, as a background to recent research on infant imitation. Recent theoretical models that have emerged from experimental studies of infant imitation are discussed in Chapter 2. This is followed, in Chapter 3, by an account of the recent theories and naturalistic studies of early human imitation in infant-mother communication. Chapter 4 complements this review with a presentation of traditional and recent theories, and empirical studies of imitations in infant-father interaction. The presentation of the aims of this research in full, and an account of the pilot and the main study, in Chapter 5, are followed by definitions of behavioural parameters that constitute the coding system for the microanalysis and signal analysis. This coding scheme forms the basis upon which the statistical analysis was conducted and the results derived, as is presented in Chapter 6. Finally, in Chapter 7, implications of the findings for an understanding of the intersubjective

nature of imitation, and for a model of infant-father interaction are discussed, and the findings of this research are incorporated into a broader theoretical framework.

CHAPTER ONE

EARLY THEORIES AND OBSERVATIONS ON THE ORIGIN AND DEVELOPMENT OF EARLY HUMAN IMITATION

Introduction

In this century, the convictions of the psychoanalytic school and then of behaviouristic learning theories, overshadowed all earlier theories, and discounted the first developmental approaches to infant imitations, including the views of the ancient Greek philosophers (Maratos, 1973; Dunkeld, 1978; Kugiumutzakis, 1983).

The ancient Greek philosophers regarded imitation as a fundamental process at inter-cosmic, inter-species and intra-human levels. Concerning the relations of imitation to cognition and emotions, cognition was regarded as an essential element, always present before imitation can occur, while emotions were either ignored or underestimated (Pythagoreans, Democritus), regarded as present but evil and requiring to be controlled by reason (Plato, Heraclitus), or accepted as of cognitive origin (Aristotle) (For a full account of ancient Greek philosophers' views on imitation see Kugiumutzakis, 1983, 1995, 1998b).

The explanatory tendencies of the imitative phenomena among the early modern writers vary from acceptance of an innate tendency to imitate (Itard, 1800; Bagehot, 1873; Tarde, 1903, cited by Kugiumutzakis, 1983), to the view that imitation is an instinct (James, 1890; Morgan, 1896, cited by Kugiumutzakis, 1983), a pseudo-instinct (McDougall, 1908, cited by Kugiumutzakis, 1983), or the result of learning (Bain, 1855; Cooley, 1902). Sometimes the concepts of "sympathy" and "suggestion" were examined in connection with imitation (Darwin, 1877, cited by Guillaume, 1971; Tarde, 1903, cited by Miller and Dollard, 1941; Allport, 1954, cited by Kugiumutzakis, 1983). The value of these observations, however, inadequate and "uncontrolled", is evident when imitation is considered within a developmental and communicative perspective (Kugiumutzakis, 1983, 1993).

In the 1920's and 1930's, truly developmental studies appeared. Notwithstanding the fact that these views came from uncontrolled observations, they

prepared the way for the appearance of the Piagetian theory (Kugiumutzakis, 1983), which constituted a landmark in infant imitation research.

In the following theories, imitation is conceived in different ways, ranging from a native impulse (Baldwin, 1894), or an instinctive tendency (Valentine, 1930), to the result of learning (Lewis, 1936; Piaget, 1962; Guillaume, 1971; Vygotsky, 1978).

1.1. Human Development and Imitation Process

(Baldwin, 1894)

It has been assumed that it was Piaget's application of Baldwin's theory of "circular reaction" that made the latter's reputation (Holmlund, 1986). Baldwin believed imitation to be the fundamental law of the developing interaction between the organism and the environment (Baldwin, 1894).

Baldwin described the phylogenetic and ontogenetic processes of human adaptation and human development as forms of action that, at different levels, depend on imitation (Holmlund, 1986).

The development of adaptation is described in terms of an "imitation process", which refers in the organism's attempt to discover repeatedly the experience of pleasant stimuli, on one hand, and to avoid the experience of unpleasant stimuli, on the other hand. The mechanism that determines the pleasant or unpleasant nature of stimuli was named by Baldwin "hedonistic consciousness", an innate representation which exists in all species and serves their survival. The "imitation" of plants and animals, in Baldwin's sense, is assumed to be of an instinctual or a reflex nature (Holmlund, 1986).

Human development was also described by Baldwin in terms of an imitation process, in development of mind (consciousness), in affective life, and in the social and moral sphere. Baldwin assumed that if pleasure and pain constitute the early manifestations of life, imitation forms the exclusive basis for mental development (Baldwin, 1894).

Baldwin made a distinction between different levels of imitation to be met in human development. He suggested that, in the case of a mature man, imitation is

“will-directed” while in the case of a little child, imitation is characterised by “suggestion” (Holmlund, 1986).

Baldwin (1940, cited by Kugiumutzakis, 1983) defined imitation as any kind of repetition that reinstates a copy, either mental (in thought) or motor (in action), or both. This definition includes the case of “self-imitation”, as a recurrence of the content that is in one’s mind. It is clear, that the effect of imitation is to make the brain a “repeating organ” and the expression and evidence of this fact is the muscular system (Baldwin, 1894).

Key-terms in Baldwin’s explanation of the process of conscious imitation are the “ideo-motor suggestion” and its consequence, the “circular reaction”. The term “ideo-motor suggestion” meant for Baldwin a repeating cycle in which the starting point was the “eye-stimulus”, mediated by the central process, resulting in a movement of the child’s own member, which brings again the same “eye-stimulus” (Baldwin, 1895, cited by Kugiumutzakis, 1983). Thus, the two-sided mechanism of “circular reaction” is constituted; that is, “. . . one which repeats its own stimulus. . .” (Baldwin, 1894, p. 31).

In the notion of “ideo-motor suggestion”, the relationship between sensory experiences and motor activities is regulated by the so-called “dynamogenetic process”, referring to the direct link between the sensory and the motor processes, and in part, is the result of the tendency to reproduce pleasant stimuli (Holmlund, 1986).

Baldwin (1894) distinguished three instances of function, all conforming to the imitative type: “biological imitations”, “psychological or cortical imitations” and “plastic or secondarily-subcortical imitations”.

The “biological imitations” concern cases that do not involve a conscious or intellectual stimulus, with the possibility of its revival as a memory. In human newborn infants, biological imitations play an important part, “. . . as the means for the gradual reduction to order and utility of the random movements . . .” (Baldwin, 1894, p. 49).

In “psychological or cortical imitations”, the copy has become consciously available through both sensation and memory. When memory is involved, desire and

volition arise. Thus, there are two kinds of psychological imitation: the simple and the persistent. "Simple imitation" is defined in terms of ideo-motor suggestion, which reinstates its own stimulus, while "persistent imitation" is the result of the experience of deliberate repeated effort (Baldwin, 1894). While simple imitation is considered unrelated to the degree to which the action matches the model, persistent imitation is assumed to be characterised by an improvement of the degree of matching. This improvement is assumed to be based on an "active comparison" in memory, between the impressions emerging from the subject's own performance and those from the instigating act (Uzgiris, 1984).

"Plastic or secondarily subcortical imitations" include all cases of stimulus-repeating reactions, "which once represented conscious adaptation, but have become what is ordinarily called "secondary-automatic" and subconscious" (Baldwin, 1894, p. 50). Fundamental facts such as instinct, impulse, imitation of facial and emotional expressions, the contagion phenomenon are cases falling in this category.

A kind of "representation" of the nature of stimuli (pleasant, unpleasant), present since birth in every species, is supposed to give rise to action. This representation is "a kind of constructive idea", translated into an intention to imitate (Holmlund, 1986, p. 20).

Further, the production of emotion ". . . depends upon the reinstatement by association or action of an ideal copy. Sympathy may be called, however, the imitative emotion *par excellence*." (Baldwin, 1894, p. 38). The association may occur in one of two ways: either the presentation of a stimulus, calls out the motor attitudes, habitual to experiences of pleasure or pain-giving objects; or, the presentation of the expression of emotion in another stimulates motor expression in us, resulting in an arousal which stimulates such an emotional reaction (Baldwin, 1894).

The emotions of pleasure and pain are considered to be ". . . original accompaniments of vital reaction.", since Baldwin can find no absolute beginning for them, anywhere in the course of mental development. The role of both kinds of emotion is considered to be of great importance . While "pleasure" aims at securing the continual presence of the copy, being something additional to the copy, "pain" is

important for new adaptations or adjustments, without which growth would be impossible (Baldwin, 1894).

Baldwin's theory of imitation is elaborated in integration with his views on the history of notion of the individual and the self. For Baldwin, the "expression of a developing personality" and the "society" are interrelated, and neither can be viewed developing separately from the other. He distinguished the projective, the subjective and the ejective phases of the self. During the projective stage, the infants' pleasures and pains come from his ability to "perceive mobile objects". Then, gradually, people are distinguished from other objects by the unpredictable nature of their movements and the effect that these movements may have on infants (Baldwin, 1894). In the course of this phase, the infant tries to predict other persons' behaviour and is interested in them but they are still enigmatic and not dependable. The sense of uncertainty is contingent upon the moods, emotions, nuances of expression and shades of treatment of people around the infant (Baldwin, 1894). At the end of the first stage, the infant manages to detect individual features, and it is according to this distinction that his attitude varies. It is exactly at this point that Baldwin viewed conscious imitation as a bridge between the two stages. He assumed that,

"Subjective elements that stem from the infant's organic sensations and emotions will now be added to the projective elements provided by the perception of others."
(Guillaume, 1971, p. 134).

Baldwin assumes that accommodation by actual muscular imitation does not occur before the seventh month, so before that, the child is utterly organic, so great is the impetus of its inherited instincts and tendencies. When cerebral development has been achieved, through the contribution of new accommodations, imitations begin (Baldwin, 1894).

During the subjective phase, it is through the "peculiar experience" of effort, that by reproduction of the model, the infant gradually comes to understand himself and the others.

Then, the subjective phase becomes the ejective or social self, and the infant reaches the point at which he understands the experiences of others through the feelings he sees in himself. It is supposed that the thinking of the child is as follows, in Baldwin's words,

“. . . other people's bodies . . . have experiences in them such as mine has. They are also me's; let them be assimilated to my me-copy . . . My sense of yourself grows in terms of my sense of myself." (Baldwin, 1899, cited by Guillaume, 1971, p. 135).

In brief, Baldwin's view is that the child's first actions are featured beyond notions of a "random" or "trial and error" kind. They are characterised as consciously controlled, through mediation of an inner consciousness that determines the nature of stimuli e.g. what is pleasant. Thus, actions are directed by the child with the purpose of joining with the outside stimuli which has been recognised by the inner representations of the child. In this kind of system, action functions at two integrated levels: the inner level, in a form of "projection", and the outer level, in a form of "imitation". Thus, the interpretation of "projections", perceived in terms of the child's own conceptions about the world, provides the child's understanding of the environment.

Baldwin's theory has been criticised by Guillaume, who concluded that he overemphasized the infant's perception of the chaos existing between the state of people and the rigorous determinism of things (Guillaume, 1971), and for his treatment of the transition from circular activity to imitation,

"Guillaume did not accept the notion that the image of the act of another could substitute for a self-produced image in the instigation of a motor act . . ." (Uzgiris, 1984, p. 5).

On the other hand, Guillaume accepted Baldwin's contribution to the theory of the evolution of the complex process of self, through imitation. In addition, while Miller and Dollard (1945) believe that Baldwin's theory is too vague to be translated into learning theory, they recognised his contribution; particularly his incorporation of the biological functions in a social milieu, and the influence that they are subjected to within this frame. Maratos (1973) has criticised Baldwin's theory, in with all learning theories, for lacking a developmental study. Uzgiris criticised Baldwin for not addressing directly the question of what led to the active comparison process employed in persistent imitation, and she suggested that this may be attributed to "...growth in attention and memory capacities and to cerebral maturation." (Uzgiris, 1984, p. 5). Morgan, much earlier, found fault with Baldwin's definition of imitation, for its "extended signification" (Morgan, 1896).

1.2. Primary and Reflective Imitation

(Valentine, 1930)

Although it seems that Valentine developed his theory within a frame of reference prejudiced as concerns infants' abilities, his observations on early infant imitative phenomena have been very interesting and challenging and some of them have been verified by recent research.

While Valentine recognised the difficulty of defining the term "imitation" because of its ambiguity and complexity, he made his observations on, ". . . anything of the type described as 'imitation' . . . though some [writers] might include certain of these phenomena under 'suggestion'¹, 'innate sympathetic response', etc." (Valentine, 1930, p. 107).

Briefly, Valentine's observations provided evidence for the following imitative activities:

- a) As early as the fifteenth day, mouth opening imitation was reported, but this was considered as "coincidence".
- b) At the end of the first month, imitation of sound-making occurs, but not as an exact reproduction.
- c) The beginning of the smiling response was noted in the second month. This was presumed to be an imitative response.
- d) Imitation of tongue protrusion was noted in the sixth month. Of great interest, in this connection, is the fact that Valentine noted both the infant's fixation of attention and gaze between the model's eyes and the corresponding part of the face (tongue).
- e) Rare imitation of arm movements was observed in the course of the sixth month. At this point in development, interest in the action and in the experimenter was taken to play an important role in the imitative development. After the eighth month, an increase in imitation was noted.

Valentine distinguished two kinds of imitation, with reference to how purposive imitation can be. In the course of the first two years of life, imitation is characterised as "primary". The term is used to designate a ". . . non-reflective

¹ Ross and Baldwin differentiate the terms "suggestion" and "imitation", assuming the former to be the cause, and the latter the effect (Miller and Dollard, 1945).

‘impulse’ or ‘instinctive tendency’ to imitate . . . ” (Valentine, 1930, p. 107). This kind of purposeless imitation seems to happen as the consequence of an impression which causes the focusing of the infants’ attention.

In the course of the first months of life, instincts and innate impulses form the base of imitative activity that leads to the copying of the form of an action. By the second year, the tendency for copying is fully developed and it is transcended by the emergence of a social impulse and enjoyment of being with others,

“. . . doing as they are and do, and especially of being thus as one with the beloved mother or father or sister.” (Valentine, 1930, p. 130).

“Reflective imitation” appears by the sixth month of life, and it becomes more obvious after the second year. This is defined as, “imitation of a means, to an already desired end” (Valentine, 1930, p. 107).

Valentine observed and reported several matters that are directly relevant to the present research, such as: individual differences in imitative actions, emotions accompanying imitations, the element of effort to re-produce a modelled action, the focus of attention on the corresponding part of the face before imitating (e.g. tongue), the timing of pauses, the dips in the development of the imitative response. However, he disregards them indirectly,

“The problem is partly one of exact defining of terms, rendered more difficult by the rich complexity of human nature . . . and by the tendency for nature to avoid sudden jumps.” (Valentine, 1930, p. 118).

Further interesting matters noted in Valentine’s observations are: gender differences in imitative actions; the frequency with which a modelled action must be repeated for imitation to occur; the effect of the model on the imitator, as well as the effect that the presence of a third person might have on infant’s imitation (implying satisfaction in showing the ability to do what others do).

Valentine’s theory has been criticised by Piaget (1962) on a specific point. Piaget doubted the early age at which Valentine claimed to observe imitation. He thought it unclear whether the imitation lasted, and believed the response could be characterised as “pseudo-imitation”. While Maratos (1973) acknowledged Valentine’s contribution, she notes that his study was only descriptive, and that he did not formulate a developmental theory of imitation.

1.3. The “Generalized Other” and Imitation

(G.H. Mead, 1934)

G.H. Mead does not seem to have an adequate theory of imitation. Since he focused on the function of imitation as a problem in social psychology rather than developmental psychology, he considered imitation as part of the problem of ego development in society. For Mead, individual experience and society must be considered together, in an essentially integrated and interrelated way, each emerging through the ongoing process of the other (Coser, 1971).

However, the common element in Mead’s various works is the interest that is inherent in every kind of social action (Coser, 1971). Despite the fact that the concept of a “social act” seems to be essential in Mead’s theory, Coser (1971) believes that Mead does not give a clear definition of this term.

According to Mead, the essential mechanism through which the functioning of social acts is possible are “gestures”. In humans, imitation of vocal gestures, is important for language acquisition (Mead, 1934). He distinguishes the “significant gestures”, found in human beings from the “nonsignificant gestures”, found in animals. It seems that the distinguishing factor is the human thought, which, through symbols (i.e. vocal gestures), enables role-taking (Coser, 1971).

For Mead, human communication becomes possible at the climax of development, as the product of a gradual process, which culminates when a symbol has the same effect in two individuals.

In Mead’s view there are certain stages in ego development by exercise of the ability to take the roles of others, which is more than simple imitation of what they do. While very young, children are not able to make use of significant symbols, interpreting and defining them. Only later in life can the child represent, evaluate and predict other people’s roles and interchanges (Coser, 1971). While role-taking was simple in the first stage, now with the benefit of the symbols of language, a relation is conceived in the child’s mind between the roles that other people play with one another outside himself. The mature self emerges only when the “generalized other” (the community) is internalised, so that it can control the behaviour of its

members from within (Coser, 1971). It seems that it is through the process of identification that the self, who is by no means a mere body, arises as a social entity from “simple conversation of gestures”. Identification is the term used by Mead instead of imitation.

Mead can be categorised among the theorists who consider imitation emerging out of a learning process. The condition for imitation to occur is social consciousness (Miller and Dollard, 1945), and according to Kugiumutzakis (1983), Baldwin’s concept of circular reaction formed the base upon which Mead explained imitation.

Mead, in trying to make clear the social foundation of the self, distinguished between the terms “I” and “me”. The point of reference in the former term is the self’s response, whereas the latter term refers to the constellation of others’ attitudes, assumed by the self, as a consequence of identification with their views. While “Me” seems to imply a mirroring, or a reflection of the others in the self, “I” allows for spontaneity, in the sense of freedom of initiative (Coser, 1971).

Miller and Dollard (1945) believed that Mead’s theory did not advance a solution to the problem of imitation, since he did not give attention to a theory of imitation. Furthermore, while it has been proposed that Mead’s theory of the development of a sense of self as a product of social contact, is similar to that of Piaget, Mead observed that a self-awareness exists at a much earlier age than did Piaget (Borke, 1978).

1.4. The Development of Speech and Imitation

(Lewis, 1936)

Lewis was concerned with the role of imitation in the development of speech. Consequently, he focused his account exclusively in linguistic imitation. Although he assumed that there is an innate tendency to imitate, he believed that this needs training in order to be developed; thus, imitation has to be learnt (Lewis, 1936).

Lewis (1936) suggested that children’s imitations are simpler than those of adults’ in two ways: infants imitate simpler activities than adults, and the imitation is in itself rudimentary. This implies that imitation develops, or grows and changes.

Stages in the Progress of Linguistic Imitation

Lewis (1936) suggested that there are three stages in the learning of imitation: “rudimentary imitation” is followed by a period “. . . in which imitation is in partial or complete abeyance . . . ”, and then there is a “rebirth” of imitation. Although Lewis admitted that “. . . we cannot make absolute correspondence our criterion. . . ”, his definition of “true imitation” required an exact reproduction of the perceived model. True imitation does not appear until the end of the first year (Lewis, 1936).

Stage I

The beginning of the first stage of learning to imitate is assumed to be around the third or fourth month, but it is not excluded that a form of this kind of imitation can occur as early as the first month (Lewis, 1936). While the child’s response, so soon after birth, may be regarded as uncertain, later his or her expressions are regarded as unquestionably vocal responses to speech. The degree at which this kind of response is imitation, is not clear. If we consider that before this stage, on hearing speech, the infant remained silent, and now he responds vocally, that is, the infant “speaks” on hearing someone speaking, then this is characterised as “rudimentary imitation” because the vocalisations bear little or no similarity to the speech heard.

Three characteristics of these early vocal responses are mentioned:

- a) The child’s attention to the speaker facilitates their occurrence.
- b) The hearing of adult speech evokes the infants’ utterances.
- c) These utterances consist of the child’s familiar sounds (Lewis, 1936).

In trying to explain the importance of attention to the speaker for infants’ imitative performance, Lewis (1936) gives accounts based both on his own experience and on others’ descriptions, in which the emotional element (a smile) is inseparable, but, paradoxically, he does not recognise its significance as a factor mediating, in one way or another, in imitative performance.

As for the second feature of the early vocal responses, even in the most conservative view, it is beyond doubt that in the course of the second or third month of life, infants are able to respond vocally to an adult voice.

The third feature assumed to be characteristic of infants' early vocal responses, is that infants' utterances consist of his or her familiar spontaneous sounds. In addition, Lewis (1936) suggests that infants' responses may occasionally be similar to adults', in both intonational and phonetic form, if the adult sound is drawn from the infants' own repertoire.

Lewis (1936) suggested that three factors may explain the child's responses, in the sense of being their incentive. These are:

- a) An innate tendency for the child to respond to speech by vocalising.
- b) The child's response to expression by expression.
- c) The intervention of an adult into the child's babbling activity.

While it is proposed that infant's vocal response to speech is innate, Lewis (1936) accepts that both this innate tendency and subsequent training are necessary. It is assumed that these two factors will together determine the degree of resemblance between what the infant hears and what he says.

As early as the second month, the infant is capable of responding expressively to the others' expressions. These responses form a main condition for imitation to arise, presupposing attention to the speaker. Lewis considers that a clear boundary cannot be set between expression and imitation, both of which develop through a "dialogue" with an adult, and thus, there is no reason why the early expressive vocal response to heard sound should not also be called rudimentary imitation, from which later complete imitation arises.

Lewis (1936) assumed that Baldwin's explanation of an associative connection between the sensation of hearing the sound and the movements of saying it, is not adequate to explain cases where the child responds with a different sound. Lewis' alternative explanation is that the hearing of the adult word can simply stimulate the child to utter sounds of his own babbling repertoire, and from this, the child may become trained to respond to a particular sound with a specific response.

Stage II

Between 4 and 9 months of age, a diminution of vocal responses signals a period of pause. In trying to explain the reasons for this lapse of imitation, as it has

already been mentioned, Lewis believes that imitation should be considered in relation to the development of the infant's vocal behaviours, which have not ceased. He suggests that there is a replacement of imitation by a different kind of response that results in an inhibition of vocal response.

The imitative dip is explained with the following assumption: while up to this point, the child's response to speech was an arousal of attention on hearing of adult speech, it becomes at this stage, an expression of the effect of speech upon the child while he is more attentive to the circumstances in which he hears speech. Thus, his response is dominated by the important novel experience that each sound-pattern brings. In consequence of this attention, the child begins to respond more to the meaning and the affective quality of speech, even if the meaning the child gives to what he hears is different from the meaning intended by the speaker (Lewis, 1936).

The discrimination of positively or negatively toned speech, and the reproduction of corresponding responses, would be expected to result into an increased degree of resemblance between the response and the imitation. This does not seem to happen because, at the same time, the child's utterance is becoming more defined in its articulation. This achievement leads to the development of distinctive features in the child's productions, making the difference between heard and uttered response more apparent.

The growth of meaning has an inhibitory effect on all the three conditions out of which imitation arises, that is, the innate dependence of utterance upon hearing, the child's expressive response to utterance and the entrance of adult speech into the infant's repetitive chain of babbling. Despite inhibition, sporadic imitations occur, and it is only when the child becomes aware of the activity of imitation in itself, that imitations again become more frequent and change in nature, in the course of the following stage.

Stage III

From 9 months onward, imitation occurs with much greater frequency, vigour and accuracy than in the first stage. The following changes seem to occur in the course of this stage:

- a) A readier imitation of sounds drawn from the child's own vocabulary.
- b) More concrete imitation of intonational form.
- c) The appearance of delayed imitation.
- d) More definite imitation of sound-groups new to the child.
- e) The development of echolalia.

The appearance of these five characteristics, in a marked form, at about the same time, is explained both by the tendencies already present in the two earlier stages, and as a result of the rapid development of the instrumental functions of language.

The development of discrimination between one sound and another, in combination with the incentives that give rise to imitation, now make possible imitation in a more accurate form. In addition, the child's learning to apprehend speech in its accompanying context, and thus respond to its meaning, seems to constitute the other condition that explains the changes in the course of the third stage. The satisfaction gained by speaking a given word in given circumstances or by behaving in a certain way in response to a given word, leads to the growth of instrumental use of words. This has two significant effects on the child's imitative behaviour:

- a) The child pays more attention to the forms of words and their instrumental use for and by him.
- b) The child becomes aware of imitation as a demonstrative activity in itself.

Initially, the child uses his own forms, and attempts to match them to forms used by adults around him. The influence of adults has a powerful effect upon the child, and if the difference between the former's and the latter's behaviour is great, then the child does not understand, and either gives up or imitates the model. This kind of social selection leads infants to closer imitation of conventional words, which is not restricted in the word's form but also into its intonational and phonetic patterns.

The child's awareness of imitation as an activity in itself is assumed to be acquired through two different ways: spontaneous imitation of a word, or imitation in response to the adult's solicitation. The common feature in the two is the

satisfaction gained in the imitation itself, a result of completing a pattern previously experienced when one element of it recurs. In addition, the child becomes aware of the instrumental linkage that exists between the heard words and their context, in the sense that he realises that certain words have contexts of their own and “. . . demand imitation.” (Lewis, 1936, p. 92).

In Lewis' attempt to explain how the child passes from familiar to unfamiliar sounds, it is suggested that apart from the incentives in function, already mentioned in the stage I, both the adult's concern with the child's responses, and the child's tendency to conform to adult patterns, are strong incentives. However, this explanation does not seem adequate for Lewis, who concludes that imitation is not based on any simple behavioural tendency, but rather on a combination of factors (Lewis, 1936).

In summary, there are six noteworthy points in Lewis theory, three of which have already been highlighted by Maratos (1973):

- a) The infant's attention may be hard to be obtained by the speaker.
- b) The human voice, as opposed to the non-human sounds, is imitated preferentially.
- c) The stimulus to the infants' imitative response is part of the child's own repertoire. In addition, the 3 month-old-infant will respond only to affectively toned speech.
- d) The recognition of individual differences in the rate of development, which seem to affect the beginning of the stages, particularly the second and the third.
- e) The developmental dips and the consequences in the quality of imitative behaviour.
- f) The recognition of an incentive to imitate, that changes in quality across the age range.

1.5. Imitation and Sensory-Motor Intelligence

(Piaget, 1962)

In Piaget's theory (1962), imitation is viewed as a phenomenon which itself develops, in close connection with acts of intelligence and representation.

Central concepts in history are those of “accommodation” and “assimilation”. Accommodation is defined as the modification of internal mental schemas to

correspond with the external world, and assimilation is the incorporation of external objects in pre-established schemas. Since sensory-motor intelligence is defined to be parallel with the development of accommodation and assimilation, development of imitation is determined by the relation which is established between these two functions. A stable equilibrium between accommodation and assimilation results in the intelligent adaptation. A primacy of assimilation over accommodation results in various forms of play, whereas domination of accommodation over assimilation brings the activity of imitation. Piaget considers imitation as “. . . a continuation of the effort at accommodation . . .” (Piaget, 1962, p. 5).

Two conditions must be met before imitation can occur:

- a) The already existing schemas have to be able to become differentiated when new data “come in”.
- b) The activity of a model must be assimilated to an already existing circular sensory-motor schema, enabling the child to perceive the model as corresponding to results he himself had obtained.

The six stages Piaget (1962) described for the development of imitation are as follows:

Stage I: Preparation Through Reflex (0-1 month)

Imitation is excluded in the first stage. Piaget refers to “imitative crying” as representative of this stage. He suggested two interpretations for this: either the infant was woken up by an unpleasant stimulus, thus began to cry; or the crying resulted from contagion, the infant “confusing” others’ cries with his own.

Stage II: Sporadic Imitation (1-4 months)

This stage is considered to be “. . . pre-imitative rather than truly imitative...” (Flavell, 1963, p. 124). In the course of this stage, experience through the incorporation of external elements, enriches the reflex schemas, producing “differentiated” primary circular reactions. This development enables the child to acquire a habitual behaviour pattern upon perceiving another person enact the pattern. In essence, the action of the model is treated by the child as one of his own

actions, as though it were a repetition he himself had just made. Imitation is explained as simply continuation of movements of accommodation, when these are already parts of a circular reaction (Piaget, 1962; Flavell, 1963).

While Piaget considers that it is not easy to see the derivation of imitation in relation to accommodation and assimilation at this stage, he claims that for imitation to happen, assimilation is a prerequisite for it, and not a result, as Guillaume believed (Piaget, 1962).

Sporadic imitation is discussed in terms of three kinds of responses: vocalisations, vision and prehension. Piaget distinguishes, as Guillaume does, between vocal imitation and the imitation which involves reproduction of visually perceived actions. While in the vocal imitation the existence of the fact is observable, in the second case there is a mechanism to analyse. The difference is due to the processes through which the perception of the act can be retained.

In Stage II, vocal imitation has a three-fold meaning:

a) "Vocal contagion", signifies the earliest phonic imitation, and refers to stimulation of the child's voice by another voice that results in an approximate reproduction of the sounds heard, either crying or another sound (Piaget, 1962),

"When it is a case of crying, the contagion is almost automatic, probably as a result of the emotion which accompanies the utterance." (ibid, p. 10).

If the vocal contagion involves other than crying, for the child's voice to be stimulated, the other person must either repeat familiar sounds, or certain intonations known to the infant.

b) "Mutual imitation", refers to the experimenter's exact imitation of the child. It is taken for granted that the child will not try to improve his imitation.

c) "Sporadic imitation", refers to the child's rare imitation of a known sound that has not been uttered immediately before, with reasonable accuracy. This case is considered "very exceptional".

Imitation of emotion is mentioned in Piaget's work, although he seems to consider it as "pseudo-imitation", imitation through training that does not last, "...with non-intentional convergence between the action of the model and that of the subject." (Piaget, 1962, p. 27). Apart from the observation connecting negative

emotion to vocal contagion, smiling or imitation of laughter are reported already in observations of the second stage,

At 0; 1 (30) [1st month, 30th day]. . . When I stopped, he made a few sounds, smiling as he did so, then seemed to make some movements of the head to continue the accommodation." (Piaget, 1962, p. 12).

In addition, the affective character of imitation at this stage is demonstrated in an indirect way. Assimilation is considered to provide significance (intellectual aspect) and interest (affective aspect). Since assimilation is a prerequisite for imitation to occur, then, we could hypothesise that the latter "inherits" all aspects of the former.

Stage III: Systematic Imitation of Sounds Already Belonging to the Child's Phonation, and of Movements he has Already Made and Seen Himself Make (4-8 months)

The emergence of new circular reactions, from the coordination of vision and prehension, which gradually incorporate the "primary circular reactions" of the previous stage, are called "secondary circular reaction". Despite this progress, imitation in this stage is still "conservative", with no indication of efforts at accommodation of new models and actions of the other people's face that the child cannot picture on his own face. These limitations are due to the fact that although the schemata have become broader, coordination and differentiation between them has not yet been achieved. Thus, the infant only imitates seen movements that belong to his spontaneous repertoire, and which he can see himself making.

Concerning the vocal imitation, Piaget believes it is becoming, at this stage, more systematic and deliberate than before, "an active process". This is due to the fact that the child wants to prolong interesting things by influencing others, and he achieves this in various ways: by using sounds that have been used in imitations, or that he has just repeated, or by imitating sounds made by someone else.

Piaget agrees partially with Guillaume as far as the conditions are concerned here, in that he claims that in order for a sound to be reproduced, it must be a recognizable object for the child. Whereas Guillaume adds that the meaning of the phoneme is essential at this point, Piaget discards this view, since he believes that the acquisition of meaning is dependent on training.

Concerning the imitation of movements, this depends on the content of the primary and secondary circular reactions, insofar as the achievement of the movements involved depends on visual perception, meaning that an isolated and specific schema is essential for a movement to be imitated. Piaget concludes,

“. . . during this stage, a model is imitated only if it can be assimilated to a schema already formed . . . any schema practiced as such can give rise to imitation provided that the movements the child has to make are within his field of vision.” (Piaget, 1962, p. 26-27).

Several cases of pseudo-imitations are mentioned in this stage. Among them, imitation of tongue protrusion is assumed to be achieved between 9 and 10 months. Piaget expresses his doubts on Valentine’s observation of tongue protrusion as early as the sixth month, since it is not clear that this imitation lasted.

Stage IV: Imitation of Movements Already Made by the Child but Which are not Visible to Him, and Beginning of Imitation of New Auditory and Visual Models (8-12 months)

The gradually acquired “flexibility and mobility of schemas” in addition to the growing coordination between them, result in the establishment of a system of “indices” which is relatively independent from immediate perception. Thus, imitation is now beginning to detach itself from adaptations-in-general to become a specialized tool of acquisition.

The above developmental progress enables the child, on one hand, “to assimilate the movements of others to those of his own body, even when his own movements are not visible to him” and on the other hand, “. . . the association of relationships facilitates accommodation to new models.” (Piaget, 1962, p. 30).

Piaget seems to explain the aim of imitations of this stage in relation to its incentive, using as a frame of reference the source of emergence of the “affective aspect of assimilation”, i.e. its interest. Whereas in the previous stages it seemed that interest in a desired result emerged from the support that this outcome provided for the activity, and in consequence for its reproduction, at this stage interest seems to arise from more complex processes. When facing a new model, the partial similarity, that exists between the model and those that the child has already constructed as

schemata, and the partial difference which stimulates his attention, result in the interest that appears in this stage. Whereas first factor, partial similarity, leads to an immediate effort at reproduction, the second factor, partial difference, is perceived as an obstacle to reproduction.

Piaget assumes that during the first stages “. . . interest in a new result discovered by chance . . .”, when it brings in mind others which were familiar, is followed by attempts to reproduce this result. At this stage, in which imitation of new models takes place, while the result is “extrinsic” to the child’s action, there is some analogy leading to a desire for reproduction. The schemas that are at the disposal of the child, will determine the differentiation or not of accommodation from assimilation, and consequently will determine imitation.

The question of meaningfulness, in relation to training acquired for the proper reproduction of acts, is discussed at this point. Piaget concludes that there is no justification for the idea that imitation begins with meaningful and ends in meaningless movements. His evidence proves the opposite. The reason for this order is found in the mechanism of spontaneous schemas. Imitation is first observed with patterns of behaviour that are ends in themselves, and then is applied to movements integrated into the infant’s schemas.

The beginning of imitation of new auditory and visual models is explained as a consequence of gradual transition between imitation as a continuation of the circular reaction and imitation as an intentional act. The aim of both kinds of imitation seems to be the maintenance of an interesting result, that has been discovered by chance, by means of a circular reaction, or, once the child has become capable of intentional reproduction, by purposeful creation of this result.

Stage V: Systematic Imitation of New Models Including Those Involving Movements Invisible to the Child (12-18 months)

The strategy of active experimentation and exploration, comes from the “tertiary circular reactions”, and the “discovery of new tools”. This is as a consequence of the previous process, which results in the coordination of more than the previously used two schemas, and lead to differentiation between accommodation

and assimilation, in the course of this stage. Thus, true imitation emerges. It seems that it is through this energetic experimentation and intermediation of a series of auxiliary index-schemas, that “meaning” is given to elements met in the process of investigation. This seems to be the point that separates, at this stage, the development of vocal imitation and new visible movements from that of imitation of unknown movements related to non-visible parts of body. Whereas the difference in development of the first two kinds of imitation in Stage IV and V is related to their degree rather than kind, the development of the third kind requires both systematic experimentation and a set of meaningful auxiliary schemas (Piaget, 1962).

Imitations of unknown movements of non-visible parts of the body indicating the new capabilities of the child in this stage. Now independence, experimentation, differentiation are terms which may be applied to the child’s action.

Stage VI: Beginnings of Representative Imitation and Further Development of Imitation (18 -24 months)

Mental combinations, translated into interiorised accommodations, emerge through the gradually acquired independence of schemas from direct perception and investigation. This progress enables : a) immediate imitation of the new models, since accommodation takes place internally, without external active exploration; b) the appearance of deferred imitation, referring to the reproduction in absence of a model, even after a considerable time has elapsed since it was perceived; and c) the imitation of material objects leading to the construction of active representations of the things in an effort for the child to understand or “grasp” what has happened.

Piaget (1962) assumes that deferred imitation is not a new faculty emerging from an unknown source, but that it occurs in continuity with development in the earlier stages, of which it is internalised. In consequence, the representative image is the internalised image of imitation in its final state.

Representation refers ranges from “mental or memory image” to “thought”, based not only on perceptions and actions, but also on a system of mental schemas. In addition, Piaget considers internalised imitation to be essential to the appearance

of the semiotic function and speech, and generally to all preoperational forms of thought.

1.5.1. Piaget's Views on Intention, Empathy, Social Interaction and Development

Intention appears, in the form of adaptation, in Stage III. It is what subordinates the intermediary movements to the target action, providing "a goal to reach and a means to use" (Piaget, 1953, p. 149),

"Intention is thus determined by consciousness of desire, or of the direction of the act, this awareness being itself a function of the number of intermediary actions necessitated by the principal act." (ibid, p. 148).

The emergence of intention seems to be gradually acquired through the following stages: from appearance of the rudiment of intention, creation of intention, and finally, to incorporation of subject's spontaneous intention to intelligent behaviour patterns.

Piaget (1950) assumes that right from the beginning of life the human being is in a social environment that influences him, in many and various ways, but is not influenced by him.

Piaget recognised in the organization of mental activity, that the combination of indissociable "intellectual and affective structures" results in two dimensions of consciousness: "intrapersonal" and "interpersonal or social" (Borke, 1978). In discussing this interdependence of social and intellectual development, Piaget arrived at ideas that, if they were applied to a model based strictly on social interaction, would imply a notion of "empathy" -- that type of social sensitivity which requires precise interpretation of others' attitudes and intentions (Borke, 1978).

Taking as granted, as Piaget did, that: a) that only after passing over a threshold of social development at the age of 7-8 years is the child capable of sociocentric thought; b) that thought as an achievement of intellectual development, occurs between 1.5-2 years; and c) that social and intellectual development are "two sides of the same coin", then we might conclude "Piaget's long-standing conceptualization of adult human social interaction" (Borke, 1978), to be a paradox that cannot be proved in any way.

Piaget proposed that equilibration is a different kind of developmental process, than that proposed by maturational or learning theories. According to his hypothesis, the process of development is explained by the operation of the following forces: maturation, the results of experience with the environment, the results of explicit and implicit teaching, and the process of equilibration, which is set in motion whenever the child's belief system develops far enough to begin to contain self-contradictions (A. L. Baldwin, 1968).

In brief, Piaget considered that the development of imitation and the development of representation are directly connected, the former leading to the latter. Infants learn to imitate through assimilation, accommodation, gradual intercoordination of the different modalities, a system of indices, and the gradual internalization of imitations.

Certain studies appear to confirm the Piagetian observations (Paraskevopoulos and Hunt, 1971; Uzgiris, 1972), while the uncontrolled observations of Zazzo (1957), Brazelton and Young (1964), and Gardner and Gardner (1970) challenge it.

Criticisms of Piaget's theory are numerous and concern most aspects (Bandura and Walters, 1963; Baldwin, 1968; Chomsky, 1975, cited by Kugiumutzakis, 1983; Dunkeld, 1978; Brown and Desforges, 1979; Kugiumutzakis, 1988). Here attention will be restricted to a brief presentation of criticism applied exclusively to his ideas on imitation in infancy, and on the psychological elements and factors related to early imitation.

That Piaget's underestimated children's capacity, and especially infants' abilities as concerns imitation, is now accepted even by upholders of his theory (Lourenco and Machado, 1996).

Bandura (1971) objects to Piaget's theory on imitation as regards the following points:

- a) For misjudging human infants' abilities for imitation as compared to those of subhuman species.
- b) For using an inadequate number of repetitions of the model before allowing the act to be imitated.

- c) For failing to recognise the general motivational factors controlling infant imitation.
- d) For the one-sided way in which Piaget regarded imitation, where incomplete information is provided for this process when only infant's reactions are observed.

Dunkeld (1978) criticised Piaget for his interpretation concerning training and familiarity, while Butterworth (1981) criticises Piaget for the following:

- a) Underevaluating the degree to which the human brain is adapted for mental activity.
- b) The inadequacy of his concept of body-related-spatial relationships.
- c) Contradictory reasoning when identifying facial imitation at a stage that, according to him, modalities are unco-ordinated.
- d) Adopting a non-social perspective and consequently, providing an inadequate explanation of the development of infants' communicative abilities.

Kugiumutzakis (1988) states that the early imitative phenomena cannot, in fact, be explained within the Piagetian theoretical frame. He also highlights the inadequate analysis of imitative motives, since these, in Piaget's theory, are supposed to be identical with the motives for cognitive development in general, although the theory is not very clear on this point.

As we shall see, the most telling criticism of Piaget's theory comes from the findings of his own student, Maratos (1973), which are supported by the great majority of experimental studies of the three decades from 1970 to the present, as will be discussed in the next chapter.

1.6. Learning, Associative Transfers and Imitation

(Guillaume, 1971)

Guillaume (1971) after rejecting the view that imitation is an instinct, considered imitation to be the result of learning, through the intervention of training and associative transfers. He believed that vocal imitation is simpler than imitation of movements, and that it depends on different processes. He assumed that the sound of infant's voice has the same effect as an external sound, whereas the infant has no image of his body parts and of the correspondence to the perception he has of the

model's body parts. He distinguished four phases in the development of vocal imitation, while accepting individual variations:

- a) The phase of self-imitation (0-5 months), which, through trial and error, leads to imitation of others. His observations do not seem to agree with this restriction since he reported reactions to sounds, smiling, vocal imitation before the fifth month.
- b) In the second phase (5-12 months), Guillaume assumed that in order for imitation to occur, two inseparable conditions should be met. Through the development of the auditory perception, the phoneme becomes recognizable, it begins to hold greater interest than mere vocal noise.
- c) In the third phase (12 months to 5 years), the imitative process seems to change in form, possibly due to this development of auditory perception and its consequences. In the second year, the child is able to imitate words uttered by people other than his parents. It is at this stage that Guillaume wonders about less strict definition of vocal imitation,

“ . . . should we classify as imitation the first ‘ dialogues ’ in which, characteristically enough, infants respond without any really recognizable words but with the proper intonations . . . ” (Guillaume, 1971, p. 46).

- d) By the end of the third year the child manages to imitate new words. This happens as a result of differentiation and combination of sounds that the child has already learned to utter by assimilation of familiar sounds. This development is due not only to a more differentiated auditory perception, but also to an increased readiness to imitate. At this stage the intention to imitate seems to appear, possible as a product of acquired habits.

Guillaume (1971) views imitation of visible movements from two different aspects, “externally” and “internally”, giving two corresponding definitions,

“ . . . any manifestation, whether acquired or innate, whose actual performance is suggested by the similar acts of others . . . [including] imitation appears either as an aspect of the assimilation of traditions that perpetuate the modes of being or behaving characteristic of a given society or as an aspect of the generalization of an individual's innovative acts.” (Guillaume, 1971, p. 60).

Guillaume employs two interesting terms that signify determining factor for such imitation: “external significance” and “associative transfers”. At first, only significant movements or the effects of these movements are imitated. Convergence, due to the similarity of somatic apparatus, results in the similarity between the

models' and the imitators' movements. Then, through training this approximate imitation is transformed to imitation of specific movements. At this point, the associative transfers take effect. Associative transfers are based on the law of transference: the model's perception arouses the corresponding memory, which results in affective motor consequences. Thus, through the associative transfers, imitations of specific movements acquire value. Once the child has acquired the imitative capability, he becomes aware of the similarities and thus assimilates the model.

Despite the fact that Guillaume does not allow that emotions can be imitated, he assumes that, even before imitation appears, there is a sameness between infants' and adults' behaviour, which is due to the mere manifestation of similar organs and instincts. This implies a behavioural and emotional regulation attributed to unknown factors. Imitation of emotional states was noted at two years. There are two points noteworthy in connection with this observation,

“Imitation of emotional attitudes usually remains unemotional or else it is affected by some emotional factor in the child himself. This is often true of external, acquired signs of affection or attitudes of compassion . . . what predominates in the child is a personal feeling of joy. This stems from sense pride in his own activity . . .” (Guillaume, 1971, p. 163).

As for the affective aspects of imitation, Guillaume assumes that at first the infant is not conscious of his internal life,

“All the affective extensions of a human being's perception, all its reverberations in the sphere of emotions and desires, remain inherent in their sensory aspect.” (Guillaume, 1971, p. 136).

It is through imitation that the infant comes out of his egocentricity.

Sympathetic participation was defined as a gradually acquired process,

“. . . the assimilation of an incomplete or inhibited imitation-as the state of mind of an observing spectator who does not himself act.” (Guillaume, 1971, p. 165).

This is a situation in which the subject is, unconsciously, so absorbed in the object of his attention that he forgets about himself; the subject becomes the imitator and the object is the model's action. Sympathetic participation is considered by Guillaume as an integrated part of total imitation (Guillaume, 1971).

Guillaume seems to believe that there is no such thing as an emotional regulation within the mother-infant pair. He believes that “affective resonance” does not exist, but only, “*reactions* in which the individual obeys special instincts”

(Guillaume, 1971, p. 168). While describing the affective world and the states of mind of a child, he assumes that it is through a learning process that affective states of mind are acquired and expressed. In a mother-infant pair, the mother's pleasure and smile emerge from the sight of her child, especially when he is smiling. On the other hand, the pleasure and smile of the child are elicited when he sees his mother, especially when she smiles. In this situation, Guillaume explains that there is a common object that delights the mother and the infant, resulting in a significance of the attitude of one for the other.

It is only later, that the inner life of others becomes an object of thought. This seems to coincide with the child's identification with others, being involved in the same situations and playing the same roles. The last stage of the attribution of feeling to other people, is reached only after intellectual growth occurs and, "It consists far more in understanding the feelings of others than in sharing them." (Guillaume, 1971, p. 178).

Guillaume's theory has been criticised chiefly by Piaget (1953, 1962). Starting from a general disagreement on the need for a distinction between perceptual mechanisms and intellectual processes, Piaget went further, referring to specific aspects of Guillaume's theory of imitation, concerning "incontinuity" versus "continuity" in development, and particularly on the derivation of the incentive which makes a child imitate. For Guillaume, the acquired significance of movements is the source from which interest in imitation emerges, that is, as a reward external to the imitation itself. Piaget, on the other hand, believes that movements have significance, in terms of their dependence on sensory-motor assimilation from earlier stages, in all movements that are susceptible to repetition and thus this significance cannot be the source of incentive to imitate. Piaget believes that the child's interest in imitating is within, "immanent", in the action, and not external to it,

"It is the possibility of reproduction which interests the child i.e., the interest is not external to the action but immanent in it, and it is identical with recognitive and reproductive assimilation." (Piaget, 1962, p. 81-82).

The concept of "associative transfer" has been also partially criticised by Piaget as being , on one hand, "too narrow" (Piaget, 1962) to explain the beginning of

imitation, while, on the other hand, it provides a good account of the fact that imitation becomes automatic.

1.7. Imitation in the Zone of Proximal Development

(Vygotsky, 1978)

While exploring the interaction between learning and development, Vygotsky proposed a theory adapted to the needs of an investigation of school learning.

Having as his starting point the wish to discover the true relations of the developmental process to learning capabilities without being restricted by the determination of developmental levels for specific abilities, Vygotsky proposed two generally applicable developmental levels. He called the first level the level of actual development, meaning the level of a child's mental functions that has already been reached, through the reproduction of certain developmental cycles (Vygotsky, 1978). This refers to the child's independent capability for problem-solving. The second developmental level was called the level of potential development, meaning the level of mental development that is reached when, for example in a problem-solving procedure, leading questions or demonstration of the solution to the problem or simple initiation of the solution, are provided by the teacher or another adult. This level refers to the child's potential for performance dependent upon the teacher's or other adult's guidance. The difference between the two levels is defined by Vygotsky as the "zone of proximal development" (Vygotsky, 1978).

What seems to be of interest for Vygotsky is not only the already matured and completed processes, but also the ones that are in a state of formation. The combination of these two kinds of process constitutes the developmental dynamics of a child (Vygotsky, 1978).

When these combined processes are internalised by the child (in the sense of internal reconstruction of an external operation), they become part of the child's independent developmental achievement (Vygotsky, 1978).

Imitation was included to provide a full understanding of the concept of the zone of proximal development. Imitation and development seems to be two interrelated terms in Vygotsky's theory, one determining and being determined by

the other. On the one hand, imitation is used as a social phenomenon through which a child learns new things (“good learning”), and on the other hand, development restricts imitative capabilities to the “actual level of development”, dictating the limits of imitated actions.

Vygotsky seems to adopt the distinction made by the comparative psychologists between intelligent-insightful imitation (understanding the field structure and relations between objects), and automatic copying (repeating trial-and-error series which show no sign of conscious comprehension) (Vygotsky, 1987). In trying to prove the view that the fundamental difference between humans and animals is based on the former’s reliance on insight rather than trial-and-error learning, he wrongly referred to Kohler’s chimpanzee experiments as demonstrating human-like abilities, since Kohler found, in fact, that chimpanzees’ imitations are limited (Van der Veer and Jaan Valsiner, 1991). In making this unfortunate comparison, Vygotsky was possibly influenced by the trend, according to which, the adoption of zoological models could form the basis for understanding the development of children.

Imitation in children, although limited, seems to be far less limited than in other species. This is due to the fact, that for the human child instruction is beneficial, enabling children to perform intellectual, insightful imitation. The emergence of special human qualities of the mind leads the child to new developmental levels (Vygotsky, 1987). Vygotsky rejected the belief that,

“... children were capable of imitating anything as if imitation were nothing but a mechanical, automatic process that revealed nothing of the mind of the imitator.” (Vygotsky 1933, 1984, in Van der Veer and Jaan Valsiner, 1991, p. 344).

The role of deferred imitation was used by Vygotsky to explain the way play gradually creates, the zone of the proximal development. It was assumed that an elementary mastery of abstract thought is achieved through both the dynamics of imagination and the recognition of governing rules, generated by the projection of children’s self into adults’ activities in play (Vygotsky, 1978).

Imitation was also recognised to have a role in learning to speak. Although Vygotsky believed that in learning to speak, imitation is “indispensable” (Vygotsky,

1987), he did not seem to believe that language acquisition is a passive process of merely imitating adult speech (Kugiumutzakis, 1983).

While Vygotsky's theory has been recognised as a unique explanation of the complex phenomenon of human social and individual life, it has been criticised for being too general, and for disregarding newborns' imitative abilities, though Vygotsky believed that learning by imitation and development are interrelated from the child's "... 'very first day of life' ... " (Kugiumutzakis, 1983).

1.8. Discussion

In summary, the concepts of imitation in the above theories may be presented as follows: Baldwin conceived imitation as the medium through which understanding of both "self" and "alter" is achieved. Valentine believed that primary imitation is an, "instinctive tendency" (Valentine, 1930, p. 107). His idea of an innate basis for imitation provides an understanding for current research findings. Mead assumed that imitation cannot be taken as a primitive response and considered it to be an acquired communicative act. Lewis provided a full account of how linguistic imitation develops over the first year of life. Piaget considered imitation to be one of the principal components involved in the development of the child's cognitive capacity. He assumed imitation to be one source of representation, and that representation takes place when an absent model is imitated. Guillaume questioned the notion of imitation as an instinct, providing an alternative learning theory. He distinguished two noteworthy areas for research: namely, vocal and the gestural imitations. In addition, he raised the issue of intermodal coordination, and he was the first to discuss the affective aspects of imitation. Vygotsky highlighted the role imitation plays in learning which both determines and is determined by development.

All of these theories, based on uncontrolled observations, underestimated neonates' and infants' imitative abilities. Nevertheless, they prepared the way and influenced both Piaget's theory and the construction of current views (Kugiumutzakis, 1983).

The common points and the divergences of these older theories and perspectives have been discussed by several recent theoreticians and researchers (Kohlberg, 1969; Uzgiris, 1984; Kugiumutzakis, 1983, 1988).

The discussion that follows is restricted to four major matters, which have constituted and continue to constitute topics of disagreement and controversy, even in recent research of infant imitation, either in experimental or in naturalistic studies of mother-infant communication.

1. Intermodal Coordination: The question that prevailed from the beginning of research on imitation observation was and remains: "How do infants imitate movements that they cannot see themselves make, and how do they know that the model's body part used in such imitation, corresponds to their own?"

On the basis of indirect evidence and hypothetically speaking, it can be assumed that Mead accepted the matter of intermodal coordination. Reference made to him by Uzgiris (1984) states that,

"Mead (1934/1962) put great stress on the fact that vocalizations and eventually language have a similar effect on the speaker and the hearer in his conception of the attainment of intersubjectivity, although otherwise he gave little importance to imitation in his theory of social development." (ibid, p. 5).

In Piaget's view, the connection between sensory modalities, their dependence on one another, and the gradual coordination of the perceptual systems, form the basis for the development of imitation. The initial independence of sensory modalities at birth, and their gradual coordination is one of the main features of the process by which sensory-motor intelligence develops. Meanwhile, there are certain observations in Piaget's account which contradict his theoretical assumption of the initial independence of perceptual systems. As early as the second stage, he refers to head movement imitation,

"At 0;1 (27) [1st month, 27th day] she watched my face when I quickly moved my head from left to right. She then reproduced this movement three times in succession." (Piaget, 1962, p. 11).

Guillaume's question (1971) concerning the nature of intersensory coordination has been recognised to be a major contribution to research on human imitative phenomena (Kugiumutzakis, 1983). Guillaume rejected the idea that the infant must become aware of the similarity between himself and the model in order

to imitate this model. He proposed that infants construct the image of their own body in the course of the development of imitation. This body image is rather the result of imitation than the prerequisite for it.

2. Developmental Changes: Baldwin seemed to hypothesise developmental changes in imitative performance. Simple imitation refers to the reproduction of the model's act, irrespective of the degree of matching. Persistent imitation is featured by an improvement in the degree to which the model's action is matched. While Baldwin attributed this improvement to an, "active comparison" between the child's own performance and the impressions of the instigating act, Uzgiris (1984) claims that the source of this comparison remains to be addressed directly. She proposes that it may be that the active comparison can be attributed to ". . . growth in attention, and memory capacities and to cerebral maturation." (Uzgiris, 1984, p. 5).

Lewis seems to accept that imitative quality and quantity undergo developmental changes. This is evident from a number of points he makes:

- a) He suggested that children's imitations are simpler than those of adult's in two ways. Apart from the fact that infants imitate simpler activities than adults, imitation of the former is not only imitation of simple activities, but it is itself rudimentary or approximate. This implies that imitation itself develops, or grows and changes.
- b) The second stage in the progress of linguistic imitation is represented by a pause, attributed to the growth of meaning, in the way that the child hesitates when beginning to respond to the meaning and the affective quality of speech.
- c) After this pause, the third stage is featured by an increase in the frequency, vigour and accuracy of imitative performance.

Piaget (1962) seems to disregard the issue of the continuity or discontinuity of imitative development. The merging of "new elements" in the earlier behaviour is supposed to be the significant aspect of assimilation. He claims that no behaviour can arise "out of the blue", without any link with the immediate or distant past. There is continuity in mental life in spite of the qualitative differences between the successive structures.

Guillaume assumes that the sensory-motor schemas of a given level are not merely continued unmodified at the higher levels. The schemas that emerge from

transitions from one level to the next, integrate new elements, and therefore imitation is learnt. It is not the product of original perceptions but rather of a “perceptive activity” (Piaget, 1962).

Uzgiris (1984) claimed that in Guillaume’s analysis, the evolution in the process of imitation,

“. . . was related to the emancipation of imitation from control by extrinsic goals, habitual cues provided by the model or the self, and subordination to affective attitudes.” (ibid, p. 6).

Further, Uzgiris (1984) claims that, for both Baldwin and Guillaume the development in imitation is attributed, to changes “. . . in the child’s understanding of the self as agent and of others as individuals like the self.” (ibid, p. 4), while Piaget attributed development in imitation to development in sensory-motor intelligence.

3. Individual Differences: The majority of the earliest theorists do not discuss the matter of individual differences directly. It is assumed that observations raise this matter either in relation to the degree of imitative performance, or in relation to the speed of development.

In Baldwin’s theory (1894), an indirect recognition of individual differences is implied through two interrelated points, in relation to awareness of the self and of others. At the point of transition from the “projective” to the “subjective” phase of self, it is assumed that the infant is able to detect the individual features of people around it. The term “subjective”, which refers to the second phase of the self, implies in itself the acceptance of individual variations.

Valentine noted individual differences in his observations, as follows,

“A. did not at the age one month respond to the sounds nearly as much as B. did, and less than Y.” (Valentine, 1930, p. 108).

While Piaget did not raise the matter of individual differences directly, in some cases he recognised their existence: “J. developed more slowly than her brother and sister.” (Piaget, 1962, p. 10). In the meanwhile, Kohlberg (1969) claims that in Piaget’s theory, individual differences emerge from “hereditary factors”,

“In fact, there is nothing in Piaget’s theory which suggests that individual differences in speed of development through his stages are not primarily due to hereditary factors.” (ibid, p. 351).

Guillaume (1971) recognised the existence of individual variations, in a way that they make difficult the establishment of any uniform pattern of distinctions between imitative phases.

4. Motivation: According to Kohlberg's (1969) analysis, Baldwin considered the matter of motivation in the following way,

"Following Baldwin, then, we may propose that the motivational basis of social reinforcement is to be found in the child's imitative tendencies, his tendencies to engage in shared activities." (ibid, p. 419).

Valentine (1930) did not raise the matter of motivation directly. Despite this, there are many examples in his observations of emotions prevailing, in the course of imitative performance,

"Only on D.49 did A. show very definite response to my 'aroo'. It started his cooing in response (with smiles), one coo at each of mine six or seven times . . . Erre repeated 'with evident effort.' " (Valentine, 1930, p. 109).

Lewis suggested the presence of three factors, in the course of the first stage, which may explain the child's responses, in the sense of being incentives for them. These are: a) the innate tendency for the child to respond to speech by speech; b) the child's response to expression by expression; and c) the intervention of the adult into the child's babbling activity. It is evident that while the first two factors are internal and under the child's volition, the third factor is external to the child's control. Later, during the third stage, Lewis assumes that in addition to these three factors, the adult's appreciation of the child's response and its tendency to conform to adult patterns, seem to constitute the strongest incentives. It is evident that the incentive for imitation undergoes some kind of developmental differentiation, and that it consists of both internal and external elements in relation to the infant's awareness.

Piaget used the term "incentive" for imitation instead of motivation. He considered the incentive for imitation to be, "immanent" in the action, within the action. The incentive to imitate is, ". . . the possibility of reproduction which interests the child . . ." (Piaget, 1962, p. 81-82). The motivating factors that regulate infant imitation are assumed to be: a) an intrinsic need for acting and knowing; b) a desire to reproduce actions that differ partially from familiar schemata; and c) the esteem in which the model is held (Kugiumutzakis, 1983).

In particular, Piaget assumes that during stage III, “interest in a new result” is discovered by chance, when it brings in mind others which were familiar, and is followed by attempts to reproduce this result. In the course of the early stages, when only familiar models are imitated, interest in a desired result emerges from the support that this result provides for the activity, and in consequence for its reproduction. Later, in stage IV, when new auditory and visual models are imitated, interest seems to come with more complex processes. In the course of this stage, while the result is, “extrinsic” to the child’s action, there is some analogy leading to a desire for reproduction. The schemas that are at the disposal of the child will determine the differentiation or not, of accommodation from assimilation, and consequently the occurrence of imitation. Piaget seems to explain the aim of imitations of this stage in relation to its incentive, using as a frame of reference the source of emergence of the “affective aspect of assimilation”, its “interest”. When facing a new model, the partial similarity, which exists between the new models and those that the child has already made, on one hand, and the partial difference, which stimulates his attention, on the other hand, result in the interest that appears in this stage. Whereas the first factor, the partial similarity, leads to an immediate effort at reproduction, the second factor, partial difference, is perceived to be an obstacle to reproduction. For Piaget “interest” of stage IV is “. . . a continuation of the earliest interests . . .” (Piaget, 1962, p. 50). It is evident that the changes attributed to the source of interest, are rather related to the nature of the imitated action in the sense of its degree of familiarity, than to internal psychological reconstructions and reorganizations.

Piaget’s view contrasts with Guillaume’s explanation. Since, for Guillaume, imitation is not instinctive behaviour, the “incentive” which makes the child imitate must be found in interests external to imitation itself. Acquired significance of movements is assumed to be the source from which interest in imitation emerges. Uzgiris (1984), in reference to Guillaume, says,

“He considered the motive for imitation to be the desire to achieve an interesting event suggested by the act of the model.” (ibid, p. 5).

A contradiction may be noted here, since in Uzgiris' assumption, "incentive" for imitation, according to Guillaume, is rather a "desire", which is an intrinsic feeling, than something external to imitation.

Piaget (1962) claimed that Guillaume accepted that "significance" or "interest" must be integrated features of perception in order this to give rise to an effort at repetition and thus, to motor efficacy.

Certain hypotheses were made evident in the reports of these pioneer observations, but the corresponding theories failed to accommodate them. While attempts to confirm certain ideas, hypotheses or suggestions, implied in the original theories and strategies of observations, were often unsuccessful, this does not detract from the great contribution of observations themselves, which set the foundations upon all later research has been conducted.

CHAPTER TWO

RECENT THEORIES AND EXPERIMENTAL STUDIES OF INFANT IMITATION

Introduction

In 1973, Maratos' pioneering study set the boundaries for an interpretation of the complex phenomenon of neonatal and infant imitation, beyond the framework set by the work of Piaget.

The new interpretational context, as well as the gradual emergence of proof of infants' inborn communicative abilities, led to a plethora of experimental studies on neonatal and infant imitation. With no intention to discount the advantages of the experimental methodology, we observe that the findings of these studies raised many more questions concerning the nature of imitative phenomena.

In the following account, experimental studies that confirmed imitation (Maratos, 1973; Meltzoff and Moore, 1977; Dunkeld, 1978; Field, Woodson, Greenberg and Cohen, 1982; Heimann and Schaller, 1985; Kugiumutzakis, 1985), and studies that failed to record imitation (Kagan and Jacobson, 1978; Abravanel and Sigafos, 1984), will be discussed. The positive studies clearly outnumber the negative. However, interpretations vary in consequence of different theoretical approaches, methodologies and the variations in findings.

2.1. The Origin and Development of Imitation in the First Six Months of Life (Maratos, 1973)

Following the instinct theory of imitation, the animal studies, psychoanalytic theory, Gestalt psychology and learning theories, Maratos' work (1973) set new limits for consideration of the nature of imitation. The restriction that the Piagetian interpretational framework set upon research made it impossible for Maratos to incorporate her findings on infants' abilities, and led her to underestimate, herself, the importance of her study until recently (Kugiumutzakis, 1983).

The fact that, in Maratos' study, only three models (mouth opening, tongue protrusion, head movements) elicited early and exact imitation led to the conclusion that imitation is preferential as early as in the first month of life (Table 2.1a):

| | Sample Size | Infants' Age | Modelled Behaviours |
|--------------------------------------|-------------|--------------------|--|
| Maratos (1973) | 12 | 0-6 months | <u>Visual models</u> (tongue protrusion, mouth opening, finger and hand movements on a surface, object movements) <u>Kinaesthetic models</u> (movements involving infants' legs and arms) <u>Auditory models</u> (vowels or vowel-groups, consonant or consonant groups and vowel-consonant or vowel-consonant groups) |
| Meltzoff and Moore (1977a) | 6 | 12-21 days old | mouth opening, tongue protrusion, sequential finger movement, lip protrusion |
| Meltzoff and Moore (1977b) | 12 | 16-21 days old | mouth opening, tongue protrusion |
| Meltzoff and Moore (1983) | 40 | 0.71-71 hours old | mouth opening, tongue protrusion |
| Meltzoff and Moore (1989) | 40 | less than 72 hours | head movement, tongue protrusion |
| Meltzoff and Moore (1992) | | | |
| Experiment 1 | 32 | 6, 12 weeks old | mouth opening, tongue protrusion (dynamic and static) |
| Experiment 2 | 16 | 9.3-12.3 weeks old | mouth opening, tongue protrusion |
| Jacobson (1979) | 24 | 2-6 weeks | tongue protrusion, hand opening-closing |
| Abravanel and Sigafos (1984) Study 1 | 90 | 4-21 weeks | mouth opening, tongue protrusion, eye blinking, hand opening, chest tapping |
| Study 2 | 65 | 4-21 weeks | tongue protrusion, hand opening, chin tapping |

Table 2.1a: Experimental Studies of Early Infant Imitation

Since these models were perceived through a different modality than that the infant used to monitor their reproduction, it was concluded that intersensory

coordination must already be operating at this early age. The fact that not all the models offered were imitated, could not be explained either in terms of limitations in intersensory coordination and discriminative ability, or by absence of motivation and reinforcement. Processes of dissociation or differentiation of reflexes, available at birth and present in the infants' intra uterine experience, provided the theoretical framework for explanation of the ups and down in imitative capacity that were observed. Despite the evident determination of changes in imitative capacity by the re-organization of reflexes, Maratos assumes that imitations are not reflexive, but intentional, and that they are used by the infant, ". . . as a means of interaction with human beings in her environment." (Maratos, 1973, p. 149). Notwithstanding these assumptions, both the origin and the destiny of imitation is related to circular reactions. Maratos concludes that,

" . . . the origin of imitation is to be found in the psychological mechanism of repetition both of circular reactions and of motor behaviour patterns (Maratos, 1973, p. 147) . . . the imitative act, once it achieves a more or less perfect match with the perceived model, turns into a circular reaction." (ibid, p. 150).

Maratos' work is recognised as the starting point for systematic research on early infant imitation (Kugiumutzakis, 1983). She recognised that one psychological element that exposed disagreements between investigators was the motivation. She did not incorporate this in the interpretation of her findings, concerning the processes controlling development of early infant imitative behaviours. With Piaget, she accepted that, "interest within the action" was a factor involved in imitative reproduction.

Maratos (1982, 1988) did not consider that a hypothesis of an innate differentiation of self from non-self was necessary for the explanation of early imitative responses. Although her findings would seem to indicate such a differentiation, she could not admit it, since she assumed that the infant's early abilities and the communicative importance of imitation were too limited (Kugiumutzakis, 1983). Twenty four years later, Maratos, herself, admitted the difficulty that the theoretical position of her mentor, Piaget, placed on interpretation,

"I found it impossible to explain the findings within the Piagetian theoretical framework..." (Maratos, 1996, manuscript).

At that time, Maratos recognised the "special emotional climate which involves a very interested and empathic adult" within which, imitation of selected models takes

place, and she also, now, considers infant imitation as “a case of intersubjective communication” (Maratos, 1996).

Maratos work has been criticised on minor methodological grounds (Meltzoff and Moore, 1977; Dunkeld, 1978; Jacobson, 1979). In Dunkeld’s view, only accurate imitations should be scored. However, observation of developmental change is impossible if inflexible and strict criteria are used (Kugiumutzakis, 1983). He agrees with Nadel’s view (1980) in observing that imitation is in the majority of cases partial and rarely accurate.

2.2. Active Intermodal Matching (Meltzoff and Moore, 1977)

Meltzoff and Moore (1995a, 1995b) have constructed a developmental theory of imitation as an interpersonal bridge, recognising the role it plays in infant’s development of a notion of self. The common supramodal framework within which representation of perception and production of human acts takes place, is assumed to be the foundation on which imitation is built (Meltzoff and Moore, 1977, 1983a, 1989, 1994). Intentional imitation is proved for neonates and age-related differentiations result from developments in the infants’ capacity for interpretation of experiences (Meltzoff and Moore, 1995a).

The work of these authors on early imitation showed that infants are able of mapping in both directions; from other to the self (infant imitating) (Meltzoff and Moore, 1977, 1983a, 1989), and from self to other (being imitated) (1990, cited by Meltzoff and Moore, 1995a) (Table 2.1a). Thus imitation proves to be a bidirectional bridge between self and other, one that goes beyond body perception, entailing “hidden” psychological dimensions (memory, intentions etc.) (Meltzoff and Moore, 1995a) .

Proof of the intentional character of imitation, as against consideration of it as a global reaction controlled by reflexes (Meltzoff and Moore, 1977, 1994), was assumed to be in line with the demonstration that the underlying process in early imitation was an “active intermodal matching” (AIM) (Meltzoff and Moore, 1977, 1989, 1994). The hypothesis is that,

“ . . . perception and production of human acts can be represented within a common supramodal framework, that infants are not limited to modality-specific information about body movements in space. The supramodal framework is the foundation on which imitation is built.” (Meltzoff and Moore, 1995a, p. 78).

Intentionality in imitation, proved by efforts to correct imitative responses, by creative errors in responses, and by the frustration of the physically handicapped infant trying to reach the matching goal, lies in the differentiation between the representation of the target external act and the representation of the infant's own body acts, "The intention is apparently to bring these two into congruence." (Meltzoff and Moore, 1995a, p. 79). It is assumed that it is this mismatch between perception and representation that motivates the infant to imitate (Meltzoff and Moore, 1992). It has been proved, that infant imitation is not restricted to duplication of the surface behaviour, but at least older infants can "see through" this behaviour, to the underlying goal, attributing intentions to others (Meltzoff and Moore, 1995b). Infants perceive others as an intending agent and simultaneously they realise themselves to be intenders. This has been shown for older infants. It is assumed that at earlier ages, infants may have intentions, but only later do they acquire awareness of them, after making a step forward in level of self-understanding (Meltzoff and Moore, 1995a).

The first differentiation of the awareness of being imitated involves a change in how infants perceive gestures that are out of their control. While younger infants are particularly attentive to being imitated, they differentiate themselves when shown gestures that are not in their control. Older infants know that adults' actions are not in their control, but they still view imitation as, ". . . the other is still willing to do just what I do.". Younger infants increase the frequency of an imitated gesture, with no sign of testing. Older infants gradually acquire the habit of testing, at first, by making simple modifications, then initiating highly unusual behaviours, accompanied by a clear expression of pleasure when they observe that the adult is matching their behaviour (Meltzoff and Moore, 1995a).

The last phase of differentiation, as explained by Meltzoff and Moore, affects the interpretative capacity: younger infants interpret being copied as a causal relation in which the adults' act is caused by their act, imitation being confined to matching of specific acts; the interpretations of older infants are more advanced, imitation being viewed as a matching game lasting for longer periods, and with far greater joy than they show when simply matching themselves in a mirror-imitation, the focus being on enjoyment of the matching relationships itself (Meltzoff and Moore,

1995a). According to Meltzoff and Moore, early in life imitation and its motive are characterised more by a cognitive quality, and it is only later that an emotional value is gradually acquired. This view is in contrast to the observation that young infants show the affective reaction of “interest” on being imitated.

Meltzoff and Moore’s first research (1977) has been subjected to systematic attack: for inadequacy of the experimental proof of deferred imitation (Dunkeld, 1978), for inappropriate analysis (Anisfeld, 1979), for failure to control for release of the same responses by inanimate stimuli (Jacobson, 1979), and for methodological reasons (Masters, 1979). Failure to replicate has been claimed (Hayes and Watson, 1979; Koepke, Hamm, Legerstee and Russell, 1983; McKenzie and Over, 1983), but this has been explained as a consequence of experimenter bias, problems of methodology and inadequate interpretation (Kugiumutzakis, 1983). In answering to the last two attempts to disprove their results, Meltzoff and Moore (1983b) asserted that McKenzie and Over (1983) had made errors in the stimulus presentation and scoring procedures, and that Koepke et al. (1983) had made methodological and procedural mistakes. It should be noted that, in most of their reports of work concerning neonatal imitation, Meltzoff and Moore seem to disregard the doctoral thesis of Maratos (1973) from which the impetus for their research came.

Despite the criticism of their research, it is recognised that Meltzoff and Moore’s studies have contributed greatly to infant imitation research by the emphasis they placed on the matter of intersensory coordination, and the implications they drew concerning infants’ inborn communicative abilities and reactions to emotional affordances.

2.3. Neonatal Imitation explained in Ethological Terms

(Jacobson and Kagan, 1978; Abravanel and Sigafos, 1984)

A quite different approach is taken by Jacobson and Kagan (1978, 1979), who provide an alternative interpretation. They suggest that selective imitation develops gradually in infancy, and that at an early age (6-14 weeks) it is rather to be considered mere matching behaviour, a “released” response elicited by a delimited class of events, and not selective or purposeful imitation of the model’s action

(Jacobson, 1979; Jacobson and Kagan, 1978, 1979). The shape of the stimulus object was said to be critical in eliciting the response (Jacobson and Kagan, 1978), but this was not proved (Table 2.1a).

Jacobson and Kagan's research has been criticised by Meltzoff and Moore (1979), for:

- a) Failing to accept "differences" in the rate of responses between the modelled action and the control stimuli.
- b) Misuse of the concept of "sign stimulus" since no special features were attributed to the effective stimulus.
- c) Methodological problems.

They concluded that,

"... Jacobson and Kagan's own data undermine their argument and offer modest support for early imitation." (Meltzoff and Moore, 1979, p. 218).

Kugiumutzakis (1983) suggests that Jacobson and Kagan's study is,

"... vulnerable to many kinds of criticisms fluctuating from the obscurity of their theoretical concepts-fixed action patterns, sign stimuli, IRM- to the methodology and to the analysis of their data." (Kugiumutzakis, 1983, p. 150).

Furthermore, the explanation of the genesis and development of imitation from their data seems impossible, in consequence of limited variety of imitative responses that were studied (Kugiumutzakis, 1983, 1992).

A similar analysis to that of Jacobson and Kagan, emerging though from a different experimental approach, is adopted by Abravanel and Sigafos (1984). The restricted evidence of accurate reproductions of the modelled act, in addition to the fact that neither linear nor curvilinear growth trends were apparent at an early age (4-21 weeks), led these authors to interpret early imitative-like matching in terms of an innate or early maturing reflexive or "fixed action pattern" type of response. Of great interest is the fact that while the authors assumed such a reflex-oriented origin for imitation, they recognised that both "... individual differences in imitative competence and motivation could be substantial." (Abravanel and Sigafos, 1984, p.391) (Table 2.1a).

It seems that after the sixth month, Abravanel, Levan-Goldschmidt and Stevenson (1976) opt for a quite different framework within which to interpret imitative performance,

“At every age, imitative performance would seem to be the result of a complex interaction between ability to process and reproduce the observed action and sufficient motivation to attend and mimic that action.” (Abravanel et al., 1976, p. 1042).

Here, the element of motivation as “interest”, seems not only to be recognised in imitative performance, but to form an integrated part of the motivation for an act to be copied.

2.4. The Function of Imitation and Imitation in Smiling in Infancy (Dunkeld, 1978)

Dunkeld’s thesis (1978) was an effort to verify Piaget’s position, according to which representational ability parallels the development of imitation or vice versa. Since the findings did not provide support for this position, Dunkeld was led to propose that, if it is true that what is imitated first are movements of unseen parts of the body, and not movements of seen parts, then the distinction made between these movements in terms of difficulty of representation may not be valid, and thus the development of imitation cannot be interpreted as a function of increasing representational ability. A finding of great interest came from an experiment on smiling, in Dunkeld’s effort to justify the differentiation of infants’ imitated facial movements.

