THE PLAY BEHAVIOUR OF YOUNG BLIND CHILDREN

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STATEMENT OF ORIGINALITY.

This work has not previously been submitted for a degree or diploma in any university. To the best of my knowledge and belief, the thesis contains no material previously published or written by another person except where due reference is made in the thesis itself.

Roseann Evelyn Ferguson

ABSTRACT

There are very few studies on developmental patterns of play in blind children. Those studies which do exist suggest that their play is not only delayed but also different in both qualitative and quantitative terms. Study 1 of this thesis gathered descriptive, cross-sectional data on the spontaneously-emerging patterns of play behaviour in 16 'educationally blind' children aged 1 year 4 months to 6 years. Study 2 extended Study 1 by gathering further play data and taking measures of concurrent developmental status, thereby allowing differences in play profiles to be related to both chronological age and current stage in cognitive, language, social, gross motor and fine motor development. All eight categories of play commonly found in sighted children were observed in the group of blind children who participated in these two studies: collaborative, exploratory, imitative, repetitive, constructive, functional, receptive and pretend play. However, frequency and duration of engagement varied between children and across age groups, reflecting both differences in individual developmental profiles and the affordance of the proffered toys. Many of the play behaviours identified correlated significantly with scores on the developmental measures taken. Children with low scores on sensori-motor understanding, verbal comprehension and expressive language were more involved in exploratory play, and significantly less involved in collaborative, constructive and fantasy play. Although an association between gross and fine motor abilities and functional play behaviour might have been expected, no significant correlations were found with scores on either of the motor measures. In contrast, constructive play, rarely

seen in the younger children, was significantly correlated with fine motor abilities, language and social skills.

The first two studies observed the children playing mainly with toys which were typically available to them in their nursery/school, and it was noted that certain toys appeared to appeal more to the blind child and to engage them differentially. Study 3 was therefore designed i) to allow a comparative investigation of play patterns when 'standard' versus 'blind-friendly' toys were made available, and ii) to provide longitudinal comparative data over an 18 month period on the development of play in blind versus typically-developing young children. Four 'educationally' blind and 4 typically-developing sighted children, matched for general cognitive status and aged 3 to 6 years, played with toys, books and art materials which either had or lacked tactile, olfactory and musical features. Six categories of play were examined, creative, exploratory, constructive, functional, receptive and pretend play. In all 6 categories, there were differences in play behaviour for both blind and sighted children when play took place under 'standard' or 'blind-friendly' conditions. The blind children typically performed less well in the 'standard' condition, producing less varied play, engaging with significantly less materials, and spending a greater length of time off-task than the sighted children. However, in the 'blind -friendly' condition these differences were not evident.

Taken together, these findings suggest that the reported delays in the development of play in blind children may, in part at least, be due to the type of toys

used in research studies or to the methods in which materials are presented to the children. Given the important role play is believed to have in development, the findings have implications for both educational practice and theories of atypical development.

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CHAPTER 1

A REVIEW OF THE LITERATURE ON PLAY

"Animals do not play because they are young, but they have their youth because they must play." (Karl Groos, 1898)

1.1 INTRODUCTION

Although there is a vast literature on the play behaviour of sighted children there is very little on the play behaviour of blind children. This chapter considers how lack of vision may impact on play and the implications of this for the development of the child. Possible reasons for the lack of research into play and blind children will also be investigated and discussed. A review of the literature on play in sighted children and a review of the literature on play in blind children is given, comparing perspectives on the development and importance of play for young children and contrasting the different theories given of play and the different types of play identified by researchers. The ages at which specific play behaviours typically occur are reported and the evidence linking play to cognitive, social and emotional development is reviewed.

This thesis presents findings from a number of studies looking at how play is spontaneously produced and at how it develops in young blind children. It starts from the position that if the specific nature of the difficulties likely to arise in research with blind children are taken into consideration and if research design is linked to the findings of theories relating to categories of play found in the literature on sighted children, it may be possible to identify the nature and causes of the reported delays in the development of play in blind children. It will seek to argue that some of the reported delays stem, not from delays in the development of play per se, but from differences in the inherent affordances of certain kinds of play materials for blind versus sighted children. On the basis of the literature to be reviewed in this chapter and the findings to be reported in subsequent chapters, the view that blind children are delayed in their play behaviour is contested and an attempt made to identify ways in which practitioners might focus on those aspects of play behaviour which are more meaningful to blind children and thus promote and enhance the development of play in this group of children.

Vision and play

Vision is the main input sense for many aspects of development and it is estimated that some 80% to 90% of sensory information is gained through the visual modality (Brambring, 1995). All 5 senses interact and to a large extent are interdependent, however, and so lack of vision impacts dramatically on all learning and development (Fraiberg, 1977; Sonsken and Stiff, 1991; Priesler, 1997; Perez-Pereira and Conte-Ramsden, 1999; Sonsken and Dale, 2002). Sonsken and Dale (2002), suggest, "there are major interactions and interdependence between the visual, neurobiological, psychosocial, neurological...domains." p 784. As there is an underlying assumption in the literature that play in the preschool child is central to early cognitive, social, emotional and physical development, it is important to assess the effects of the lack of vision on the play behaviour of the young blind child.

In the past there has been a great deal of interest in the effects of the lack of vision on development and there is also a vast literature on play and development in the normally developing child. There are very few studies on play and development in the blind child, however. There are a number of reason why the play behaviour of young blind children has not yet been studied to any great extent, most obviously perhaps, because blindness is not a common condition.

Incidence

In a study on the incidence of visual impairment by Clunies-Ross and Franklin (1997) it was suggested there are approximately 20,000 children in the UK classified as visually impaired (2.1 children per 10,000). However only 5% (840) of those classified visually impaired between the ages of 4 and 16 use Braille and are considered educationally blind. The medico-legal methods currently used to establish the numbers of visually impaired children may underestimate incidence (Webster and Roe, 1998) and certainly when doing research or interpreting research findings, grouping visually impaired children together into a homogenous group based on medical or legal definitions of visual impairment often presents difficulties.

Legal and medical definitions of visual impairment are different to educational definitions. The medical definitions of visual impairment are generally based on visual acuity tests that measure only one or two aspects of vision, essentially estimations of what a person can and cannot see. By contrast, educationalists prefer to make judgments based on an individual's visual function – that is, what they can and cannot do with the vision that they have.

Heterogeneity

Children with visual impairments are a heterogeneous population in terms of the type and severity of their visual impairments. Fifty percent of children with visual impairment have enough vision to use large print, 25% have light perception, and 25 % are totally blind (Warren, 1994; Hodapp, 1998). Several causes of visual impairment are closely associated with the presence of other disabilities. For example, increasing numbers of infants are born very prematurely and survive but are at risk of developing retinopathy of prematurity, cortical visual impairment, refractive errors and other types of visual impairments (Jacobson, Ek, Fernell, Flodmark, and Broberger, 1996; Luoma, Herrgard, and Martikainen, 1998), along with learning disabilities, hearing loss, and other medical problems (Pike, Holmstrom, de Vries, Pennock, Drew KJ, Sonksen, and Dubowitz, 1996.). There is likewise a higher incidence of cortical visual impairments, refractive errors, and other visual problems in infants with cerebral palsy, Down syndrome, and other genetically-based developmental disabilities than in the non-disabled infant population (Hodapp, 1998). A small number of children who are visually impaired also have a hearing loss: 2 in every 1000 children with disabilities have both a visual impairment and hearing loss and are typically referred to as deaf-blind (Baldwin, 1993).

Visual impairments can range from mild low vision to functional or total blindness. Many children have additional disabilities such as physical impairments, learning disabilities, or developmental delays, but cognitive abilities can range from those who are gifted to those who are severely and multiply handicapped. Tobin (1998) suggests 'the job of researchers and practitioners, whether blind or sighted, is to identify, more precisely, where and when handicap can arise' (p113).

Rates of progression and regression

Cass, Sonksen, and McConachie (1994) examined the Reynell Zinken developmental scores of three groups of visually impaired children: those who were totally blind, those whose vision improved as they developed, and those who maintained some form of useful vision throughout the six year period of their study. In comparison to the partially sighted groups, many more of the children who were totally blind, 31 percent (10 of the 32), showed regressions in development over the 1 to 6 year period of the study. All regressions involved a significant loss of language production, comprehension, or sensorimotor abilities, which began at 16 to 27 months; less than half of these children experienced even partial recovery over the following few years.

1.2 PLAY IN NORMALLY DEVELOPING CHILDREN

The review of literature below begins with a general overview of the literature on play behaviour in normally developing children and then goes on to look more specifically at what is known about play behaviour in young blind children.

The following are the two main questions which arise when researchers consider play in young children:

- What is play?
- What function in development, if any, does it serve?

Definitions of play

> "Play is a free activity standing quite consciously outside "ordinary" life as being "not serious", but at the same time absorbing the player intensely and utterly. It is an activity connected with no material interest, and no profit can be gained by it. It proceeds within its own proper boundaries of time and space according to fixed rules and in an orderly manner. It promotes the formation of social groupings which tend to surround themselves with secrecy and to stress their differences from the common world by disguise or other means." (Huizinga, 1970, p13).

The definition cited above is just one of many definitions given to play, and although play is reliably recognised when seen, academics have found difficulty in providing a suitable definition (Johnson, Christie, and Yawkey, 1999). Pelligrini and Smith (1998) suggest that no one definition of play is necessary and that no one definition could adequately describe the nature and function of children's play. Nonetheless, researchers have specified a number of components that are typical of play (Garvey, 1977; Rubin, Fein and Vandenberg, 1983). The most widely accepted definition of play is that it is multidimensional and includes the following elements:

- Non literality (i.e., uses one thing to represent another),
- Intrinsic motivation (i.e., reflects a child's interests and curiosity),
- Attention to means (i.e., focuses on "What can I do with it?")
- Freedom from external rules, and active engagement (i.e., engages full attention and participation)
- Positive affect (induces a feeling of joy and an element of tension)

Some theorists, however, such as Johnson, Christie and Yawkey (1999), argue that two of the play characteristics proposed above by Rubin, Fein and Vandenberg (1983), freedom from external rules and active engagement, are too restrictive as they exclude games with rules and daydreaming.

Although there is a general consensus in the literature that play is a voluntary activity involving active (often physical) engagement that is pleasurable for its own sake and includes a make-believe quality (Blanchard, 1995; Makedon, 1984; Pellegrini, Davis and Jones, 1995), it could be argued that play is not always voluntary or pleasurable. For example, play activities may be encompassed within customs and rituals in some cultures and in other cultures there may be parental, peer and social pressures for children to join in a sporting event, such as football. In both these circumstances play may act as a mechanism for children to achieve social interaction and peer acceptance. A number of studies have suggested that there are differences at the level of the individual as to whether play is a voluntary activity. For example, in a review of research on differences between children's and teachers' view of play, Ceglowski (1997) found that teachers considered some academic work presented in game form to be play, whereas the children focused on voluntary choice and self-direction as key elements in play. Similarly, King (1982), in a study of preschool children and fifth graders found that preschool children believed only voluntary activities were play whereas fifth graders defined play as an activity, voluntary or required, which was pleasurable. Wood and Attfield (1996) point out that "in the urge to explain and categorise play, we may be overlooking the fact that children define play for themselves" (p4). Hence each child's definition of what constitutes play may differ from that of adults and other children.

Isenberg and Jalongo (1997) suggest that there are criteria that need to be met to determine whether an activity is play or non-play. They ask the following three questions and then go on to answer them in an attempt to clarify the difference between play and non-play:

1. Who is in charge or control?

   Play: The child is in charge of the situation. There are a variety of choices available (Open-ended).

Non-play: Someone else is in charge of the situation. There are a limited number of responses available (Close-ended).

2. Why are the children engaged in this behaviour?

   Play: The child is engaged for the sake of experience or pleasure.
   Non-play: The child is engaged for some sort of reward.

3. What are the constraints of the environment on the children's behaviour?

   Play: The child can freely pretend and engage in creative expression and behaviour.
   Non-play: The child has to conform to reality and demonstrate specific behaviours.

Play and work

Play is often defined in the literature as the opposite of work (Farley, 1998; Wood and Attfield, 1996). Wardle (1987) writes, "Children do not play for a reward—praise, money, or food. They play because they like it."(p. 28). Huizinga (1970) also argues that play is not considered productive but is rather performed for its own sake and Froebel distinguishes play from work by the fact that "play is what children are involved in when they initiate the task and work is what they do when they fulfil a task required by an adult" (quoted in Bruce, 1992, p17). According to Ellis (1973), work is meaningful and purposeful; with play something people do in their spare time.

Wardle (1999) argues this tendency in the literature to define play as the opposite of work makes it easy to question the validity of play. However, some theorists have attempted to reconcile the differences between work and play. The Plowden Report of 1967 stated, "knowledge does not fall into neatly separate compartments and work and play are not opposite but complementary" (para.19). Rogers and Sharapan (1993) also contend that in childhood, work and play seem to come together and that for young children their play is their work.

Blanchard (1995) has proposed a model of play which incorporates an association between play and work (Figure 1.1, see over). The four quadrants in Blanchard's model are designed to embody the full range of human activities. Quadrant A (playful work) defines work that is satisfying and rewarding and therefore could be considered both work and play. Quadrant C (not-play work), on the other hand, includes types of work that are not enjoyable, but are done due to obligations. Quadrant B (playing at leisure) includes the types of leisure activity, which would most commonly be described by observers as play. Finally, Quadrant D (not-play leisure) defines periods where, although technically leisure time, neither play nor work is being carried out.

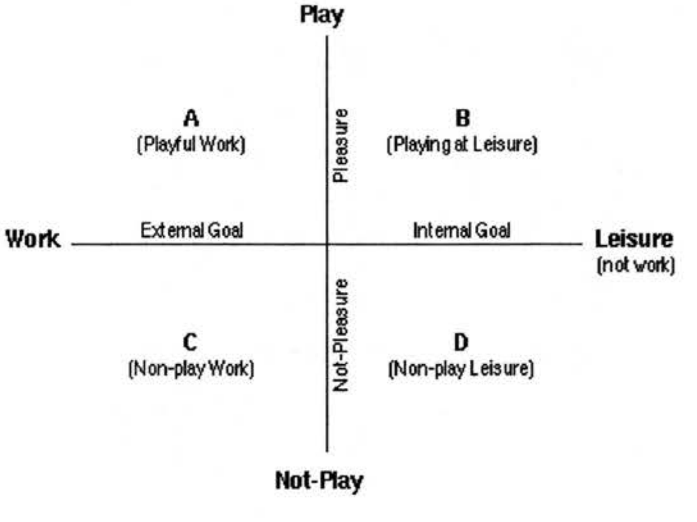


Figure 1.1 The Dimensions of Human Activity (taken from Blanchard, 1995)

The goals for work (Quadrants A and C) are external to the individual whereas the goals for leisure (Quadrants B and D) are internal. Blanchard's model, although perhaps designed to depict the adult world of work and leisure, may be appropriately applied to children's work and play, if school, nursery and the home are considered places were work may be carried out. Although this model attempts to reconcile the differences between work and play in that work can be enjoyable, it is argued that although work can be enjoyable it is still extrinsically motivated, and the non-literal element that typifies play is not usually found in work (Hughes 1991). Wood and Attfield argue, "This polarisation between work and play has evolved because of diverse definitions and conflicting perspectives about its relationship with learning" (Blanchard 1995, p9).

1.3 THEORIES OF PLAY

The role of play in children's development and learning has historically been a controversial topic. Attitudes towards the value of play range widely: from beliefs that play is something "trivial or fruitless", not as vital as work, may be demoralising, may stifle educational growth, and if pursued for its own sake may lead to irresponsible behaviour (Ellis, 1973) to beliefs that children's play is a primary vehicle for and indicator of their mental growth (Fromberg, 1986; Sponseller, 1982) and enables children to progress along the developmental sequence from the sensorimotor intelligence of infancy to preoperational thought in the preschool years to the concrete operational thinking exhibited by primary children (Piaget, 1952). In addition to its role in cognitive development, the belief is also widely held by many that play serves important functions in children's physical, emotional, and social development (Herron & Sutton Smith, 1974).

Although it is suggested in the literature that no adequate theory of play exists and that every theory provides a somewhat different perspective (van der Kooij and Meyjes, 1986), it is nevertheless argued that all theories provide a framework or model to provide a fuller understanding of child development (Hughes, 1991). Most contemporary psychological theories of play concentrate on the areas of physical, cognitive, social and emotional development.

Cognitive developmental theories

The most influential theorists of cognitive development and play are undoubtedly Piaget and Vygotsky. Piaget (1952) considered play as an assimilation strategy and imitation as an accommodation strategy. Play, he argues, supports the assimilation of new ideas into a person's existing knowledge structures, whereas imitation supports accommodation, a process which expands a person's cognition as they build new knowledge structures by adapting already existing structures. Piaget suggests play progresses through three distinct stages from, practice or functional play, to symbolic play and finally to play with rules

Vygotsky's theories of child development and of play are both centred on his concept of the zone of proximal development (ZPD – Vygotsky, 1978) and suggest that with the help of a skilled partner, children can perform tasks that would otherwise be beyond their reach. Vygotskian theory assumes a more reciprocal connection among play, cognition and language than Piagetian theory. The Zone of Proximal Development is defined as "the distance between the actual developmental level as determined by independent problem solving and the level of potential development as determined through problem solving under adult guidance or in collaboration with more capable peers" (p. 86). Vygotsky recognised the natural enhancement of ability provided to a child through play and maintained that:

> "Play creates its zone of proximal development of the child. In play, a child is always above his average age, above his daily behaviour; in play it is as though he were a head taller than himself" (Vygotsky, 1976, p552)

Piaget's theories are often criticised for neglecting the social aspects of learning and his views are often contrasted with those of Vygotsky who looked more to social interaction as the primary source of cognition and behaviour. Attempts have been made to reconcile these differences by suggesting that Vygotsky and Piaget offer complementary rather than competing views (Bruner, 1974; Glassman, 1994; Fowler, 1994).

Social and emotional theories (psychoanalytic)

1. Emotional development

The psychoanalytic theory of play regards play as a reflection of children's emotional conflicts and developing intellectual competence. Play can give children a feeling of empowerment in a world that caters to adults. It also allows them a means of expressing strong, negative emotions and it gives them an outlet for their aggression (Kraus, 1990).

According to Freud, play allows children to feel in control of a situation and children need to feel they have some control since this helps them to deal with reality (Kraus, 1990).

2. Social development

By definition, social development involves an interaction with the environment, the environment being both the physical surroundings and the people within these physical surroundings. The environment in turn influences the course of the child's development of social relations. Parten (1933) charted the changing nature of children's social play from the unoccupied play of the one year old to the co-operative play of the 4 year old as they interacted with both children and adults and with objects in their environment. Parten described the following ways children participate in play:

Unoccupied play - Children watch others at play but do not join in. They may just stand around or move around the area.

Onlooker - 2 year old- Children watch others at play, talk to other children, or ask questions. These children seem to move closer to a group rather than watching whatever momentarily catches their attention.

Solitary play - 2 year old - A child plays alone with objects. Even if the child is within speaking distance of others the child does not alter his or her play or interact with others.

Parallel play - All age groups - A child plays with toys like those used by nearby children. The child does not try to influence other children's activities " He plays beside rather than with other children".

Associative play - 3-4 year olds - Common activities occur between children. Children may exchange toys and/or follow one another. All the children in the group are doing similar activities, but specific roles and goals are not defined.

Co-operative play - 4 year olds - Two or more children are engaged in a play activity that has a common goal, one that can be realised only if all the participants carry out their individual assigned roles.

Almost forty years later, Barnes (1971) attempted to replicate Parten's study. His findings suggested that children still progress from the unoccupied play of the one year old to the co-operative play of the 4 year old but he found that the children in his study engaged in significantly less associative and cooperative play than the children in Parten's study 40 years earlier.

Physical (Biogenic) theories

From both the psychoanalytic and the cognitive perspectives, the motivation to play is considered intrinsic but there are a number of other behaviourist and biogenic theories of play which see the motivation to play as extrinsic. To these theorists, play is a means to promote physical development and to satisfy basic physiological needs. For example:

- The surplus energy theory holds that play is used as a means of release for excess energy.
- The recapitulation theory suggests that individuals go through stages in their personal development and that this evolution is biologically based.
- Arousal theories maintain that the brain has an optimal arousal level to which it is constantly striving. To increase the arousal level, the brain frequently pushes

the organism to execute actions which have no immediate survival enhancing function. Since this drive has no apparent immediate useful purpose, it can be thought of as a drive to "play". If there is too little stimulation in the organism's environment then it is driven to seek more "interesting" and unpredictable experiences to balance the boredom of real-life. Conversely, if the organism is under stress through over-stimulation, it will attempt to escape to a less stimulating environment, again potentially allowing play-like behaviours to emerge and demonstrating an inherent instinct to play (Ellis, 1973; Fein, 1981).

Historically the psychoanalytic and the cognitive perspectives of play behaviour have been kept apart. However, as Slade and Wolf (1994) suggest, there is much to be gained from considering these phenomena as integrated and necessarily complementary because cognitive development is limited to a certain range at any given age and full cognitive development requires social and emotional interaction.

Behaviourist and biogenic theories see the motivation to play as extrinsic. The psychoanalytic and the cognitive theories see the motivation to play as intrinsic. The Vygotskyian activity theory of development suggests development can be either internal or external in motivation but both need to be analysed together for a proper understanding to be achieved. Internalisation relates to the human being's ability to imagine, to consider alternative approaches to a problem and to perform mental simulations (e.g. to imagine/pretend a toy brick is a cup of milk). Externalisation transforms an internalised action into an external one (e.g. pretending to drink from it).

From the above, it is clear that there are many theories of play in the literature but that these theories may not be alternative views of the same thing, but different views of different things, describing different parts or different aspects of play. For example, a "theory of play" may deal with one small aspect such as its motives, its function, its structure, its meaning, its nature, its appreciation, its enjoyment, its understanding, or the conditions necessary for its creation. A "theory" may deal with the verbal, the social, the behavioural, the emotional, or the cognitive level and so on, hence each theory tends to supplement rather than exclude the other.

1.4 PLAY CATEGORIES

Play is often described in the literature as progressing along a developmental continuum. Piaget (1962), for example, describes play as progressing in a developmental sequence through the following three stages:

- Practice play - exploratory and sensorimotor (six months to 2 years)
- Symbolic play - sociodramatic, fantasy or pretend play, involving the use of mental representation (2 to 6 years)
- Games with rules (6 to 7 years and upwards)

Smilansky (1968) adds a fourth type of play - constructive play - and suggests play progresses from functional play through constructive play to dramatic play and then to games with rules. Weinberger and Starkey (1994) agree with Smilansky and suggest the first and earliest type of play is functional play, which is defined as "muscle movements with or without objects" (p 328). The second type is constructive play in which children use objects to build or create something. Finally, pretend play emerges, which is characterised by children reproducing events, taking on the roles of others, and using objects in new ways.

It is perhaps worth briefly noting here differences in terminology which arise in reference to 'symbolic' and 'pretend' play. As noted above, symbolic play is frequently described in the literature as encompassing pretend, sociodramatic and fantasy play behaviours (see e.g. Goldstein, 1994, Piaget, McCune-Nicolich, 1981, Leslie 1987, MacIntyre, 2001). The following are Oxford English Dictionary and Roget's Thesaurus definitions of symbol/symbolic, pretend and fantasy; no definition for sociodramatic appears in either:

- Symbol: An image, representation. Symbolic: The practice of representing objects, events, or relationships by means of symbols
- Fantasy: An imagined event or sequence of mental images.
- Pretend: To make believe by using the imagination. To represent fictitiously in play; make believe:

From the above definitions the words image or representation appear to be the two key words linking the meanings of pretend, fantasy and symbolic play. According to Leslie (1987), there are three potential manifestations of pretence in pretend play: object substitution, attribution of pretend properties, and/or use of imaginary objects. Has one object been made to stand in for another, different object? (e.g. has the child pretended a shell was a cat?). Has a pretend property been attributed to an object or a situation? (e.g. has the child pretended the dolly's [clean] face is dirty?). Has the child invented an imaginary object? (e.g. has the child pretended that a spoon is there when it is not?). If we have evidence that the child's play involves any one of these, we have reason to believe the child is engaged in pretend play. Otherwise, we have no compelling reason to assume pretence. This is how the terms symbolic/pretence/fantasy play will be used in this thesis.

There has been substantial research on exploratory and symbolic play but less on the other forms of play, it is argued that the stages of play described in the literature should not be seen as distinct but overlapping (Smith, Cowie and Blades, 1998).