Dunkeld (Table 2.1b) suggested that early imitation “. . . may be an epiphenomenon of social intercourse.” in mutually rewarding interaction, performed for its own sake, the development of which, is more a special form of learning, through social reinforcement, than an action on the basis of innate knowledge of isomorphism. Particular facial movements (mouth opening and tongue protrusion) seem to have a privileged position. The nature of reinforcement involved can be viewed in two alternative hypotheses:

- a) Reinforcement is in the match itself which the infants make. Knowledge, on the infants’ part, that the match is correct seems to be related to an innate ability for similarity detection.
- b) Some external consequence to making the match may provide reinforcement. Individual differences in infants’ imitative performance are viewed in Dunkeld’s terms as a reflection of the “vagaries of individual experience”, while the dips in imitative development are supposed to be due to the shaping of behaviour by the

mother, reflecting fostering or monitoring on her part of infants' expressive behaviours.

Dunkeld proposes two stages in imitative development: the early non-intentional imitation and the later "true imitation". While the process according to which the transition from one stage to the other is not clear, Kugiumutzakis (1983), in criticising Dunkeld's work, proposed that if isomorphism is given, the emergence of new behaviours is a matter of increasing motor skill. However, what really seems to change is rather the importance of an act for infants, and not the motor capacity required for the act.

| | Sample Size | Infants' Age | Modelled Behaviours |
|--|-------------|--|--|
| Dunkeld (1978) Experiment I | 8 | 4-13 weeks | moving toy, shaking the head, tongue protrusion |
| Experiment II | 6 | 3-11 weeks | tongue protrusion, head nodding |
| Experiment III | 8 | 3-13 weeks | mouth opening, finger movement |
| Experiment IV | 6 | 3-15 weeks | eye movements, hand movement |
| Experiment V | 8 | 23-39 weeks | object touching |
| Experiment VI | 8 | 19-33 months | action on the basis of pictorial and literal representation |
| Experiment VII | 3 | 2-2.8 years old | same as above (with a slight modification of the category of pictorial representation) |
| Experiment VIII | 24 | 49-91 days | smile |
| Experiment IX | 6 | 6, 13 and 28 months | smile |
| Field, Goldstein, Vega- Lahr and Porter (1986) | 40 | 2-6 months | facial expressions of happy, sad and surprise |
| Field, Woodson, Greenberg and Cohen (1982b) | 74 | 36 hours | facial expressions of happy, sad and surprise |
| Field, Woodson, Cohen, Greenberg, Garcia and Collins (1983) | 96 | 48 term infants: 35 hours, 48 pre- term infants: 42 hours | facial expressions of happy, sad and surprise |

Table 2.1b: Experimental Studies of Early Infant Imitation



In her effort to determine whether the two imitated facial movements (mouth opening and tongue protrusion) were differentiated by infants, Dunkeld performed two experiments on the qualitative and quantitative differences and the function of smiling in normal and blind infants. This was suggested to be the most dramatic proof of infants' ability to discriminate faces, social versus non-social stimuli, as well as the role of learning in the social smile response. Evidence was reported not only on qualitative and quantitative differences of infants' smiles to different faces, to social and non-social stimuli but also on the smiling responses of normal and blind infants. The smiles of blind infants differed in form from those of sighted infants. The last finding led Dunkeld to suggest that there are certain features in smiling response that are learned, ". . . possibly through imitation." (Dunkeld, 1978, p. 128).

Of great interest is the finding that boys smiled more often and more intensely at social stimuli than girls. It is possible that Dunkeld (1978) supports Piaget's view on considering smiling imitation as a form of pseudo-imitation, with no intention to converge, or realisation of convergence, between the behaviour of infant and adult. While the interpretation of the former point is not clear, it can be inferred that since it was proved that girls imitate variations of smile forms, thus imitating quality, boys imitate more quantity than quality, possibly compensating for the insensitivity to quality.

Dunkeld's interpretation has been criticised for underestimating the role of representation in imitative performance (Mounoud and Vinter, 1981), as well as for the contradictory argument on the role of the mother in shaping the course of imitative development (Kugiumutzakis, 1983).

2.5. Imitation of Facial Expressions of Emotion

(Field et al., 1982)

Field has gradually incorporated her work on term and preterm (Field, Woodson, Cohen, Greenberg, Garcia and Collins, 1983), neonatal (Field et al., 1982), and infant (Field, Goldstein, Vega-Lahr and Porter, 1986), imitation within a view that ". . . infants do come into world prepared for the very adaptive functions of perceiving and responding to people." (Field, 1985, p. 32). This seems to apply in even less mature neonates (Field et al., 1983), who seem to be ". . . handicapped by

less developed attentional processes.” (Field, 1985, p. 50), not by less imitative ability. While the above mentioned interpretation of the imitative phenomenon as well as the findings, tend to stress the communicative side, Field et al. (1982, 1983), adopts the earlier cognitive explanation of Meltzoff and Moore (1977).

Field et al. (1982) and Field et al. (1986) (Table 2.1b) focused on imitations of facial expressions (happy face, surprise face and sad face) at 36 hours of life and longitudinally from the 2nd to the 6th month, respectively, proving that the discrimination and imitation of salient features of these expressions (brows, eyes and mouth) in middle trials, concludes the view that these are not arousal responses or fixed action patterns, as has been suggested. In addition, in the second experiment, the total fixation time, translated into attentiveness or interest, was scored. The results showed that since all the parameters representing imitation (mouth movements correspondence, looking time, expressivity ratings) decreased along the age range, the authors concluded that imitative behaviour declines across early infancy. Furthermore, the decrease in the looking time suggested a possible relation between imitative behaviour and attentiveness, their observations finding “greater attentiveness to one region of the face facilitating imitation of the behaviour modelled in that region” (Field, et al. 1983, p. 489). The reasons for the fall in tendency to imitate are uncertain,

“... it is also not clear from this study whether the decline in imitative behaviour was related to lesser interest in the static face . . . , the development of facial expression blends, or to a simple developmental shift from reflexive-like behaviour to more natural interactive responses to the model’s behaviour . . . ” (Field et al., 1986, p. 421).

This developmental decline is in accordance with the findings of Maratos (1973), Abravanel and Sigafos (1984), and Meltzoff and Moore (1992), who interpreted it in many and various ways.

It has been suggested that individual differences in expressivity (Field, 1982a, 1985), which may entail differences in broader dimensions such as: discrimination, production of facial expressions, temperament, autonomic reactivity and social responsivity, influencing imitation, even in twins (Field, 1985), suggest that they “...occur as early as birth, possibly due to genetic differences.” (ibid, p. 50), or even “Differential prenatal experiences . . . ” (Field, 1985, p. 50). The reported individual differences in imitation are in contrast to the findings of Maratos (1973), while they are in accordance to those of Kugiumutzakis (1985).

Field et al. (1986) seem to overlook the role of familiarity in imitation, suggesting that infants' imitations are similar with the experimenter and the mother as models, a consideration that agrees with Maratos' (1973). In another study, Field (1978), seems to contradict this conclusion. In studying the interaction behaviours of primary versus secondary caretaker fathers, she interpreted the similarity between mothers and fathers as primary caretakers to the similar amount of experience or familiarity that they have with their infants (Field, 1978).

2.6. Individual Differences in Neonatal Imitation

(Heimann and Schaller, 1985)

Heimann's work (Heimann, 1989, 1991; Heimann, Nelson and Schaller, 1989; Heimann and Schaller, 1985; Heimann and Ullstadius, 1996; Nelson, Heimann and Abuelhaija, 1989) is of great interest due to attention he paid to three crucial matters in infant imitation research (Table 2.1c):

| | Sample Size | Infants' Age | Modelled Behaviours |
|-------------------------------------|-------------|--|--|
| Heimann (1989) | 32 | 2-3 days, 3 weeks, 3 months | mouth opening, tongue protrusion |
| Heimann (1992) | 11 | 14-21 days old | mouth opening, tongue protrusion |
| Heimann, Nelson and Schaller (1989) | 32 | 2-3 days, 3 weeks, 3 months | mouth opening, tongue protrusion |
| Heimann and Schaller (1985) | 11 | 14-21 days old | mouth opening, tongue protrusion |
| Heimann and Schaller (1992) | 11 | 14-21 days old | mouth opening, tongue protrusion |
| Kugiumutzakis (1985) Study A | 170 | less than 45 minutes old | mouth opening and tongue protrusion, eye movements, m-sound, a-sound and ang-sound |
| Study B | 14 | less than 40 minutes and from the 15th-180th day | mouth opening, tongue protrusion, eye movements, m-sound, a-sound and ang-sound |

Table 2.1c: Experimental Studies of Early Infant Imitation

a) The Frame for Interpreting Imitation: The belief that the best interpretative frame for imitation is the prototypical dialogue between the mother and the child. He adopts Trevarthen's and Bråten's view that,

“ . . . neonatal imitation is an innate social competence that is expressed by the child, in a state of felt immediacy . . . ” (Heimann and Ullstadius, 1996, manuscript).

Regardless of who imitates whom, imitation is regarded by Heimann (1991) as a facilitating factor, enhancing each participant's sensitivity to social cues within the interaction.

b) Individual Differences: The emphasis put on individual differences as a determining factor in imitative performance. Individual differences are discussed in relation to two important inter-related matters raised in research of infant imitation: the infant's imitative capacity, and motivation. Heimann and Schaller (1985) believe that if subgroups of differently responding individuals exist, when group data are combined, the imitative abilities of some infants will be underestimated, and this has had significant consequences for the direction of past research. In trying to explain individual differences, Heimann (1989) suggests that they are due either to different abilities for processing information, or they may “ . . . rest in differential motivation or tendencies to produce actions . . . ” (Nelson et al., 1989, p. 306). Differences in developmental history as well as innate differences in motivation for participating in social interactions and imitation games, seem the most likely explanations for individual differences observed in imitative behaviour (Heimann and Ullstadius, 1996).

c) Discontinuity in Development, and its Significance for Prediction: The short-time stability that has been observed over the first three weeks of life, and its disappearance over the first three months of life, is, “ . . . a possible indicator of a discontinuity in imitative development.” (Heimann et al., 1989, p. 99). It was also demonstrated that individual differences may show stability over short time periods. Changes in neural organization in subcortical and cortical structures are the likely causes for discontinuity (Heimann, 1991). In addition, data suggest, that early infant imitation at three months, and not neonatal imitation, as it would have been expected, correlated with imitation at 12 months (Heimann and Ullstadius, 1996).

Heimann's evidence on the functional frame of imitation, and on the impact of individual differences is convincing, but this explanation of discontinuity is exclusively in "biological" or brain development terms. In an interactional approach, changes in the influence of infant's interest in the other's acts, at different ages would be expected. Such an explanation seems to be underestimated by Heimann even though he emphasises the functional significance of interaction.

2.7. The Intersubjective Nature of Imitation (Kugiumutzakis, 1985)

Kugiumutzakis studies (1983, 1985, 1988, 1993, 1998a, 1998b) have been inspired and influenced by Trevarthen's theoretical framework (Trevarthen, 1980, 1993b, 1993c). Kugiumutzakis (1985) emphasises the communicative function of the innate propensity for imitation, and he proved, by qualitative and quantitative evidence, the importance of attention to individual differences in motivation for imitation, and for non-imitation. In addition, Kugiumutzakis posits two inter-coordinated levels of activity in neonatal imitation,

"... one *unconscious*, intuitive and probably conceptless level, in which the baby perceives, recognizes and communicates with the core of the other's mind, and another *conscious* and effortful level, in which the neonate strives to perceive clearly and tries to imitate the models in a satisfactory way." (Kugiumutzakis, 1998b, in press).

His contribution to research on imitation can be summarised as follows (Table 2.1c):

a) The Functional Frame of Imitation: It has been proposed that imitation serves two functions, corresponding to the two complementary aspects of all communicative acts: the cognitive and the emotional. As far as the cognitive aspect is concerned, Kugiumutzakis (1985) suggests that it is reasonable to view imitation as a problem solving ability, and he provides several kinds of qualitative evidence, including,

"... good discriminative ability, the triple cognitive recognition (of the experimenters' intention, of the isomorphism of the organ and of the organ in movement), selection of the correct motor schema, comparison of the two (or more) kinds of information, the knowledge of the results, the self-corrective movements if necessary and the stopping mechanism" (Kugiumutzakis, 1985, p. 19).

Regarding the emotional-communicative aspect of imitation, in both experimental adult-infant and naturalistic infant-mother interaction, emphasis is placed on the structure of imitative performance, the developmental course of imitation, and the

fact that there are non-imitators. Evidence that imitation is an “effortful, polymorphic communicative action” (Kugiumutzakis, 1985) has theoretical interpretative implications for the imitative phenomena “translated” or picked up by infants’ innate abilities. In infant-mother interaction, the impetus for vocal imitation,

“. . . is an interpersonal sense of communicative sharing . . . the sound made by one subject is transformed intuitively by the partner . . . into a medium for intersubjective, selective vocal games, in which the reproduction of the sound is the result of mutual regulation of their central states of motivation.” (Kugiumutzakis, 1993, p. 39).

While Kugiumutzakis’ views on imitative functions resemble those of Uzgiris (1981), he seems to go further by presenting plausible data that supports these views and have other important theoretical and empirical consequences as follows:

b) On Individual Differences: There are three important points related to individual differences: a) differences exist in infants “in advance” of the communicative tests that determine their imitative performance; b) some infants are non-imitators; and c) other communicative acts occur when there is no imitation.

Heimann’s emphasis on individual differences should not be underestimated. He viewed them as a potential categorization factor, useful to distinguish infants after imitative performance has been observed, and as a possible interpretative factor regarding motivational differences. Kugiumutzakis (1983, 1985) recognised the existence of individual differences before testing imitation, thus he could use it not only in post hoc interpretation, but also to adapt the experimental procedure to differences in demand, “respecting” infants’ idiosyncratic motivations and sensitivities to the situation,

“Thus the task in imitation experiments with young babies must be flexible and adapted to the babies’ systems, interests, needs and individual differences at the moment of the test.” (Kugiumutzakis, 1985, p. 3-4).

According to Kugiumutzakis, non-imitators, “. . . do not constitute a special stable category of babies who show non-imitative behaviour continuously.” (Kugiumutzakis, 1985, p. 12). In the same session, an infant may imitate one act, but not another. The reasons for “failure” are complex and are considered in relation to, a) individual differences in tendency to imitate; b) habituation or the need for new stimuli; c) the emotional relationship of the model with the infant; and d) the possibility of lost motivation due to the monotony of demonstrations of the same

battery of models by the same person (Kugiumutzakis, 1985). The fact that there are non-imitators is evidence for the purposefulness or intentionality of imitation, for the role of individual differences, for the part played by motivation, for the developmental course of imitation, and for the complex relation of imitative phenomena to other factors, such as emotions.

In close relation to the fact that some infants are non-imitators is the variety of communicative acts non-imitators produce: such as smiling, coos, clear phonoemes, prespeech movements, imitation of the rhythm of the vocal models. This proves that when the infant cannot, or does not, imitate the act per se, he may, nevertheless, respond in other ways, always with an aim to maintain the interaction matching or regulating the other's expressions (Kugiumutzakis, 1985).

c) The Developmental Course of Imitation: Kugiumutzakis (1985, 1993) suggests that a linear or non-linear development of imitation depends on which response is selected, and that the imitative ability itself never disappears, but, on the contrary, it increases (Kugiumutzakis, 1985, 1993, 1998a). The "dialectic process", "the periodicity", "the unevenness", "the metamorphosis or qualitative transformation" and the "adaptive processes which overcome impediments that the infant encounters", all are characteristics of the development of imitation of each model (Kugiumutzakis, 1983). The explanation provided is that these features result from,

" . . . periodic reorganizations in the infants' motivational systems, a type of development presumably related to anatomical changes in the infants' brain . . . these reorganizations lead to motor, perceptual and cognitive changes . . ." (Kugiumutzakis, 1993, p. 42).

It is the writer's opinion that while this kind of interpretation is coherent, involving both psychobiological and emotional terms of motivational elements, it is also partial, given that Kugiumutzakis' adopts an interactional approach and thus any change in communication should not be attributed solely to infants, but to parents as well.

In reviewing Kugiumutzakis' theory, we find that it gave a focus to aspects that had not really been mentioned before. He places special emphasis on the communicative function of neonatal imitation, on the contribution of the emotional side of motivation, on the place of individual differences and particularly on non-

imitators and the communicative acts that they display instead of imitating. Despite this acceptance of the function of imitation within communication, no detailed and systematic information is given by Kugiumutzakis on affective aspects of imitation, and no integrated view is presented of the phenomenon in a naturalistic context.

2.8. Further Developments in Imitation

Imitation between toddlers or in interaction with their parents (mothers and fathers²), has been considered, mainly in experimental studies, in relation to the following topics: vocabulary building (Rodgon and Kurdek, 1977), general aspects of language development and the extraction of grammatical information from the repertoire of imitated sequences (Bloom, Hood and Lightbown, 1974; Clark, 1976), and the socialization by imitation in toddlers (Kuczynski, Waxler and Yarrow, 1987). In addition, several acoustic aspects of speech, in particular pitch and intonation, have been studied with reference to imitation (Kessen, Levin and Wendrich, 1979; Siegel, Cooper, Morgan and Sarshad, 1990). Imitation has also been studied in toddlers and adolescents with autism and Down syndrome, possibly in an effort to elucidate aspects and underlying mechanisms of the disorders, and such research has flourished in the present decade (Heimann, Ullstadius, Dahldren and Gillberg, 1992; Heimann and Ullstadius, 1996; Rogers, Bennetto, McEvoy and Pennington, 1996;). A recent study compared gestural imitation in chimpanzees and children (Custance, Whiten and Bard, 1994). Tomasello (Tomasello, Kruger and Ratner, 1993), showed that chimps are much older than humans when they imitate gestures.

2.9. Discussion

In summarising the explanations that constitute milestones in neonatal and infant imitation research, we have found a variety of interpretations. Maratos concludes that neonatal imitation, functioning with intersensory coordination soon after birth, is preferential and intentional, one of its functions being as a means of interaction with other human beings. Meltzoff and Moore invoke a supramodal

² Additional studies reporting imitative phenomena in infant-father interaction, in experimental or naturalistic setting, are presented in Chapter 4.

framework, within which representation of perception and production of human acts takes place. Dunkeld found, however, that representational development does not parallel imitative development. Heimann highlights the importance of individual differences in imitation. He proposed that variations in developmental history, motivation, or differential ability for processing information provide explanations for such differences. Kugiumutzakis stressed the intersubjective nature of imitation, and he identified non-imitators.

The following discussion will focus on certain controversies in interpretation, and methodological differences in experimental studies of neonatal and infant imitation.

2.9.1. Theories and Interpretations

1. Intersensory Coordination: Maratos (1973) assumed that, at one month, infants possess a discriminative capacity enabling them to perceive incoming information, and a capacity for intersensory coordination.

Meltzoff and Moore (1977) postulate that neonates can represent proprioceptively and visually perceived information in some form common to both modalities. That is, there is a translator (intermodal active matching) in the form of an abstract, non-iconic representative system that unifies different modalities. Imitation is based upon the neonate's ability to "utilize equivalences" between the body movements he sees and the body movements he feels himself perform. Field et al. (1982) and Heimann (1991) favour Meltzoff and Moore's hypothesis of active intermodal matching. Dunkeld (1978) seems to adopt Piaget's position on the gradual learning of isomorphism. While Meltzoff and Moore (1977) did not make clear whether the process of perceptual equivalence is mediated by cortical or subcortical systems in the first months, Heimann (1991) postulates that the essential mechanism is subcortical.

Kugiumutzakis (1985) adopts Trevarthen's nativistic view regarding the intersensory coordination. Neonates possess at birth the necessary devices which are:

1) An internal discriminating image of the visible and audible expressive movements of the model. This provides the mean for the recognition of persons, this is the “recognitive” part of the built-in machinery. The “expressive” part is less developed.

2) A mechanism for “patterning matching movements”, is also possessed by neonates (Trevarthen, 1975/1977, 1980). Later, Kugiumutzakis claimed that the mediation of a congenital representation of the desirable, called “memory-engram”, facilitates the identification of the correspondence between movement of the environment and the subjects’ own movements (Holmlund, 1986).

2. Developmental Changes: Developmental dips are supposed to be connected with regressions in development (Kugiumutzakis, 1983). The explanation of developmental regressions is considered to be difficult due to a lack of clear knowledge of brain maturation, which prevents us from discovering the causes of behaviour dips (Strauss, 1982, cited by Kugiumutzakis, 1993).

The contradictory finding of developmental ups and downs by Piaget’s student, Maratos (1973), was interpreted with reference to the functioning, through dissociation or differentiation, of reflexes available at birth and informed by the infant’s prenatal experience.

After failing to replicate Maratos’ finding (1973), Meltzoff and Moore (1992) assumed that “. . . older infants’ social communicative efforts often displace imitative responding to simple facial gestures.” (Meltzoff and Moore, 1992, p. 482). They argue that the drops cannot be explained by the reflexive account, but rather as performance changes that can be reversed using novel designs that pose cognitive challenges to the older infants (Meltzoff and Moore, 1992).

Dunkeld (1978) and Jacobson (1979), confirming Maratos (1973), provide interpretations in term of differentiation. After the second month, the “matching” ability disappears, as is the case with certain neonatal reflexes (Jacobson, 1979). Dunkeld (1978) attributes the developmental “dips” in imitative performance to the mother’s shaping, through the withholding of positive reinforcement for the infant’s unacceptable behaviours such as tongue protrusion (Dunkeld, 1978). Field et al. (1986) attribute the developmental ups and downs to a relationship between a decline in infant attentiveness and a decrease in imitation of facial models.

Heimann (1991) hypothesises changes in neural organization from subcortical to cortical structures as causes for discontinuities.

Kugiumutzakis (1985, 1993) found that imitation does not disappear in the course of the first six months of life, a finding that supports Trevarthen's explanation for the non-linear course of development. The possibility of reorganizations in infants' motivational systems, a type of development which is presumably related to anatomical changes in infants' brain, is proposed. These reorganizations lead to perceptual, motor and cognitive changes and to an increase and improvement of infants' imitative tendency (Trevarthen, 1982).

3. Individual Differences: Maratos (1973) seems to doubt the existence and influence of individual differences in imitative performance. She considers that, as an aspect in the description of imitative behaviour, ". . . individual differences, if they exist, are simply ignored . . ." (Maratos, 1973, p. 23). In contrast, the observation of Meltzoff and Moore that ". . . 'some infants converge toward more accurate imitation matches over successive efforts' . . ." (Meltzoff and Moore, 1985, p. 153, cited by Heimann, 1991), implies the recognition on their part, that individual differences in imitation exist. In Dunkeld's analysis (1978), individual differences in infants' imitative performance are interpreted as reflecting the "vagaries of individual experience".

Field (1982, 1985) suggested that individual differences in expressivity, which may occur as early as birth, may reflect differences in broader psychological dimensions, such as: discrimination, production of facial expressions, temperament, autonomic reactivity and social responsivity, all capable of influencing imitative performance.

Heimann (Heimann et al., 1989; Heimann and Ullstadius, 1996) proposes that the following factors can explain individual differences in imitation: a) differential ability for processing information; b) differential motivation to produce action; and c) different developmental history.

In addition to recognising empirically the existence of individual differences, Kugiumutzakis (1985) respected such differences in his approach to eliciting imitative responses. He found that non-imitators performed other kinds of communicative actions. Jones (1996) similarly, proposed that differences in how

much individual infants “see” interest in tongue protrusion should be considered in estimating the success or failure of replication of imitation experiments.

4. Motivation: In Maratos work (1973), “motivation or incentive” is taken to constitute the psychological element of imitation which provokes most disagreements between investigators. While Piaget used the term “incentive”, which means in English, something that encourages one to greater activity (Longman Dictionary of Contemporary English, 1992), Maratos does not distinguish incentive from motivation. For Izard (1992), “. . . the emotional experience as a feeling state is a motivation . . .” (ibid, p. 561). If Maratos agrees with Piaget’s view on the nature of an incentive, then this is considered not a “feeling state”, but to be “immanent” in the action, within the action. In the case of imitation, it is, “. . . the possibility of reproduction which interests the child . . .” (Piaget, 1962, p. 81-82).

Meltzoff and Moore (1992) consider a cognitive motive for imitation. In their view, when the adult stops gesturing, the infants “see a mismatch between their current perception of the model and their memory representation”. Then the infant responds in order to “. . . reinstate the absent event (the gesturing), to make it perceptually present again.” (Meltzoff and Moore, 1992, p. 502). It is assumed that this mismatch between perception and representation motivates the infant to imitation (Meltzoff and Moore, 1992). This recalls the mechanism implied in Piaget’s description of the second stage of imitation of non-visible acts. In imitation of head movement, for example, Piaget assumes that, “. . . in order to retain his perception of another persons’ movements (i.e. in order to continue to see another face moving), all the child has to do is to reproduce his own movements of accommodation.” (Piaget, 1962, p. 13-14).

While Abravanel and Sigafos (1984) do not consider imitation as contributing to the development of communication, they recognised that communication is a substantial factor in eliciting imitation. Abravanel et al. (1976) considered that, after the sixth month, motivation, in the form of interest, is an essential requirement for imitative performance. Jones (1996) also considers that “...infants’ behaviour in imitation experiments is motivated by visual interest and the

urge to explore, and the match between infant and adult oral gestures is the product of coincidence.” (Jones, 1996, p. 1953).

Heimann et al. (1989) seem to recognise the existence of a motivation for imitation as one factor which may determine individual differences, but he does not specify its nature. Kugiumutzakis (1998b, in press) suggests that neonatal imitation “...involves concrete kinds of shared experience between the two partners, that it is motivated by two emotions or kinds of motive . . .”, namely “interest” and “enjoyment”.

2.9.2. Methodological Variations

1. Cultures: Infants’ imitative abilities have been studied in Greece (Kugiumutzakis, 1985), Germany (Papousek and Papousek, 1989), Sweden (Heimann, 1989), U.S.A (Meltzoff and Moore, 1977), Nepal (Reissland, 1988), Japan (Ikegami, 1984, cited by Heimann, 1991). In some cases, the infants’ origin has not been mentioned at all. While the phenomenon is usually thought to be universal, Guillaume (1971) did not share this view. It is possible that cultural influences exist, mostly after the first months, with diverse consequences in the interactions of infants with unfamiliar persons.
2. Age: Imitation has been studied both in neonates and older infants, from 10 minutes after birth to one year and more. There are also studies of imitation with toddlers and older children.
3. Sample Size: The number of subjects used varies widely.
4. Experimental Design: While the majority of experimental studies have been cross-sectional, there are some longitudinal studies (Maratos, 1973; Jacobson, 1979; Kugiumutzakis, 1985, 1993). In most cases, the age points do not fall at equal intervals.
5. Observational Recording: In most studies video-recording has been used, there are cases in which one or two observers recorded the infant responses without video (Maratos, 1973).
6. Familiarity of the Adult Model: The person(s), mother or unfamiliar experimenter or both, who modelled the actions for the infant varies. In most studies, until

Heimann (1991), the experimenter has acted as the model. Two have used both the experimenter and the mother as models (Lewis and Sullivan, 1985; Field et al., 1986; cited by Heimann, 1991), and two have used only the mother (Dunkeld, 1978; Heimann and Schaller, 1985). Meltzoff and Moore (1992) found that the imitative effect did not differ when the mother or a stranger was the model, while Field (1978) attributed the similarities in interaction behaviours of primary caretakers, i.e. mothers and fathers, to the similar familiarity they have with their infants.

7. Kinds of Activities Modelled: Acts that have been observed and scored as imitative, fall into one or more of the following categories: facial expressions (mouth opening, tongue protrusion, lip protrusion, swelling the cheeks, facial expressions of emotion, closing the eyes), vocal expressions (vowel-sounds, consonant-sounds and combinations of vowel-consonant sounds), hand movements (arm movements, waving, sequential finger movements, hand opening-closing, pointing the index finger), head movements (nodding, shaking, turning), chest tapping.

As Heimann (1991) recorded, tongue protrusion and then mouth opening have been used as modelled acts in most studies, under different interpretational frames, and Jones (1996), asserts that, "The claim that very young infants can imitate rests largely on reports that infants match adult displays of mouth opening (MO) and tongue protrusion (TP)." (Jones, 1996, p. 1952). The reason that these two oral activities have been privileged to test imitative ability is not clear, and there are many and varied suggestions.

Piaget (1962) called imitation of tongue protrusion pseudo-imitation, the imitative response being maintained through conditioning and affective reward. Guillaume (1971) characterised imitation of tongue protrusion as precocious imitation, and not a spontaneous response, and it was assumed to occur as a product of selection or games taught to the infant in a variety of ways. It seems as if it is not considered to be real imitation, since Guillaume believes that "There is nothing that leads one to think that the infant assimilates the model with the imitation." (Guillaume, 1971, p. 116). Valentine (1930) characterised imitation of tongue protrusion as a "curious phenomenon". The early age at which he observed its appearance caused confusion to him in the light of his assumptions about

intersensory coordination, and led him to conclude that “. . . if (the imitation of tongue protrusion) is of a reflex type, the puzzling thing is to account for its existence by any degree of utility.” (Valentine, 1930, p. 119).

Maratos (1973) accepts that the significance of early imitation of tongue protrusion is difficult to assess due to the involvement of movements of parts of the infants' body that are not visible to the infant. She considers that the rhythm of tongue protrusion, when it is imitative, differs considerably from that in spontaneous tongue movements. She suggests that this kind of imitation may become a privileged form of communication between infants and their fathers. It has been found that tongue protrusion occurred in “excited play” or “delighted surprise” in nursery school children (Brannigan and Humphries, 1972, cited by Dunkeld, 1978).

Eibl-Eibesfeldt (1989) assumed that tongue protrusion can be categorised among the expressive movements or behaviour patterns that have undergone distinctive differentiation in the service of signalling. It is suggested that in the course of ritualization of behaviour patterns into signals, a number of changes occur, among which motivation changes are mentioned. He distinguishes the behaviour of sticking out the tongue from tongue flicking, the latter assumed to be a friendly signal of readiness for contact. For students of animal and human behaviour, “The smooth and curling movements of the tongue have been interpreted as a vestige of the infantile licking movements that formed part of the mouth-mouth feeding process in prehistorical times . . .” and it is “. . . thought to be the origin of the human courtship interaction known as the tongue kiss.” (McFarland, 1981, p. 175, cited by Kugiumutzakis, 1983). Kugiumutzakis (1983) suggests that the tongue protrusion “...is an example of ‘emblems’ used in circumstances where verbal messages are impossible, less efficient or undesirable.” (Kugiumutzakis, 1983, p. 233). In addition, he assumes that the meaning of tongue protrusion is a matter of tradition, and that it is context-and-execution-dependent.

Heimann (1991) points out that mouth opening and tongue protrusion constitute two behaviours that are displayed frequently and spontaneously by infants, but according to Jones (1996), they lack any meaning or function. Individual differences determine that only some infants find interest in a tongue protrusion, and

Jones (1996) suggests that the success or failure in replicating imitation findings “...depends on whether chance puts the majority of such babies into the experimenter’s sample.” (Jones, 1996, p. 1960).

While I would agree with Kugiumutzakis (1983), Heimann (1991) and partly with Jones (1996), in consideration of the impact that individual differences may have in imitative performance, I propose that the “interactional history” of tongue protrusion and mouth opening performance in infant-parent communication may have an additional effect and in combination with the above views. What is meant by “interactional history” is not the intervention of training but rather the degree of use of the above oral expressions in terms of a code of communication between infants and their parents when infant and parental individual differences are taken into account;

8. Definition of Imitation: Some definitions have been strict, while others are more lenient. This occasionally constitutes a matter for criticism. In some studies where the same activities were modelled, different definitions were used. The most striking example of this diversity of definitions concerns “tongue protrusion”, the activity that has been used as a model in the great majority of the studies. The tongue has to pass “. . . ‘clearly beyond lips’. . . ” (McKenzie and Over, 1983; Neuberger, Merz and Selg, 1983; cited by Heimann et al., 1989). Maratos (1973, 1982) reports “. . . ‘distinct tongue protrusion’. . . ”, and Dunkeld (1978), considers tongue protrusion an imitation when the tongue has “. . . ‘to pass the lower lip’. . . ”. Fontaine (1984) scores a tongue protrusion when the tongue has “. . . ‘clearly left the mouth’. . . ”, which matches Kugiumutzakis’ definition (1985). Jacobson (1979) considers that the tongue must be “. . . ‘visible on screen for more than 0.5 seconds’. . . ”, and Meltzoff and Moore (1983) note a tongue protrusion when the tongue has “. . . ‘crossed the back edge of the lip’. . . ” (Heimann et al., 1989). In a recent study, tongue protrusions were “. . . instances where the tongue popped out of the mouth on its way to the cheek or the space between the lower lip and gum . . . ” (Jones, 1996, p. 1956).

9. Accuracy of Imitation: Varied gradations of accuracy are accepted in some studies (Maratos, 1973; Kugiumutzakis, 1985; Heimann, 1991), in others all variation is rejected (Dunkeld, 1978). Abravanel, Sigafos and Wolff found that an imitative

tendency only existed for partial responses (cited by Heimann, 1991). This seems to be in agreement with Nadel who suggested that “. . . imitation is rarely literal and most often partial.” (Nadel, 1980, p. 169). It has been assumed that this kind of distinction shows “a clearly significant group effect” (Heimann, 1991). In addition, Kugiumutzakis (1983), has suggested that the use of strict criteria prevents the observation of the developmental course of imitation.

10. Experimental Conditions: In experimental studies, differences may be noticed in the lighting conditions, the angle between camera and stimuli in relation to infant, the distance between the infant and the camera, the infants’ posture and the angle at which it is supported, use of split-screen, etc.

11. Number, Duration of Models and Length of Response Time: Studies vary in response time and length of presentation of the model. Heimann (1991) recommends that a response period of 60 seconds allows the strongest indication of imitation.

12. Reliability Controls: The control of reliability of discrimination of an imitation has been, in some cases, interscorer (Jacobson, 1979), while in other cases both intrascorer and interscorer controls were used (Kugiumutzakis, 1985; Meltzoff and Moore, 1992).

13. Setting: The place in which the experiments took place varies, but in most studies it was the laboratory. In other cases, the hospital (Kugiumutzakis, 1985), or the home (Maratos, 1973), were selected while in others a combination of hospital, laboratory setting and home were employed (Heimann et al., 1989).

14. Stimulus Features: Some stimuli to be modelled have been presented in movement, while in others they have been static. While Meltzoff and Moore (1992) found that infants imitated both static and dynamic facial postures (mouth opening and tongue protrusion), Vinter (1986) found that imitation only occurred with presentation of a moving model for tongue protrusion and opening and closing of the hand. In addition, presentation of the complete face, and not only of the mouth, proved to be necessary for neonatal imitation of tongue protrusion (Ikegami, 1984, cited by Heimann, 1991).

15. Infant’s Sex: Maratos (1973) used exclusively girls and she insists that this is not to assume that both sexes behave in the same way. On the contrary, since there is

evidence of sex differences in social and emotional development, it was considered that the use of one sex would allow the results of a larger number of infants to be treated as equal. Girls were selected because of their higher birth rate. In most studies, the number of boys and girls has been equal, or about equal, while in others the infants' sex is not mentioned at all.

16. Kind of Imitation: While the majority of experimental studies have sought to elicit immediate imitations, there are some studies that have dealt with deferred or delayed imitation. In only one study, were spontaneous dialogues between infants and their mothers studied in the laboratory (Papousek and Papousek, 1989).

It is concluded that despite the divergent theoretical frameworks and the lack of consensus for a commonly accepted method for investigating early imitative phenomena in experimental settings, neonatal and infant imitation may now be considered to be rather a fact than an artifact.

CHAPTER THREE

RECENT THEORIES AND NATURALISTIC STUDIES OF EARLY HUMAN IMITATION IN MOTHER-INFANT COMMUNICATION

Introduction

In the 1970's, the direction of infant imitation research changed, while some experimental research continued. The reason of this shift has not been declared clearly anywhere, but it may be attributed to the need for construction of a theory that would provide explanations of the development of understanding in all species that learn by example, that practice interaction and that develop cooperative use of knowledge (Trevarthen, 1980).

While it has been known for a long time that imitation is to be attributed not only to children, but to parents as well, and that imitation is not exclusively a cognitive phenomenon (Bain, 1855; Tarde, 1903; Mead, 1934, cited by Kugiumutzakis, 1983), it was only in the '70s that the nature of imitative behaviours began to be examined systematically.

The new research strategy set out to go beyond the study of imitative abilities, by techniques that tended to severely channel the activity of infant subjects in encounters with unsmiling and unfamiliar persons, conditions that inhibited any impulse for interpersonal engagement. Typically, mother and infant were left to play as they usually did, either in their home or in the laboratory. Thus, the setting resembled much more the normal situation, where infant and mother engage in mutual interaction, and behaviours were left to unfold uncontrolled and uninhibited, while overt or hidden videorecording took place.

The starting point for this kind of approach is an acceptance of the fact that infants are social beings, and that "conversation-like" exchanges take place spontaneously in infants' interactions with mothers. Differences in theoretical approaches start at the point that concerns the source of infants' abilities, both perceptual and emotional, as they find expression in communication.

A presentation of theories that can be categorised within this naturalistic framework will follow, reviewing the work of Wallon (1934, cited by Nadel, 1980, 1986), Newson (1978), Uzgiris (1981, 1984), Stern (1985), Papousek and Papousek (1989) and Trevarthen (1980, 1993b, 1993b, 1993c). In each case, the most representative corresponding study follows, either carried out by the theoreticians themselves or by other researchers who have been inspired by their work and who attempt to apply and extend their ideas.

3.1. The Affective Relationship-Making Aspect of Imitation (Wallon, 1934)

Wallon's developmental theory describes the gradual three-stage differentiation of the self within relationships of "the human milieu", and he specially emphasises the emotional context of all developmental periods. By "differentiation", Wallon meant a process of learning to attribute to others feelings and mental states through adoption of complementary roles. In this way, the child gains both self-awareness and awareness of the others, thereby overcoming self-other confusion.

In Wallon's theory, imitation is attributed to an affective relationship-making function. Messages of admiration, solidarity, intimidation and so on, constitute interpersonal messages qualifying imitating and being imitated. In addition, such representations, apart from being symbolic and cognitive, form an integral part of the processes of social affiliation and cooperation (Trevarthen, 1993a).

Further, two other features in Wallon's theoretical framework seem to be well-chosen: the emphasis he places on transitory adaptations, and on the genesis of social competence (Nadel, 1980, 1986; Nadel and Baudonniere, 1982). Transitory adaptations have two interrelated aspects. First, different behaviours may have different functions but be indicative of different underlying processes at different developmental stages. The second, complementary, aspect is that the same behaviours may have different functions depending on the child's age. In Wallon's theory, the genesis of social competence is described as qualitative transformations rather than quantitative increases (Nadel, 1993; Nadel and Fontaine, 1989).

Following the pace of development, social exchanges between infants and the “human milieu” exist from birth, indicating that the human infant is “genetically sociable” (Nadel, 1993). These exchanges are mediated by expressive behaviours, which, while comprising innate universal-emotional expressions, are, at the same time, “agents of affective fusion” (Nadel, 1993, p. 232). The living milieu is considered to be the primary environment for humans, engaged by,

“. . . a metarepresentational inner world composed of motives, emotional representations, logical predictions, and causal inferences, which can be sometimes contrasted and sometimes combined with concrete events . . . ” (Nadel, 1993, p. 232).

It seems that it is through emotions, in affective symbiosis (after the third month), that infants belong to their milieu before they belong to themselves.

In Wallon’s consideration of emotions, the main expressive role is attributed not to facial expressions but to bodily postures which indicate the nature and the intensity of involvement in events. He emphasised the core function of emotion and its role in phylogenesis of prelinguistic communication and the construction of mental image. Emotions are supposed to be,

“. . . an autogenous modeling of the organism . . . the mental realizations of this autogenic modeling, from which impressions of consciousness are first drawn.” (Nadel, 1993, p.234).

Differentiation between self and other seems to start at the sixth month, in the stage of affective mimicry. The main feature of this stage is the direct and “...immediate coping with emotional expressions, which permits the sharing of common feeling states.”, or emotional matching (Nadel and Fontaine, 1989). Thus, mutual imitation is attributed to a major function, in the course of the first year, in the establishment of a symbiotic affective bond. In addition to incorporation of new behaviours, the process of active distinction of the self seems to be facilitated by repetition (Nadel and Fontaine, 1989).

By the 15th month, toddlers become aware of appropriate changes of roles. Thus, during this stage of interchangeable personalities, minimal distancing seems to occur, in the sense that the child attributes their own personal motives to others’ behaviour. By two years, toddlers reactions are transitive, not only do they attribute their own motives to others, but they also espouse the motives of others which they then attribute to themselves. While the sharing of emotional states still remains an

integral part of the means of communication, it implies an external topic (Nadel, 1993).

Within Wallon's theoretical framework, Nadel (1980, 1986; Nadel and Baudonniere, 1982; Nadel and Fontaine, 1989) considers imitation as a means of dialogue, and one of the foundations of ontogenesis, especially in relation to the development of communication (Nadel and Fontaine, 1989).

Thus, an analysis of Wallon's view led Nadel to infer that overlapping or synchronous imitation, could be the main vehicle for transivitism in interpersonal life, as it permits direct and symmetrical exchanges with the partner, and leads the toddler to experience identity through the sensation of doing the same thing at the same time with a companion (Nadel, 1993). On the basis of positive emotional sharing, in which interest and attention seem to dominate, this behavioural identification allows children to sustain interactions (Nadel, 1993; Nadel and Fontaine, 1989).

In assessing Wallon's contribution, Trevarthen assumes that, while his pioneering work formed the base upon which modern psychology of social capacities was founded, his observations were, nevertheless, too distant from the young infant, that is the infant under 6 months of age,

“. . . too artificial in their investigative position, and too focused on the asymmetric relationship between the knowing speaking adult and the inarticulate and supposedly reactive infant. They were prevented by their philosophy from seeing the communications that the infant can build with a sympathetic and affectionate partner.” (Trevarthen, 1993a, p. 44).

3.2. An Intersubjective Approach to Imitation

(Newson, 1978)

In trying to give an account of the ontogenesis of communication, Newson posed the problem of the acquisition of signal “significance” within the mental experience of the infant. Thus, his theoretical approach puts “communication” at the centre of the stage, in relation to human infant development (Newson, 1978). Imitation makes possible shared understanding, in a situation when one of the two participants is incapable of meaningful communication, in the verbal sense (Newson and Packer, 1972).

In Newson's theory, "communication" refers to a general human facility upon which, language seems to be founded. In essence, the reference is made to the power,

". . . to create shared understanding with other people via interactions which make use of mime and gesture as well as overt display of emotions and feelings." (Newson, 1978, p.31).

In attempting to describe the complexities of interaction in the course of the first year of life, the notion of "dialogue", representing a "cultural construction", in the sense of "alternating sequence of communication gestures" (Newson, 1978, p. 41), seems to be central. Communicative gestures are considered to be based on patterns of movements in time, with rhythm as one of its most identifiable parameters (Newson, 1977).

There are two theoretical assumptions upon which Newson's approach is based:

a) The first basic assumption is that a process and a content are necessarily implied by communication. Based on Trevarthen et al.'s assumption (1975, cited by Newson 1977) that human infants are biologically pre-tuned for communication with other people, Newson considers that the infant becomes actively involved in the "process" of communication. The infant learns to play an active role in an "oft-repeated exchange", through his being caught up in the same ritual sequence with the same person, in a repeated manner.

In a further step, the "content", in the form of understanding, is acquired. Then, sharing of understanding with other people begins as a product of regular communication. The mother, being the most regular caretaker, is the person who organises her actions, in the temporal domain, so as to establish patterns of reciprocation linked with the infants' otherwise unrelated action patterns, and recurring frequently in the infants' experience. In the resulting structured interactions, the infants both reflect and are governed by the more sophisticated partner's intentions, expectations and understanding. At this point, the infant's gestures are processed through the subjective filter of human interpretation, according to which some of his actions are judged to have coherence and only these are reflected back. In this way, mothers impute meaning to infant gestures when in

face-to-face interaction, giving them organization and providing evidence for understanding the emergence of shared mental constructs.

b) The second assumption is that even newborns have the ability to share with their mothers a capacity to produce non-random strings of discrete actions, with natural breaks. This capacity implies that human attentional abilities are organised in two complementary channels of communication: the auditory and the visual.

In Newson's view, it is not possible to make an exhaustive compilation of communication gestures having universal situation-dependent meaning, for two reasons. First, any action of a partner can be attached to a new meaning for communication purposes. Second, many gestures have "specific object reference" only in the particular context at the moment of interaction. In such cases, when both partners accept the action in question as a signal in the ongoing communication, then transmission of meaning is possible.

Two additional points are noteworthy in Newson's theory. The motive for imitation exist only in the mother, in the form of her ". . . desire to establish a degree of shared understanding with her baby . . ." (Newson, 1978, p. 37). Infants are treated by mothers as persons who have feelings, intentions, desires etc., and mothers seek confirmation in subsequent communication. The historical dimension, in terms of idiosyncratic strategies previously developed by a particular mother-infant pair, is also highlighted as of great importance for explaining how new strategies develop. It is suggested that it is through training, or stage-by-stage adaptation, that the acquisition of rules of communicative exchanges, in the form of symbols with shared meaning, is achieved (Newson, 1978).

In Newson's approach, the terms of "empathy" and "imitation" are so close that they can more properly be viewed as opposites sides of the same coin. The "mysterious" process of imitation is identified in cases of empathic reaction, and in direct imitation. Facial gesture imitations or shared emotions are categorised as empathic reactions, while the reproduction of an action sequence in relation to some external object is described as direct imitation (Newson and Packer, 1972).

As for the origin of imitation, it is assumed to be learned and not a capacity that arrives fully-fledged, out of nowhere. This learning is assumed to be due to the mothers' "shaping" of the infants' responses, addressed to acts that are recognizable to her, or equally to another communicating member of her culture because they are included in their own repertoire of social responses. Thus, imitated actions progressively approximate to intentional and meaningful ones (Newson and Packer, 1972).

An imitative act is considered to serve a communicative function by which the child indicates back to an adult "... 'message received and understood'..." (Newson and Packer, 1972, manuscript). Imitation is considered to be something more than going through a precise sequence of motor movements; that is, an infant really imitates to the extent that he is beginning to share the mother's intention.

3.2.1. Imitation and Learning within an Intersubjective Approach

(Pawlby, 1977)

Within Newson's theoretical framework, Pawlby (1977) conducted a study to observe interpersonal imitative activity between mothers and their infants, in natural and relatively spontaneous interaction episodes, in the laboratory (see Table 3.1):

| | |
|---------------------------|---|
| <p>Aims</p> | <p>The study of the following: -frequency of imitative sequences within a natural interaction setting; -kinds of activities imitated; -turn-taking in communicative sequences; -acts characteristic of communicative sequences; and accompanying imitative sequences</p> |
| <p>Methodology</p> | <p>a. Subjects: Age: 17-43 weeks Number: Eight (8) mother-infant pairs Sex: Five (5) boys and three (3) girls b. Procedure: Video-recordings in the laboratory. Mothers were told that the aim was to study play and communication. Use of records of infants' development. The data collection resulted in 191 recorded sessions. c. Analysis: 1. <u>Imitative sequence</u>: Begins "from the moment when the act, which was then imitated, was initially made and extending until the last production of that act before both partners' attention turned to some other activity" (Pawlby, 1977, p. 206). Analysis for two seconds before and after the imitative sequence. 2. For each imitative sequence, <u>the stream of activities</u> were coded in terms of 64 sub-categories grouped under: a. eye direction, b. hand movements, c. face movements, d. body movements 3. In addition to coded variables, <u>a narrative account</u> for each imitative sequence was made</p> |

Table 3.1: Pawlby's Study (1977) of Imitation in Mother-Infant Interaction

The results can be summarised as follows:

- Imitative sequences occupied 16% of interaction time and occurred in almost all the observed interaction episodes.
- The number of mother-imitated sequences (IM) was greater than the number of infant-imitated sequences (MI). While the infant-imitated sequences increased across the age range, the mother-imitated sequences remained stable.
- Forty nine different activities were found to occur in imitative sequences. These were classified into the following 5 groups: face/head movements, non-speech sounds, body/hand movements, manipulation of objects, speech sounds. Almost all of the imitative sequences that occurred in MI, occurred in IM as well, while a number of activities only occurred in IM sequences.
- Frequency differences were observed at the kind of activities imitated by either partner, across the age range. Imitative sequences of speech sounds were the most frequent throughout the whole study. Imitation of facial acts was infrequent, except between the 4 and 6 months. Imitation of manual movements and non-speech sounds was most frequent between 6 and 8 months while imitation of activities involving manipulation of toys was most frequent between 8 and 10 months.
- Some of the characteristics of other kinds of communicative sequence, such as turn taking, constituted a feature of the imitative sequences as well. The number of imitative sequences was not limited to a single interchange.

Imitation is assumed to emerge gradually in the context of the reciprocal pattern of social interplay between mother and infant “. . . as a result of the mother’s intention to communicate.” (Pawlby, 1977, p. 219). Thus, the origin of imitation is rooted in the readiness of the mother to imitate her infant; that is, her marked tendency to reflect back to her infant selected gestures, to which she attributes communicative significance.

Imitation is considered by Pawlby to be a process that involves performance of a precise sequence of movements. The infants’ spontaneous imitation of a pattern of movements, is assumed to imply comprehension of the action, or at least sharing of the meaning of that movement pattern with the partner (Pawlby, 1977).

Despite the valuable inspiration provided by the research of Pawlby and Newson and Packer, there is one point of interpretation open to criticism, as pointed out by Kugiumutzakis (1983), which the writer accepts. Pawlby contradicts her concept of interaction with the notion that infant's imitation is "shaped" by maternal behaviour whereas the reverse action, that is, maternal imitation "shaped" by infant behaviour, is assumed not to occur. According to this theory, imitation is not reciprocal. It is a one-way transfer of skill within an intersubjective awareness that remains unexplained.

3.3. The Interpersonal Aspects of Imitation

(Uzgiris, 1984)

Uzgiris, in her early work on infant imitation, interpreted her findings exclusively within the Piagetian framework (Uzgiris, 1972; Sibulkin and Uzgiris, 1978). Later, after 1979, an extension was made in her explanation of imitative behaviour (Uzgiris, 1979, 1981, 1983, 1984, 1989; Uzgiris and Silber, 1976, cited by Uzgiris, 1984; Killen and Uzgiris, 1981 cited by Uzgiris, 1981). This modification was possibly a consequence of Uzgiris' acceptance of the change of thinking in infant-parent research, caused by the recognition of capabilities attributed to very young infants that permit them to influence and regulate behaviours of parents on one hand, and to be influenced and regulated by them in a complementary way. Within a reciprocity of awareness, "matching" of behaviours conveys sharing of understanding and of feelings in social exchanges with other people, and, through the affirmation of the acts of others in mutuality, reciprocity and symmetry (Uzgiris, 1989), it promotes continuation and development of interaction, leading to more conventional means of communication. This communication is achieved through the establishment of both states and interests that can be shared by others and specific acts that can be mutually understood to express those shared states or interests (Uzgiris, 1983).

Thus, interaction and imitation in the largest sense, without restriction to the understanding of specific isolated acts, became the framework within which Uzgiris considered imitative exchanges. In essence, according to her new conception (Uzgiris, 1981), imitation serves two interrelated functions underlying two different

views of the world: understanding of puzzling observations (the cognitive view), and communicating mutuality and shared understanding with other persons (the interpersonal view) (Uzgiris, 1981). In the first case, the focus of attention is on the imitator and a clear distinction between him and the model object or event is made. In the second case, emphasis is paid on the relation of similarity that is established between the model and the imitator, meaning,

“... to do the same thing as the other is to confirm a similarity in capability, interest or feeling with the other.” (Uzgiris, 1981, p. 6).

Furthermore, the motivational source of imitation will be different in the two cases: imitation results from puzzlement in the cognitive view while, in the interpersonal view, imitation is engendered by apprehension and realisation of mutuality.

Since Uzgiris (1981) believes that, across the age range, the two functions of imitation need to be viewed in interplay in any interpretation of an imitative exchange, any developmental change in imitation is explained as an integration of the two: cognitive changes, and interpretational changes in the child's interpersonal situation. From the developmental point of view, Uzgiris seems hesitant to accept neonatal imitation, on the grounds that there is no adequate explanation of such an ability at birth.

Uzgiris adopts Moscovici's views (1976, cited by Uzgiris, 1981) on the two motivating functions underlying the expression of a consensus: one being “the validation of opinions and judgements” and the other being the provision of “reaffirmation of identity” (Moscovici, 1976, p. 152, cited by Uzgiris, 1981), the former being objective and the latter subjective. She considers that these two kinds of confirmation, factual and personal, “. . . may be evident in imitative interactions during infancy.” (Uzgiris, 1981, p. 9).

Later, Uzgiris seems to adopt the model emerging from infant-mother studies, according to which, the following changes occur in child's interpretation of the interpersonal situation: early realisation of mutuality for both the infant and mother gives way to acknowledgement of the intention of the partner to act on a particular object, and this leads to sharing of the other's understanding of the meaning attached to acts, and simultaneous attempts to communicate interest and desires to others. It is

the writer's opinion that Uzgiris (1984) pays special emphasis on the interpersonal view of imitation, rather than to the cognitive side, a shift that may have emerged from her search for the "incentive" for imitation. Adopting Piaget's suggestion, she initially assumed that the infant's incomplete understanding of the model's action gives rise to optimal interest in imitating. However, her suggestions go beyond this interpretation, and she claims that,

"... imitation or matching during interpersonal interaction serves a social function that is distinct from the individualistic function of attaining better understanding of the observed act (p. 25) ... the source of their attractiveness (reproduction) ... lies in their interpersonal meaning." (Uzgiris, 1984, p. 27).

As for the relation of imitation and feeling states in plausible terms, Uzgiris claims that,

"Imitation or matching that occurs in interpersonal interactions with young infants involves acts that pertain to the expression of feelings, intent, or engagement with the other." (Uzgiris, 1984, p. 26).

Within this theoretical frame, a study was conducted to provide detailed data on the matching behaviour occurring in the course of ongoing infant-mother interaction, in a large sample (Uzgiris, 1984) (see Table 3.2):

| | |
|---------------------------|---|
| <p>Aims</p> | <p>The study of the following:</p> <ul style="list-style-type: none"> - duration of the matching episodes; - initiator; - sequence of turns; - number of rounds; - degree of matching (full or partial); - act being matched |
| <p>Methodology</p> | <p>a. Subjects Age: 2,5, 5,5, 8,5 and 11,5 months Number: 80 mother-infant pairs Sex: each age group was evenly divided by sex.</p> <p>b. Procedure Video recordings in the laboratory. Face-to-face interaction (12 minutes) was followed by toy-playing. Mothers were interviewed while being shown portions of their interaction with the infants.</p> <p>c. Analysis 1. <u>Interpersonal involvement</u>: periods within which matching episodes were identified. Three types of interpersonal involvement were identified: a) Face-to-Face; b) Mutual Gaze; and c) Mutual Involvement. Occurrence, duration and type were scored for each type of interpersonal involvement. 2. "<u>A matching episode</u> was said to extend from the beginning of the act which was subsequently reproduced to the last production of the act by one of the partners" (Uzgiris, 1984, p. 20) (underlining added).</p> |

Table 3.2: Uzgiris' Study (1984) of the Interpersonal Aspects of Imitation

The results can be summarised as follows:

- Over half of the matching episodes involved motoric acts. Another third of the episodes involved vocal matching, while the remainder were combinations of both vocal-facial or vocal-manual behaviours.
- Matching episodes that involved toys showed a greater frequency with older infants.
- Interpersonal involvement, identified with matching episodes, accounted for 65% of interaction time. No significant differences across age in the proportions of the interaction time spent in interpersonal involvement, were found.
- Age variations were found for the proportion of time spent in different types of interpersonal involvement.
- The overall frequency of matching episodes was found to increase across age, from a median frequency of 3.5 to a median of 13.5 in the last age-group.
- Considerable individual variation was reported at all ages.
- The mean number of rounds of matching episodes increased across the age.
- Maternal matching was reported for all the age-groups, and the absolute frequency of these episodes increased with age, particularly from 6 to 8 months. The relative proportions of these episodes decreased, however, due to the fact that infant matching increased more.
- The importance of imitation was mentioned spontaneously by more than a third of the mothers.

On the basis of these findings, Uzgiris (1984), claims that there are four related features that provide an adequate frame within which the interpersonal aspect of imitation is understood:

a) Imitation is interpersonally meaningful, both with regard to the nature of acts involved in imitative exchanges, and in terms of the function of imitation within communicative exchanges.

b) Imitation is reciprocal, in turn-taking sequences, in which it is claimed that,

“ . . . the understanding is conveyed not directly through the action, but indirectly, through proper adherence to the script of the game.” (Uzgiris, 1984, p. 28).

c) Imitation is selective, as is shown by the meaningful acts on the part of the child whereas on the maternal side, the selective character of imitation is manifested in the use of conventional means of shared understanding.

d) Imitation is progressive during development, in that the form and range of actions matched across the age systematically approaches more advanced modes of communication.

Uzgiris' work has inestimable value in the emphasis it gives to the reciprocal nature of imitation. However, there is one point of contradiction that has to be mentioned. While she suggests that the interpersonal meaning may be one source of incentive for imitation, at the same time, she claims,

“... acts that are matched by the young infant may not even involve a direct attempt on the infant's part to match the mother.” (Uzgiris, 1984, p. 18).

It is the writer's opinion that the achievement of a shared interpersonal meaning would not be possible, unless interest in matching or complementing behaviours constitutes a component of communication on both sides.

3.4. Affect Attunement and Imitation

(Stern, 1985)

Daniel Stern (1984, 1985, 1993, 1995; Stern, Barnett, Spieker, 1983) reflecting his experience as both a psychoanalyst and a developmentalist, created a theory that views the interpersonal world of infants from two complementary perspectives. Stern's aim is to draw inferences about the infant's subjective life, and to evaluate their possible clinical and theoretical implications.

According to Stern (1985), infants experience, from birth, different, but not mutually exclusive and not successive, senses of the self. Once each sense is formulated, it remains functioning and then the subsequent sense starts growing and thus coexists with the preceding one. What defines each sense is a different domain of self-experience and social relatedness. The four senses of the self are: the emergent self (from birth to two months), the core self (two to six months), the subjective self (seven to fifteen months), and the verbal self (fifteenth month and onwards).

The Sense of the Emergent Self

Infants are supposed to be “pre-designed” to occupy a “pre-social, pre-cognitive, pre-organised life phase”. The way in which infants are able to experience the social world, in this initial phase, is explained in terms of three processes of direct perception, each associated with a different complementary integration of the senses, that is: amodal perception, physiognomic perception, and perception that detects vitality affects; these are added to complementary cognitive constructions (Stern, 1985).

It is assumed that infants have an innate capacity for amodal perception, which involves the taking of information through one sensory modality and the immediate translation of it into another sensory modality. A particular kind of amodal perception, physiognomic perception, confers the capacity to discriminate qualities, experienced directly by infants, that constitute the categorical affects expressed by persons and not perceptual qualities of objects, such as shape, intensity, etc. The mechanisms of both amodal and physiognomic perception remain a mystery, but it is noted that Heitz Werner (1948, cited by Stern, 1985) assumed that the latter kind of perception arose from experience with the human face in all its emotional displays. Vitality affects refers to a category of feeling quality, that concerns how a behaviour, any kind of behaviour, is performed. This category involves the “...dynamic micro-momentary shifts of intensity over time. . .” that are perceived as changes of expression, both within ourselves and by the others (Stern, Hofer, Haft and Dore, 1985, p. 264). It is assumed that, as with physiognomic perception, vitality affects arise directly from encounters with people (Stern, 1985).

The three processes that have just been mentioned are forms of direct perception. The other approach to development of awareness, the constructionist view, is assumed to complement these processes, and refers to the infants’ capacity to construct a synthesized configuration, through successive stress of perception, detection and integration. The processes that form perceptions, according to the constructionist view of development, are assimilation, accommodation, identifying invariants and associational learning (Stern, 1985).

The Sense of a Core Self

The sense of the core self is presented in two integrated steps: in the first, the predominant question concerns how the self is presented as a coherent physical entity, separate from the other. In the second sense, what matters most is the infant's sense of being with, and not against, the other, sharing experience with the other (Stern, 1985).

D) The Sense of Core Self Separate From the Other

The always-present-features or invariant elements of repeating experience when a general pattern is seen, that provide the organization of the core self, are: a) agency; b) self-coherence; c) self-affectivity; and d) self-history (Stern, 1985).

Agency: "Authorship of action" is assumed to be broken in three invariants of experience: a) the sense of volition, experienced before the action; b) the proprioceptive feedback, that either occurs or not during the act; and c) the predictability of the results that follow the act.

Self-coherence: The features of experience that specify the self separate from the other in a coherent, physical entity, are: a) unity of locus, meaning being in one place, at one time while actions come out of one locus; b) coherence of motion, meaning that things move in a reasonably connected way, in time; c) coherence of temporal structure, meaning that an organising structure, provided by time, enables the identification of different behaviours; d) coherence of intensity structure, referring to the identification of a separate person's behaviour in a common intensity structure; and e) coherence of form, meaning that there are striking configurations of a person that serve as identifying cues of him or her.

Self-affectivity, refers to the affective experiences of an infant gained by two to three months. It is assumed that, for each emotion, there is a characteristic constellation of self-invariants, that the infant expects and recognises: a) the proprioceptive feedback to face, respiration and vocal apparatus; b) the sensations of arousal or activation that are patterned within the self; and c) the emotion-specific qualities of feeling.

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Self-history memory, refers to a system that provides the continuity of experience, through the integration of the agency, the coherence, the affectivity and the continuity.

II) The Sense of Core Self With the Other

The experience sensed at this stage, can be viewed as both an objective event and a subjective event (Stern, 1985).

In interaction with the other, experiences are viewed “as active acts of integration”. Each partner’s experience is assumed to regulate and be regulated by the other in the following experiences: a) arousal; b) affect intensity; c) security or attachment; and d) somatic state.

In addition, it is assumed that, somehow, the infants record the objective experience with the self-regulating other as a subjective experience. This kind of sensation presupposes that there is no confusion between the core self and the core other. This intactness is achieved through the invariants of experience, already mentioned, defining the core self separate from other. Another matter that arises at this point refers to the relationship that is established between the altered self-experience and the regulating role of the other. It is claimed that whatever the relationship is, obvious or silent, the alteration in self-experience belongs exclusively to the self. It is further suggested that the observable interaction becomes the bridge between the two separate subjective worlds, the dyadic system being symmetrical in principle, but not in practice.

The Sense of a Subjective Self (I)

The next step in the development of the sense of self occurs between 7 and 9 months, when the infant realises that the inner subjective experience has been a matter for the other people’s mind as well, in a way that can be shared. Thus, the infant gets into a new domain of intersubjective relatedness and a new organising perspective about the self emerges. Now two conditions occupy the mind. First, infants sense others as distinct from themselves. This is a property with which infants are endowed since birth. From the time of the emergent self, infants never experience

a period of total self/other undifferentiation. Second, others, distinct and separate from the self, hold mental states that resemble the self's mental states (Stern, 1985).

By definition, infants are preverbal. Evidence for the sharing of subjective experience involves three complementary aspects of behavioural expression: a) sharing orientation of the focus of attention or inter-attentionality; b) sharing intentions or inter-intentionality; and c) sharing affective states or inter-affectivity (Stern, 1985).

Stern suggests two ways in which intersubjective awareness may be reinforced: a) by the achievement of security needs or attachment goals; and b) by satisfaction of the human need to be part of a group, “. . . with potentially shareable subjective experiences.” (Stern, 1985, p. 136).

The Sense of a Subjective Self (II)-Affect Attunement

In his effort to explain how subjects may get “inside of” each other's experience and affectivity, without using words, Stern considers imitation, for the first time when describing developments occurring around the ninth month. Use of the term “imitation” in its literal meaning, as the “reproduction or copying of the other's act” was rejected (Stern, 1985).

Stern claims that three processes should take place for real intersubjective sharing of affect to occur: a) infants' expressive behaviours should provide evidence of his or her feeling states, so that they can be read by the parents; b) the parent's behaviour should correspond, in some way, to the infant's expressions; and c) this corresponding parental behaviour should be readable by the infant, so that the infant can realise that the parent is reacting to his or her own feeling states, and not just imitating superficial aspects of behaviour.

The phenomenon that underlies these processes, is assumed to be “affect attunement” by the mother. Affect attunement is defined as a behaviour performance, which, without imitating in a stereotyped way any particular inner state, expresses the quality of feeling of a shared affect state. Attunement is supposed to constitute a new dimension in the mother's imitative behaviour, which is regulated and directed in response to the infants' new status as a potentially intersubjective partner.

The characteristics of attunements, adapting them for affective intersubjective sharing, are suggested to be the following:

- a) An impression is gained that a kind of imitation has occurred.
- b) The matching that occurs is, in most cases, cross-modal; that is, the modality of expression that is used by the mother to match the infant's behaviour is different from the one that has been used by the infant.
- c) Matching does not concern the superficial behaviour of the imitator but rather some level or dynamic aspect of his or her behaviour that reflects his feeling state.
- d) The match occurs between the expressions of inner state.
- e) The process is fast, unconscious and automatic (Stern, 1985; Stern et al., 1985).

The indicators of attunement are to be found in the three following dimensions, each comprising more specific types of match:

- **Intensity**

Absolute Intensity: matching of the infant behaviour's level of intensity, irrespective of the mode or form of the behaviour.

- Intensity Contour: matching of the changes of intensity over time.

- **Time**

Temporal Beat: matching of the "regular pulsation" in time.

Rhythm: matching of the "pattern of pulsations of unequal stress".

Duration: matching of the behaviours' time span.

- **Shape**: matching of some spatial behavioural features.

The Sense of a Verbal Self

In the course of the second year, the combined acquisition of several capacities, including language among others, leads to a new developmental level of relatedness, and the negotiation of shared meaning of mutually created messages, with another, about personal knowledge (Stern, 1985).

Among the capacities developing in the middle of the second year is the ability to make simple delayed imitations, structuring the infant's capacity to coordinate the schemas already existing in his mind with the actions or verbal operations of others. It is assumed that such an ability presupposes five capacities,

three of which have already been acquired before the eighteenth month: a) a capacity for representation of both things and events selected or created by others, but for which the infant does not yet possess action schemas; b) a physical capacity for performance of the action; and c) a capacity for encoding and retrieval of the representation of the action from long-term memory (Stern, 1985).

By these developments, an infant acquires two versions of an act, the represented version corresponding to the model act as performed by the other person, and the infant's own actual execution of the act by imitation. Within this two-part construction, infants must be capable of moving from one version to the other and, in addition, they must be able to make adjustments of the one or other representation, in order to perform a good imitation. Apart from this, a kind of psychological relationship should be established between the imitatee and the imitator. This is assumed to be possible only through a process that requires the representation of the self both as an objective entity from the outside, and as a subjectively self entity from the inside.

Stern (1985) seems to acknowledge the existence of the developmental dips, referring to them as qualitative organizational changes, and he assumes that these shifts may occur in any kind of overt behaviour or subjective experience. He assumes that the following are periods of great change: between two and three months, to a lesser degree, between five and six months, between nine and twelve months and between fifteen to eighteen months. In the course of these shifts, the infants' modified sense of subjective experience gives the impression of another person coming into being. Parental interpretations of these observed shifts, and the underlying organizational changes, are supposed to be facilitative and mutual, rather than sequential.

3.4.1. The Transmission of Affect and Imitation According to Stern

(Stern, Barnett and Spieker, 1983)

As we have said, Stern (1985) rejected the notion of imitation in its literal meaning, as the "exact reproduction of the model's act", when he was considering

the “attunement” process through which sharing of affective states could be explained. He gave the following reasons:

- a) The exactness of the copied behaviour (imitation) provides no proof to the infant who was imitated, of the fact that the mother experiences the same feeling state as the infant does.
- b) The definition of imitation implies reproduction of the superficial behaviour, and not the internal state.
- c) If imitation is guided by a matching representation, conceptualization of the representation of internal feeling states would be difficult (Stern, 1984).

Stern et al. (1983) concerned with the origin of empathy, consider the nature, function and mechanisms of affect signals. The phenomenon of resonant emotional response, in the sense of the receiver’s internal affective experience corresponding to that of the sender’s, is referred to as the core of empathic experience. In their discussion of the development of affect transmission in which the infant is viewed as recipient, perceiver, processor of, and responder to affect signals, but not as producer, they refer to imitation as a possible mechanism.

Affect signals are assumed to contain two complementary types of information: categorical information, which refers to the kind of affect that is present, and gradient information, which refers to the intensity of the signal within the affect³ category. Furthermore, it is suggested that the gradient dimension of emotional expression is present and functioning before the categorical dimension. The mechanism through which infants evaluate the categorical aspects of emotion is considered to be learned, while in regard to the gradient aspect, “prewiring” is assumed to outweigh learning, the association between actual and perceived intensity being a consequence of the innate structure of the nervous system.

Stern et al. (1983) propose that imitative transmission of the gradient aspect of the affect signal and its evaluation by an infant involves a process very similar to evocation of a resonant emotional response in the other.

³ It is noteworthy that Stern uses the terms “affect” or “feeling states” instead of “emotions”. While some claim that these terms can be used interchangeably (The Penguin Dictionary of Psychology, 1985), others claim that “feeling” is “...a consciousness (of something felt in the mind or body)...”, that is, overlooking interpersonal regulation (Longman Dictionary of Contemporary English, 1987).

Within this theoretical framework, in particular reference to “the sense of the subjective self (II)”, a study was conducted (Stern, 1985; Stern et al., 1985) to examine the affect attunement by which parents mirror back to their infants the infants’ experiences, in a non-verbal way, thus allowing the infant “. . . to perceive *how* he is perceived.” (Stern et al., 1985, p. 249) (Table 3.3):

| | |
|---|---|
| <p style="text-align: center;">Aims</p> | <p>The study of the following:</p> <ul style="list-style-type: none"> -frequency of attunements; -feature of the infant behaviour attuned to by the mother; -feature of behaviour that the mother used to make an attunement; -modality or modalities used in attunement; -dimensions of attunement; -functions of attunement; -maternal awareness; -infant’s response to maternal attunement |
| <p style="text-align: center;">Methodology</p> | <p>a. Subjects Age: 8-12 months Number: ten (10) mother-infant pairs Sex: Five (5) boys and five (5) girls</p> <p>b. Procedure Videorecordings in an observation room. Warm-up period. Play sessions lasted 15 minutes. Replaying of the tapes, with the mother, for scoring behaviours and answering questions.</p> <p>c. Analysis</p> <ol style="list-style-type: none"> 1. Matched behaviours scored: <ul style="list-style-type: none"> -Modality of matches -Dimensions of attuning matches: <ol style="list-style-type: none"> a) Intensity (absolute intensity, intensity contour) b) Time (beat, rhythm, duration) c) Shape 2. Maternal awareness of her behaviour 3. Type of attunement <p>Function of attunement</p> |

Table 3.3: Stern et al.’s Study (1985) of Affect Attunement

The results can be summarised as follows:

- The infants’ expression of affect were responded to by: maternal attunements (48%), comments (33%), and imitations (19%). That is, maternal attunements were the most common response to the infants’ affect display.
- The infants’ affective display, to which mothers attuned, was made by either one kind of behaviour or, most commonly, by several features, performed through several modalities at the same time.

- The maternal behavioural responses, when making the attunement, were composed of several features.
- In the majority of the cases, mothers' attuned to their infants' affective display using mixed-modal matches.
- Intensity, and particularly the intensity contour, was found to be the most common dimension of matching.
- The most common function of attunements was reported to be the fostering of interpersonal communion (45%). Other functions mentioned were: to respond (33%), to tune (18.6%), to reconstruct the interaction (1.7%) and to follow a play routine (1.0%).
- When attuning performance, mothers were found to be roughly equally divided in three groups who were: fully aware (31.3%), partially aware (29.5%), unaware (38.2%).
- Apart from the attuning behaviour, mothers responded to the infant's affective display in the following two ways: either they intentionally under or over-matched a parameter or two of the infants' affective display (purposeful misattunement), or they incorrectly identified to some extent of the infants' affective state quality or quantity (true misattunement).
- On the infant's part, maternal misattunements were found to result in alteration or interruption of the ongoing infant behaviour, while after communing attunements, infants acted as if nothing had happened.

It is assumed that affect attunements by the mother only signify a new level of interpersonal relatedness called "intersubjective relatedness". On the basis of the basic capacity to recognise cross-modal correspondences, with noninvolvement of cognitive processes, and with the aim to capture the others' inner feeling quality, it is assumed that the route to empathy is opened up.

Stern's theory makes an inestimable contribution, both in regard to his revolutionary views on infant psychology within the psychoanalytic-developmental perspective, and with his theory of "affect attunement". Nevertheless, there are certain points susceptible of criticism (Kugiumutzakis 1992, 1998c; Jonsson and Fahrman, 1998).

The writer notes three additional points:

- a) Stern (1985) initially assumed that the dyadic interaction between the mother and the infant is symmetric in principle, but not in practice. This kind of asymmetry was attributed rather to the mother's personal history than to the infants' immature affective or interpersonal capacities. Later, the assumption that the infants' initial psychic reality includes experiences that are motivated, and thus interpersonal, should lead Stern to a review of his initial assumption on "asymmetry", since both interactant partners demonstrate both potential and real abilities to contribute in symmetric communication.
- b) Apart from the overt discrepancy between Stern's views on the function of imitation, there two noteworthy additional ambiguities. First, while he attributes "affect attunement" exclusively to maternal performance, earlier, in attributing the mechanism of transmission of affect to imitation, Stern invokes examples from infant imitation research. Second, while Stern (Stern et al., 1983) agrees that infants possess an integral endowment that permits neonatal imitation (preexistent perceptual and motor schemata and a way of connection between them, for recognition and behaviour performance), later (Stern, 1985), infant imitation is assumed to start at the sense of the verbal self.
- c) Stern (1985) makes reference to the "reinforcing" power of intersubjectivity. At another point, where he refers to maternal imitation, Stern implies the existence of a motive by saying, ". . . the feeling state that gave rise to the overt behaviour" (Stern, 1985, p. 13). Stern seems to acknowledge the existence of an under-structure of motives for intersubjective communication, but possibly the theoretical implications of this acknowledgement do not permit him to make an overt declaration.

3.5. Imitation as Matching

(Papousek and Papousek, 1989)

Within the theoretical frame of behaviourism, Papousek and Papousek attempted to explain the character of the didactic interaction between infants and their parents. Through these interchanges in which adults are assumed to adjust

sensitively to the infant's integrative constraints, the newborn's cognitive abilities develop and the arrangement of the infants' learning situations are adapted to his needs (Papousek and Papousek, 1983, 1984). "Vocal matching" in emotional attachment, in the sense of mutuality of understanding, and an empathetic response to share emotional experience, are considered to be two of the functions served by "matching" in mother-infant interaction (Papousek and Papousek, 1989).

Papousek and Papousek did not restrict their theory to an account of mother-infant interaction, but they tried to extend it to other species. By adopting the psychobiological perspective of Bowlby, the Papouseks refer to the evolution of parent-infant attachment, explained in terms of Lovejoy's theory (1981, cited by Papousek and Papousek, 1984). They have shed light on the interdependency between the cultural contribution and biological factors. It is assumed that if man's basic capacities for symbolization and sharing of affective experience have been developed in integration with biological factors in the course of evolution, then this occurred at the same time as the unfolding of culture, the latter providing the impetus for the sharing of experience beyond the limits of individual consciousness. The main factor in the successful survival of human species is a reduction of losses by environmental selection, and this is assumed to have been achieved through evolution of strong social bonds, high intelligence, intense parenting, and a long period of childhood learning (Papousek and Papousek, 1984).