Exploratory play

During the period from birth to approximately 2 years of age, exploration is the predominant form of play with objects (Pellegrini and Boyd, 1993). In her study of mother and child interactions, Clarke-Stewart (1973) found that children of 18 months spend about 50% of their time exploring and playing with objects. Although certain types of exploratory behaviour are described as play in the literature, Hughes (1991) has argued that there are ways in which exploration and play differ. In terms of the child's affective state, Hughes suggests exploration is often characterised as a neutral or mildly negative emotional experience, while play is seen as joyful and highly positive. Hughes also suggests that exploratory behaviour is stereotypical, ritualistic and is accompanied by a certain amount of tension, whereas play is devoid of stereotypy and rigidity and is more flexible and relaxed. Ruff and Saltarelli (1993) differentiate 'active' forms of exploration, such as manipulation accompanied by inspection, and mouthing from sensorimotor behaviours, and manipulation or inspection performed in isolation, which they describe as 'non-exploratory'. They propose that the former, which involve focused attention, are the most effective in extracting information about objects, a claim supported by evidence from experiments using habituation and recovery as indices of learning (Ruff, Saltarelli, Cappozzoli, and Dubiner, 1992)

Berlyne (1960,1971) and Wohlwill (1981) also suggest that here is more than one type of exploratory behaviour, as the following three examples illustrate:

- Type 1. *Inspective behaviour*, which is aimed at uncertainty reduction. Exploratory behaviour occurs in order to analyse a new situation, to gain comfort by assessing danger levels, etc. (Berlyne, 1960).
- Type 2. *Diversive behaviour*, which is stimulus/sensation seeking. An individual engages in this in order to relieve boredom or to raise arousal (Berlyne, 1960).
- Type 3. *Affective exploration*, which is directed at maintenance of an optimal hedonic tone. In children this may be high level play for the pure joy of it. In adults, it may take the form of mental explorations, such as philosophising (Wohlwill, 1981).

The difference between affective and diversive exploration can be thought of as different levels of the same thing. Whereas diversive behaviour is aimed at boredom relief, or simple stimulation, affective behaviour is tied more to extraordinary stimulation.

Functional play

Functional play is frequently described in the literature as a component of exploratory play. However, Belsky and Most (1981) and Weinberger and Starkey (1994) suggest that functional play is a separate category of play which develops as exploratory play decreases. They suggest that the development of functional play indicates knowledge of how toys should be used (e.g., pushing a toy vehicle) and includes activities that involve the combination of two or more objects (e.g., placing one block on top of another). Similarly, Lewis, Norgate, Collis, and Reynolds (2000) describe functional play as play in which the child shows understanding of everyday objects by playing in an appropriate way with a toy which is physically similar to an everyday object but may often be of a very different size.

Repetitive play

There is very little in the literature on repetitive play and in the main it is referred to as perseverative behaviour with little or no value. However, as Wardle (1999) points out, children progress through levels of complexity in play, and master new concepts by practicing them through repetitive play, hence, progressing to the next level of complexity in their understanding.

Constructive play

There are a number of definitions in the literature of constructive play. It is described as a stage of play amongst children during which they develop skills by using objects in non-pretend ways (such as doing a jigsaw puzzle), fostering the ability to see things in a new way or to see problems that no one else may even realise exist, and then using prior knowledge and available information to provide unique, and effective solutions to these problems (Papalia and Olds, 1993; Smith 1996). Smilanski (1968) argues that constructive play is an intermediate stage between functional play and dramatic play, characterised by the child making something, Smith, Cowie and Blades (1998) suggest that the distinct sequential nature of constructive play in Smilanski's scheme is questionable because Piaget believed "Constructive games are not a definitive stage of play like the others, but occupy... a position halfway between play and intelligent work or between play and imitation" (Smith, Cowie and Blades, 1998, p130). The goal-directed nature of much constructive activity, for Piaget, made it more accommodative than purely playful behaviour.

Creative play

Although creative play is often included in the literature as a component of constructive play, there are a number of elements within creative play behaviours which do not fit the definitions of constructive play. Constructive behaviour is mainly perceived as play with objects which is carried out in a non-pretend ways, for example, whereas creative play may be carried out with or without objects, as in activities such as creative movement, creative games and creative dramatic play.

Symbolic play

Piaget (1952) argued that the main feature of the transition from the sensorimotor to the pre-operational stage was the development of representational capacities. Among the earliest manifestations of representational abilities is the expression of the understanding that one object may stand for another, that is, the emergence of symbolism. Symbolic representation involves the use of some form of reference (object, action, vocalisation, thought) to represent another. This representation may be literal (e.g. drawing), obey the laws of social convention (as in the case of language), or may be completely arbitrary (symbolic play).

For an infant to engage in symbolic play it is often assumed (e.g. Piaget, 1962) that the child must treat an object as being something other than it is, e.g. treating a wooden brick as a cup. Symbolic play is not usually witnessed before the second half of the second year of life (McClune-Nicolich, 1980). Vygotsky (1978) proposed that the development of symbolic thinking, oral language and literate behaviour occur together and that the development of written language is related to oral language in symbolic play. If a child's language development is delayed, similar lags are seen in symbolic play and imitation (Bates, O'Connell and Shore, 1987; Snyder, 1978; Ungerer, Sigman and Levinson, 1984). When children start to combine words at around 18 months of age, they also start to combine symbolic gestures into a sequence of pretend play. In a review of the literature, Pellegrini (1985) concluded that although observational results support the theory that both symbolic play and literate behaviour involve representational abilities, experimental results question a causal relationship between symbolic play and literate behaviour. Vygotsky argued that in order for children to be able to engage in symbolic play, they must sever the meaning of an object from its physical form. A variation on this view has been offered by Leslie (1987), who maintained that pretence involves 'metarepresentations' of objects, unconstrained by reality. Leslie's account proposes that symbolic play becomes possible around the age of 18 months because of maturation and the 'switching on' of a 'decoupling device' which enables the child to engage in metarepresentation. Belsky and Most (1981) concluded that age was a poor predictor of the child's level of sophistication in symbolic play, and several other studies have reported differences in the symbolic play of children of equal ages (Belsky, Garduque and Herncir, 1984; Slade, 1987). Johnson Christie and Yawkey (1999, p82-83) also cite results from a study by van der Kooij (1998) showing that imitation does not decline with age but remains fairly constant over the years.

Physical Play

Physical play, although a characteristic mode in children's play behaviour, has not received the psychological attention given to other forms of play (Pellegrini and Smith, 1998; Humphreys and Smith, 1984). However, from those studies which do exist, physical play is considered valuable in many way as it provides critical opportunities for children to develop both individual gross and fine muscle strength and an overall integration of muscles, nerves, and brain functions (van Lewick-Goodall, 1968; Shore 1997). Research has suggested a critical link between stimulating activity and brain development (Shore, 1997) and Pellegrini and Smith (1998) suggest that there are three types of physical play, each with different functions:

1. *Rhythmic stereotypies* (e.g. body rocking and foot kicking) occur most frequently throughout the first year of life and it is estimated that an infant spends approximately

5.2% of their time in their first year in stereotypic behaviours (Thelen, 1981; McHugh and Lieberman 2003). Thelen claims that such "rhythmic stereotypies are transition behaviour between uncoordinated behaviour and complex, coordinated motor control." In her opinion, they are "phylogenetically available to the immature infant. In this view, rhythmical patterning originating as motor programs essential for movement control... are "called forth", so to speak, during the long period before full voluntary control develops, to serve adaptive needs later met by goal-corrected behaviour" (p 253). She suggests an adaptive function for such stereotypies as aids to the infant in becoming an active participant in their social environment.

2. *Exercise play* occurs from preschool to the middle childhood years. Developmental progression in gross motor abilities makes possible a form of play that is much more physical in nature and involving body parts, such as running, hopping and jumping. It is hypothesised that exercise play functions primarily for strength, endurance, fat reduction and thermoregulation.

3. *Rough and tumble play* involves play-fights, with chasing, hitting and rolling. Pellegrini and Smith, argue that although rough and tumble play has primarily a dominance function, it also has a distinct social component. While child development experts report that rough-and-tumble play occurs more often among boys than girls, the value of rough and tumble play is frequently questioned. Many educators believe rough and tumble play symbolises violent acts of aggression. Children that become involved in rough and tumble play are often unpopular with their peers and it is also thought that

play fighting can turn into real fighting as its intensity increases (Johnson et al, 1999). The question then most often asked about rough and tumble play is 'Is this behaviour normal or is it a reflection of a more violent society?'

The functional hypothesis theory suggests that rough-and-tumble play originally functioned as practice for fighting and hunting skills (Humphreys and Smith, 1984) but this does not mean that it still functions in this way today, or that other effects of this form of play may not now be culturally of greater importance. Modern theorists suggest that this form of play gives children a chance to exercise and release energy and helps them to handle feelings and control impulses, teaching them to work within a group and serving as a form of social communication (Johnson et al., 1999).

1.5 PLAY MATERIALS

Early years educationalists have for many years been aware of the importance of the availability of play materials to children's play. A number of studies have shown that toy-related activities account for a great deal of children's play time (Giddings and Halverson, 1981; Hutt, Tyler, Hutt and Christopherson, 1989; Tizard, Phelps and Plewis, 1976). Giddings and Halverson (1981) observed 562 children during play in nurseries. They found play which involved play materials constituted, on average, 30% of all play behaviours. Tizard, Phelps and Plewis's (1976) study of British preschool children also found play materials to be a significant part of their play, with 97% of children's free play activity involving some kind of play material. Authors argue that learning activities and play materials should be concrete, real, and **relevant** to the lives of young children if they are to be used to good developmental effect (Piaget, 1952; Biber, 1984; Evans, 1984; Kline and Meckstroth, 1985; Williams and Kamii, 1986; Schickedanz, 1986; Seefeldt, 1992)

1.6 PLAY TUTORING

"Free play" means play free of structure and adult involvement. However the literature shows adults play a variety of critical roles in supporting children's play. These roles include providing materials that encourage high-quality play, structuring environments, modelling play, and introducing children to new play opportunities. Vygotsky's idea of scaffolding (Vygotsky, 1978; Berk and Winsler, 1995) is particularly useful in explaining the role of an adult in extending play. He highlights the use of private speech by children to structure, extend, and expand their own play, conceptualising this as the children's internalisation of scaffolding.

It is evident from the above that developmental theory can provide useful structures through which to organise thinking about play and advance our understanding of children's play development. The research on development and play described above gives a fairly global picture of the stages children pass through as they grow but with some fair degree of inconsistency in expression within these stages. Piaget's belief that development always follows an invariant order and that stages are clean and distinct has been widely challenged and although it is generally conceded that there is some sort of global order in the emergence of play behaviours there is a great deal of variability within that order. The tests of developmental stage which emerged from Piaget's theory have also been questioned as they have been shown to vary depending on the amount of informational redundancy in the task; if a child is familiar with, for instance, a perspective-taking task (or is made familiar), if there are salient landmarks available, and/or if the relevant perceptual input is made more prominent, then young children tend to be able to succeed on tasks for which Piaget would have maintained they were not yet developmentally ready (Donaldson, 1978; DeLisi,1983) .

1.7 BENEFITS OF PLAY

Although a wide range of individual and social benefits are presumed to be associated with play, there is "considerable disagreement about exactly what the benefits of play are" (Smith, Cowie and Blades, 1998, p178). Based on a review of more than 40 studies, Fisher (1992) nevertheless felt able to conclude that play enhances the progress of early development by up to 34% to 67% - by increasing adjustment, improving language and reducing social and emotional problems.

Materials

It is argued that children who have a variety of toys available for their use and choose to use them perform better on various intellectual measures than infants who lack such materials, at the time as well as later in life (Hughes, 1991; p 163). In a study of young children's play and development, Bradley, (1985) established a moderate relation between toy availability and children's developmental progress throughout early childhood. Theme-related reading and writing materials have similarly been shown to increase emergent reading and writing abilities (Christie, 1994; Newman and Roskas 1997).

Social benefits of play

In a study by Ladd and Hart (1992), 83 preschool children and their families were observed and measures taken of peer relations in informal and school contexts, including the frequency of parents', children's, and peers' play initiations. It was found that frequent parent initiations were associated with higher levels of prosocial behaviour, lower levels of nonsocial behaviour and, among boys, greater peer acceptance in preschool. Children who were more initiating of informal peer contacts displayed less anxious behaviour in school and were better liked by their classmates. Finally, the degree to which parent's involved children in the process of arranging informal play activities was positively related to the frequency with which children initiated their own peer contacts. Ladd and Hart concluded "Preschoolers' social competence may depend on the frequency with which informal play activities are initiated by parents, children, and playmates".

Benefits of Symbolic play

A number of studies have demonstrated the importance of symbolic play as a tool for learning curriculum content with 3 to 6-year-old children. When teachers provide a thematic organisation for play, offer appropriate props, space, and time, and become involved in the children's play by extending and elaborating on their ideas, both language and literacy skills have been shown to benefit (Levy, Schaefer and Phelps, 1986; Schrader, 1989, 1990; Morrow, 1990; Pramling, 1991; Levy, Wolfgang and Koorland, 1992).