Within this evolutionary theory of the advantages of successful experience sharing, it is assumed that the newborn has inherited an innate capacity to respond to certain stimuli from the environment with adequate forms of learning or cognitive operations, integrating information across modalities. Striking individual differences are said to exist among newborns. At about four-months, infants' control over contingent events, is considered by the Papouseks to indicate intentionality and the formation of concepts related not only with the circumstances of externally controlled events, but also to certain intrinsic aspects of the self. The infants' information processing is facilitated by the parent, who adjusts the way information is "passed through" to the infant's actual state of integration in psychological capacities (Papousek and Papousek, 1984).

For the achievement of this kind of experience-sharing and behavioural regulation, some means of communication, in the form of selected integrative processes of ontogenetic development, have evolved in both parents and infants. Parents are motivated by both biological and cultural factors to make a didactic contribution to infants' intellectual development. In parallel, infants are effectively motivated for successful learning from didactic interactions with parents (Papousek and Papousek, 1984).

In trying to describe the required means of communication, Papousek and Papousek focus mainly on vocal parent-infant interchanges. It is suggested that, early in the first year of life, infants are confronted with homogeneous patterns of biologically determined, and thus universal, parental vocal communication while by the end of the first year they experience different forms and varieties of culturally determined vocal environments (Papousek, Papousek and Bornstein, 1985). Each is suggested to serve certain functions for the promotion of growth of infant competence.

In the first year of life, features of a phylogenetically selected system of unintentional, unconscious and thus automatic behavioural routines in adult to infant speech permit parents to facilitate their infants' social and intellectual survival, through their active participation in didactic interactions. Newborns provoke adults (not only both parents but strangers as well) to speak in a particular way. Among the features of this system, the learned and initially non-intentional act of imitation, in the sense of "vocal matching", is viewed in a context within which,

". . . parents hold a didactic lead inasmuch as they are the first to imitate in interactions with newborns." (Papousek, Papousek and Harris, 1987, manuscript).

Thus, the Papouseks view vocal imitation in a different way from other researchers, under the broad term of "matching". Matching is defined in the sense of "perceptual similarity", concerning any one or any combination of the following sound features: absolute pitch, pitch contour, duration, rhythm, vowel-like resonance and consonant-like closure (Papousek and Papousek, 1989). This extends the traditional definition of imitation as "reproduction of an act", with further empirical and theoretical implications.

In the course of the first weeks of infants' life, parents are the ones who match and echo infants vocalisations and activities, reinforcing infant's motivation for vocal modulation and offering events contingent on infant activities. Through parental motivation of infants to use their natural vocal apparatus as the first toy, didactic and playful results are achieved (Papousek et al., 1985).

Papousek and Papousek (1989) claim that early communication is "non-intentional" and that vocal matching facilitates in progression to intentionality. They recognise in infants "distinct signs of effort to achieve a match", (Papousek and Papousek, 1989, p. 142), and thus intentional control, "but also an intrinsic motivation to imitate"⁴ coincides with the "powerful mechanism of intrinsic motivation" that is involved in the "fundamental system of adaptive functions"; that is, a,

"... 'need' to acquire knowledge, to solve problems, to be in active, mental rapport with the environment and with one's self." (Papousek, Papousek and Harris, 1987, manuscript).

In addition, motivational functioning produces expressions of emotionality. "Vocal matching" constitutes a source of ,

"... particularly rich and joyful experiences which may contribute to emotional attachment and provide both partners with a sense of mutuality or shared understanding..." (Papousek and Papousek, 1989, p. 153).

The processing of familiarity, predictability and the control of one another's behaviour between infant and parent seems to be associated with the expressions of "intrinsic motivation". The affective meaning of matching episodes is supposed to be gradually acquired, although it is accepted that neonates have an innate tendency to match affective expressions (Papousek and Papousek, 1989).

While Papousek and Papousek's view on developmental dips is not clear at any point, it may be assumed that they accept this notion. This assumption is based on the two following points:

⁴ It has to be noted that uncertainty on imitation motives is expressed also by Papousek et al. (1985) themselves when they preface their observations with the comment: "If there is an endogenous readiness for infants to match..." (ibid, p.273).

1) In discussing the homogeneity and heterogeneity of behavioural repertoire in the course the first year of infants' life, they suggest that these result from,

“ . . . differentiation, integration, and combination of initial patterns although some earlier patterns may disappear . . . development is widely variable in terms of timing, intensity, frequency and integrative structure.” (Papousek et al., 1985, p. 270).

2) In particular, when reference is made to vocal interchanges, age-dependent variability in vocal matching was found (Papousek and Papousek, 1989). If we assume that vocal matchings depend on the rate of spontaneous vocalisations, then the ups and down mentioned would be expected to influence matching performance.

Within this theoretical framework, a laboratory study was conducted to investigate vocal matching as a didactic strategy between mothers and their infants (Papousek and Papousek, 1989, Table 3.4):

| | |
|---------------------------|---|
| <p>Aims</p> | <p>The study of the following: -frequency of matches; -complexity in matches; -reciprocity of matching; -individual variability; -sound patterns involved in matches</p> |
| <p>Methodology</p> | <p>a. Subjects Age: 2nd, 3rd and 5th months Number: 17 mother-infant pairs Sex: 11 girls and 6 boys b. Procedure Video and audio recordings in the laboratory, for 3-5 minutes. Warm-up period. c. Analysis 1. <u>A match</u> was defined as “any instance of perceptual similarity between adjacent or simultaneous utterances from the model” (Papousek and Papousek, 1989, p. 141). A match was scored when the similarity concerned any one or any combination of the six sound features: absolute pitch, pitch contour, duration, rhythm, vowel-like or consonant-like closure 2. <u>The sequence of the match</u>: a) infant-mother (IM-match) b) mother-infant (MI-match) c) simultaneous match (S-match)</p> |

Table 3.4: Papousek and Papousek's Study (1989) of Vocal Matching in Mother-Infant Interaction

The results can be summarised as follows:

- Maternal utterances were more than three times as high as the number of infant vocalisations. The latter increases between two and three months followed by a

decrease at five months. The number of turn-takings increased with age. More than half of the infants' utterances occurred in maternal pauses.

- No differences were found between infant imitating mother (MI) and mother imitating infant (IM) matches. Both types of matches occurred most often at 3 months, but this increase was found significant only for the MI matches. The incidence of matches decreased, insignificantly, at 5 months.
- A high percentage of infant vocalisations were involved in vocal matches. Between 2 and 3 months, infant sounds, in both MI and IM matches, increased, while between 3 and 5 months, infant sounds increased only in MI matches.
- The complexity of matches (number of sound features matched simultaneously) increased significantly with age, and was higher in IM matches than in MI matches at all ages.
- Considerable individual variability was found in all measures of matching, and in the number of infant vocalisations.
- At all ages, absolute pitch was the most frequently matched sound feature, and was more frequent in MI than IM matches.
- Individual patterns of melodic contours were distributed disproportionately in analysed matches.

The following functions of vocal matching are proposed:

a) provision of corrective auditory and visual feedback; b) a contingent response that aims to reinforce practising of newly emerging infant sounds; c) facilitation of infants' discovery of the ready availability of their voice; d) form of joint action and source of joyful experience, contributing to emotional attachment; e) generation of an empathic response sharing emotional experience; and f) communication of learned meanings (Papousek and Papousek, 1989).

The interesting theoretical approach and results of the studies of Papousek and Papousek, are open to criticism at many points (Kugiumutzakis, 1993). In the writer's opinion, additional points can be made:

a) While the proportion of MI and IM matches was reported to be equal, the high incidence of vocal matching was attributed exclusively to the mother.

b) It is unclear how infant imitations are to be viewed, since it is assumed that the interactional data cannot provide us with information of whether, and to what degree, infants contribute in vocal matching. If the interactional frame is not efficient to resolve this question, then Papousek and Papousek should suggest an alternative way.

c) Concerning the affective aspects of imitation, it is suggested that one function served by vocal matching is “. . . a shared nonverbal code for potential communication . . .” (Papousek and Papousek, 1989, p. 153). This implies that vocal matching is not yet communication itself, but it rather facilitates or motivates progress to it. This makes impossible for the Papouseks to explain the newborn’s, “...innate tendency to match affective expressions . . .”, and to “. . . match adult facial expressions of emotions . . .” (Papousek and Papousek, 1989, p. 153-154).

d) Papousek and Papousek’s research seem to have the methodological flaw of an insufficient time of recorded interactions, which is accepted by themselves. It is the writer’s opinion that they underestimate the infant’s emotional and cognitive abilities, as well as the dynamic-interpersonal phenomenon of imitation. No explanation is offered for the dips in imitation that were observed, and individual differences are not given sufficient attention, since they are examined exclusively in terms of the interrelation between vocal perception and production in different infants.

3.6. Imitation within Innate Intersubjectivity Theory

(Trevarthen, 1993b, 1993c)

The above theories tend to attribute to the mother the fabrication of a structure within which the infant at first acts with immature and rather aimless movements, and his or her emotional expressions are concerned to be the result of learning. The regulation of development is taken to depend on factors alien to the child’s mind and his contribution to psychological growth is unexplained. Trevarthen has constructed a theory of Innate Intersubjectivity, which attempts to explain the origins and the nature of human intelligence and consciousness within the infant.

Cultural learning, in the sense of generation-to-generation-cumulative transference of artificial knowledge, techniques and beliefs, sets demands on human groups. To meet these demands, human mental development and its intersubjective representations, are conceived as products of an innate, prefunctionally adapted process. Given this kind of process, and through the “intuitive mimetic acceptance” by the young of intentions and interests displayed by the elders, human group functioning is made possible.

Thus, in preparation for cultural learning, the newborn brain is assumed to have been equipped, from the fetal stage, with a constellation of elaborate mental powers that are formatted in intrinsic regulatory mechanisms. Connection of these mechanisms with expressive organs (facial, vocal and gestural) and mutual connections between brain motivating structures and the expanding neocortical system, are prerequisites for the elaboration of the post-natal experience (Aitken and Trevarthen 1998), enabling prospective control of an active existence of the body in interaction with objects and with other individuals (Trevarthen, Kokkinaki and Fiamenghi, 1998).

In trying to explain how a newborn brain is equipped with mental powers, Trevarthen invokes the classical embryological principle of “prefunctional morphogenesis”. It is assumed that a prefunctional psychological mechanism, formed in the embryo, acts at two reciprocally integrated levels: the motor or effectual, and the sensory or perceptual. Motor effects are conditioned by the early definition of the organism’s morphological features (eyes, hands and face) that contribute to the regulation of other features that come into being later. Organised brain structures generate anticipatory rules of psychological function, body-related form and movement-related-timing. Thus, the anatomy of infants’ expressive organs and the cyclic patterns of expression, through which a mechanism of motives, coded in emotions, is displayed, are examples of innate features that act as developmental organisers of psychological function, enabling the infant to interact efficiently with another person by exchange of complementary, mutually-imitative messages (Aitken and Trevarthen, 1998).

Equipped with this constellation of mental powers and psychological features, the brain controls and assesses the affordances (act-related inputs of information) of the environment by coordinated motor and sensory systems that “map” the body in neural systems (by somatotopy), endowing the active self a primitive coherence or unity (Trevarthen, 1993b). Perceptual access to environmental stimuli depends on the infants’ movements that adjust the receptors. These action patterns are called rudimentary intentions because they are directed to obtain and predict consequences or experiences (Trevarthen, 1977). Thus, the experiences within activities “pass through” the motor and sensory regions, coordinated within the central nervous system by a unique system of motives which is referred to as an Innate or Intrinsic Motive Formation (IMF).

The IMF is assumed to be both prefunctional and functional; that is, its emergence can be traced back in brain development, where it acts as the regulator of morphogenesis and it continues functioning after birth to generate motives, regulating human actions and interactions (Aitken and Trevarthen, 1998). Transformations in the initial motive formation of the embryo brain, serve, at the post-natal stage, to regulate functions at two mutually integrated levels: a) the generation of intelligent exploration of the objective environment; and b) the emergence of a dialogic mechanism that represents the “self-subject” as a partner for the “other-subject” in many forms of negotiations. These lead through a series of age-related transformations in infancy, to “. . . preverbal mimetic negotiation of cooperative awareness and joint task performance.” (Aitken and Trevarthen, 1998).

The term “endogenous motive” was chosen by Trevarthen, instead of “cognitive schema” or IRM (Innate Releasing Mechanism), to designate the inner generative and developmental aspect of psychological activities. A motive, is assumed to make the subject “curious” and “exploratory” as well as “purposeful” and “effective”, regulating both perception and memory. The paradox in the nature of motives is that while their origin lies in inaccessible cerebral activity, a wealth of intentional movements for perception and action is generated by them, making them observable and real for psychological science (Trevarthen, 1993b, 1997).

The active generative and developmental aspect of motive structures, anticipating the processing of perceptual information, and necessary for the motive ontogeny, is revealed in, “. . . an inherent specialization, or modularity, in perception...” (Trevarthen, 1993b, p. 124). This specialization of receptive systems forms the basis for the development of the various cognitive abilities (Trevarthen, 1993b).

The spontaneous processes of motives are assumed to act in two directions as integrated motor and perceptual sets. Motor outputs conceived by motive generation, take shape in the outside world as forms of activity. Activation of sensory-accessory muscle systems, prepares for the control of a sequence of other potentially effective movements of limbs and body that are intended to act on the environment. These movements of orientation, focus and modulation to select affordances, give other subjects advance information about the actor's interests and intentions. Corresponding perceptual sets generated by motives, prepare the cognitive brain systems to grasp the affordances of sensory stimulation which will guide coordinated movements, increasing their efficiency and efficacy (Trevarthen et al.,1998).

This two-direction motive functioning, producing movements of orientation and perceptual readiness within the mind, creates moment-by-moment variation in coordinated motivation determining: a) the rate in time at which it is generated; b) its levels of energy or power; and c) the form over the body of sensory information it is aimed to excite. Thus, brain-generated “kinematic”, “energetic” and “physiognomic” parameters of movement express the coherent dynamics of motivation.

In short, motives refer to,

“... an anatomical-physiological basis in the brain for the endogenous coordination that holds together all of a subject's behaviours and perceptions at any given moment. This determines how behaviour and experience will evolve in time, with confirmation and guidance from the exogenous perception of the environment.” (Trevarthen, 1993b, p.125-126).

The motives of the “Interpersonal Self” detect “complementary motives” of the “Other”, and require appropriate responses from the “Other”. Within interpersonal communication, the above mentioned features of motivation (motor and perceptual sets) constitute “symptoms of the inner psychological activity” of each partner. These features are assumed to be coded and to take visible form as emotions. Emotional

expressions are proposed to reveal the “. . . central energy and self-regulating quality of motives . . .” (Trevarthen, 1993b, p. 124), and are thus an integral part of motives, with “strong innate adaptive organization” (Trevarthen, 1993c, p. 48). Emotions constitute “intrinsically-generated”, regulatory states expressed in both perceptual and behavioural vitality, changing in time and space, that aim to a cohesion in the subject’s awareness and coordinated activity, signalling communication to and from the Interpersonal Other (Trevarthen, 1993b, 1993c). As a consequence of this definition, emotions are assumed to act at three different levels:

- a) Within the Organism: The function of self-regulatory emotions within the self aims to protect the coherence of the body, by assessing consequences of action in advance, and determining subsequent adjustments.
- b) In Relation to the Outside World: The action of object-related emotions aims to guide perception, action and learning, by the evaluation of affordances, that is, through estimation of act-related input information.
- c) In the Interpersonal World: The expression of interpersonal emotions goes beyond self-and-object-related regulation, promoting motivation matching, regulation and communication with the Interpersonal Other, generating cooperative awareness and driving cultural learning (Trevarthen, 1993c, Trevarthen et al., 1998).

It has to be noted that this theory of cultural learning or acquisition of knowledge does not imply that learning is a prerequisite for emotional expression. It is assumed that emotions are intrinsically-generated mental states that originate from within the subject, caused and generated in them, regulated in relation to outside events (Trevarthen, 1993c). This “within-subject” origin implies that emotional reactions will have universal features, in spite of the fact that the meaning of emotional words and the “mapping” of emotions in various languages will be different. Despite difficulties in defining words for emotions, it is assumed that there is universal agreement between humans about the positive or negative qualities of feelings, and their power or weakness to influence mental states (Trevarthen, 1993b). The role of learning is not underestimated, since it is recognised that motive communication, and thus emotional regulation, forms the basis upon which human

learning of social or cultural adaptations, habits and thoughts is achieved (Trevarthen, 1993b).

In Trevarthen's intersubjectivity theory, chains of emotional changes called "emotional transients" or "transient emotional shifts", generated by motivating processes, communicate expressive forms between the mentally-active subjects (Trevarthen, 1993b). The organization of sequences of these emotional shifts in time is called "emotional narrative". The temporal base and the qualitative distinctions in the emotional field are the parameters which provide us with the understanding of the way emotional narratives are organised (Trevarthen, 1993b).

Developmental Stages

Neonate Stage

The neonate is characterised, in Trevarthen's theory, as "pre-dialogical, pre-conversational being as well as a pre-object-seeking one" (Trevarthen, 1980, p. 538). Newborn infants are assumed to be endowed, since foetus stage, with all the structures that will serve interpersonal communication in a rudimentary form, enabling them to integrate different-sensory-modality experience as directed by their interest, but restricted by physiological states and certain potential processes of differentiation.

There is morphological and behavioural evidence that structures, adapted to serve interpersonal communication, are present in latent condition in the neonate. Complex motor patterns preadapted to visual exploration, prehension, walking, head and eye orientation in the direction of voice, rudiments of the integrated movements of face expression, social gestures and social interaction have been observed in quiet alert neonates (Humphrey, 1969; Jouvett, 1975; Alegria and Noirot, 1977, cited by Trevarthen, 1980). These motor patterns are defined as "proto-intentional" due to the goal prediction that they evidently contain, though there is no evidence that they assimilate stimuli (Trevarthen, 1980). The rudimentary form of these potentially expressive behaviours does not imply, in Trevarthen's theory, a dissociation between motor patterns and perceptual systems (Trevarthen, 1980). On the contrary, it is

assumed that “. . . there are indeed highly elaborate structures for awareness in the neonate brain.” (Trevarthen, 1980, p. 539).

In Trevarthen's theory, human newborns are attuned to signals of their mother's presence in several modalities. In the course of the first two weeks of life, feeding, defensive or distress behaviours and signals of physiological state, are self-regulatory for the infant (Trevarthen, 1979). Despite this primary orientation to the physiological level of functioning, the neonate is finely pre-adapted for maternal care and “fitted” to complement the mother's specialized sensitive care behaviour. Within hours of birth, newborns prefer their mother's speech or voicing over that of another woman (DeGasper and Fifer, 1980, cited by Trevarthen, 1993c). Even these behaviours which aim at meeting infants' physiological needs, such as feeding and holding, are soon highly cooperative and through these both partners become rapidly better at anticipating the others' acts or signals (Trevarthen, 1980). In addition, these regulatory behaviours testify to an innate readiness to receive regulation and support from the emotions expressed in maternal care, on one hand, and generate and respond to her emotions, on the other hand (Trevarthen 1993b).

Primary Intersubjectivity

After the neonate stage, interpersonal communication assumes in a distinctive form, leaving aside self-regulatory behaviours. At the end of the first month, infants indicate, in an increasingly “dramatic” form, signs of adaption to mutual perception of others, motivational organization within “ proto-conversational” interactions by means of a rich repertoire of expressive behaviours pre-adapted to intersubjective-exchange, in combination with orientation of the gaze to and from the mother's face and immediate response to her intentional, emotional expressions. On the other hand, while mothers differ in the style or range of their expressions according to their personalities, they automatically adapt their behaviour to match infants' perceptions and communicative capacities in a special manner which captures infants' interest.

Early pre-adapted expressive behaviours of intersubjective exchange include cooing, facial expressions of smiling, pre-speech mouth movements, head and hand postures and gestures, and gaze control.

Coos are defined as "pleasure, positive and non-crying vocalisations", their quality and intensity being determining factors for the effect that they have in adults' emotional responses. The motor patterns required for the vocalised cooing are adapted to communication and independent of auditory feedback from self or others (Lenneberg et al., 1965, cited by Trevarthen, 1979).

The theory of "an innate, pan-human facial 'vocabularly' of emotional signs" (Trevarthen, 1979, p. 327) is adopted. Thus, the infant smile is shown not to be the result of imitative learning by its appearance in blind infants (Freedman, 1964; Fraiberg 1968, cited by Trevarthen, 1979). Like cooing, the motor patterns of smiling must be pre-formed before birth. Facial movements related to language and speech include lip and tongue movements named "prespeech". Like other expressions mentioned, prespeech movements exist at birth, but they become more distinct after the second month. The systematic production of prespeech to signals from a partner in face-to-face interaction is assumed to indicate infants' rudimentary intention to speak, despite differences from adult speech (Trevarthen, 1979).

Ethologists assume that prespeech movements have evolved from non-linguistic actions like kissing, biting etc. (Andrew, 1963; Eibl-Eibesfeldt, 1970; Blurton and Jones, 1971, cited by Trevarthen, 1979).

The systematic relation of head and hand posturing to particular facial expressions, forms of vocalising and prespeech leads to the working hypothesis, supporting Darwin's proposal, that there is an "innate template" upon which the patterns of expression through posture is based. In particular, Trevarthen gives emphasis to the expressive function of hand postures. The hand movements near the face combined with expressive vocalisations and prespeech are termed "gesticulation", and it is recognised that despite individual variability and innate-in-basis nature, they may be modified by imitation.

At two months, infants' eye movements communicate the changing direction of their visual attention. The shift of eye movements to or away from hands and face and especially within the face area (mouth and eyes) signify person-to-person interaction. The selection of expressive organs as foci of attention presumes that "looking is a pre-adapted response to particular signal patterns" (Trevarthen, 1979,

p.330). The defining feature of face-face communication is often assumed to be mutual eye contact (Robson, 1967; Stern, 1974, cited by Trevarthen, 1979).

Intrinsically-generated cycles of motivation, expressed in emotional regulation, generate oscillations in a coherent dual-performance interplay, which results in the creation of periodically alternated "utterance", "syllable" or "phrase-like" messages between the mother and the infant. This is called "protoconversation" (Bateson, 1979, cited by Trevarthen, 1993c).

This conversational play indicates that for mutual engagement to be sustained, the infant depends on a particular form of maternal behaviour that is both momentarily adjusted to their immediate needs and interests, and progressively adjusted to their development, to support growing and learning through communication (Trevarthen, 1993c). Thus, mothers have an inherent adaptation to produce a special kind of talk and, in coordination, other paralinguistic features. The special infant-directed talk, called "intuitive motherese", is characterised by periodically repeated short, evenly-spaced words, with simple sing-song intonations and highly-pitched voice. This type of speech enables the infant to pick up the beat and respond to it, in a turn-taking way (Trevarthen, 1993c). Among other things, the contents of intuitive motherese, and its developments, reflect the mother's emotional changes and her feeling about the relationship to the infant's play (Trevarthen and Hubley, 1978; Trevarthen and Marwick, 1986).

The organization of the infant's and the mother's emotional structures in a functional system is clearly demonstrated when an artificial breakdown is caused that interrupts the normal flow of interest and pleasure between the mother and the infant. After making efforts to reinstate communication and starting protesting, the infant becomes withdrawn and avoids looking at the mother. On the other hand, when the mother encounters an infant who, due to an artificial separation, fails to engage in organized patterns of responsive expression, she feels something is wrong and she starts expressing protest and distress, or blaming herself (Murray and Trevarthen, 1985). It has also been proved that maternal depression can have severe immediate effect on infant's cognitive and social development over the first year (Murray, 1992).

Epoch of Games

Around the middle of the fourth month, it is assumed that the primary form of dialogic communication changes due both to transformations of the infant's motivational structures and to improvements of his motor control, leading to more vigorous engagements than before, and more marked rhythmic patterns of activity. The initial expressive behaviours decline (eye contact, smile, prespeech movements) and as a consequence, changes in the mother's behaviour occur (Trevarthen 1980; Trevarthen et al., 1998).

Mothers and infants join in a wide variety of "games of the person", in which, despite the individual temperamental variations, they share common patterns or rules of repetition and emphasis, leading to accentuated climaxes. Patterns of expressive behaviour and turn-taking are striking features of these rituals of play (teasing games, baby songs, action games), that when repeated are greeted with signs of pleased recognition by the infant. Infants make either alternating or coacting contributions, engaging with the rhythm and prosody of these active patterns which permit them to predict the cyclic expressive events in the "emotional narrative" (Trevarthen, 1980; Trevarthen et al., 1998).

One or two months after games of the person are familiarised by the pair, "games with objects" begin. Objects used are usually the ones that are of interest to the infant. The aim of this type of game is the establishment of a bridge between the will of the mother and the infants' exploratory intentions. As an integrated part of this coupling, coordinated expressive behaviours of many forms accompany these "artificially-facilitated cooperations" (Trevarthen, 1980). In the beginning, these artificial interactions are one-sided, in the sense that the mother adapts herself to an infant who accepts a toy, given by the mother, inside his or her intentions, and watches the effects closely. The infants' gaze and attentional shift signifies a change that has effects within the person-person-network. That is, at a next step, as a consequence of differentiation in the emotional quality of motive interchanges, the infant, instead of being absorbed in the object-motion effects, starts paying more attention on the mother either directly looking at the mother's face, or indirectly

listening to her voice, to observe the effects of the object on the mother (Trevarthen, 1980; Trevarthen et al., 1998).

Secondary Intersubjectivity

At the close of the epoch of games, around the eighth month, it appears that brain developments, under-structured by the emotional quality of motive interchanges, cause a new communicative perspective. This new form of communication leads both towards understanding of language and to developments of infants' ideas of objects, through interactional acts addressed to other people in both grammatical and non-linguistic forms. The most striking feature of the new behaviour is the systematic combination of infants' interests in the physical world and his communicative acts addressed to persons (Trevarthen, 1993b ; Trevarthen and Hubley, 1978).

At the beginning of this stage, while the child's intrinsically-generated awareness that the mother is an Interpersonal Other has not been lost, its manifestation is less direct than before. Thus, spontaneous play with an object or toy between mother and infant is characterised by the initiatives of the child and by extensions of these by the observant mother (Trevarthen and Hubley, 1978).

Then, within a few weeks, a fundamental change takes place, signifying infants' "heightened recognition" of the mother's meaning and understanding. This shift is signalled, mainly, by a change of the purpose and significance of the infants' gaze behaviour. Infants begin to look for signs of interest in the mother, waiting a chance to follow her ideas, while before, an infant's look of acknowledgement followed the mother's giving of an object to him or her. This differentiation of the emotional quality of motive interchanges is manifested in communicative acts of either an emotional or a verbal or non-verbal form, or a combination of these, in give-and-take games, vocal comments in combination with handing toys, recognition smile etc. (Trevarthen, 1980).

The most significant and central achievement, the goal of this adaptive mental development, is clear when the infant shows a new skill, learned under the guidance of another, and actively practised. At this point, triadic "person-person-object"

network is created, in which awareness shifts occur freely from each of the two persons to the other person, and to the common object (Trevarthen, 1980).

At the end of this stage, the emotional quality of motive interchanges is more elaborate, with the Other's responses becoming more rapidly exchanged and more directive, ending in prolonged "emotional narratives". The infant expresses himself or herself in a more assertive way, exhibiting a more conscious "self". The Innate Intersubjectivity of the first stage changes in its motives, emotional alertness and richness, facilitating negotiation of cooperative awareness and joint task performance (Trevarthen, 1993b; Aitken and Trevarthen, 1998). In addition, it is assumed that, there is an element of metacommunicative pretension called "protosymbolic" (Trevarthen, 1993b), involving an emotional transfer that appears to be crucial in the development of language (Trevarthen and Logotheti, 1987).

Learned intermodal associations between feedback effects of moving, establishing of emotional coherence and self-awareness as a primary function of imitation, identification of the other, problems of sensory information processing or representations in thinking, are preoccupations from which the explanation of imitation turns attention (Trevarthen, 1993b, Trevarthen et al., 1998). The constellation of intrinsic behaviour-regulating mental powers with which the newborn infant is equipped through "prefunctional morphogenesis", endows him or her with the following processes, states and conditions, all necessary for imitation to occur:

- 1) A dual representation of qualities or states in organization and regulation of both the "self-subject" and the "other-subject", this double image being integrated with the mechanism for patterning matching movements. Innate self-other organization requires translation between the feelings of "self-as-agent" (proprioception) and of the "other-agent" (alteroception) through operation of a mechanism called "affordance mirroring".
- 2) Unique intrinsic motivational structures, or an inborn mechanism of "phrasing", in rhythmic cycles of expressions, which are regulated between mentally-active subjects. Alternating phases of motivation provide imitation with timing features, the

coherence of which is assumed to be essential for unity of consciousness (Trevarthen et al., 1998). As a product of this intrinsically-generated equipment, imitations, even those made by premature newborns, are metacommunicative. Higher level intersubjective encounters arise from the readiness to explore with communication about communication (Trevarthen, 1993b).

Trevarthen (Trevarthen et al., 1998) assumes that imitation is a manifestation of sympathy, in the sense of the term used by Adam Smith and Frances Hutcheson, as the qualities generated at the emotional field by the others' attitudes. It is suggested that it is as if we are endowed with an internal imitator who makes judgements about the nature of actions, our own and others', causing sympathetic responses. This kind of transaction-regulation becomes visible as the endogenous motives, coded in emotions are translated intersubjectively.

It is assumed that there are two conditions that should be met for imitation to occur:

- a) Infants, particularly newborns, should observe the model with evident effort many seconds before they imitate it.
- b) Infant should be in optimal alert arousal and the modelling should "respect" infants' felt needs; that is, it must be adjusted to his or her state of interest (Trevarthen, 1982, 1993b). Apart from these two conditions, Trevarthen recognises that individual temperamental differences in readiness to imitate are a determining factor of imitative performance (Trevarthen, 1993b).

Trevarthen does not share Guillaume (1971) and Piaget's view (1962) that visual imitation is more difficult to explain than auditory imitation, due to the fact that the model's and the imitator's behaviour are experienced in the same sensory form in the latter case. He points out that even the auditory signals are experienced in different form for the emitter and for the perceiver. Within the emitter's perception, the sound making is both caused and results in diversified "self-as-agent" feelings. Visual imitation is not different in requiring an internal form of behavioural mirroring (Trevarthen et al., 1998).

Trevarthen (1982) has distinguished imitations of two kinds: "magnetic" and "discretionary". This terminology may lead to a misconception. It has to be noted

that the distinction is made rather in accordance with the degree of control under which imitations occur, than in relation to the degree of deliberation. "Magnetic" describes early imitation which is more automatic, and thus relatively unpredictable, while "discretionary" imitation involves more attentional control, in the sense of fixing of interest on the presented model, and it entails an element of choice (Trevarthen, 1982). Trevarthen himself recognises that some degree of deliberation is evident in magnetic imitation (Trevarthen, 1982), and it is rather a matter of increase in deliberation by the older infant (Trevarthen, 1979).

From the beginning of the human communicative life, imitation has attributed intersubjective regulatory functions. This is achieved through the two following processes:

a) Adjustments of the messages conveyed through imitation that express the infants' motivation for cooperative action and intersubjective play according to age-related developmental changes (Trevarthen et al., 1998).

b) Age-related losses in willingness to imitate. In trying to explain the problem of temporary loss of an ability such as a form of mutation, Trevarthen assumes that while a remarkably complete outline of psychological functions is present in newborns, the postnatal developments are regulated partially by interactions between the innate components as they become more elaborate, in combination with the benefit from stimuli from a highly organised environment, to which they are adapted. In particular, neural components, predetermined in the internal self-regulatory developmental processes, react to one another, becoming more distinct and associated in functional systems, in ways that determine how the effects of experience will accumulate (Trevarthen, 1982).

A model of dynamic regulation of intersubjective communication, proposed by Trevarthen et al. (1998), identifies the function and place of imitation, at points of alternation, when one mentally-active mind of a communicating dyad is in the active state of "assertion", while the other mind is in the more passive but concentrated state of "acceptance". It is assumed that the mechanism causing motivation to vary is inborn in the infants' mind but adapted to respond to expressive states of a partner. Adopting Lynch's "phrasing theory" (Lynch, Oller, Steffens and Buder, 1995),

which identifies three periodicities expressed in infants' vocalisations, namely, "syllables", "utterances" and "phrases", Trevarthen assumes that these periodicities represent "a phasic alternation" of intrinsic motivation structures affecting all forms of expression. At a given moment in a dyadic interaction, one mentally-active subject is in "assertive effort", while the partner is in a more receptive state of "apprehension", entailing reduction in activity that favours concentration in organs of awareness, necessary for enhanced information processing. Imitation is likely to occur as part of this state of apprehension (Trevarthen et al., 1998).

In summary, by combining evidence from neuropsychology, brain embryology, genetics of the body and brain and from detailed accounts of the behaviour of human infants, Trevarthen has constructed a theory that presents humans as endowed with unique motivational structures for early intersubjective communication, cooperative imagination and joint interest in objects and tasks, the motives for which are determined long before birth.

Trevarthen's theory has set boundaries for a new approach in developmental psychology, not restricted to explanation of the imitative abilities of infants, but concerned with all of human intelligence and consciousness. However, it has to be noted that the theory was constructed to account for evidence concerning infant-mother interaction. In principle, the theory may be applied to familiar others in the infants' world, such as fathers. Trevarthen himself admitted, when he first proposed the theory, that the data on fathers or females other than the mother, was not enough to permit comparative statements (Trevarthen, 1979).

Trevarthen's theory of innate intersubjectivity stimulated theoreticians (Neisser, 1993; Bråten, 1994, 1996) and researchers, both experimental and naturalistic (Kugiumutzakis, 1985, 1993). An account will follow of representative theory and research which has extended this theoretical framework.

3.6.1. The Self Perceived (Neisser, 1993)

Neisser (1993) distinguishes five selves, experienced as one, in the sense that each self does not constitute a particular part of the person, but it is rather the awareness of the whole person from a particular point of view. The experience of

these selves is based on different kinds of information, emerging in different times in ontogeny taking different developmental courses. In particular, the "perceived self" consists of an "ecological self", an "interpersonal self", a "conceptual self", a "temporally extended self", and a "private self".

The "ecological" and the "interpersonal" selves are not constructed by learning, but are directly perceived. The "ecological self" perceives the location, the movement, the action and the agency of the subject located "here and now" in the environment. Similarly, the "interpersonal self" involves the direct face-to-face interaction which establishes a ". . . preconceptual form of knowing: knowledge of the 'other' and of the self as engaged with the other." (Neisser, 1993, p. 13). It is in connection with this version of self that Neisser invokes early imitative phenomena, suggesting that these provide evidence for the early appearance of the interpersonal self. The interaction of the ecological and the interpersonal knowledge, the former emerging from the interaction with the physical environment, and the latter arising from the interactions with others, constitute the forms of perception that are present since birth.

The "conceptual self" refers to the indirectly perceived ability to think about oneself, bringing expectations, evaluations and obligations in its train. It appears near the end of the first year and in its mature form it leans on cultural forms. The "temporally extended self" refers to a version of the self-concept that transcends the present and extends in the past, on the basis of memory and reconstructions. It appears later than the conceptual self, around the third year of life or later. The "private self" refers to the uniqueness of conscious experience of each individual, built on the basis of recalled thoughts, images, pains, dreams and feelings. This self-concept appears around the 4th-5th year of life (Neisser, 1993).

3.6.2. Imitation within an Intersubjective “Companion Space”

(Bråten, 1996)

Bråten views imitation and imitational learning⁵ as functions in an intersubjective “companion space” (Bråten, 1994), which is different from the “observational space” accessible to third party observation and analysis (Bråten, 1996). Within the companion space, success or failure of connectivity between the “actual self” and the “virtual other”, constitutes a prerequisite for imitation or imitational learning at two, possibly interlaced, levels: for “between-subjects” and “within subject”, “co-enactment” and “re-enactment”, respectively.

Bråten hypothesises the existence of an intrinsically generated self-other organization in the developing mind that both invites and permits actual others to complement the bodily self in “felt immediacy”. This self-other organization is assumed to constitute the mechanism through which infants’ inborn cerebral base is endowed for intersubjective attunement to a variety of expressions. If the existence of this base is taken for granted, then the elements that constitute the “companion space” are: the “self”, the “actual other”, and the “virtual other”.

The virtual “other” is defined in regard to an “inherited companion perspective”, an integrated part of the self, with the same operational efficiency as the actual other (Bråten, 1994). The self’s virtual other has a two-fold function:

- a) It enables “alteroception”, the specific cerebral response to the kinematic, energetic and physiognomic aspects of the other’s bodily movements, (Trevarthen 1986; Bråten, 1994).
- b) It complements the “bodily self perspective”, which is evoked in a proprioceptive response to kinematic, energetic and physiognomic aspects of self. Thus, the infants’ companion space in which the infants’ bodily self is complemented by the other, virtual or actual, is defined in regard to both these integrated aspects, the “alteroceptive” space and the “proprioceptive” space, (Bråten, 1994).

⁵ The term “imitational learning” applies to delayed re-enactment of novel movements or performances (Bråten, 1994).

For a successful engagement between self and actual other, an inverted alteroception is a prerequisite; that is, a capacity for “. . . *mirror reversal of the other's perspective as felt.*” (Bråten, 1994, manuscript), arising from the asymmetry between the bodily self and the virtual other perspectives. This is the “alter-centric participation”; that is, participation in the other's expressions from the other's position, which is the reverse of the own bodily “egocentric” position (Bråten, 1997).

The process by which the other (virtual or actual) complements the bodily self in “felt immediacy”, is termed as “operational closure”. There are two self-other connective circles, determined by the closure, that enable the infants' developing self to be recreated and transformed: a) engagement with others in felt immediacy; and b) self engagement (with the virtual other), re-enacting the engagement in felt immediacy. Success in the first step which entails inverted alteroception, and conformation of the second, lead to imitation, which depends on successful engagement of two self-other loops:

- 1) Connection with the actual other (external), resulting in co-enactment, through inverted alteroception.
- 2) connection with the virtual other (internal), triggered by the preceding feeling of co-enactment, which results in re-enactment through emotional memory, in an affective companion space. “(E)motional memory” is a term referring to,

“. . . resemblance of motions experienced in felt immediacy that connects to in-form proprioceptively felt re-enactment.” (Bråten, 1994, manuscript).

3.6.3. The Intersubjective Nature of Imitation

(Kugiumutzakis, 1993)

Inspired by Trevarthen's theory of innate intersubjective motivation, Kugiumutzakis (1993) made a longitudinal naturalistic study to episodes of vocal imitation in free mother-infant interaction. Dyads were observed every fifteen days from the first two weeks to the sixth month of postnatal life (Table 3.5):

| | |
|--------------------|--|
| Aims | <p>The study of vocal imitations, in the following structural aspects:</p> <ol style="list-style-type: none"> 1. direction of imitative sequence; 2. type of imitative exchange and number of turns of the imitative episode; 3. classification of sounds; 4. temporal patterns of the imitative episode, the model, the pause and the imitator. |
| Methodology | <p>a. Subjects Age: 15 days to sixth month Number: twenty one (21) mother-infant pairs Sex: eleven (11) boys and ten (10) girls</p> <p>b. Procedure Video-recordings at infants' homes. Parents were told that the aim was to study play in the home environment. Taped interview at the end of the study. The data collection resulted into 252 10-minute recorded sessions.</p> <p>c. Analysis <ol style="list-style-type: none"> 1. Categorization of all vocalisations in Greek orthographic approximations to speech sounds, resulting in the exception of "vegetative" sounds. 2. <u>Vocal imitations</u> were analysed in episodes defined as: "...an exchange in which one partner produced a sound that had not been uttered by either partner in the immediately preceding 2 seconds, and in which the other partner repeated a sound judged to be an imitation within a 2-second interval and with no intervening vocal activities (Kugiumutzakis, 1993, p. 28). </p> |

Table 3.5: Kugiumutzakis' Naturalistic Study (1993) of Vocal Imitation in Infant-Mother Intersubjective Communication

The results of the study can be summarised as follows:

- In natural early mother-infant play, the mean number of vocal imitations is relatively low (3.2 per 10 minutes). Mothers imitate their infants more frequently (73%) than vice versa.
- No significant differences were found between mothers' imitations of boys and girls.
- The majority of vocal imitations occurred in simple turn-takings, while overlapping was rare.
- Imitation of speech sounds was significantly more frequent than imitation of non-speech sounds, such as coughs, sneezes, whimpers and sighs.
- Imitation of vowel-sounds prevailed in the speech-sound imitations, while combinations of vowel-consonant sounds were imitated to a lesser extent and consonant-sound imitations were rare.
- Vowel-sounds were imitated significantly more frequently by mothers, consonant-sounds were imitated almost exclusively by mothers, while infants imitated vowel-consonant-sounds significantly more frequently than mothers.

- There were considerable individual differences in imitative interaction, competence and performance.
- The temporal pattern of model and pause remained stable in time, and the latter had a mean of 0.47 seconds.
- Maternal and infant imitations were found to have about the same response latency, and mothers' imitations lasted 0.2 seconds more than those of infants.
- Infant vocal imitative responses decreased from the 15th day to the 1.5 month, and from 3.6 months to the sixth month.

In interpreting his results, Kugiumutzakis (1993) attributes spontaneous vocal imitations in free infant-mother interactions to an innate intersubjective sharing on the following grounds: a) a common temporal pattern characterises maternal and infant imitations; b) both mother and infant seek turn-taking; c) imitations have a relaxed quality; and d) the developmental pattern of vocal imitations matches that described for maternal speech in the period of primary intersubjectivity (Kugiumutzakis, 1993).

The higher frequency of turn-takings compared to overlaps, establishing turn-taking as the rule for vocal imitation, reveals in the most "dramatic" way the conversational and thus communicative nature of vocal imitative exchanges. In addition, the fact that mother's imitations in simple turns prevail over infant imitations does not imply an unbalanced interaction. Mothers rather than infants, are the partners making efforts to prolong engagements (Kugiumutzakis, 1993).

The non-linear developmental curve of infant vocal imitative responses, and the temporal pattern changes of infants' vocal imitations are attributed to anatomical changes, resulting in regular reorganizations of the infants' intrinsically generated motivational structures. These reorganizations lead, in turn, to integrated motor, perceptual and cognitive changes, in addition to both an increase and an improvement of imitative tendency and skill (Kugiumutzakis, 1993).

Of interest are Kugiumutzakis' ideas on the affective values of the sounds imitated by the two partners. It is assumed that, since mothers imitate their infants' vowel-sounds more than vice versa, this means that the infants initiate sounds of this kind that prevail in their vocal repertoire, and mothers, in their turn, adopt and

imitate these sounds. Vowel-sounds are attributed an affective value of great importance for these interpersonal exchanges. In addition, it is assumed that since infants imitate combinations of vowel-consonant sounds more than their mothers do, we can conclude that the mother initiated them to “. . . support elements of a shared code of transient emotions.” (Kugiumutzakis, 1993, p. 40), and the infant, then, adopted this emotional enrichment and reproduced the sounds.

In his latest contributions (Kugiumutzakis, 1998a, 1998b), Kugiumutzakis has been more specific about the shared nature and the affective value of vocal imitative exchanges. He assumes that what is shared is,

“ . . . the same 3D space, the same companion space, the same tendency to act and interact in turns, the same temporal pattern, the same ability for self-other discrimination, the same ability for recognition of face and voice isomorphism, the same code of communication, the same ability to read each other's motives and intentions, the same transient emotions, the same innate ability to imitate each other's actions and the same developmental changes in early infancy.” (Kugiumutzakis, 1998a, in press).

In addition, it has been proposed (Kugiumutzakis, 1998b), that certain shared emotions, namely, “interest” and “pleasure”, motivate both infants and parents to imitate within a “companion space” that expresses the innate intersubjective, dialogical and social nature of the newborn mind (Kugiumutzakis, 1998b).

Kugiumutzakis has greatly enhanced our comprehension of the affective value of spontaneous vocal imitative exchanges in infant-mother interactions. While recognising this contribution, the writer perceives three points of criticism:

- a) As Kugiumutzakis (1993) has admitted himself, an account of the development of imitative tendencies cannot be drawn from measurements of just one kind of response, since different linear and non-linear developmental curves are obtained, depending on which kind of imitated activity is studied.
- b) While it is recognised that there is no satisfactory standard coding of the emotional content of vocal expressions, the affective values of vocal exchanges are inferred rather than directly studied.
- c) The value of imitations of consonant-sounds appears to be underestimated. The finding that consonant sounds are almost exclusively imitated by mothers was not interpreted.

Experimental studies and descriptive accounts that assess mother-infant imitation in other interpretational frameworks (Moss, 1967; Waxler and Yarrow, 1975; MacFarlane, 1977; Moran, Krupka, Tutton and Symons, 1987) are reviewed.

3.7. Discussion

The authors whose work we have reviewed make different assumptions about the endowments of the infants for communication; and about the role of emotions and imitation. Wallon claimed that the affective relationship-making aspect of imitation generates messages of admiration, solidarity, intimidation, jealousy and so forth. Notions of "dialogue", "communicative gestures" as well as the relation between imitation and empathy, incorporated in Newson's theory, elucidate the place of imitation within the naturalistic context. Uzgiris claimed that, within a reciprocity of awareness, "matching" of behaviours conveys sharing of understanding and of feelings, and promotes continuation and development of interaction, thus, leading to more conventional means of communication. Daniel Stern's main contribution lies in his concepts of "vitality affects" and "affect attunement", which describe qualities of imitative behaviour necessary for regulation of intersubjective interaction. Papousek and Papousek attribute to infants fundamental learning and cognitive operations but consider that affective meaning is acquired gradually, through vocal matching. Trevarthen's theory of innate intersubjectivity and of its relation to an intrinsic motive formation in the brain, attributes to infants a constellation of mental endowments that permits them, from birth, to receive information from and respond to the motivational structures of others, via matching emotions, which have a regulatory function.

The methodological and interpretational differences of the above theories and research are evident. Methodological points have been reviewed in the previous chapter. Basic interpretational differences of the more recent theories of infant-mother imitation, can also be identified in the same terms as were discussed for the classical theories and observations of the early part of this century:

1. Intersensory coordination: How infants can receive information on a partner's activity from one modality and translate it into a movement perceived in themselves,

by another sensory modality, has remained a matter of controversy for theoreticians and the researchers of attempting to account for imitation in infant-mother interaction.

In Wallons' view, it appears there is no innate basis for intersensory coordination, the initial state being one of undifferentiated self, not distinct from others. Gradually and after the sixth month of infants' life, segregation between self and other starts.

In Newson's theory, the matter, nature and origin of intermodal coordination are not defined. Hypothetically speaking, it may be assumed that this is supposed to be a by-product of learning, that is, a process that is not innate but gradually acquired through experience. This assumption is justified by Newson's claim that human attentional abilities are originally organised in two independent channels of communication: the auditory and the visual. The reception of a signal in one mode does not distract the child from giving attention to the other mode, and, as Newson accepts, this ". . . implies a powerful and economic use of two independent channels of communication." (Newson, 1978, p. 40). Evidence for the independent contribution of hearing and sight comes from the disadvantages suffered by a deaf child.

One process involved in forming the "sense of an emergent self" in Stern's theory, is the innate general capacity of amodal perception. It is the writer's opinion that in Stern's theory the matter of intersensory coordination has been discussed more in relation to its possible origins than to the mechanism through which it is achieved. This is clearly recognised by Stern himself, who says, "We do not know how they (infants) accomplish this task." (Stern, 1985, p. 51). Stern suggests that the information received from one particular modality does not belong to this modality alone, but rather transcends modes or channels and exists in some supra-modal form. It is assumed that encoding to a mysterious amodal representation is involved, so that it can be recognised by any modality (Stern, 1985). In addition, Stern (1985) suggests there exists another kind of inter-modal perception, the innate capacity of "physiognomic" perception, which assists translation from one modality into another by transfer of categorical affects, such as the smile of happiness, or the scowl of

anger, rather than of perceptual qualities such as dynamic forms of movements. The mechanisms of both kinds of perception, amodal and physiognomic, remain unknown.

Papousek and Papousek (Papousek and Papousek, 1989; Papousek et al., 1985) do not discuss the matter of intersensory coordination, as such. One reason for this, may be that the main concern in the Papouseks' studies has been vocal matching and not facial expressions, the latter being the expressive behaviours that prove intersensory coordination in the most "dramatic" and representative way. Stern (1985) assumes that speech is dependent on perception of both visual and acoustic configurations, because the lips of a mother are seen to move, while Trevarthen assumes that even auditory signals from vocalisations are experienced in different form by the emitter and the perceiver. Within the emitter's perception, the sounds of vocalisations are both caused by and resulting from diversified internal "self-as-agent" feelings. Thus, visual imitation does not necessarily depend on a very different form of internal behavioural mirroring (Trevarthen et al., 1998).

In Trevarthen's theory of innate intersubjectivity, intersensory coordination is assumed to be of embryogenic origin. Trevarthen has been more specific concerning the mechanism and the nature of the intermodal phenomena. He assumes that "...the mapping of the body in one individuated neural system . . .", enables the integration or the coordination of behaviours and experiences (Trevarthen, 1993b, p. 125). The brain is endowed with organisation to control and assess the affordances of the environment by motor and sensory systems, both of which, (by somatotopy) "map" the body in neural systems, giving the foetal self a primitive coherence or unity (Trevarthen, 1993b). The translation, in the active life of the infant, between the affordances of proprioception (self-as-agent feeling) and alteroception (self-as-other-feeling) is mediated by a mechanism called "affordance mirroring". Each subject perceives and makes use of the partner's affordances, making them affordances for the self (Trevarthen et al., 1998).

2. Developmental Changes have been discussed extensively both directly and indirectly. While some researchers and theoreticians make special reference to developmental dips in imitative behaviour, others discuss the process of development

in more general terms. Further, some researchers provide interpretations for developmental phenomena in imitative behaviour while others do not.

In a rather indirect way, it seems that Wallon accepted discontinuity of imitative structures,

“We have accepted the fact that up till now there has been functional continuity in the succession of imitative structures, although authors as authoritative as Guillaume and Wallon are opposed to this view.” (Piaget, 1962, p. 49).

Stern (1985) seems to acknowledge the existence of the developmental dips, referring to them as qualitative organizational changes.

Papousek et al. (1985) express no definite view on developmental dips. It may be assumed that they accept the existence of such events, in principle, without providing an interpretation.

In Trevarthen's view, the matter of developmental dips is not simply accepted but it is discussed and interpreted. In reference to imitation, it is assumed that by observing developmental dips it is possible to infer intersubjective regulatory functions that may be attributed to imitation. (Trevarthen et al., 1998).

3. Individual Differences, generally, and specifically in relation to imitative performance, have been discussed in studies of imitation in infant-mother interaction. While some authors recognise infant individual differences, others emphasise only parental individual differences of parents, while some discuss individual differences of dyads.

In Newson's theory, individual differences are not discussed directly. It can be inferred that what the mother does, is influenced by the fact that the limited behavioural repertoire of the infant is “. . . by no means entirely unpredictable.” (Newson and Packer, 1972). Stability of the infant's personality in exchanges, and the ritual sequences of gestures acquired, are the conditions that create the frame within which development of communication occurs. This historical dimension, the idiosyncratic strategies developed by a particular infant-mother pair, is highlighted as of great importance, explaining how new strategies develop. It is suggested that it is through training or stage-to-stage adaptation that rules of communicative exchange, and symbols with shared meaning, are acquired (Newson, 1978).

Stern seems to consider differences between pairs to be due to the different behaviours of mothers. Mothers are assumed to “carry” their personal histories as they participate within interaction, and these histories influence mothers’ subjective experience of observable ongoing interactions. A mother’s personal history is not restricted only to the inclusion of a “working model” of her infant, but also of corresponding models for her husband, her own mother and various others. In addition, it is assumed that the past history of the infant contributes to the formation of different subjective experience (Stern, 1985).

Papousek and Papousek seem to recognise mainly the existence of individual differences of parents and dyads while they do not seem to refer to differences in infant imitative performance. Papousek et al. (1985) recognised the inter-individual variations in vocal stimulation that parents provide for infants in the course of the first year of life. Later, Papousek and Papousek (1989) refer generally to individual variations in matching and infants’ readiness to vocalise within a short observation period. That is, infant individual differences are correlated with an external factor i.e. limited response time, and not identified with intrinsically generated factors alone.

In Trevarthen’s theory, individual differences are discussed in an integrated view. All parental and infant differences, and differences between pairs are viewed as they affect interpersonal interaction. It is assumed that mothers differ in the style or range of their expression according to their personality, while there are communicative expressions of pan-human language that are socially cultivated (Trevarthen, 1979). Further, it is suggested that each mother-infant pair develops conventions of communication. As for infants, they are assumed to be sensitive to subtle differences in the mother’s expression. In reference to individual differences influencing infant imitative performance, Trevarthen adopts Kugiumutzakis’ evidence (Kugiumutzakis, 1985, 1993) that there are some subjects who do not imitate the most careful and persistent modelling and Field’s evidence (Field, 1985) that there are considerable individual “temperamental” differences in readiness to imitate (Trevarthen, 1993b). Trevarthen also discusses the interrelated factors of interest, attention, effort and state of alertness as they impact on imitative performance (Trevarthen, 1993b).

4. Motivation has also been discussed, to a limited extent, by theoreticians and researchers concerned with the development of imitation. Some of them discuss motives in relation to intersubjectivity, others are more specific in reference to imitation. The consideration of motivation is, in the writer's opinion, inseparable from the account of the infant's emotional development.

In Nadel's view, based on Wallon's theory, it seems that after the second year of life toddlers attribute their motives to others, and they espouse the motives of others, attributing them to themselves. While the nature of the motives involved is not clarified, Nadel considers that in moments of positive emotional sharing, in which interest and attention seem to dominate, behavioural identification motivates children to sustain interactions (Nadel, 1993; Nadel and Fontaine, 1989).

In Newson's theory, the motive for imitation is attributed only to the mother. This takes the form of her, ". . . desire to establish a degree of shared understanding with her baby . . ." (Newson, 1978, p. 37). Infants are treated by mothers as persons who have feelings, intentions, desires etc., and mothers seek confirmation of this in the emerging communicative consequences.

Uzgis (1981) initially adopted Moscovici's views on motivation for imitation. There are two motivations corresponding to the two aspects of imitation, the cognitive and the social. The roots of these motivations ". . . may be evident in imitative interactions during infancy." (Uzgis, 1981, p. 9). The first motivation is "the validation of opinions and judgements", while the second motivation refers to the provision of "reaffirmation and identity" (Moscovici, 1976, cited by Uzgis, 1981). Later, Uzgis (1984) seems to pay special emphasis to the interpersonal meaning as the "incentive" for early imitation within infant-mother communication.

In Stern's theory, the reinforcing, power of intersubjectivity, is suggested to be: a) the achievement of security needs or attachment goals; and b) the human need to be included in a group as a member (Stern, 1985). While the exact motive for imitation is not clear in Stern's theory, at one point while referring to maternal imitation, he says: ". . . the feeling state that gave rise to the overt behaviour." (Stern, 1985, p. 139).

Papousek and Papousek (1989) claim that there is “. . . an intrinsic motivation to imitate.” (Papousek and Papousek, 1989, p. 150). The nature of this kind of motivation is not further clarified, it may be a,

“. . . ‘need’ to acquire knowledge, to solve problems, to be in active, mental rapport with the environment and with one’s self.” (Papousek et al., 1987, manuscript).

Motivation is central in Trevarthen’s theory. His theory of innate intersubjectivity is related to the hypothesis of an Innate Motive Formation. It is suggested that this Formation is both prefunctional and functional; that is, it emerges, before birth in brain development as the principal regulator of morphogenesis in neural systems, and after birth it persists as generator of motives and emotions by which human contacts are regulated. Further, it is assumed that the differentiates of the initial motive formation serve to generate motives for intelligent exploration of the environment on the one hand, and the emergence of an additional dialogic mechanism through which the “self-subject” and the “other-subject” are represented, on the other (Aitken and Trevarthen, 1998). Emotions are taken to express the “central energy and the self-regulating quality of motives” (Trevarthen, 1993b). Trevarthen refers to “imitation of motives” (Trevarthen et al., 1998). In like manner, Kugiumutzakis (1993, 1994, 1998b) proposed that the neonatal imitative episodes are both preceded and followed by two interacting emotions, “Both interest and pleasure motivate the intersubjective, imitative game . . .” (Kugiumutzakis, 1998b, in press).

It may be concluded that investigators in the area of imitation research in infant-mother interaction, have many and various interests. Despite the wide variability of the measures taken, the level of analysis applied, and the interpretational frameworks adopted, there emerges a general consensus that early infant and maternal imitative phenomena do constitute integrated components of interpersonal communication. The under-lying structure of these early imitations gives evidence of a prefunctional endowment that is proved “dramatically” through the coordination and the sharing of purposes and awareness.

CHAPTER FOUR

RESEARCH ON IMITATIVE PHENOMENA IN INFANT-FATHER INTERACTION⁶

Introduction

Studies of interaction between fathers and infants are far fewer than those concerned with mother-infant communication, and the contribution of fathers has evidently been underestimated. Various explanations have been offered for this neglect (Lamb, 1975; Parke, 1979). In recent decades, with changes in society and in concepts of the role of parents in child development, there has been a notable increase of concern for the special contribution fathers may make in a family with a young infant and communication between fathers and infants has been analysed in a number of studies (Lamb, 1976, 1987; Yogman, 1982a, 1982b; Beail, 1983). These have revealed wide variations in fathers' contact with infants and fathers' behaviour, including cultural differences (Lamb, 1979, 1987; Parke, 1981; Parke, Grossman and Tinsley, 1981; Yogman, 1982a).

As with mother-infant studies, methodological issues have been discussed in a search for explanations of controversial findings, or to explain historical changes (Lewis, 1982), and the special difficulties encountered in research with fathers (Lewis, 1986). Several research models have been proposed (Lamb, 1976; Lewis and Weinraub, 1976; Parke, 1979; Pedersen, Yarrow, Anderson and Cain, 1979; Pedersen, 1985). Recent research on infant-father interaction may be divided according to various criteria. The country of origin clearly is important. In Britain,

⁶ Some portions of this literature review have been presented in:

Kokkinaki, T. (1996) Imitation as a way of communication between infants and their fathers. Paper presented in "Working with Fathers", The Association for Child Psychology and Psychiatry, Stirling, 15th November.

Trevarthen, C., Kokkinaki, T., Fiamenghi, G. (1998) What infants' imitations communicate: with mothers, with fathers and with peers. In J. Nadel, G. Butterworth (Eds), Imitation in Infancy: Progress and Prospects of Current Research. Cambridge: Cambridge University Press (in press).

research has been most concerned with the development of the father's role as parent, while in America, the direct and indirect effects of fathers on children has received more attention (Beail, 1983). Reports on imitation in infant-father interactions is incorporated in this variety of approaches, as will be evident in the presentation that follows.

This chapter is structured as follows: Processes of "identification" and "imitation" in father-child relationship are discussed within the Freudian theoretical framework (Freud, 1921), in Social-Learning theory (Mowrer, 1950), in Cognitive-Developmental theory (Kohlberg, 1969) and in Ethological theories (Biller and Meredith, 1975). In the writer's opinion, the largest part of the recent research in infant-father interaction is incorporated within Attachment theory (Ainsworth, 1969, 1973; Bowlby, 1969), and a brief account of this approach follows, with special reference to the emotional and motivational aspects. Then, recent views on infant-father interaction are presented (Lamb, 1975; Parke, 1979, 1981; Power, 1981; Pedersen, 1985; Yogman, 1982a, 1982b; Greenburg, 1985; C. Lewis, 1986). At the end of the chapter, recent studies reporting imitative phenomena in infant-father interactions will be discussed (Parke, O'Leary and West, 1972; Greenbaum and Landau, 1979; Parke et al., 1981; Power and Parke, 1982; Papousek, Papousek and Harris, 1987; Siegel, Cooper, Morgan, Breinneise-Sarshad, 1990), and comparisons made to findings for infant-mother interactions.

4.1. Traditional Theories of the Father-Infant Relationship with Special Emphasis on Identification and Emotion

The aim of this part of the chapter is not to review the psychoanalytic, social learning, ethological or attachment theories and views per se, but rather to present those aspects that, directly or indirectly, recognise the father's role and his contribution to early development of the infant ego. Several interpretations, representative of each theory, have been selected.

Special attention is given to clarification of the notions of identification and imitation, the place of emotions, and psychoanalytic object relations theory, with emphasis on the father's contribution in infant ego development.

4.1.1. Psychoanalytic Theory

4.1.1.1. Empathy, Identification and the Oedipal Complex

(S. Freud, 1921)

In 1920, Freud's conception of the distinction between imitation and "identification" was inconsistent. Sometimes the two terms were used interchangeably, at other times Freud referred to "identification" as a phenomenon that goes further than anything implied by the term "imitation" while, when the concept of the "superego" was developed, identification formed an integral part of the process through which the superego was acquired (Mowrer, 1950). After 1921, Freud's consideration of identification was concerned with the implications of identification, and its relation to superego formation (Mowrer, 1950). We are focusing on this last formulation,

"Identification is known to psycho-analysis as the earliest expression of an emotional tie with another person (p. 60) . . . identification endeavours to mould a person's own ego after the fashion of the one that has been taken as a 'model'." (Freud, 1921, p. 63).

In addition to being the original form of the emotional tie with an object, according to "object relations theory", identification may arise either in a regressive way, as a substitute for the libidinal object tie, or it may emerge within every new perception of a common quality shared with another person, who is not an object of the sexual instinct (Freud, 1921).

In the earliest form of identification with an object, the "expression of an emotional tie", a boy exhibits a special interest in his father, taking him as his ideal. At the same time, the boy begins to develop a true object-cathexis towards his mother, that is, his libidinal energy is directed towards her, according to the anaclytic type of object choice. At this point of development, the two psychologically distinct ties of sexual object cathexis towards the mother and the identification with the father, coexist without interference. When the two ties begin to influence each other, as a result of ". . . the irresistible advance towards a unification of mental life . . ." (Freud, 1921, p. 61), the normal Oedipal complex emerges. The little boy realises that his father is an impediment to his relationship with his mother, and then his identification takes a hostile colour. Even at an initial stage, identification is

ambivalent, since it can turn into an expression of tenderness as easily as into a wish for his removal. In the end, identification with the father is the precursor of an object tie with him.

At this stage of Freud's formulation, it was claimed that the girl's development ran on a path parallel to that of the boy, with the necessary changes in parental roles occasioned by the child's sex (Freud, 1921).

After 1935, clinical material forced Freud to a revision of his earlier position and led him to focus on the importance of the pre-oedipal relationship to the mother for both boys and girls. Thus, both the problems introduced by female sexuality and those connected with the concept of bisexuality, led to revisions of his view of the oedipal situation for the two sexes, and to recognition of the divergent developmental paths taken by boys and girls. In the long term, the intervention of these two factors influences both subsequent development and the dissolution of the oedipal complex (Machtlinger, 1976).

In Freud's theory, "empathy" is related to identification. Suspecting that the identification problem had not been exhausted, Freud (1921) refers to "empathy" as a process,

"... which plays the largest part in our understanding of what is inherently foreign to our ego in other people." (ibid, p. 66).

He is also concerned with "the immediate emotional effects of identification", concluding that,

"A path leads from identification by way of imitation to empathy, that is, to the comprehension of the mechanisms by means of which we are enabled to take up any attitude at all towards another mental life." (Freud, 1921, p. 70).

Identification, in Freudian theory, has been taken to refer to a motive or a process.

Bronfenbrenner's remark is of interest in this connection,

" 'If the core of the concept of identification is a motive to become like another person, the presence of similarity is, at best, only a by-product rather than an essential feature of the phenomenon.' " (Bronfenbrenner, 1960, cited by Lamb, 1976, p. 23).

Apart from the revisions of Freud's theory occasioned by his clinical experience, the death of his father revolutionised both his self-analysis and his theory. Thus, Freud's discoveries about his relationship with his father went far beyond the discussion of his own Oedipal complex. He became aware of the child's

role as a “narcissistic extension” for the father, of the latter’s concerns for his child and, most importantly, of the positive emotional bond of love a son may have for his father (Mahl, 1982).

Lamb (1975) has claimed that the psychoanalytic theory of Sigmund Freud is “the most influential characterization” of the father-child relationship. Later Lamb (1979) suggested that,

“It is ironic that Freud’s emphasis on the formative significance of early experiences should have nurtured the notion of maternal pre-eminence, since Freud himself placed a major emphasis on the father’s role. For Freud, the lack of paternal involvement in child rearing increased the father’s potential influence.” (ibid, p. 938).

It has already been noted that the Post-Freudian psychoanalytic views on father’s role (A.Freud and Burlingham, 1944; Winnicott, 1957; A.Freud, 1966; Burlingham, 1973; Mahler, Pine and Bergman, 1975) are characterised by a shift to earlier developmental phases than the ones considered by Sigmund Freud. This shift does not mean that the first generation of analysts failed to perceive the importance of pre-oedipal developmental phases. It is more correct to say that contemporary psychoanalytic approaches have led to a different kind of attention to pre-oedipal processes. This new perspective emerged as a result of the wider knowledge about the internal forces of the pre-oedipal phases, which, in the short-term, contribute in the shaping of the child’s characteristic ways of responding and, in the long term, have an impact upon the nature, course and resolution of the oedipal conflicts themselves (Machtlinger, 1975).

4.1.2 Social Learning and Cognitive-Developmental Theories

4.1.2.1. Developmental and Defensive Identification (Mowrer, 1950)

Mowrer’s views (1950) on identification emerged in reaction to the inadequacies of the theories of Holt and of Miller and Dollard. In brief, Holt claimed that most of an infants’ responses result in self stimulation of the infant as well as stimulation of others and he tried to provide a general explanation of imitation in terms of conditioning or contiguity learning, excluding emotional reward as a relevant factor in this learning. Miller and Dollard, in contrast, emphasised strength of reward as a necessary and sufficient condition for all learning, excluding

contiguity of stimulation as an independent principle of reinforcement. Integrating these two explanations, Mowrer assumed that,

“ . . . a comprehensive conception of learning does not rest upon the question of contiguity *or* reward but must instead embrace *both* principles and attribute to each its special functions.” (Mowrer, 1950, p. 579).

In special reference to identification and object relations, Mowrer assumes that an infant identifies first with the mother, in an undifferentiated way. That is, the mother is perceived by the child not as a woman who is different from men, but as a human being different in no systematic way from the other adult figures of the environment. It is only later that the child becomes aware of the father who comes to be the,

“ . . . special mentor, as his proctor, guide, and model in matters which will help the boy eventually to achieve full adult status in the society . . . ” (Mowrer, 1950, p. 608).

As for the girls, the mother is assumed to be the teacher and the model, not only in the course of infancy but also during later stages when sex-type training is acquired. In short, the mother is assumed to be the most familiar, responsive and loving parent with whom initially both boys and girls identify. Later, when sex-typing and the restrictive aspects of culture become significant, the boy is encouraged to take his father as a personal model, while the girl retains the mother as a model (Mowrer, 1950).

In considering the relation between imitation and identification, Mowrer claimed that while the two notions are closely related, the nature of this relationship has not been clarified because the notion of identification has never been precisely defined. In an attempt to remedy this with a systematically formulated theory of identification, Mowrer adopted Lair's views of developmental and defensive identification in combination with Courtney's concept of “mediation” (Mowrer, 1950).

In Mowrer's theory, identification has two developmental levels: at the most primitive level, imitative performances are of an autistic nature, as these were manifested in a talking-bird paradigm⁷, in which the first words of a parrot (or an infant) are uttered "... as a means of reproducing a bit of the beloved and longed-for trainer." (Mowrer, 1950, p. 590). Aspects of the personality of the "... beloved parent or parent-substitute are satisfyingly reproduced *without regard to objective utility* ..." (Mowrer, 1950, p. 591). It is only later that the bird's own voice making the same sounds as the trainer becomes rewarding to the bird (Lynn, 1974). The latter finds that the trainer spends more time with it and is more responsive when it utters recognizable words, while the imitations may attract the attention of other human beings as well (Mowrer, 1950). In a similar way, the son's imitation of the father, can provide the boy's self with a substitute for when the father is absent (Lynn, 1974). Thus, at a second level, some types of behaviour will become valuable in an "external instrumental sense" (Mowrer, 1950, p. 591).

In Lair's terms, as adopted by Mowrer, the notion of defensive identification coincides to Anna Freud's terminology of "identification with the aggressor"; that is, identification with a force that is faced with fear, leading to protection of the self by making the self equivalent to the previously feared force.

In Mowrer's terms, the subject is "frustrated" in both developmental identification and defensive identification, but this frustration is of a different nature in the two types. In the first, the sense of frustration emerges from the sense of loneliness due to the fact that the parent is absent and the infant wishes he or she were present. In defensive identification, the frustration arises rather from the interference and punishment of the parent, who is present and the infant wishes he or she were absent. In the latter case, Mowrer notes that the child experiences a conflict in the sense that while he hates the parent for his or her disciplinary actions, he also loves him or her and experiences the anxiety of being separated, either physically or emotionally.

⁷ Mowrer provided evidence that support the belief that the account of imitative learning in birds can be applied to the early stages of language learning in human infants (Mowrer, 1950).

As for the powers motivating these identifications, Mowrer assumes that developmental identification is “. . . powered mainly by biologically given drives. . .” while defensive identification is powered by “. . . socially inflicted discomforts. . .” (Mowrer, 1950, p. 592). In addition, it is claimed that the distinction made between the two types of identification does not imply that events connected with the latter cannot be categorised within the former.

In Sears’ theory (Sears, Rau and Alpert, 1965), described by Lynn (1974), as an adaptation of Freud’s theory to the social-learning framework, notions of parental nurturance, affection, “expression of love” and “motive” seem, under certain conditions, to be linked with strengthening of the motive to identify. Periodical provision and withdrawal of affection creates a situation where the child is rewarded by reproducing his parents’ behaviour, thus providing a substitute for them. In a deviant absence of dependency motivation, identification would not develop and in unusually high dependency, it should develop more rapidly (Sears et al., 1965).

4.2.1.2. The Motivating Conditions for Imitation (Kohlberg, 1969)

The cognitive-developmental approach of Kohlberg, following Baldwin and Piaget, is based on the assumption of an “interactional” process, in which basic mental structure emerges from contributions of both organism and the environment, rather than reflecting either one directly. This interaction results in a series of cognitive stages, which are assumed to represent transformations emerging from application of simple early cognitive structures to the environment and their subsequent restructuring by effects of the external world (Kohlberg, 1969).

Socialization is accordingly conceptualised in terms of cognitive-structural changes which emerge as a result of restructuring of conceptions of the social self, the social world and their relations. These driving processes of cognitive development, that is motivation and learning, are assumed to require social role taking. It follows that an account of imitation and identification needs to be elaborated, since all role-takings have imitative components (Kohlberg, 1969).

In cognitive-developmental theory, the distinction between imitation and identification is not clear. They are assumed to differ in degree due to the development of structure, not to be strictly distinct. Identification refers to,

“ . . . (generalized enduring modeling and perception of a portion of the self as shared with the parents) . . . ” (Kohlberg, 1969, p. 426).

As a type of identification, imitation is “a cognitive copying process” (Kohlberg, 1969, p. 414) i.e.,

“ . . . one component of a cluster of attitudes of perceived similarity, dependency, attachment, approval-seeking, and moral conformity toward the parent.” (ibid, p. 456).

Kohlberg (1969) discusses the notion of “instinct” as an explanation for the often intrinsically motivated and universal early imitation, on the grounds of the flexibility of behaviour in imitative acts and of the motivation that conditions the performance of these acts. Furthermore, the emotional value of the adult who is imitated by the infant, and the affective significance of the behaviours being imitated, are assumed not to constitute integral parts of experimental imitative performance. “The motivational conditions for imitation” refer to conditions that lead to the reproduction of an interesting behavior pattern. They are not satisfactions of a special imitative motive.

In essence, “sharing” and “motivation” constitute, for Kohlberg, two complementary aspects of socialization. The structure of the self in its initial state is social, or shared, and the primary motivation for competence and self-actualization requires sharing. On the imitative tendency, it is proposed that,

“ . . . the motivational basis of social reinforcement is to be found in the child’s imitative tendencies, his tendencies to engage in shared activities.” (Kohlberg, 1969, p. 419).

The motivation for imitation and for social attachment, is defined in terms of effectance or competence motivation. Other determinants for imitation and identification are the interest value of the other’s activities, the other’s competence and his social value, the relevance of the other’s competence to actions of the self, the degree of similarity of the self and other. Developmental shifts in these motivational conditions for imitation are assumed to be due to cognitive-structural transformations, not the formation of new motives (Kohlberg, 1969).

Kohlberg claims that his account of the development of social dependency and attachment, integrated with identification and imitation, fits better the

development of the boy's orientation to the father at 4 to 8 years. The child's sex-role identity results from the self-categorization as a male or female, early in development. Thus, the value of social reinforcers is determined by the child's sex-identity, rather than the reverse. Imitation and liking for the same-sex parent arises from a tendency to value positively and imitate objects like the self. In particular, the identification of the boy with his father is essential not for the child's desire to adopt the sex-role stereotype but rather to aid the child to define his state of masculinity in more individualistic terms. Identification with the same-sex parent emerges from self-categorization and sex-role stereotyping and its developmental function is to channel primary sex-role aspirations into aspirations for culturally conforming and "moral" roles (Kohlberg, 1969).

Change in the boy's orientation to his parents is accounted as follows: While still mother-oriented, the child learns to sex-type himself in the second and third year. Thus, by the age of 3-4 years the child is aware of his or her sex-identity and is led to prefer things that are similar or familiar to himself. Around the age of 5 years, the boy prefers masculine activities and seeks a model for these activities, imitation of the father leads to emotional dependency on him (Kohlberg, 1969). From 4 to 7 years, girl-father identification seem to increase, though less markedly than in boys, and in no particular sequence. Her increase of identification with him seems to be due to an increased awareness of the father's role prestige (Kohlberg, 1969).

Lynn (1974) claims that the research in the social-learning tradition, which attempts to apply learning principles to explain the father-child relationship, is not successful. He proposes that,

"Strictly speaking, there is no such thing as a social-learning theory of the father, although some aspects of the father's influence in the child's development have been formulated in the language of learning theory." (ibid, p. 107).

Lamb (1975) claims that psychoanalytic theories have used the concept of "power" to explain identification, while the learning theorists claim that positive feelings experienced between an adult and a child are the determining factors for modelling. He concludes that, in this respect, learning theorist depict identification better than psychoanalytic theory.

In summarising, among Social Learning and Cognitive Developmental Theories, which are preoccupied with the notions of developmental and defensive identification, Mowrer emphasised the mother's mediation role in the first, and both parents as mediators of the second kind of identification. Sears considers that "affection" and "motive" may be linked in the process of identification with parental behaviours and attitudes. Kohlberg sees developmental shifts of motives for imitation as emerging from cognitive-structural transformations that differ in boys and girls. The father is a role model for masculine activities for a boy, and an object of admiration for girls.

4.1.3 Ethological Approaches

(Eisenberg, 1966; Lynn, 1974; Biller and Meredith, 1975)

There are several ethological theories of the human male's place in the family. Some of these emphasise sexual activity, others consider a more general biological element, while still others assume that social conventions, codified in language, motivate the male's inclusion.