The effects of exploring/not exploring

Most studies show that exploratory behaviour is a positive trait. For example, a positive relationship between exploratory behaviour and creativity has been found (Vidler, 1977). A study by Hutt and Bhavnani (1972) showed that boys' responsiveness to novel stimuli in preschool years was associated with higher scores on a creativity test at age nine. Initially, exploration of toys and other objects takes the form of indiscriminate mouthing and simple manipulation. In the course of development, exploratory behaviours decline with age (as there is less uncertainty in the adult's world that needs to be understood) and are gradually replaced by functional play and various forms of pretence play which signal the ability to use symbolic thought processes (Belsky and Most, 1981;Voss 1987).

Benefits of constructive (and creative) play

Constructive play allows children to experiment with objects, find out combinations that work and do not work, and acquire basic knowledge about stacking, building, drawing, and constructing. It also gives children a sense of accomplishment and empowers them with some degree of control over their environment. Children who are comfortable manipulating objects and materials also become good at manipulating words, ideas, and concepts (Wardle, 1999). Although creative play is often included in the literature as a component of constructive play, teaching staff in nurseries and schools frequently structure creative play as a separate art form, using paints, crayons and other art materials. For example, MacIntyre (2001) provides the following list of benefits associated with arts and crafts activities:

Social development

- Taking turns
- Sharing equipment
- Discussing with peers and adults
- Cooperating/ sharing idea's

Perceptual motor development

- Controlling paint brush, pencils, pens, sponges, glue spreader
- Hand - eye coordination
- Placing textures (collage)
- Creating a pattern/design
- Crossing the midline (to draw certain patterns)

Emotional Development

- Appreciating the pattern
- Making choices, e.g. which colour to use and why
- Expressing ideas and thoughts on paper
- Experiencing different textures (glue, play dough, materials) on fingers
- Using symbols to express ideas
- Sense of achievement

Intellectual Development

- Learning colours and their names
- Language - children describing their pictures
- Sharing their ideas

(Taken from MacIntyre's 2001 'Enhancing Learning Through Play')

1.8 PROBLEMS ASSOCIATED WITH FAILURE TO PLAY

Psychologist David Elkind has carried out extensive research into what happens to children who are not allowed to play (Elkind, 1989). He maintains that many parents now "overprogram" their children by enrolling them in too many activities and as a consequence, all of their time is pre-programmed and they have no opportunities to play freely. The result, according to Elkind, is that more children are suffering from stress, emotional and mental breakdowns, and other conditions that used to be considered adult diseases and conditions:

> "Unfortunately the value and meaning of play are poorly understood in our hurried society. What happened to adults in our society has now happened to children. Play has been transformed into work. What was once recreational - sports, summer camp, musical training - is now professional and competitive" (Elkind, 1989; p 55).

Failure to play socially

During the last two decades a convincing body of evidence has accumulated to indicate that unless children achieve minimal social competence by about the age of six years, they have a high probability of being socially at risk throughout life (McClellan and Katz, 1993). Hartup (1992) suggests that peer relationships contribute a great deal to both social and cognitive development and to the effectiveness with which we function as adults. She states that:

> "Indeed, the single best childhood predictor of adult adaptation is NOT IQ, NOT school grades, and NOT classroom behaviour but, rather the adequacy with which the child gets along with other children. Children who are generally disliked, who are aggressive and disruptive, who are unable to sustain close relationships with other children, and who cannot establish a place for themselves in the peer culture are seriously "at risk".

Other problems associated with failure to play socially include poor mental health, poor employment history, low achievement and other school difficulties (Katz and McClellan, 1991).

Although many researchers have suggested that play enhances cognitive, social emotional and physical development and there is some evidence that failure to play may have long lasting effects in these areas, causal relationships have been difficult to substantiate, partly because so many factors affect children's development. Environments differ both culturally and physically and research shows that children have individually distinctive personalities and temperaments from birth which interact with their social, emotional and physical development. Some children develop faster or slower, not always following the prescribed and expected pathways, or within the expected time frames. This is especially true where there are impairments like blindness. As Johnson et al (1999) point out "A child's disability (both its nature and intensity) can affect a child's approach to play activity and what a child can gain from a play opportunity or experience"(p157).

1.9 PLAY BEHAVIOURS IN CHILDREN WHO ARE VISUALLY IMPAIRED

A number of studies suggest that the play behaviour of visually impaired children differs in quality and quantity from that of sighted children (Fraiberg, 1977; Hughes Dote-Kwan and Dolendo, 1998; Parsons, 1986a, 1986b; Recchia, 1997; Rettig, 1994; Schneekloth, 1989; Troster and Brambring; 1994; Lewis et al 2000). Hughes et al (1998) observed the play of 13 preschool children with visual impairments while they played alone in their homes. Findings revealed that over half of the play behaviours were in the category of exploration and sensorimotor play, with symbolic play accounting for less than 4% of all play behaviours.

In a study of symbolic and functional play by Lewis, Norgate, Collis and Reynolds, (2000), two symbolic tests were used to assess the nature of pretend play in 18 visually impaired children aged between 21 and 86 months. The poor scores at first seemed confirmed previous reported delays in symbolic play in blind children. However almost a quarter of the blind children in this study were identified as also being severely, mildly or moderately autistic. When the autistic children's failures were excluded from the results, it was found that the remaining children had age-appropriate scores on pretend play. From this pattern of findings, Lewis et al. concluded that the functional and symbolic play of children with no vision or only light perception did not differ significantly from children with some vision. Their findings also suggested that symbolic play was strongly related to language.

Vision loss must clearly affect the blind child's acquisition of language and ability to communication with others. Erin (1990) reported that children with visual impairments often demonstrate frequent use of questions, with echolalia also common. Other observations of young children with visual impairments reveal that they tend to use physical contact rather than eye contact during interactions. Peers may not appreciate these behaviours: it has been shown that preschoolers with visual impairments and sighted peers do not repair the breakdowns in communication that occur (Kekelis, 1992).

Preisler (1993, 1995) compared the interactions of blind and deaf infants with their mothers between 6 and 18 months. Lack of visual responsiveness in blind infants proved to be a barrier to intersubjectivity, possible because caregivers found it hard to 'read' the more subtle emotional signals from their infant. The blind infants tended to 'freeze' in response to auditory stimulation and were delayed relative to the deaf infants in including objects into their play (an indicator of secondary intersubjectivity).

Parents of blind infants must find it more difficult to incorporate objects into play smoothly due to the lack of eye gaze direction as a cue to attention. They need to learn to 'read' more subtle cues. The object has to be in contact with blind child or be audible if it is to become a topic of joint attention between infant and caregiver. Such situations must be actively produced. The blind child cannot follow the caregiver's pointing gestures and so the scope of joint attention is very limited. Deaf infants, by contrast, usually develop within the normal range, using visual signals to produce and read joint attention cues. Rattray and Zeedyk (1995) studied infant-mother dyads in which either the mother or infant was blind and dyads in which both partners were sighted. The transition from primary to secondary intersubjectivity was found to be smoother with sighted mothers and least smooth in the visually impaired mother/sighted infant dyad, most likely because the visually impaired mother cannot monitor her infant's activity when playing with objects.

Social Interaction

A number of studies have suggested that visually impaired children spend less time in peer interaction than their sighted peers (Lewis, 2003; Preisler, 1997; Troster and Brambring, 1994; Schneekloth 1989), that they are relatively passive and uninvolved in nursery school settings (Preisler, 1993) and that they are more interested in interacting with adults than in playing with toys (Parsons, 1986b). Schneekloth (1989), for example, reported that preschoolers with visual impairments spend one-third of their time interacting with adults while sighted children spend most of their time interacting with other children. Similarly, Erwin and Hill (1993) found that young blind children spent approximately twice as much time playing alone when compared to children with low vision and four times as much time as sighted children. Erwin suggests that young children with visual impairments spend more time playing alone than with peers because they have difficulty interpreting the nonverbal communication of their peers and maintaining interaction. D'Allura, Russello and Cardinali (1998), in a study which compared the social interaction skills of 3 and 4 year olds with and without visual impairments in integrated settings and visually impaired 3 and 4 year olds in special education settings before and after intervention, also found that in the first year of their study, prior to intervention, visually impaired children spent less than 5% of their free time interacting whereas the sighted children spent more than 20% of their free time interacting with peers.

Preschoolers with visual impairments have also been observed to engage in more repetitive behaviours during play and to handle toys in stereotypic ways such as waving, mouthing or banging them; they have also been observed using toys in atypical ways to their sighted peers (Parsons, 1986). These stereotypical behaviours may interfere with social interactions with peers (Brambring and Troster, 1992). Another recent study found children with visual impairments engaging in more gross motor play and less symbolic or imaginative play than their sighted peers (Skellenger, Rosenblum, and Jager, 1997). Similar delays in symbolic play have been reported previously (Fraiberg, 1977; Rogers & Puchalski, 1984).

As can be seen from the above, a number of elements have been linked to the reported delays in the development of play behaviours in the blind child. O'Donnell & Livingston (1991), in a review of the literature on blind children, concluded:

> "Young children with low vision tend to experience delays in cognitive development, motor development, and social skills because of

insufficient motivation and opportunities to explore their environments actively" (p287).

Parsons (1986a) has also suggested that the limited repertoire of play skills in children with visual impairments may be related to lack of opportunities. This suggestion is supported by Olson's (1983) findings in a study of the exploratory behaviour of fifteen legally blind preschoolers and 15 sighted controls in which the children with visual impairments displayed similar behaviours to the sighted children when exploring a variety of toys, with types of behaviours displayed and length of school experience being positively related.

In Germany, Troster and Brambring (1994) interviewed parents of 91 children with visual impairments aged 4 to 72 months. Their findings indicate that these children had less interaction with peers, a preference for tactile-auditory games and toys, and displayed a lower frequency of symbolic play when compared to sighted peers. The blind children preferred musical toys, noisemaking objects, household items, and natural objects (e.g. stones); the sighted children preferred construction toys, picture books, paints, play dough, crayons, and symbolic toys. When with their parents, the children who were blind engaged in cuddling, singing songs and making noises; the sighted children looked at books, read stories, and played with puzzles and other construction and sorting games. The above studies, in conjunction with other findings in the literature, indicate that visual impairment in children affects their early active exploration, inhibits their spontaneous imitation of others, and influences the nature of their play interactions (Brambring and Troster, 1992; O'Donnell and Livingston, 1991; Ross and Tobin, 1997).

Language development

Research suggests that parents of young children who are blind and parents of sighted children speak to their children differently (Anderson, Dunlea, and Kekelis, 1993; Urwin, 1978). For example, Kekelis and Prinz (1996) found that blind preschoolers made fewer utterances than their mothers per communicative episode while sighted children and their mothers had a similar and fewer numbers of utterances - less than two per episode. Appropriate language input, maternal verbal responsiveness, and emotional support have each been shown to be related to the language development of infants with visual impairment (Kekelis and Andersen, 1984, Ungerer, Sigman and Levinson, 1984; Dote-Kwan, 1995). A number of other studies have reported on parental difficulties in communicating with their blind children, Kekelis and Prinz (1996) report that parents use different speech styles with 2 to 3 year old children with visual impairment compared with sighted children, Rogers and Puchalski (1984) suggested that parents use these different speech styles because they have difficulty in interpreting the behavioural clues of their child's focus of interest. Norgate, Collis and Lewis (1998) report an association between over reliance on repetitive social rhymes and poor cognitive and language functioning in the second year.

Play and social acceptance

Children gradually learn about differences in other children who have disabilities. This awareness may emerge between three and five years of age. Gerber (1977), for example, found that preschool-aged children, ranging in age from three-and-one-half to five years of age, were aware of the disabilities of other children. Gerber noted that the awareness of each disability was related to the severity and visibility of the disability, with children aware of highly visible disabilities earlier. Jones (1989) suggested that by age four children could already recognize limitations which were due to physical disabilities. Of particular concern is that young children may reject a child who is disabled because of fear of the disability or stereotypical beliefs about what the disabled child may and may not be able to do (Derman-Spanks, 1989).

Exploratory play and the blind child

A great amount of exploration is done visually in typically developing children. From a fixed position, a sighted child can take in at a glance the positional relationships of significant landmarks and a visual mental map can be created very quickly. For blind children, exploring and playing must be inherently very difficult. It would seem reasonable to suggest that the possibilities for exploratory play must be limited when one does not know what is 'out there' to be explored. Also, the associated delays in independent mobility and the consequent restrictions on interactions with the environment must also impinge not only on play but also on conceptual development in general. (Warren, 1994; Troster and Brambring, 1994; Perez-Pereira and Conti-Ramsden, 1999).