Eisenberg (1966, cited by Lynn, 1974) stated that a combination of aid in parental care of offspring, defense of the group, and maximum fertilization of receptive females in species that have no defined reproductive season, are functions that favor the male inclusion in the family. An elaborated examination of the research on the evolutionary process led Lynn (1974) to propose two alternative theories. Assuming that paternalism is natural with biological advantages, he outlines interactions of a circle of causation in the evolution of the human family, in which the male is universally a member. According to one scenario, the man was led to join the woman to form a family, and as he became sexually attached to her he also grew fond of the young, which made him gentler. The alternative explanation proposed is that after the establishment of social conventions, through language, the male's conventional role in the family supplemented the weak binding power of sexuality.

Biller and Meredith (1975) believe that the human male became endowed with a "father instinct" and a sense of power that the child satisfied and reinforced. It is claimed that fatherhood has evolved as a natural role for men in the human family,

added to which is the acquired concept of a "cultural father" (Biller and Meredith, 1975).

Father power supplements the corresponding, but psychologically different, mother power. It does not mean the tyrannical or the traditionally paternalistic power but rather,

"... the pervasive, profound power that is a part of ... every other father's natural as a parent." (Biller and Meredith, 1975, p. 7).

The psychological difference between father and mother emerges from physiological needs of the mother and the father's sensory awareness of the child as his.

The advantages of paternal involvement in the family are assumed to be both direct and indirect. He offers the child a different kind of person, to learn that different needs and expectations may be met by different people. An indirect advantage is gained from the way the father influences the mother.

While emphasis has been paid upon the "father power", the woman's power, as a mother and a woman, and the power of the child to be respected as a human being, are not denied. Biller and Meredith (1975) support the notion that the newborn has no innate preference for one parent or the other and thus there is no reason why children cannot identify initially with the father as well as with the mother. Mothers are assumed to be attached to their infants, while attachment to mothers is not the rule for infants. Initially, a significant number of infants make as strong or even stronger attachments to their fathers as to their mothers. By the age of three months, infants are assumed to react, through cooing, smiling or excitement in father's presence, as much as to their mothers. As fathers initially underestimate the child's need for interaction, the father-child relationship is equally beneficial, the father learns about fathering from the infant as the infant learns about the world from the father. Among the things learned by fathers, from their relationship with the child, is that strength can be moderated by gentleness. In the course of the second year, infants with highly involved fathers show equal attachments to both parents.

In reference to the evolutionary process through which father-child attachment has been established, Biller and Meredith (1975) claim that part of this attachment resulted from the child's attachment to the mother when the father was

attached to the mother. The "father instinct" and the "father's natural curiosity" (Biller and Meredith, 1975), seem to be two factors providing additional explanation for father-child attachment. Within this frame of reference, the place of imitation is clarified in the following assumptions,

"The father also found that when he nurtured this creature, the infant, it became attached to him; it would mimic him and respond to him. To early man, as to today's man, imitation is the sincerest form of flattery, and it was flattering to see an image of himself mirrored in the behaviour of his child (p. 14) . . . you observe him imitating you and you sense the effect your attitudes have on him." (Biller and Meredith, p. 69).

4.2. Recent views and perspectives on father-infant relationship

A review of research on the infant-father relationship, leads to the conclusion that a disproportionately large number of studies have been conducted within the interpretational framework of attachment theory as formulated by Bowlby (1969) and Ainsworth (1969, 1973).

Infants' attachment behaviours to their fathers and mothers (Lewis, 1972), the possible similarities and differences in infant-mother and infant-father interaction in the strange situation (Bridges, Connell and Belsky, 1988), the association of security of attachment to mother and father to the infant's sociability with strangers (Lamb, Hwang, Frodi and Frodi, 1982), and the prediction of infant-father and infant-mother attachment (Cox, Owen, Henderson and Margand, 1992), are all topics in research directly aimed to assess attachment.

Measures of attachment and affiliative behaviours have also been used in research of father participation in infancy (Pedersen and Robson, 1969), in the study of mother's and father's responses to cries of normal and premature infants (Frodi, Lamb, Leavitt, Donovan, Neff and Sherry, 1978), their responses to infant smiles and cries (Frodi, Lamb, Leavitt and Donovan, 1978), and in the study of adolescent mother-infant-father relationships, and social support networks and life stresses (Lamb and Elster, 1985).

The following presentation of the attachment theory will be based mainly on Bowlby's formulation, since Ainsworth (1969) admitted herself that the difference between Bowlby's views and hers consists only of ". . . slight differences in emphasis." (p. 1009).

Bowlby's views constitute a revision of the psychoanalytic view of the origin and development of the infant-mother tie. From consideration of the biological roots of several aspects of psychological development, Bowlby constructed an instinct theory on the foundations of ethology and control systems theory.

Affect serves as an "appraisal process" in Bowlby's control-systems account, and motivation is taken to be implicit in any account of the behaviour system. In particular, feelings -- a term used to cover both affects and emotions -- are assumed to be phases in the activity of an individual's intuitive appraisal systems. The notion of appraisal implies that sensory input, whether relating to the state of the organism or the environment, has to be interpreted and evaluated in order to be useful. For this kind of evaluation to be achieved, comparisons of input with standards and then, on the basis of these comparisons, selection of certain behavioural forms instead of others, have to be made. On the assumption that appraisal processes may or may not be conscious, they are conceived as having three roles: a) evaluation of changing environments and organismic states; b) provision of a "monitoring service" to the individual; c) provision of "a communicative service" to others.

Bowlby considers feelings to be, in general, causative of behaviour, but a sense of sympathy may not be necessary for elicitation of behaviour. Feeling, attention and consciousness are inseparable. Bowlby discusses three views of the exact point that feelings begin to be experienced, in the sequence of processes that appraise persons and objects, and lead to the activation of behaviour. According to the first, emotion is very often experienced as soon as behaviour occurs. Alternatively, feedback from voluntary muscles augments whatever emotion is felt. Of interest is the third suggestion, according to which,

" . . . it may still be that emotional feeling is experienced also at the very start of behavioural activation or, indeed, as an alternative to behavioural activation . . . "

(Bowlby, 1969, p. 148) (underlining added).

As for the role of motivation, it is claimed that since the system is self-activated, there is no need to consider an extrinsic motor force. It is suggested that the conditions of an activation or termination of a behavioural system should be examined instead. According to Bowlby's theory, the activation of a behaviour

system may be influenced by any one or combination of the following factors: hormonal state, central nervous system activity, the environmental stimulus situation.

He distinguishes four major phases in the development of an infant's attachment to the mother: a phase of "undiscriminating social responsiveness", followed by a phase of "discriminating social responsiveness", the end of which is marked by the emergence of "active initiative in proximity seeking", followed by a phase identified as a "goal-corrected partnership".

4.2.1. A Bidirectional Approach to Newborn Infant-Father Interaction

(Parke, 1979)

Parke (1979), an attachment theorist, suggests a model for viewing the father's impact on the infant's life. He believes that fathers modify infants' behaviours in direct and indirect ways, when the social context is taken into consideration.

Direct effects, which arise in face-to-face interaction, are bidirectional -- "reciprocity of interaction" and the ways ". . . in which parents and infants mutually regulate each other are of central interest." (Parke, 1979, p. 553), and it is recognised that the purpose of parent-infant research is increasingly the provision of an "...understanding of the dynamics of interpersonal synchrony..." (Parke, 1979, p.553).

Infants' behaviours are indirectly affected by fathers in the following five ways:

- 1) The father may cause modification of mother-infant interaction patterns.
- 2) The father's behaviours oriented directly to the infant may cause a change in the mother's attitudes to the infant.
- 3) The changes that may occur in infants' behaviour patterns, resulting from the father's treatment of the infant, affect the infant's subsequent treatment by others.
- 4-5) It is assumed that there is bidirectional relation between the birth of an infant and the husband-wife interaction; the husband-wife relationship is assumed to have an influence on the infant's behaviour patterns, and on the other hand, the birth of a child modifies the husband-wife relationship (Parke, 1979; Dickstein and Parke,

1988). It seems that father is the parent who is most directly affected by quality of the husband-wife relationship, while mothers are affected more by the degree to which their husbands agree with them on views related to their infant's temperamental characteristics (Parke, 1979).

There is an increasing interest in both the continuities and in discontinuities that occur in triads of mother, father and infant, and in the concept that all members of an interactive network undergo changes over time. While developmental changes on either side (parent or infant) are of interest, Parke gives special emphasis to the shifts occurring on the parental side, both in relation to the transition to parenthood but also, more generally, in reference to the psychology of life-span development.

It is clear that a parent is a "thinking organism" (Parke, 1979), and parental cognitions, perceptions, attitudes and knowledge will influence the interactive process. Concerning fathers' views on fatherhood, it was proved that a father's willingness to assume infant care responsibilities was related to his sex-role concepts and the amount of time this role was available to him. Fathers who held the view that fathers should serve a greater number of functions connected with care of their children were more likely to have been present in the delivery room at the infant's birth (Cordell, Parke and Sawin, 1980).

Individual differences exist in both fathers and infants. Parke (1981) claims that some men are very involved with their infants while others are distant. It is assumed that this variability may be explained either by assuming fathers have different involvement which causes differences in their children's attachment, or by attributing the cause of such variability to infants' behaviour, which may affect how involved a parent will become.

Documenting the shift of contemporary fathers' role in infancy from the traditional one, Parke has provided data that prove:

- 1) Fathers are interested in the newborn when they are given the opportunity to become involved (Parke et al., 1972; Parke and O'Leary, 1976, cited by Parke and Sawin, 1976).

2) Fathers are as nurturant as mothers in their interactions with newborns (Parke et al., 1972; Parke and O'Leary, 1975, cited by Parke and Sawin, 1976; Parke and Sawin, 1975, cited by Parke and Sawin, 1976).

3) Fathers do engage in less caretaking, when comparisons with mothers are restricted to feeding (Parke et al., 1972; Parke and O'Leary, 1976, cited by Parke and Sawin, 1976; Parke and Sawin, 1975, cited by Parke and Sawin, 1976).

4) Fathers can be capable and competent in the execution of caretaking activities, when sensitivity and responsiveness to infant cues is the defining feature of competence (Parke and Sawin, 1976).

The sex of infant is considered to be "One of the most consistent determinants of parental expectations, perceptions, and organizers of behaviour . . .", even before the infant's birth (Parke, 1979, p. 565). In reference to the newborn period, it was found that fathers treat boys and girls in a different ways, touching first-born boys more than either later born boys or girls of either ordinal position. Fathers vocalised more to first-born boys than first-born girls, while they vocalised equally to later-born infants irrespective of their sex (Parke and O'Leary, 1976, cited by Parke, 1979). In investigating the impact of infant vocalizations on parent behaviour, similar patterns of paternal differentiation appeared as in the previous study. Fathers are particularly likely to react contingently to infant vocalisations by vocalising, especially in the case of male infants (Parke and Sawin, 1975, cited by Parke, 1979). The sex-of-infant effect continues beyond the newborn period. In a play context, parents stimulate their same-sex infant more than the opposite-sex infant, and thus appear to play complementary roles with their male and female infants (Parke and Sawin, 1977, cited by Parke, 1979).

The writer notes one point of contradiction in Parke's approach. While presenting a bidirectional model, in which the reciprocal nature of interaction and the mutual regulation are said to be of central interest, in practice he emphasises parental behaviours, and thus appears to underestimate infant communicative abilities. In the great majority of the cases, the data derived from his studies provide information about the frequency of parental behaviours or attitudes, differences between maternal and paternal behaviours or differences of parental behaviours in relation to the sex of

the infant. This underestimation of infant communicative abilities can be seen in the following summary statements,

“. . . the bidirectional influences on parent-infant interactive behaviours that give recognition to the infant's role as a determinant of parent behaviours as indexed by the responsiveness of parents to infant behavioural and affective signals or cues.” (Sawin and Parke, 1977, p. 510).

“Face-to-face games may teach the infant turn-taking skills and provide early lessons in control of the social environment.” (Parke, 1981, p. 55).

To the writer's knowledge there is, in fact, only one study in which it was shown that parent vocalizations can modify newborn infant behaviour, such as infant vocalizations (Parke and Sawin, 1977, cited by Parke, 1979).

In addition, in spite of an orientation that assumes developments on both sides, data is concentrated on how parents experience the transition from being adults to becoming parents and on parental life-span development. This contradiction is evident in Parke's assumption,

“The study of early parent-infant interaction is typically viewed as the study of infancy...” (Parke, 1979, p. 554).

4.2.2. The Father's Role on Infant Sex-Typing (Power, 1981)

Power's perspective (1981) on the father's role in infancy focuses on sex-typing. The construction of his model can be seen as an application and an extension of Sander's stages of mother-infant interaction (1962, cited by Power, 1981), to father-infant interactions.

The Period of Initial Adaptation (0 to 2.5 months)

The starting stage of this period is featured by the mother attuning her activities to the infant's cues. Infants are assumed to be endowed with “. . . a fairly limited social repertoire.” (Power, 1981, p. 230). In parallel, learning seems to be of great importance also for the parents, in that parenting skills and familiarization with infants emerge from it. It is assumed that parents learn how to interpret and respond to the infant's signals, and how to provide the most appropriate level of social stimulation, and become acquainted with his or her idiosyncratic needs and characteristics.

Power (1981) assumes that there are at least two explanations for differential treatment of the sexes by parents, in special reference to first-born infants:

a) Parents are not familiar with their infants. In the initial stage, the infants' gender and physical appearance is the only information immediately available to parents that may influence their behaviour.

b) The infants' restricted abilities may invoke indirectly differential treatment of the sexes, as follows: The young infant's limited repertoire may cause parents to sense a freedom of choice as to when and how to interact, and this may lead to the assumption of varied treatment according to the infant's gender.

Studies, that have focused on structured situations of play and feeding, have shown that both mothers and fathers treat boys and girls differently. Parents generally engage in more affectionate interactions with infants of the opposite sex, while they engage in more stimulating interactions with same-sex infants (Thoman, Leiderman and Olson, 1972, Parke and Sawin, 1980, cited by Power, 1981). In unstructured situations, mothers seem to spend more time interacting with their boys (Moss, 1967; Crockenberg and Smith, 1980, cited by Power, 1981) due to their lower level of alertness and the greater level of irritability, in comparison to girls. However, in the caretaking context, the pattern seems to change, and mothers appear to stimulate girls, visually, verbally or physically, more than boys. Corresponding data at this early age is not available for fathers.

The Period of Reciprocal Exchange (2.5 to 5 months)

In this period, mother-infant interaction is featured by “. . . reciprocal, affectively charged, face-to-face interactions . . .” (Power, 1981, p. 232). The studies suggest that mothers' differential treatment of infants according to gender has disappeared, with the exception of verbal interactions (Moss, 1967; Lewis, 1972; Crockenberg and Smith, 1980, cited by Power, 1981). Mothers have been found to be more likely to vocalise in imitation of their daughters, than to their sons' vocalizations. In contrast to mothers, fathers keep on exhibiting a differential treatment - interactive games seem to predominate with boys while vocal imitation seems to predominate in fathers' interactions with girls (Field, 1978).

The hypothesis that fathers continue to treat boys and girls differently in periods, while mothers do not, is explained as follows:

- a) It has been proved systematically that fathers are more likely to report sex-differences in the goals concerning child-rearing.
- b) It is suggested that fathers are more likely than mothers to have differential sex-stereotyped perceptions of the behaviour of their infant.
- c) The experiential differences of mothers and fathers with their infant may result in fathers being less sensitive to infants' subtle behavioural signals, and cues and they may consequently be influenced more by infants' overt physical features.

The Period of Early Directed Activity (5 to 9 months)

The third stage of mother-infant interaction is featured by the beginning of the infant's active role as initiator of social interactions with the parent, while the use of objects starts to dominate within exchanges. In addition, the exploration of the environment has increased, due to the rapid postural and fine motor development that takes place in this period.

The differential treatment of the sexes by mothers is restricted, and it seems that the exception continues to be in the greater influence of daughters over mothers' vocal behaviour and variety of speech. Fathers continue to show differential treatment of the sexes, playing, looking at and encouraging visual, locomotor and fine motor exploration in interactions with their sons (Rendina and Dickerscheid, 1976, cited by Power, 1981), while preferring to encourage vocal behaviour with daughters (Field, 1978, cited by Power, 1981).

After the ninth month, the following stages are distinguished: a) a Period of Focalization on the Parent (9-12 months); b) a Period of Self-Assertion (12-18 months); and c) Toddlerhood (18-24 months). Important cognitive and motor developments, and development of language, enable infants to initiate social interactions and, later, to engage in activities that are considered by parents to be either sex-appropriate or sex-inappropriate, such that they are to be encouraged or disapproved of, respectively. Fathers show patterns of differential treatment, consistently through all three stages, while mothers are more likely to do so in the course of the last two periods.

In summarising Power's view on father's role in infants' sex-typing, it is assumed that mothers and fathers are influenced directly by the infant's sex at birth, while only fathers continue to show differential treatment to sexes after the initial period. The nature of this paternal differential treatment can be accounted for in two ways:

- a) Independently of the infants' developmental status, fathers encourage boys' visual-spatial and manipulatory abilities while they encourage girls verbal abilities.
- b) In reference to the infant's developmental status, fathers encourage boys' exploratory skills, by showing them toys (3 months), then by encouraging toy manipulation (7-10 months) and by allowing exploration of the physical environment (11-17 months). In interactions with girls, fathers initially encourage vocal behaviour, through imitating games, while later asking of questions and labelling of objects predominate (Power, 1981).

4.2.3. Qualitative Differences in Mother- and Father-Infant Attachment (Lamb, 1982)

Lamb adopts the theoretical stance of the ethological attachment theory elaborated by Ainsworth (Lamb, 1982). As a consequence, his research is concentrated after the middle of the first year.

Lamb's theory rests on the assumption that infants form qualitatively different attachments with mothers and fathers in the middle of the first year (Lamb, 1977, 1979). Despite these qualitative differences in parental attachments, mothers and fathers were found to respond to infants' affective signals in the same (Frodi, Lamb, Leavitt and Donovan, 1978), or almost the same way (Frodi, Lamb, Leavitt, Donovan, Neff and Sherry, 1978). The important dimensions of parental influence relate to parental individual characteristics rather than to gender (Lamb, 1987). Fathers influence their children's development both directly, through interaction, and indirectly, through their impact on the family's social and emotional climate (Lamb and Stevenson, 1978). Paternal variations exist, while parental values and attitudes are important when the matter of increased paternal influence is discussed (Lamb, Pleck and Levine, 1987). Fathers must be studied within the family context, where

the behaviour of one member influences the behaviour of others. The significance of inter- and intra-cultural diversity of paternal influences is also recognised (Lamb, 1987).

Two points constitute salient features in Lamb's approach: a) the family system; and b) parental variations. Beyond considerations that view infant as a passive organism shaped by the social and physical environment, the child is examined as an active contributor, modifying parental behaviour, initiating and terminating interaction, being capable from an early age of "sophisticated modes of relating to others (Lamb, 1976). On the basis of these capacities, the family is seen to be a system within which reciprocal relationships, roles, demands and expectations exist (Lamb, 1976), each member appearing to be likely to influence every other (Lamb, 1979). This is the framework within which the nature of the relationship within the father-child subsystem must be understood. Lamb (1982) assumes that there are three types of influence on individual differences in parental sensitivity: a) the enduring values of the individual (including the motivation for seeking to become a parent); b) the characteristics of the child; and c) the social context in which the parents and families are embedded. Following Ainsworth, Lamb (1982) assumes that there are two important aspects of infants' expectations for eliciting responses from others: a) trust or faith in the parent's propensities; and b) confidence in one's own efficacy.

Lamb (1976, 1979) assumes that the emphasis on the quantity of mother-infant interaction compared to father-infant interactions, is possibly not related to the quality of experiences, which makes parents salient partners in the infants' life. He suggests that the quality of the father's interaction may compensate for its smaller quantity (Lamb, 1979). Lamb also suggests that in attachment formation, a minimal amount of interaction may be the threshold beyond which the quality of interaction is more significant than its quantity (Lamb, 1976).

Lamb assumes that many infants form qualitatively different attachments to mothers and fathers around the middle of the first year, as a consequence of differences in prior patterns of interaction with the two parents (Lamb, Hwang, Frodi and Frodi, 1982), providing different types of experience (Lamb, 1977; Lamb and

Stevenson, 1978). This suggests that infants can distinguish their parents on the basis of perceptual and behavioural criteria and develop different expectations so the infant will, “. . . learn different behavioural patterns from each parent . . . ” (Lamb, 1977, p.179).

Fathers do interact in characteristic ways with their infants (Lamb and Stevenson, 1978). Many fathers are accessible to their infants, enjoying interacting with them, being responsive to their signals. It is in this way that fathers may become salient features in the infants' complex social world (Lamb, 1976). The establishment of close relationships with both parents is assumed to contribute to the infant's socialization. However, many fathers are rather inaccessible to their infants, interacting with them little if at all, being more apt to have a negative than a positive impact on their children's development. Variations in the degree of paternal involvement in adolescent mother-infant-father relationships were found to be significantly related to the degree of mother-father engagement as well as measures of social support, whereas maternal engagement with infants was unrelated to these measures (Lamb and Elster, 1985).

The difference in maternal and paternal roles, at the beginning of the second year in Lamb's studies, resides mostly in play patterns and sex typing, (Lamb, 1976; Lamb and Lamb, 1976; Lamb and Stevenson, 1978). Apart from these differences, it was proved that mothers and fathers do not differ either in their response to an infant's affective signals of smile or cry, or in their perception of their child. It is suggested that,

“. . . response to a crying infant may be motivated not only by empathy or altruism but also by a desire to terminate the aversive signal from the infant.” (Frodi, Lamb, Leavitt and Donovan, 1978, p. 196).

In response to cries of normal and premature infants, mothers reported that they felt more alert and more attentive than did fathers, but no significant sex differences were found in the psychophysiological measures (Frodi, Lamb, Leavitt, Neff and Sherry, 1978).

Lamb emphasises the importance of studying the father's role within the whole family system, and he suggests that,

"Dyadic models, while simpler to conceptualize, seriously distort the psychological (and sociological) realities of the ecology in which children develop." (Lamb, 1976, p.30).

It is claimed that within the family, each member appears likely to influence every other (Lamb, 1979) and the same was emphasised in an earlier study,

"This finding leads us to stress that mothers and fathers are part of a complex family system within all persons influence one another, both directly and indirectly." (Lamb and Lamb, 1976, p. 383).

However, in an other work, he admitted that,

"... the focus must be upon the dyadic interaction, which means that we must examine the behaviour of each person is examined in the context of the contingent behaviour of the other." (Lamb, 1975, p. 251).

4.2.4. Expressive Communication and Developmental Changes in the Father-Infant Relationship (Yogman, 1981, 1982a)

The focus of Yogman's views (1981, 1982a, 1982b; Brazelton, Yogman, Als and Tronick, 1979) is on the nature of unstructured face-to-face exchanges of expressive communication and on the developmental changes that may underlie the developing father-infant relationship and in comparison with the mother-infant relationship. His approach is not to be identified with either the American or the British type of research, as these have been categorised by Beail (1983), since Yogman tried to combine the two perspectives.

Provided the father considers the infant as a joint creation with the mother, his emotional investment may be psychologically adaptive. In addition, it may be that men seek an increased opportunity for emotional contact with their infants, because pressures at work limit emotional expression. The male transition to parenthood is claimed to be influenced by these shifts (Yogman, 1982a).

It is claimed that the human infant displays predictable behavioural patterns with an adult from birth. In the first few weeks, infants establish different behavioural patterns for interaction with objects and persons, displaying attention and behaviour appropriate to the unique qualities of things and persons. Interactions with persons, through the rhythmic coordination of facial or vocal expressions,

feature smooth and rhythmically repeated cycles of attention and disengagement, the function of the latter being to balance the former. This synchrony is assumed to,

“. . . represent the condition under which a nurturing adult shapes the newborn infant—both affectively and psychologically—the infant ‘learns’ about himself . . . he learns his own limits of socialization . . . as the infants’ capacity to attend to his environment increase with maturity, he learns how to achieve an optimal state of attention . . . and how to capture and control with expressive displays the important persons in his environment . . .” (Brazelton, et al., 1979, p. 30).

In such a theoretical framework there is no good reason why infants should not elicit social interaction with the father as well as with the mother (Yogman, 1982a).

Fathers are assumed to be capable of skilled, sensitive, meaningful and direct social interaction with young infants, without this implying that there are no differences between mother-infant and father-infant interactions. Dyadic interactions of infants with mothers and fathers appears to be similarly mutually regulated, in the levels of affectively positive involvement of the partners, the almost simultaneous timing of transitions between phases within interaction and in the quality of dyadic states and nature of transition between them. In both cases, partners reach a peak of attentional involvement and then come down in an orderly and cyclical fashion. In addition, infants exhibit well-organized affectively positive expressive displays with both parents, which become differentiated in a similar developmental progression of modulated social exchanges (Yogman, 1982a, 1982b).

Infants develop notions of shared control in an interactive situation through play which offers the infant the opportunity to participate in “turn-taking”. Play interaction with fathers is described as “heightened”, while the interactions with mothers appear to be “smoothly modulated” (Yogman, 1982a). It is assumed that these differential tracks facilitate the development of a wide range of social skills. Sex-of-parent differences in the quality of play interactions may be attributed to their different familiarity of parents with their infants (Yogman, 1982a).

In mutually regulated reciprocal exchanges, infants learn the rules of both culture and family (Bruner, Jolly and Silva, 1976, cited by Yogman, 1982a), while both parents provide a responsive environment that matches infants developmental capacities.

The analysis of the developmental changes in structure of one female infant-father interaction indicated that this infant demonstrated an orderly sequence over the first five months of life in which affective range expanded, spending a greater proportion of time in more affectively positive phases, while the affective expressions became more differentiated. In addition, the progression noted in this pair was similar to that described for mothers and infants (Brazelton, Tronick, Adamson, Als and Wise, 1975; Als, Tronick and Brazelton, 1979; Brazelton and Als, 1979, cited by Yogman, 1982a).

Yogman (1982a) concludes from studies conducted by others, that after the sixth month infants seem to be attached to both parents, although under conditions of stress they prefer their mothers. Physical play characterises father-infant interaction, and infants, particularly males, respond more positively to paternal play.

Yogman (1982a) believes that the family triad, mother and father playing complementary roles in rearing of their infant, "provides one model for a nuclear family". Within such a system one can learn about each other partner as an individual, but also the underlying rules regulating the other dyad (Brazelton et al., 1979). It is assumed that the notion of ". . . interlocking feedback of a mutually regulated system . . ." (Brazelton, et al., 1979, p. 41) is best represented by the concept of cybernetics (Ashby, 1956, cited by Yogman 1982a). According to Ashby, there are two interdependent aspects of this system. The whole triadic system provides an overall stability, "... a stable matrix for developmental organization . . ." (Yogman, 1982a, p. 262), while the feedback system, within each of the dyadic subsystems may be transiently disrupted, thus providing the opportunity for learning about synchronization, differentiation with each partner, and they in turn with him (Brazelton et al., 1979), separation, individuation within a dyad (Yogman, 1982a). In addition, the degree of flexibility of the whole system is related on how loosely coupled the subsystems are. In Sander's theory (1977, cited by Brazelton et al., 1979), under conditions in which the subsystems are loosely coupled, temporary independence of subsystems permits infants' differentiation, individuation and autonomy to develop. Thus, all these conditions together permit balance of

togetherness, and separation between the infant and the caregiver (Brazelton et al., 1979).

In general terms, cultural and social influences, as well as the amount of time spent with the infant, are recognised to be influential factors in interaction. Infant communicative competencies seem to be more long-lasting than either biological or hormonal influences in parents (Yogman, 1982a, 1982b).

4.2.5. Engrossment in Newborn Infant-Father Interaction

(Greenburg, 1985)

The interest of Greenburg (Greenburg, 1985; Greenburg and Morris, 1982) in father-child relationship emerged as a "by-product" of his study of the early mother-infant relationship and the several influences exerted upon this relationship. The father was considered as "a significant other person" who would influence the mother-infant relationship (Greenburg and Morris, 1982).

"Bonding" and "attachment" are general terms that provide an account of the link or connection between the parent and child with special reference to the mother. For the description of early father-newborn involvement, the term engrossment or father bonding was employed. Engrossment refers to,

" . . . a universal process, an innate potential in *all* fathers . . . a father's sense of absorption, preoccupation, and interest in his baby." (Greenburg, 1985, p. 19).

The interaction of engrossment with culture, and its far-ranging consequences for the child and the family are accepted (Greenburg and Morris, 1982). Despite the fact that the term is used particularly to describe the father-newborn link, it is assumed to have many similarities to mother-infant bonding.

In essence, engrossment refers to something beyond mere involvement. The word "engross", which is the origin of engrossment, means to "make large" (Greenburg, 1985). In Greenburg's notion, the father's sense of engrossment in his infant, entails to an enlarged dimension, an increased sense, of both the infant and himself, such that,

" . . . the infant has become larger than life for him . . . but fathers suddenly feel as if they themselves have grown." (Greenburg, 1985, p. 19).

This experience results in a feeling of being bigger, older, stronger and more powerful, for both the infant and the father, while particularly for the latter, feelings of increased "self-esteem", "worth" and "validation" of his existence, and of his role as a parent and a father, are sensed.

The father's potential for being involved is assumed to be often released in early contact, at the first sight of the infant, but in other cases it may take some time to develop, evolving more gradually. The initial intensity of paternal emotions may fade in the first few weeks, but they are reinstated later, in a more mature way, constituting the foundation upon which affectionate involvement with the child continues.

A study was carried out to investigate the validity of the concept of "engrossment", and to reveal experiences sensed by first fathers (Greenburg and Morris, 1974, cited by Greenburg, 1985). The father-newborn bond was found to consist of the following seven characteristics:

1) There is visual awareness of the newborn, who is perceived as attractive, pretty or beautiful. In particular, the newborn's face is assumed to have a powerful impact upon the father that results in the latter's awareness of the infant as an individual, or as an English father stated: ". . . it seemed to have a personality immediately . . ." (Greenburg, 1985, p. 20).

2) There is tactile awareness of the newborn, manifested by the fathers' desire to touch, hold, play and have physical contact with him or her and by his impression of the soft feeling of the infants' skin and its smoothness.

3) There is awareness of the newborns' distinct features. The father can describe the infant in subtle detail and, in several cases, may feel that he is able to recognise him in a crowd. In addition, it is assumed that the father is more likely to emphasise the infant's resemblance to himself rather than to his wife. One English father stated,

" . . . 'I definitely would be able to recognize him by his face, and If I was not sure about the face, I could definitely go by the hands and feet.' " (Greenburg, 1985, p.21).

4) There is the perception of the infant as "perfect".

5) There is a feeling of strong attraction to the infant, which results in a focusing of father's attention upon it. As one father stated: "It's like a magnet . . ." (Greenburg,

1985, p. 21). This kind of focusing on the infant makes it seem larger in the father's eyes.

6) A feeling of "extreme elation" and "exhilaration", is assumed to be experienced by almost all the fathers. This feeling leads in the fathers' sensing himself as "high, . . . stunned, stoned, off the ground, ten feet tall, taken out of himself" (Greenburg, 1985, p. 22).

7) An increased sense of self-esteem is experienced by fathers. Fathers express feelings of proudness and maturity.

It is assumed that the infants' normal behaviour and normal reflexes enhance the fathers' feeling of engrossment in his infant. A dramatic illustration of this are the words of a first-time father who stated,

" . . . 'I thought it was going to be an object that would just be there . . . I felt suddenly I had a daughter! I didn't just have a baby.' " (Greenburg, 1985, p. 23).

While it was assumed that fathers who attended their child's birth did not differ to a great extent to those who did not (Greenburg and Morris, 1982) Greenburg (1985), suggests that the best way for the father to become engrossed immediately is to be present at the child's birth. However the following differences were noted between fathers who attended and fathers who did not attend their child's birth:

a) Fathers who were present at their infants' birth had a feeling of being able to distinguish their infant among others, more than fathers who did not attend the infants' birth.

b) A trend suggested that fathers of the first group (attend birth) felt more comfortable holding the baby than fathers of the second group.

c) Fathers who saw their child's birth commented, in a repeated and spontaneous way, that ". . . 'when you see your child born, you know it's yours' . . . ". In contrast, fathers of the second group did not mention spontaneously this concept. It is assumed that the "know it's yours" notion is associated to the fathers' sensation of being connected emotionally with his newborn. It is concluded that qualitative differences in the degree of engrossment may exist between the two groups, based on the degree of contact with the newborn.

Through the personal account of his own engrossment in his infant, intended to help other fathers who are engrossed, Greenburg (1985) provides useful information on the psychology of the transition from boy to man and father, as well as on the infant's early communicative abilities that emerge within this involvement.

Mothers may interfere, helping the husband's engrossment. Feeling of uncertainty and anxiety or absence of interest in the infant, may constitute factors delaying a father's engrossment. Among the strategies for assisting a father's inclusion in infant's care and nurturance, paternal and infant imitation is discussed. It is suggested that mothers should encourage their husbands to engage in spontaneous interactions with their infant. Cooing, singing or dancing with the infant are claimed to be an "emotional language" understood by the infant. The latter may respond with unique facial expressions, smile, laugh or make body movements. Reinforcement of the infants' responses is advocated. Further, it is advised that mothers should point out to fathers the infant's imitations of his expressions. Words such as: "She's pursing her lips the way you do. Isn't that fascinating?" are suggested. It is claimed that the more the father perceives the infant as an individual, with his or her own set of responses, the more involved he will feel. The infant's specific responding to him will have a great influence on him (Greenburg, 1985).

The validity of Greenburg and Morris' theoretical perspective has been criticised (Sluckin, Herbert and Sluckin, 1983, cited by C. Lewis, 1986) on the grounds that cultural expectations as well as parental perceptions should be taken into consideration (C. Lewis, 1986).

4.2.6. Conceptualization of Paternal Influences in Infancy

(Pedersen, 1985)

Pedersen (1985, Pedersen and Robson, 1969; Pedersen, Yarrow, Anderson and Cain, 1979; Pedersen, Zaslow, Cain and Anderson, 1981) approaches the infant-father relationship in three ways:

- 1) He emphasises the need for conceptual integration of empirical data from the field of research on the role of the father, and proposes the rudiments of a theoretical

model of pluralistic conceptions of the paternal role (Eclectic Theory of Pluralistic Fatherhood) (Pedersen, 1985).

2) In special reference to infancy, Pedersen et al. (1979) raises three issues to be included in a theory of father influences, in integration with an empirical base, recognising the multiple and interlocking networks of influence within the family.

3) Within this frame of reference, the studies of Pedersen offer interesting data on father-infant interaction and on the father within the family context.

Four elements are proposed for inclusion in a theoretical model of paternal behaviour:

a) Internalized conceptions of appropriate paternal behaviour should be considered in relation to culture and idiosyncratic variations in normative behaviour.

b) Selective influences exerted upon the father's role constructions are to be perceived as affected by several modifying constraints existing in the environment.

c) An "integrator" mechanism should reconcile the discrepancies between the first two elements, that is, the role constructions and the situational constraints. Closely related to the psychological processes involved in this mechanism, are subjective experiences such as ideas, thoughts, emotions, which may assume both ". . . a transient and more enduring character . . ." (Pedersen, 1985, p. 439).

d) The developmental perspective should be integrated in the model. The influence of time must be recognised as it affects the development of father and child (in developmental time) and changes of culture and society (in historic time). In addition, continuities from one stage to another as well from one historic period to the other must be recognised.

In reference to the infancy period, Pedersen et al. (1979) proposed that the three following elements should be encompassed in a theory of fathers' influences:

1) The multiple relationships of infants within the family structure. The omission of such consideration, until recently, is assumed to be due to the fact that infants were not conceived as capable of making the complex discriminations necessary to enter into multiple relationships.

2) Conceptions regarding child rearing should be considered in relation to both individual variations and culturally shared definitions of paternal roles.

3) The interdependencies existing among the different family subsystems must be recognised.

Thus, the effects of the father on the infants are assumed to be both direct and mediated. Direct effects are a product of father-infant interactions, while the mediated effects are the influences of either parent on the child via the husband-wife relationship.

Three hypotheses are expressed in regard to paternal influences on development in the nuclear family, assuming that a wide range of paternal behaviours are relevant to these hypotheses. The earliest father-infant interactions will provide opportunities for the infants to make simple perceptual discriminations between fathers and mothers. These sensory discriminations may form the basis for more complex later discriminations and learning. More generally, fathers are assumed to help the establishing of boundaries between the infant and the outside world, constituting an important help in the individuation process and the development of the infant's autonomy.

The second hypothesis concerns fathers' influence on infants' cognitive capacities. This kind of effect is discussed in terms of the novelty and richness in infants' experience and stimulation, the establishment of differential expectancies for mothers and fathers and the personal constructs and representational labels.

The third hypothesis is related to the father's influence on the infant's attachment to the mother. There are two issues. The husband-wife affectional relationship may enhance a mother's nurturant behaviour to her child, or the fathers' insensitive behaviour to the infant may make the latter turn to the mother for the promotion of a sensitive and responsive relationship.

In subsequent development, the contribution of the father-infant attachment lies raises the following possibilities: a) extension of social ties beyond family; b) promotion of greater receptivity of the infant to activities involving high rates of stimulus change; and c) establishment of a foundation for the identification process of later childhood (Pedersen et al., 1979).

Pedersen (1975, cited by Yogman, 1982a, 1982b) showed that infants' alertness and motor maturity at four weeks were associated with the husband's

support of his wife. Thus, it was assumed that fathers had an indirect influence on the infants, mediated through the support of mothers, which resulted in a more effective mother-infant relationship. Yogman (1982a, 1982b), assumed that this kind of study, that describes how mothers and fathers interact with their infants, can provide little information about the infant's influence on the father. Later, in another study Pedersen et al. (Pedersen, Anderson and Cain, 1977, cited by Yogman 1982b) made home observations of five-month-old infants, and found that the father's behaviour with the infant was closely related to the quality of the marital relationship even though the parents' perceptions of the infant's temperament may differ widely. Marital tension and conflict were associated with less competent maternal feeding and with the display of negative affect within mother-infant interaction. On the basis of these two studies, Yogman (1982b) claimed that the course of the early months of infants' life is featured by a wide variability in both the kinds and the amount of paternal caregiving, as well as in fathers' interactions with their infants. In another study (Pedersen, Rubenstein and Yarrow, 1978, cited by Yogman 1982b), Pedersen et al. found from maternal reports on fathers, and from Bayley test, that five-month old infants' increased social responsiveness during Bayley test was associated with increased paternal involvement. In trying to investigate the psychological implications of the Cesarean childbirth, for mothers and fathers, Pedersen et al. (Pedersen, Zaslow, Cain and Anderson, 1981) found that fathers of Cesarean delivered infants were significantly more responsive to their first-born five-month-old infant's crying and fussing than fathers in the comparison group. In addition, fathers whose infants had been born by Cesaerian delivery smiled less at their infants and their infants smiled less at them than the infants of the comparison group.

In 8- to 9-month old infants, Pedersen and Robson (1969) found that caretaking, investment (positive affective or emotional involvement) and the level of stimulation in play that the father provides, are positively correlated with the attachment greeting behaviour (smiles, vocalizations, increased motor activity and general level of excitement when seeing the father after a period of absence) for boys.

4.2.7. The Emergent View of Fatherhood

(C. Lewis, 1986)

The theory of Charlie Lewis (1982, 1986; Lewis and O'Brien, 1987) emphasises the contradictions, at a theoretical and empirical level, in the transition to fatherhood, and in the experience of fatherhood.

Ambiguities in the experience of a fathering role, both practical and emotional, start in the course of the mother's pregnancy, and may persist later in the year after the infant's birth. In essence, the core of such ambiguities is the difference between the fathers' feelings and what the external conditions impose. At other times, expressions of real feelings may be inhibited, not by external conditions, but by the man himself. In a wider perspective, the experience of fatherhood is assumed to involve unknown feelings, making men find it continually surprising, arousing both a sense of wonder and worry (Lewis, 1986).

In addition, the phenomenon of "couvade"⁸ -- a term derived from the French word *couver*, which means "to hatch" (Parke, 1981), which is manifested in the performance of ritualised practises in small societies, by men and women, to ensure the safety of the foetus and the healthy delivery, is assumed to be paralleled in the reactions of contemporary men to fatherhood (Lewis, 1982).

A study was conducted to examine the "emergent" view of fatherhood, "from the man's point of view" (Lewis, 1986, p. 11); that is, the contemporary understanding, from their own perspective, of men's increasing involvement in family life. The development of father-infant relationship was examined from the period preceding infants' birth until the end of the first year.

In Lewis' account of the development of the father-infant relationship in the first year, comparisons were made between the father-child and the mother-child relationships (Lewis, 1986).

⁸ The meaning and function of "couvade" practices are discussed by the great majority of researchers and theoreticians addressing father-infant research (Parke, 1981; Beail, 1982; Greenburg and Morris, 1982; Lewis, 1982, 1986; Greenburg, 1985)

In the early months of infants' life, fathers continue to sense contradictions in their psychological involvement with the infant, which had started during pregnancy. Mothers and fathers have different roles, the former being the primary caretaker, building her relationship with the infant through frequent contact, while the latter is the more remote secondary caretaker. As the year unfolds, paternal emotional involvement changes, and around the end of the first year and largely through maternal mediation, father-infant attachment is established. Play is assumed to be an important feature of this father-child "attachment". Regardless its duration, father-infant involvement is assumed to expose,

"... the intimate side of the man's character; the child is the mirror, repeatedly bringing the man face to face with his emotions." (C. Lewis, 1986, p. 150).

Lewis reports that while father's accounts in the early days indicated the experience of feelings of engrossment (absorption, preoccupation and interest in the infant), at the same time, such feelings were not expected, and one group of fathers become psychologically distanced due to their detached practical responsibilities. As Greenburg (1986) had mentioned, fathers' accounts, in Lewis' study, showed that a variety of factors may constitute an obstacle in early paternal engrossment in the infant, and initial feelings of strangeness may continue. Fathers were found to perform a central practical role in the beginning, "sharing" experience with their wife while their relationship with the newborn is indirect.

Lewis (1986) claims that in the course of the early months, the father-infant bond is not "... as simple and straightforward as some attachment theorists suggest." (ibid, p. 116). The father is assumed to sense contradictions, which may persist as the first year unfolds: while men's perception of the child is that of being "totally unresponsive and fragile", which leads them to avoid contact, they are expected to demonstrate their affection to the infant. Later, most men are said to be satisfied with being involved from a distance, through the mothers' mediation.

Later, during the first year, the father-child relationship gradually becomes a "reciprocal affair". Fathers' perceptions of their developing children reflect the former's psychological changes. They become psychologically more involved with

their children for three reasons: a) the child is more awake when the father is at home; b) the child is developing greater competence; and c) for many fathers the contradictions experienced earlier had eroded in time.

At the end of the infant's first year, two factors were found to relate to the amount of time fathers devoted to play:

- 1) Men seem to play longer if their wives work.
- 2) Fathers belonging in the middle class claimed to play for an hour per day more than professional and unskilled manual workers.

Generally, parents appear to adhere to the ideal of an "emergent" fatherhood, which entails the same type of provision from both parents for children, in terms of emotional and practical support (Lewis, 1986).

The above recent studies of infant-father relationship, reflect the influence of the Attachment Theory of Bowlby and Ainsworth. Parke's studies provide evidence that fathers are interested in their newborns provided that they are given the opportunity to become involved, and they can be nurturant, capable and competent caretakers of their infant, despite the fact that they engage less in caretaking than mothers. Power has mainly been concerned with the father's role on sex-typing. He assumes that mothers and fathers tend to be influenced directly by infant's sex, at birth, while only fathers continue to show differential treatment to sexes after the initial period. The qualitatively different attachments in mother-infant and father-infant relationships constitute the core of Lamb's perspective, while Yogman is concerned with the nature of spontaneous unstructured face-to-face exchanges of expressive communication. Yogman also has considered the developmental changes that may underlie the developing infant-father relationship per se, in comparison with the mother-infant relationship. Greenburg and Morris present the notion of "engrossment" as a ". . . universal process, an innate potential in *all* fathers . . . a father's sense of absorption, preoccupation and interest in his baby.". Within the attachment framework, but in a rather indirect way, Pedersen has proposed two models for the conceptualization of paternal influence. In reference to the infancy period, he emphasises multiple relationships, individual variations, and the interdependency of family subsystems. In his effort to examine the term of the

“emergent view of fatherhood”, Lewis emphasises the theoretical and empirical contradiction concerning both the transition and the experience of fatherhood. This contradiction emerges from the divergence between fathers’ feelings and the impositions of external conditions.

In addition to studies of quality or quantity of father-infant and mother-infant interaction in the course of the first year, research on relationships with parents has also been conducted with toddlers (Clarke-Steward, 1978; Pakizegi, 1978; Liddell, Henzi and Drew, 1987; Solomon, Johnson, Zaitchil and Carey, 1996; Bridges, Grolnick and Connell, 1997), children (Lynn, 1976; Tauber, 1979), and adults (Crouter, Perry-Jenkins, Huston and McHale, 1987; Krasanakis, 1991; Hooker, Fiese, Jenkins, Morfei and Schwagler, 1996).

Apart from the studies in the United States and in Britain, there is a limited number of naturalistic studies of infant-parent interaction in other cultures, such as India (Roopnarine, Talukder, Jain, Joshi and Srivastav, 1990), and Taiwan (Sun and Roopnarine, 1996). Further, there are cross-cultural observations (Staton, 1972; Mackay and Day, 1979; Carlile and Holstrum, 1989; Fernald, Taeschner, Dunn, Papousek, de Boysson Bardies and Fukui, 1994), or cross-cultural comparisons made at a theoretical level (Bronstein, 1984; Hossain and Roopnarine, 1994).

4.3. Studies Reporting Imitative Phenomena in Father-Infant Interaction

To the writer’s knowledge there is no study that directly investigates all overt and spontaneous imitative phenomena in infant-father interaction. Two studies have investigated acoustic aspects of vocal imitation, in infant-father interaction and compared it to infant-mother interaction. One concerns matching of intonation (Siegel et al., 1990), while the other adopts a broader definition of matching (Papousek et al., 1987).

In addition to these studies, others report imitative activity, directly or indirectly, in the following ways:

- 1) Imitation is included among the variables under investigation, and is presented in results (Parke and O’Leary, 1976; Field, 1978; Parke et al., 1981, cited by Beail, 1982; Parke et al., 1972).

2) Imitation is included with the variables under investigation and presented as "nonfindings", that is, it is reported as showing nonsignificant effects on certain other variables of principal interest for the study (Pedersen, Cain, Zaslow and Anderson, 1982).

3) Imitation is investigated but the findings were not considered significant enough to be mentioned in the verbal account (Parke et al., 1972).

4) Imitation is included in the coding categories, but was so infrequent that it was excluded from the presentation of results (Power and Parke, 1983). Reliability problems may prevent the provision of systematic data on imitation (Greenbaum and Landau, 1979).

5) Imitation is coded in the protocol but not reported (Yogman, 1982a).

6) The phenomenon of imitation in infant-father interaction is evident as qualitative but not quantitative data (Brazelton et al., 1979).

The presentation of the studies will follow the above mentioned categorization.

Several researchers present evidence of infant pitch imitation and different responses to maternal and paternal speech (Lieberman, 1967; Reich, 1986, cited by Siegel et al., 1990). In an attempt to replicate Lieberman's findings, children's spontaneous imitations of the average fundamental frequencies or the fundamental frequency contour of their mothers and fathers' talking, were studied in two experiments (Siegel et al., 1990) (Table 4.1a). Acoustic analyses, derived from these experiments, failed to reveal any tendency on the infant's part to adjust vocal pitch, amplitude or duration to those of their speaking partners. It is claimed that this failure to replicate Lieberman's findings does not imply that infants are unable to imitate intonations. It is suggested that when infants are young, they exploit their ability to match prosodic features of speech, but with the onset of language, they either lose or set aside this ability.

| | Sample Size | Infants' Age | Design |
|---|-------------|--------------------|-----------------------------|
| Siegel, Cooper, Morgan and Breinneise-Sarshad, (1990) | 10 | 9-12 months | Home and laboratory setting |
| Papousek, Papousek and Harris (1987) | 20 | 2, 3, and 4 months | Laboratory setting |
| Field (1978) | 36 | 4 months | Laboratory setting |

Table 4.1a: Studies Reporting Imitative Phenomena in Father- and Mother-Infant Interaction

The emergence of playfulness between young infants and their parents in early learning situations and vocal interchanges was examined in relation to both the phylogenetic and ontogenetic significance of play in humans (Papousek et al., 1987). Vocal interchange as a means for repetitive, matching or imitative actions, for experience in various modalities, and as an expression of pleasure, helped to determine the assignment of playfulness to observed interactions (Table 4.1a). The results indicated that the majority of the vocal play episodes were initiated by the infants, rather than by the parents. No significant differences between the vocal play initiated by mothers and fathers, or in relation to age of the infants, were found. In the episodes initiated by the infants, parents answered the infant's sounds with matching turns in 62% of the cases, with no sex differences. When the episodes were initiated by the adult partner, infants answered about 17% of parental sounds with matching turns. Despite the fact that, by definition, parental sounds in the vocal play episodes belonged to the infant's repertoire,

"Only maternal sounds were effective in the present sample, no paternal sounds in vocal play were followed by matching turns in infants . . ." (Papousek et al., 1987, manuscript).

The explanation provided for this impressive finding is that these fathers had limited familiarity with their infants. It was found that in 17.4% of cases, infants answered parental sounds with expression of pleasure. In all the audible expressions of pleasure, no significant relation to either age or parental sex was found.

Familiarity has also been used as an interpretative factor that affected imitative patterns in a study that compared the interaction patterns of primary versus secondary caretaker fathers during face-to-face interactions with their infants (Field, 1978) (Table 4.1a). Primary caretaker fathers and mothers engaged in more smiling, imitative grimaces and high-pitched imitative vocalisations than did secondary caretaker fathers.

Parke's first study (Parke et al., 1972) planned to investigate the effects of maternal medication, labor and infants' sex upon mother-father-newborn interaction (Table 4.1b). Imitation defined in the wide sense, as ". . . imitates infant . . .", was among the behaviours that were recorded for both mother and father (Parke et al., 1972, p. 85). The results indicated that fathers did not differ from mothers, in the majority of behaviours, including imitation. When sex-of-infant effects on parental interaction were analysed, it was found that sex differences were related only to the variable of "touching". It may be inferred that boys and girls did not differ in the degree to which they were imitated by their mothers and fathers.

| | Sample Size | Infants' Age | Design |
|------------------------------------|-------------|---------------------------|--------------------------|
| Parke, O'Leary and West (1972) | 19 | 6-48 hours after delivery | Hospital room |
| Parke, O'Leary (1976) | 82 | 6-48 hours after delivery | Hospital room |
| Parke, Grossman and Tinsley (1981) | 37 | Newborn infants | Hospital room |
| Pedersen et al. (1982) | 41 | 5 months | Natural home environment |
| Power and Parke (1982) | | | |
| Study I | 24 | 8 months | Laboratory setting |
| Study II | 20 | 7.5 and 10.5 months | Home setting |

Table 4.1b: Studies Reporting Imitative Phenomena in Father- and Mother-Infant Interaction

This study appears to have had several limitations concerning either contextual factors or methodological issues (sample size, social class) (Parke and O'

Leary, 1976; Parke and Sawin, 1976, cited by Beail, 1982). A second study carried out by Parke and O'Leary (1976, cited by Beail, 1982), with the same observation method as the first study (Table 4.1b), showed that fathers engaged in more social and stimulating activities with their infants than mothers did. These activities included eye contact, imitating the infant's facial expressions, talking to the infant and tactual-kinetic stimulation (e.g. touches, moves parts of body) (Sawin and Parke, 1979).

To the writer's knowledge, the only cross-cultural study that reports imitation is the one conducted by Parke et al. (1981). This aimed to compare early interactions of mothers and fathers with their newborns, in triads during feeding in the hospital room, in both United States and West Germany. Sex-of-infant effects on interaction patterns were also examined (Table 4.1b). The following results, in particular reference to imitation and affectional behaviours, were reported:

- a) Regardless of culture, fathers were found to imitate infant behaviour as much as mothers, while mothers displayed more affection than fathers, on the basis of smiling and kissing, but fathers still smiled a substantial amount.
- b) When sex-of-infant effects were examined, an effect for holding the infant was reported, and imitation is not mentioned. This leads to the conclusion that parents, irrespectively of their sex, imitated boys and girls, and displayed affectional behaviours to them, to the same degree.
- c) When culture was taken into consideration, German parents were found to vocalise and imitate their infants more than American mothers and fathers.
- d) Based on the findings that mother was holding the infant more than the father, and many of the affectional and stimulatory behaviours are more likely to occur when the infant is being held, the researchers were led to examine maternal and paternal behaviours with the variable of "holding" the infant held constant. The results indicated that when the father is holding the infant, he is significantly more likely than mother to imitate behaviour, while he equals her in affectional behaviour such as smiling. When the mother held the infant, the imitative behaviour did not differ but mother was found to smile significantly more often than the father.

The researchers concluded that contextual variables were important in modifying the nature of interaction patterns. They claimed,

“This study extends our understanding of the universality of parent-infant interaction patterns and suggests that the cultural environment has a significant impact on family interaction behaviour.” (Parke, et al., 1981, p. 109).

Cultural differences were also found in the parents' characteristic mode of interaction, in that American parents were more physical in their interaction, while German parents interacted in more auditory and visual ways.

Mothers and fathers did not differ significantly in rates of vocalisation (i.e., high-pitched, often imitative sounds and ways of “baby-talk”) (Pedersen et al., 1982) (Table 4.1b). This “nonfinding” was assumed to suggest shared responsibility for caretaking in the particular sample.

In another study (Power and Parke, 1982, 1983), dyadic parent-infant play, with infants at eight months of age, was examined in the laboratory (Table 4.1b). Frequent interaction bouts were coded along three independent dimensions: “toy” versus “no-toy”, degree of “physicalness”, “play type”. Seven play types were coded, in order of increasing complexity: “no motor behaviour”, “watching an object”, “grasping an object”, “retrieving an object”, “imitating a parent motor behaviour”, “giving the parent an object”, and “engaging in a turn-taking”. The results indicated that imitating bouts occurred infrequently, a fact that did not permit analysis. This was interpreted to have occurred probably as a function of the fact that the simple toys, used in the play sessions, had few manipulable parts.

In a further step, the same researchers (Power and Parke, 1982) aimed to investigate whether the patterns of family interaction identified in the laboratory are generalizable to more naturalistic settings and to nonplay contexts (Table 4.1b). The results indicated that exploratory bouts, in which parents actively attempted to get their infants to engage in some form of large or fine motor exploration, imitating occurred, and fathers showed greater differential treatment of the sexes than did mothers. They were more likely to encourage visual, large-motor and fine-motor exploration in their sons (watching, large-motor, assisting, retrieving, and imitating), while they encouraged the vocal behaviour of their daughters. It was hypothesised that among the other bouts that occurred at the home setting and not in the

laboratory, the imitating bouts may serve in the long term to encourage infant exploratory, cognitive and social development, through facilitation of the development of various social skills (Power and Parke, 1982).

Greenbaum and Landau (1979) studied the infant's exposure to talk by familiar people (mothers, fathers and siblings) and differences in four environments (middle-class, lower-class, kibbutz and residential institution) (Table 4.1c). The researchers reported that no systematic data concerning imitations by familiar people of infant responses could be provided, due to observer reliability problems with this category. Despite this, imitations appeared to be fewer than any of the other verbal responses. Imitations of consonants uttered by the child were found to increase in frequency at seven and eleven months in comparison with preceding ages.

| | Sample Size | Infants' Age | Design |
|---|---------------|--|----------------------|
| Greenbaum and Landau (1979) | 96 | 2, 4, 7 and 11 months | Natural environments |
| Yogman (1982a) | 6 | 3 months | Laboratory setting |
| Brazelton, Yogman, Als and Tronick (1979) | not mentioned | Infants were observed repeatedly over the first six months of their life | Laboratory setting |

Table 4.1c: Studies Reporting Imitative Phenomena in Father- and Mother-Infant Interaction

In another study attempting to investigate, in a subtle way, the exchanges of expressive communication that may underlie the developing father-infant relationship, at infants' three-months of age, "verbal imitation" was one of the variables examined under the category of parental vocalisations (Yogman, 1982a) (Table 4.1c). No results are reported in reference to parental behaviours in the particular study.

Within the theoretical framework of Brazelton, Yogman, Als and Tronick, that has been described earlier in this chapter, imitation is described qualitatively in

father-infant interactions (Brazelton et al., 1979) (Table 4.1c). According to these researchers the human infant is endowed from birth onwards with the ability to display predictable behavioural patterns with an adult, who shapes affectively and psychologically the infant, while the latter gradually learns,

“. . . how to capture and control with expressive displays the important persons on his environment . . .” (Brazelton et al., 1979).

In setting the context for the discussion of their data, Brazelton et al. (1979) describe a segment of a three-month-old boy playing with his mother, and then with his father,

“Here, the father enters with a neutral facial expression and begins a narrative vocalization while the infant stills, sits upright, and watches the father intently and quietly. The infant appears ‘set’ to interact. After about six seconds, the infant then greets his father with a wide grin and punctuates this with a large abrupt movement of his foot. Infant vocalizations are likely to be in the form of laughs, short and intense, followed by long pauses, while father imitates and amplifies his infant’s facial expressions. Episodes of mutual play are followed by pauses . . .” (Brazelton, et al., 1979, p.32).

In summarising, the imitative patterns which have emerged from these studies, the following inferences may be drawn: Imitative phenomena do exist in infant-father interaction. When parental imitation or matching was found in infant-mother and infant-father interaction, either there was no difference between the estimated proportion of these imitations, or the estimated proportions of paternal imitations are higher than maternal imitations. When infant imitation or matching was found, either this occurred in response only to maternal sound or the infant vocal pitch, amplitude and duration adjustment was not matched at all, neither to mothers nor to fathers. When the sex-of-infant was considered, either no significant results emerged, that is, mothers and fathers were found not to differ in the amount they imitated their boys or girls, or fathers were more likely to encourage imitation in their sons, while they encouraged vocal behaviour in their daughters.

4.4. Discussion

In Freud’s final theory, identification is inseparable from superego formation. It is by way of identification, in confluence with the process of an object cathexis, that the Oedipal complex emerges and, in the long-term, an object tie is formed with the father. The phenomenon of “empathy” is regarded by Freud as an emotional

effect, not a prerequisite for identification. Post-Freudian views on father's role exhibit a shift to interest in earlier stages of development than those considered by Sigmund Freud.

Preoccupied with the notions of developmental and defensive identification, Mowrer, within a social-learning theory perspective, emphasised the mother's mediation role in regard to developmental identification, and the mediation of both parents in reference to defensive identification. Sears considers "affection" and "motive" to be linked, under certain conditions, with identification to parental behaviours and attitudes. Kohlberg discusses developmental shifts in the motivational conditions for imitation, which he believes emerge from cognitive-structural transformations, and not from the formation of new motives for imitation. Around the age of 5 years, the boy prefers masculine activities and starts to seek a model for these activities, while in the course of 4-7 years, girl-father identification increases, with no particular sequence of stages comparable to those of boys.

In an ethological framework, Eisenberg and Lynn identify a combination of factors that have favoured the inclusion of the male in the family. Biller and Meredith introduce the terms "father", "mother" and "child power". Imitation in infant-father relationship, is considered "the sincerest form of flattery", which makes the father "sense the effect" that his attitude has on the infant.

Recent perspectives on the infant-father relationship have been developed largely in the interpretational framework of attachment theory, as formulated by Bowlby and Ainsworth. The notion of "engrossment", as a ". . . universal process, an innate potential in *all* fathers . . ." is discussed by Greenburg and Morris. In reference to the bidirectional quality of regulation, Parke's studies provide evidence that fathers may be interested, nurturant, capable and competent caretakers of their infants, provided that they are given the opportunity to become involved. In Power's sex-typing perspective, mothers and fathers tend to be influenced directly by the infant's sex at birth, while after the initial period, this differential treatment to sexes appears to be manifested only through interactions with fathers. Lewis also from an Attachment Theory position, emphasises the theoretical and empirical contradictions, in both the transition and the experience of the "emergent view of fatherhood".

Contradictions emerge from the divergence between fathers' feelings and the imposition of the external conditions. Within the same framework, but in a rather indirect way, Pedersen has proposed two models for the conceptualization of a paternal influence. In reference to the infancy period, Pedersen's model emphasises the multiple relationships, individual variations, and the interdependency of the family subsystems. The concept of qualitative different attachments in mother-infant and father-infant relationships constitutes the core of Lamb's perspective. Yogman is concerned with the nature of unstructured face-to-face exchanges of expressive communication, the developmental changes that may underlie the developing infant-father relationship per se, and the comparison with the mother-infant relationship.

The following conclusions emerge from studies that report imitation in father-infant interaction. Imitation does take place in infant-father interaction; in infant-mother and infant-father interactions maternal and paternal matchings are equal or fathers imitate more; when infant imitation or matching was found, either this occurred in response only to a maternal sound or the infant made no adjustment of acoustic features to the model at all, neither for the mother nor for the fathers; in their interactions with their boys and girls, either mothers and fathers stimulated imitation equally or fathers were more likely to encourage imitation of expressions of movement in their sons, while they encouraged vocal behaviour in their daughters.

In Freud's theory, which has influenced most subsequent studies, the father's role is perceived in relation to the hypothesis of an Oedipal complex (Lynn, 1974), and the process of identification is considered, not in its own right, but rather as it serves, in the short or in the long term, formation of the superego in "pathological"⁹ circumstances. The notion of reciprocity in infants feelings for adults, in the sense of primary intersubjectivity (Trevarthen, 1979; Trevarthen et al., 1998) is excluded. The motive for the resolution of the Oedipal complex is assumed to be fear, for males, and loss of mother's love, for the females (Lynn, 1974). Kohlberg (1969) describes the "thought processes" in identification as "magical", in the sense that what is involved is not a perceived similarity between a distinct self and a distinct other but

⁹ Kohlberg (1969) has characterised identification in psychoanalytic and neo-psychoanalytic theories as "pathological".

rather “incorporation” or “absorption” of the other in the self. Thus, Lynn and Kohlberg both give a “pathological” colouring to the nature and quality of the “strong deficit-state of motivation” that is supposed to cause identification in psychoanalytic theories.

The fact that the Post-Freudian psychoanalytic views on the father’s role show a shift of interest to earlier developmental stages, and a different kind of attention to behaviour than that of Freud, has led to two logically conceptions, which are sustained by a forced continuity in theorising, especially with regard to what motivates early father-infant interactions. On the other hand in certain aspects, particularly those concerning the identification process, the neo-psychoanalytic views are not substantially different from those of the original theory.

Social learning theories also assimilate many ideas from Freud. Mowrer considers that developmental identification is, “powered by biologically given drives”, while defensive identification, arises from “socially inflicted discomforts”. Two different kinds of frustration motivate identification. Again negative emotions are prominent. In Sears view, the “motivational system” is inseparable from “dependency”, while an ambiguous activity of the “expression of love”, meaning periodic provision and withdrawal of affection, can strengthen the motive for identification. The “pathological” nature of motive is thus manifested in a rather indirect way.

Cognitive-developmental theory following the lead of Piaget, causes Kohlberg to differentiate his position, regarding the motivation for identification from psychoanalytic, neo-psychoanalytic and social-learning theories. He changes both the definition of motivation and the conception of its nature. Kohlberg’s “Motivating conditions for imitation”, refer rather to general impulses that lead to the reproduction of the experience of any interesting behaviour pattern; there is no special imitative motive. This cognitive motivation also serves social attachment; that is, Kohlberg’s theory departs from explanation of the “pathological”, and seeks to comprehend the social affordance of imitation and identification in normal circumstances.

Recent research opens a wider perspective on the infant-father relationship and interactions, within it. There is evidently no comprehensive theory conceptualizing the role of the father in infancy, a fact that has been accepted, given the wide variety of models and explanations proposed to integrate empirical data and theory. Recent attempts are characterised by intra- and inter-theoretical contrasts, contradictions, and lead to no comprehensive theory of the role of the father during infancy. Given the restricted number of studies, most of which report, rather than investigate, imitative phenomena in infant-father interaction, it is not possible to define the nature of motives for imitation, in general or within an interpersonal context.

Both traditional and recent theoretical and empirical studies recognise that fathers have some direct or indirect role, at some point, early or late, in infant development. Only Freud has assumed that boys and girls have different motives for identification. The recent "discovery" of infants' communicative abilities challenges any idea that these motives are fundamentally "pathological", and demonstrates the need for a new theoretical framework. There is now evidence that imitative phenomena occur in father-infant interaction. The need for an integrative theory for all kinds of infant-father interaction, that accounts for its natural features, is obvious.

CHAPTER FIVE

PILOT, MAIN STUDY AND METHODOLOGY

5.1. Aim and Implications

The aim of this thesis is to study systematically the intersubjective nature of infant and parental imitation, between the 8th week and the 24th week of an infant's life. The following aspects will be studied:

- The Emotional Context: Emotional aspects of imitative exchange will be considered to test the following hypotheses:

a) If imitation of emotional states precedes imitation of expressive behaviours, then these emotions could be considered as revealing motives for imitative exchange. Alternatively, the motive for imitation should be attributed to other factors, possibly ones that are extrinsic to the psychological state of the interactants.

b) If emotional states that precede reproduction of actions, are judged to be positive, i.e. to indicate interest and pleasure, then the view could be adopted that the motive for imitation is to seek pleasurable intersubjective contact (Kugiumutzakis, 1998b; Trevarthen, Kokkinaki and Fiamenghi, 1998). If emotions expressed before imitation are negative or neutral, then it may be concluded that the function of an imitative exchange is rather to regulate the balance of interaction, as a homeostatic mechanism that operates between cycles of engagement and disengagement.

c) If emotional matching or attunement, occurs in parallel with behavioural imitation, then this would support the interpretation that imitation in infant-parent interaction constitutes an intersubjective phenomenon, with all the implications that this may hold for the existence of inborn communicative abilities in infants. If no emotional matching or attunement occurs with imitation, this would suggest that early imitation may be an emotionless phenomenon and that emotional regulation of communication is acquired through learning at a later age by observation of displays of parental emotional states.

- Timing: The results of the duration analysis of imitative behaviours will be discussed in relation to developmental dips or age-related regressions

(Kugiumutzakis, 1993), and communicative phrasing (Lynch, 1996; Lynch, Oller, Steffens and Buder, 1995; Poppel, 1994). Changes in the timing of imitation between 8 and 24 weeks may give evidence on developmental changes in infants' motivational states or parental perceptions of them. On the one hand, stability of timing across this age range, in combination with evidence of stable and universal features of phrasing (duration of phrases, cross-linguistic similarities, syllable compression, sound-silence relation), may clarify preverbal motive functions with the implication that universal rhythmic principles in perception and motor expression act as a frame for communication.

- Developmental Changes: If certain imitative expressive behaviours show a non-linear developmental course this may give information on motivational and reorganizational changes in the infant, in combination either with corresponding motivational changes in the parent, or with changes in parental perception of changes in the infant's motivation. Again, these changes could be considered as evidence of transitions between developmental stages (Trevvarthen 1982). If the developmental course of imitative expressions is linear, then this could be considered as evidence of a rigid and automatic principle of motivation better explained in terms of ethological theory of sign-stimuli, innate releasing mechanism and fixed action patterns. In any case, evidence of infant imitation appearing as early as the 8th week and developing in either a linear or a non-linear course, would prove that the ability to imitate does not disappear in the first six months of life as it has been claimed to do (Kugiumutzakis, 1993).

- Type of Imitative Interchange: The results of timing analysis will be discussed in relation to the following points:

A predominance of "turn-takings" over "co-actions" may have the following implications:

- 1) It provides evidence that the mechanisms that regulate conversation, the most "dramatic" form of communication, are intrinsically-generated, since they are present, at least in rudimentary form, from birth.

2) It supports the suggestion that “dialogic” motives are actively regulated, before the infant acquires control of manipulative action on objects, and long before language (Trevvarthen, 1993b; Aitken and Trevvarthen, 1998; Trevvarthen et al., 1998).

A predominance of overlapping imitative exchanges over turn-takings, may provide evidence for regulation of the emotional affordances of expressive behaviours in infant-parent interaction. This co-active type of interaction does not exclude the communicative turn-taking mode, but it introduces a higher intensity of emotional regulation than that characteristic of turn-taking.

- The Direction of Imitative Exchange: Analysis of the direction of imitation will give evidence on the symmetry or asymmetry of motives for interaction. Total asymmetry of interaction will be considered only in the case where there is no evidence of either infant or parent imitating. Whenever both infant and parent imitate, this will be regarded as evidence for symmetry of the impulse to imitate, as alternative expressive or communicative behaviours do exist that could substitute for imitation (Trevvarthen, 1993b; Trevvarthen, et al., 1998). Imitations by infants and parents have important implications for the theory of inborn communicative abilities of infants and that of intuitive parenting, respectively.

- Kinds of Imitated Activity: Both main and interactive effects of nation, and of the infant’s or parent’s sex on the different kinds of imitative expressive behaviour will be investigated. Sex differences in expressive behaviours may imply that females and males are differently involved in interpersonal communication. A predominance of expressive behaviours such as hand movements, in one group may provide evidence that this group is more active in the domain of constructive invention and discovery (Trevvarthen, 1986). Cultural differences may emerge in relation to the kind of imitative expressive behaviour, and these will be discussed in relation to cultural stereotypes. Evidence of the intersubjective nature of imitation may shed light on the predominant kinds of imitative exchange in the two countries, reflecting their cultural modes of communication. Similarities between the two countries in the kinds of expressive behaviour imitated may suggest other possibilities, including intrinsically-generated structures that are culturally invariant.

5.2. Pilot Study

5.2.1. Aim of the Pilot Study

A Pilot Study was planned to help in the design of the Main Study as follows:

- a) To address practical problems known to be encountered in home-based observational studies (finding the optimal position of the camera, dealing with distracting responses of the subjects to the presence of the investigator, etc.), and to gain experience in use of the recording equipment.
- b) To practice subject recruitment.
- c) To decide about the most appropriate ages of infants.
- d) To obtain a sample of tapes on which to practice methods of analysis, and to become familiar with the analysis software and equipment.

5.2.2. Subject Recruitment

A cross-sectional sample of ten infant-parent pairs (N=30, 10 mothers, 10 fathers and 10 infants -- 5 boys and 5 girls) participated in the Pilot study. Initially, eleven pairs were selected but one father refused to take part in the study. At first, six infant-parent pairs were to be observed, but the effects of various disturbing conditions (sleep, crying, bowel movement) caused the researcher to increase the number of the subjects.

Subjects were recruited from a list of volunteers at the Department of Psychology of the University of Edinburgh. All infants were full-term and healthy, with normal weight and height and uncomplicated deliveries. Two were born in Linlithgow and the remainder in Edinburgh. All but one were first-born. Eight infants were breast-fed, with no problems. The mean age of the infants' parents was, for mothers 29.4 years and for fathers 33.1 years. All the fathers were well-educated and employed in professional and skilled jobs. Finally, all the fathers attended the labour and birth. Eight of the ten fathers described it as a "wonderful experience", one as an experience which involved "mixed feelings", and one as "drama".

Parents were first visited for an introductory discussion and to familiarise them with the researcher. They were told that she was interested in how parents and

their infants play together, and in how they communicated with one another. No mention was made about our interest in imitation. In addition, information of the infants' development was taken by means of a short interview with the parents, which confirmed that all the infants were developing normally.

5.2.3. Methodology

The Pilot Study was planned as a cross-sectional one with the following aims:

- a) The pilot video recordings would not be analysed in detail, but they would be reviewed to provide a provisional summary to direct future research.
- b) The cross-sectional design would allow a limited number of recordings, and assist quick subject recruitment and data collection.
- c) An overall and age-specific view would be gained of infant-parent interactions, over the whole age range of interest, in a limited period.

Subjects were selected to cover three age levels (Table 5.1).

| | | |
|--|------------------|--------------------------------|
| Cross-Sectional Design | | |
| N=30 subjects, 10 infants, 10 mothers, 10 fathers | | |
| Age-level 1 | 15 days-2 months | 3 infants (2 boys, 1 girl) |
| Age-level 2 | 2-4 months | 3 infants (2 boys, 1 girl) |
| Age-level 3 | 4-6 months | 4 infants (2 boys, 2 girls) |
| Recording frequency: once every 15 days | | |

Table 5.1: Description of Subjects in the Pilot Study

Videorecordings took place in the infants' homes under conditions, which with the equipment used, will be described in detail in the account of the Main Study.

Infants were filmed after they had been fed, when alert and relaxed, once every two weeks. Because younger infants tire quickly, and older infants are more

interested in the environment than in interactions with their parents, thereby requiring more time if the necessary face-to-face interactions are to be obtained, the duration of the videorecordings varied in relation to the infants' age, i.e. 5 to 8 minutes for the younger group and 10 minutes for infants of the second and the third levels.

The first two-minutes was a warm-up period. Parents were asked to play with their infants as they normally do. The order of interaction was counterbalanced, beginning always with the same-sex parent.

Some infants were observed more than once in two weeks because recording was interrupted by sleep, crying, nappy changing, etc. When the infant was unwell or became distressed for any reason, or if the parents or the researcher considered that the visit should be postponed, it was arranged to return on one of the following days, as soon as possible. In all 36 visits, 26 recordings were made.

5.2.4. Comments on the Pilot Study

The Pilot Study contributed to the Main Study in the following ways:

- a) Videorecordings should start when infants are 8 weeks old. Before the 8th week of life, it is likely to be too difficult to find a time when infants would be alert and fathers would be at home.
- b) Although the video recordings of the Pilot Study were not subjected to detailed analysis, they led to the construction of the analysis protocol which was used, in its condensed form, for formal data analysis. In addition to its use with the Pilot study data for initial construction of the coding system, the protocol was reapplied to one third of the Main Study's data before formal analysis started.

5.3. Main Study

The Main Study was longitudinal, naturalistic and cross-cultural. Infants 8 to 24 weeks of age were video-recorded in free interactions with their mothers and fathers in Crete and Scotland.

The design was guided by the new research methodology that combines descriptive analyses with statistical treatment of quantitative data. Observations of free interactions between infants and their parents, permit optimal description of the

phenomenon of imitation and its emotional context. Infants express themselves more naturally to a familiar partner who does not have communicative inhibitions, than they are likely to do in experimental procedures. A well-designed experiment may permit sound inferences of what may happen in the infants' brain, but is necessarily selective. Naturalistic recording that captures the regular, repeatable and effective patterns in spontaneous action, seems to be the best way to identify the components and constraints of developing psychological systems, as these are reflected in the dynamics of psychological action.

The developmental course of imitation was followed across the age range of 8 to 24 weeks of an infant's life. To the writer's knowledge, no other longitudinal study has been made to compare the quality of dyadic expressive interactive patterns of infants with their fathers and with their mothers.

The cross cultural comparison aims to extend our understanding of universal aspects of the imitative phenomena. In addition, the predominance of certain imitative expressive behaviours in one country as compared to another, may confirm the intersubjective nature of imitation by demonstrating a flexibility that reflects cultural differences in interaction.

5.3.1. Subject Recruitment

After ethical approval had been obtained for the research, contact was established with obstetricians and paediatricians who opened access to birth records. The birth records of hospitals and clinics were searched to identify parents of infants aged a few days before the starting age of 8 weeks old when first videorecording was to be made. Where possible, parents were approached before birth either at home or in the maternity hospital or clinic. They were contacted by letter (Letters to Parents in Appendix I), or by telephone to arrange home visits.

5.3.2. Subjects

The sample consisted of 30 families, fifteen from Crete and fifteen from Scotland. The total number of subjects was 90 (30 infants with their fathers and mothers) (Table 5.2).

| | |
|---|--|
| Longitudinal and Cross-Cultural Design | |
| N=90 subjects 30 infants (17 boys, 13 girls) (14 first-born, 14 second-born, 2 third-born) 30 mothers, 30 fathers | |
| Infants' age: 2nd-6th month of life Recording frequency: once every 15 days | |
| Crete | 15 infants 8 boys, 7 girls 8 first-born infants (six girls and two boys), 6 second-born infants (boys) and one third-born infant (girl). |
| Scotland | 15 infants 8 boys, 7 girls 6 first-born infants (4 boys and 2 girls), 8 second-born infants (3 boys and five girls) and one third-born infant (boy). |

Table 5.2: Subjects of the Main Study

Parents: All parents were married. The mothers' mean age was 31.32 years (SD=4.83, range 21-39 years). The Cretan mothers' mean age was 29.10 years (range 21-39 years). The Scottish mothers' mean age was 33.53 years (range 27-39 years). In both samples, Cretan and Scottish, only a single mother was not working. In the Cretan sample, 10 mothers had a university degree and 5 mothers were with lyceum school education. Of the Scottish sample, 14 working mothers had a university degree, and one was a housewife. Pregnancy, duration of labour and perinatal factors were within normal limits. Of the Cretan mothers, thirteen had a normal labour and two infants were born by caesarian section. In the Scottish sample, twelve mothers had a normal labour and three gave birth by caesarian section.

The mean age of fathers was 33.60 years (SD=5.03, range 26-47 years). The Cretan fathers' mean age was 32.01 years (range 26-47 years). The Scottish fathers' mean age was 34.99 years (range 30-44 years). Of the Cretan fathers, eleven had a

university degree while the rest had completed lyceum education. All but one of the Scottish fathers had a university degree while one of them had a Ph.D. Five Cretan fathers attended the labour and the delivery of their child, and all 15 Scottish fathers were present through their wives' labour and the delivery.

Infants: All the infants of the study were full-term and healthy. The Cretan infants were delivered at a maternity clinic in Rethymnon and the Scottish infants were delivered at the Royal Infirmary of Edinburgh. The infants' mean birth weight was 3,439 gr (range 2,718-4,250 gr). The Cretan infants' mean birth weight was 3512.82 gr (SD=414.81, range 2,800-4,250 gr), and the Scottish infants' mean birth weight was 3,370 gr (SD=425.81, range 2,718-4,131 gr). The infants' mean birth height was 52.53 cm (range 48-58 cm). The Cretan infants' mean birth height was 52.15 (SD=1.96, range 48-55 cm) and the Scottish infants' mean birth height was 52.89 (SD=2.36, range 50-58 cm).

Of the Cretan infants, five infants were not breast-fed at all, one was breast fed for the first ten days, one was breast-fed for the first two weeks, three were breast-fed for the first 20 days, two was breast-fed for the first 40 days, one was breast fed for the first two months, two were breast-fed for the whole of the first six months. Of the Scottish infants, all 15 were breast-fed for the whole of the first six months and twelve planned to continue breast feeding after the sixth month. In answering the question: "Who else, apart from mother, is the caregiver?", Cretan parents reported, in seven cases, that grandparents assisted in caregiving, in two cases aunts gave assistance and in six cases families the parents were sole caregivers. In the Scottish sample, all fathers gave assistance as caregivers, and in four cases grandparents also helped with care of the infant.

5.3.3. Recording Conditions

After parents had agreed to participate in the study, they were visited in their homes and informed about the aims and the procedure of the study. It was explained that this was a study of parent-infant play that aimed to reveal possible differences in playful activities of parents in the two cultures studied. No mention was made of our interest in imitation. After the discussion, parents were invited to ask any clarifying

or informative questions, and then the first visit was arranged at a time suitable for the parents, when the infant was likely to be fed, relaxed and alert, and a time usually preferred for social games.

Videorecordings were made at 15 day intervals. The order of videorecordings with the parents was counterbalanced, beginning always with the same-sex parent: e.g. if the infant was a girl, the first recording, in the first visit, was made with the mother and then one was made with the father. In the second visit, in this example, the recording was made first with the father, followed by one with the mother, and so on, switching the order in each successive visit.

The recording with one parent was followed immediately, or as soon as possible, by the recording with the other parent so that a change in the infant's mood would be less likely.

The recording with each parent occupied 8-10 minutes (8 minutes for the younger infants and 10 minutes for the older infants), and, therefore, each visit took 16-20 minutes. For each infant there are 9 videorecordings, each lasting up to 20 minutes. Thus, the data collected for each family totalled a maximum of 180 minutes of videorecorded interactions, and for the whole population of subjects there was a total of up to 5,400 minutes of recorded interactions. The shortest total time for a subject was 144 minutes. A total of 540 8 to 10-minute videorecordings were made; 270 with the mothers, and 270 with the fathers.

No specific instruction was given to the parents of what to do. When the researcher was asked how they should behave, she said: "Please, play as you normally do with your baby".

The recordings took place in a room chosen by the parents. There was no restriction in relation to the infant's position or the place where he or she would sit. In some cases, the infant remained in their chair for the whole duration of the recording, others were placed by their parents on the sofa, or taken on their lap.

While the recording of one parent was made, the other was asked to leave the room, so that there would be no third party intervention. If the phone happened to be in the same room that the recording was taking place, parents were asked to put it off the hook, or to take it into another room, so that there would be no distraction.

The researcher tried not to be noticed by the infant. If the infant looked at her in the course of the videorecording, she moved out of the infant's visual field. In the course of the recording, the researcher did not speak to the parents or to the infant. If the parents asked questions, the researcher either answered very briefly or interrupted the recording to answer, but this was a rare occurrence.

The lighting was arranged by the parents according to what they thought would be most suitable for the infant, providing they did not place themselves in front of a window, a precaution to avoid back-lighting. Thus, camera had a sensitivity to 1 LUX for a high quality recording.

All recordings were made with a Panasonic NV-MS4 S-VHS HI FI STEREO camera.

If the infant was unwell or became distressed, or either the parents or the researcher considered that the visit should be postponed for some reason it was postponed to one of the following days, as soon as possible.

Written records, or regular discussions with the parents, concerning the infants' development confirmed that all the infants were progressing "normally". At the end of the study, parents were given a short debriefing interview. The aim of this was to ensure that none was aware that imitation had been the focal point of interest in the study, and to gain information about the sharing of caretaking between the parents or other relatives. In addition, a copy of the recorded interactions between the parents and their infants were given as a present by the researcher to each family. Finally, a thank-you letter was sent by the supervisors of the researcher to each family (Appendix I).

5.4. Data Analysis

According to Bakeman and Gottman (1986), possible strategies of analysing sequential data obtained from systematic observations, are as follows:

a) Interval Coding: A period of time is divided into a number of brief intervals. Observers either categorise each interval or note which codable event, if any, occurred during each interval. This strategy has been criticised because it cannot provide information as accurately as an event coding strategy; the major problem is

that more than one code may occur within an interval, or near the boundaries of intervals.

b) Cross-Classifying Events: Cross-classifying events is a useful way of recording data when investigators have well-defined questions. This strategy does not require continuity between successive events but results in behavioural sequences being captured. It does not simply classify events on a single dimension but instead cross-classifies them on several dimensions.

c) Event Sequences: The data is reduced to event sequences, meaning that the data is represented as sequences or chains of coded events. The onset and offset times of the defined events are determined. Information is gained about the frequency, the duration and the relative occurrences of different behaviours.

It was decided that the strategy of Event Sequences would be most appropriate for the detailed coding of the imitative phenomena, and the accompanying emotional states and streams of activities in infant-parent interaction.

5.4.1. Levels of Microanalysis

Data microanalysis was made at three integrated levels:

5.4.1.1. Units of Interaction

Within each ten-minute sample of infant-parent interaction, units of interaction were defined, within which imitations, and their behavioural and emotional context, were analysed (Diagram 5.1). The occurrence of imitation, and thus of an imitative episode, determined the definition and analysis of the unit of interaction and the number of units in a ten-minute interaction was determined by the number of imitative episodes.

Given that an imitation has occurred at a certain moment in infant-parent interaction, then the temporal and qualitative description of the unit of interaction depends on the type of communication before and after the imitative episode. An imitative episode was defined as the period from the moment that the model's expressive act starts until the completion of the imitator's last imitative activity. A unit of interaction is divided in three successive periods, in relation to the imitative

10 MINUTE SAMPLE OF BEHAVIOUR

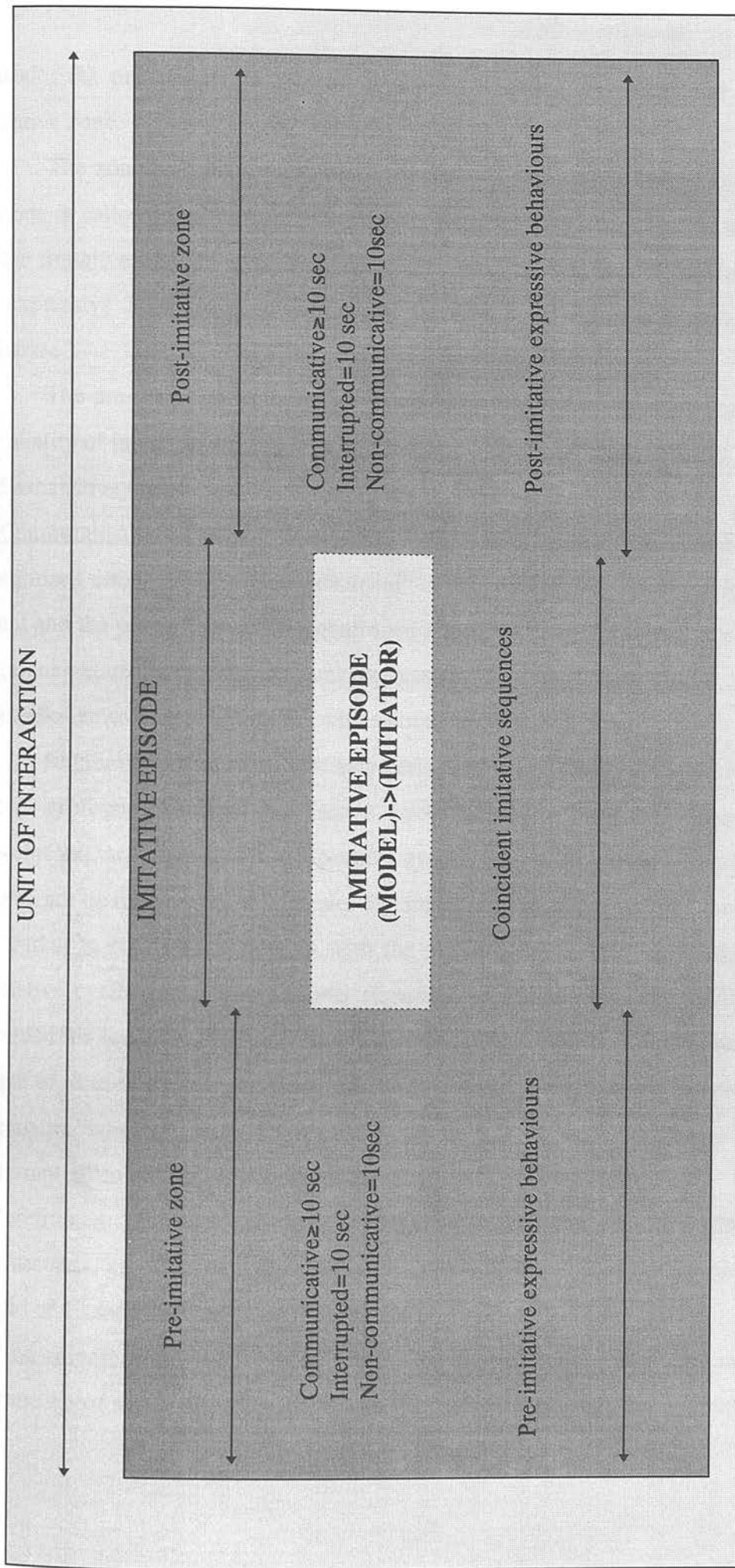


Diagram 5.1 : Levels of Microanalysis

episode: the pre-imitative zone, the coincident imitative sequences and the post-imitative zone.

The zone or group of expressive behaviours that appear before an imitative episode is called "pre-imitative". Expressive behaviours that occur at the same time as the imitative episode are called "coincident imitative sequences", while the zone of expressive behaviours occurring after the imitative episode is called "post-imitative".

The pre- and post-imitative zones are identified and categorised according to the quality of interpersonal engagement in them, which is of three mutually exclusive and exhaustive types:

1) Communicative: A zone is communicative if it consists of interaction that can be categorised either as "protoconversational" or "rhythmic". In protoconversation the infant and the parent interact in a controlled mutually attentive manner, coordinating emotional states, eye contact, oral expressions and body movements, either in alternation or overlapping, but not with a strongly marked rhythm.

Rhythmic interactions constitute periods in which the parent's vocal or non-vocal expressive behaviours (songs, vocalisations, non-speech sounds and movements), are organised in a repetitive cyclic game, with a clear beat which may or may not be regular and predictable. The infant joins in, either to "fill" the intervals the parent is creating, to overlap with the parent's expressions, or to complete a repetitive cyclic game. Interpersonal engagements, identified as "communicative", occupied 10 seconds or more, and the duration of the zone was determined by the length of time that the engagement continued without a break. If the duration of the interaction was less than 10 seconds then it fell in the next category of an "interrupted" interpersonal engagement.

2) Interrupted: These are periods in which short interactions, usually lasting one or two seconds, are interchanged with short periods of interrupted communication. A period of 10 seconds is selected for analysis.

3) Non-communicative: Periods in which the infant does not join in the interaction because he or she is directing interest to the environment, or is fully occupied with

his or her psychological mood, are identified as “non-communicative”. Again, a period of 10 seconds is selected for analysis.

Categorizations of pre- and post-imitative zones are independent, in the sense that when, for example, the pre-imitative zone is judged to be communicative, the post-imitative zone can be any one of the three types of interpersonal engagement.

5.4.1.2. The Stream of Expressive Behaviours

For each unit of interaction, the stream of both infants’ and parents’ expressive behaviours that occurred before, during and after the imitative episode were coded. The coding of expressive behaviours employed 122 sub-categories for the parent and for the infant, 46 for the pre-imitative zones, 33 for the imitative episodes and 43 for the post-imitative zones. These 122 sub-categories were grouped under 5 main headings, identifying the zones (duration and kind), emotional states, gaze directions, oral expressions and body movements (Coding System in Appendix II).

Emphasis was given to the definition of emotional states and their variation since these expressive behaviours are directly related to the theoretical orientation of the analysis and the foundation for the interpretation of the psychological context of imitation.

5.4.1.2.1. Parameters of Emotional State and Emotional Range

The definitions of the emotional states and the emotional ranges that follow were applied to analysis of the behaviours of infant, mother and father, and to the three sequential periods in the unit of interaction (pre-imitative zone, coincident imitative sequences and post-imitative zone).

Every of emotion change identified in the stream of a subject’s activities was entered into the computer with the time of onset. Based on Trevarthen’s view (1993b) that mental processes are communicated in chains of transient emotional shifts, the coding of emotional states was continuous; that is, the onset time of any change in emotional expression was also the offset time of the previous emotional expression. This convention does not exclude the possibility of more than one

emotion occurring at the same time in the subject's experience as, for example, in the case of interest and pleasure. As Izard, Kagan and Zajonc (1984) propose, single emotional expression cannot be taken as a criterion for determining the duration of the corresponding emotional experience. Continuous coding of a pair of subjects yielded two separate records of emotional expressions and their shifts, one for each communicative partner, throughout the interaction.

The coding of the emotional expressions was based on observation of **facial expressions, the emotional valence expressed, and the change of intensity of emotion over time.**

5.4.1.2.1.a. Facial Expressions

Darwin (1965) gave the first accurate descriptions of infants' face movements, and from his studies on infants' abilities to perceive emotions, it can be concluded that infants seek awareness of other people's faces and can appreciate emotions in the facial expressions of others at an early age.

Trevarthen (1985) assumes that when 2-month-old infants are interacting with their mothers, face expressions form part of the visible evidence of an emotional system and its changes. Internal states of motivation, adapted to and regulated by the mother's responses, are revealed in movements of muscles in the infant's face. The human facial communicative system is described as having the following elements,

"1. A highly differentiated facial anatomy comprising a forward-facing, bony frame covered by skin in which is attached a bisymmetric set of muscle units that are differentially excitable and capable of contracting, if not independently, in many distinct combinations. . .

2. A motor coordinative neural system capable of combining facial muscle contractions in distinct patterns. . .

3. A central cerebral motivating system that generates facial movement patterns in consistent relation to emotional reactions, autonomic adjustments, feelings and modes of cognitive functioning. . .

4. A perceptual-interpretative system that can see facial movements as expressive of significant emotional states in another person." (Trevarthen, 1985, p. 22).

In Trevarthen's theoretical framework (1985), it is assumed that infants can intrinsically understand, respond to and regulate emotional states through perception of the facial expressions of their communicative partners. Other researchers offer

supportive evidence that facial expressions provide a clear read-out of the infant's under-lying emotions.

Of all organs serving nonverbal behaviours, the face as a multi-message system has been described as the most “. . . commanding and complicated and perhaps the most confusing . . .” (Ekman, 1982, p. 45). The face is always visible and it provides information about emotion even in repose. In addition, the face is the site of organs for the input of elements necessary to life, and it is the source of output for speech, and a leading symbol of the self (Ekman, 1982).

Izard (1992) proposes a differential emotions theory, in which he accepts the innateness and universality of certain emotion expressions. The theory provides an empirical foundation for cross-cultural research on facial expressions (Izard and Dougherty, 1982). Facial expression, in its prototypical form, is taken to be one of three differentiable components of the naturally occurring emotion, the other two components being a pattern of consistent autonomic changes, and a distinct subjective feeling state (Izard, 1977, 1978, cited by Ekman and Davidson, 1994).

Camras (1994) has suggested that, if it can be assumed that when, in infancy, an emotion is experienced, a corresponding facial expression will be produced, investigators should be able to take facial expression as a sole index of infant emotions. Saarni (1982) believes that infants possess at a very early age (4 weeks) a basic repertoire of facial behaviour linked to affective states.

5.4.1.2.1.b. Valence

Valence is defined as “. . . the psychological value of an object, event, person, goal etc. . . .” (The Penguin Dictionary of Psychology, 1985). In Lewin's theory, the qualifiers of negative and positive are used, for the valences of things that are avoided and sought after, respectively. The valence of an emotional response is the verbal judgement that locates this response along a dimension from a maximum of joy to a minimum of extreme displeasure (Lang, 1984).

Almost all investigators find that valence accounts for most of the variance in affective reports (Lang, 1984; Ellsworth, 1994).

5.4.1.2.1.c. Intensity

The intensity of an emotion is defined as, “. . . the degree to which an emotion is experienced . . .” (The Penguin Dictionary of Psychology, 1985).

It refers to two aspects of the expressed emotion: a) emotional change in quality when expression is driven through extremes of intensity; and b) the range of intensity within which the quality of emotion changes little (Clynes, 1980). While descriptions of the second kind were made in the present study to account for fluctuations of intensity within each emotional state, the final coding system focuses on emotional-state-changes as described by the first point of the definition of intensity change.

Intensity of emotion and facial behaviour has been used as a parameter for measuring emotions (Scherer and Ekman, 1982; Izard et al., 1984; Ricci-Bitti and Scherer, 1986; Bloom, Beckwith and Capatides, 1988). Ekman et al. (1980, cited by Scherer and Ekman, 1982) find that the intensity of facial action is correlated with the intensity of an emotional experience.

Trevarthen (1993b) proposes that emotions express the central energy and the self-regulating quality of intrinsically generated motives. One of the parameters that may vary in the coordinated motivation of a subject is its energy or power (Trevarthen, 1993b). It can be inferred that since emotion expresses the quality of motivation, it will reflect the defining parameter of motivation, including its variation in intensity. The dynamics of emotional or feeling state have attracted the interest of many theoreticians and researchers. Stern (1985) refers to “vitality affects”, and Trevarthen (1993b) has used the term “emotional narratives”.

The coding scheme described 3 basic types of expressed emotion and their gradations: happy (happy-relaxed face, gentle smile, broad smile, laughter, interest), neutral and sad (grumpy face, whimper, cry); three qualities of valence-(positive, neutral and negative; and four categories for the direction of intensity change-(ascending, descending, stable and fluctuating).

An elaborate description of facial muscle actions is beyond the scope of the present study. Thus, the onset and offset of the emotional facial expressions was

marked and coded when the last sign of the preceding expression faded away, and change of facial expression was recorded at the first appearance of any criteria of a different expression.

5.4.1.2.2. Definitions of Emotional States

5.4.1.2.2.a. Positive Expressions

Pleasure

Pleasure was scored when one of the following expressions were observed:

1) Happy-Relaxed Face; 2) Mild Smile; 3) Broad Smile; 4) Laughter.

As it will be obvious these grades of pleasure are not distinctly different in quality of facial movements, but rather different degrees of the appearance of facial features and different intensities of the sound of pleasurable vocalisation. Thus, when there is a change from laughter to a happy-relaxed face, the intensity of expression becomes less. In addition, each of the facial expressions could be combined or not with eye contact, with gazing at the partner's face or trunk, or even gazing away; and vocalisations may be emitted or not.

1) A happy-relaxed face has the following expression: open eyes, no wrinkles around the eyes, very slightly elongated mouth which is closed or very slightly open, the corners of the mouth are drawn very little upwards, the lips are slightly stretched, causing slight wrinkles on each side of the mouth. The mouth elongation may be so subtle that it does not cause wrinkles around the mouth; this kind of happy facial expression is difficult to describe in words.

2) A mild or gentle smile is shown by: open eyes, an elongated mouth which is closed or slightly open in the horizontal plane, the lips are slightly stretched, both corners of the mouth are drawn upwards, there is evidence of wrinkles on each side of the mouth and beneath the eyes, a slight narrowing of the eyes, and the cheeks are very slightly drawn upwards. In some cases, only one side of the outer edge of the mouth was moved and wrinkled, and this was called a "grin" and was coded as a gentle smile. In this expression, the facial movements are performed in a much smaller degree, and much more slowly than in the broad smile and laughter.

3) There is hardly any difference between a broad smile and laughter of low intensity, the only difference being related to the intensity of the sound of laughter. Even in the case of broad smile, it is possible, but not necessary, that the slight sound of a laugh may be heard at the beginning of the smile. A broad smile has the following features: open narrowed eyes, elongated mouth opened more in the horizontal than in the vertical plane, lips stretched with marked drawing of the corners backwards, with evidence of wrinkles on each side of mouth, the cheeks are drawn slightly upwards, and the eyebrows are slightly lowered.

4) In combination with laughter, a high intensity of pleasure is signified by the following facial expression: open narrowed eyes, the mouth is more or less widely open and the corners of the mouth are pushed backwards and upwards causing wrinkles on each side of the mouth, the cheeks are drawn upwards, bulging under the eyes, and the skin between the end of the nose and the upper lip is wrinkled. Wrinkles are formed under the eyes and at their outer ends. While the intensity of laughter varied, no further distinctions were made.

Various terms -- happiness, pleasure, delight, joy -- are used to refer to positive states. Joy has been recognised to be one of the ten fundamental and universal emotions (Izard et al., 1984; Frijda, 1994). It is generally accepted that smiling and laughter are associated with positive states and that laughter is a more intense expression of positive affect than is smiling (Lewis and Michalson, 1983; Wallbott, Ricci-Bitti and Banninger-Huber, 1986).

Darwin (1965) took smiling and laughter as evidence for happiness, and accepted that the latter is a gradation of the former. He made marvellous subtle descriptions of the expressions of joy. His accounts focused on the elaborate descriptions of the consequences caused on the skin by the contractions of the corresponding muscles around the mouth, the eyes, the forehead and the cheeks. He talks about "gentle laughter", "moderate laughter", "excessive laughter", "violent laughter". On the expression of the eyes in the expression of joy, Darwin says,

"A bright and sparkling eye is as characteristic of a pleased or amused state of mind, as is the retraction of the corners of the mouth and upper lip with the wrinkles thus produced." (Darwin, 1965, p. 204).

Field, Woodson, Greenberg and Cohen (1982) defined the happy expression in relation to “. . . widening of the lips . . .” and “. . . relaxed or furrowed brows . . .” (ibid, p.218). Etzel and Gewirtz (1967) defined smile in relation to configurations of mouth, the naso-labial folds, the eyes and the cheeks (cited by Dunkeld, 1978).

Interest

Whether interest should be considered as an emotion has been a matter of controversy. Several researchers take interest to be an innate emotion (Izard and Buechler, 1980; Tomkins, 1980), while others dispute this view (Ortony and Turner, 1990, cited by Ekman, 1992).

While interest can not be easily categorised as inherently “positive” or “negative”, for convenience it has been taken to be the most frequently experienced positive emotion (Izard and Buechler, 1980), and it has been taken to have great importance (Izard et al., 1984). Interest has also been categorised as an “affiliative emotion”; that is, one that leads one to seek out others for some purpose (Shweder, 1994).

Whether there are separate signals for interest and excitement has also been a matter of controversy. Tomkins (1963) and Izard (1971) (cited by Ekman, 1994) consider them as the same state while Ekman (1994) considers them to be separable.

Trevarthen (1985) assumes that the human facial communication has two primary anatomical and cerebral components: one for the transmission of data on shifting attention and interest from the upper face, round the eyes; the other conveys affective information related to vocalisation from the lower face.

In the present study, interest was defined according to the partner’s gaze behaviour:

1) Direct Interest: This kind of interest was signalled by an unsmiling face, with open eyes. The lips are usually open or at other times loosely closed. When the lips are open, the corners of mouth are very slightly downward, with the upper lip in a reversed-U shape, and the lower lip is relaxed or slightly stretched. The subject is gazing at the partner’s face or body, but without necessarily initiating eye contact. In

addition to this gaze behaviour, one or a combination of the following facial or vocal expressions should occur:

a) raised eye brows; b) knitted eye brows; c) wide open eyes; d) blinking; e) cooing (infant) or other vocalisations (parent); f) pre-speech mouth movements (infant); g) baby talk (parent).

The gaze to the partner's face or body was defined regardless of what the latter did. Eye contact was defined as the time during which two interactants gaze simultaneously into each others eyes (or faces).

2) Indirect Interest: A quick orientation to the other partner's face or body, accompanied by an unsmiling face, and expressed either through a glance or head turning towards the other. In rare cases, this orientation occurred in combination with one or more of the above facial or vocal behaviours.

The focus on gaze as a variable of interest in the dyadic interaction of parent and child has already been noted, and it follows from the complementary assumption that the infant is much less likely to gaze at stimuli that evoke no interest or that arouse unpleasant sensations (Exline, 1982). Dirks and Gibson (1977, cited by Exline, 1982) inferred from infant attention, derived from infant gaze, the infant's discrimination of one emotional expression, from others. Preferential looking is often used in tests of infants' discriminations or learning.

Tomkins (1980) considered gaze behaviour as a variable indicating interest or excitement, one of the nine innate affects.

Eye contact has been assumed to be especially important in mother-infant interaction (Eibl-Eibesfeldt, 1989), and a defining feature of face-to-face communication (Robson, 1967; Stern, 1974, cited by Trevarthen, 1979).

As far as the function of frowning is concerned, Darwin (1965) discussed it in the chapter of "reflection". He refers that the frowning confers on the expression an aspect of intellectual effort. The effort of eye brow knitting, indicates the intention of the mind, the mind energy, conveying the idea of mind and a mixing of thought and emotion. He concludes that the act of frowning is indicative of something more than simple reflection, no matter how deep, or close, is the attention. It is a sign of perception of something "... difficult or unpleasant ...". It has to be noted here that

“displeasant” is viewed in the sense of something in disagreement with the stream of thought or action.

In the Dictionary, “knitted brows” means, among other things, “. . . deep thought by frowning . . .” (Longman Dictionary of Contemporary English, 1987).

More recently, Eibl-Eibesfeldt (1989) described interest as expressed through raised eye brows. He suggested that among the expressive functions of eye brow raising are to signify attention, curiosity or friendly surprise.

Eibl-Eibesfeldt (1989) drew attention to the signal function of eye brow raising, depending on its duration, rapid or slow. Rapid eye brow flashing and slow eye brow raising convey different social messages. The former is assumed to be an empathic “opening” of the face, indicating affection and acceptance, through which all modalities are extended in an accentuated manner. It is suggested to occur in situations of congenial affection and to have a wide spectrum of meanings but always to be an “. . . expression of social contact readiness.” (Eibl-Eibesfeldt, 1989, p. 452), followed by visual contact and expressed in combination with other behavioural patterns such as head nodding or a smile. Slow eye brow raising, designates attention and expansion of the visual field, in a context of curiosity, surprise or inquiry (Eibl-Eibesfeldt, 1989).

Trevarthen (1979) defines the infant’s facial expression of interest as “. . . wide open eyes, brow ‘knitted’, everted lips, mouth slightly open. . .” (ibid, p. 333). A focused gaze on mother’s eyes or mouth occurs with the distinctive attentive expression called “. . . ‘knit-brow with jaw-drop’ . . .” which Oster (1978, cited by Trevarthen, 1993b, p. 134) noted to be associated with intense concentrated attention in young infants (4-10 weeks).

Izard (1992) defines, in brief report, the interest signal as a “. . . (slight corrugator action pulling browheads together) . . .” (ibid, p. 563).

It has been assumed that while fathers do not get engaged in body grooming behaviour with children, as much as mothers do, they play more with their children, who in their turn, respond most positively to these play bouts. Among the playful activities, eye brow raising is an affectionate expression in the father-child relationship (Eibl-Eibesfeldt, 1989).

The relaxed open-mouth face is known as “play face” (Eibl-Eibesfeldt, 1989). As far as its origin is concerned, it is presumed to derive from “. . . an intention movement of playful biting and is a phyletic precursor of laughing.” (ibid, p. 138). It is assumed that among small children, the “play face” or the “relaxed mouth-open face” signifies an invitation to play. In addition, it has been suggested that infant mouth opening is considered by mothers “. . . to be an expression indicating a higher level of affectively positive arousal than the smile.” (Beebe, 1973, cited by Stern, Barnett and Spieker, 1983, p. 80).

The expression of blinking was used as one of the parameters indicating interest. In literature, it is reported that the blinking rate is positively associated, among other behaviours, with attention to social stimuli and with involvement in cognitive work of increasing difficulty (Exline, 1982).

Pre-speech mouth movements appear to express a rudiment of intention to speak to a person (Trevarthen, 1979, 1985). Infant cooing (pleasant, positive, non-crying vocalisations) and vocalisations are expressive behaviours adapted to intersubjective exchanges (Trevarthen, 1979). In addition, “baby talk” or “infant-directed speech”, addressed by both parents to infants (Papousek, Papousek and Bornstein, 1985), evidently gives emotional support of a kind the infant needs (Trevarthen, 1993b)

Mutual orientation between mother and infant, after separation, is described as serving resynchronization of the arousal level generated by the infant’s nervous system against the “reference standard”, i.e. the template set by the mother’s nervous system. In addition, the same mutual orientation functions in “social referencing” to transfer from parent to child an emotional evaluation of a strange object or event (Schore, 1994).

5.4.1.2.2.b. Neutral Expression

Alternations of “on” and “off” cycles in infant visual attention, signs of change in central nervous system activity in arousal, appear to provide the regulatory background within which the expressive behaviours are prepared for, occur and terminate (Stern, 1974). The naming of an emotional expression as “neutral”, does

not imply that it has no regulatory or balancing function in the interpersonal situation. For convenience, a neutral expression was identified, in the present study, not only when an infant had an indifferent expression in relation to the other partner's solicitations to engage in interaction, but also when, in another situation, the infant showed signs of interest, addressed not to parent, but either to the inanimate world, or to the researcher.

A neutral expression was defined as follows: The subject should not look or orient to the partner's face or body. The expression should be that of an unsmiling, relaxed face, with no signs of vocalisation or intent to vocalise (such as pre-speech mouth movements).

Neutralization of emotion has been defined as voluntary attempt to maintain little or no display of emotion (Ekman, 1972; Ekman and Friesen, 1969, cited by Masters and Carlson, 1984). The neutral expression is claimed to occur when "...one's feeling is masked behind a neutral poker face." (Saarni, 1982, p. 137), or it has been defined as "... the face being in a resting or baseline position . . ." (Bloom, Beckwith and Capatides, 1988, p. 174). A neutral expression has also been considered to signify an inhibited state (Shennum and Bugental, 1982).

Ekman and Friesen (1975, cited by Saarni, 1982) claim that with neutralization of expression the "... facial muscles may be relaxed, or they may be held tensely but without any obvious sign of contraction. . . [and this] creates a 'wooden quality' to the facial expression." (ibid, p. 137).

A poker face is defined in the dictionary as "a face that shows nothing of what a person is thinking or feeling" (Longman Dictionary of Contemporary English, 1987), and "neutral" is defined as "Indifferent. . . lying at or arbitrary close to the zero point on some dimension." (The Penguin Dictionary of Psychology, 1985).

5.4.1.2.2.c. Negative Expression

In the present study, a negative expression of an infant was defined in any one of the following gradations:

a) Grumpy Face (bad-tempered and tending to complain, Longman Dictionary of Contemporary English, 1987): The grumpy face was signified by the following facial

features: A furrowed brow (lines on the forehead), wrinkles around the eyes, tight and somewhat protruded lips, corners of the mouth slightly downwards while the infant is gazing at or away from the parents' face or trunk. A grumpy face was usually the preliminary expression to a whimper or crying.

b) Whimper: The intensity of the grumpy facial expression is increased in whimpering, that is, the making of small weak cries. In accompaniment to this vocal intervention, a whimper was signified by the following facial expression: Wrinkles around the eyes, mouth slightly open, corners of the mouth slightly downwards while gazing at or away from the parents' face or trunk.

c) Crying: In crying the eyes are firmly closed so that the skin around them is wrinkled, a frown is displayed across the forehead, the mouth is widely open in a way that the lips are separated forming a squarish shape, and the corners of the mouth drawn a little downwards. As far as infants' gaze behaviour is concerned, he or she gazes at or away from the parents' face or trunk. An effusion of tears that run over the eyelids and roll down the cheeks may occur. In some cases, the facial expression of crying occurred in combination with laying the back of one of the hands over the head.

The denotation of parents' emotional states as "negative" was extremely rare. This was signified in cases in which the parent showed signs of annoyance that was rather expressed by verbalisation than by facial expression.

The specific sign of sadness is usually taken to be crying and the other important non-verbal reaction mentioned is a sad facial expression (Wallbott et al., 1986).

Field et al. (1982), in studying discrimination of facial expressions by infants 36 hours of age, defined the sad facial expression in terms of movements of the brow (furrowed) and lips (tight and somewhat protruded).

Crying may be taken to be an affective information transmission system that serves as a primary mode of communication, reflecting homeostatic mechanisms upon which message-conveying behaviours are built. Crying provides one of the major channels through which parents tune into infants' rhythms, and emotional states are conveyed (Lester, 1984).

5.4.1.2.3. Definitions of Emotional Range

After the coding of the facial expression of each partner was completed, the intensity change was noted. Changes of intensity of emotion over time were signified separately for each participant and for each period (pre-imitative zone, coincident imitative sequence, and post-imitative zone) throughout the unit of interaction. In describing the change of intensity over time, each facial expression within each category of valence of the emotional states was symbolised as follows:

Positive Expressions: Interest: (+),

Happy (happy-relaxed face, gentle smile, broad smile, laughter): (++)

Neutral Expression: (0)

Negative Expression: Grumpy face, whimper, cry: (-)

As it has already been noted, coding of the emotional states (facial expressions and corresponding valence) was continuous, the onset time of any change in emotional state being also the offset time of the previous emotional state. Within any one unit of interaction, it was possible for each partner to express more than one emotional state. The order of the facial expressions symbols (-, 0, +, ++), for each period within the unit of interaction, determined the direction identified for the change of each participant's emotional intensity, as in Table 5.3:

| Ascending Emotional Range | Descending Emotional Range | Stable Emotional Range | Fluctuating Emotional Range |
|---|---|------------------------------------|--|
| (-)->(0) ->(+) ->(++) or (-)->(0) -> (+) or (-)->(+) or (-)->(++) or (0)->(+) or (0)->(++) or (+)->(++) | (++)->(+) ->(0) ->(-) or (+)->(0) ->(-) or (+)->(-) or (++)->(-) or (0)->(-) or (++)->(0) or (++)->(+) or | (++) or (+) or (-) or (0) | (+)->(-) ->(+) or (+)->(0) ->(+) or (-)->(0) ->(-) or (-)->(+) ->(-) or (0)->(+) ->(0) or (0)->(-) ->(0) or (++)->(+) ->(++) or (+)->(++) ->(+) or (++)->(0) ->(++) or (0)->(++) ->(0) or (++)->(-) ->(++) or (-)->(++) ->(-) |
| Key: Interest (+); Pleasure (++); Neutral (0); Negative (-) | | | |

Table 5.3: Defining Sequences for the Categories of Intensity Change

In brief, **ascending** is defined as a sequence in which the last sign is higher in the scale than the first, no matter what are the intervening signs. An example of ascending emotional state is when a partner changes from interest (+) to pleasure (++). That is, pleasure (++), is higher in the scale of emotional states than interest (+). **Descending** is defined as a sequence in which the last sign is lower in the scale than the first, no matter which are the intervening signs, as when interest (+) is followed by a negative emotional state (-). A **fluctuating** sequence is defined as one in which the first and the last sign are the same, independently of intervening signs. An example of fluctuating emotional range is when a partner is in the state of pleasure (++), then he or she turns into a neutral (0) emotional state and then he or she turns back in the state of pleasure (++). The **stable** category refers to the expression of an unchanging quality as defined above, without taking account of variations in intensity of emotion. Thus, when a partner remains in the state of

interest (+) throughout an imitative episode, or through any other zone of the interaction, this is identified as a stable sequence. When the category “stable” was coded, more attention was given to the facial expression than to the symbol for its valence.

5.4.1.3. Imitation

In the present study, the operational definition of imitation was the following: An imitation occurs when one individual’s vocal, kinetic, facial expression or any combination of these expressions, that had not been expressed by either parent or infant in the immediately preceding 10 seconds, is “recreated or reproduced” by the partner within a 10-second interval.

The temporal limitation of 10 seconds is applied both within an imitative episode and outside it, and thus it determines both the identification of an imitative sequence that continues, and the definition of the unit of interaction. If according to the definition, an imitative sequence ends at a certain point, and within the next 10-second period a different expressive behaviour by one partner occurs which is then “recreated or reproduced” by the other partner within the temporal limit, then the unit of interaction is extended. The unit ends only when within the last 10 seconds, no expressive behaviour occurs by any partner which is imitated by the other.

The response period of 10 seconds has been judged to be appropriate for imitation tests with infants by both Kugiumutzakis (1985) and Heimann (1996).

The accuracy of the imitated activity may vary with the initial expression. Four categories of accuracy of imitation were distinguished:

- 1) Accurate Imitation: Any imitation that was a precise “reproduction” of the initial expression.
- 2) Partial Imitation: Any imitation that reproduced part of the initial expression, either in quality or in intensity: e.g. the parent may vocalise /a/ and the infant may imitate by answering /ae/.
- 3) Expanded Imitation: Any imitation that was a precise or partial reproduction of the initial expression but had an element of either improvisation, recreation or emphasis, in the same or a different modality from that of the initial expression: e.g. the infant

may vocalise /a/ and the parent may imitate it by expanding, enriching and “building” it onto a rhythmic cyclic game; or by imitating infant’s /a/ sound with simultaneous head nodding movements as if giving evidence of approval.

4) Imposed Imitation: Any imitation that was imposed by the parent on the infant, specifically in hand movement imitations: e.g. the parent may clap his hands while singing and then hold infant’s hands to do clapping hands while kept on singing or silent.

Distinctions of imitative accuracy have been adopted by Maratos (1973), Nadel (1980), Kugiumutzakis (1985) and Heimann (1996).

Imitation was not scored if the response of a partner was different in kind, or of the same kind as the initial expression but performed in synchrony or as an immediate reply: e.g. the infant may vocalise /a/ and the parent may move her head, or the parent may vocalise /a/ and the infant may answer /o/. These would not be scored as imitations.

5.4.1.3.1. Kinds of Imitated Activity

The kinds of imitative activity that were studied are the following:

1) vocal imitations; 2) facial imitations; 3) non-speech sound imitations; 4) head movement imitations; 5) hand movement imitations; and 6) combinations of the above imitated activities.

1) Vocal Imitation

Vocal imitation was scored when the imitator’s sound fell into one of the following categories: a) vowels or vowel-like sounds, b) consonants or consonant-like sounds; c) combinations of vowel (vowel-like)-consonant (consonant-like) sounds. All vocalisations could be noted as approximations to speech sounds of the standard Greek orthography (Table 5.4).

| Standard Greek Orthography | Standard Phonetic Equivalences |
|------------------------------|--------------------------------|
| Vowels | Vowels |
| α | /a/ |
| αε | /ae/ |
| αι | /ai/ |
| αο | /ao/ |
| αου | /au/ |
| ε | /e/ |
| ο | /o/ |
| οα | /ou/ |
| ου | /u/ |
| ουα | /ua/ |
| Consonants | Consonants |
| γκ | /g/ |
| μ | /m/ |
| μχ | /mh/ |
| χ | /h/ |
| Vowel-consonant combinations | Vowel-consonant combinations |
| αγ | /ag/ |
| αγγ/αγκ | /ag/ |
| αγγ/αγκου | /agu/ |
| αμ | /am/ |
| αμπου | /abu/ |
| αμχου | /amhu/ |
| αντα | /ada/ |
| αχ | /ah/ |
| αχα | /aha/ |
| γκα | /ga/ |
| γκου | /gu/ |
| μα | /ma/ |
| μα-μα | /mama/ |
| μουα | /mua/ |
| μπα | /ba/ |
| μπα-μπα | /baba/ |
| μπου | /bu/ |
| νε | /ne/ |
| οχ | /oh/ |
| ταα | /taa/ |
| χα | /ha/ |
| χο | /ho/ |

Table 5.4: Categories of Speech Sounds Used in Vocal Imitation Analysis (Kugiumutzakis, 1993)

In the case that the imitator vocalised while having the hand into his or her mouth, the sound was not marked as imitation. In addition, the rhythm and the prosodic

features (pitch, duration and intensity) were not taken into consideration, so that two phonetically, but not rhythmically, corresponding sound were coded as imitations.

2) Facial Imitation

Facial imitation was scored when the imitator's facial expression fell into one of the following categories: a) tongue protrusion; b) mouth opening; c) lip protrusion; d) blinking; e) surprise face; f) sad face; g) various (defined facial expressions or movements that could not be categorised in one of the above sub-categories).

Tongue protrusion; the tip of the tongue passed beyond the external edge of the down lip. "Partial" tongue protrusion was scored when the tongue moved clearly outwards while its tip did not pass the edge of the lip. Tongue protrusion was not scored when the tongue moved while remaining inside the mouth.

Mouth opening; the lips were widely apart, either with no particular formation or forming a clear o-shape or an a-shape. "Partial" mouth opening was scored when the lips separation was only minor, in relation to the previous state of the mouth. In the case that the imitatee produced a mouth opening and the imitator reproduced the action while emitting a vowel, then the imitation was coded as "expanded". Yawning was coded separately and thus it was not included as a mouth opening imitation. In addition, the intense /a/ or /o/ vocalisations, that were necessarily accompanied by mouth openings were scored as "combinations of activities" (facial and vocal) and not as mouth openings.

Lip protrusion; the upper part of the lower lip was turned outwards and the corners of the mouth were drawn down.

Blinking; when, in eye contact, both eyelids closed simultaneously and then immediately opened in the same way. Imitation was not scored when blinking occurred when one of the partners looked away from the other or when eye contact "broke" after the imitator opened the eyelids, and a change of visual attention occurred.

Surprise face expression; the mouth was widely open, with the lips stretched, the eyes are widely open and the eye brows raised.

Sad face expression; the lips were protruded, the edges of the mouth were drawn downwards and a frown could be observed on the forehead. In other cases, sad

face imitation was scored when the mouth was slightly open, with its corners drawn slightly downwards, wrinkles around the eyes and the mouth edges, and frowning on the forehead.

Among the various facial expression imitations, kiss facial expression imitation was common enough to need definition.

Kiss facial expression; the lips of the imitator are puckered up forward with no accompanying sound. When the imitator produced the facial expression with the corresponding sound, then the imitation was coded “expanded”. Any deviation from the model’s facial expression was scored “partial”.

3) Non-Speech Sound Imitation

A non-speech sound imitation reproduced one of the following categories of sound-making: a) sneezing; b) yawning; c) sighing; d) crying; e) whimpering; f) coughing; g) hiccup; h) various (defined sounds that could not be categorised in one of the above sub-categories).

Sneezing; the mouth opened, a deep inhalation followed, the head moved backwards and then forwards while, with the emission of the sound “apsiou” or “atsiou”, exhalation occurred. “Partial” imitation was scored when the imitator just made the sound “apsiou” or “atsiou” without moving the head and/or the deep breathing in and out.

Yawning; the mouth opened widely, in combination with a deep inhalation followed by a strong exhalation, while eyelids either close or not, wrinkles are formed around the eyes¹⁰. “Partial” imitation was scored when the imitator opened and closed the mouth in a rapid way or when he or she just made the sound of yawning (prolonged /a/ or /o/).

Hiccup; the real hiccup sound (the one that comes from inside the body) was imitated. “Partial” imitation was scored when the sound “hic” or “kic” was made with the mouth alone.

¹⁰ This definition does not exclude the tension experienced in the other parts of the body (Clynes, 1980).

Coughing; the imitator opened the mouth, and made the real sound of coughing (as coming from inside the body). “Partial” imitation was scored when the imitator emitted a sound resembling coughing.

Crying, whimpering and sigh; the sounds made by the imitator were close approximations of the imitatee, while any deviation was scored “partial”.

The various other non-speech sounds that were scored included: kissing sounds, chewing sounds, moaning sounds, raspberries, blowing-nose sounds, sounds made from the hit of the tongue against the palette. The most common various non-speech sounds that were scored were raspberry and moan imitations.

Raspberry; a sound made by tightening the inside part of the lips, when closed, and blowing to make a harsh sound. Any deviation from the model’s sound was scored “partial”.

Moan; the imitator emitted a low sound produced internally, which was expressed with a suffering or discontented voice with falling pitch. Any deviation was scored “partial”.

4) Hand Movement Imitation

Hand movements were imitated either by the parent or by the infant in the course of the present study. They included: pointing, “alali” (a Greek game involving rotation of the palm, with fingers slightly bent), several finger configurations on a surface (scratching) or not, palm opening-closing, hand movements left, right, up, down, towards the body (in one sequence or repeated).

Pointing; one of the two index fingers was extended, in either slightly bent or stretched way, and the other fingers were bowed into the palm. A “partial” pointing was scored when one of the two index fingers was extended as above, and not all of the rest fingers were bent into the palm. The rest fingers could be either stretched or bowed.

“Alali”; the imitator rotated one of his or her palm while the fingers were slightly bent. A “partial alali” was scored when the imitator rotated his or her palm while all or some of the fingers were more than slightly bent.

In palm opening-closing; the following sequence appeared for at least one hand: all fingers opened, in an extension way, and then they immediately bent into

the palm. A “partial” palm opening-closing was scored when either the fingers were extended in a sequential way or when fingers opened partially.

Finger configurations; the imitator moved all fingers, of one of his or her hands, in the same way as the imitatee while “partial” imitation was scored when at least two fingers were moved.

Hand movements to various directions (up, down, left, right, towards the body); the imitator moved one of his or her hands to the same direction and the same number of times as the imitatee, completing each time the whole cycle (route), from the beginning to the end. “Partial” imitation was scored when the route was not completed or when the imitator did not follow the number of movements. Hand movement imitation, on infant’s part, was not scored if the final result was to put the hand into the mouth.

In any of the above cases, it was possible that imitation was observed in one, and in some cases, in both hands, not simultaneously but in a sequential way.

5) Head Movement Imitation

Head movements were imitated either by the parent or by the infant. They included: head movement up, down, left, right, in simple or repeated sequences. Imitation was scored when the imitator moved his or her head to the same direction and the same number of times as the imitatee, completing each time the whole cycle (route), from the beginning to the end. “Partial” imitation was scored when the route was not completed or when the imitator did not follow the number of movements.

6) Combinations of Activities

This category refers to the combination of different kinds of activity and not to the occurrence in combination of different sub-categories of the same kind (that is, mouth opening and blinking).

Combinations of activities could be expressed in one of the following ways:

a) any one of the above mentioned categories (vocal sounds, facial expressions, non-speech sounds, head movements, hand movements) was expressed simultaneously with another, or b) any of the above mentioned categories was expressed overlapping with another. Accurate combination imitation was scored only when the two activities were imitated simultaneously or overlapping, respectively. Any of the

following combinations was scored: a) vocal sound and non-speech sound; b) vocal sound and facial expression; c) vocal sound and hand movement; d) vocal sound and head movement; e) non-speech sound and facial expression; f) non-speech sound and hand movement; g) non-speech sound and head movement; h) facial expression and head movement; i) facial expression and hand movement; j) head movement and hand movement.

In the case of simultaneous combinations, “partial” imitation was scored either when the two imitated activities did not occur simultaneously (one activity overlapped the other), or when one or both activities were imitated partially. In the overlapping combinations, “partial” imitation was scored when either the two imitated activities occurred simultaneously, or when one or both activities were imitated partially.

5.4.1.3.2. Direction of Imitative Episode

The direction of the imitative episode indicates who is the initiator of the expressive act and who gives the first imitative response to it. The following abbreviations were used:

IP (the parent imitates the infant, in co-action);

PI (the infant imitates the parent, in co-action);

I-P (the parent imitates the infant, in turn-taking);

P-I (the infant imitates the parent, in turn-taking);

IM (the mother imitates the infant, in co-action);

MI (the infant imitates the mother, in co-action);

I-M (the mother imitates the infant, in turn-taking);

M-I (the infant imitates the mother, in turn-taking);

IF (the father imitates the infant, in co-action);

FI (the infant imitates the father, in co-action);

I-F (the father imitates the infant, in turn-taking);

F-I (the infant imitates the father, in turn-taking).

5.4.1.3.3. Type of Imitative Episode

Timing, between the model's and the imitator's expressive behaviour, is the measure defining the type of the imitative episode. Thus, imitative episodes were categorised as conforming to two basic types: "turn-taking" and "co-action". In addition, when the imitative exchange was complicated in a way that it could not be categorised in any of these two basic types, then the coding was made in a third category described as "multiple with turn-taking(s) and co-action(s)".

1) In turn-taking the onset of imitation of the expressive behaviour and the offset of completion of the model's activity is separated by a pause of no longer than 10 seconds. Thus, the number of pause(s) determines the simplicity or complexity of the turn-taking.

A turn-taking is called "simple" when one pause is inserted between the model's and the imitator's expressive behaviours, as in Infant-Parent or Parent-Infant sequences. Similarly, a turn-taking is called "multiple" when more than one pause intervenes between the model's and the imitator's expressive behaviours. The number of pauses determines the description of the turn-taking e.g. Infant-Parent-Infant (two pauses, two turn-takings).

2) Co-action occurs when the beginning of the imitation of an expressive behaviour occurs before the completion of the model's expressive action. The point at which the beginning of imitation occurs and the duration of imitation, in relation to the model's activity, determine the following five kinds of co-action:

Full co-action is the case in which the model's and the imitator's expressive behaviours begin and end at the same time. Left-sided co-action is the case in which the the model's and the imitator's expressive behaviours begin at the same time while either the model or the imitator stops first and the other ends the activity at a later temporal point. Right-sided co-action is the case in which the model's expressive behaviour begins and after a lapse of time, imitation starts, before the model stops, and the expressive actions end at the same time. Centered co-action is the case in which imitation of the expressive behaviour starts and ends in the course of the model's expressive activity, that is, it begins after the model and it ends before

the model stops. Prolonged co-action is the case in which imitation of the model's expressive action starts after the beginning of the model's behaviour and ends after the completion of it.

3) Multiple with Turn-taking(s) and Co-action(s): Some exchanges were complicated and could not be categorised in any of the two basic types of imitative episodes, neither as "turn-taking" nor as "co-action". Thus, a third category was created, noted as "multiple with turn-taking(s) and co-action(s)". Imitative exchanges of any of the simple kinds of activities (vocal, facial, non-speech sounds, head movements, hand movements) could be coded in this category, while combinations of imitative activities were coded only within this category. This type of imitative exchange excluded the coding of both the simple or multiple turn-taking and the simple co-action. The following variables come out of this type and were recorded: a) the number of turn-takings; b) the number of co-actions; and c) the sum of co-action durations.

5.4.1.3.4. Frequency of Imitations

In cases of turn-taking, independently of the number of turns, the number of times that each partner responds, before the other partner takes the turn, was noted as the "frequency" of imitation e.g. The infant may vocalise /a/ twice before the parent imitates the sound three times. The frequencies noted, in this case of simple turn-taking, are two (2), for the model, and three (3), for the imitator. The same applies for any kind of multiple turn-taking.

5.4.1.3.5. Durations of Imitation

Apart from the kind, direction, type and frequency of imitation in an imitative episode, durations were recorded for any kind and type of imitative activity. Thus, the following durations were analysed:

- 1) total duration of the imitative episode, independently of the type of exchange;
- 2) durations of model(s), pause(s) and imitator(s) response, in the case of turn-takings;
- 3) durations of co-action, in the case of simple co-action; and
- 4) the sum of co-action durations, in the case of multiple with turn-taking(s) and co-action(s).

5.4.2. Software Used in Microanalysis and Signal Analysis

5.4.2.1. Microanalysis of Non-Verbal Behaviours and Imitations

Non-verbal behaviours were microanalysed in two successive stages:

a) data description; and 2) transformation to quantitative data.

A detailed descriptive analysis may reveal hidden or overt aspects of psychological actions taking place in natural infant-parent interactions, which under strict experimental techniques may be represented in either a distorted or incomplete way (Trevarthen, 1979). In addition, the non-verbal analysis carried out here was not restricted to the simple recording of behaviour occurrences, but durations of these behaviours and thus sequences and co-occurrences were noted as well. It has been recommended that the analysis of behavioural records collected on videotape must begin with a laborious transcription of details of the events of interest, along with timing information from an on-screen clock (Macleod, Morse and Burford, 1993). The system developed for analysis of non-verbal behaviours and imitations in this kind of research is called the Video-Logger Event Recorder Program (1993).

In particular by this technique the otherwise laborious transcription of timing information which relates the recorded behaviour to an on-screen digital clock is automated, by the utilisation of two features of the video recorder (VCR). First, the machine is equipped with an RS232 interface which allows it to be connected to any computer system and communicate with it. The computer is then able to control the functions and to sense the state of the VCR. In brief, the computer can tell the VCR what to do, and can control that it has been done. Secondly, the VCR has a time-code generator which allows it to record timing information onto the tape (using one of the audio channels). This time code can be sensed by the computer (Macleod et al., 1993). These special features of the VCR mean that frame-accurate timing information (accuracy of 1/25th of a second) can be immediately transcribed by a researcher, in computer readable form for later analysis, while the researcher is watching a tape. Further, as the timing is being taken directly from the tape itself, the information can be logged no matter what the replay speed being used, nor how often the tape has been played or rewound (Macleod et al., 1993).

The initial survey of the recordings for possible events of interest, resulted in the construction of a system of behavioural event categories. Then, each single behaviour was noted during each pass of the videotape, using the slow motion and the freeze frame controls on the computer screen to move the tape forward and back between frames, until the precise frame in which a behaviour begins and ends was located (a degree of control not available to the researcher in previous methods of video observation) (Burford, 1997, personal communication).

The data format used by the VCR, and thus initially stored by the computer, is an eight digit number string. These eight digits are four pairs of numbers representing the time in hours, minutes, seconds and twenty fifths of a second. For analysis, these number strings have to be converted into something upon which arithmetic calculations can be performed. The data is converted into an integer number counting twenty fifths of a second (Macleod et al., 1993).

5.4.2.2. Signal Analysis of Vocal and Certain Non-Speech Sound Imitations

A signal describes “. . . **any detectable physical quantity that changes over time.**” (Keller, 1994, p. 16) and one of the fundamental aspects of signals is that they are multidimensional. Sound is defined as a signal and any analysis involving continuous measurements of a property in change is described as “signal analysis” (Keller, 1994).

The signal analysis of vocal and certain non-speech sound imitations was carried out with the aid of a program providing some basic tools for analysis of vocalisations called Signalyse (Version 3.0, 1994). The program was developed for analysis of acoustic aspects of speech. Specifically, the program does multidimensional analysis of the sound waveform, and it handles up to 100 concurrent channels. Signalyse enables a researcher to extract the sound signal's fundamental frequency, or pitch, its amplitude envelope, its frication index, its spectral characteristics, durations and other particular features (Keller, 1994).

In the present study, the use of Signalyse was restricted to the measurement of durations of infants' and parents' vocal and certain non-speech sound imitations to an accuracy of one millisecond. That is, the durations of model behaviours, pauses,

imitations, either in simple or multiple turn-takings, co-actions and total durations of imitative episodes were determined by measures taken from the spectrographic display.

CHAPTER SIX

STATISTICAL ANALYSIS AND RESULTS

6.1. Statistical Analysis

For the statistical analysis, most of the data were coded as categorical variables. Chi square tests and Fisher's exact tests were used to determine possible relationships between pairs of variables. Loglinear models (Everitt, 1977) were also used for the analysis of such relationships, and for the building of models for effects of many variables.

A Loglinear model is a linear model for the logarithms of the frequencies of level combinations of the categorical variables of interest. With the term linear it is meant that the expected values of observations are given by a linear combination of a number of parameters. A Loglinear model can help us determine useful simple or interaction effects between categorical variables (Everitt, 1977).

A Logit model was used for the statistical analysis of the categorical variables. This is a Loglinear model when one of the categorical variables can be considered as a dependent variable and the others as factors or explanatory variables. The z-values, that appear in the Loglinear models, are used for testing the significance of differences of model coefficients (Everitt, 1977).

Whenever there were cases in which a difference on inferences was noted between a chi square test and a z-test, due to the different nature of the two tests, the result of the chi square test was preferred.

The experiment, by its nature, generated data with relatively strong dependencies between them. Longitudinal categorical data present such dependencies, which were not taken into account in the analysis. This would tend to increase the number of significant results. For this reason, the significance level was set at 1% for Loglinear Models and chi square, as a safeguard against false rejections of the null hypothesis. All other tests were set at the 5% significance level. No chi square test was considered as valid if a minimum expected frequency less than one

was found. In cases where proportions of two-outcome experiments were assessed, Binomial tests were used to test equality of outcomes.

Durations were measured as continuous. Mann Whitney non-parametric tests were performed to compare duration times between countries or parents. For a deeper analysis, logarithm transformation eliminated asymmetries of the data to a great extent. Then, a repeated measures analysis of variance with Greenhouse-Geisser correction (Crowder and Hand, 1990) was used to determine possible differences between the levels of the "between subjects" factor, a possible trend of measurements over time, or an interaction between time and the "between subjects" factor.

All analyses were performed using SPSS statistical package (Version 6.0, 1993)¹¹.

The analysis of the results will be presented as follows:

- First, the effect of variables country of origin, infant's and parent's sex and age on the estimated proportions of imitative episodes, will be presented for all imitations, regardless their kind.
- Main and interaction effects of the country, the infant's, the parent's sex, the main effect of age and the (age) × (infant's sex) interaction effect on the estimated proportions of imitative episodes, will then be examined for the different kinds of imitative expressive behaviour.
- The two basic types of imitative exchanges, turn-takings and co-actions, will be analysed against the kind of imitative activity. Main and interaction-effects of the country, the infant's, the parent's sex and the main effect of age upon the estimated proportions of imitative episodes will be examined in relation to the type of imitative exchange.

¹¹ Part of the statistical analysis and the results of this thesis has been presented in the following:

Vasdekis, V., Kokkinaki, T., and Kugiumutzakis, G. (1995) Methods of contemporary microanalysis and statistical analysis of behaviours in developing parent-infant dyad. Paper presented at the 5th Panhellenic Conference of Psychological Research, University of Patras, Patra, 23rd-26th May.

Kokkinaki, T. (1997) The contribution of imitation in intersubjective infant-mother and infant-father communication, in two cultures. Paper presented at the 6th Panhellenic Conference of Psychological Research, Pantion University, Athens, May 29th-June 1st.

- Results from the analysis of the direction of the imitative episodes, irrespective of the kind of imitative behaviour, will be presented next. On the basis of segregations between imitative episodes in interactions between mothers, fathers and infants (for the type of imitative exchange), an account will be given of main and interaction-effects of the country, the infant's sex, and of the main effect of age upon the estimated proportions of imitative episodes.

- The analysis of behaviours in time concerns two parts:

a) means of durations for the model, the pause, the imitation, and the total duration, as well as comparisons of these times across the two countries; and b) analysis of differences in levels of the "between-subjects" factor to assess a possible trend of measurements over infant's age or an interaction between age and the "between-subjects" factors. Given that repeated measures analyses imposed entry of additional data, "country" and "sex of infant" were selected as "between-subject" factors.

- Results are presented from the analysis of the emotional states and their ranges, in relation to the type and the direction of the imitative episodes. Main and interaction effects of country, infant's and parent's sex upon the emotional ranges of the two partners, and the main effect of age are discussed.

Two clarifications are required concerning the reading of the tables:

a) Each contingency table contains the frequencies and the percentages that correspond to the independent variable of this table in parenthesis. For convenience, when results are presented in a table, the independent variable will always be presented in the columns. Conclusions based on these tables, will be made in relation to the distribution of the dependent variable, for each value of the independent variable. Any differences in the conclusions reached on the basis of presentation of frequencies, in relation to percentages, will be reported although inferences on the basis of frequencies can be misleading when different sample sizes are used for different levels of explanatory variables.

b) Each summary table contains the p-values that represent the greatest z-values that appeared in the Loglinear Models. For tables that represent cross-tabulations, the χ^2 and the corresponding p-values are presented.

6.2. Results

6.2.1. Analysis of Imitative Episodes

Comparisons of the proportions of imitative episodes by the Binomial test, across the countries, the sex of the infant, and the sex of the parent, separately, for all kinds of imitative expressive behaviour, gave the following results (Table 6.1):

| | Number of Imitative Episodes | p-value |
|----------|------------------------------|---------|
| Scotland | 2469 | <0.001 |
| Crete | 2297 | |
| Girls | 2049 | 0.01 |
| Boys | 2717 | |
| Mothers | 2219 | <0.001 |
| Fathers | 2547 | |

Table 6.1: Distribution of Imitative Episodes Across Countries, the Infant's and the Parent's Sex.

It may be inferred that more imitative episodes occur in Scotland than in Crete. When infant's sex is considered, more imitative episodes occur within interactions with boys, in comparisons to girls, and more imitative episodes occur in interactions with fathers than with mothers.

The analysis of the possible effect of interaction between (parent's sex) × (infant's sex) on the estimated proportions of imitative episodes gave the following table:

| | Mothers | Fathers |
|-------|----------------|----------------|
| Girls | 947 (42.7) | 1102 (43.3) |
| Boys | 1272 (57.3) | 1445 (56.7) |

Table 6.2: Distribution of Imitative Episodes Across the Parent's and the Infant's Sex Based on Frequencies and Estimated Proportions ($\chi^2 = 0.16$, $p = 0.68$).

There are no significant differences between the estimated proportions of boys' imitative episodes with mothers or fathers, or between the estimated proportions of girls' imitative episodes with mothers or fathers.

The analysis of the main effect of country on infant's sex gave the following table:

| | Crete | Scotland |
|-------|----------------|----------------|
| Girls | 1097 (47.8) | 952 (38.6) |
| Boys | 1200 (52.2) | 1517 (61.4) |

Table 6.3: Country Main Effect on Infant's Sex ($\chi^2 = 41.09$, $p < 0.001$).

Clearly, imitative episodes occur more often in interactions with boys in Scotland than in Crete, and imitative episodes occur at significantly higher levels in interactions with girls in Crete, than in Scotland.

The analysis of the possible effect of interaction between (country) \times (parent's sex) on the estimated proportions of imitative episodes is shown in the following table:

| | Crete | Scotland |
|----------------|----------------|----------------|
| Mothers | 1107 (48.2) | 1112 (45.0) |
| Fathers | 1190 (51.8) | 1357 (55.0) |

Table 6.4: Frequencies and Estimated Proportions of Imitative Episodes Across Country and Parent's Sex ($\chi^2 = 4.75$, $p = 0.02$).

The estimated proportions of imitative episodes in interactions with mothers and fathers in the two countries, do not differ to a significant extent.

A significant interaction of (country) \times (parent's sex) \times (infant's sex) affected the estimated proportions of imitative episodes, as shown in the following two tables:

| | Mothers | | Fathers | |
|--------------|--------------------------------|---------------|-------------------------------|---------------|
| | Crete | Scotland | Crete | Scotland |
| Girls | 553 (50.0) | 394 (35.4) | 544 (45.7) | 558 (41.1) |
| Boys | 554 (50.0) | 718 (64.6) | 646 (54.3) | 799 (58.9) |
| | $\chi^2 = 47.82$, $p < 0.001$ | | $\chi^2 = 8.34$, $p = 0.003$ | |

Table 6.5: (Country) \times (Parent's Sex) \times (Infant's Sex) Interaction Effect on the Estimated Proportions/Frequencies of Imitative Episodes.

In mother-boy interactions, there are significantly higher probabilities for imitative episodes to occur in Scotland, than in Crete.

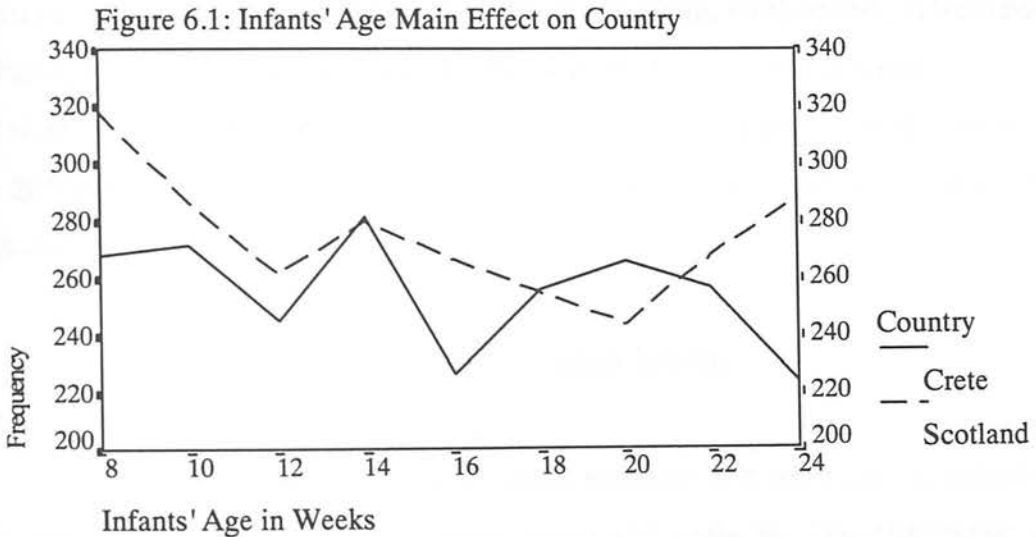
In father-boy interactions, there are significantly higher probabilities for imitative episodes to occur in Scotland, than in Crete.

The analysis of the age main-effect upon country, by Loglinear Models and χ^2 , showed a significant effect:

| Infants' Age in Weeks | | | | | | | | | |
|-----------------------|---------------|---------------|---------------|---------------|---------------|---------------|---------------|---------------|---------------|
| | 8 | 10 | 12 | 14 | 16 | 18 | 20 | 22 | 24 |
| Crete | 268 (45.7) | 272 (48.7) | 245 (48.3) | 282 (50.2) | 227 (46.0) | 256 (50.1) | 266 (52.2) | 257 (49.0) | 224 (43.8) |
| Scotland | 318 (54.3) | 287 (51.3) | 262 (51.7) | 280 (49.8) | 267 (54.0) | 255 (49.9) | 244 (47.8) | 268 (51.0) | 288 (56.3) |

Table 6.6: Infant's Age Main Effect on Country ($\chi^2 = 11.4, p = 0.17$).

The corresponding figure to this table is the following:



The developmental curves of imitative episodes occurring in Crete and in Scotland differ between the 20th week and the 24th week.

The analyses of age main-effect upon infant's ($\chi^2 = 14.45, p = 0.07$) and parent's sex ($\chi^2 = 13.85, p = 0.08$) indicated a non-significant effect. That is, boys do not show different estimated proportions of imitative episodes across the age range of 8-24 weeks. The same applies for the estimated proportions of imitative episodes occurring within interactions with girls, mothers or fathers.

In summarising, it is evident that:

- a) More imitative episodes occur in Scotland than in Crete. When infant's sex is considered, more imitative episodes occur in interactions with boys, in comparisons

to girls, and more imitative episodes occur in interactions with fathers than with mothers.

b) There are no significant differences between the estimated proportions of boys' imitative episodes, when with mothers or fathers or between the estimated proportions of girls' imitative episodes.

c) Imitative episodes have significantly higher probabilities of occurrence in interactions with boys in Scotland, than in Crete, and imitative episodes occur at significantly higher levels in interactions with girls in Crete than in Scotland.

d) The estimated proportions of imitative episodes in interactions with mothers and fathers, do not differ to a significant extent, between the two countries.

e) In Scotland, there are significantly higher probabilities for imitative episodes to occur in mother-boy interactions, than is the case in Crete. Furthermore, in Scotland, imitative episodes occur more often in father-boy interactions than in Crete.

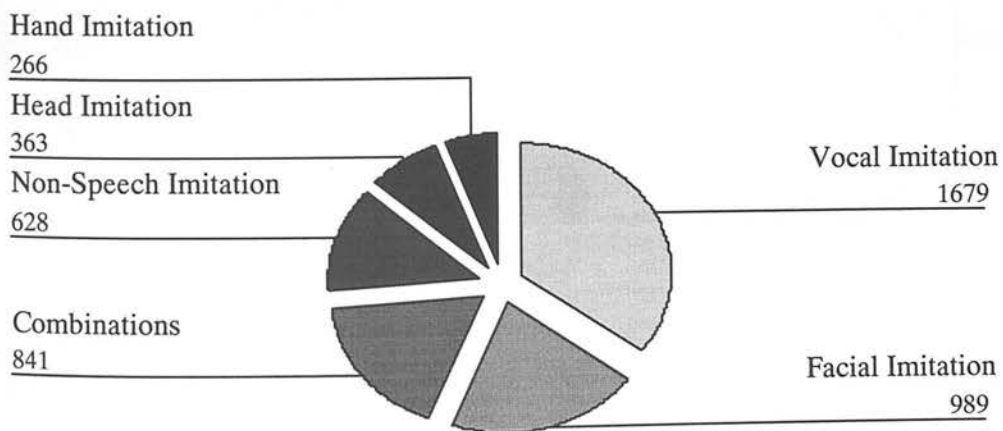
f) Infants in Crete showed a decrease in proportions of imitative episodes between the 20th and the 24th week, while in Scotland the estimated proportions of imitative episodes increased in the same age period.

6.2.2. Kinds of Imitative Activity

6.2.2.1. Distribution of Imitative Episodes

According to the criteria set to define imitation and the kinds of imitative activities, 4,766 imitative episodes were found and analysed. The distribution of these imitative expressive behaviours is presented in Figure 6.2:

Figure 6.2: Distribution of Imitative Expressive Behaviours



It is obvious that vocal imitations predominate over other kinds of expressive behaviour. Further analysis of the distribution of imitative behaviours in each category is shown in Figures 6.3 to Figure 6.6. The presentation of the figures follows the hierarchy that emerges in Figure 6.2. No figures are presented for head and hand movements since these behaviours were analysed as present or absent without sub-categorization.

The dominant sub-categories of imitated expressions are as follows: vowel sounds (61.7%) in vocal imitations, mouth opening (71.9%) in facial imitations, vocal with facial expressions (50.8%) in combinations, and various sounds (44.7%) in non-speech sound imitations.