Warren (1994) suggests that there is a growing awareness that all of these delays result from limited opportunities to learn, rather than from visual impairment per se. For example, most manufactured toys are designed to stimulate and address the exploratory play needs of sighted children - their desired function or play potential may mean nothing to blind children as each is typically visually triggered (Boyce and Hammond, 1996). A young child with visual impairment has little reason to explore interesting objects in the environment and thus may miss opportunities to have wide-ranging play experiences and to learn. This low level of exploration may continue until learning itself becomes motivating or until intervention begins.

Play materials

As mentioned above, a study by D'Allura, Russello and Cardinali (1998) examined the effects of play-group composition (segregated or integrated) and category of play materials (functional, constructive, or dramatic) on the level of play and language use in 24 preschool children with developmental disabilities. There were no effects for play-group composition but category of play materials significantly influenced the type of play. These findings are consistent with the position taken by a number of authors that there is need to provide play activities and play opportunities to children which are rich and varied and can thus help to develop concepts and life skills (Neilsen, 1992; Troster and Brambring 1994; Bishop, 2000; Urosevic, and Cross 2003). As Urosevic, and Cross (2003) point out:

> "Although it is easy to begin to search for the ideal toy, flashy and bright, which will teach these skills and certainly, these types of toys do have a place in a child's play, there is a need to question which type of activity the blind child will learn more from: an electronic toy which has only hard plastic textures, with sounds which are not meaningful except within the context of that toy, or household objects which the child will experience throughout daily activities. For example, an electronic toy can teach a (sighted) child to sort shapes, with sounds which correspond to a picture of an animal on each shape. These pictures or plastic shapes of animals are likely meaningless to a blind or visually impaired child, and thus the sounds may be meaningless too" (Urosevic, and Cross, 2003).

There are a number of suggestions in the educational literature on which kinds of materials/ toys might enhance the play of the blind child, such as the 'Little Room' (Neilson, 1996), the Beactive Box (Dunnett, 1997, 1999) and Independent Life Skills Trays (Bishop, 2000). Neilson developed the "Little Room" - a box with a variety of objects, which the child finds interesting and enjoyable, suspended from the ceiling – on the basis of her observations of blind children. She argues that the time spent playing with the objects gives the blind child the opportunity to experience the properties of objects, to compare different objects, and try out on his own different things to do with the object. It allows the child to repeat his actions with an object without dropping or losing it, with this repetition enabling the child to store the information gained from the experiences in memory. The Beactive box was designed because of difficulties in erecting the room and suspending the objects in the original version of Lilli Nielson 'Little Room'. The Beactive box is designed to encourage movement, play and exploration. The box is placed over the child and inside there are objects that are intended to feel and sound interesting. Working from the same principles, Bishop (2000), a preschool teacher at the American Foundation for Blind Children, designed her Independent Life Skills Trays, each focusing on a different aspect of everyday life (e.g. common kitchen utensils, common garden smells etc) and based on Montessori educational materials. Independent Life Skills Trays were designed for blind children from two-and-a-half to five years of age and aim to provide structured and supportive opportunities to initiate, practice, and independently organise their play around everyday events and objects.

Although there are many other suggestions in the educational literature of materials/ toys which might aid the development of play in blind children, many of these have been derived solely from practitioners' observations while working with blind children. There have been very few empirical studies which have evaluated the relative efficacy of different play materials for blind children.

Developmental domains

It is generally taken as a given that differing domains of children's development - physical, social, emotional, and cognitive - are closely interrelated, with development in one domain having the potential to limit or facilitate development in others (Sroufe, Cooper and DeHart, 1992; Kostelnik, Soderman, and Whiren, 1993). For example, when babies begin to crawl or walk, their ability to explore the world expands and this mobility in turn affects their cognitive development. Likewise, children's language skills affect their ability to establish social relationships with adults and other children, just as their skill in social interaction can support or impede their language development.

Because developmental domains are interrelated, visual impairment may have a profound effect on many areas of development: for example, lack of vision may restrict mobility, which in turn restricts exploration, which in turn delays language.

1.10 FACTORS AFFECTING THE PLAY BEHAVIOUR OF YOUNG BLIND CHILDREN.

Children with visual impairments have the same needs as other children physically, but their vision obviously restricts their activities to an extent that they are often delayed in motor development (Bouchard and Tetrault, 2000). Problems such as fear of injury often leave these children over protected and timid about trying out play activities which are physically challenging, for example, riding a bike, football, and rough and tumble play (O'Donnell and Livingston, 1991). As a result, they are often underweight, with poor posture, poor coordination, and poor muscle development (Sforza, Eid and Ferrario 2000). This impaired muscle development may in turn further restrict the children's ability to indulge in the more physical forms of play.

Age of onset of visual impairment also plays an important role in how the blind child will cope with activities requiring movement. For example, a child who has had sight but lost it later in life will have better social skills and perceptual concepts that they can relate to, hence aiding them in play with objects and peers. These individuals have an understanding of colour, movement, speed, etc. but can nevertheless be more prone to frustration and find it difficult to adapt to movements when left without sight. Those born without sight at birth are usually more adaptable to different situations and able to cope without the use of sight better than those who have had vision but then lose it.

Motor development

Levtzion-Korach, Tennenbaum, Schnitzer and Ornoy (2000) assessed motor patterns of development in blind children in a study which compared developmental data on 10 motor skills in 40 blind children and a control group of sighted children, using the motor developmental milestones of the Bayley Developmental Scale and the Revised Denver Developmental Screening Test. Motor development in the blind children proved to be delayed, the delay being significant in all 10 motor skills examined. This delay emphasizes the major importance of vision as a sensory input modality in the process of sensory-motor development. Levtzion-Korach et al. suggested that an adequately stimulating environment and proper parental handling could potentially reduce the degree of this delay in motor developmental delay but probably not eliminate it entirely. Following on from Levtzion-Korach et al's argument, an adequate stimulating environment could be provided by way of suitable play materials with properties which enhance sensor-motor development as, for example, in Lilli Neilsons 'Little Room' (see p 42).

Compensatory skills

The visually impaired do not have any "sixth sense", or senses which are technically any better than the average person, but because they depend totally on their remaining senses, it appears they may hear, smell or feel with more sensitivity than a sighted person (Warren 1984). For the average person, approximately 70% of sensory input is visually based so the average person does not place a lot of concentration on other senses such as hearing or touch. Without the sense of sight, however, these other senses become much more important and perceptual development of these senses, along with the acknowledgement of sensory input through these senses, becomes much more focused for someone with a visual impairment (Lessard, Pare, Lepore and Lassonde, 1998). In an investigation into how an ecologically critical function, three-dimensional spatial mapping, is carried out by early-blind individuals with or without residual vision, it was demonstrated that early-blind subjects can map the auditory environment with equal or better accuracy than sighted subjects. Furthermore they can correctly localize sounds monaurally (unlike sighted subjects); blind subjects with residual peripheral vision, in contrast, localise sounds less precisely than either sighted or totally blind subjects. From this pattern of results it was concluded that compensation varies according to the aetiology and extent of blindness. Behavioural evidence also suggests that totally blind individuals have better auditory ability than sighted subjects, to some extent enabling them to compensate for their loss of vision (Lewis, 2003).

It may also be the case that the visually impaired have superior tactile perceptual discrimination. Studies have shown that certain visual cortical areas can be activated by somatosensory input in blind subjects but not in those with sight (Cohen, Celnik, Pascual-Leone, Corwell, Falz, Dambrosia, Honda Sadato, Gerloff, Catala and Hallett (1997). Cohen et al used transcranial magnetic stimulation to disrupt the function of different cortical areas in people who were blind from an early age as they identified Braille or embossed Roman letters. Transient stimulation of the occipital (visual) cortex induced errors in both tasks and distorted the tactile perceptions of blind subjects. In contrast, occipital stimulation had no effect on tactile performance in normal-sighted subjects, whereas similar stimulation is known to disrupt their visual performance. It was concluded that blindness from an early age could cause the visual cortex to be recruited to a role in somatosensory processing and suggested that cross-modal plasticity may account in part for the superior tactile perceptual abilities of blind subjects.

These findings are in accord with the section above (pp 41-43) describing the tactile and auditory properties of play materials that it is suggested blind children prefer. If the argument that somatosensory processing and cross-modal plasticity may account in part for the superior tactile perceptual abilities of blind subjects, then providing play materials designed to stimulate these intact senses could be of importance to the development of play in blind children.

1.11 OVERVIEW

As can be seen from this review of the literature on play, there has been a great deal of research on the developing patterns of play in typically developing children. The available literature on play in blind children suggests that blind children often lack play skills as a result of the restricted opportunities to engage in play which stem from their impaired visual abilities.

Lack of vision clearly limits the blind child's experience at a very general level, inhibiting the development of understanding of how toys can be used and restricting the affordances of play materials, while simultaneously reducing opportunities for social interaction. At a more specific level, absence of visual props clearly inhibits fantasy formation and interferes with the child's ability to play with toys and to share toys with peers while working collaboratively towards a common goal. Visual impairment is also likely to inhibit the development of the fine motor and gross motor skills central to exploratory play; functional play and creative play and in addition may restrict ability to model or imitate the actions of others.

The problems associated with definitions of play and categories of play in both blind and sighted children have been highlighted in this chapter. Many researchers conducting research on symbolic play, for example, use the terms 'pretend', 'fantasy' and 'symbolic' interchangeably. Similarly, confusions in the definitions of play abound, with some researchers defining a given behaviour as 'exploratory play', for example, while others define the same behaviour as 'repetitive' play. For findings from studies to be understood, replicated or cross-referenced, either a definition of the type of play under study needs to be provided or better still, some standardisation of play terms achieved across studies.

Problems of definition notwithstanding, it is clear from the literature that it is generally accepted that play has benefits for social, emotional, cognitive and physical development. Given the many studies reporting delays in the play behaviour of blind children, the wider importance of supporting the development of play in this group of children is self-evident. Although there has been some research on exploratory and symbolic play in blind children there has been little, if any, on the other forms of play described in the literature for typically developing children. This thesis therefore sought to investigate the types of play displayed spontaneously by young blind children and the ways in which they engage with different types of play materials, including any preferences displayed in these.

The following three questions were investigated:

- Are blind children involved in all of the categories of play reported in the literature for sighted children? (Study 1)
- Is the emergence of different categories of play behaviours in blind children related to developmental stages? (Study 2)
- Does type of play material affect the ways in which young blind children play? (Study 3).

To answer the first question - are blind children involved in all the types of play described in the literature for sighted children? - it was first necessary to ascertain from the literature the most commonly agreed types of play behaviours that are attributed to young children, attempt to reconcile the many definitions of these, and then to apply these definitions to observations of blind children's play.

To address the second question - are the play behaviours in blind children related to developmental stages? - it was necessary to examine the relationship between developmental status and both the type and quality of play behaviours spontaneously produced by blind children, the aim being to identify any relationship between specific play behaviours and stage in cognitive, language, social or motor development.

The third question - does the type of play material affect the way young blind children play? - required a detailed examination of how blind versus sighted children play with different kinds of toys and other kinds of materials which can be incorporated into play, the aim being to investigate whether appropriately–tailored sensory stimulation can substitute for visually-presented stimuli in promoting the development of play in blind children.

Methodological issues

Complications of attributing the reported delays in the play behaviour of young blind children to any one cause have been discussed above (pp 2-5). Many of the studies of blind children reviewed in this chapter tended to group together congenitally blind and visually impaired children, both with and without cognitive and physical impairment, with few reporting any within-group differences. A number of the reports of delays in cognitive, social, emotional and physical development in blind children are additionally based on single case studies. Differences in the level of visual impairment in the children studied further complicate the picture; even a small amount of vision can aid understanding of objects and the environment and hence assisting play. In the same way, if a blind child has had vision for up to two years of age, prior to losing vision, some sort of visual memory may be retained, again facilitating the potential of play objects and toys within the environment (Brambring, 1995, Preisler, 1993; Warren, 1994). Interpretation of findings in the literature is complicated yet further by the inclusion in studies of some children who, although blind from birth and with no apparent physical or cognitive impairment, were found to have a cognitive impairment when followed up a number of years later. These findings suggest the need for caution in interpreting findings from studies of play in very young children with visual impairment and also suggest that there may be inherent difficulties in assessing the cognitive levels of young blind children while still at an early stage in their development. As standardised infant intelligence tests are based on typically developing children, they are not designed to pick up, for example, any improvements in blind children's tactile skills. Such skills, however, may be critical to their progress in many developmental domains.

A number of intervention studies reviewed in this chapter adopted a 'deficit model' of visual impairment in comparing play development in blind children and sighted children. This thesis will argue that the goal of research with blind children should not be to see how well or badly they perform in comparison to sighted children but to identify methods which will support the development of their play and recognise both the strengths and weaknesses in other play-related skills. Comparison groups taken from a deficit standpoint may only show what a blind child cannot do in comparison to a sighted child. However, if a 'difference' approach is taken - proposing for example, that play behaviours in blind children develop in ways functionally equivalent to play development in sighted children (albeit perhaps more slowly or by a different means) – analysing 'differences' rather than 'deficits' may reveal different pathways but to similar developmental levels. This in turn might allow practitioners to recognise areas within play where intervention could enhance both development in general and development of play behaviours. The inclusion of comparison groups can therefore still provide valuable insights into possible intervention methods for blind children but without necessarily prejudging the nature or outcome of developmental processes in this group of children. These issues, including the complexities of assessing cognitive status in blind children and the difficulties of matching sighted with blind children on these dimensions, are addressed in detail in subsequent chapters.

CHAPTER 2

THE PLAY BEHAVIOUR OF YOUNG BLIND CHILDREN

STUDY 1.

2.1 INTRODUCTION

This chapter describes an exploratory study[1] which aimed to gather descriptive data on the spontaneously emerging patterns of play behaviour in a group of young visually impaired children, none of whom had any additional associated impairment. The longer term aim of how young blind children might be helped to develop is addressed in subsequent studies in this PhD (Chapters 3,4 and 5).

i) symbolic representational use of objects,

ii) exploratory skills, and

iii) self generated creativity.

The literature reviewed in Chapter 1 suggests that blind children often lack play skills because of the restricted opportunities which stem from their impaired visual abilities. Absence of visual props, for instance, clearly inhibits fantasy formation

[1] This and the next study have been reported in part in Ferguson, R. and Buultjens M. (1995): The play behaviour of young blind children and its relationship to developmental stages. *British Journal of Visual Impairment*, 13 100 -107.

and interferes with the child's ability to play with and to share with peers while working towards a common goal. Visual impairment is also likely to inhibit the development of the fine motor and gross motor skills central to exploratory play, functional play and creativity and in addition may restrict ability to model or imitate the actions of others. In addition it limits the blind child's experience at a more general level. These difficulties may inhibit the development of understanding of the use of toys and the affordance of play materials while also reducing opportunities for social interaction - hence further impeding the development of all forms of play.

As the literature search reported in Chapter 1 revealed, there is an extensive body of knowledge on the development of play in typically developing children but a real dearth of studies on the developmental patterns of play in young children with severe visual impairment that could be applied to this study. Although there are some useful pointers from studies of symbolic play, social and emotional interaction, and language development in blind children (in for example, Parsons, 1986 a and b; Preisler, 1993; Brambring and Troster, 1991; Lewis and Collis, 1997; Lewis et al., 2000; Perez-Pereira and Conti-Ramsden, 1999; D'Allura, 2002), the first year of the studies to be reported in this thesis of necessity involved observing how and when young visually impaired children spontaneously exhibit different kinds of play, and relating these behaviours to the categories of play which have been established for typically developing children (referred to in Chapter 1).

2.2 METHOD

Participants

Children for the study were identified by contacting the visual impairment education services in all of the 22 regions of Scotland and asking for notification, subject to parental permission, of any children within their service who fulfilled all of the following research-related criteria:

i) diagnosed as blind at birth or by age 2

ii) 'educationally blind[2] (light/colour perception at most)

iii) between the ages of 16 months and 6 years

iv) with no other identified physical or cognitive impairment.

The fourth qualification was considered to be especially important to the research aim of identifying the implications of lack of sight on developing play unconfounded by associated variables such as, additional complex learning difficulties or significant physical impairment.

All 22 regional education services replied giving details of the children within their region who met the research criteria. A total of 17 children were identified and can be assumed to be the total of such children known to educational services in Scotland at the time of the research. One child whose home was geographically too distant from the project base for regular visiting was not included in either of the studies to

[2] The term 'educationally blind' signifies that at the time of recruitment to the study, it was the considered opinion of the specialist visual impairment teacher that the child(ren) referred would need to use non-sighted methods as the main medium for learning.

be reported in this and following chapters. Sixteen 'educationally blind' children, ages 1 year 4 months to 6 years 2 months (mean 41.5 mths; sd 18 mths) and with no other identified physical or cognitive impairment, therefore took part in the study. Fifteen of the children had been blind from birth and one had lost his vision in the second year of life as the result of a tumour in the visual cortex. For the purposes of subsequent analyses, the participants were split into two groups: an older group (N = 9) aged 3 years 6 months to 6 years 2 months (mean 54 mths; sd 12.8 mths) and a younger group (N = 7) aged 1year 4 months to 3 years 0 months (mean 25.4 mths; sd 7.3 mths). Three of the children were currently attending integrated nursery schools and 2 were still at home; the remaining 11 were all attending special educational schools/nurseries for the visually impaired.

For each participating child permission was sought from parents to obtain background medical and family information from the person in charge of the nursery, playgroup or school. This information covered: number of siblings, position in family, visual impairment diagnosis (including any light perception, colour perception, or evidence of functional vision) and details of attendance at nursery or school. For the two children not yet attending nursery school and for those children for whom visits were made to both the home and school the required information was collected directly from the parents.

Table 2.1 shows the medical diagnosis of cause of visual impairment, along with the sex and age of each child at the start of the study. For those children whose chronological age was 3 years and under (N=5), a correction for prematurity is included in parenthesis.

Table 2.1 Description of the 16 blind children participating in study 1

Participant	Sex	Diagnosis	Age at entry to study year/month	Group
A	m	retinopathy of prematurity (LP)	6.2	older
B	f	retinopathy of prematurity (PC)	6.0	older
C	f	Peters'[3] anomaly (PC)	5.0	older
D	m	retinopathy of prematurity	5.0	older
E	f	retinopathy of prematurity	3.10	older
F	m	tumour of the visual cortex	3.9	older
G	m	cone dystrophy (LP)	3.8	older
H	m	retinopathy of prematurity	3.7	older
I	f	retinopathy of prematurity	3.6	older
J	m	septo-optic dysplasia	3.0	younger
K	m	retinopathy of prematurity	2.6 [2.3]	younger
L	m	retinopathy of prematurity	2.6 [2.3]	younger
M	f	retinopathy of prematurity	2.3 [2.0]	younger
N	f	Peters' anomaly (PC)	1.9	younger
O	m	Retinopathy of prematurity	1.6 [1.2]	younger
P	m	Retinopathy of prematurity (LP)	1.4 [1.0]	younger

Key:
PC = perception of colour; LP = light perception; [] = Correction for prematurity (children below 3.0 years)

In cases where some perception of light or colour had been identified, this is indicated by 'LP' (light perception: N=3) or 'PC' (perception of colour: N=3). Hart (1984) reports instances where infants and young children, previously considered

[3] Peters' anomaly is a central corneal opacity (leukoma) that is present at birth. The more hazy and white the cornea the more blurred the vision will be.

blind, have developed vision. The presence of early light or colour perception may also indicate a potential for some degree of visual acuity at later ages. There is little or no available information on developmental outcomes in such cases, however, and certainly no statistical data on the extent of any changes in visual acuity in childhood years. As has been found in other studies (e.g. Thomson et al., 1985), boys outnumbered girls in the research group (N=10 and 6 respectively). As Table 2.1 shows, retinopathy of prematurity was by far the most common cause of blindness, affecting 11 out of the 16 participants.

2.3 DEVELOPMENTAL ASSESSMENTS

In order to get a current measure of developmental status, the Reynell-Zinkin Scales for Young Visually Handicapped Children (Reynell, 1979), specifically designed for use with severely visually impaired children, were administered to each child three months into the study. The Reynell-Zinkin Scales are considered to "serve as reference points - not norms - for the assessment of the developmental stage of the child" (Brambring 1988, p139). The test battery consists of 5 subscales with a total of 114 items and covers the age range birth to 5+ years. The 5 sub-scales measure the following six areas of intellectual development of children with severe visual handicaps:

- social adaptation (SA)
- sensorimotor understanding (SM)
- exploration of the environment (EE)
- response to sound and verbal comprehension (VC)
- expressive language: structure (EL/S)
- expressive language: vocabulary and content (EL/C)

As yet, the test measures only mental development; no physical scale is currently available.

Table 2.2 gives the scores on the Reynell-Zinkin test for all 16 participants 3 months

TABLE 2.2 Reynell - Zinken test scores: 3 months from the start of the research project (n=16)

Participant	Age	SA	SM	EE	VC	EL(S)	EL(C)
A*	6.5	18 (5.0)	23 (5+)	12 (5+)	36 (5+)	22 (5+)	18 (5.3+)
B*	6.3	18 (5.0)	23 (5+)	12 (5+)	36 (5+)	22 (5+)	18 (5.3+)
C*	5.3	18 (5.0)	23 (5+)	12 (5+)	36 (5+)	22 (5+)	18 (5.3+)
D	5.3	17 (3.8)	19 (4.2)	11 (4.0)	22 (4.0)	18 (4.2)	11 (4.3)
E	4.1	15 (3.2)	15 (3.1)	9 (3.0)	18 (3.5)	15 (3.4)	8 (3.10)
F	4.0	18 (5.0)	23 (5+)	12 (5+)	30 (4.11)	22 (5+)	18 (5.3+)
G	3.11	17 (4.0)	18 (3.11)	12 (5+)	27 (4.7)	22 (5+)	16 (5.3+)
H	3.10	16 (3.8)	17 (3.8)	10 (3.6)	19 (3.7)	16 (3.7)	8 (3.10)
I	3.9	16 (3.8)	18 (3.11)	10 (3.6)	18 (3.5)	16 (3.7)	11 (4.3)
J	3.3	9 (1.7)	10 (1.10)	7 (2.2)	9 (1.10)	6 (<1)	0 (<2)
K	2.9 [2.6]	11 (2.0)	12 (2.4)	8 (2.6)	9 (1.10)	9 (1.10)	0 (<2)
L	2.9 [2.6]	10 (1.10)	12 (2.4)	6 (1.11)	9 (1.10)	9 (1.10)	0 (<2)
M	2.6 [2.3]	13 (2.6)	11 (2.1)	8 (2.6)	12 (2.6)	11 (2.5)	5 (3.4)
N	2.0	12 (2.3)	13 (2.6)	7 (2.2)	16 (3.2)	14 (3.0)	3 (2.11)
O	1.9 [1.6]	7 (1.2)	7 (1.1)	3 (1.5)	8 (1.7)	9 (1.10)	0 (<2)
P	1.7 [1.3]	8 (1.4)	8 (1.4)	4 (1.7)	7 (1.2)	6 (0.10)	0 (<2)

Key: SA = Social adaptation; SM = Sensory motor understanding; EE = Exploration of the environment; VC = Response to sound and verbal comprehension; EL(S)= Expressive language: structure; EL(C)expressive language: vocabulary and content. The age equivalents in years and months for the Reynell – Zinken scales are given in parenthesis. Under Chronological age, corrections for prematurity (children below 3.0 years) are given in parenthesis. * = ceiling on all the developmental scales

into the study. Participants A, B and C had reached ceiling on all of the subscales as was to some extent to be expected; all three of these children were over 5 years of age and the Reynell-Zinken development test is designed to test visually impaired children from birth to 5+ years.

Although there was considerable variation in the scores for the remaining 13 children, with some children scoring below age equivalents in some areas and above age equivalents in others, there are recognised difficulties in obtaining "any sort of 'norms' with a visually handicapped population so any interpretation of age scores should take this into consideration" (Reynell, 1979, p46). Visits were continued and play behaviour observed for participant J although his developmental scores were well below age equivalents across all developmental areas, suggesting that he did not in fact meet the inclusion criteria for the study (see Results –above)

2.4 PROCEDURE

Monthly visits were made to schools, nurseries or the child's home with the initial intention of continuing visits for a period of 12 months. In the first 2-3 visits the researcher familiarised herself with the child, and with the child's home, the nursery or school. Each subsequent visit lasted $1^1/_2$ to 2 hours. As this period was interrupted by ongoing routines within the nursery or home (e.g., toileting, eating and periods of inactivity), video recording was only carried out during periods when the child was involved in free or adult-structured active play. An average of 20-30 minutes of video recorded material was collected for each child at each visit. A research diary was kept to record maternal and nursery teacher reports on each child's progress in play and on his/her general developmental progress and physical well being during the preceding month. Observations by the researcher of the child's routine behaviour were also noted in the research diary.