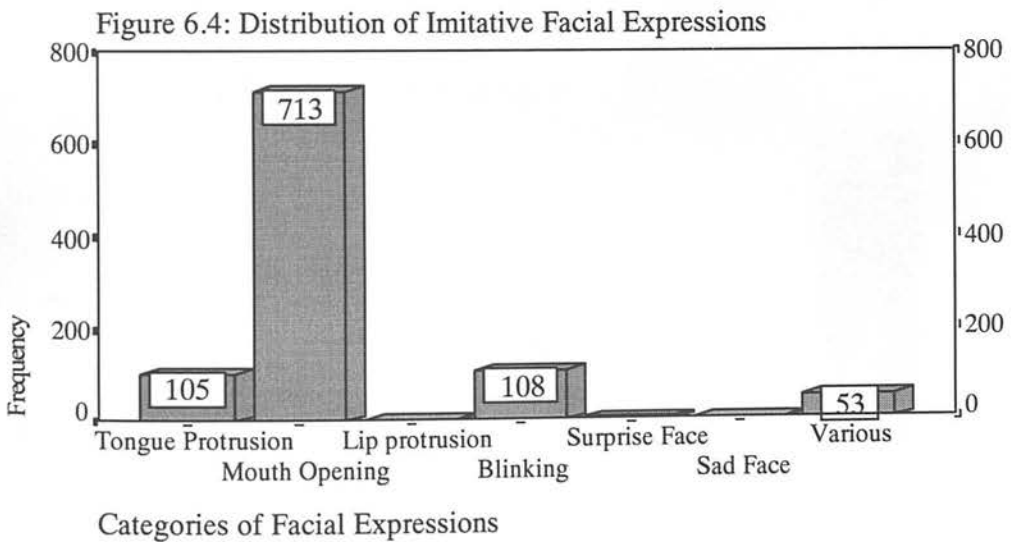
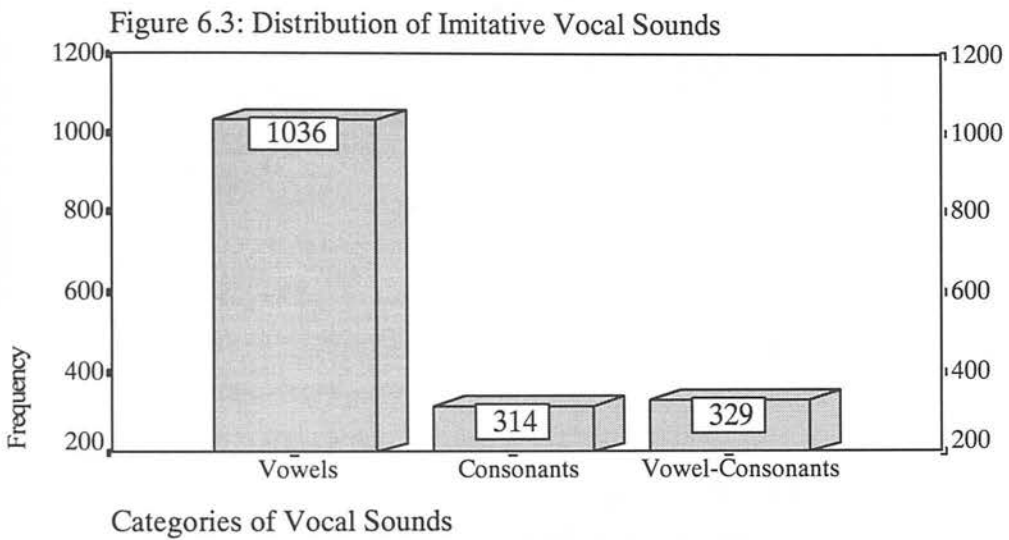
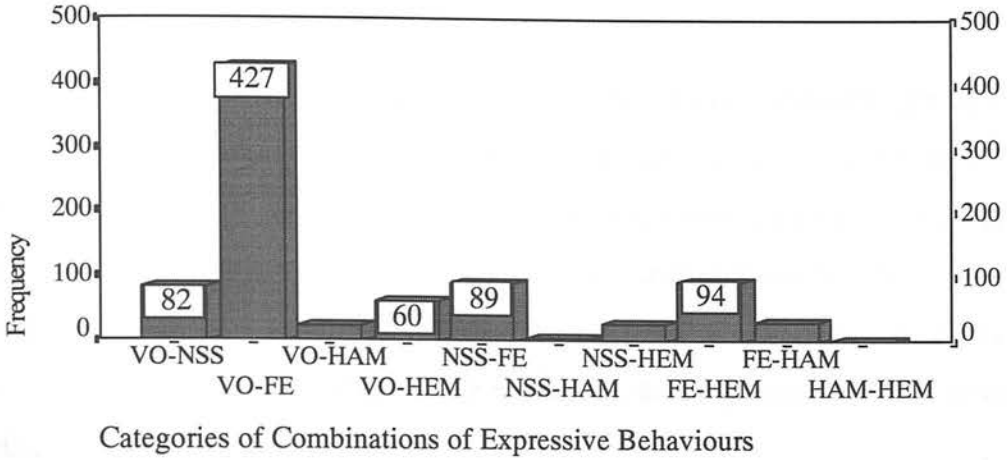


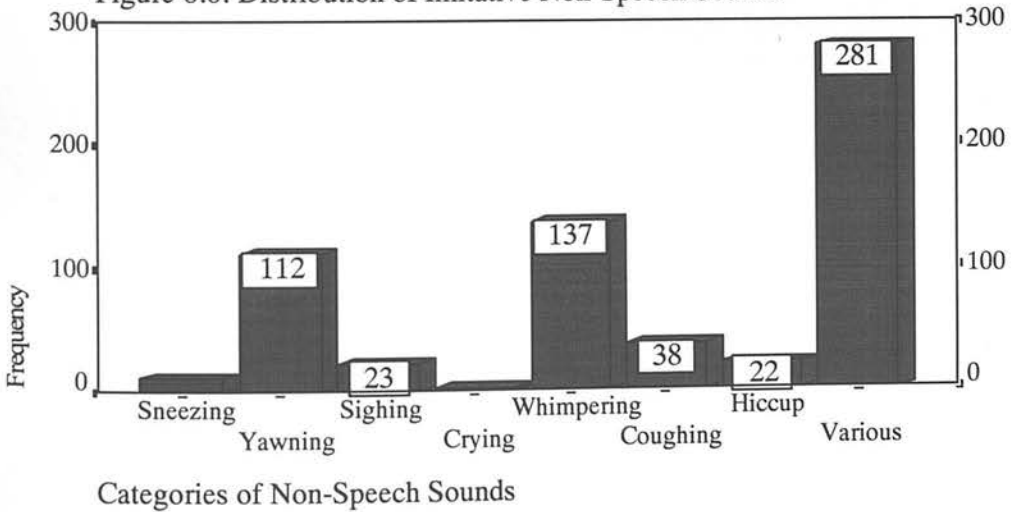
Figure 6.5: Distribution of Imitative Combinations of Expressive Behaviours



Key to Codes in Figure 6.5

VO - NSS = vocal and non-speech sound imitation
 VO - FE =vocal and facial expression imitation
 VO - HAM = vocal and hand movement imitation
 VO - HEM = vocal and head movement imitation
 NSS - FE = non-speech sound and facial expression imitation
 NSS - HAM = non-speech and hand movement imitation
 NSS - HEM = non-speech and head movement imitation
 FE - HEM = facial expression and head movement imitation
 FE - HAM = facial expression and hand movement imitation
 HAM - HEM = hand and head movement imitation

Figure 6.6: Distribution of Imitative Non-Speech Sounds



6.2.2.2.1. Main and Interaction Effects

In order to investigate interactions or main effects of country, sex of infant, sex of parent and age of infant (independent factors), upon each kind of imitative behaviour (dependent variable), a condensation of the sub-categories of each kind of imitation was judged to be necessary. Three facts imposed this reduction:

- a) The sub-categories of facial, non-speech sound and combination imitations were so many that p-value would not make sense, due to the presence of low frequency cells.
- b) Hand and head movement imitations were not sub-categorised.
- c) The interaction effects should be derived from a homogeneous treatment. Therefore, each kind of imitative activity was reduced to a two-outcome value, according to which the category either occurred (1) or did not occur (0).

With categories condensed in this way, an investigation of possible main and interaction effects of country, the infant's and the parent's sex upon each kind of imitative expressive behaviour, led to the results summarised in Table 6.7:

| p-values | | | | | | | |
|-----------------------------------|--------------------|------------------|------------------|---------------------|---------------------------|--------------------------|------------------------------------|
| | Main Effects | | | Interaction Effects | | | |
| | Country (C) | Infant's Sex (I) | Parent's Sex (P) | (C) × (I) | (C) × (P) | (I) × (P) | (C) × (I) × (P) |
| Vocal Imitation | Crete <0.001 | 0.42 | 0.46 | 0.04 | 0.34 | Fathers-Girls <0.01 | 0.05 |
| Facial Imitation | Scotland <0.001 | Girls <0.001 | Mothers <0.01 | 0.36 | 0.01 | Scottish Mothers 0.03 | 0.46 |
| Non-Speech Sound Imitation | Crete <0.001 | 0.06 | Fathers <0.01 | 0.13 | 0.24 | | 0.18 |
| Hand Imitation | 0.27 | Boys <0.001 | 0.16 | 0.25 | Cretean Mothers <0.001 | 0.09 | Cretean Fathers-Boys 0.001 |
| Head Imitation | Scotland <0.001 | 0.15 | 0.27 | 0.25 | 0.47 | Fathers-Boys <0.01 | 0.32 |
| Combinations | Scotland <0.001 | 0.02 | 0.04 | <0.01 | 0.41 | Scottish Boys 0.31 | Scottish Mothers-Boys <0.001 |

Table 6.7: Main and Interaction Effects of Country, Infant's and Parent's Sex Upon Each Kind of Imitative Expressive Behaviour.

The following conclusions can be reached:

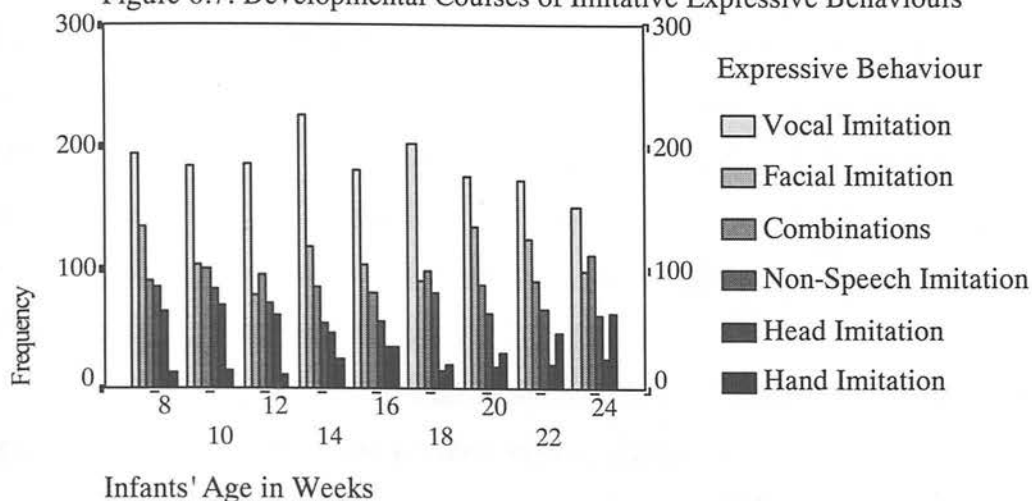
- 1) More effects were found between imitative expressive behaviours and country than with any other main or interaction effect. Hand movement imitation was the only kind of expressive activity which did not differ in estimated proportions across the two countries. In addition, Greeks seem to prefer vocal and non-speech sound imitations, while Scots seem to indulge more in non-vocal imitations, such as facial expression and head movements.
- 2) The sex of the infant seemed to have an effect on the estimated proportions of facial expressions and hand movements imitations, such that more imitations of facial expressions occur in girl-parent interactions and more imitations of hand movements occur in boy-parent interactions.
- 3) It is of interest that no effect was found between sex of infant and vocal imitations; that is, vocal imitations occur with the same probabilities in interactions with boys and girls.
- 4) The parent's sex seemed to have an effect on the estimated proportions of facial expressions and non-speech sounds imitations, such that more imitations of facial expressions occur in mother-infant interactions and more imitations of non-speech sounds occur in father-infant interactions.

The analyses of main effects of the infant's age on each kind of imitative behaviour are shown in the following table:

| Infant's Age in Weeks | | | | | | | | | | | |
|-----------------------------------|---------------|---------------|---------------|---------------|---------------|---------------|---------------|---------------|---------------|---------|--|
| | 8 | 10 | 12 | 14 | 16 | 18 | 20 | 22 | 24 | p-value | |
| Vocal Imitation | 194 (33.1) | 185 (33.1) | 186 (36.7) | 228 (40.6) | 182 (36.8) | 203 (39.7) | 177 (34.7) | 173 (33.0) | 151 (29.5) | <0.001 | |
| Facial Imitation | 135 (23.0) | 104 (18.6) | 78 (15.4) | 119 (21.2) | 104 (21.1) | 92 (18.0) | 135 (26.5) | 125 (23.9) | 97 (19.1) | <0.01 | |
| Non-Speech Sound Imitation | 86 (14.7) | 84 (15.0) | 72 (14.2) | 56 (10.0) | 57 (11.5) | 81 (15.9) | 63 (12.4) | 67 (12.8) | 62 (12.1) | 0.10 | |
| Head Imitation | 66 (11.1) | 70 (12.5) | 62 (12.2) | 48 (8.5) | 36 (7.3) | 16 (3.1) | 19 (3.7) | 21 (4.0) | 25 (4.9) | <0.001 | |
| Hand Imitation | 14 (2.4) | 16 (2.9) | 12 (2.4) | 27 (4.6) | 36 (7.3) | 21 (4.1) | 30 (5.9) | 47 (9.0) | 63 (12.3) | <0.001 | |
| Combinations | 91 (15.5) | 100 (17.9) | 96 (18.9) | 86 (15.3) | 80 (16.2) | 98 (19.2) | 87 (17.1) | 91 (17.3) | 112 (21.9) | <0.01 | |

Table 6.8: Age Main Effect Upon the Imitative Expressive Behaviours, Shown as Frequencies and Percentages of All Forms of Imitation

Figure 6.7: Developmental Courses of Imitative Expressive Behaviours



The developmental courses of imitative expressive behaviours may be seen in more detail in the following two figures:

Figure 6.8: Developmental Courses of Vocal, Facial, Combinations and Non-Speech Sound Imitations

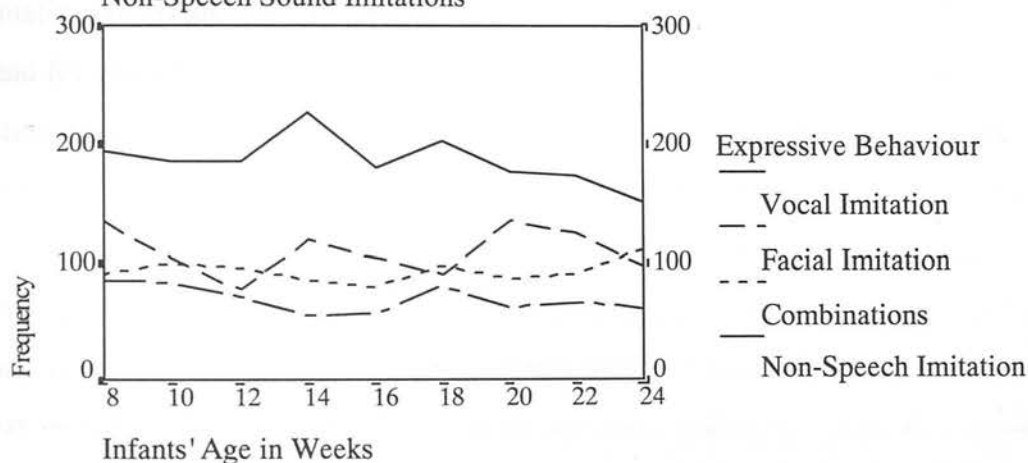
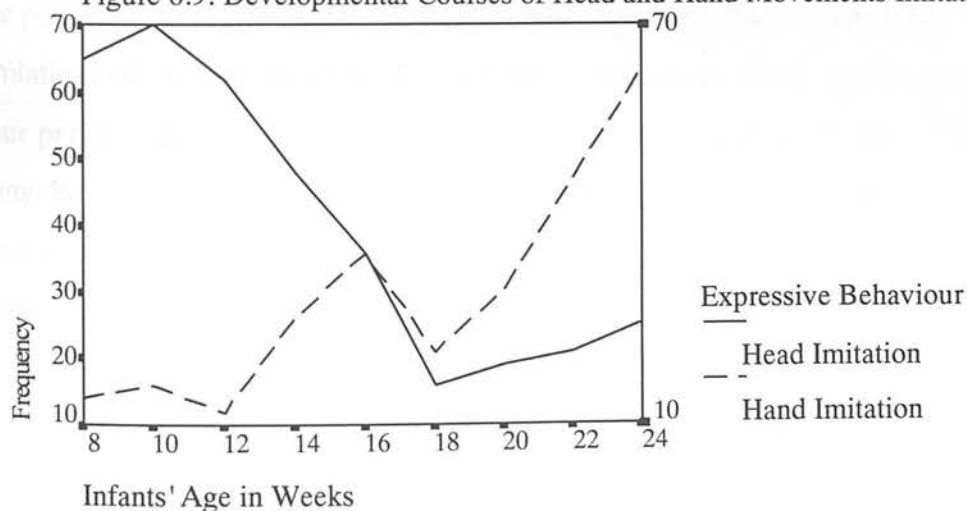


Figure 6.9: Developmental Courses of Head and Hand Movements Imitations



The following comments can be made:

The developmental curve of vocal imitations indicates dips at 16 weeks and at 20 to 24 weeks, while facial imitations show dips at 8 to 12, 14 to 18 and 22 to 24 weeks. There seems to be a downward trend for head imitations across the age range of the 8th week to the 24th week, while at the age of 10 weeks there appear to be more head imitations than at in any other age point. The developmental curve for hand imitations seems to follow an upward trend across the age range of the 8th week to the 24th week with a maximum likelihood at 24 weeks.

As far as the combinations are concerned, while Loglinear Models indicated a significant age-main-effect, the χ^2 -value was not significant.

Non-speech sound imitations is the only kind for which the main effect of age was found not to be significant. Infants rarely imitated non-speech sounds.

The developmental curves seem to have the following general features: a dip occurs in facial imitations at 8 to 12 weeks, a time at which vocal imitations and imitations of combinations of expressions increase (although in absolute numbers the trend for vocal imitations seems to be in the opposite way while for combinations it seems to be increasing and then decreasing), while hand and head imitations fluctuate. Then, in the course of weeks 12 to 16, facial imitations increase (although in absolute numbers the trend seems to be increasing and then decreasing) while vocal imitations fluctuate upward and then downward, head imitations decrease, hand imitations increase and imitated combinations of expressions decrease. In the next period, 16 to 20 weeks, facial, head and hand imitations fluctuate downward then upward, while vocal imitations and imitated combinations rise and then fall. In the period of 20 to 24 weeks, facial and vocal imitations show a downward trend but imitations of movements of head, hand and combinations rise. In the course of these four periods, dividing the age range of 8 to 24 weeks, during the first two periods some kinds of imitation increase, some decrease, while others fluctuate. In the third period, all kinds of imitation fluctuate in different ways, while in the last period all imitations show distinctive differences in upward or downward change.

6.2.2.2.2. (Age) × (Infants' Sex) Interaction Effect

The analysis of the (age) × (infants' sex) interaction effect is shown in the following table:

| | (Age) × (Infants' sex) (p-values) |
|----------------------------|--------------------------------------|
| Vocal Imitation | 0.002 |
| Facial Imitation | 0.03 |
| Combinations | 0.01 |
| Non-speech Sound Imitation | 0.02 |
| Head Imitation | 0.2 |
| Hand Imitation | 0.04 |

Table 6.9: (Age) × (Infants' Sex) Interaction Effect on Imitative Expressive Behaviours.

It is obvious that a significant interaction occurs with vocal imitations. Further analysis of the (age) × (infants' sex) interaction effect on vocal imitations is shown in the following tables:

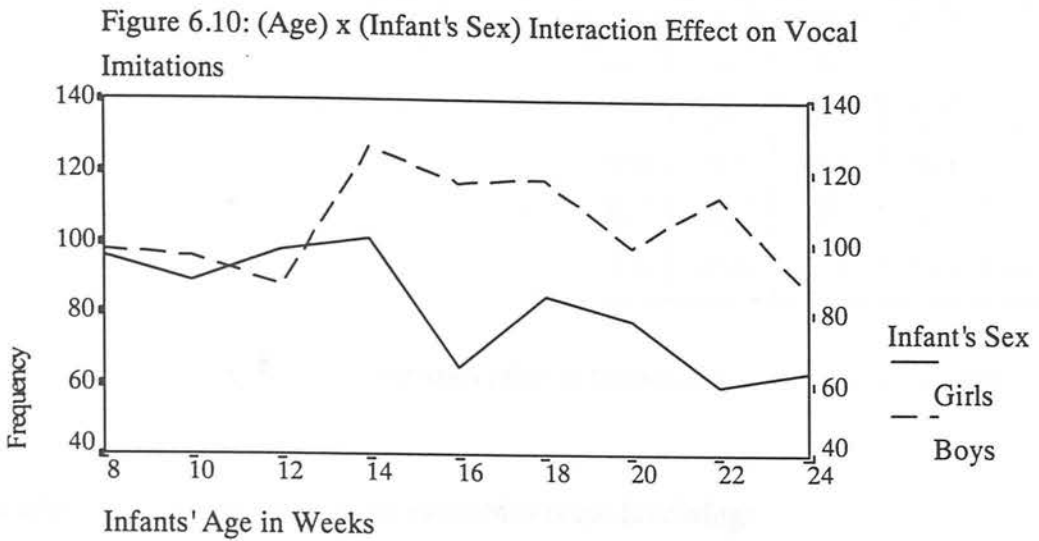
| Vocal Imitations in Interactions With Girls, Ages in Weeks | | | | | | | | | |
|--|---------------|---------------|---------------|---------------|---------------|---------------|---------------|---------------|---------------|
| | 8 | 10 | 12 | 14 | 16 | 18 | 20 | 22 | 24 |
| No Vocal Imitation | 171 (64.0) | 161 (64.4) | 140 (58.8) | 138 (57.7) | 160 (71.1) | 128 (60.1) | 134 (63.2) | 141 (70.1) | 140 (68.6) |
| Vocal Imitation | 96 (36.0) | 89 (35.6) | 98 (41.2) | 101 (42.3) | 65 (28.9) | 85 (39.9) | 78 (36.8) | 60 (29.9) | 64 (31.4) |

Table 6.10a: (Age) × (Infants' Sex) Interaction Effect on Vocal Imitations ($\chi^2 = 18.46$, $p = 0.01$).

| Vocal Imitations in Interactions With Boys, Ages in Weeks | | | | | | | | | |
|---|---------------|---------------|---------------|---------------|---------------|---------------|---------------|---------------|---------------|
| | 8 | 10 | 12 | 14 | 16 | 18 | 20 | 22 | 24 |
| No Vocal Imitation | 221 (69.3) | 213 (68.9) | 181 (67.3) | 196 (60.7) | 152 (56.5) | 180 (60.4) | 199 (66.8) | 211 (65.1) | 221 (71.8) |
| Vocal Imitation | 98 (30.7) | 96 (31.1) | 88 (32.7) | 127 (39.3) | 117 (43.5) | 118 (39.6) | 99 (33.2) | 113 (34.9) | 87 (28.2) |

Table 6.10b: (Age) × (Infants' Sex) Interaction Effect on Vocal Imitations ($\chi^2 = 25.82$, $p = 0.001$).

The corresponding figure to these two table is the following:



The developmental curve of vocal imitations in interactions with girls indicates a fluctuating downward trend across the whole age range of the 8th week to the 24th week. Vocal imitations in interactions with boys follow an upward trend from the 8th week to the 16th week, at which age-point a downward trend begins (although in absolute numbers the developmental curve of vocal imitations in interactions with boys follows an upward trend from the 8th week to the 14th week, at which age-point a downward trend begins).

The second significant (age) x (infants' sex) interaction effect concerns the combinations of imitative expressive behaviours. Further analysis is summarised in Table 6.11a and Table 6.11b:

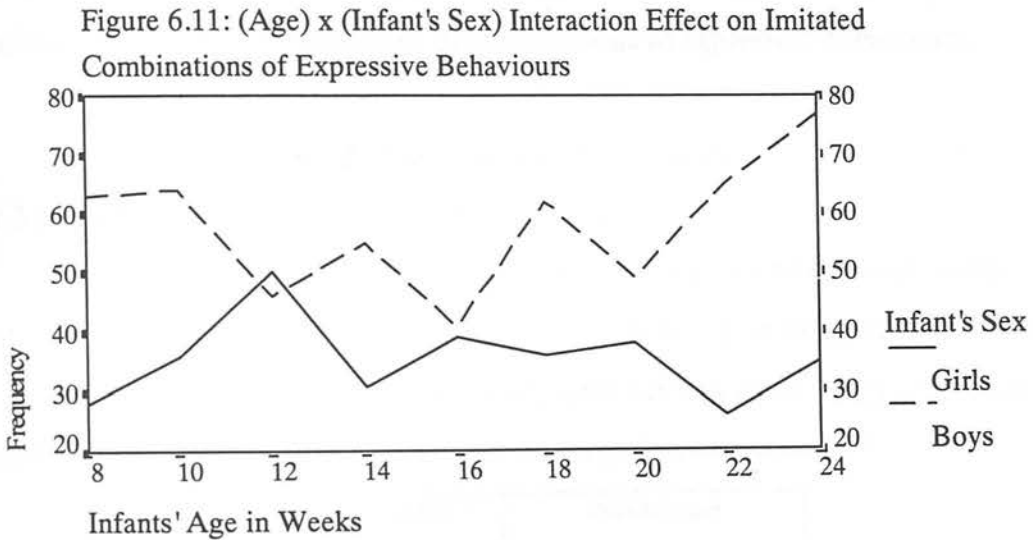
| Combinations of Imitative Expressive Behaviours in Interactions With Girls, Ages in Weeks | | | | | | | | | |
|---|--------|--------|--------|--------|--------|--------|--------|--------|--------|
| | 8 | 10 | 12 | 14 | 16 | 18 | 20 | 22 | 24 |
| No | 239 | 214 | 188 | 208 | 186 | 177 | 174 | 175 | 169 |
| Combinations | (89.5) | (85.6) | (79.0) | (87.0) | (82.7) | (83.1) | (82.1) | (87.1) | (82.8) |
| Combinations | 28 | 36 | 50 | 31 | 39 | 36 | 38 | 26 | 35 |
| | (10.5) | (14.4) | (21.0) | (13.0) | (17.3) | (16.9) | (17.9) | (12.9) | (17.2) |

Table 6.11a : (Age) x (Infants' Sex) Interaction Effect on Combinations of Imitative Expressive Behaviours ($\chi^2 = 15.25, p = 0.05$).

| Combinations of Imitative Expressive Behaviours in Interactions With Boys, Ages in Weeks | | | | | | | | | |
|--|---------------|---------------|---------------|---------------|---------------|---------------|---------------|---------------|---------------|
| | 8 | 10 | 12 | 14 | 16 | 18 | 20 | 22 | 24 |
| No Combinations | 256 (80.3) | 245 (79.3) | 223 (82.9) | 268 (83.0) | 228 (84.8) | 236 (79.2) | 249 (83.6) | 259 (79.9) | 231 (75.0) |
| Combinations | 63 (19.7) | 64 (20.7) | 46 (17.1) | 55 (17.0) | 41 (15.2) | 62 (20.8) | 49 (16.4) | 65 (20.1) | 77 (25.0) |

Table 6.11b : (Age) × (Infants' Sex) Interaction Effect on Combinations of Imitative Expressive Behaviours ($\chi^2 = 13.76$, $p = 0.08$).

The corresponding figure to these two tables is the following:



The developmental curves of imitated combinations of expressive behaviours in interactions with boys and girls are different across the age range of the 8th week to the 24th week.

In summary, the predominant expressive behaviour imitated in interactions of parents with infants under 6 months of age is vocal. Predominant sub-categories are vowel sounds in vocal imitations, mouth opening in facial imitations, vocal and facial expression imitations together in combinations, and various sounds in non-speech sound imitations. As for main effects, it was shown that the country of the subjects has a significant effect on almost all the expressive behaviours that infants imitate. Vocal and non-speech sound imitations predominate in Crete, while facial expressions, head movements imitations, and combinations of imitative expressive behaviours predominate in Scotland. The only imitated expressive behaviour that did not differ in the two countries was hand movement. A significant sex of infant main

effect appeared for the facial expressions and the hand movements imitations, such that more facial expression imitations occur in girl-parent interactions and more hand movement imitations occur in boy-parent interactions. Further, a sex of parent main effect was found to be significant for facial expressions and non-speech sounds imitations, such that more imitations of facial expressions occur in mother-infant pairs and more imitations of non-speech sounds occur in father-infant pairs.

Further, the (age) × (infant’s sex) effect was found to be significant for vocal imitations as follows: a) vocal imitations in interactions with girls fluctuate across the whole age range of the 8th week to the 24th week; and b) vocal imitations in interactions with boys rises from the 8th week to the 16th weeks, at which age-point a downward trend begins. An (age) × (infant’s sex) interaction effect of limited significance was seen for imitations of combinations of expressive behaviours.

6.2.3. Types of Imitative Episode

6.2.3.1. Distribution of Types of Imitative Episode

The Binomial comparison of means showed that out of the total number of imitative episodes that were analysed (4,766), 3,108 could be categorised according to the two basic types of imitative exchange, while the rest imitative episodes (1,658) could be categorised as “multiple with turn-taking(s) and co-action(s)”:

| Type of Imitative Exchange | Percentages |
|----------------------------|--------------------|
| Turn-Takings | 2168 (69.8%) |
| Co-Actions | 940 (30.2%) |
| Total | 3108 (100%) |

Table 6.12: Distribution of the Basic Types of Imitative Exchange (p<0.001).

Turn-takings predominate more than 2 times over the occurrence of co-actions in imitative exchanges.

The distribution of the number of turns in turn-takings is presented in the following table:

| Turn-Takings | Percentages of Turns |
|-----------------------|------------------------|
| Simple Turn-Takings | One turn 1529 (70.6%) |
| Multiple Turn-Takings | Two turns 394 (18.2%) |
| | Three turns 133 (6.1%) |
| | Four turns 69 (3.2%) |
| | Five turns 12 (0.6%) |
| | Six turns 17 (0.8%) |
| | Seven turns 7 (0.3%) |
| | Eight turns 2 (0.1%) |
| | Ten turns 3 (0.1%) |
| Twelve turns 1 (0%) | |
| Total | 2168 (100%) |

Table 6.13: Distribution of Turn-Takings, in Respect of the Number of Turns.

Clearly, simple turn-takings predominate over multiple turns.

Within the predominant type of imitative exchange, that is, the turn-takings, the frequencies of repeated expressive actions for the model, and for the imitator, are summarised in the following table:

| Frequencies of Repeated Expressive Actions in Turn-Takings | | |
|---|--------------|--------------|
| Frequencies | Model | Imitator |
| (1) | 1677 (78.1%) | 1523 (70.8%) |
| (2) | 294 (13.7%) | 360 (16.7%) |
| (3) | 83 (3.9%) | 140 (6.5%) |
| (4) | 38 (1.8%) | 52 (2.4%) |
| (5) | 22 (1.0%) | 31 (1.4%) |
| (6)-(12) | 30 (1.3%) | 44 (2%) |
| (15) | 1 (0.0%) | |
| (17) | 1 (0.0%) | |
| Total | 2245 (100%) | 2150 (100%) |

Table 6.14: Distribution of the Model's and the Imitator's Repeated Expressive Behaviours.

Most displays were presented only once, both for the model and for the imitator.

Investigation (by Binomial function), of the predominant type of imitative exchange in the 2 countries, led to the following results:

| | Crete | Scotland |
|---|-------------|-------------|
| Turn-Takings | 1162 | 1004 |
| Co-Actions | 412 | 530 |
| | p<0.001 | p<0.001 |
| Total | 1574 (100%) | 1534 (100%) |
| Total Number of Turn-Takings and Co-Actions: 3,108 | | |

Table: 6.15: Distribution of Turn-Takings and Co-Actions in the Two Countries.

In both countries, turn-takings predominate, to a highly significant extent, over co-actions.

6.2.3.2. Main and Interaction Effects

Further analysis of the main or interaction effects of the infant's, the parent's sex, and the country, upon the two basic types of imitative exchange (turn-takings and co-actions) derived the following summary table:

| | Country (C) | Infant's Sex (I) | Parent's Sex (P) | (I) × (C) | (P) × (C) | (I) × (P) | (I) × (P) × (C) |
|---|----------------|---------------------|---------------------|-----------|-----------|-----------|--------------------|
| Type of Imitative Exchange | p<0.001 | p<0.01 | 0.16 | 0.48 | 0.45 | 0.12 | 0.06 |

Table 6.16: Summary Table of Main and Interaction Effects on the Type of Imitative Exchange.

The analysis of the age main effect on type of imitative exchange gave a non-significant result ($p = 0.07$).

Further analysis of the significant country and infants' sex main effects with respect to type of imitative exchange gave the following results:

| | Crete | Scotland |
|---------------------|----------------|----------------|
| Co-Actions | 410 (26.0) | 530 (34.6) |
| Turn-Takings | 1164 (74.0) | 1004 (65.4) |

Table 6.17: Country Main Effect on Type of Imitative Exchange ($\chi^2 = 26.61, p < 0.001$).

That is, there are higher probabilities for turn-takings to occur in Crete than in Scotland, while in Scotland there are higher probabilities for co-actions to occur compared to Crete.

Further, a significant effect of infant's sex on the type of imitative exchange, is shown in the following table:

| | Girls | Boys |
|---------------------|----------------|----------------|
| Co-Actions | 385 (27.8) | 555 (32.2) |
| Turn-Takings | 1000 (72.2) | 1168 (67.8) |

Table 6.18: Infant Sex Main Effect on Type of Imitative Exchange ($\chi^2 = 7.08, p = 0.007$).

Imitative exchanges in the form of turn-takings have higher probabilities to occur in interactions with girls than with boys, and imitative exchanges in co-actions have higher probabilities to occur in interactions with boys than in those with girls (although in absolute numbers imitative exchanges in the form of turn-takings and co-actions occur more in interactions with boys than with girls).

In summary, turn-takings predominate over co-actions, in both countries. Simple turn-takings predominate over any other kind. Most turn-takings, represent imitation of single expressions, both for the model and for the imitator. As for the

cultural differences, there are higher probabilities for turn-takings to occur in Crete than in Scotland, while in Scotland, there are higher probabilities for co-actions to occur than in Crete. Sex of infant differences showed that imitative exchanges in turn-takings are more likely in interactions with girls than with boys, or conversely, that imitative co-actions have higher probabilities to occur in interactions with boys than with girls.

6.2.4. Direction of Imitative Episode

6.2.4.1. Distribution of Type of Imitative Exchange in Relation to the Direction of Imitation

Through the construction of several new variables and the use of the Binomial test, the analysis of the imitative direction led to the following tables:

| Mother-Infant Interaction | | | |
|---------------------------|-----------------|----------------|--------------|
| Simple Turns | Multiple Turns | Co-Actions | Total |
| I-M : 538 (75%) | I-M : 166 (60%) | IM : 314 (71%) | 1018 (70,8%) |
| M-I : 177 (25%) | M-I : 111 (40%) | MI : 130 (29%) | 418 (29,2%) |
| p<0.001 | p = 0.001 | p<0.001 | |
| Total | | | |
| 715 (50%) | 277 (19%) | 444 (31%) | 1436 (100%) |

Table 6.19: Distribution of Directions of Imitative Episodes Across the Basic Types of Imitative Exchange, in Mother-Infant Interaction.

| Key for Table 6.19 |
|---|
| I-M = Mother Imitates Infant, in Simple or Multiple Turn-Taking |
| M-I = Infant Imitates Mother, in Simple or Multiple Turn-Taking |
| IM = Mother Imitates Infant in Co-Action |
| MI = Infant Imitates Mother in Co-Action |

Mothers tend to imitate their infants more than vice versa, in all kinds of imitative exchange.

| Father-Infant Interaction | | | |
|---------------------------|-----------------|----------------|--------------|
| Simple Turns | Multiple Turns | Co-Actions | Total |
| I-F : 618 (76%) | I-F : 183 (51%) | IF : 379 (76%) | 1180 (70.7%) |
| F-I : 194 (24%) | F-I : 177 (49%) | FI : 118 (24%) | 489 (29.3%) |
| p<0.001 | p = 0.79 | p<0.001 | |
| Total | | | |
| 812 (48.6%) | 360 (21.5%) | 497 (29.7%) | 1669 (100%) |

Table 6.20: Distribution of Directions of Imitative Episodes Across the Basic Types of Imitative Exchange, in Father-Infant Interaction.

| Key for Table 6.20 |
|---|
| I-F = Father Imitates Infant, in Simple or Multiple Turn-Taking |
| F-I = Infant Imitates Father, in Simple or Multiple Turn-Taking |
| IF = Father Imitates Infant in Co-Action |
| FI = Infant Imitates Father in Co-Action |

While, like mothers, fathers seem to imitate their infants more than vice versa, in simple turns and co-actions, irrespective of the kind of imitative expressive behaviour, in multiple turn-takings, fathers and infants have equal probabilities to imitate each other.

6.2.4.2. Main and Interaction Effects

Further analysis of main and interaction effects for country and infant's sex, on the type of imitative exchange in relation to the direction of imitation, separately for infant-mother and infant-father interactions, led to the results shown in the following table:

| Mother-Infant Interaction (p-values) | | | |
|---|----------------|---------------------|-----------------------------------|
| | Country | Infant's Sex | (Country) × (Infant's Sex) |
| Simple Turns | <0.001 | 0.09 | 0.42 |
| Multiple Turns | 0.09 | 0.22 | 0.14 |
| Co-Actions | 0.17 | 0.04 | 0.01 |
| Father-Infant Interaction | | | |
| Simple Turns | 0.02 | 0.20 | 0.24 |
| Multiple Turns | 0.06 | 0.10 | 0.03 |
| Co-Actions | 0.10 | 0.46 | 0.16 |

Table 6.21: Summary Table of Main and Interaction Effects for Country and Infant's Sex, on the Type of Imitative Exchange.

The only effects that appear to be significant are those of the country on the simple turn-taking type of imitative exchange, and of the interaction of the (country) × (infants' sex) on the imitative co-actions, in infant-mother interactions.

The analysis of the first significant effect led to the construction of the following table:

| | Crete | Scotland |
|---|---------------|-----------------|
| Maternal Imitations (Simple Turns) | 341 (83.2) | 197 (64.6) |
| Infant Imitations (Simple Turns) | 69 (16.8) | 108 (35.4) |

Table 6.22: Country Main Effect on Simple Turn-Takings, in Infant-Mother Interactions ($\chi^2 = 32.41$, $p < 0.001$).

It may be noted that, in Crete, mothers show significantly higher likelihood to imitate their infants in simple turns than in Scotland, and, alternatively, in Scotland, infants are significantly more likely to imitate their mothers in simple turns than in Crete.

The analysis of the second significant interaction effect led to the following results:

| | Crete | | Scotland | |
|---------------------------|---------------------------|--------------|----------------------------|---------------|
| | Girls | Boys | Girls | Boys |
| Maternal Co-action | 71 (68.9) | 73 (71.6) | 70 (82.4) | 100 (64.9) |
| Infant Co-action | 32 (31.1) | 29 (28.4) | 15 (17.6) | 54 (35.1) |
| | $\chi^2 = 0.17, p = 0.67$ | | $\chi^2 = 8.09, p = 0.004$ | |

Table 6.23: (Infant's Sex) × (Country) Interaction Effect on the Direction of Co-Action in Infant-Mother Interaction.

In Crete, there are no differences between the estimated proportions of maternal co-actions within interactions with boys and girls.

In Scotland, mothers have higher probabilities to imitate girls co-actively (although in absolute numbers mothers imitate co-actively boys more than girls). Conversely, infant-boys have higher probabilities to imitate their mothers, in co-action, than infant-girls.

The analysis of the main effect of age on the type of imitative exchange in relation to the direction of imitation, in infant-mother and infant-father interactions, gave the results shown in the following table:

| Mother-Infant Interaction (p-values) | |
|---|------------|
| | Age |
| Simple Turns | 0.13 |
| Multiple Turns | 0.002 |
| Co-actions | <0.001 |
| Father-Infant Interactions | |
| Simple Turns | 0.08 |
| Multiple Turns | 0.18 |
| Co-actions | 0.003 |

Table 6.24: Age Main Effect on the Type of Imitative Exchange.

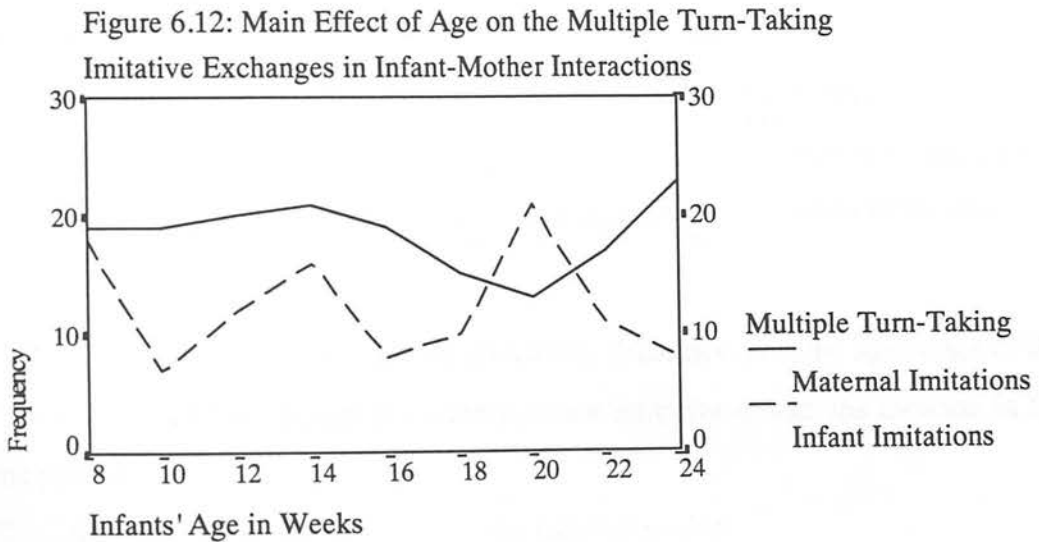
The effects that appear to be significant are those of infants' age on the multiple and the co-action type of imitative exchange in infant-mother interactions, as well as that of the infants' age on the co-action type of imitative exchange in infant-father interactions.

The first significant effect gave the following analysis:

| | | Infant's Age in Weeks | | | | | | | | |
|-----------------------|--|-----------------------|--------|--------|--------|--------|--------|--------|--------|--------|
| | | 8 | 10 | 12 | 14 | 16 | 18 | 20 | 22 | 24 |
| Maternal | | 19 | 19 | 20 | 21 | 19 | 15 | 13 | 17 | 23 |
| Multiple Turns | | (51.4) | (73.1) | (62.5) | (56.8) | (70.4) | (60.0) | (38.2) | (60.7) | (74.2) |
| Infant | | 18 | 7 | 12 | 16 | 8 | 10 | 21 | 11 | 8 |
| Multiple Turns | | (48.6) | (26.9) | (37.5) | (43.2) | (29.6) | (40.0) | (61.8) | (39.3) | (25.8) |

Table 6.25: Main Effect of Age on the Multiple Turn-Taking Imitative Exchanges, in Infant-Mother Interactions ($\chi^2 = 13.77, p = 0.08$).

The corresponding figure to this table is the following:



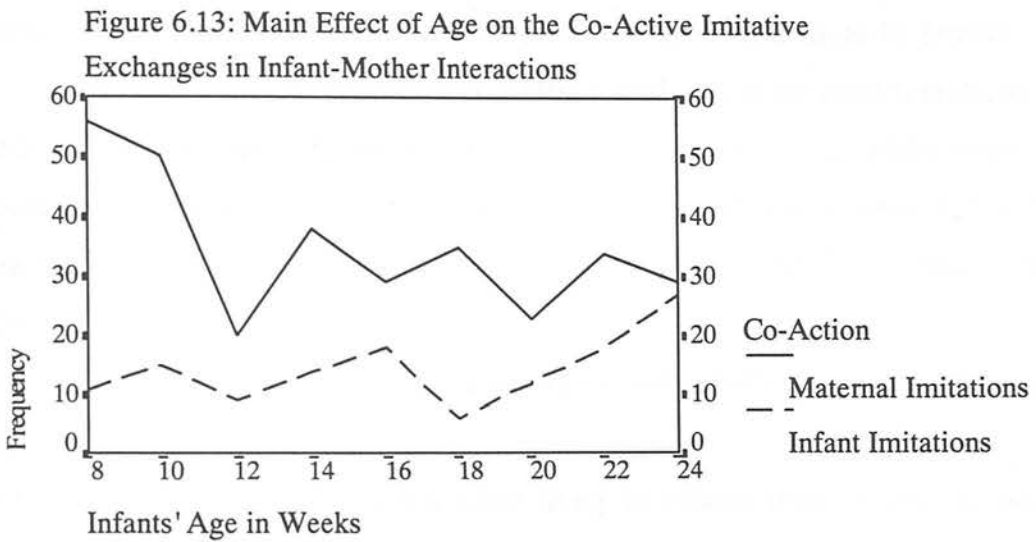
The developmental curve of multiple turn-takings initiated by mothers, appears not to differ across the age range of the 8th week to the 24th week. The same applies for the multiple turns initiated by infants, in their interactions with mothers.

Analysis of the second significant effect gave the following table:

| Infant's Age in Weeks | | | | | | | | | |
|----------------------------|--------------|--------------|--------------|--------------|--------------|--------------|--------------|--------------|--------------|
| | 8 | 10 | 12 | 14 | 16 | 18 | 20 | 22 | 24 |
| Maternal Co-Actions | 56 (83.6) | 50 (76.9) | 20 (69.0) | 38 (73.1) | 29 (61.7) | 35 (85.4) | 23 (65.7) | 34 (65.4) | 29 (51.8) |
| Infant Co-Actions | 11 (16.4) | 15 (23.1) | 9 (31.0) | 14 (26.9) | 18 (38.3) | 6 (14.6) | 12 (34.3) | 18 (34.6) | 27 (48.2) |

Table 6.26: Age Main Effect on the Co-action Type of Imitative Exchange, in Infant-Mother Interactions ($\chi^2 = 23.67, p < 0.01$).

The corresponding figure to this table is the following:



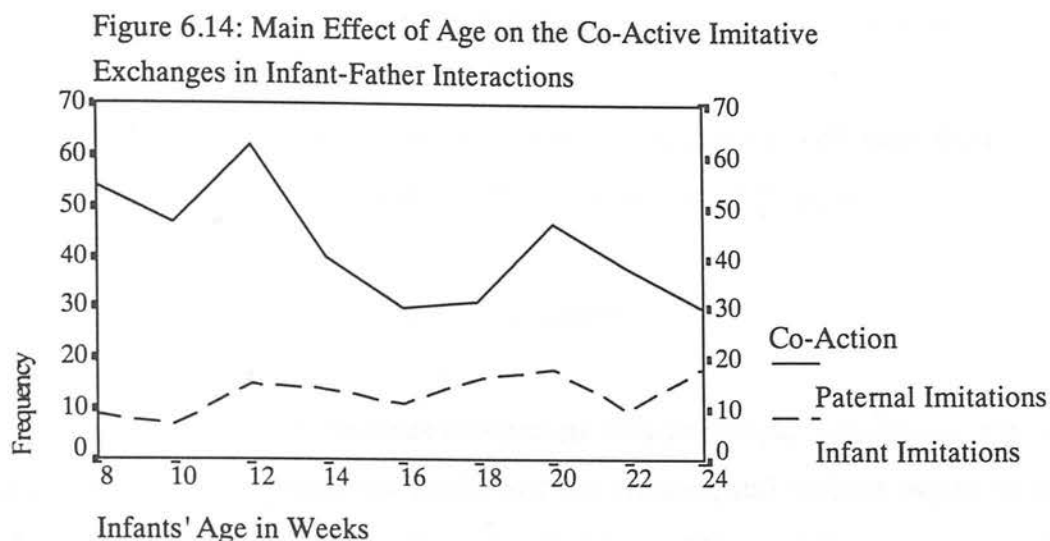
The developmental curve of maternal co-actions decreases over the age range of the 8th week to the 24th week, and conversely, infant imitative co-actions increase in the same period.

Analysis of the third effect gave the following table:

| Infant's Age in Weeks | | | | | | | | | |
|----------------------------|--------------|--------------|--------------|--------------|--------------|--------------|--------------|--------------|--------------|
| | 8 | 10 | 12 | 14 | 16 | 18 | 20 | 22 | 24 |
| Paternal Co-Actions | 54 (85.7) | 47 (87.0) | 62 (80.5) | 40 (74.1) | 30 (73.2) | 31 (66.0) | 47 (72.3) | 38 (79.2) | 30 (62.5) |
| Infant Co-Actions | 9 (14.3) | 7 (13.0) | 15 (19.5) | 14 (25.9) | 11 (26.8) | 16 (34.0) | 18 (27.7) | 10 (20.8) | 18 (37.5) |

Table 6.27: Age Main Effect on the Co-Action Type of Imitative Exchange, in Infant-Father-Interactions ($\chi^2 = 16.26, p = 0.03$).

The corresponding figure to this table is the following:



There is a non-significant shift to relatively fewer co-active imitations by fathers.

The above results indicate that mothers tend to imitate their infants, in all kinds of imitative exchange, more than infants imitate mothers. In simple turns and co-actions fathers also seem to imitate their infants more than vice versa. In multiple turn-takings, however, fathers and infants have equal probabilities to imitate each other.

The main or interaction effects of country and infant's sex on the direction of imitative exchange gave the following results:

- Greek mothers are significantly more likely to imitate their infants, in simple turns, than Scottish mothers. Conversely, infants in Scotland are more likely to imitate their mothers, in simple turns, than infants in Crete.
- In Crete, there are no differences between the estimated proportions of maternal co-actions in interactions with boys and girls. However, in Scotland, mothers have higher probabilities to imitate girls co-actively, than boys or the converse -- infant-boys are more likely than infant-girls to be the imitators in co-actions with their mothers.

The main effect of age on the direction of imitative exchange showed the following:

- Estimated proportions of multiple turn-takings initiated by the mothers, do not differ from the 8th week to the 24th week. The same applies for the multiple turns initiated by the infants in their interactions with mothers.

b) In mother-infant interaction, the estimated proportions for maternal imitative co-actions decrease across the age range of the 8th week to the 24th week, and infant imitative co-actions increase.

c) Paternal imitative co-action and infant imitative co-actions with their fathers do not show change across the age range of the 8th week to the 24th week.

6.2.5. Durations

6.2.5.1. Comparison of Means

The means of duration times reported are only for simple turn-takings; that is, single acts are made by both the model and the imitator, and without regard to the kind of imitative activity. The use of descriptive statistics and the non-parametric Mann Whitney test gave the following results:

| | Mean (seconds) | S.E. of Mean | Std.D. | Minimum | Maximum |
|-----------------------|-------------------|--------------|--------|---------|---------|
| Model | 0.73 | 0.03 | 0.86 | 0.05 | 9.68 |
| Pause | 1.12 | 0.06 | 1.62 | 0.05 | 10.00 |
| Imitation | 0.74 | 0.03 | 0.79 | 0.05 | 8.64 |
| Total Duration | 2.76 | 0.09 | 2.56 | 0.32 | 23.48 |

Table 6.28: Mean Duration, Standard Error and Standard Deviation of Model and Imitation Expressive Behaviour, Pause and Total Duration of the Imitative Episode.

The mean durations of models and imitations are both below 1 second, while the mean duration of pause and total duration are above 1 and 2 seconds.

The above measures for parental and infant imitations were as follows:

| Parental Imitations | | | | | |
|----------------------------|---------------------------|---------------------|---------------|----------------|----------------|
| | Mean (seconds) | S.E. of Mean | Std.D. | Minimum | Maximum |
| Model | 0.67 | 0.03 | 0.70 | 0.05 | 7.24 |
| Pause | 0.88 | 0.06 | 1.40 | 0.05 | 9.92 |
| Imitation | 0.70 | 0.03 | 0.68 | 0.04 | 8.12 |
| Total Duration | 2.43 | 0.09 | 2.20 | 0.41 | 17.40 |
| Infant Imitations | | | | | |
| Model | 0.88 | 0.08 | 1.20 | 0.08 | 9.68 |
| Pause | 1.84 | 0.13 | 1.95 | 0.02 | 10.00 |
| Imitation | 0.83 | 0.07 | 1.04 | 0.03 | 8.64 |
| Total Duration | 3.71 | 0.22 | 3.21 | 0.32 | 23.48 |

Table 6.29: Mean Durations, Standard Errors and Standard Deviations of Models, Pauses, Imitations and Total Durations, in Parent and Infant Imitations.

The mean duration of all models and imitations are below 1 second. The mean duration of the model and the imitation for infants and parents are very close. The mean duration of pauses, in parental imitations is below 1 second, while, in infant imitations, it is above 1.5 seconds. Due to the longer duration of pauses in infant imitations, the corresponding total durations are longer than those in parental imitations.

Descriptive analysis of model, pause, imitation and total durations, in relation to the countries led to the following results:

| | Mean (seconds) | S.E of Mean | Std.D | p-value |
|---------------------------|-------------------|----------------|-------|---------|
| Model Duration | | | | |
| Crete | 0.69 | 0.041 | 0.822 | 0.12 |
| Scotland | 0.75 | 0.043 | 0.887 | |
| Pause Duration | | | | |
| Crete | 0.87 | 0.063 | 1.263 | 0.001 |
| Scotland | 1.34 | 0.089 | 1.852 | |
| Imitation Duration | | | | |
| Crete | 0.72 | 0.040 | 0.792 | 0.73 |
| Scotland | 0.74 | 0.038 | 0.792 | |
| Total Duration | | | | |
| Crete | 2.51 | 0.115 | 2.292 | 0.02 |
| Scotland | 2.97 | 0.132 | 2.759 | |

Table 6.30: Comparisons of Mean Durations of the Models' and the Imitators' Expressive Behaviours, the Pauses and the Total Durations, Across the Two Countries.

It is noted that neither the means of model durations nor the means of imitation durations differ, to a significant extent, across the two countries. Further, the mean durations of pauses indicate a difference of limited significance -- Scottish subjects seem to respond after a longer pause than Greeks. A significant difference in total durations between Crete and Scotland, appears to be due to this difference in pause lengths.

6.2.5.2. Analysis by Repeated Measures

The second kind of duration analysis is based on simple turn-takings, irrespective of the frequencies of expressive behaviour of each participant and the kind of imitative activity. The repeated measures analyses gave the following table:

| | Between-Subjects Factor | Box M p-value | Greenhouse Geisser Correction (Effect of Time) | Greenhouse Geisser Correction (Interaction) |
|------------------|----------------------------|------------------|--|---|
| Model | Country | 0.23 | 0.59 | 0.77 |
| Duration | Infant's sex | 0.23 | 0.64 | 0.73 |
| Pause | Country | 0.02* | 0.23 | 0.21 |
| Duration | Infant's sex | 0.23 | 0.18 | 0.25 |
| Imitation | Country | 0.11 | 0.77 | 0.37 |
| Duration | Infant's sex | 0.01* | 0.84 | 0.07 |
| Total | Country | 0.08 | 0.66 | 0.79 |
| Duration | Infant's sex | 0.07 | 0.68 | 0.28 |

Table 6.31: Values of Greenhouse Geisser Correction Derived from the Repeated Measures Analysis of Variance for the Determination of Possible Differences Between the Levels of the "Between Subjects" Factor, a Possible Trend of Measurements Over Time or an Interaction Between Time and the "Between Subjects" Factor.

* There is no homogeneity across the treatment groups.

It is obvious that none of the duration times, subjected to repeated measures analyses was found to change to any significant extent, from the 8th week to the 24th week of infant's age. None of the measurements of these duration times was found to differ between the levels of any of the "between-subjects" factors, to show an interaction between time and the "between-subjects" factor or to show any kind of trend over time.

In summarising, the comparison of means showed that the duration of imitation, in both parental and infant imitations, is less than 1 second. No significant cultural differences were found. The model and the imitation durations appeared to be close. A difference of limited significance was found between the pauses of the two countries; in Crete the pause duration is shorter than in Scotland. The total duration was consistently found to be more than 2.5 seconds. None of the duration times (model, pause, imitation, total duration) that were subjected to repeated

analysis was found to show any kind of trend, across infants' ages between the 8th week and the 24th week, to differ in the levels of the "between-subjects" factor or to show an interaction between time and the "between-subjects" factor. Country and infant sex were used for "between-subjects" factors.

6.2.6. Emotional States and Emotional Ranges

Of the 4,766 imitative episodes analysed, 3,108 (65%) were categorised in the two basic types of imitative exchange, that is, turn-takings (simple and multiple) and co-actions. For these cases, an analysis of emotions before and during the imitative episodes was carried out. This segregation was due to the fact that only imitative exchanges that belong to these kinds of exchange would allow determination of who imitates whom in a sequential order, and thus gives evidence on the direction of emotional regulation between the two interactant partners.

A further distinction was made on the basis of who imitated whom, that is, a distinction was made between the cases in which the parent was the imitator, in turn-takings or in co-actions (i-p), and the cases in which the infant was the imitator, either in turn-takings or in co-actions (p-i). This distinction offered a subtle view of the emotional aspects of imitative exchange.

6.2.6.1. Emotions During the Imitative Episode

Before presenting the analysis of emotions during the imitative episode, it should be remembered that an ascending emotional range is defined as one in which the last sign is higher in the scale of emotional states than the first, no matter what are the intervening signs. For example, an ascending emotional range is scored when one subject is in state of interest (+) and then shows pleasure (++). Correspondingly, a descending emotional range is defined as one in which the last sign is lower in the scale of emotional states, no matter what are the intervening signs. A fluctuating emotional range is defined for a sequence in which the first and the last signs for emotion are the same, independently of the intervening signs. The stable category refers to the expression which is unmodified in quality, but not necessarily in quantity valence, over time. An example of a stable emotional range is when a partner remains in the state of interest (+) in the course of the coincident imitative sequences, or in the course of any other part of the unit of interaction.

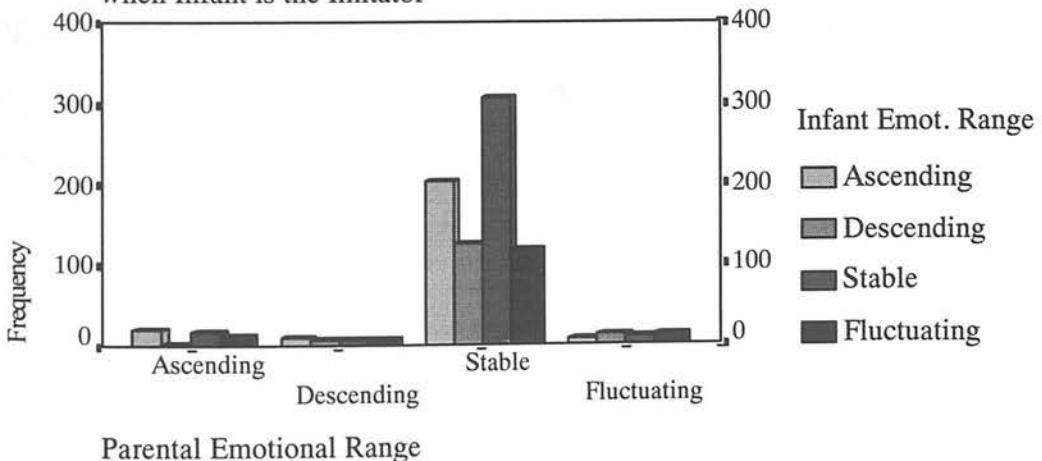
The analysis of the emotional range of the partners, when infant is the imitator, gave the following table of estimated proportions:

| | | Parent as Model | | | |
|---------------------------|-------------|------------------------|--------------|---------------|--------------|
| | | Ascending | Descending | Stable | Fluctuating |
| Infant as Imitator | Ascending | 21 (35.6) | 11 (28.9) | 205 (26.9) | 8 (17.0) |
| | Descending | 5 (8.5) | 10 (26.3) | 128 (16.8) | 15 (31.9) |
| | Stable | 20 (33.9) | 8 (21.1) | 308 (40.5) | 11 (23.4) |
| | Fluctuating | 13 (22.0) | 9 (23.7) | 120 (15.8) | 13 (27.7) |

Table 6.32: Main Effect of Parental Emotional Range on Infant Emotional Range, when Infant is the Imitator ($\chi^2 = 26.17, p = 0.001$).

The highest frequencies can be seen in the cell that represents stable emotional ranges for both partners (Figure 6.15). When the emotional range of the parent is ascending, the infant’s emotions are mostly ascending or stable. When the parent’s emotions are descending, the infant’s emotions are mostly ascending or descending. When the parent is stable, the infant is likely to be stable in emotions or ascending. When the parent’s emotions are fluctuating, the dominant categories for the infant are descending and fluctuating.

Figure 6.15: Regulation of Infant and Parent Emotional Ranges, when Infant is the Imitator



Analysis of the emotional states that composed the emotional ranges of the two subjects, in the imitative exchange, was not possible for the non-stable categories, due to the low-frequency of occurrences in many cells. For the “stable”

emotional range, the analysis of emotional states in the course of the imitative exchange, when the infant is the imitator, after the exclusion of the infant's emotions that were of low frequency (neutral and negative), led to the construction of the following table of frequencies and estimated proportions:

| | | <u>Parent as Model</u> | |
|---------------------------|----------|------------------------|---------------|
| | | Interest | Pleasure |
| <u>Infant as Imitator</u> | Interest | 26 (92.9) | 142 (55.9) |
| | Pleasure | 2 (7.1) | 112 (44.1) |

Table 6.33: Main Effect of Parental Interest and Pleasure on the Corresponding Infant Emotional States, when Infant is the Imitator ($\chi^2 = 14.29, p < 0.001$).

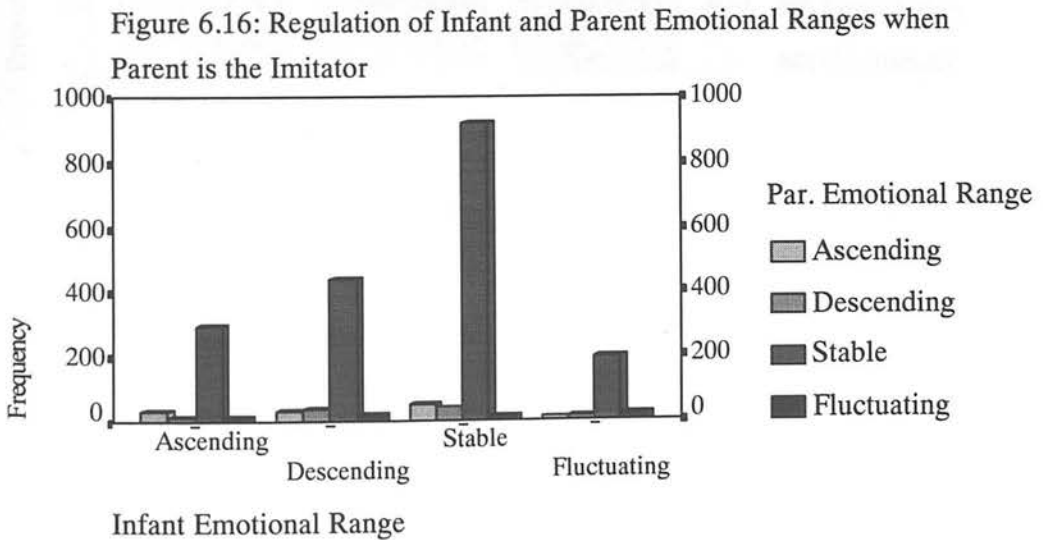
It is evident that when the parent is interested, it is highly probable that the infant is also interested than when the parent is showing pleasure (although in absolute numbers the infant shows interest more when the parent is pleased than when the parent is interested). When the parent is showing pleasure the infant is more likely to also be pleased than when the parent is showing interest. That is, when the parent is exhibiting a positive emotional state of interest or pleasure, the infant is significantly more likely to be in a sympathetic or matching emotion than in the complementary state.

A corresponding analysis of the emotional range of the two subjects, when parent is the imitator, gave the following table of frequencies and estimated proportions:

| | | Infant as Model | | | |
|---------------------------|-------------|------------------------|---------------|---------------|---------------|
| | | Ascending | Descending | Stable | Fluctuating |
| Parent as Imitator | Ascending | 37 (10.1) | 35 (6.5) | 53 (5.1) | 13 (5.2) |
| | Descending | 15 (4.1) | 42 (7.7) | 44 (4.3) | 17 (6.7) |
| | Stable | 298 (81.0) | 444 (81.9) | 920 (88.9) | 198 (78.6) |
| | Fluctuating | 18 (4.9) | 21 (3.9) | 18 (1.7) | 24 (9.5) |

Table 6.34: Main Effect of Infant Emotional Range on Parent Emotional Range, when Parent is the Imitator ($\chi^2 = 61.04, p < 0.001$).

The highest frequencies can be seen in the cell that represents stable emotional ranges for both partners (Figure 6.16). It is strongly evident for all emotional ranges of the infant, that the parent is likely to have stable emotions. When the emotions of the infant are ascending, the predominant categories for the parent are stable and ascending. When the emotions of the infant are descending, the predominant categories for the parent are stable and descending. When the emotions of the infant are stable, the predominant categories for the parent are stable and ascending. When the emotions of the infant are fluctuating, the predominant categories for the parent are stable and fluctuating.



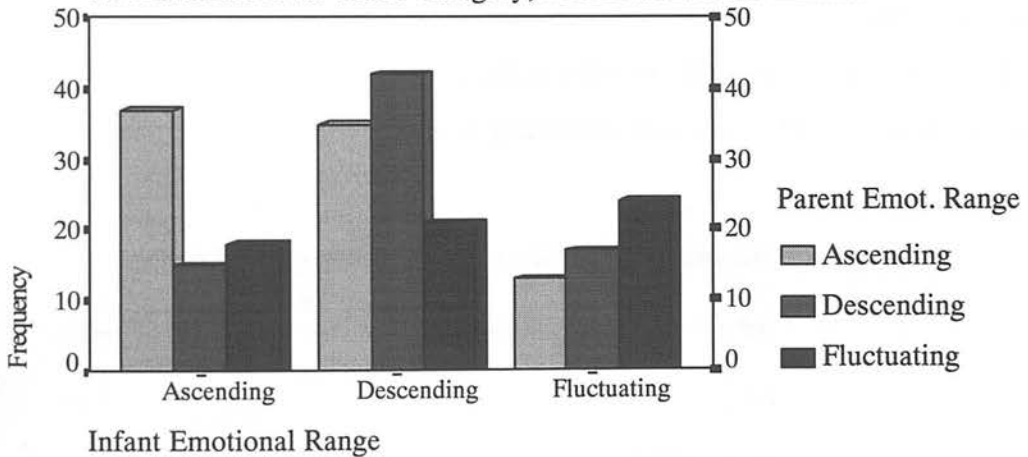
The above observations concerning the non-stable categories (ascending, descending, fluctuating) become more evident after the omission of the stable category, in the following table of frequencies and estimated proportions:

| | | Infant as Model | | |
|---------------------------|-------------|------------------------|--------------|--------------|
| | | Ascending | Descending | Fluctuating |
| Parent as Imitator | Ascending | 37 (52.9) | 35 (35.7) | 13 (24.1) |
| | Descending | 15 (21.4) | 42 (42.9) | 17 (31.5) |
| | Fluctuating | 18 (25.7) | 21 (21.4) | 24 (44.4) |

Table 6.35: Main Effect of Infant Emotional Range on Parent Emotional Range, After the Omission of the Stable Category ($\chi^2 = 19.35, p < 0.001$).

It is clear that when the emotional range of the infant is ascending, descending or fluctuating, the parent is most likely to be in the matching category (Figure 6.17).

Figure 6.17: Regulation of Infant and Parent Emotional Ranges, after the Omission of the Stable Category, when Parent is the Imitator



The analysis of the kinds of emotional state in the emotional ranges, when parent was the imitator, gave the following table of frequencies and estimated proportions:

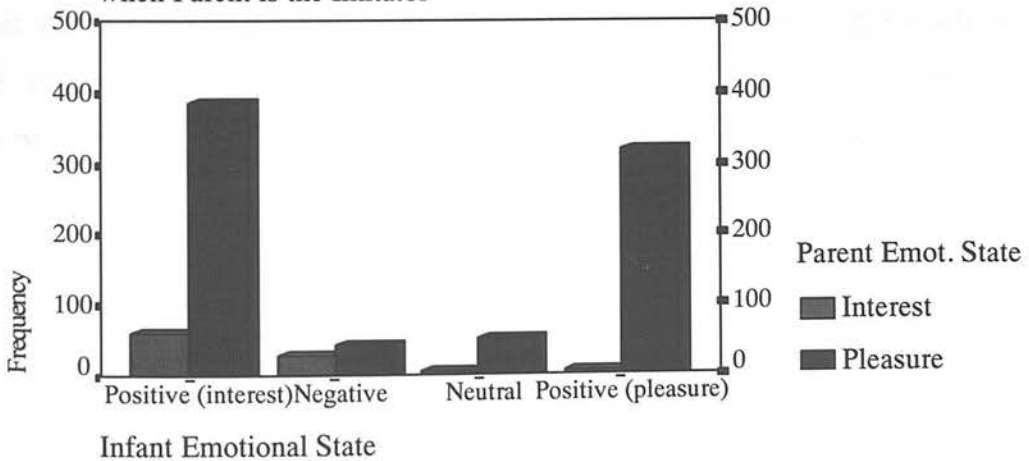
| | | Infant as Model | | | |
|---------------------------|---------------------|------------------------|--------------|--------------|---------------------|
| | | Positive (interest) | Negative | Neutral | Positive (pleasure) |
| Parent as Imitator | Positive (interest) | 63 (14.0) | 31 (41.3) | 7 (11.5) | 8 (2.4) |
| | Positive (pleasure) | 386 (86.0) | 44 (58.7) | 54 (88.5) | 320 (97.6) |

Table 6.36: Main Effect of Infant Emotional States on Parent’s Emotional States, when Parent is the Imitator ($\chi^2 = 91.67, p < 0.001$).

Two points are noteworthy:

- 1) When the parent imitates the infant, who is expressing any of the three emotional states, positive (pleasure or interest), neutral, or negative, the parent’s emotion is positive (pleasure or interest).
- 2) Whenever the infant is expressing a positive emotional state of interest or pleasure, the parent is significantly more often in the same positive state. When the infant is interested, the probability that the parent is interested is higher than that when the infant is showing pleasure. When the infant is pleased, the parent is likely to be in the same state [although in absolute numbers the parent imitates the infant with pleasure more when the infant is interested than when the infant is showing pleasure (Figure 6.18)].

Figure 6.18: Regulation of Infant and Parent Emotional States when Parent is the Imitator



Exclusion of the infant’s emotions that occurred to a minor extent (neutral and negative), led to the construction of the following table of estimated proportions:

| | | Infant as Model | |
|---------------------------|----------|------------------------|---------------|
| | | Interest | Pleasure |
| Parent as Imitator | Interest | 63 (14.0) | 8 (2.4) |
| | Pleasure | 386 (86.0) | 320 (97.6) |

Table 6.37: Main Effect of Infant Emotional States of Interest and Pleasure on the Corresponding Parental Emotional States, when Parent is the Imitator ($\chi^2 = 30.67, p < 0.001$).

That is when the infant is interested, the parent is more likely to be in the same state than when the infant is showing pleasure. Correspondingly, when the infant is pleased, the parent is more likely to be pleased than when the infant is showing interest (although in absolute numbers the parent is more pleased when the infant is interested than when the infant is pleased). Positive emotional states of interest or pleasure exhibited by the infant are likely to be imitated by an expression of pleasure.

6.2.6.2. Emotions Before an Episode of Imitation

The analysis of the emotional states of the infant and adult when an imitation occurs, led to an examination of the same variables in the period before the imitative episode.

Construction of new variables for the two basic types of imitative exchange, and the use of Loglinear models and χ^2 -test, made possible comparison of emotional states before the imitative episode with those recorded during the imitative episode. This analysis was possible when the infant was the imitator, but when the parent was the imitator the low-frequency of certain behaviours precluded a meaningful statistical analysis. The analysis of the emotional states of infant and parent before and during imitation gave the following proportions:

| | | Parent as Model-Infant as Imitator | | |
|-------------------------|----------------------|---|-------------------------|--------------------------|
| | | Before Imitation | | |
| | | p(+) <i>i</i> (+)(p-i) | p(+) <i>i</i> (++)(p-i) | p(++) <i>i</i> (++)(p-i) |
| During Imitation | p(+)- <i>i</i> (+) | 16 (76.2) | 7 (24.1) | - |
| | p(++)- <i>i</i> (++) | 5 (23.8) | 22 (75.9) | 73 (100.0) |

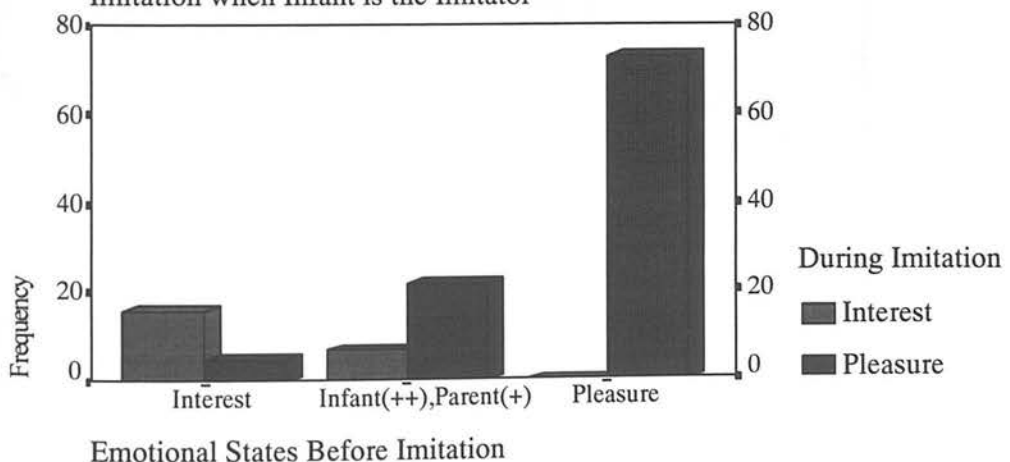
Table 6.38: Main Effect of Subjects' Emotional States Before Imitation on their Emotional States During Imitation, when Infant is the Imitator ($\chi^2 = 63.01, p < 0.001$).

| Key for Table 6.38 | |
|---------------------------|---|
| Before Imitation | |
| p(+) <i>i</i> (+)(p-i) | = Parent Interested and Infant Interested |
| p(+) <i>i</i> (++)(p-i) | = Parent Interested and Infant Pleased |
| p(++) <i>i</i> (++)(p-i) | = Parent Pleased and Infant Pleased |
| During Imitation | |
| p(+)- <i>i</i> (+) | = Parent Interested and Infant Interested |
| p(++)- <i>i</i> (++) | = Parent Pleased and Infant Pleased |

The following conclusions can be drawn:

- 1) When both partners display “interest” or “pleasure” before imitation, they are most likely to remain in the same state during imitation.
- 2) If the parent is showing “interest” and the infant is showing “pleasure” before imitation occurs, it is much more likely that both will show “pleasure”, rather than “interest”, when imitation takes place (Figure 6.19).

Figure 6.19: Infant and Parent Emotional States Before and During Imitation when Infant is the Imitator



| Key for Figure 6.19 | |
|----------------------------|----------------|
| Interest: (+) | Pleasure: (++) |

6.2.6.3. Interaction Effects

6.2.6.3.1. Interaction Effects During the Imitative Exchange

Given that the emotional matching of the two partners was the main interest of this analysis (Loglinear Models), any interaction effect would be of interest provided that it contained the predominant emotional states of both partners. With this restriction, no significant interaction effects of country, infants' or parents' sex, on the emotional matching of the two partners, was found, as it is shown in the following table:

| Interaction Effects on the Emotional Matching when Infant is the Imitator | | | | | | | |
|---|------|------|------|-----------|-----------|-----------|-----------------|
| | (I) | (C) | (P) | (C) × (I) | (P) × (I) | (C) × (P) | (C) × (P) × (I) |
| Matching of Emotional States | 0.43 | 0.26 | 0.14 | 0.23 | 0.31 | 0.21 | 0.28 |
| Interaction Effects on the Emotional Matching when Parent is the Imitator | | | | | | | |
| Matching of Emotional States | 0.12 | 1.14 | 0.17 | 0.28 | 0.21 | 0.37 | 0.12 |

Table 6.39: Interaction Effects on Emotional Matching, in Infant and Parental Imitations.

| Key for Table 6.39 | |
|--------------------|---|
| (I) | = Infants' Sex |
| (C) | = Country |
| (P) | = Parents' Sex |
| (C) × (I) | = Country × Infants' Sex |
| (P) × (I) | = Parents' Sex × Infants' Sex |
| (C) × (P) | = Country × Parents' Sex |
| (C) × (P) × (I) | = Country × Parents' Sex × Infants' Sex |

Even when the effect of each independent factor (country, gender, parent) on the dependent variable (emotional matching) was analysed separately, no significant results emerged:

| | Country | Infant's Sex | Parent's Sex |
|---|---------|--------------|--------------|
| Matching of Emotional States when Infant Imitates | 0.07 | 0.46 | 0.41 |
| Matching of Emotional States when Parent Imitates | 0.46 | 0.42 | 0.30 |

Table 6.40: Interaction Effects on Emotional Matching, in Imitations by Infant and Parent.