Naturalistic play

Play was observed under the following circumstances, both outdoors and indoors:

- adult-structured play
- free play alone (without adult intervention)
- free play with other children (but without adult intervention).

No specific instructions were given to the adult present as to how to interact with the child during structured play. As with adult play, free play could obviously take many forms. When other children were involved, this might include both children playing with creative materials, engaging in social play, or playing games such as hide and seek or tag, as described in Howes and Matheson, 1992.

Researcher-structured play

Although most of the observations of play were recorded with the children using the toys/materials which were routinely available to them in the nursery/school or in their own home, in the final ten minutes of each visit the researcher introduced a number of toys selected for properties with the potential to evoke each of a number of categories of play identified in the literature on the development of play in typically developing children (see Chapter 1, pp 6-34). These more informal sessions were not video-recorded but the behaviours of the children when playing with these toys were noted in the research diary.

The toys introduced to the children by the researcher and their associated targeted play category included:

- remote control car (functional play)

- slinky (exploratory, repetitive play)
- battery - operated rolling ball (collaborative play)
- form boards (constructive play)
- tactile books with songs nursery rhymes and stories (receptive, imitative play)
- box of household items (exploratory play)
- doll (fantasy play).

2.5 ANALYSIS

Participant J (3 yrs 0 mths) had to be excluded from the analysis as insufficient play episodes were observed over the 4 sessions in which he was observed. As his developmental scores were also well below age equivalent levels across all developmental areas (see Table 2.2), this also raised doubts over the legitimacy of including him in a study which was specifically investigating spontaneous play behaviour in blind children having no additional impairments.

The number of videotaped sessions for the 15 children included in the analysis ranged from 5 to 12 (mean 10; sd 2.05[4]. The first two sessions for each child were excluded from analysis, as these were considered familiarisation sessions; the remaining 3 to 10 (mean 7.7; sd 2.05) sessions were then analysed. A total of 115 play sessions were examined.

Each tape was viewed for instances of play which were either adult-structured play, or free play without adult intervention, either alone or with other children without

[4] The total number of videotaped sessions varied due to illness, school/nursery holidays and also reflects sessions during which a child did not exhibit any form of free play.

adult intervention) and which fulfilled the criteria for the 8 categories of play behaviours identified in the literature reviewed in Chapter 1 and listed below in Table 2.3. These play category definitions were derived from the work of a number of previous workers in the area, specifically Piaget (1952), Jansen, Hutt and Smilanski, (1972, as described in Smith, 1986), Fein (1981), Parsons (1986a), Johnson, Christie and Yawkey (1999) and were used to assist in the identification, differentiation and coding of individual play behaviours.

TABLE 2.3 CATEGORIES OF PLAY AND THEIR DEFINITIONS

CATEGORY	DEFINITION
Fantasy	- familiar activities performed in the absence of the necessary materials or social context (e.g. pretending to drink from an imaginary cup) - activities not carried through to their usual outcome (e.g. pretending to go for a walk on the moon) - inanimate objects treated as animate (e.g. using a toy horse and pretending to make it trot) - one object (or a gesture) substituted for an other (e.g. playing with a toy brick and pretending it is a car) - an activity usually done by someone or something else (e.g. pretending to be mother)
Exploratory	- exploration of the environment (e.g. finding out about the properties of objects through the senses of sight, sound, smell, touch and taste (e.g. putting a toy in the mouth)
Functional:	- demonstrates knowledge of how toys/materials should be used functionally (e.g. materials with a cause/effect relationship such as a pop-up toy)
Repetitive	- repeatedly performs the same action with an object, evidencing pleasure at having control over it. (e.g. repeatedly banging a toy on the table)

TABLE 2.3 continued CATEGORIES OF PLAY AND THEIR DEFINITIONS

Constructive:	- manipulation of objects to construct or create something, using objects in non-pretend ways (e.g. doing a jigsaw puzzle)
Imitative:	- imitating actions, sounds, speech or music (e.g. repeating parts of nursery rhymes)
Collaborative:	- working together with other children/adult on construction/ creation, either physically or verbally. (e.g. building a Lego house in collaboration with another child)
Receptive	- listening to stories or looking at pictures (e.g. listening to a story being read at story time in the nursery)

The author coded the videotapes from all 115-play sessions. Ten minute extracts from each of the 115 sessions were randomly selected for reliability analysis by a second researcher to establish inter-rater coding reliability. Each 10-minute extract was scored by both coders, the author and a colleague with extensive experience of working with children with visual impairment, for the presence of the 8 categories of play listed in Table 2.3 in each of the three contexts: adult-structured play, free play alone and free play with other children. A count was taken of both the number and type of play behaviours each child exhibited in each of these contexts. Where two or more categories of play were exhibited in parallel, each behaviour was separately counted as an instance of the given category of play.

In assigning play to one of the 8 above categories, in cases where the type of play was not clear from the child's actions alone, the child's verbal statements were used as further indication of the intended category of play (e.g. in constructive play "I am making an aeroplane" or in pretend play "I am an aeroplane").

Inter-rater reliability in identifying the presence or absence of each of the 8 categories of play behaviour behaviours and in differentiating the 3 different contexts in which play could be produced were calculated using Cohen's Kappa (Cohen, 1960). An acceptably high degree of agreement in identification of the 8 contrasting kinds of play behaviours was achieved: fantasy .88; exploratory .90; functional .89; repetitive .91; constructive .95; imitative .91; collaborative .90; receptive .91. Similar consistency was found for play context coding: adult-structured play .96, free play alone .86 and free play with other children .80.

Observations of the behaviours of the children when playing with the toys introduced by the researcher at the end of each session are reported below in descriptive form only as these were taken from the research diary and thus were not open to reliability assessment. This is taken into account when describing the behaviours and commenting on them.

2.6 RESULTS

In exploring play profiles, comparisons were made between the older children (> age 3: 3 yrs 6 mths to 6 yrs 2 mths; N = 9) and the younger children (< age 3: 1 yr 4 mths to 2 yrs 6 mths; N = 6).

All eight categories of play behaviour found in the play literature (fantasy, exploratory, functional, repetitive, constructive, imitative, collaborative, and receptive) were identified in the video analysis of the 115 play sessions of the remaining 15 young blind children who participated in this study (see Table 2.4 - over). However, as Table 2.4 shows, not all of the children in the study evidenced all types of play behaviour and some children were involved in some categories of play to a much greater extent than others.

TABLE 2.4

TOTAL NUMBER OF TIMES EACH PLAY BEHAVIOUR WAS EXHIBITED BY EACH PARTICIPANT IN FREE AND ADULT STRUCTURED PLAY (N = 15)

Participant	Age at first observation year/month	Group	Fantasy	Exploratory	Functional	Repetitive	Constructive	Imitative	Collaborative	Receptive
A	6.4	Older	7	3	6	0	3	0	8	3
B	6.3	Older	6	1	8	0	3	0	2	4
C	5.4	Older	8	5	5	0	8	0	8	5
D	5.3	Older	0	4	10	0	1	0	2	6
E	4.1	Older	5	3	3	0	0	0	1	3
F	4.0	Older	6	8	6	0	4	0	8	3
G	3.10	Older	5	6	5	0	1	0	5	2
H	3.10	Older	0	10	8	3	0	0	0	2
I	3.9	Older	4	8	7	0	0	0	0	2
K	2.9(2.6)	Younger	0	4	6	4	0	1	1	3
L	2.9(2.6)	Younger	0	2	5	7	0	0	2	4
M	2.6(2.3)	Younger	4	7	5	6	0	0	2	2
N	2.0	Younger	6	5	10	0	5	0	5	6
O	1.9(1.6)	Younger	2	10	5	2	0	5	1	5
P	1.6(1.2)	Younger	0	16	10	1	0	3	0	3

NB For children of chronological age 3 years and under, the correction for prematurity is included in brackets

Distribution of play over categories in younger versus older profiles

As can be seen from figure 1, the older children in the study exhibited more fantasy, constructive and collaborative play than the younger children whereas the younger children exhibited more exploratory, imitative and repetitive play. There was very little difference between age groups in functional play and receptive play.

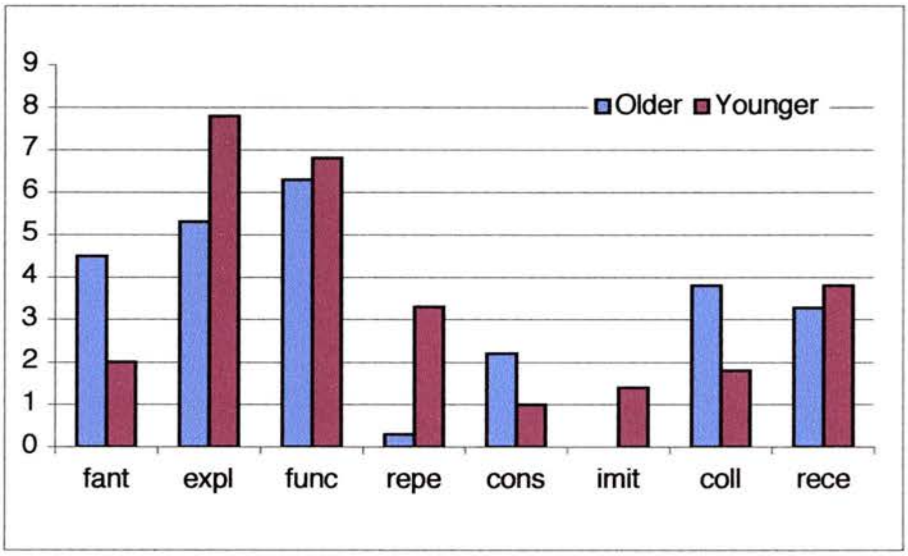


Figure1. Mean frequency of play behaviours exhibited in older v younger children (N = 15)

There were three exceptions to this developmental trend: a 21 month child (Participant O), who although limited in mobility, exhibited transient fantasy play by verbal means (pretending he was a monster); a child aged 2 years and 6 months (Participant M) who exhibited fantasy play behaviour but only when prompted by an older child; and a 2 year old child (Participant N) with Peters' Anomaly who was involved in constructive, collaborative and fantasy play to an even greater extent than some of the older children. Although it was the considered opinion of the visual impairment specialists that this latter child's main learning media would be Braille, she had very good mobility (had been walking unaided at 1 year), appeared to use her limited peripheral vision to identify objects in her environment, and had verbal comprehension, expressive language structure and expressive language content scores on the Reynell Zinken Scale reflecting a blind child age equivalent of 2.9 - 3.2 years (see Table 2.2), well in advance of her current chronological age.

Fantasy play

Although fantasy play was evident at all ages, in the younger children it was typically transitory, prompted by an adult or older child, and verbal in its form of expression. In contrast, the older children in the study exhibited fantasy play both in the free play context and collaboratively when with other children; they also used props, e.g. dolls, prams and dressing up clothes, much more frequently. A great deal of the fantasy play exhibited in both the younger and older groups of children was supported by fantasy-related verbal statements.

Exploratory play

This was also evident at all ages. It was frequently exhibited in parallel with other types of play in the older children, whereas in younger children this was their dominant play behaviour, with any attempts to introduce other types of play being met with resistance while exploration was taking place.

Functional play

Again, this was evident at all ages and similar across all ages, usually with a preference demonstrated for musical toys, noisemaking objects and household items (radio, television, video etc.).

Repetitive play

The younger children were involved in a great deal of repetitive play, e.g. opening and closing doors, waving and banging objects, and repetitively pushing buttons and levers on toys. The older children were involved in less repetitive behaviour.

Constructive play

With the exception of participant N, only the older children played constructively, with this mainly observed during adult-structured play.

Imitative play

This was observed on only nine occasions and mostly in the two youngest children. Imitation was observed only in vocalization, e.g. repeating sounds and nursery rhymes.

Collaborative play

This was mostly observed in the older children and in the majority of cases was initiated by an adult or another child. With the exception of participant N, the younger children were only observed in collaborative play when with an adult or older sibling but even then, this was a relatively infrequent occurrence

Receptive play

Only one child, participant H, who had access to a number of very good tactile illustrations, spontaneously chose a book to read. The other younger children showed very little interest in books or being read to, although they all enjoyed singing and listening to nursery rhymes. The older children participated best in reading sessions with adults when there were accompanying tactile illustrations.