6.2.6.3.2. Interactions Effects Before the Imitative Exchange

Our interest in emotional regulation before imitative episodes led to a search for interaction effect affecting the emotional states of both subjects. With this restriction, no significant interaction effects of country, infants' or parents' sex, on the emotional matching before imitative episodes, was found, as shown in the following table:

| Interaction Effects on the Emotional Matching Before Imitation when Infant is the Imitator | | | | | | | |
|--|------|------|------|-----------|-----------|-----------|-----------------|
| | (I) | (C) | (P) | (C) × (I) | (P) × (I) | (C) × (P) | (C) × (P) × (I) |
| Matching of Emotional States | 0.25 | 0.40 | 0.05 | 0.26 | 0.26 | 0.27 | 0.24 |

Table 6.41: Interaction Effects on Emotional Matching, Before Imitation by Infant.

| Key for Table 6.41 | |
|--------------------|---|
| (I) | = Infants' Sex |
| (C) | = Country |
| (P) | = Parents' Sex |
| (C) × (I) | = Country × Infants' Sex |
| (P) × (I) | = Parents' Sex × Infants' Sex |
| (C) × (P) | = Country × Parents' Sex |
| (C) × (P) × (I) | = Country × Parents' Sex × Infants' Sex |

No significant results were found even when the effect of each independent factor (country, infants' sex, parents' sex) on the dependent variable (emotional matching before imitation) was analysed separately:

| | Country | Infant's Sex | Parent's Sex |
|-------------------------------------|---------|--------------|--------------|
| Matching of Emotional States | 0.26 | 0.23 | 0.06 |

Table 6.42: Interaction Effects on Emotional Matching, Before Imitation by Infant.

6.2.6.4. Longitudinal Analysis

In an attempt to verify the above findings on the emotional states in each age-period, the use of Fisher's exact test led to the construction of some cross-tabulations. One has to be very cautious about the interpretation of these tables since low-frequency cells prevented the extraction of Fisher's exact-value, in some tables differences did not reach significance levels, while in two other cases, both corresponding to parental imitations, the value of Fisher's Exact was of limited significance (Table 6.43). The fact that in each age-period the trend of emotional matching existed, in addition to the fact that the reverse effect was not verified, in any age-period, led us to believe that the weakness in the extraction of chi square can be attributed explicitly to the low frequency cells.

In summarising, emotional identification, either of the emotional range or of predominant emotional states, was found for both infant and parental imitations. In the cases of infant imitations, emotional matching was shown to precede the beginning of the imitative episode. The emotional states that predominate, both for the infants and the parents, were found to be those of "interest" and "pleasure". No significant main or interaction effects of country, infants' sex or parents' sex were found on the emotional regulation, either before or during the imitative episode. Despite the fact that the main effect of age was not consistently significant, a trend of emotional identification was demonstrated. When parents were imitating, a result of limited significance was found for 14 and 20 weeks of age.

| Infants' Age in Weeks | | | | | | | | | | | |
|------------------------|---------------|--------------|---------------|---------------|---------------|--------------|---------------|--------------|--------------|--|--|
| | 8 | 10 | 12 | 14 | 16 | 18 | 20 | 22 | 24 | | |
| | 4 (100.0) | 2 (100.0) | 1 (100.0) | 5 (100.0) | 4 (100.0) | 6 (100.0) | 2 (66.7) | 2 (66.7) | - | | |
| Infant Imitates | 31 (75.6) | 19 (61.3) | 18 (52.9) | 13 (52.0) | 16 (55.2) | 9 (47.4) | 14 (53.8) | 6 (46.2) | 16 (44.4) | | |
| | - | - | - | - | - | - | 1 (33.3) | 1 (33.3) | - | | |
| | 10 (24.4) | 12 (38.7) | 16 (47.1) | 12 (48.0) | 13 (44.8) | 10 (52.6) | 12 (46.2) | 7 (53.8) | 20 (55.6) | | |
| Fisher's Exact | 0.56 | 0.52 | 1.00 | 0.06 | 0.13 | 0.05 | 1.00 | 1.00 | * | | |
| | 7 (6.9) | 19 (24.4) | 10 (16.4) | 7 (17.9) | 1 (2.8) | 4 (10.0) | 7 (21.2) | 5 (14.3) | 3 (11.5) | | |
| Parent Imitates | - | 2 (5.6) | - | - | - | 2 (4.0) | - | 2 (5.7) | 2 (4.3) | | |
| | 94 (93.1) | 59 (75.6) | 51 (83.6) | 32 (82.1) | 35 (97.2) | 36 (90.0) | 26 (78.8) | 30 (85.7) | 23 (88.5) | | |
| | 23 (100.0) | 34 (94.4) | 29 (100.0) | 37 (100.0) | 28 (100.0) | 48 (96.0) | 44 (100.0) | 33 (94.3) | 44 (95.7) | | |
| Fisher's Exact | 0.34 | 0.02 | 0.03 | 0.01 | 1.00 | 0.40 | <0.01 | 0.43 | 0.34 | | |

Table 6.43: Emotional Matching at Different Ages

* Statistical significance could not be calculated

Key for Table 6.43

Infant Imitates

p(+)-i(+) = Parent Interested and Infant Interested

p(++)-i(+) = Parent Pleased and Infant Interested

p(+)-i(++) = Parent Interested and Infant Pleased

p(++)-i(++) = Parent Pleased and Infant Pleased

Parent Imitates

i(+)-p(+) = Infant Interested and Parent Interested

i(++)-p(+) = Infant Pleased and Parent Interested

i(+)-p(++) = Infant Interested and Parent Pleased

i(++)-p(++) = Infant Pleased and Parent Pleased

6.3. Reliability

The measurements in the study were assessed for both inter-observer and intra-observer reliability. Both kinds of reliability measurement were made on the quality of emotional categories of the interactant partners, and on the durations of emotional categories and imitative exchanges.

To check intra-observer reliability, the experimenter rescored a random sample of 33% of the material after an interval of three weeks following the first analysis and the results were tested by Cohen's Kappa. Reliability for all categories ranged from 0.80 to 0.89, the mean value of k for all categories being 0.83. Scores obtained for emotions ranged from 0.82 to 0.89, and those for the duration of imitative exchanges (model, pause, imitation and total duration) ranged from 0.80 to 0.89, while scores for the duration of emotional categories ranged from 0.81 to 0.88.

For measures of inter-observer reliability, a second observer who had been trained in use of the coding scheme scored a sample of the data, independently. The second observer had no previous experience of video microanalysis and was not aware of the hypotheses under investigation. The training for all the sections of the coding scheme involved the following stages:

- The coding scheme was introduced, explained and discussed.
- Familiarisation of the software used for the microanalysis gave particular emphasis to accurate recording of onset and offset times.
- Microanalysis of a randomly selected sample of five minutes from each category was briefly demonstrated in order to familiarise the second observer with the procedures of the coding scheme.
- The definitions of the categories under measurement for reliability were learned.
- Analysis of one whole session was made in cooperation with the rater, followed by an exhaustive discussion.
- The rater coded another sample of five minute duration on her own to establish that the training had been successful.

After this training, the second observer coded a randomly selected 33% sample of the data, independently. Inter-observer reliability was estimated by Cohen's Kappa statistic. Reliability for all categories ranged from 0.70 to 0.87. The mean value of k for all categories was 0.80. Scores obtained for emotional categories ranged from 0.70 to 0.86, those for durations of imitative exchanges ranged from 0.80 to 0.87, and scores for duration of emotional categories ranged from 0.70 to 0.85.

The difficulty of establishing high inter-observer reliability, when a complicated coding system is used, has to be noted. The increased task demands on the rater and the multiple messages of a complex interaction itself are recognised as two factors that contribute to the difficulty of establishing high inter-observer reliability (Bakeman and Gottman, 1986). In particular reference to sequential analysis, the establishment of inter-observer reliability is even more difficult due to the fact that any disagreement can result in lack of synchrony and thus prevent subsequent matching of comparisons (Hollenbeck, 1978, cited by Papoudi, 1993). Given these constraints, it is felt that the inter-observer reliability values given above are satisfactory.

CHAPTER SEVEN

DISCUSSION, AND INTERPRETATION OF FINDINGS

Introduction

The microanalysis of non-verbal behaviours and imitative episodes as well as the signal analysis of vocal imitations, in free interactions of infants with their parents, have produced rich data on the emotions and on other coordinated features of infant, maternal and paternal imitations. In this chapter, I will summarise, and interpret the results presented in the previous chapter. I will attempt to clarify our understanding of the intersubjective nature of imitation, as well as to suggest the foundations upon which a theory of early infant-father interaction may be built. Finally, this thesis has raised several issues which will need further research, and suggestions and directions for future studies will be provided.

7.1. Summary of the Results of This Thesis

7.1.1. Imitative Episodes

Imitative exchanges occur in both infant-mother and infant-father interactions, and they involve many kinds of expressive behaviour. They were frequent in both Cretan and Scottish families, but significantly more numerous in Scotland. It is interesting that interactions with fathers contain more imitative exchanges than those with mothers. They occur with both boys and girls, being more frequent with the boys overall. However, the proportions of imitative episodes between boys and their fathers and mothers did not differ significantly, and girls also interacted equally frequently with their mothers and fathers.

Analysis of the differences between imitative episodes in the two countries gave some significant main and interaction effects. In particular, a significant main effect of country led to the conclusion that imitative episodes are significantly more likely in interactions with boys in Scotland, than in Crete, and that imitative episodes with girls are significantly more frequent in Crete than in Scotland. The analysis of the main effect of country on parent's sex gave no significant result, leading to the

conclusion that imitative episodes in interactions with mothers or with fathers, did not differ between Scotland and Crete.

There are significantly more imitative episodes in mother-boy interactions in Scotland compared to Crete; conversely in Crete there are significantly higher probabilities for imitative episodes to occur in mother-girl interactions, compared to Scotland. In Scotland, there are more imitative episodes in father-boy interactions, than there are in Crete, and, correspondingly, there are significantly more imitative episodes in Crete in father-girl interactions, compared to Scotland.

Age had no significant effect with respect to the sex of the infant or the parent's sex. That is, across the age range of the 8th week to the 24th week, with mothers and with fathers, boys do not show changing proportions of imitative episodes, and the same applies for the estimated proportions of imitative episodes occurring in interactions with girls. However, infants in both countries showed different estimated proportions of imitative episodes between the 20th week and the 24th week.

7.1.2. Kinds of Imitative Expressive Behaviour

Vocal imitations were more common than imitations of other expressive behaviours. The remaining categories of imitations fell into the following order of diminishing frequency of occurrence: facial movements, combinations of expressive behaviours, non-speech sounds, head movements and hand movements. In each of these groups of expressive behaviours, the predominant sub-categories were as follows: vowel sounds in vocal imitations, mouth openings in facial imitations, vocal with facial expressions in combinations, and various sounds among non-speech sound imitations. Imitations of head and hand movements were analysed as present or absent, without further sub-categorisation.

The analysis of the main and interaction effects of country and the sex of infant and parent on the estimated proportions of expressive behaviours, showed a significant main effect of country for the majority of these behaviours. Imitations of vocal and non-speech sound predominate in Crete while facial expressions, head movements and combinations of expressive behaviours are imitated more frequently

in Scotland. Only hand movement imitations appeared not to differ between the 2 countries. More facial expression imitations occurred in girl-parent interactions and more hand movement imitations occurred in boy-parent pairs. The parents also differed in the same sense, in that more facial movement imitations occurred in mother-infant interactions and more non-speech sound imitations occurred in father-infant interactions.

Age of the infant had a significant main effect on all imitative expressive behaviours with the exception of non-speech sounds, which appeared not to be influenced by the infant's age.

The developmental curves of imitative expressive behaviours showed the following dips: vocal imitation decreased and then increased at 16 and 20 to 24 weeks, facial imitations showed dips at 8 to 12, 14 to 18 and 22 to 24 weeks, imitations in the form of combinations of expressive behaviours dipped at 14 and 20 weeks. Head movement imitations showed a downward trend across the whole age range of the 8th week to the 24th week with a maximum appearing at the age of 10 weeks. The developmental curve of imitated hand movements, by contrast showed an upward trend between 8 and 24 weeks.

An overview of the developmental curves for which significant main effects of age were found, that is vocalisations, facial expressions, combinations of expressions, head and hand movements, produced the following description: The age range of 8 to 24 weeks may be segregated into 4 successive periods (namely, 8 to 12, 12 to 16, 16 to 20, 20 to 24 weeks). In the first two periods (8 to 12 and 12 to 16 weeks), some imitative expressive behaviours increase, others decrease and a third group exhibit a fluctuating trend. In the third period (16 to 20 weeks), all imitative expressive behaviours are fluctuating in different ways and in the fourth period (20 to 24 weeks), imitative expressive behaviours show distinct increases or decreases.

Vocalisations and combinations of expressive behaviour imitations occur in different ways in boy-parent and girl-parent interactions. Vocal imitations in girl-parent interactions show a fluctuating trend across the whole age range. Vocal imitations in boy-parent interactions increase from the 8th week to the 16th week, at which age, a downward trend begins. Combinations of expressive behaviours in girl-

parent interactions, occur to the same degree for all ages and the same applies for boys.

7.1.3. Type of Imitative Exchange

The analysis of the type of imitative exchange revealed a predominance of turn-takings over co-actions, in both Crete and Scotland, and simple turn-taking was by far the most common pattern. In other words, both the expressive behaviour of the model and the imitation were presented just once.

In Crete there are significantly higher probabilities for turn-taking to occur than in Scotland, where imitations overlapped, as co-actions, more often than in Crete. Turn-taking imitative exchanges are significantly more common with girls than with boys, and co-active imitative exchanges are significantly more frequent with boys.

The estimated proportions of both the turn-taking type of imitative exchange and co-actions do not change significantly across the age range of 8 to 24 weeks.

7.1.4. Direction of Imitative Exchange

Mothers imitate their infants significantly more than vice versa, for all kinds and types of expressive behaviour. In simple turn-takings and co-actions, fathers tend to imitate their infants significantly more than vice versa, for all kinds of expressive behaviour, but in multiple turn-taking, fathers and infants have equal probabilities to imitate each other.

Mothers in Crete have significantly higher probabilities to imitate their infants in simple turn-takings, than mothers in Scotland, or, conversely, infants in Scotland have significantly higher probabilities to imitate their mothers, in simple turns.

The estimated proportions of maternal co-actions in interactions with boys and girls, do not differ in Crete. In co-actions in Scotland, however, mothers are significantly more likely to imitate girls, and boys are more likely than girls to imitate their mothers.

Analysis of the main effect of age on the direction of imitation for different types of imitative exchange gave three clear results:

- a) The estimated proportions of multiple turn-takings initiated by mothers did not differ across the age range from the 8th week to the 24th week, and the same applies for the multiple turn-takings initiated by infants.
- b) Estimated proportions of maternal imitative co-actions decreased from the 8th to the 24th week, while infant co-actions increased.
- c) Co-active imitations initiated by fathers and those initiated by infants, did not change between the 8th week and the 24th week.

7.1.5. Durations of Behaviours in Imitative Exchanges

The analysis of the timing of behaviours comprised comparison of mean times for parts of an imitative exchange (model, pause, imitation and total duration) and repeated measures analysis of these times.

The duration of imitation, either by infant or by parent, is less than 1 second, and the same finding was obtained from the combined values of infant and parental imitations. No significant differences were found between Crete and Scotland for these durations.

The durations of the model and of the imitation appeared to be approximately the same, in both infant and parental imitations, and the same finding was obtained from the combined results of infant and parental imitations comparing the two countries.

When infant and parental imitations are combined, the average pause between model and imitation is more than 1 second (1.12 second), this duration in parental imitations (0.88 seconds) being shorter than the pause in infant imitations (1.84 seconds). A difference of limited significance was found between the pause durations of the pause in the two countries -- it seems to be shorter in Crete than it is in Scotland.

The total duration of the imitative episode was consistently around 3 seconds, but it tends to be shorter in Crete than in Scotland, which may be explained by the difference in the length of pause in the two countries.

Repeated measures analysis gave no significant effect for any of the times (model, pause, imitation and total duration); no kind of trend could be found from the 8th week to the 24th week, for the “between-subjects” factors of country and the infant’s sex, and there was no significant interaction between time and these 2 factors.

7.1.6. Emotions in Imitative Exchanges

Before the sixth month of life, imitations by both infant and parent are characterised by significant emotional regulation, either in the form of emotional “matching”, or in the complementary form of emotional “attunement”.

Emotional matching was found when the emotional states of both interacting partners were “stable”, and the emotions of interest and pleasure predominated. When expressive behaviour of either parent or infant shows the emotion of “interest”, then the imitative expressive behaviour of the other is likely to be performed with an expression of “interest”. Similarly, when the expressive behaviour of one partner showed “pleasure”, then the imitative behaviour of the partner was likely to be performed with an expression of “pleasure”.

Emotional attunement was found when the emotional states of both interacting partners were “non-stable”; that is, exhibiting ascending, descending or fluctuating forms. Parental imitations show subtle emotional attunement to the infant’s emotions. In infant imitations, attunement occurs to ascending emotional expressions of the parent, but, when the emotional range of the parent was descending, the predominant emotional response of the infant was ascending. When the emotional expression of the parent was fluctuating, the predominant response of the infant was descending.

When the emotional range of both partners were “stable” and expressing mainly interest and pleasure, emotional matching was found to precede imitation in the form of reproduction of an action.

All these patterns of emotional regulation and quality, before and during the imitative episode, were the same in Crete and Scotland and they showed no differences related to the sex of either parents or infants.

The tendency toward emotional matching was apparent at each age-point, but the differences were not significant.

7.2. Discussion of the Findings

Many of the results of this thesis agree with the findings of other experimental or naturalistic studies, while others are inconsistent with these studies.

Vocal imitations predominated over non-speech sound imitations, which finding is consistent with Pawlby (1977) and Kugiumutzakis (1993), but the frequent facial imitations are not in accordance with Pawlby (1977). The finding that infants imitate vocal sounds as early as the 8th week of life confirms Maratos (1973) and Kugiumutzakis (1985, 1993), but not the negative results of Moran, Krupka, Tutton and Symons (1987). Eight-week-old infants imitated mouth opening and tongue protrusion as has been reported by many researchers (Maratos, 1973; Meltzoff and Moore, 1977, 1983a, 1992; Fontaine, 1984; Heimann and Schaller, 1985; Kugiumutzakis, 1985; Kaitz, Meschulach-Sarfaty, Auerbach and Eidelman, 1988; Heimann, Nelson and Schaller, 1989; Heimann, 1989; Meltzoff and Moore, 1989). Others have failed to observe this form of imitation (Jacobson, 1979; Jacobson and Kagan, 1979; McKenzie and Over 1983; Koepke, Hamm, Legerstee and Russell, 1983; Abravanel and Sigafos, 1984; Moran et al., 1987). The finding that 8 week-old infants do imitate blinking confirms Fontaine (1984), Kugiumutzakis (1985) and Moran et al.(1987), but it is not in accordance with Abravanel and Sigafos (1984). Eight-week-old infants imitated hand movements, including finger and arm movements, and this is consistent with Maratos (1973) and Meltzoff and Moore (1977), but not with other experimental studies (Jacobson, 1979; Jacobson and Kagan, 1979; Koepke et al.,1983; Abravanel and Sigafos, 1984). In agreement with Maratos (1973) and Meltzoff and Moore (1989), 8 week old infants imitated head movements.

Other experimental studies (Kuhl and Meltzoff, 1982; Kuhl and Meltzoff, 1984; Uzgiris, 1984; Legerstee, 1990) have found that the combination of facial and vocal imitations predominated over the other sub-categories of combined imitative expressive behaviours as early as the eighth week of life, and this was confirmed.

In vocal imitations, vowel-sound imitations were found to prevail, constituting 61.7% of the cases, vowel-consonant sound imitations constituted 19.6%, while consonant sound imitations constituted 18.7%. This hierarchy, as well as the corresponding percentages of the vowel and the vowel-consonant combinations, are very close to findings in Kugiumutzakis' naturalistic study (1993). Further, the predominance of vowel sounds over consonants is consistent with Pawlby (1977).

For facial imitations, the predominance of mouth opening imitations over tongue and lip protrusion of the present study, is in accordance with Pawlby (1977), as are the predominance of coughs, sighs and yawnings over sneezes, and the predominance of whimpers over yawnings in the non-speech sound imitation category. Yawnings were more often imitated than sighs in the present study, and this is not in accordance with Pawlby (1977).

The significant age main effect on various imitative expressive behaviours, including vocal, facial, head and hand movement imitations, agrees with a number of experimental studies (Maratos, 1973, 1982; Dunkeld, 1978; Jacobson, 1979; Fontaine, 1984; Kugiumutzakis, 1985; Field, Goldstein, Vega-Lahr and Porter, 1986; Papousek and Papousek, 1989), as well as with Kugiumutzakis' naturalistic study (1993), while the significant main effect of age on facial imitations is inconsistent with Meltzoff and Moore (1992). No reliable subtle comparisons can be made between the developmental curves of vocal, facial and hand movement imitations obtained here, and those derived from experimental studies, because the latter investigated only some of the sub-categories subsumed in the developmental curves of the present study.

The discussion of the significant age main effect will restrict comparison to the naturalistic study of Kugiumutzakis (1993), which was carried out in similar conditions and derived a developmental curve of vocal imitation for the same sub-categories of vowel, consonant and vowel-consonant sounds as the present study.

Age was found to have an effect on the development of vocal imitations which were stable during the 8th to the 10th week, increasing from the 10th to the 14th week, decreasing from the 14th to the 16th week, increasing again from the 16th to the

18th week, then decreasing from the 18th to the 24th week. While Kugiumutzakis also found an age-effect upon the number of vocal imitative episodes, the trend found in the present study is in partial accordance with the one found by him. The decreases in the number of vocal imitative exchanges between 14 and 16 weeks and again between 18 and 24 weeks are the same in both studies. Differences observed may be due to the following:

- 1) The time-interval used to define imitative responses in the two studies differ. An interval of 2-seconds was used as a criterion for vocal imitation by Kugiumutzakis (1993), while in the present study this time was set at 10 seconds.
- 2) Different statistical methods were used for the data analysis. While Kugiumutzakis (1993) found an age-effect using multivariate analysis of variance for repeated measurements, the present study employed Loglinear Models.
- 3) Different samples were used. In Kugiumutzakis' study, interactions of mothers with their infants were studied, and in the present study recordings of both mothers and fathers interacting with their infants were analysed. Inclusion of infant-father interactions in the study may have had an effect on vocal imitations at different ages.

The coding of similar types of head movements in Maratos' (1973) and in the present study permits a further reliable comparison, and the significant main effect of age on head movement imitation, showing a downward trend confirms that found by Maratos.

In the present study, no significant interaction effect was found of infants' and parents' sex on vocal imitation. This finding is in accordance with the findings of Kugiumutzakis (1993), but inconsistent with the hypotheses of Valentine (1930) and of Moss (1967).

Turn-takings were found to be more frequent than co-actions. This finding is consistent with the observations of Valentine (1930), Pawlby (1977), Trevarthen (1977) and Kugiumutzakis (1993). A predominance of turn-takings is also in partial agreement with the findings of Moran et al. (1987) and Papousek and Papousek (1989). Moran et al. (1987) assumed that “. . . infants were less likely to begin vocalising while their mothers were vocalising than when they were silent.” (ibid, p.484-487), but “. . . [mothers] were more likely to begin a particular facial

movement when their infant was engaged in that action than when the child was not.” (ibid, p. 487). In vocal imitations “. . . there was a strong tendency for mothers and infants not to vocalise simultaneously.” (ibid, p. 488). Papousek and Papousek (1989) found that “Turn taking between maternal and infant utterances occurred only occasionally at two months and increased with age.” (ibid, p. 143).

In imitative episodes, the activity was usually expressed just once by the model, but in some cases the expression was offered between 2-17 times before being imitated. The expressed activity was imitated just once in most cases, but it was occasionally imitated 2-12 times. These findings regarding repetition of expressions are very close to those reported by Kugiumutzakis (1993).

In the present study, mothers tended to imitate their infants more than vice versa. Thus, in simple turn-takings, the percentages were as follows: 538 cases (75%) were in the I-M direction (mother-imitated sequences) and 177 cases (25%) were in the M-I direction (infant-imitated sequences). These percentages agree with Pawlby (1977) and Kugiumutzakis (1993), but not with Papousek and Papousek (1989).

The non-significant age main effect on the simple turn-taking type of imitative exchange, when either the infant or the mother is imitating confirms a finding by Papousek and Papousek (1989), but is not in accordance with Uzgiris (1984) and Kugiumutzakis (1993).

The mean duration of both parental and infant imitations was less than 1 second, with a range of 0.05 to 8.64 seconds. The mean durations of model and imitation were very similar, a finding reported previously by Meltzoff and Moore (1992). These times are in accordance with those of Kugiumutzakis (1993), who reported that the range of durations for imitations was 0.1 to 8.3 seconds. Kugiumutzakis (1993) found that the mean duration of maternal vocal imitation was 0.61 seconds, a value very close to the mean duration of parental imitation of 0.70 seconds, found here. The two studies found rather different durations for infant imitations. In the present study, the mean duration of infant imitations for all expressive behaviours, was 0.83 seconds, while in Kugiumutzakis’ study the infant’s vocal imitations had a mean duration of 0.42 seconds. In Kugiumutzakis’ study, imitations of speech or non-speech sound were distinguished, a treatment that was

not done in the present study. This may have affected the recorded range of durations for the imitated responses.

Further, the mean duration of the pause in all imitations of infant and parent, was 1.12 seconds, with a range of 0.05 to 10 seconds. This does not agree with the duration of pauses derived in Kugiumutzakis' study. This appears to be due to the fact that, as mentioned above, the time-intervals used to define an imitation in the two studies differ.

In infant imitations the mean duration of pauses was 1.84 seconds while the mean pause length before parental imitations was 0.88 seconds. This finding is consistent with Papousek and Papousek (1989), who assume that the infant's latency for response may be considerably longer than that of the mother in vocal imitation. It is also consistent with Trevarthen (1977), who found that in protoconversations mothers imitated the infant's expressions with a lag of between 0.2 and 1.0 seconds. In addition, the finding on duration times of the present study, is not in accordance with Moran et al. (1987), who found that mothers imitated their infants with a pause of 1.0 to 2.0 seconds.

In the present study, none of the durations for the model or the pause, for imitation and for the total duration of an imitative episode that were subjected to repeated measures analysis was found to change, to any significant extent across the age range of 8 to 24 weeks. The finding seems to be in partial accordance with Kugiumutzakis' study (1993), who found no significant age trends in the duration of the model's vocalisations and in the inter-vocalisation pauses. However, while the durations of maternal vocal imitations showed no significant change with age of the infant, a significant age trend was found for the duration of the infant's vocal imitations. This difference in the 2 studies may be explained as follows:

a) While in both studies, data were transformed to a logarithmic scale, different statistical methods were used to analyse the findings. In Kugiumutzakis' study (1993) the analysis for repeated measurements could not be done because there were not enough infant-mother pairs with simple turn-taking sequences occurring at all twelve age points. Thus, the duration times were analysed by one-way analysis of

variance with respect to the twelve age groups. The results of the present study derived from repeated measurements analysis.

b) The maternal and infant imitations were segregated and then subjected to one-way analysis of variance in Kugiumutzakis' study (1993). In the present study, repeated measurements analysis was conducted on the combined durations of infant and parental imitations.

c) Kugiumutzakis' study (1993) restricted analysis to the durations of vocal imitations, while the present study included analysis of additional expressive behaviours.

7.3. Interpretation of the Findings

An attempt will be made to conceptualise the basic findings of this thesis within the framework of a theory of the universal innate intersubjective nature of imitation. In addition, in integration with a model of intersubjectivity, a proposal will be made for the foundations upon which a theory on infant-father interaction may be constructed. The conceptualisation will be based on the analysis and interpretation of the following general points:

7.3.1. Emotional Aspects of the Phenomenon of Imitation

As early as two months after the infant's birth, imitations by both infant and parent feature a significant element of emotional regulation, either in the form of emotional matching, or as emotional attunement. In emotional matching, the emotions of interest and pleasure predominate and emotional matching precedes the reproduction of an expressive action. All the patterns of emotional regulation and their quality were found to be the same across the two countries, and for infants and parents of both sexes.

Taking as a starting point the finding that emotional matching in universal forms precedes imitation, it may be proposed that this is evidence that emotions are expressions of motives specifically adapted for interpersonal communication. On the basis of this assumption, the findings seem to be compatible with the theory of innate intersubjectivity (Trevvarthen, 1993b, 1993c; Trevvarthen, Kokkinaki and Fiamenghi,

1998), and the perspective which considers imitation to be intersubjective in nature (Kugiumutzakis, 1993, 1994, 1998b).

According to Trevarthen, human intelligence and consciousness is adapted to achieve cultural learning. It is proposed that, in the regulation of intentional activities, experiences become organised within motor and sensory regions of the central nervous system, through activity in a system of prefunctionally adapted motives mediated by an Intrinsic Motive Formation (IMF) of the core of the brain. Further, it is hypothesised that the IMF is both prefunctional and functional, its emergence being traced back in the regulation of morphogenesis in the embryo and its development continues after birth generating motives that regulate human interaction and learning.

The spontaneous processes of motives act at two reciprocally integrated levels, the motor and the perceptual. In brief, the first level is manifested in the conceived form of purposeful activities, while the function of the second level is to provide intermediated guidance of efficient and effective coordinated movements in adjustment to external goals. An explanation for "imitation of motives" is proposed on the foundation of this model of conscious and purposeful action.

In interpersonal communication, expressions of endogenous motives constitute "symptoms of the inner psychological activity" in each partner. These features are assumed to be coded and to take recognizable form as emotions. The innately organised and universal emotional field, constitutes a range of contrasting "intrinsically-generated" regulatory states, expressed in both perceptual and behavioural vitality, aiming the subject's awareness and maintaining the cohesion of coordinated activity, which can signal communication to and from the Interpersonal Other. The chains of emotional changes in communication are called "emotional transients", which, being expressive of dynamic motivating processes, serve as expressive forms between the mentally-active subjects. The organization of these emotional shifts in time generates "emotional narratives".

Within the interpersonal context of imitation, which constitutes the most "dramatic" connection between endogenous motives and intentionality, motives as the source of intentions, enable intentions to pass from one person to the other, --

they must be, “. . . reciprocated or ‘reflected back’, for sympathetic mimesis to begin.”. In short, endogenous motives are interwoven with “. . . narratives of sympathetic intentionality charged with emotions.” (for a full account of Trevarthen’s theory see Chapter 3).

Kugiumutzakis (1993) suggested that before and after the presentation of the facial models, and before the first correct infant imitative expression,

“the infant could detect the experimenter’s emotion(s), lying behind the kinematic surface of the modelled movements and sounds” (Kugiumutzakis, 1994, p. 18).

He proposed that “an ever-present prior element” of imitation and cognition, is the sharing of the transient emotions. Further, Kugiumutzakis (1998b) proposed that the prevailing emotions felt by the infant before, during and after the intersubjective imitative game, and which motivate it, are those of interest and pleasure. It is claimed that the emotion of pleasure is evoked “. . . by the potential sharing in the occurrence of a desired encounter”. The emotion of interest is evoked by “. . . the recognition of the modelled movements and sounds as *incomplete, imitable, known* tools of communication and as novel and changing stimuli . . .” (Kugiumutzakis, 1998b, in press).

It seems that the findings of this study are fully compatible with these theoretical frameworks, in respect of the following strongly interrelated points:

1) Emotional matching was found to precede imitation of expressive behaviours. This finding proves and extends two of the integrated substantial points upon which Trevarthen’s theory is founded, that is, motives are coded and take form as emotions. Further, the proposal that motives “must be . . . reciprocated or ‘reflected back’, for sympathetic mimesis to begin.” is supported. In addition, support is provided for Kugiumutzakis’ assumptions that: a) infants are able to detect the emotions experienced by the experimenter, before infant makes the first correct imitative behavioural expression; and b) “an ever-present prior element” of imitation and cognition, is the sharing of the transient emotions.

2) Imitation is accompanied by emotional matching. This with point (1) above, confirms the conclusion that what takes place is “imitation of motives”, in both the introduction to an imitative episode and in the actual imitation of actions. This

finding also supports the notion that interpersonal emotions promote motivation matching, and the regulation of communication with the Interpersonal Other.

3) In addition to emotional matching, imitation was found to be associated with emotional “attunement”. Apparently what takes place, in addition to “imitation of motives” and actions, is imitation of the transient emotional shifts, which are underlied by motivating processes. This seems to be in accordance with the assumption that motives are “. . . woven into narratives of sympathetic intentionality charged with emotions.” (Trevarthen et al., 1998, in press). Daniel Stern conveys exactly the same concept with his term “dynamic emotional envelopes” (Stern 1985, 1993).

On the basis of this finding, we may postulate an understanding of the way emotional narratives are organised and regulated between parent and infant. While parents were found to subtly attune their emotional narratives to those of their infants, in infant imitations the pattern of attunement was different. In cases of ascending parental emotional range, infants were found to attune in a sympathetic way. In cases of descending parental emotional range, however, the infant’s response was generally ascending in emotion. This pattern may be explained by the fact that the infant does not want to adapt to the descending pattern, which may lead to disruption of interpersonal communication, and he or she rather makes efforts to regulate the partner’s emotional range, in an upward direction. Further support for this is provided by the finding that before imitation begins, infants, by expressing pleasure, are able, through imitation, to regulate the parental emotional state of interest and transform it so that imitation is accompanied by matching emotional states of pleasure for both partners. These infant regulating patterns signify both self-awareness and other-awareness, as well as awareness of purposeful sharing of states of mind.

Another pattern of attunement emerges when the emotional range of the parent is fluctuating. In this case, the corresponding emotional range of the infant is descending and then fluctuating. This may be explained by the fact that sudden jumps of parental emotional states, which make communication unpredictable, are regulated by infants in the following way: The emotional dynamics of the infant

indicate a downward trend, with the effect of leading the partner's emotional narratives in the same direction, and thus promoting disengagement of the interpersonal communication. Such disengagement is essential for keeping the infant's balance of self-regulation. It has to be noted that it has not been determined whether the last shift of the fluctuating emotional range of the parent is in a downward direction, to which the infant is matching.

4) Before the sixth month of infant's life, the emotions of interest and pleasure were found to predominate in emotional matching, both before and during imitation by infant or parent. This seems to be compatible with the speculation that, "Imitation is evidently a special case of intersubjectivity mirroring . . ." (Trevarthen, 1979, p.333). In a wider perspective, innate intersubjectivity is assumed to be a central motivator and regulator for human mental growth. According to Trevarthen, intersubjectivity endows infants with the ability to regulate personal relations, through showing distinctive expressive actions, entailing cooperation in both awareness and purpose. The evidence for innate intersubjectivity lies in the observations that behaviours of human infants are intentional, conscious and personal.

Further, the finding that infants find imitative exchanges interesting and pleasurable, confirms Kugiumutzakis proposition (1998b) that the prevailing emotions felt by the infant before, during and after the intersubjective imitative game and which motivate it, are those of interest and pleasure.

5) The phenomenon of imitation and its emotional aspects were found to occur in the same way in Crete and Scotland and for both sexes of parents and infants. This finding, in integration with the first four points, supports and extends our understanding of human communication and promises additional possibilities to assess the universality of the emotional language, of the phenomenon of intersubjective imitation and its emotional aspects. In a wider perspective, the uniformity of the emotional aspects of imitation across the two communities with their different histories and cultures provides further support for the universal nature of innate intersubjectivity, as central motivator and regulator for human mental growth and interpersonal communication, cooperative intentions and joint patterns of awareness (Trevarthen, 1979, 1998).

Further support for theory of an innate, universal, communicative and emotional function of imitation in general, but for the emotional affordances of the “special case” of combined vocal and facial mimesis, comes from the evolutionary hypothesis of Merlin Donald (1991). We recall that in parent-infant interactions combinations of vocal and facial expressions predominated (see Figure 6.5, p. 224). In his attempt to conceptualise the origins of the modern mind, and evolutionary stages in the development of culture and cognition, Donald (1991) introduces the notion of “mimetic culture” and a “mimetic mind”, conceived as an advanced cognitive layer, embedded within the modern human mind, forming “. . . the most basic medium of human communication.” (Donald, 1991, p. 188).

The basic elements of intelligence for mimetic culture may be summarised as follows: An innate and universal capacity for mimesis, is supported by abilities for analysis of one’s own motor actions. Recreation of experience by recombining of components behaviours, is supported by a potential for communication, appreciative of the emotional affordances of mimetic expressive subsystems. Emphasis upon the modalities of mimetic expression is combined with supramodal integration across mimetic modalities, with interest in “perceptual resemblance” and the exclusion of reinforcers or contingencies for reproduction of actions.

Of special interest are Donald’s assumptions about the modalities involved in mimetic acts, their emotional quality and their integration. It is claimed that the first mimetic expressions required the integrated use of modalities, coupling a variety of expressive subsystems at a supramodal level, through tracking in time and creation of rhythm. Further, he characterises combinations of vocal and facial mimesis as constituting “special cases”. He observes that,

“. . . facial and vocal mimesis combine in the expression of emotion. The combination of facial and vocal emotional expression might have played a paramount role in mimetic culture, as it still does in modern society. . . Facial expression, often combined with vocalization, is a medium of emotional communication and also of subtle, intimate expressions of feeling.” (Donald, 1991, p. 180).

In a wider sense, Donald assumes that,

“The controlled use of emotional expression is an integral part of mimetic behaviour, even in today’s society. (p. 180) . . . expanded hominid control over emotional expression probably evolved . . . as part of the overall adaptation that established mimetic culture.” (Donald, 1991, p. 185).

Although Donald clearly specifies the prefunctionally adapted fundamental template for the social structures of interpersonal communication, it seems that the significant element of intersubjective integration is missing from his account.

The findings of the present study concerning the emotional aspects of imitation, support and extend Stern's theory of affect attunement (Stern, 1985, for an account of Stern's theory see Chapter 3).

However, the evidence for reciprocal emotionally attuned imitation between infants and their parents before the sixth month of life is not compatible with Stern's assumption that infant imitation is absent in the first nine months. Stern defines affect attunement as a form of communication that excludes imitation, by definition and considers only maternal affect attunement in imitation of the feeling behind infant's actions, from the stage of the sense of the "subjective self". As a matter of fact, Stern's assumptions about the age of appearance of affect attunement in infants and the relation of it to imitation, as well as attribution of both imitation and affect attunement to infants before the seventh month, have all emerged as findings from the work of Stern himself (Kugiumutzakis, 1998c).

Criticism on Stern's theory has been already presented in Chapter 3. A further ambiguity related to the patterning of affect attunement behaviour has to be mentioned. Vitality affects, that is, a category of feeling quality involving the "...dynamic micro-momentary shifts in intensity over time..." (Stern, Hoffer, Haft and Dore, 1985), is proposed as one of the processes involved in forming the "sense of an emergent self" separate from the "other" (Stern, 1985). This assumption seems to be compatible with the suggestion that the infant's mechanisms for evaluating the graded aspects of emotion, that is, the varying intensity within an affect category, is "prewired" rather than learned (Stern, Barnett and Spieker, 1983). What seems incompatible is Stern's suggestion that after the sense of the "emergent self", in the sense of the "core self", features of coherence of motion, temporal structure and intensity structure in expression, specify the self-coherence (Stern, 1985). Stern appear to propose the prefunctional existence of a structure or mechanism for the evaluation of the affect category intensity that constitutes the basis for affect

attunement, while the template for this structure specifying motion, time and intensity coherence, is absent until the sense of the core self I is acquired.

7.3.2. Durations of Imitative Expressive Behaviours

The findings on the timing of behaviours that emerged from the two different kinds of analysis will be discussed and conceptualised in an integrated way with the aid of the summary presented in Table 7.1:

| | Mean (seconds) | S.E of mean | S.D. | Minimum | Maximum |
|-------------------------|-------------------|-------------|------|---------|---------|
| All Imitations | | | | | |
| Model | 0.73 | 0.03 | 0.86 | 0.05 | 9.68 |
| Pause | 1.12 | 0.06 | 1.62 | 0.05 | 10.00 |
| Imitation | 0.74 | 0.03 | 0.79 | 0.05 | 8.64 |
| Total duration | 2.76 | 0.09 | 2.56 | 0.32 | 23.48 |
| Infant Imitation | | | | | |
| Model | 0.88 | 0.08 | 1.20 | 0.08 | 9.68 |
| Pause | 1.84 | 0.13 | 1.95 | 0.02 | 10.00 |
| Imitation | 0.83 | 0.07 | 1.04 | 0.03 | 8.64 |
| Total duration | 3.71 | 0.22 | 3.21 | 0.32 | 23.48 |
| Parent Imitation | | | | | |
| Model | 0.67 | 0.03 | 0.70 | 0.05 | 7.24 |
| Pause | 0.88 | 0.06 | 1.40 | 0.05 | 9.92 |
| Imitation | 0.70 | 0.03 | 0.68 | 0.04 | 8.12 |
| Total duration | 2.43 | 0.09 | 2.20 | 0.41 | 17.40 |

Table 7.1: Means of Durations of Components of Imitative Exchanges: Model, Pause, Imitation and Total Duration of the Imitative Episode.

It was found that the durations of the model, the pause and the total episode of imitation are not affected by the infant's age, across the range of 8 to 24 weeks. Furthermore, none of the measurements of these durations was found to differ across the infants' sex or between the two countries, and, no significant interaction-effect was found between the infant's sex or the two countries, on any of these measurements.

These findings seem both to be compatible with the theoretical framework of Lynch for prelinguistic phrasing of infants' spontaneous vocalisations (Lynch, 1996; Lynch, Oller, Steffens and Buder, 1995) and Pöppel's theory of a temporal mechanism of perception (Pöppel, 1994).

Lynch's theoretical framework to explain prelinguistic timing of infant vocalisations assumes that fundamental tendencies for grouping serial events are a universal tendency of human communication, to exhibit "phrasing". It has been assumed that a universal standard of prelinguistic phrasing provides "communicative frames of bi-directional transaction that are components of social intuition" (Lynch, 1996, p. 18). Early human vocalisations are featured by the presence of a rhythmic hierarchy of grouping units, suggesting that, either at birth or very early in life, infants acquire the groundwork for the grouping of units seen in adult speech. The proposed hierarchy of grouping units of prelinguistic phrasing consists of the following periodicities: syllables (0.29-0.45 seconds), utterances (0.46-0.82 seconds) and phrases (3.04-4.36 seconds). The features that characterise the structural cohesiveness of prelinguistic phrases are: a) final-lengthening; b) syllable compression of hierarchical embeddedness; and c) relations of rhythmic unit durations and the durations of subsequent silences. In respect of the second and the third feature, within prelinguistic phrases, syllable durations and durations of silence are similar. The same pattern applies to utterances embedded within prelinguistic phrases in relation to non-phrased utterances (in the first case utterance durations appear to be slightly shorter than inter-utterance silences), while prelinguistic phrase durations are assumed to be considerably shorter than the inter-phrase silences. Further, the prelinguistic phrases are featured by stable durations across development that are similar to those of some cross-culturally optimal rhythmic units from other domains, such as poetry and music.

Within this framework, the assumption that prelinguistic imitative exchanges consist of phrased utterance units, that is, rhythmic units embedded within higher-order units, thus manifesting the features of prelinguistic phrasing, is supported by the following observations:

a) As may be noted from Table 7.1, the durations of the model and the imitation, for all imitations together and for imitations of infant and parent separately, fall within the limits of Lynch's utterance unit (0.46 to 0.82 seconds). These two significant durations of the imitative exchange fit, to a reliable extent, those of the phrased-utterances.

b) Pauses between the model and the imitation are longer than the duration of the model or the imitation, in all cases. This kind of relation fits with the second and the third features that describe the structural cohesiveness of prelinguistic phrasing. This evidence may be considered to be incomplete, since no comparisons were conducted between non-phrased and phrased utterances.

c) The finding of the present study that the model, the pause, the imitation and the total durations are not affected by the factor of time, across the age range of 8 to 24 weeks, fits with Lynch's proposal that the durations of prelinguistic phrases remain stable across development.

d) The non-significant interaction-effect of time and the country of the subjects on any of the durations fits with the general proposal concerning the universality of the hierarchy of units of phrasing. Further support is provided by the durations of the model, the pause, and the imitation within each country separately (Table 6.30), which fit within the expected duration of the utterance unit. In addition, in both Crete and Scotland the pause between model and imitation is longer than the durations of the model and the imitation, a relationship that is, again, in agreement with the proposal of a universal structural cohesiveness of prelinguistic phrasing.

e) The total durations of imitative exchanges suggest that the phenomenon of imitation *per se* obey the principle of phrasing on the basis of the following points:

1) Universality: The non-significant interaction-effect between the infants' age and the country, on total durations of imitative episodes fits with the notion that phrasing is a universal characteristic of human communication. Further support is provided by the data on the durations for Crete and Scotland separately (Table 6.30), which fit into the hypothesised phrase. In addition, when parental and infant imitations are considered separately (Table 7.1), the total duration of parental imitations (2.43 seconds) is similar to the minimum phrase duration, while the total duration of infant

imitations (3.71 seconds) fits perfectly with the mean phrase duration (3.7 seconds) found by Lynch and colleagues.

2) Stability across Development: Total durations were found to be stable across development (Table 6.31), and this is in agreement with Lynch's findings for infant vocalisations.

3) Embedded Rhythmic Units: On the basis of point (a) above, an imitative exchange is made up of utterance units.

4) Structural Cohesiveness: On the basis of the point (b) above, the rhythmic hierarchy of imitative exchange fits the two of the three features of structural cohesiveness of prelinguistic phrasing, that is, the durations of phrased-embedded utterance units, and the correspondence between the durations of spoken units and silences.

Thus, points (a), (b), (c), (d), and (e) permit the assumption that prelinguistic imitative exchanges consist of phrased utterance units, that is rhythmic units embedded within higher-order units. This is supported by the universality and stability across development of the structure of both the imitative exchange and the constituent units, in addition to structural cohesiveness and embedded rhythmic units in the imitative exchange.

The present study was not restricted to an investigation of vocal imitations. Thus, the conclusions may be extended to give support for the proposal that imitation behaviour conforms to the phrasing features predicted by Pöppel's theory on the temporal mechanisms in perception. Pöppel (1994) proposes that primary consciousness is based on neuronal programs implementing perceptions, memory, evaluation and actions. A common temporal mechanism, based on excitability cycles, may be used for the binding of the above domains (perception, memory, evaluation, action). Primary consciousness is assumed to be embedded on two hierarchically related levels of temporal mechanism: the system states, with a duration of approximately 30 msec, and the "presemantic temporal integration" of 3 seconds, that provides an operational window for primary consciousness.

Thus, on the basis of the duration of 3 seconds, or less, that emerged for the whole imitative exchange, it may be suggested that imitation gives evidence, not only of

phrasing as a universal feature of human communication, but of dynamic events in perception and action or, in a wider sense, phrases of cognitive and motoric processes.

7.3.3. Developmental Changes in Imitative Expressive Behaviours

Among the findings that emerged from the present study is the fact that when the developmental curves of each imitative expressive behaviour is considered separately, or when the development of all forms of imitation together is followed, then a pattern of instability may be inferred.

In a more specific perspective, in line with Trad's and Trevarthen's theoretical frameworks, the developmental changes in imitation provoke interesting speculations. In Trad's theory, a central position is attributed to the notion of "previewing", an inherent phenomenon in the dynamic dyadic process, which constitutes a principle for motivating communication, propelling development toward the cumulative acquisition of adaptive skills, on the part of both the caregiver and the child. Positive emotionality, emerging from the infant's exposure to new experiences, is claimed to be a feature of previewing. Imitative behaviour is claimed to reveal the occurrence of internal integration in the infant. In addition, imitation may signify a way through which the infants achieve verification of his prediction, regarding the caregiver's subsequent manifestation. Infant development entails the gradual decrease in pure imitative responses, which in turn leads, through the creation of a genuine interactional dialogue, to either a varied or a modified new kind of response that emerges from the original imitative sequences. This shift in the pattern of imitative variation is assumed to give the infant both increasing control and more discrete manipulation of internal representations, in order to elicit a predictable response from the caregiver. Trad (1990) suggests that the father's role is as significant as that of the mother in promoting adaptive development through previewing.

In parallel, in Trevarthen's theoretical framework, on the basis of neurological and psychobiological evidence, it is hypothesised that both the cognitive and the intersubjective functions are affected by a ". . . systematic phasic elaboration

of intrinsic motivating process in development . . .” (Aitken and Trevarthen, 1998, in press). In special reference to imitation as an intersubjective regulatory function, Trevarthen claims that the age-related developments in infant motives give rise to changes in the imitative messages. Emphasis is paid on the internally generated changes in motivation for cooperative action and intersubjective play (Trevarthen et al., 1998).

Kugiumutzakis (1993, 1994) proposed that the increasing or non-linear developmental course of certain imitative expressive behaviours, and the linear decrease of other imitative expressive behaviours, shows that the infant’s ability to imitate never disappears in the course of the first six months. The writer adopts this view, but concludes that attributing these developmental ups and downs to, “...periodic reorganizations in the infant’s motivational system.” (Kugiumutzakis, 1994, p. 18), does not provide an adequate explanation, if one considers early imitation as an intersubjective phenomenon.

In extending and complementing Trevarthen’s, Kugiumutzakis’ and Trad’s considerations, the writer is of the opinion that the instability in the developmental curves of imitative expressive behaviours cannot be attributed exclusively either to unidirectional intrinsically generated motivational changes or to maturational-developmental processes in infants. Emphasis has to be given to the bidirectionally changing motivational states of both interactants, infant and parent. The motivational changes that may occur in infants give rise to either corresponding internally generated motivational changes in parents, or to changes in the parent’s perception of the moods and interests of infants. It may be that patterns are far more complicated when, in extending Trevarthen’s theory (1982), the constant competitive interaction between processes of cognition, perception and emergent individual action, on one hand, and the powerful psychological mechanisms for social cooperation, on the other hand, are taken into account, for each interacting partner. When cerebral and anatomical changes in the infants are taken into account, the dyadic propelling of development by the interaction of motivational changes in both infants and parents, or of infant’s motivational changes and parent’s perceptions of these changes, will inevitably lead to non-linear transitional periods in infancy, which, in a wide

perspective, will serve to direct the development of human consciousness and intelligence.

Special emphasis has to be given to the fact that the present thesis does not appear to support those models that consider the father's role in early infancy to be essentially remote, either because fathers lack mothering ability or because they lack of familiarisation with infants or sensitivity to their needs. The results seem rather to strongly suggest that fathers do contribute, in a dynamic but intuitively sensitive way, to the regulation of imitative communication with their infants that is truly intersubjective.

Within this frame of reference, the remarkable instability of the period between 16 and 20 weeks, is not at all random but rather a necessarily preliminary, introductory, or preparatory phase before the transition to the "games" epoch starting at 20 weeks (Trevvarthen, 1980). The evidence that motivations of the "epoch of games" differ from those of the previous period comes from Trevvarthen's longitudinal studies. In his view, in the initial period of innate "primary intersubjectivity" the motivation is assumed to be focused on immediate regulation of communication itself, while later, in the epoch of games, motivation manifested through rituals in play, teasing games, baby songs and action games, is correlated with a more intense playful reaction to a partners attempts to obtain communication. It seems that the direct and intimate dynamic interpersonal communication and engagement of the primary period comes to change in form and quality, in response to changes in motivation. The epoch of games is featured by a wider range and vigour interaction, a change that seems to explain the corresponding increase in imitations of head, hand movements and of combinations of all kinds of expressive behaviour.

In contrast to those imitations of expressive behaviours for which non-linear developmental curves were evidenced, non-speech sound imitations did not change significantly between 8 and 24 weeks. It may be that low frequency of infant imitations of non-speech sounds explains this non-significant age effect. In special reference to imitation of yawning, Kugiumutzakis' explanation (1992) appears valid. He characterises imitation of yawning as featuring a ". . . rigid and stereotypic form,

the appearance of it being automatic . . . a case of fixed type of movement.” and suggests,

“In this case consideration of the three ethological concepts of sign-stimuli, fixed action pattern, innate releasing mechanism, in combination with the neonatal ability to recognise the isomorphism of parts of the body of two people, the neonate and the experimenter, may offer a satisfactory interpretation for the release of yawning...it may be taken to be a case of contagion phenomena, conceived as an ancient and primitive form of imitation, in which no cognitive processes are involved, and which is overtly different from the polymorphic, non-stereotypic neonatal vocal reactions of mouth opening, tongue protrusion, and even more different from vocal imitations.” (translated from Kugiumutzakis, 1992, p. 132).

On the basis of the fact that imitation of yawning has been observed in animals (McFarland, 1981, cited by Kugiumutzakis, 1992), it may be concluded that this kind of imitative exchange has an ancient phylogenetic origin, and that it is different both in form and function from imitation of other expressive behaviours in interpersonal interaction.

According to the writer’s perspective it would not be appropriate to extend the explanation provided for the yawning imitations to all kinds of non-speech sound (such as raspberries, kissing sounds, tongue playing sounds), which are evidently intentional and well-controlled. It may be that these types of imitation are more situational-dependent than developmental-stage-dependent, in that they meet the playful needs of momentary infant-parent interactions. They may be inventions peculiar to a particular partnership between familiar playmates [See Trevarthen (1990) in “protosigns” of older infants who are much more likely to imitate such peculiar behaviours].

7.3.4. Forms of Imitative Exchange

The present study shows that turn-taking imitative exchanges predominated over the co-action type, irrespectively of the country or the sex of the parent. The conversational character of adult-infant interaction, and its inherent reciprocity, has been demonstrated in a number of studies. These studies may be summarised as follows:

- a) One kind of model views the dyadic system as an interchange of emotional messages between the partners, such that one partner achieves his own goals in

contingency with those of the partner (Tronick, Cohn and Shea, 1986). The infant appreciates the form of maternal turn-yielding signals, and rather than regulating the interaction takes his turn in contingency with them (Mayer and Tronick, 1985).

b) The second model, assuming rule learning, both for the mother and for the infant, views the conversational structure as an interdependency of rhythms which is taken to be at the root of attachment and communication (Brazelton, Koslowski and Main, 1974). The infant learns how to interact, and the amount of stimulation from the outside world determines the infant's regulation of his internal state of arousal.

c) A third model also views turn-taking as the result of learning, but gives less attention to "state control". The human mother is assumed to be able to predict the temporal structure of the infant's behaviour in a way that creates a conversational structure of the interaction, which is accounted for by the mother purposely fitting her behaviour to the rhythm of the infant's stream of behaviour (Kaye, 1977). The simultaneous and the alternating kind of dialogue, created by the mother, is assumed to provide for ". . . joint engagement in a task and the opportunity for mutual imitation . . ." (Kaye, 1977, p. 113).

d) On the basis of a hypothesis of mutual accommodation, the fourth model assumes that the partners' main goal is the maintenance of an optimal level of excitement rather than responding and eliciting specific behavioural forms (Fogel, 1977). Subsequently Fogel called this "co-regulation" (Fogel and Thelen, 1987).

e) In another model, the protoconversational structure is assumed to involve,

" . . . mutual influences between mother and infant to match (in reciprocal or compensatory fashion) the durations of each other's vocal and kinetic behaviours. . . this matching of interpersonal timing provides one way for both partners to enter into each other's temporal world and feeling state." (Beebe, Jaffe, Feldstein, Mays and Alson, 1985, p. 244).

In special reference to co-action, Beebe (1982), suggests that,

" . . . coaction is a basic aspect of mother-infant temporal integration relatively independent of the quality of affective arousal, whether positive or negative . . . [it is] an index of the intensity of affective arousal, regardless of quality." (ibid, p. 194).

f) Stern (1974) proposed that the regulation of the infant's arousal and affect by the partner's interpersonal behaviour, provides the infant the experience necessary to

learn to initiate, maintain and disengage interactive contact, with reference to the effect of the mother's behaviour on him.

None of these approaches can provide an adequate explanation for the turn-taking nature of imitation seen in the present study, and in others, too. The following problems may be identified: a) The evident emotional motivational aspects of imitation, and the structural cohesiveness of imitative phrasing, implying that this behaviour is regulated by coherent motives, provides proof that infants possess an intrinsically-generated, adaptive and prefunctional endowment for psychological activity in intersubjective communication and regulation of interaction.

b) The maternal and paternal sensitivity shown by the subtle emotional and temporal regulation in their imitations, cannot be explained in the frame of learning, familiarisation or imitation of maternal behaviours by fathers. With no intention to underestimate the fundamental role of parameters of timing in communication with infants, it is felt that timing features of infant-parent regulation can only be adequately interpreted on the basis of further considerations to recognise the adaptive mechanisms infants possess for communication.

According to Trevarthen (1993c), the regulation of emotional expressions in infant-mother interaction is organised as a "coherent dual performance", in which the periodic creation of utterance or utterance-like messages that alternate between the mother and the infant and vice versa, generates exchanges of a peculiar kind, which were labelled "protoconversations" by Bateson (1979). With reference to imitation, it may be assumed that the precision of timing in imitative intersubjective encounters with infants reveals regularity of motive states in the brain in three fundamental dimensions of embryogenic origin: morphology (structure), intensity (energy) and timing (process). Trevarthen concluded that the alternating expressions and predictable timing features of an infant-adult imitative exchange,

"... indicates that they share a rhythmic 'time-base' for expression, and perhaps that they have matching **cycles of motivation** leading to regular sequences of active expression (**assertion**) and attentive reception (**apprehension**), or of 'intention' and 'attention'..." (Trevarthen et al., 1998, in press).

In particular, it is further assumed that the turn-taking type of exchange seems to evidence the intrinsically generated underlying oscillation of motives, at certain predictable intervals, between an active state of "assertive" effort, and a receptive state of "apprehension" that favours reception and information processing. Thus, within these phrases of motivation, it is proposed that imitation will,

"... occur at one place in alternation, when assertiveness of one subject is waning, and the other is still highly apprehensive or acceptive." (Trevarthen et al., 1998, in press).

It has to be noted that this kind of alternating motive oscillation needs further evidence, through application of an elaborate coding system capable of distinguishing subtle gradations of intensity within each partner's emotional state and their corresponding emotional ranges and dynamic transformations.

Kugiumutzakis (1993) has examined the intersubjective nature of infant and maternal vocal imitative exchanges with attention to: a) their matching temporal patterns; b) their similar turn-taking structure; and c) the matching pattern of developmental change. As his findings indicated that, "... turn taking is the rule for vocal imitation . . ." (Kugiumutzakis, 1993, p. 38), and he claimed that an "...interpersonal sense of communicative sharing..." (ibid, p. 39) is the most basic function of early vocal imitation taking place in mother-infant interaction.

In this study, a significant effect of country on the type of imitative exchange showed that in Crete there are higher probabilities for turn-takings to occur than in Scotland, where co-actions are more common. Hypothetically speaking, on the basis of the cultural stereotype that Latins are more temperamental and verbal while British are often characterised as being consciously more serious and responsible (Babad and Wallbott, 1986), we would expect the reverse. That is, it would be expected that due to their impatience imposed by their temperamental Mediterranean nature, interactions within Greeks should be featured by more interruptive co-actions than turn-takings. Further evidence is provided by the finding that the pause in turn-taking imitative exchanges, in Crete, is shorter than the pause in Scotland. The apparent cultural difference in the type of imitative exchange may be explained as follows: Babad and Wallbott (1986) have proposed that British, or Northern Europeans generally, may be more achievement-oriented than socially-oriented,

while, on the contrary, Southern Europeans give value to strong family ties, and this may cause them to give less attention to work while social relationships are focused on to a substantial extent. Cretan and Scottish parents may be seeking a different kind of intersubjective play, projecting adult habits of conversation.

It is the writer's opinion that the contribution of co-active imitations in intersubjective emotional regulation has not been understood. Trevarthen claims that the alternating assertive-apprehensive states may be a central regulatory feature of intra-subject expressions, and that expressions can regulate either alternation or synchronization of these phases. The writer proposes that co-active imitative exchange may express coincident intersubjective attunement in the following way: While the emotional narrative of one partner (the model) is unfolding, in an active-assertive state, the motivational state of the partner (the imitator), who has been in the apprehensive state, attunes in the same direction, achieving the same intensity as that of the model, and thus shares and complements this organization by an overt and "dramatic" manifestation of purpose and awareness.

7.3.5. Direction of the Imitative Exchange

We have found that, in interactions with their infants, mothers imitate their infants more than vice versa, irrespective of the type of imitative exchange. Fathers were found to imitate more than their infants, in simple turns and co-actions. In multiple turns, however, fathers and infants have equal probabilities of imitating.

The writer wishes to make three points concerning the origin of motives for imitation:

- a) Infants actively regulate their participation in interaction with their parents. They show emotional attunement and match the motivation responsible for reproduction of expressive behaviours. There is, therefore, no justification for describing parent-infant communication as one-sided.
- b) Even if there were no evidence that infants are capable of emotional regulation in imitative exchanges, it is clearly proven that infants, both boys and girls, have the ability to communicate and this is overtly manifested.

c) Interactions of both mothers or fathers with their infants exhibit a spontaneous intuitive sensitivity, beyond anything acquired by learning or imitation. There is no evidence that fathers need to imitate mothers' behaviours. Obviously infant and parent are not equally mature physically or at the cognitive level, but there is good evidence that at the level of emotional language they are equally endowed (Trevarthen, 1993b; Trevarthen et al., 1998).

Maternal imitations may predominate over infant imitations, but the infant can express sympathetic communicative feelings in other ways as Trevarthen (1993b) has explained in his account of protoconversation,

“... communication is sympathetic in tone or feeling, rather than imitative in form, and most responses are complementary translations of the partners expressions, creating a negotiation of feelings by a sequence of different signals.” (Trevarthen, 1993b, p. 139).

Later, in 1998, Trevarthen's speculation, in regard to the same matter has been more clear,

“... imitation clearly serves a between-subjects communicative function, in association with many other sympathetic reactions of a non-imitative kind such as smiles, hand gestures and various vocal expressions of feelings.” (Trevarthen et al., 1998, in press).

In conclusion, it is claimed that while imitation undoubtedly serves an intersubjective function, there are many other kinds of complementary communicative expression taking place in interaction. Thus, “asymmetric” participation by the infant in imitations does not mean that the infant is not endowed with a constellation of mechanisms for intersubjective communication. Human communication is regulated by an integrated system of equivalent expressions, and conclusions regarding the motivation for interpersonal contact cannot be made on the basis of a single form of behaviour, excluding others.

Further argument concerning the symmetry of motives in infant-parent communication supporting the conclusion that the infant has an endowment for intersubjective contact comes from the following points:

a) Analysis of the effect of the infant's age on the type of imitative exchange showed that turn-taking imitations, the most lively or “dramatic” form of interaction between infants and their mothers and fathers, does not change in the first 6 months. This

indicates that the constellation of mechanisms responsible for the communicative ability is adapted prefunctionally and does not “emerge” as a product of learning.

b) In multiple turn-takings, fathers and infants were found to have equal chances to imitate each other. This finding proves that symmetric intersubjective communication is possible in infant-parent imitation games. If the infant exhibits rudimentary forms of communicative intention, in this kind of imitative exchange, it is unlikely that such an ability will disappear for a different type of exchange.

Kugiumutzakis (1993) in his consideration of the intersubjective nature of imitation, attributed the predominance of maternal imitations over infant imitations to the mothers’ desire to convert simple turn-takings of vocalisations into multiple turn-takings, thus prolonging communication with their infants. This explanation cannot be applied for the occurrence of multiple turn-takings in infant-father interactions, unless one accepts that infants and fathers are equally desirous of prolonging their play together.

Taken as a whole, the evidence suggests that the motivational regulation of communication between infants and other persons allows behavioural reproduction, symmetry and even predominance of the infants’ initiation of emotional matching or attunement.

7.3.6. Kinds of Imitative Expressive Behaviour: Cultural Differences and Similarities

The cultural differences that emerged from the findings of this thesis affect the proportions of the imitative expressive behaviours. In Crete, vocal and non-speech sound imitations are more common than in Scotland, where non-vocal imitations, that is, facial expressions and head movement imitations are more likely to occur than in Crete. These results seem to confirm the stereotype that Latins are more temperamental and verbal while British are often characterised as being extremely serious and responsible (Babad and Wallbott, 1986). Stronger family ties and a focus on social relationships in Southern Europeans may cause less attention to work and achievement than is usual among Northern Europeans. This national stereotyping was not confirmed by the results of a study that compared the social expression of emotions in adult-adult interaction across several countries. Higher

levels of verbalisation of emotion were reported by Swiss, British and Italian subjects and the lowest levels by the French and the Belgian subjects (Babad and Wallbott, 1986). But the patterns of adult-adult interaction are different from those recorded in adult-infant interaction in many aspects, especially in speech. In addition, the above results come from self-reports of the respondents, which may be not so reliable as the results derived from observation of natural adult-adult interaction.

The cultural differences that have emerged from the present study may be explained on the basis of a more formal and scientific analysis of behaviour than that provided by research on learned stereotypes. Gudykunst and Ting-Toomey (1988), attempting an examination of the theoretical influence of culture on interpersonal communication, refer to four stylistic modes of verbal interaction, among which "elaborate" and "succinct" styles are distinguished. An elaborate style uses ". . . rich, expressive language in everyday conversation.", while the succinct style includes more ". . . understatements, pauses and silences . . ." (Gudykunst and Ting-Toomey, 1988, p.105). Of course the use of pauses should not be conceived as non-communication -- ". . . 'the silences between words . . . also carry meaning and are significant' . . ." (Hall, 1983, cited by Gudykunst and Ting-Toomey, 1988, p. 107). Pauses are imposed by respiration, but they ". . . occur in locations that may facilitate language processing . . ." (Lynch et al., 1995, manuscript).

The cultural differences we have recorded may be explained by the assumption that Crete and Scotland employ the "elaborate" and "succinct" modes of verbal communication, respectively, to which may be added the assumption that the predominant imitative expressive behaviours observed in parent-infant communication, may reflect these different modes of interaction.

It should be added that while the two cultures may differ in the way they use verbal communication, other forms of expression follow different rules. Combinations of imitative expressive behaviours, especially vocal and facial imitations, occur in higher probabilities in Scotland than in Crete. These combinations appear to compensate for the low levels of purely verbal interchanges in Scotland.

The only kind of imitative expressive behaviour that was found not to differ in frequency between the two countries, was hand movement imitations. The two following points, regarding the emotional and the timing features of imitative exchanges, appear to give evidence on the motivating processes underlying imitation of hand gestures:

- a) Imitation of hand movements by infants and by parents recorded as early as the 8th week of the infants' life.
- b) Informal examination of the video-data suggests that hand movement imitations occurred mainly in overtly rhythmic engagements.

According to Donald's theory, the primary form of human mimetic expression is visuomotor, in which he includes almost ". . . all forms of hand and limb movements, postural attitudes and locomotor movements." (Donald, 1991, p.177). It may be inferred that hand movement imitations may constitute the behavioural substrate of mimetic expression in primates. Rhythm, that is, the manifestation of the integrative capacity of mimesis, is a key feature of all motor modalities. As a supramodal ability, rhythm may be played out with any motor modality, most notably with the hands. However, Donald does not consider the underlying motivating states of imitation, nor does he analyse the requirements of "intersubjectivity" as the integrating principle coordinating the motivational and emotional states of interacting partners.

In his analysis of the functions of expressive hand movements Trevarthen (1986) classified human hand gestures into five different kinds, in accordance to their ". . . communicative potential and the psychological control." (ibid, p. 153), as "gratuitous", "self-regulatory", "emotional", "indicating" and "symbolic". Further, he assumes that,

"Repeated rhythmic patterns of hand waving, touching, tickling, clapping, etc. form the backbone of many games that cause infants over 3-months-of-age to laugh and vocalize. . . The behaviour of the infants shows every sign of being an intrinsically motivated form of expression that already existed before the games started . . ."

(Trevarthen, 1986, p. 173).

The intrinsically-generated motivating phrases that have been inferred on the basis of the emotional aspects and timing features of imitation, share a rhythmic

“time-base”. Expressions are coordinated on the basis of variations in their time, structure and energy, and these brain-generated parameters of movement express the dynamic coherence of motivation (Trevarthen, 1993b).

Taking account of the emotional aspects of imitation already discussed, we may assume that humans are universally endowed with a structure of motivating states which hand movements display. Imitations of hand movements in games between parents and infants show a “dramatic” evidence of infants’ intrinsically generated and coherently motivated ability to enter into precise coordination in the rhythm of engagement.

The sex differences that emerged from this study, indicating that more hand movement imitations occur in boy-parent than girl-parent interactions and that girls and mothers prefer to imitate facial expressions, may be explained on the basis of the following observation,

“In most human cultures . . . females are more involved than males in interpersonal responsibilities and communication important in assisting early child development and males are more active in constructive invention and discovery.” (Trevarthen, 1986, p.198).

Support for this assumption is provided by the finding that turn-takings have higher probabilities to occur in interactions with girls than with boys, or, conversely, there are more co-actions in interactions with boys. In her study of kinesic or body movement expression in the mother-infant system, Beebe has found that co-active exchanges predominate (Beebe, 1982; Beebe et al., 1985). As hand movement imitations are kinesic expressions, they would be expected to occur more in co-active than turn-taking imitative interchanges and, furthermore, this co-active pattern of kinesic imitation would be expected to be more common in interactions with boys. Informal observation of the data from this study supports both these conclusions.

The core of these speculations, may be conceptualised as follows:

a) Emotional aspects of imitation indicated the existence in the infants of an adaptive motive formation prefunctional to psychological activity in communication and regulated by emotional expressions. Motive processes function, at both the motor and

the perceptual level, and the behaviour in communication between infants and parents gives evidence for “imitation of motives”. Further, the motivating-emotional regulation taking place in imitation is not restricted to the matching of the form of separate emotional expressions, but rather extends to the dynamic coordination of motives within emotional narratives. Thus, emotional attunement, regulated either by the infant or by the parent, is a central motivating feature of early imitation.

The predominance of the emotions of interest and pleasure in the regulation of imitative exchanges with an infant before the sixth month of life, strongly supports the hypothesis that a universal innate intersubjectivity is central motivator for human communication and mental growth.

b) The timing of emotional expressions, in imitative exchanges with infants, gives evidence for an alternation of matching or attuned cycles of motivation, and the timing of features of imitative exchange generate matching or attuned phrases of motivation and of motor and perceptual processes between the two subjects.

c) The non-linear development of the majority of imitative expressive behaviours, and the stability of non-speech sound imitations indicate that infants’ imitative ability persists, without disappearing, throughout the first six months of life. The changes in imitation should be attributed to developments in the infant’s motivations, in combination with either corresponding motivational changes in parents or changes in their perception of their infant’s motivations.

d) Analysis of the direction of imitations of expressive behaviours confirm that infants can imitate many expressions as early as the second month of life. Parental imitations give proof of intuitive sensitivity in both mothers and fathers, for their infants’ motive states. Imitation should not be viewed as an isolated form of response, but rather in integration with all other expressive behaviours, taking into account underlying motivating structures.

e) Cultural variation affecting the occurrence of non-vocal and vocal imitative expressive behaviours in the two countries, appears to be due to the accepted modes of social interaction of each culture. Despite this differentiation in customs of behaviour, there are many expressive behaviours that are common to the two cultures. The cultural universals in the complex balance between intrinsic motivating

states and the expressive hand movement imitations give clear proof of intrinsically-generated and coherently-motivated rhythmic structures in human infants.

The phenomenon of infant imitation vividly demonstrates a three-dimensional structure that is universal, adaptive and pre-functionally generated. These three aspects may be summarised as follows:

- The motivation for intersubjective communication gives form to emotions and is manifested through expressive behaviours coordinated within and between subjects.
- Innate intersubjectivity, is manifested in the emotional qualities by which imitation is regulated between interacting individuals, in the form of either emotional matching or emotional attunement.
- The temporal communicative frame, that is, the fundamental tendency of the mind to group sequential events, which is indicated by the phrasing of motivated behaviour, is apparent in the phrasing of the motor and perceptual functions that are integrated in the process by which social affordances are taken up.

In sum, the intersubjective nature of imitation has been proved by evidence for the intrinsically-generated motives for interpersonal communication, the innate ability for intersubjective interaction and the universal communicative frame, in which are regulated the emotional, the timing and the durational features of early imitative exchanges.

These speculations support neither a cognitive-developmental nor a developmental-psychoanalytic theory. They are more compatible with a theoretical framework that recognises intrinsically-generated motivational systems specifically adapted for intersubjective imitative encounters (Trevarthen et al., 1998). These take the form of “effortful, polymorphic, communicative action”, that provides universal communicative frames (Lynch, 1996), and that functions in two intercoordinated levels: an unconscious intersubjective and a conscious intra-mental (Kugiumutzakis, 1985, 1998b),

These speculations have two principle implications:

- a) They promise additional possibilities for the innate communicative abilities of young infants. Beyond the theoretical considerations of how communicative abilities

are learned, and shaped by maternal behaviours, or contingent upon them, and thus acquired at a late age, a fundamental capacity for intersubjective communication is shown in its completed tri-partite form (of motive, ability and frame) to be independent of experience, and therefore innate, in nature and function.

b) They have both empirical and theoretical implications for infant imitation research. Perspectives that view imitation from an ethological approach (seeking evidence for fixed action patterns, innate releasing mechanisms, sign-stimuli), or that attribute to imitation a simple cognitive, or interpersonal function, are shown by the findings of this thesis to be inadequate. Our understanding of the nature of imitation within its natural context has been extended, relating it to the general functions of intersubjective communication. Experimental methodology, when well-designed, has permitted the control of performance and the proof of well-chosen cognitive abilities in infants. However, different evidence is obtained by the interactional approach to infant imitation research, by analyses of recordings of infant-parent or infant-experimenter interchanges in an experimental or a naturalistic setting.

In a wider perspective, the intrinsic three-fold structure of imitation behaviours, functions not only on a micro-scale in early intersubjective encounters, it is also present in the macro-regulations characterising the life cycle. It may be suggested that each life stage experienced by an individual is sustained by the proposed three-dimensional structure of motives' activities and time frames. Each developmental stage is the result of innate motivating interactions within the self and between the Interpersonal Self and Other, and this is manifested in the outcome of each stage, in integration to the preceding and the following phase, and in relation to its place, as a part of the frame, of the whole life cycle. In the process of development, this structure is assumed to be experienced as a balance emerging out of a complex interaction between each individual's cognitive abilities and experiences within environmental situations and with the corresponding structures of other people.

We can apply this intersubjective frame of reference, in a model for further investigation of father-infant interaction within the integrated family system. Such a model should be build upon the following foundations:

- a) The intrinsically-generated and coherently-motivating structures of infants which enable them to animate intersubjective encounters, with all the implications for self- and other-awareness and sharing of purpose. This endowment is evidenced as motivation for communication, the manifested ability for intersubjective interaction and the signification of the universal communicative frame, which constitutes the generator of social affordances.
- b) A universal language of emotional regulation which we have shown taking place in infant-father interactions.
- c) Infant-father interaction is featured by transformations in time, which may be attributed to the interrelated developmental status of the infant and the father.
- d) Paternal intuitive sensitivity.
- e) Paternal and infant individual differences as shown in the regulation of their behavioural expressions.
- f) Interactions of early infant-father communication are embedded in a wider cultural context, and show both cultural variations and invariants of form rather than the fundamental structure.

Such propositions do not preclude recognition of the indirect effects that family members (infants, mothers, fathers) have on all the linked dyadic and triadic interactions and relationships that develop within the family system.

7.4. Comments on This Thesis

While we have derived several important conclusions from our data, it is admitted that caution must be exercised in generalising from these findings. The following reservations must be made:

- 1) Relatively few dyads were studied, the number being constrained by the time demands of microanalysis and signal analysis, and by the additional work required to collect data from two different cultures.
- 2) The sample was composed of middle or upper-middle class families. While it has been suggested that there is “. . . ‘no clear-cut social class effects in the existent literature’ . . . ” (Goldberg, 1983, p. 1373, cited by Belsky, 1985), it may be assumed that the level of education and the low social stress of the participating parents may have made them more positively oriented to their infants. In addition, the fact that the families were volunteers, strengthens the chances of a pre-existing positive relationship of each parent with the infant. It should not be forgotten that this kind of naturalistic research can only be conducted with the consent of both parents.
- 3) There was no prior familiarisation of the parents with the technical equipment used for recording behaviour. An optimal situation would have been one in which at least one or two videorecordings would have been made before the formal data collection started, to give the parents a chance to get used to the camera and become relaxed so as to behave as normally as possible.

With these limitations in mind, some suggestions can be made for future extension of this research.

7.5. Suggestions for Future Research

This thesis set out to investigate the intersubjective nature of spontaneous imitation and it has provided the framework within which further study of this kind would be possible and desirable. A detailed coding scheme has been developed for the analysis of imitation within free naturalistic interactions. In addition, several issues have been raised that need further research before any firm conclusions regarding them can be reached.

Notwithstanding the indisputable contribution of experimental research, there is a great need for a shift, guided by the new methodology of descriptive analysis. This method, in addition to capturing the regular patterns in spontaneous action, seems to be an effective way to identify the functions of the predetermined developing systems as these functions are reflected in the dynamics of psychological actions (Trevarthen, 1977). Now that a start has been achieved, the next steps will provide a more integrated account of interpersonal aspects of imitative behaviours. The following additions and modifications of research methods are suggested:

- Emotional aspects and the intersubjective regulation of imitative episodes require further examination. It would be desirable to apply a coding scheme that identifies subtle gradations within each emotional category, to permit the investigation of detailed intensity changes within each state. This would offer the possibility of a more rigorous test of the model of motives for imitation proposed by Trevarthen (Trevarthen et al., 1998). In this model, each of the three periodic elements (syllables, utterances and phrases) that have been proposed to regulate the timing of vocalisations, represents a phasic alternation of intrinsically generated motives. This alternation is supposed to occur between an active state of “assertive” effort and a receptive state of “apprehension”. This means that, in an intersubjective encounter, cycles of assertive expression interchanged with apprehensive attending occur, either within or between subjects. Between subjects these phrases are either synchronised or alternated.
- The study of individual differences in behaviour during imitative episodes, both of the infant and of the parent, would provide further evidence on the interactive nature of imitation and the motivating structure that generates it. The present study identified a different pattern of imitative patterns for an infant of whom the father was the principal caretaker. It is proposed that the study of infant-father interaction, when the father is a primary or a secondary caretaker would provide further data to explain individual variations of imitative performance.
- The relation between imitations and systematic coordinated attentions that involve orientations of body parts, would provide evidence for the hypothesis that human

communication is adapted to make use of information contained in movements of exploratory focusing on prospective goals of behaviour (Trevarthen et al., 1998).

- The relation between vocal imitation and prespeech movements would provide further support for the hypothesis that “. . . infants appear to express a rudiment of intention to speak . . .” (Trevarthen, 1979, p. 327).
- Vocalisations by infants, mothers and fathers require more detailed analysis by acoustic techniques to determine which dimensions (absolute pitch, pitch contours, rhythm etc.) are most significant in imitative responses.
- While there is some research on father’s involvement with premature infants, there is no information about the particular nature of imitation within these interactions.
- To the writer’s knowledge, imitation has not been studied in the triad-network of infant-mother-father interaction. It has been suggested that a better understanding of infants’ social reactions may be obtained on the basis of analysis of infants’ relationships with both mother and father than on either the mother-infant or the father-infant relationship alone (Main and Weston, 1980, cited by Parke, 1981). In addition the study of the triad-network may shed some light on the two recent views of the male self-concepts. Cross and Madson (1997) claim that men are motivated to desire relationships principally with the aim of serving themselves (Baumeister and Sommer, 1997). In contrast, Baumeister and Sommer (1997) claim that men, like women, are driven by the need to belong in relationships. The difference is that men, unlike women, realise this need through a broader social sphere of relations. These claims need substantiation.
- Longitudinal research on infant-father imitation should be extended beyond the sixth month of the infants’ life, to the period of secondary intersubjectivity, which is characterised by a systematic combination of infants’ interests in the physical world with communicative acts addressed to persons (Trevarthen, 1993b).
- Imitative episodes in naturalistic contexts with other communicative partners, not only mothers and fathers, but siblings, grandparents or other children should be included.

- The infant's birth order is an additional variable that should be taken into account. The experience gained by parents from the birth and development of the first child may alter their interactions and imitative patterns with the later-born children.
- Social class, as well as urban and rural samples, should be taken into consideration. Imitative patterns within father-infant or father-mother-infant interactions in families of lower socio-economic class, and comparisons with patterns in families from urban and rural areas, are likely to bring further evidence on the variety of relationships between parents and their infants.
- The problem of sample size needs serious consideration. An increase in the number of subjects would lead to some more secure findings that could be more reliably generalised. In addition, an increased number of subjects would permit further investigation of the emotional aspects of infant and parent imitations, not in reference only to the course of imitation itself, but also in the period before and after an imitative episode. This kind of investigation, with attention to the above mentioned hypothesis of motive oscillations may have both empirical and theoretical implications for infant imitation research, be it experimental or naturalistic.

Further research to obtain additional evidence concerning the intersubjective nature of imitation from both intra- and inter-cultural samples, would undoubtedly be time consuming and expensive. Nevertheless, it is the writer's belief that this kind of research has special value in the effort to uncover the remarkable inborn communicative abilities of these innocent human beings, the infants.

APPENDIX I
Letters to Parents

LETTER SENT TO PARENTS

Dear _____

Thank you for your interest in my research project.

My name is Theano Kokkinaki and I am a Ph.D student in the Department of Psychology, University of Edinburgh. I am interested in the ways infants and their both parents play in their natural environment-at home-from the eighth to the twenty fourth week of infant's life.

In more detail, I am investigating the development of the infant's relationship with his/her mother and father in a restricted number of families which live in Rethymnon of Crete and in Edinburgh of Scotland.

I would be grateful if you could help in my study. I want to give you some information about it.

If you would like to participate in the research project, I will visit you at home, once we have arranged a time suitable for you when the baby is one month and fifteen days old. In the course of this visit I will examine your infant and I will discuss with you a brief background of the pregnancy, the conditions of the child birth and the baby's behaviour. In this short visit you will say which day of the week, every fifteen days, is suitable for you to be visited by me, in time that you believe the baby is alert and ready to play with his/her parents.

In the next programmed visit, when the infant is 56 days old, I will come at your home with a video camera and I will ask from the mother and then from the father to play as they usually do with their baby. Each play episode (baby-mother/baby-father)

will last 7-10 minutes, a total of 14-20 minutes videorecording of baby-parents interactions. During the videorecording, in the place that the parents will choose, only the infant, the one parent and I will be there.

This will be repeated every 15 days up to the day the infant will be six months old.

In every visit I will examine the psychosomatic development of your baby, I will inform and discuss with you whatever interests you in relation to his/her development.

I am aware of the needs for confidentiality of this information, I assure you that your privacy will be respected at all times. Names of parents and infants will not be reported.

At the end of the project I will give in every family a copy of the videorecorded cassette with their babies.

If you have any queries please do not hesitate to contact me on _____

Many thanks for your help,

Yours sincerely,

Ms Theano Kokkinaki

THANK YOU LETTER TO PARENTS

Dear (parent's name)___
and (infant's name)___

On behalf of Pr. Colwyn Trevarthen, Professor of Psychology in the University of Edinburgh and myself, I would like to express our warmest thanking for your participation in my research project, which I believe will contribute in the enrichment of the scientific knowledge for human development, in the course of the first months of life.

We know that you love your child and if we have the right of a friendly advice, that is: keep on dedicating time and affection to your child, and in parallel take seriously his/her messages, which all the parents are able to understand when they consider their child a person and not an infant.

We wish you a happy motherhood and fatherhood experience and to you (infant's name)___ a happy and healthy development route.

Thank you very much

Yours sincerely,

Ms Theano Kokkinaki

APPENDIX II
Coding System

2.5.5. Gaze Behaviour Before the Imitative Episode

| Infant | Parent |
|---|---|
| a) Concentration or Interest Before Imitation | a) Infant's Body <input type="checkbox"/> |
| parent's eyes face <input type="checkbox"/> | b) Infant's Face <input type="checkbox"/> |
| parent's mouth-tongue <input type="checkbox"/> | c) Infant's face-infant's body <input type="checkbox"/> |
| parent's hand-palm <input type="checkbox"/> | d) Infant's Body-Elsewhere <input type="checkbox"/> |
| b) Hemisphere Functions | e) Infant's Face-Elsewhere <input type="checkbox"/> |
| left <input type="checkbox"/> | f) Infant's Face-Infant's Body-Elsewhere <input type="checkbox"/> |
| right <input type="checkbox"/> | |
| c) Other Directions | |
| parent's trunk <input type="checkbox"/> | |
| elsewhere <input type="checkbox"/> | |
| parent's trunk-elsewhere <input type="checkbox"/> | |
| parent's face-elsewhere <input type="checkbox"/> | |
| Mutual Eye Contact <input type="checkbox"/> | |

2.5.6. Oral Expressions Before Imitation

| Infant | Parent |
|--|---|
| a) Vocalises <input type="checkbox"/> | a) Speech <input type="checkbox"/> |
| b) Pre-Speech Movements <input type="checkbox"/> | virtual baby <input type="checkbox"/> |
| | empathic words <input type="checkbox"/> |
| | b) Rhythmic Oral Expressions <input type="checkbox"/> |

2.5.7. Body Movements Before Imitation

| Infant | Parent |
|---|--|
| a) Body Movements <input type="checkbox"/> | a) Simple Tactile Expressions <input type="checkbox"/> |
| b) Limbs Motionless and Stretched to Parent <input type="checkbox"/> | b) Cyclic Games <input type="checkbox"/> |
| c) Body Movements and Limbs Motionless (or vice versa) <input type="checkbox"/> | c) Hand Movements Related to Asymmetry |
| d) Body Movements Related to Hemisphere Function | 1. Hand Used for Signalling |
| left hand <input type="checkbox"/> | left <input type="checkbox"/> |
| left leg <input type="checkbox"/> | right <input type="checkbox"/> |
| right hand <input type="checkbox"/> | 2. Hand Used to Touch/Hold Infant |
| right leg <input type="checkbox"/> | left <input type="checkbox"/> |
| combination <input type="checkbox"/> | right <input type="checkbox"/> |
| | 3. Infant's Hand Touched/Held by the Parent |
| | left <input type="checkbox"/> |
| | right <input type="checkbox"/> |

2.6. Coincident Imitative Sequences

2.6.1. KIND OF IMITATION

| | |
|--|--------------------------|
| 1) Vocal | <input type="checkbox"/> |
| 2) Facial | <input type="checkbox"/> |
| 3) Non-Speech Sound | <input type="checkbox"/> |
| 4) Head Movement | <input type="checkbox"/> |
| 5) Hand Movement | <input type="checkbox"/> |
| 6) Combinations of Expressive Behaviours | <input type="checkbox"/> |

2.6.1.1. VOCAL IMITATION

| | |
|--------------------|--------------------------|
| 1) Vowel | <input type="checkbox"/> |
| 2) Consonant | <input type="checkbox"/> |
| 3) Vowel-Consonant | <input type="checkbox"/> |

2.6.1.2. FACIAL IMITATION

| | |
|----------------------|--------------------------|
| 1) Tongue Protrusion | <input type="checkbox"/> |
| 2) Mouth Opening | <input type="checkbox"/> |
| 3) Lip Protrusion | <input type="checkbox"/> |
| 4) Blinking | <input type="checkbox"/> |
| 5) Surprise Face | <input type="checkbox"/> |
| 6) Sad Face | <input type="checkbox"/> |
| 7) Various | <input type="checkbox"/> |

2.6.1.3. NON-SPEECH SOUND IMITATION

| | |
|---------------------|--------------------------|
| 1) Sneezing | <input type="checkbox"/> |
| 2) Yawning | <input type="checkbox"/> |
| 3) Sighing | <input type="checkbox"/> |
| 4) Crying Sound | <input type="checkbox"/> |
| 5) Whimpering Sound | <input type="checkbox"/> |
| 6) Coughing Sound | <input type="checkbox"/> |
| 7) Hiccup Sound | <input type="checkbox"/> |
| 8) Various | <input type="checkbox"/> |

2.6.1.4. COMBINATIONS OF IMITATION

- | | |
|-------------------------------------|--------------------------|
| 1) Vocal and Non-Speech Sound | <input type="checkbox"/> |
| 2) Vocal and Facial Expression | <input type="checkbox"/> |
| 3) Vocal and Hand Movement | <input type="checkbox"/> |
| 4) Vocal and Head Movement | <input type="checkbox"/> |
| 5) Non-Speech and Facial Expression | <input type="checkbox"/> |
| 6) Non-Speech and Hand Movement | <input type="checkbox"/> |
| 7) Non-Speech and Head Movement | <input type="checkbox"/> |
| 8) Facial and Head Movement | <input type="checkbox"/> |
| 9) Facial and Hand Movement | <input type="checkbox"/> |
| 10) Head and Hand Movement | <input type="checkbox"/> |

2.6.2. Duration of coincident imitative sequences___(seconds)

2.6.2.1. Emotional States During the Imitative Episode

| | Infant | Parent |
|------------------------------|--------------------------|--------------------------|
| a) Positive (pleasure) | <input type="checkbox"/> | <input type="checkbox"/> |
| b) Positive (interest) | <input type="checkbox"/> | <input type="checkbox"/> |
| b) Neutral | <input type="checkbox"/> | <input type="checkbox"/> |
| d) Negative | <input type="checkbox"/> | <input type="checkbox"/> |
| Structure of Emotional Range | | |

2.6.2.2. Emotional Range During the Imitative Episode

| | | |
|----------------|--------------------------|--------------------------|
| a) Ascending | <input type="checkbox"/> | <input type="checkbox"/> |
| b) Descending | <input type="checkbox"/> | <input type="checkbox"/> |
| c) Stable | <input type="checkbox"/> | <input type="checkbox"/> |
| d) Fluctuating | <input type="checkbox"/> | <input type="checkbox"/> |

2.6.2.3. Gaze Behaviour During the Imitative Episode

| Infant | Parent |
|--|---|
| a) Concentration-Interest During Imitation | a) Infant's Body <input type="checkbox"/> |
| parent's eyes-face <input type="checkbox"/> | b) Infant's Face <input type="checkbox"/> |
| parent's mouth-tongue <input type="checkbox"/> | c) Infant's Face-Infant's Body <input type="checkbox"/> |
| parent's hand-palm <input type="checkbox"/> | |
| b) Hemisphere Functions | |
| left <input type="checkbox"/> | |
| right <input type="checkbox"/> | |
| Mutual Eye Contact <input type="checkbox"/> | |

2.6.2.4. Oral Expressions During Imitation

| Infant | Parent |
|---|---|
| Pre-Speech Movements <input type="checkbox"/> | a) Speech <input type="checkbox"/> |
| | virtual baby <input type="checkbox"/> |
| | empathic words <input type="checkbox"/> |

2.6.2.5. Body Movements During Imitation

| Infant | Parent |
|---|--|
| a) Body Movements <input type="checkbox"/> | a) Simple Tactile Expressions <input type="checkbox"/> |
| b) Limbs Motionless and Stretched to Parent <input type="checkbox"/> | b) Cyclic Games <input type="checkbox"/> |
| c) Body Movements and Limbs Motionless (or vice versa) <input type="checkbox"/> | c) Hand Movements Related to Asymmetry |
| d) Body Movements Related to Hemisphere Function | 1. Hand Used for Signalling |
| left hand <input type="checkbox"/> | left <input type="checkbox"/> |
| left leg <input type="checkbox"/> | right <input type="checkbox"/> |
| right hand <input type="checkbox"/> | 2. Hand Used to Touch/Hold Infant |
| right leg <input type="checkbox"/> | left <input type="checkbox"/> |
| combination <input type="checkbox"/> | right <input type="checkbox"/> |
| | 3. Infant's Hand Touched/Held by the Parent |
| | left <input type="checkbox"/> |
| | right <input type="checkbox"/> |

2.6.3. TYPE OF IMITATIVE EXCHANGE

| |
|---|
| a) Turn-Taking <input type="checkbox"/> |
| b) Co-Action <input type="checkbox"/> |

2.6.3.1. TYPE OF CO-ACTION

| | PARENT-INFANT <input type="checkbox"/> INFANT-PARENT <input type="checkbox"/> |
|-------------------------|--|
| 1. Full Coactions | |
| 2. Left-Sided Coaction | |
| 3. Right-Sided Coaction | |
| 4. Centered Coaction | |
| 5. Prolonged Coaction | |
| 6. Various | |

2.6.3.2. TYPE OF TURN-TAKING

| INFANT-PARENT <input type="checkbox"/> | PARENT-INFANT <input type="checkbox"/> |
|--|--|
| NUMBER OF TURNS | |
| 1. Simple Turns | |
| 2. Two Turns | |
| 3. Three Turns | |
| 4. Four Turns | |
| 5. Five Turns | |
| 6. Six Turns | |
| 7. Seven Turns | |
| 8. Eight Turns | |
| 9. Nine Turns | |
| 10. Ten Turns | |

2.6.4. DURATIONS OF IMITATIVE EXCHANGE

2.6.4.1. DURATIONS OF IMITATIVE EXCHANGE
TURN-TAKINGS
(seconds)

| | (M) | (P) | (I) | (P) | (M) | (P) | (I) | (P) | (M) | (P) | (I) | (P) | (M) | (P) | (I) | (P) | (M) |
|----------------|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|
| 1. Simple Turn | | | | | | | | | | | | | | | | | |
| 2. Two Turns | | | | | | | | | | | | | | | | | |
| 3. Three Turns | | | | | | | | | | | | | | | | | |
| 4. Four Turns | | | | | | | | | | | | | | | | | |
| 5. Five Turns | | | | | | | | | | | | | | | | | |
| 6. Six Turns | | | | | | | | | | | | | | | | | |
| 7. Seven Turns | | | | | | | | | | | | | | | | | |
| 8. Eight Turns | | | | | | | | | | | | | | | | | |
| 9. Nine Turns | | | | | | | | | | | | | | | | | |
| 10. Ten Turns | | | | | | | | | | | | | | | | | |

Key for Table 2.6.4.1.
(M) = Model
(P) = Pause
(I) = Imitator

**2.6.4.2. DURATION OF IMITATIVE EXCHANGE
CO-ACTION
(seconds)**

**2.6.4.3. DURATION, NUMBER OF TURN-TAKINGS AND CO-ACTIONS
MULTIPLE WITH TURN-TAKINGS AND CO-ACTION
(seconds)**

| | |
|------------------------------------|--|
| 1. Number of Turn-Takings | |
| 2. Number of Co-Actions | |
| 3. Sum of Co-Action Duration Times | |

**2.6.4.4. DURATION, NUMBER OF TURN-TAKINGS AND CO-ACTIONS
COMBINATIONS OF IMITATIVE EXPRESSIVE BEHAVIOURS
(seconds)**

| | |
|------------------------------------|--|
| 1. Number of Turn-Takings | |
| 2. Number of Co-Actions | |
| 3. Sum of Co-Action Duration Times | |

2.6.5. FREQUENCIES OF IMITATIVE EXCHANGE (TURN-TAKINGS)

2.6.5.1. FREQUENCIES OF IMITATIVE EXCHANGE
TURN-TAKINGS
(seconds)

| | (M) | (P) | (I) | (P) | (M) | (P) | (I) | (P) | (M) | (P) | (I) | (P) | (M) | (P) | (I) | (P) | (M) | (P) | (I) | (P) | (M) | (P) | (I) | (P) | (M) | |
|----------------|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|--|
| 1. Simple Turn | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 2. Two Turns | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 3. Three Turns | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 4. Four Turns | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 5. Five Turns | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 6. Six Turns | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 7. Seven Turns | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 8. Eight Turns | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 9. Nine Turns | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 10. Ten Turns | | | | | | | | | | | | | | | | | | | | | | | | | | |

Key for Table 2.6.5.1.
(M) = Model
(P) = Pause
(I) = Initiator

| 2.6.6. FORM OF IMITATION | | |
|---|---------------|---------------|
| 2.6.6.1. ONE IMITATION BY EACH PARTNER OR ALL IMITATIONS OF A PARTNER HAVE THE SAME FORM | | |
| | INFANT | PARENT |
| Accurate Imitation | | |
| Partial Imitation | | |
| Expanded Imitation | | |
| Imposed Imitation | | |
| 2.6.6.2. MORE THAN ONE IMITATION BY A PARTNER OF A DIFFERENT FORM | | |
| Accurate-Partial Imitations | | |
| Accurate-Expanded Imitations | | |
| Partial-Expanded Imitations | | |
| Accurate-Partial-Expanded Imitations | | |

2.7. Post-Imitative Zone

2.7.1. Duration of post-imitative zone ___(seconds)

2.7.2. Kind of Post-Imitative Zone:

1. Protoconversational
2. Rhythmic
3. Non-communicative
4. Transitional

| 2.7.3. Emotional States After the Imitative Episode | | |
|--|--------------------------|--------------------------|
| | Infant | Parent |
| a) Positive (pleasure) | <input type="checkbox"/> | <input type="checkbox"/> |
| b) Positive (interest) | <input type="checkbox"/> | <input type="checkbox"/> |
| c) Neutral | <input type="checkbox"/> | <input type="checkbox"/> |
| d) Negative | <input type="checkbox"/> | <input type="checkbox"/> |
| Structure of Emotional Range | | |
| 2.7.4. Emotional Range After the Imitative Episode | | |
| a) Ascending | <input type="checkbox"/> | <input type="checkbox"/> |
| b) Descending | <input type="checkbox"/> | <input type="checkbox"/> |
| c) Stable | <input type="checkbox"/> | <input type="checkbox"/> |
| d) Fluctuating | <input type="checkbox"/> | <input type="checkbox"/> |

2.7.5. Gaze Behaviour After the Imitative Episode

| Infant | Parent |
|---|---|
| a) Hemisphere Functions | a) Infant's Body <input type="checkbox"/> |
| left <input type="checkbox"/> | b) Infant's Face <input type="checkbox"/> |
| right <input type="checkbox"/> | c) Infant's Face-Infant's Body <input type="checkbox"/> |
| b) Other Directions | d) Infant's Body-Elsewhere <input type="checkbox"/> |
| parent's trunk <input type="checkbox"/> | e) Infant's Face-Elsewhere <input type="checkbox"/> |
| elsewhere <input type="checkbox"/> | f) Infant's Face-Infant's Body-Elsewhere <input type="checkbox"/> |
| parent's trunk-elsewhere <input type="checkbox"/> | |
| parent's face-elsewhere <input type="checkbox"/> | |
| Mutual Eye Contact <input type="checkbox"/> | |

2.7.6. Oral Expressions After Imitation

| Infant | Parent |
|--|---|
| a) Vocalises <input type="checkbox"/> | a) Speech <input type="checkbox"/> |
| b) Pre-Speech Movements <input type="checkbox"/> | virtual baby <input type="checkbox"/> |
| | empathic words <input type="checkbox"/> |
| | b) Rhythmic Oral Expressions <input type="checkbox"/> |

2.7.7. Body Movements After Imitation

| Infant | Parent |
|---|--|
| a) Body Movements <input type="checkbox"/> | a) Simple Tactile Expressions <input type="checkbox"/> |
| b) Limbs Motionless and Stretched to Parent <input type="checkbox"/> | b) Cyclic Games <input type="checkbox"/> |
| c) Body Movements and Limbs Motionless (or vice versa) <input type="checkbox"/> | c) Hand Movements Related to Asymmetry |
| d) Body Movements Related to Hemisphere Function | 1. Hand Used for Signalling |
| left hand <input type="checkbox"/> | left <input type="checkbox"/> |
| left leg <input type="checkbox"/> | right <input type="checkbox"/> |
| right hand <input type="checkbox"/> | 2. Hand Used to Touch/Hold Infant |
| right leg <input type="checkbox"/> | left <input type="checkbox"/> |
| combination <input type="checkbox"/> | right <input type="checkbox"/> |
| | 3. Infant's Hand Touched/Held by the Parent |
| | left <input type="checkbox"/> |
| | right <input type="checkbox"/> |

REFERENCES

- Abravanel, E., Levan-Goldschmidt, E. and Stevenson, M. B. (1976) Action imitation: the early phase of infancy. Child Development, 47: 1032-1044.
- Abravanel, E. and Sigafos, A. D. (1984) Exploring the presence of imitation during early infancy. Child Development, 55: 381-392.
- Ainsworth, M. D. (1969) Object relations, dependency and attachment: a theoretical review of the infant-mother relationship. Child Development: 40, 569-1025.
- Ainsworth, M. D. (1973) The development of infant-mother attachment. In B. M. Caldwell and H. N. Ricciuti (Eds), Review of Child Development Research 3. Chicago: University of Chicago Press.
- Aitken, K. J. and Trevarthen, C. (1998) Self-other organization in human psychological development. Development and Psychopathology (in press).
- Anisfeld, M. (1979) Interpreting "imitative" responses in early infancy. Science, 205: 214-215.
- Babad, E. Y. and Wallbott, H. G. (1986) The effects of social factors on emotional reactions. In K. R. Scherer., H. G. Wallbott. and A. B. Summerfield (Eds), Experiencing Emotion: A Cross-Cultural Study. European Monographs in Social Psychology. Cambridge: Cambridge University Press.
- Bakeman, R. and Gottman, J. M. (1986) Observing Interaction: an Introduction to Sequential Analysis. Cambridge: Cambridge University Press.
- Baldwin, J. M. (1894) Imitation: a chapter in the natural history of consciousness. Mind, 3: 26-55.
- Baldwin, A. L. (1968) Theories of Child Development. London: John Wiley and Sons.
- Bandura, A. (1971) Analysis of modelling processes. In Bandura, A. (Ed), "Psychological Modelling: Conflicting Theories". Chicago: Aldine-Atherton.
- Bandura, A. and Walters, R. H. (1963) Social Learning and Personality Development. London: Holt, Rinehart and Winston, INC.

- Bateson, M. C. (1979) The epigenesis of conversational interaction: A personal account of research development. In M. Bullowa (Ed), Before Speech: The Beginning of Human Communication. London: Cambridge University Press.
- Baumeister, R. F. and Sommer. K. L. (1997) What do men want? Gender differences and two spheres of belongingness: comment on Cross and Madson. Psychological Bulletin, 122: 38-44.
- Beail, N. (1982) Role of the father during pregnancy and childbirth. In N. Beail and J. McGuire (Eds), Fathers: Psychological Perspectives. Great Britain: Biddles Ltd.
- Beail, N. (1983) The psychology of fatherhood. Bulletin of the British Psychological Society, 36: 312-314.
- Beebe, B. (1982) Micro-timing in mother-infant communication. In M. Key (Ed), Non-Verbal Communication Today: Current Research. NY: Mouton.
- Beebe, B., Jaffe, J., Feldstein, S., Mays, K. and Alson, D. (1985) Interpersonal timing: the application of an adult dialogue model to mother-infant vocal and kinesic interactions. In F. M. Field and N. Fox (Eds), Social Perception in Infants. Norwood, NJ: Ablex.
- Belsky, J. (1985) Experimenting with the family in the newborn period. Child Development, 56: 407-414.
- Biller, H. B. and Meredith, D. L. (1975) Father Power. New York: David McKay
- Bloom, L., Hood, L. and Lightbown, P. (1974) Imitation in language development: If, when and why. Cognitive Psychology, 6: 380-420.
- Bloom, L., Beckwith, R. and Capatides, J. B. (1988) Developments in the expression of affect. Infant Behaviour and Development, 11: 169-186.
- Borke, H. (1978) Piaget's views of social interaction and the theoretical construct of empathy. In L. S. Siegel and C. J. Brainerd (Eds), Alternatives to Piaget: Critical Essays on the Theory. London: Academic Press.
- Bowlby, J. (1969) Attachment and Loss. London: Hogarth; New York: Basic Books.
- Bråten, S. (1994) Companion space theorems: imitational learning from (e)motional memory. In S. Bråten (Ed), Intersubjective Communication and Emotion in Ontogeny. Cambridge: Cambridge University Press (in press).
- Bråten, S. (1996) When toddlers provide care: infants' companion space. Childhood: a Global Journal of Child Research, 3: 449-465.

- Bråten, S. (1997) What enables infants to give care? Prosociality and learning by alter-centric participation, Centre for Advanced Study. Lecture in the Norwegian Academy of Science and Letters, Oslo.
- Brazelton, T. B., Koslowski, B. and Main, M. (1974) The origins of reciprocity: The early mother-infant interaction. In M. Lewis and L. Rosenblum (Ed), The Effect of the Infant on its Caretaker, Vol 1. London: John Wiley and Sons.
- Brazelton, T. B. and Young, C.C. (1964) An example of imitative behaviour in a nine-week-old infant. Journal of American Academy of Child Psychiatry, 3: 53-67.
- Brazelton, T. B., Yogman, M. W., Als, H. and Tronick, E. (1979) The infant as a focus for family reciprocity. In M. Lewis and L. Rosenblum (Eds), The Child and its Family. New York: Plenum Press.
- Bridges, L. J., Connell, J. P. and Belsky, J. (1988) Similarities and differences in infant-mother and infant-father interaction in the strange situation: A component process analysis. Developmental Psychology, 24: 92-100.
- Bridges, L. J., Grolnick, W. S. and Connell, J. P. (1997) Infant emotion regulation with mothers and fathers. Infant Behaviour and Development, 20 (1): 47-57.
- Bronstein, P. (1984) Differences in mothers' and fathers' behaviours toward children: a cross-cultural comparison. Developmental Psychology, 20: 995-1003.
- Brown, G. and Desforges, C. (1979) Piaget's Theory: A Psychological Critique. London: Routledge and Kegan Paul.
- Burlingham, D. (1973) The preodipal infant-father relationship. Psychoanalytic Study in the Child, 28: 23-47.
- Burlingham, D. and Freud, A. (1944) Infants Without Families. London: George Allen and Unwin Ltd.
- Butterworth, G. (1981) Infancy and Epistemology: An Evaluation of Piaget's Theory. Sussex: The Harvester Press.
- Camras, L. A. (1994) Two aspects of emotional development: expression and elicitation. In P. Ekman and R. J. Davidson (Eds), The Nature of Emotion: Fundamental Questions. Oxford: Oxford University Press.
- Carlile, K. S. and Holstrum, W. J. (1989) Parental involvement behaviors: a comparison of Chamorro and Caucasian parents. Infant Behaviour and Development, 12: 479-494.

- Caron, A. J., Caron, R. F. and MacLean, D. J. (1988) Infant discrimination of naturalistic emotional expressions: the role of face and voice. Child Development, 59: 604-616.
- Clark, R. (1976) What's the use of imitation? Journal of Child Language, 4: 341-358.
- Clark-Steward, K. A. (1978) And daddy makes three: the father's impact on mother and young child. Infant Development, 49: 466-478.
- Clynes, M. (1980) The communication of emotion: theory of sentics. In R. Plutchik and H. Kellerman (Eds), Emotion: Theory, Research, and Experience. New York: Academic Press.
- Cordell, A. S., Parke, R. D. and Sawin, D. B. (1980) Fathers' views on fatherhood with special reference to infancy. Family Relations, 29: 331-338.
- Coser, L. A. (1971) Masters of Sociological Thought. New York: Harcourt Brace Jovanivick.
- Cox, M. J., Owen, M. T., Henderson, V. K. and Margand, N. A. (1992) Prediction of infant-father and infant-mother attachment. Developmental Psychology, 28: 474-483.
- Crouter, A. C., Jenkins, M. P., Huston, T. L. and McHale, S. M. (1987) Processes underlying father involvement in dual-earner and single-earner families. Developmental Psychology, 23: 431-440.
- Crowder, M. J. and Hand, D. J. (1990) Analysis of Repeated Measures. London: Chapman and Hall.
- Custence, D. M. and Bard, K. A. (1994) The Development of Gestural Imitation and Self-Recognition in Chimpanzees and Children. Proceedings of the XIVth Congress of the International Primatological Congress, Strasburg.
- Darwin, C. (1872/1965) The Expression of Emotions in Man and Animals. Chicago: The University of Chicago Press.
- Dickstein, S. and Parke, R. D. (1988) Social referencing in infancy: a glance at fathers and marriage. Child Development, 59: 506-511.
- Donald, M. (1991) Origins of the Modern Mind: Three Stages in the Evolution of Culture and Cognition. Cambridge and London: Harvard University Press.
- Dunkeld, J. (1978) The Function of Imitation in Infancy. Ph.D Thesis, University of Edinburgh.

- Eibl-Eibesfeldt, I. (1989) Human Ethology. New York: Aldine de Gruyter.
- Ekman, P. (1982) Methods for measuring facial action. In K. R. Scherer and P. Ekman (Eds), Handbook of Methods in Nonverbal Behaviour Research. Cambridge: Cambridge University Press.
- Ekman, P. (1992) Are there basic emotions? Psychological Review, 99: 550-553.
- Ekman, P. and Davidson, R. J. (1994) The Nature of Emotion: Fundamental Questions. Oxford: Oxford University Press.
- Ellsworth, P. C. (1994) Some reasons to expect universal antecedents to emotion. In P. Ekman and R. J. Davidson (Eds), The Nature of Emotion: Fundamental Questions. Oxford: Oxford University Press.
- Everitt, B. S. (1977) The Analysis of Contingency Tables. London: Chapman and Hall.
- Exline, R. V. (1982) Gaze behaviour in infants and children: a tool for the study of emotions? In C.E. Izard (Ed), Measuring Emotions in Infants and Children. London: Cambridge University Press.
- Feldman, R. S. (1982) Development of Nonverbal Behaviour in Children. New York: Springer-Verlag.
- Fernald, A., Taeschner, T., Dunn, J., Papousek, M., de Boysson-Bardies, B. and Fukui, I. (1994) A cross-language study of prosodic modifications in mothers' and fathers' speech to preverbal infants. Journal of Child Language, 16: 477-501.
- Field, T. (1978) Interaction behaviors of primary versus secondary caretaker fathers, Developmental Psychology, 14: 183-184.
- Field, T. (1982) Individual differences in the expressivity of neonates and young infants. In R. S. Feldman (Ed), Development of Nonverbal Behaviour in Children. New York: Springer-Verlag.
- Field, T. (1985) Neonatal perception of people: maturational and individual differences. In T. Field and N. A. Fox (Eds), Social Perception in Infants. Norwood, N.J: Ablex.
- Field, T., Goldstein, S., Vega-Lahr, N. and Porter, K. (1986) Changes in imitative behaviour during early infancy. Infant Behaviour and Development, 9: 415-421.
- Field, T., Woodson, R., Cohen, D., Greenberg, R., Garcia, R. and Collins, K. (1983) Discrimination and imitation of facial expressions by term and preterm neonates. Infant Behaviour and Development, 6: 485-489.

- Field, T., Woodson, R., Greenberg, R. and Cohen, D. (1982) Discrimination and imitation of facial expressions by neonates. Science, 218: 179-181.
- Flavell, J. H. (1963) The Developmental Psychology of Jean Piaget. New Jersey: D. Van Nostrand Company.
- Fogel, A. (1977) Temporal organization in mother-infant face-to-face interaction. In H. R. Schaffer (Ed), Studies in Mother-Infant Interaction. London: Academic Press.
- Fogel, A. and Thelen, E. (1987) Development of early expressive action from a Dynamic Systems Approach. Developmental Psychology, 23: 747-761.
- Fontaine, R. (1984) Imitative skills between birth and six months. Infant Behaviour and Development, 7: 323-333.
- Freud, A. (1965/1966) Normality and Pathology in Childhood. London: the Hogarth Press and the Institute of Psycho-Analysis.
- Freud, S. (1921/1949) Group Psychology and the Analysis of the Ego. London: The Hogarth Press and the Institute of Psycho-Analysis.
- Frijda, N. H. (1994) Universal antecedents exist and are interesting. In P. Ekman and R. J. Davidson (Eds), The Nature of Emotion: Fundamental Questions. Oxford: Oxford University Press.
- Frodi, A. M., Lamb, M. E., Leavitt, L. A. and Donovan, W. L. (1978) Fathers' and mothers' responses to infant smiles and cries. Infant Behaviour and Development, 1: 187-198.
- Frodi, A. M., Lamb, M. E., Leavitt, L. A., Donovan, W. L., Neff, C. and Sherry, D. (1978) Fathers' and others' responses to the faces and cries of normal and premature infants. Developmental Psychology, 14: 490-498.
- Gardner, J. and Gardner, H. (1970) A note on selective imitation by a six-week-old infant. Child Development, 41: 1209-1213.
- Greenbaum, C. W. and Landau, R. (1979) The infant's exposure to talk by familiar people: mothers, fathers and siblings in different environments. In M. Lewis and L. Rosenblum (Eds), Child and Its Family. New York and London: Plenum Press.
- Greenburg, M. (1985) The Birth of a Father. New York: The Continuum Publishing Company.

- Greenburg, M. and Morris, N. (1982) Engrossment: The newborn's impact upon the father. In S. H. Cath., A. R. Gurwitt. and J. M. Ross (Eds), Father and Child: Developmental and Clinical Perspectives. Boston: Little Brown.
- Gudykunst, W. B. and Ting-Toomey, S. (1988) Culture and Interpersonal Communication. London: Sage Series, Interpersonal Communication 8.
- Guillaume, P. (1971) Imitation in Children . Chicago: The University of Chicago Press.
- Hayes, K. R., and Watson, J. S. (1979) Neonatal Imitation: Fact or Artifact. Paper presented at the SRC D Meeting, San Francisco, March.
- Heimann, M. (1989) Neonatal imitation, gaze aversion and mother-infant interaction. Infant Behaviour and Development, 12: 495-505.
- Heimann, M. (1991) Neonatal imitation: a social and biological phenomenon. In T. Archer and S. Hansen (Eds), Behavioral Biology: Neuroendocrine Axis. London: Lawrence Erlbaum Associates.
- Heimann, M., Nelson, K. E. and Schaller, J. (1989) Neonatal imitation of tongue protrusion and mouth opening: methodological aspects and evidence of early individual differences. Scandinavian Journal of Psychology, 30: 90-101.
- Heimann, M., and Schaller, J. (1985) Imitative reactions among 14-21 days old infants. Infant Mental Health Journal, 6: 31-39.
- Heimann, M., and Ullstadius, E. (1996) Neonatal imitation and imitation among children with autism and down syndrome. In J. Nadel and G. Butterworth (Eds), Imitation in Infancy. Progress and Prospects of Current Research. Cambridge: University Press (in press).
- Heimann, M., Ullstadius, E., Dahlgren, S. O. and Gillberg, C. (1992) Imitation in autism. A preliminary research note. Behavioural Neurology, 5: 219-227.
- Heimann, M., Ullstadius, S. O. and Gillberg, C. (1992) Imitation in autism. A preliminary research. Behavioural Neurology, 5: 1-9.
- Holmlund, C. (1986) The foundations of communication: A theoretical approach to imitation, intermodality and suggestion in the child's early communicative actions. Research Bulletins from the Institute of Education. Vol. XII:III. University of Stockholm.
- Hooker, K., Fiese, B. H., Jenkins, L., Morfei, M. Z. and Schwagler, J. (1996) Possible selves among parents of infants and preschoolers. Developmental Psychology, 32: 542-550.

- Hossain, Z. and Roopnarine, J. L. (1994) African-American fathers' involvement with infants: relationship to their functioning style, support, education, and income. Infant Behaviour and Development, 17: 175-184.
- Izard, C. E. (1982) Measuring Emotions in Infants and Children. London: Cambridge University Press.
- Izard, C. E. (1992) Basic emotions, relations among emotions, and emotion-cognition relations. Psychological Review, 99: 561-565.
- Izard, C. E. and Buechler, S. (1980) Aspects of consciousness and personality in terms of differential emotions theory. In R. Plutchik and H. Kellerman (Eds), Emotion: Theory, Research, and Experience. New York: Academic Press.
- Izard, C. E. and Dougherty, L. M. (1982) Two complementary systems for measuring facial expressions in infants and children. In C. E. Izard (Ed), Measuring Emotions in Infants and Children. London: Cambridge University Press.
- Izard, C. E., Kagan, J. and Zajonc, R. B. (1984) Emotions, Cognition and Behaviour. United States of America: Cambridge University Press.
- Jacobson, S. W. (1979) Matching behaviour in the young infant. Child Development, 50: 425-430.
- Jacobson, S. W. and Kagan, J. (1978) Released responses in early infancy: evidence contradicting selective imitation. Paper presented at the International Conference on Infant Studies, Providence, R.I.
- Jacobson, S. W. and Kagan, J. (1979) Interpreting "imitative" responses in early infancy. Science, 205: 215-217.
- Jones, S. (1996) Imitation or exploration? Young infants' matching of adult's oral gestures. Child Development, 67: 1952-1969.
- Jonsson, C. O. and Fahrman, M. (1998) Affect attunement during the first year of life. Infant Mental Health Journal (in press).
- Kaitz, M., Meschulach-Sarfaty, O., Auerbach, J. and Eidelman, A. (1988) A reexamination of newborns; ability to imitate facial expressions. Developmental Psychology, 24:3-7.
- Kaye, K. (1977) Toward the origin of dialogue. In H. R. Schaffer (Ed), Studies in Mother-Infant Interaction. London: Academic Press.

- Keller, E. (1994) Signalize: Signal Analysis for Speech and Sound (User's Manual), Version 3.0. InfoSignalInc.
- Kessen, W., Levine, J. and Wendrich, K. A. (1979) The imitation of pitch in infants. Infant Behaviour and Development, 2: 93-99.
- Killen, M. and Uzgiris, I. C. (1981) Imitation of actions with objects: The role of social meaning. Journal of Genetic Psychology, 138: 219-229.
- Koepke, J. E., Hamm, M., Legertsee, M. and Russell, M. (1983) Neonatal Imitation: two failures to replicate. Infant Behaviour and Development, 6: 97-102.
- Kohlberg, L. (1969) Stage and Sequence: The cognitive-developmental approach to socialization. In D. A. Goslin (Ed), Handbook of Socialization Theory and Research. Chicago: Rand McNally.
- Krasanakis, G. (1991) O Partikos Rolos: Empiriki Psychopaidagogiki Proseggisi (The Paternal Role: An Empirical Psychopaidagogical Approach). Heraklion: Krasanakis.
- Kuczynski, L., Waxler, C. and Yarrow, M. (1987) Development and content of imitation in the second and third years of life: a socialization perspective. Developmental Psychology, 23: 276-282.
- Kugiumutzakis, G. (1983) Imitative Phenomena: A New Challenge. M.A. Thesis, Department of Psychology, University of Uppsala, Sweden.
- Kugiumutzakis, G. (1985) The Origin, Development and Function of the Early Infant Imitation. Ph.D. Thesis, Department of Psychology, University of Uppsala, Sweden.
- Kugiumutzakis, G. (1988) I genesis tis anthropinis mimesis (The origin of human imitation). Psychologica Themata, 1 (1): 5-21.
- Kugiumutzakis, G. (1992) Fonitikes mimiseis stin epikoinonia miteras-brefous (Vocal imitations in mother-infant communication). In Kugiumutzakis, G. (Ed), Proodos stin Anaptixiaki Psychologia twon Proton Xronon (Progress in Developmental Psychology of the First Years). University of Crete Press: Heraklion.
- Kugiumutzakis, G. (1993) Intersubjective vocal imitation in early mother-infant interaction. In J. Nadel and L. Camaioni (Eds), New Perspectives in Early Communicative Development. London: Routledge.

- Kugiumutzakis, G. (1994) Is early human imitation an emotional phenomenon? In S. Bråten (Ed), Intersubjective Communication and Emotion in Ontogeny, Symposium Proceedings, The Norwegian Academy of Science and Letters. August.
- Kugiumutzakis, G. (1995) Anthropini anaptixi: to klouvi kai ta poulia (Human development: the cage and the birds). In G. Kugiumutzakis (Ed), Anaptixiaki Psychologia: Parelthon, Paron, Mellon (Developmental Psychology: Past, Present, Future). Heraklion: University of Crete Press.
- Kugiumutzakis, G. (1998a) Origins and genesis of early infant mimesis to facial and vocal models. In J. Nadel and G. Butterworth (Eds), Imitation in Onfancy: Progress and Prospects of Current Research. Cambridge CUP (in press).
- Kugiumutzakis, G. (1998b) Neonatal imitation in the inter-subjective companion space. In S. Bråten (Ed), Intersubjective Communication and Emotion in Ontogeny. Cambridge: Cambridge University Press (in press).
- Kugiumutzakis, G. (1998c) I anaptixi ton aisthiseon tou eautou kata ton Stern (The development of self sensations according to Stern). Psyxiki Igia kai Psychopathologia tou Paidiou kai tou Efivou (Psychic Health and Psychopathology of the Child and the Adolescent), volume 1 (in press).
- Kuhl, P. K. and Meltzoff, A. N. (1982) The bimodal perception of speech in infancy. Science, 218: 1138-1141.
- Kuhl, P. K. and Meltzoff, A. N. (1984) The intermodal representation of speech in infants. Infant Behaviour and Development, 7: 361-381.
- Lamb, M. E. (1975) Fathers: forgotten contributors to child development. Human Development, 18: 245-266.
- Lamb, M. E. (1976) The Role of the Father in Child Development. New York: Wiley.
- Lamb, M. E. (1977) Father-infant and mother-infant interaction in the first year of life. Child Development, 48: 167-181.
- Lamb, M. E. (1979) Paternal influences and the father's role: a personal perspective. American Psychologist, 34: 938-943.
- Lamb, M. E. (1982) On the familial origins of personality and social style. In L. M. Laosa and I. E. Sigel (Eds), Families as Learning Environments for Children. New York and London: Plenum Press.

- Lamb, M. E. (1987) The Father's Role: Cross Cultural Perspectives. London: Lawrence Erlbaum Associates.
- Lamb, M. E. and Elster, A. B. (1985) Adolescent mother-infant-father relationships. Developmental Psychology, 21: 768-773.
- Lamb, M. E., Hwang, C. P., Frodi, A. M. and Frodi, M. (1982) Security of mother- and father-infant attachment and Its relation to sociability with strangers in traditional and nontraditional Swedish families. Infant Behaviour and Development, 5: 355-367.
- Lamb, M. E. and Lamb, J. E. (1976) The nature and importance of the father-infant relationship. The Family Coordinator, 25: 379-385.
- Lamb, M. E., Pleck, J. H. and Levine, J. A. (1987) Effects of increased paternal involvement on fathers and mothers. In C. Lewis and O'Brien. M. (Eds), Reassessing Fatherhood: New Observations on Fathers and the Modern Family. London: Sage Publications.
- Lamb, M. E. and Stevenson, M. B. (1978) Father-infant relationships: their nature and importance. Youth and Society, 9: 277-298.
- Lang, P. J. (1984) Cognition in emotion: concept and action. In C. E. Izard., J. Kagan., and R. B. Zajonc (Eds), Emotions, Cognition and Behaviour. United States of America: Cambridge University Press.
- Legerstee, M. (1990) Infants use multimodal information to imitate speech sounds. Infant Behaviour and Development, 13: 343-354.
- Lester, B. M. (1984) Infant crying and the development of communication. In Fox, N. A. and Davidson. R. J. (Eds), The Psychobiology of Affective Development. Hillsdale: Lawrence Erlbaum Associates
- Lewis, C. (1982) "A feeling you can't scratch"?: The effect of pregnancy and birth on married men. In N. Beail and J. McGuire (Eds), Fathers: Psychological Perspectives. London: Junction Books.
- Lewis, C. (1986) Becoming a Father. United States of America: Open University Press.
- Lewis, C. and O'Brien, M. (1987) Reassessing Fatherhood: New Observations on Fathers and the Modern Family. London: Sage Publications.
- Lewis, M. M. (1936) Infant Speech. London: Routledge and Kagan Paul.

- Lewis, M. (1972) Mothers and fathers, girls and boys: attachment behavior in the one-year-old. In Monks-Hartup de Wit (Ed), Determinants of Behavioural Development. London: Academic Press.
- Lewis, M. and Michalson, L. (1983) Children's Emotions and Moods: Developmental Theory and Measurement. London: Plenum Press.
- Lewis, M. and Weinraub, M. (1976) The father's role in the child's social network. In M. E. Lamb (Ed), The Role of the Father in Child Development. New York: Wiley.
- Liddell, C., Henzi, S. P. and Drew, M. (1987) Mothers, fathers, and children in an urban park playground: A comparison of dyads and triads. Developmental Psychology, 23: 262-266.
- Lynch, M. P. (1996) The case of total deafness II: Phrasing of prelinguistic vocalizations of a child born with congenital absence of cochleas. Applied Psycholinguistics, 17: 1-31.
- Lynch, M. P., Oller, D. K., Steffens, M. L. and Buder, E. H. (1995) Phrasing in prelinguistic vocalizations. Developmental Psychobiology, 28: 3-25.
- Lynn, D. B. (1974) The Father: His Role in Child Development. Monterey: Brooks/Cole.
- Lynn, D. B. (1976) Fathers and sex-role development. The Family Coordinator, 25: 403-409.
- Longman Dictionary of Contemporary English (1987), Longman Group.
- Lourenco, O. and Machado, A. (1996) In defense of Piaget's theory: a reply to 10 common criticisms. Psychological Review, 103: 143-164.
- MacFarlane, A. (1977) The Psychology of Childbirth. London: Fontana/Open Books.
- Machtlinger, V. (1976) Psychoanalytic theory: Preoedipal and oedipal phases with special reference to the father. In M. E. Lamb (Ed), The Role of the Father in Child Development. New York: Wiley.
- Mackay, W. C. and Day, R. D. (1979) Some indicators of fathering behaviours in the United States: a crosscultural examination of adult male child-interaction. Journal of Marriage and the Family, 41: 287-299.

- Macleod, H., Morse, D. and Burford, B. (1993) Computer support for behavioural event recording and transcription. Psychology Teaching Review, 2: 2112-116.
- Mahl, G. F. (1982) Father-son themes in Freud's self-analysis. In S. H. Cath., A. R. Gurwitt. and J.M. Ross (Eds), Father and Child: Developmental and Clinical Perspectives. Boston: Little and Brown Company.
- Maratos, O. (1973) "The Origin and Development of Imitation in the First Six Months of Life". Unpublished Ph.D Thesis, University of Geneva.
- Maratos, O. (1982) "Trends in the development of imitation in early infancy". In T. G. Bever (Ed), "Regressions in Mental Development: Basic Phenomena and Theories". New Jersey: Lawrence Erlbaum Associates, Publishers.
- Maratos-Panopoulou, O. (1988) To amfolegomeno thema tis mimisis sta mwra: Simiwma-apantisi sto arthro tou I.Kougoumoutzaki "H genesis tis anthrwpinis mimisis" (The controversial subject of imitation in infants: A note-answer to the article of G. Kugiumutzakis "The origin of human imitation"). Psychologica Themata, 2: 82-85.
- Maratos, O. (1996) Newborn and infant imitation: a case of intersubjective communication. Invited talk at the Second European Research Conference on "The Development of Sensory, Motor and Cognitive Abilities in Early Infancy: Antecedents of Language and the Symbolic Function", Barcelona, Spain, April 1996.
- Masters, J. C. (1979) Interpreting "imitative" responses in early infancy. Science, 205, 215.
- Masters, J. C. and Carlson, C. R. (1984) Children's and adult's understanding of the causes and consequences of emotional states. In C. E. Izard., J. Kagan. and R. B. Zajonc (Eds), Emotions, Cognition and Behaviour. United States of America: Cambridge University Press.
- Mayer, N. K. and Tronick, E. Z. (1985) Mother's turn-giving signals and infant turn-taking in mother-infant interaction. In T. M. Field and N. A. Fox (Eds), Social Perception in Infants. Norwood, NJ: Ablex.
- McKenzie, B. and Over, R. (1983) Young infants fail to imitate facial and manual gestures. Infant Behaviour and Development, 6: 85-95.
- Mead, G. H. (1934) Mind, Self and Society: from the Standpoint of a Social Behaviorism. Chicago: The University of Chicago Press.

- Meltzoff, A. N. and Moore, M. K. (1977) Imitation of facial and manual gestures by human neonates. Science, 198: 75-78.
- Meltzoff, A. N. and Moore, M. K. (1979) Interpreting "imitative" responses in early infancy. Science, 205: 217-219.
- Meltzoff, A. N. and Moore, M. K. (1983a) Newborn infants imitate adult facial gestures. Child Development, 54: 702-709.
- Meltzoff, A. N. and Moore, M. K. (1983b) Methodological Issues in Studies of Imitation: Comments on McKenzie and Over and Koepke et al. Infant Behaviour and Development, 6: 103-108.
- Meltzoff, A. N. and Moore, M. K. (1989) Imitation in newborn infants: exploring the range of gestures imitated and the underlying mechanisms. Developmental Psychology, 25: 954-962.
- Meltzoff, A. N. and Moore, M. K. (1992) Early imitation within a functional framework: the importance of person identity, movement and development. Infant Behaviour and Development, 15: 479-505.
- Meltzoff, A. N. and Moore, M. K. (1994) Imitation, memory and the representation of persons. Infant Behaviour and Development, 17: 83-99.
- Meltzoff, A. N. and Moore, M. K. (1995a) A Theory of the Role of Imitation in the Emergence of Self. In P. Rochat (Ed), The Self in Early Infancy. New York: North-Holland-Elsevier, Science Publishers.
- Meltzoff, A. N. and Moore, M. K. (1995b) Understanding the intentions of others: Re-enactment of intended acts by 18-month-old children. Developmental Psychology, 31: 838-850.
- Miller, N. E. and Dollard, J. (1945) Social Learning and Imitation. London: Kegan Paul, Trench, Trubner and Co.
- Moran, G., Krupka, A., Tutton, A. and Symons, D. (1987) Patterns of maternal and infant imitation during play. Infant Behaviour and Development, 10: 477-491.
- Morgan, C. L. (1896) Habit and instinct. In A. Riopelle (Ed), Animal Problem Solving. London: Penguin Books.
- Moss, H. A. (1967) Sex, age and state as determinants of mother-infant interaction. In J. Sants and H. J. Butcher (Eds), Developmental Psychology: Selected Readings. London: Penguin Books.

- Mounoud, P. and Vinter, A. (1981) Representation and sensorimotor development. In Butterworth, G. (Ed), Infancy and Epistemology: An Evaluation of Piaget's Theory. Sussex: The Harvester Press.
- Mowrer, O. H. (1950) Identification: a link between learning theory and psychotherapy. In O. H. Mowrer (Ed), Learning Theory and Personality Dynamics: Selected Papers. New York: The Ronald Press Company.
- Murray, L. (1992) The impact of postnatal depression on infant development. Journal of Child Psychology and Psychiatry, 33 (3): 543-561.
- Murray, L. and Trevarthen, C. (1985) Emotional regulation of interactions between two-month-olds infants and their mothers. In M. Field and N. A. Fox (Eds), Social Perception in Infants. Norwood: NJ, Ablex.
- Nadel-Brulfert, J. (1980) The functional role of imitation in personality development: Wallon's contribution, French-Language Psychology, 1: 169-177.
- Nadel, J. (1986) Matching activities and the regulation of peer-toddler sustained interactions. In J. Camus and J. Cosnier (Eds), Ethology and Psychology. Toulouse: Privat, I.E.C.
- Nadel, J. (1993) The development of communication: Wallon's framework and influence. In B. Vyt., H. Bloch and P. Bornstein (Eds), Francophone Perspectives on Structures and Process in Early Mental Development. New Jersey: Erlbaum.
- Nadel-Brulfert, J. and Baudonniere, P. M. (1982) The social function of reciprocal imitation in 2-year-old peers, International Journal of Behavioural Development, 5: 95-109.
- Nadel, J. and Fontaine, A. M. (1989) Communicating by imitation: A developmental and comparative approach to transitory social competence. In H. Schneider et al. (Eds), Social Competence in Developmental Perspective. Dordrecht: Kluwer Academic Publishers.
- Neisser, U. (1993) The self perceived. In U. Neisser (Ed), The Perceived Self: Ecological and Interpersonal Sources of Self-Knowledge. Cambridge: Cambridge University Press.
- Nelson, K. E., Heimann, M. and Abuelhaija, L. (1989) Implications for language acquisition models of childrens' and parents' variations in imitation. In G. E. Speidel and K. E. Nelson (Eds), The Many Faces of Imitation in Language Learning. London: Springer-Verlag.

- Newson, J. (1977) An intersubjective approach to the systematic description of mother-infant interaction. In H. R. Schaffer (Ed), Studies in Mother-Infant Interaction. London: Academic Press.
- Newson, J. (1978) Dialogue and development. In A. Lock (Ed), Action, Gesture and Symbol: The Emergence of Language. London: Academic Press.
- Newson, J. and Packer, S. (1972) Imitation and Pre-verbal Communication. Unpublished paper. Child Development Research Unit. University of Nottingham.
- Pakizegi, B. (1978) The interaction of mothers and fathers with their sons. Child Development, 49: 479-482.
- Papoudi, D. (1993) Interpersonal Play and Communication between Young Autistic Children and their Mothers. PhD thesis. University of Edinburgh
- Papousek, H. and Papousek, M. (1977) Mothering and the cognitive headstart: psychobiological considerations. In H. R. Schaffer (Ed), Studies in Mother-Interaction. London: Academic Press.
- Papousek, H. and Papousek, M. (1983) Interactional failures: their origins and significance in infant psychiatry. In J. Call., E. Galenson and R. Tyson (Eds), Frontiers of Infant Psychiatry. New York: Basic Books, Inc, Publishers.
- Papousek, H. and Papousek, M. (1984) The evolution of parent-infant attachment: new psychobiological perspectives. In J. Call., E. Galenson and R. Tyson (Eds), Frontiers of Infant Psychiatry, Volume II. New York: Basic Books, Inc, Publishers.
- Papousek, M. and Papousek, H. (1989) Forms and functions of vocal matching in interactions between mothers and their precanonical infants. First Language, 9: 137-158.
- Papousek, M., Papousek, H. and Bornstein, M. H. (1985) The naturalistic vocal environment of young infants: on the significance of homogeneity and variability in parental speech. In T. M. Field and N. A. Fox (Eds), Social Perception in Infants. Norwood, N.J.: Ablex.
- Papousek, M., Papousek, H. and Harris, B. J. (1987) The emergence of play in parent-infant interactions. In D. Grolitz and J. F. Wohlwill (Eds.), Curiosity, Imagination, and Play: On the Development of Spontaneous Cognitive and Motivational Processes. Hillsdale: N.J.: Erlbaum.
- Paraskevopoulos, J. and Hunt, J. (1971) Object construction and imitation under differing conditions of rearing. Journal of Genetic Psychology, 119: 301-321.

- Parke, R. D. (1979) Perspective on father-infant interaction. In J.D. Osofsky (Ed), The Handbook of Infant Development. New York: Wiley.
- Parke, R. D. (1981) Fathering. Glasgow: Fontana Paperbacks.
- Parke, R. D., Grossman, K. and Tinsley, B. R. (1981) Father-Mother-Infant interaction in the Newborn Period: A German-American Comparison. In T. Field (Ed), Culture and Early Interactions. New Jersey, Lawrence Erlbaum Associates.
- Parke, R. D., O'Leary, S. E. and West, S. (1972) Mother-father-newborn interaction: Effects of maternal medication, labor and sex of infant. Proceedings of the American Psychological Association, 80th Annual Convention.
- Parke, R. D. and Sawin, D. B. (1976) The father's role in infancy: a re-evaluation. The Family Coordinator, 25: 365-371.
- Pawlby, S. J. (1977) Imitative interaction. In H. R. Schaffer (Ed), Studies in Mother-Infant Interaction. London: Academic Press.
- Pedersen, F. A. (1985) Research and the father: Where do we go from here? In S. Hanson and F. Bozett (Eds), Dimensions of Fatherhood. Beverly Hills: Sage.
- Pedersen, F. A., Cain, R., Zaslow, M. J. and Anderson, B. J. (1982) Variation in infant experience associated with alternative family roles. In L. M. Laosa and I. E. Sigel (Eds), Families as Learning Environments for Children. New York and London: Plenum Press.
- Pedersen, F. A. and Robson, K. S. (1969) Father participation in infancy. American Journal of Orthopsychiatry, 39 (3): 466-472.
- Pedersen, F. A., Yarrow, L. J., Anderson, B. J. and Cain, R. L. (1979) Conceptualization of father influences in the infancy Period. In M. Lewis and L. Rosenblum (Eds), The Child and its Family. New York: Plenum Press.
- Pedersen, F. A., Zaslow, M. J., Cain, R. L. and Anderson, B. J. (1981) Cesarean childbirth: psychological implications for mothers and fathers. Infant Mental Health Journal, 4: 257-263.
- Phillips, R. D., Wagner, S. H., Fells, C. A. and Lynch, M. (1990) Do infants recognize emotion in facial expressions?: Categorical and "metaphorical" evidence. Infant Behaviour and Development, 13: 71-84.
- Piaget, J. (1950) The Psychology of Intelligence. London: Routledge and Kegan Paul LTD.

- Piaget, J. (1951/1962) Play, Dreams and Imitation in Childhood. London: Routledge and Kegan Paul.
- Piaget, J. (1936/1953) The Origin of Intelligence in the Child. London: Routledge and Kegan Paul LTD.
- Plutchik, R. and Kellerman, H. (1980) Emotion: Theory, Research, and Experience. New York: Academic Press.
- Pöppel, E. (1994) Temporal mechanisms in perception. International Review of Neurobiology, 37: 185-202.
- Power, T. G. (1981) Sex-typing in infancy: the role of the father. Infant Mental Health Journal, 2: 226-240.
- Power, T. G. and Parke, R. D. (1982) Play as a context for early learning: lab and home analysis. In L. M. Laosa and I. E. Sigel (Eds), Families as Learning Environments for Children. New York and London: Plenum Press.
- Power, T. G. and Parke, R. D. (1983) Patterns of mother and father play with their 8-month-old infants: a multiple analyses approach. Infant Behaviour and Development, 6: 453-459.
- Reber, A. S. (1985) The Penguin Dictionary of Psychology. Penguin Books
- Reissland, N. (1988) Neonatal imitation in the first hour of life: observations in rural Nepal. Developmental Psychology, 24: 464-489.
- Ricci-Bitti, P. and Scherer, K. R. (1986) Interrelations between antecedents, reactions, and coping responses. In K. R. Scherer., H. G. Wallbott. and A. B. Summerfield (Eds), Experiencing Emotion: a Cross-Cultural Study. Great Britain: Cambridge University Press.
- Rodgon, M. M. and Kurdek, L. (1977) Vocal and gestural imitation in 8-, 14- and 20-month old children. The Journal of Genetic Psychology, 131: 115-123.
- Rogers, S. J., Bennetto, L., McEvoy, R. and Pennington, B. F. Imitation and pantomime in high-functioning adolescents with autism spectrum disorders. Child Development, 67: 2060-2073.
- Roopnarine, J. L., Talukder, E., Jain, D., Joshi, P. and Srivastav, P. (1990) Characteristics of holding, patterns of play, and social behaviours between parents and infants in New Delhi, India. Developmental Psychology, 26: 667-673.

- Saarni, C. (1982) Social and affective functions of nonverbal behaviour: developmental concerns. In R. S. Feldman (Ed), Development of Nonverbal Behaviour in Children. New York: Springer-Verlag.
- Sawin, D. B., and Parke, R. D. (1979) Fathers' affectionate stimulation and caregiving behaviours with newborn infants, The Family Coordinator, 28: 509-513.
- Scherer, K. R. (1982) Methods of research in vocal communication: paradigms and parameters. In K. R. Scherer and P. Ekman (Eds), Handbook of Methods in Nonverbal Behaviour Research. Cambridge: Cambridge University Press.
- Scherer, K. R. and Ekman, P. (1982) Handbook of Methods in Nonverbal Behaviour Research. Cambridge: Cambridge University Press.
- Schore, A. N. (1994) Affect Regulation and the Origin of the Self: The Neurobiology of Emotional Development. Hillsdale: Lawrence Erlbaum Associates.
- Sears, R. R., Rau, L. and Alpert, R. (1965) Identification and Child Rearing. Stanford, California: Stanford University Press.
- Shennum, W. A. and Bugental, D. B. (1984) The development of control over affective expression in nonverbal behaviour. In R. S. Feldman (Ed), Development of Nonverbal Behaviour in Children. New York: Springel-Verlag.
- Shweder, R. A. (1994) "You're not sick, you're just in love": emotion as an interpretative system. In P. Ekman and R. J. Davidson (Eds), The Nature of Emotion: Fundamental Questions. Oxford: Oxford University Press.
- Sibulkin, A. E. and Uzgiris, I. C. (1978) Imitation by preschoolers in a problem solving situation. Journal of Genetic Psychology, 132: 267-275.
- Siegel, G. M., Cooper, M., Morgan, J. L. and Sarshad, R. (1990) Imitation of intonation by infants. Journal of Speech and Hearing Research, 33: 9-15.
- Solomon, G. E., Johnson, S. C., Zaitchik, D. and Carey, S. (1996) Like father, like son: Young children's understanding of how and why offspring resemble their parents. Child Development, 67: 151-171.
- Staton, R. D. (1972) A comparison of Mexican and Mexican-American Families. The Family Coordinator, 21: 325-330.
- Stern, D. (1974) Mother and infant at play: the dyadic interaction involving facial, vocal and gaze behaviours. In M. Lewis and L. Rosenblum (Eds), The Effect of the Infant on its Caregiver. London: John Wiley.

- Stern, D. (1984) Affect attunement. In J. Call., E. Galenson. and R. Tyson (Eds), Frontiers of Infant Psychiatry, Volume II. New York: Basic Books, Inc, Publishers.
- Stern, D. (1985) The Interpersonal World of the Infant: A View from Psychoanalysis and Developmental Psychology. United States of America, Harper Collins Publishers.
- Stern, D. (1993) The role of feelings for an interpersonal self. In U. Neisser (Ed), The Perceived Self: Ecological and Interpersonal Sources of the Self-Knowledge. New York: Cambridge University Press.
- Stern, D. (1995) The Motherhood Constellation: A Unified View of Parent-Infant Psychotherapy. United States of America: Harper Collins Publishers.
- Stern, D., Barnett, R. and Spieker, S. (1983) Early transmission of affect: some research issues. In J. Call., E. Galenson. and R. Tyson (Eds), Frontiers of Infant Psychiatry. New York: Basic Books, Inc, Publishers.
- Stern, D., Hofer, L., Haft, W. and Dore, J. (1985) Affect attunement: The sharing of feeling states between mother and infant by means of inter-modal fluency. In T.M. Field and N.A. Fox (Eds), Social Perception in Infants. Norwood, N.J.: Ablex.
- Sun, L. C. and Roopnarine, J. L. (1996) Mother-infant, father-infant interaction and involvement in childcare and household labor among Taiwanese families. Infant Behaviour and Development, 19: 121-129.
- Tauber, M. A. (1979) Sex differences in parent-child interaction styles during a free-play situation. Child Development, 50: 981-988.
- Tomasello, M., Kruger, A. C. and Ratner, H. H. (1993) Cultural learning. Behavioral and Brain Sciences, 16(3): 495-552.
- Tomkins, S. S. (1980) Affect as amplification: some modifications in theory. In R. Plutchik and H. Kellerman (Eds), Emotion: Theory, Research, and Experience. New York: Academic Press.
- Trad, P. V. (1990) Infant Previewing: Predicting and Sharing Interpersonal Outcome. New York: Springer-Verlag.
- Trevarthen, C. (1977) Descriptive studies in infant behaviour. In H. R. Schaffer (Ed), Studies in Mother-Infant Interaction. London: Academic Press.
- Trevarthen, C. (1979) Communication and cooperation in early infancy: a description of primary intersubjectivity. In M. Bullowa (Ed), Before Speech: the Beginnings of Human Communication. London: Cambridge University Press.

- Trevarthen, C. (1980) Instincts for human understanding and for cultural cooperation: their development in infancy. In M. von Cranach., K. Foppa., W. Lепенies. and D. Ploog (Eds), Human Ethology: Claims and Limits of a New Discipline. Cambridge: Cambridge University Press.
- Trevarthen, C. (1982) Basic patterns of psychogenetic change in infancy. In T. Bever (Ed), Regressions in Mental Development: Basic Phenomena and Theories. Hillsdale, New Jersey: Erlbaum.
- Trevarthen, C. (1985) Facial expressions of emotion in mother-infant interaction. Human Neurobiology, 4: 21-32.
- Trevarthen, C. (1986) Form, significance and psychological potential of hand gestures of infants. In J. Nespoulous., P. Perron. and A.R. Lecours (Eds), The Biological Foundations of Gestures: Motor and Semiotic Aspects. London: Lawrence Erlbaum Associates, Publishers.
- Trevarthen, C. (1990) Signs before speech. In T. A. Sebeok and J. Umiker-Sebeok (Eds), The Semiotic Web, 1989, Berlin, New York, Amsterdam: Mouton de Gruyter.
- Trevarthen, C. (1993a) An appreciation of the interpersonal psychology of Henri Wallon. Enfance, 47: 43-46.
- Trevarthen, C. (1993b) The self born in intersubjectivity: An infant communicating. In U. Neisser (Ed), The Perceived Self: Ecological and Interpersonal Knowledge of the Self. New York: Cambridge University Press.
- Trevarthen, C. (1993c) The function of emotions in early infant communication and development. In J. Nadel and L. Camaioni (Eds), New Perspectives In Early Communicative Development. London: Routledge.
- Trevarthen, C. (1997) The nature of motives for human consciousness. Psychology: The Journal of the Hellenic Psychological Society, 4(3): 187-221 (Special Issue, Part 2, December 1997: "The Place of Psychology in Model Science." Ed. T. Velli).
- Trevarthen, C. (1998) Concept and foundations of infant intersubjectivity. In S. Braten (Ed), Intersubjective Communication and Emotion in Early Ontogeny. Cambridge: Cambridge University Press (in press).
- Trevarthen, C. and Hubley, P. (1978) Secondary intersubjectivity: confidence, confiding and acts of meaning in the first year. In A. Lock (Ed), Action, Gesture and Symbol: the Emergence of Language. London: Academic Press.

- Trevarthen, C., Kokkinaki, T. and Fiamenghi, G. (1998) What infants' imitations communicate: with mothers, with fathers and with peers. In J. Nadel and G. Butterworth (Eds), Imitation in Infancy: Progress and Prospects of Current Research. Cambridge CUP (in press).
- Trevarthen, C. and Logotheti, K. (1987) First symbols and the nature of human knowledge. In J. Montangero., Athyphon. and S. Dionnet (Eds), Symbolisme et connaissance/Symbolism and Knowledge. Cahier No.8, Geneva: Jean Piaget Archives Foundation.
- Trevarthen, C. and Marwick, H. (1986) Signs of motivation for speech in infants, and the nature of a mother's support for development of language. In B. Lindblom and R. Zetterstrom (Eds), Precursors of Early Speech. Basingstoke: Macmillan.
- Tronick, E. Z., Cohn, J. and Shea, E. (1986) The transfer of affect between mothers and infants. In T. B. Brazelton and M. Yogman (Eds), Affective Development in Infancy. Norwood, NJ: Ablex.
- Turner, T. J. and Ortony, A. (1992) Basic emotions: can conflicting criteria converge? Psychological Review, 99: 566-571.
- Uzgiris, I. C. (1972) Patterns of vocal and gestural imitation in infants. In F. J. Monks., W. W. Hartup and J. deWitt (Eds), Determinants of Behavioural Development. New York: Academic Press.
- Uzgiris, I. C. (1978) Imitation by preschoolers in a problem-solving situation. The Journal of Genetic Psychology, 132: 267-275.
- Uzgiris, I. C. (1979) Continuity and discontinuity: the case of imitation. Paper presented at the meeting of the International Society for the Study of Behavioural Development. Sweden: Lund.
- Uzgiris, I. C. (1981) Two functions of imitation during infancy. International Journal of Behavioural Development, 4: 1-12.
- Uzgiris, I. (1983) Mother-infant communication during the first year of life. Paper presented at the meeting of the International Society for the Study of Behavioural Development, Munich, F.R. Germany.
- Uzgiris, I. C. (1984) Imitation in infancy: its interpersonal aspects. In M. Perlmutter (Ed), Parent-Child Interaction and Parent-Child Relations in Child Development. Hillsdale: NJ, Erlbaum.
- Uzgiris, I. (1989) Infants in relation: performers, pupils, and partners. In W. Damon (Ed), Child Development Today and Tomorrow. United States of America: the Jossey-Bass social and behavioural science series.

- Uzgiris, I. C. and Silber, S. (1976) Imitation with and without objects in infancy. Unpublished manuscript, Clark University.
- Valentine, C. W. (1930) The psychology of imitation with special references to early childhood. British Journal of Psychology, XXI: 105-132.
- Van der Veer, R. and Valsiner, G. (1991) Understanding Vygotsky: A Quest for Synthesis. Cambridge: Blackwell Publishers.
- Vinter, A. (1986) The role of movement in eliciting early imitations. Child Development, 57: 66-71.
- Vygotsky, L. S. (1978) Mind in Society: The Development of Higher Psychological Processes. London: Harvard University Press.
- Vygotsky, L. S. (1987) Thought and Language. London: The MIT Press.
- Wallbot, H. G., Riccit-Bitti, P. and Banninger-Huber, E. (1986) Non-verbal reactions to emotional experiences. In K. R. Scherer., H. G. Wallbott. and A. B. Summerfield (Eds), Experiencing Emotion: a Cross-Cultural Study. Great Britain: Cambridge University Press.
- Wallon, H. (1934/1949) Les origines du caractère chez l'enfant. Paris: Presses Universitaires de France.
- Waxler, C. Z. and Yarrow, M. R. (1975) An Observational Study of Maternal Models. Developmental Psychology, 11: 485-494.
- Winnicott, D. W. (1957) The Child and the Family: First Relationships. London: Tavistock Publications Ltd.
- Yogman, M. W. (1981) Games fathers and mothers play with their infants. Infant Mental Health Journal, 2: 241-248.
- Yogman, M. W. (1982a) Development of the father-infant relationship. In H. Fitzgerald., B. Lester. and M.W. Yogman (Eds), Theory and Research in Behavioural Pediatrics, Vol 1. New York: Plenum.
- Yogman, M. W. (1982b) Observations on the father-infant relationship. In S. H. Cath., A. R. Gurwitt. and J. M. Ross (Eds), Father and Child: Developmental and Clinical Perspectives. Boston: Little Brown.
- Zazzo, R. (1957) Le probleme de l'imitation chez le nouveau-ne. Enfance, 10: 135-142.