Play in differing contexts: younger versus older profiles

Table 2.5 Frequency of adult-structured play, free play alone and free play with other children in older versus younger participants (older n=9; younger n=6)

Older participants	Adult-Structured	Free play alone	Free play other children
A	10	13	7
B	8	8	8
C	23	12	4
D	16	7	0
E	10	5	0
F	20	7	8
G	12	8	4
H	10	13	0
I	13	8	0
Total	**122**	**81**	**31**
Mean	**13.5**	**9**	**3.4**
Younger participants			
K	11	8	0
L	11	9	0
M	13	13	0
N	27	10	0
O	17	10	3
P	16	15	2
Total	**95**	**65**	**5**
Mean	**15.8**	**10.8**	**0.8**

-

Adult-structured play

As Table 2.5 shows, all of the children in the study were involved in adult-structured play. Although the mean number of adult-structured behaviours was greater for younger children, there was considerably individual variability at both age levels.

Free play alone (without adult intervention)

Again, as with the adult-structured play all of the children in the study engaged in free play alone. Some of the older children played alone more frequently than some of the younger children, however, as the means in Table 2.5 indicate, means number of episodes was very similar at both age levels (10.8 and 9 respectively).

Free play with other children (without adult intervention)

In comparison to adult-structured play and free play alone, free play with other children occurred infrequently in both the younger and older groups of blind children in this study (mean frequency = 0.8 and 3.4 respectively). Only 2 of the 6 younger children and 5 of the 9 older children were involved in free play with other children.

Notes on adult-structured play, free play (alone) and free play with other children from the researcher diary.

The adults who interacted with the younger children in the study engaged in hugging, singing songs, which incorporated movement, and naming of body parts, and making noises. Attempts to introduce toys into play were often unsuccessful. Adult-structured play with the older children involved mainly storytelling and encouraging construction activities (e.g. form boards and arts and crafts).

Free play alone in the younger children usually involved exploration of objects within the environment and repetitive behaviour. Play preferences in the older children included functional toys and water and sand play.

Opportunities to observe the two youngest children playing with other children were limited as they were visited at home. Parents reported that during visits to mother and toddler groups, their children did not attempt to initiate play with the other sighted children in the group but that they played comfortably in parallel with them. Both of these children were observed playing well with their older siblings; for example, participant O was observed with his older brother involved in rough and tumble play and at one visit participant P played happily with his older sister, turn-taking at pushing each other around the room in a toy car. There was no opportunity to observe participant N interacting with other children as she had no siblings, did not attend any mother-toddler group and no other children were present when she visited the visual impairment unit. The remaining 3 younger children (Participants K, L, M) all attended the same nursery school for visually impaired children but made no attempt to interact with other children while there. Five of the children in the older group (Participants A, B, C, F and G) were observed to both initiate and join in play with other children. Participants A and B attended a Primary 1 class of only 3 children in a school for deaf and blind children. Participants C, F and G each attended a different mainstream integrated school/nursery and all of their play with other children was with sighted children. The remaining 4 older children

(Participants D, E, H and I), all of whom attended nursery schools for visually impaired children, made no attempt to interact with other children.

Researcher-structured play

Analysis of the behaviours of the children when playing with the toys introduced by the researcher at the end of each session revealed a mixed pattern of reactions. With the exception of the slinky and the tactile books, which induced exploratory and repetitive play behaviour, the two youngest children in the study (Participants O and P) either ignored or showed tactile defensiveness to the toys. The remaining 4 younger children explored and played repetitively with the slinky, tactile books and box of household items; they also played for a short time functionally with the rolling ball and the car (pushing both manually) but showed no interest in their automatic function; no attempt was made to play with the doll and formboards. The older children all played appropriately with the remote control car, slinky, battery-operated rolling ball and box of household items. They took a great deal of interest in the tactile books, repeating the stories and requesting to read them again on subsequent visits. Very little interest was shown in the form board and doll, with any play only transient.

Caution must be exercised when interpreting the above described play behaviours. These were informally recorded in the research diary and as such could not be subjected to any reliability check or any meaningful numerical analysis. But it was thought useful to record these as the specifics of other play behaviours and the contexts within which play was observed could both enhance and provide a meaningful explanation for the more formal findings.

2.7 DISCUSSION

The findings from this study have demonstrated that blind children are capable of producing all of the types of play described in the literature for sighted children. However, the blind children in this study showed clear preferences for exploratory and functional play and were observed to play mostly alone (a total of 146 instances) or with adults (a total of 217 instances) as opposed to with other children (a total of 36 instances). Although adults frequently introduced arts and crafts and constructive play in nursery contexts, such as card making and painting, the children rarely spontaneously chose these activities (from the researcher diary).

These findings are similar to the findings of a study carried out in Germany by Troster and Brambring (1994) in which parents of 91 children with visual impairments (4 months to 6 yrs) and 73 sighted children (4mths to 4 yrs) responded to questionnaires on their children's play behaviour. No direct observations of the children were made, however. Parents of the children who were blind reported less interaction with peers and a lower frequency of symbolic play compared to sighted peers, and a preference for toys or materials with tactile or auditory properties, household items, and natural objects (such as stones). Sighted children by preference chose construction toys, picture books, paints, play dough, crayons, and symbolic toys. When with their parents, the children who were blind engaged in cuddling, singing songs and making noises; by contrast, the sighted children looked at books, read stories, and played with puzzles and other construction and sorting games.

In the study reported here, although free play alone (without adult intervention) was rarely observed in the younger blind children, mobility appeared to be a limiting factor. Where mobility was limited, stereotypic behaviour was frequently observed. In intersubjective play in which the parent/caregiver introduced an object, play with the object was mainly repetitive and exploratory (tactual and oral) in such children. Play in the younger blind child with good mobility however, usually involved actively seeking and exploring objects within their environment.

These findings are similar to findings from studies into the play behaviour of the sighted child: the younger the child, the more time is spent in exploration. In her study of mother-child interactions, Clarke-Stewart (1973) found that by 18 months sighted children spend about 50% of their time exploring and playing with objects. However a sighted child can take in at a glance the properties of objects of play, creating a visual mental map very quickly; a great amount of exploration is therefore done visually and usually goes unnoticed. For blind children, exploring tactually in parallel with other kinds of play may be necessary in order to assess or remove uncertainties about the properties of potential play objects.

Delays in symbolic play in the blind child have been reported a number of times in the literature (see e.g. Fraiberg, 1977; Rogers and Puchalski, 1984). In one of the more recent studies of play in blind children, Hughes et al. (1998) observed the cognitive play of 13 preschool children with visual impairments aged between 32 and 52 months while they played on their own in their homes. Findings revealed that over half of the play behaviours were in the category of exploration and sensorimotor play, with symbolic play accounting for less than 4% of observed play behaviours. Although fantasy play constituted a small proportion of the play behaviours in the younger children in the study reported here, the older children were observed to be involved in fantasy play to a far greater extent, both symbolically with objects in their environment and verbally. As most of the children in this study were observed playing in nurseries and schools with other children, the greater quantity of symbolic play observed may have been due to the availability of peer interaction; this may facilitate and promote the production of fantasy play in blind children and be more central to its development than for sighted children.

It has been argued that outdoor play settings facilitate fantasy play and gross motor activities in sighted children (Johnson, Christie and Yawkey, 1999). In this study, observations of the blind children were carried out in both indoor and outdoor settings. However, outdoor play was seldom observed and limited to just 3 of the older children in the study: two six-year-old children who used this time in unstructured gross motor activity and fantasy play and a four-year-old whose outdoor play activity was adult-structured and again gross motor in content. There could have been a number of reasons for these findings. Firstly, it was reported by both parents and nursery teachers that the uneven surface area of gardens appeared to cause distress to the younger children. Secondly, the safety of known space and available landmarks when within the home environment was clearly not available to the children when outdoors and it was suggested that fear of the unknown might have prevented the younger children from exploring and playing when outside. The reactions of parents/caregivers to the child's fear and distress may have resulted in limited opportunities to play outdoors and to overcome these difficulties. Parsons (1986a) has also suggested that the limited repertoire of play skills in children with visual impairments, irrespective of indoor/outdoor context, may be related to a lack of opportunities to develop a wider range of play behaviours. As O'Donnell and Livingston (1991) concluded in a review of the literature on exploration of the environment by young children with low vision:

> *"Young children with low vision tend to experience delays in cognitive development, motor development, and social skills because of insufficient motivation and opportunities to explore their environments actively" (p287).*

Although play opportunities clearly did exist within the home, schools and nurseries in which the children were observed, many of the toys and books available to these children were toys specifically designed with sighted children in mind. These perhaps did not provide the motivation for the blind child to become maximally involved in each of the types of play behaviour being investigated here. Motivation to explore picture books appeared high when the books were tactile and olfactory in nature and toys which produced a positive feedback tactually or aurally appeared to be favoured by these blind children. Similarly, a number of the children appeared to enjoy arts and crafts when the material was meaningful and tactile, e.g. play dough.

However, the children were reluctant to take part in - and appeared to have difficulty in relating to - other forms of arts and crafts, such as card making and painting. The difficulty may have been in the type of material, the way materials were presented to the child, and the lack of positive feedback from the finished product.

During observation of the 15 children in this study it was also noted that a number demonstrated some very specific patterns of play behaviour which were not only produced frequently but also in a number of quite different contexts. These children appeared to be much more interested in some activities than in others. For example, observations of the spontaneous play behaviour of participant E. showed she was intensely interested in anything, which she could open, or close (from the researcher diary):

> *(Participant E) was observed on a number of occasions repetitively opening and closing doors. The focus of her attention would then shift to repetitively opening and closing boxes and toys with lids, and on other occasions she was observed in the play corner repetitively opening and closing handbags.*

Athey (1980, 1990) and Nutbrown (1999) referred to these patterns of behaviour as schemas and defined these as patterns and behaviours which reveal the characteristics of children's thinking and learning. They suggest these schemas are important and useful for educators in recognizing the common links running through children's thoughts and the development of concepts and conceptual thinking.

Frequently... children shift from one kind of content to another within the same period. When they do this they are accused of 'flitting'... and so they might be ... but they are also 'fitting'! They are fitting various kinds of content onto a particular schema (Athey, 1980; p8).

"Spontaneous behaviour in young children is difficult to record and because of weak theory it is even more difficult to interpret ...much less 'tap' into its educational potential' (Athey 1990; p28).

Athey, drawing on the Piagetian framework of 'schemas' taken from a constructivist perspective (where the emphasis is on the learner as an active "maker of meanings") investigated these patterns of behaviour by observing 20 sighted children at home and in pre-school settings over a 5 year period at the Froebel Educational institute in London. Athey's study aimed to identify the ways in which young children acquire knowledge and to document the developmental sequences of behaviour from early motor behaviours to thought. The ultimate aim was to provide the basis for designing an effective enrichment program for children from disadvantaged sections of the community.

Athey's observations consisted of the following eight schemas, each of which she sub-divided into four developmental sequences, from sensorimotor behaviours through symbolic representation and functional dependency to thought.

- Dynamic vertical.
- Dynamic back and forth, or side to side

- Dynamic circular
- Going over and under
- Going round a boundary
- Enveloping and containing
- Going through a boundary
- Thought

Athey (1990; p132) gives the following examples for each of the four developmental sequences in the evolution of the dynamic vertical schema:

Sensorimotor level:

"Kamal came down the slide several times. He then collected a brick from the classroom, put the brick on the slide and made it slip down the slope. He repeated this several times."

Symbolic representation level:

"Brenda dropped toy aeroplanes from a height, saying 'The aeroplane has fallen down'. Later she played a *falling-down* game, shouting ... 'I've fallen down'."

Functional dependency level:

"Alastair increased his height by standing on a chair in order to peg clothes onto a washing-line. Alastair placed several blocks on top of each other in order to bring himself up to the equivalent height of the piano stool that was occupied."

Thought level:

Amanda "You know leaves? They fall off the tree onto the ground [pause] and acorns fall off the tree."

At the end of the pre-school study, Athey visited some of the children in their primary schools and found that the schematic basis of speech, writing and all other kinds of representation stood out to her in ways that they had not done before. Athey suggests curriculum extensions to observed behavioural schemas could be of educational benefit to young children, assisting them in making developmental advances in their understanding of the similarities and interconnections between objects and events in their daily environments.

Nicholls, Sedgwick, Duncan, Curwen and McDougal (1986), following Athey's work on schemas, also observed sighted children at play in nursery and school settings and developed a 'schema spotters guide' in which they described 17 schemas they had been able to identify within the nurseries and classrooms. Similarly, Nutbrown (1999), in her book 'Threads of Thinking', also gives examples of schemas in children's talk, actions and representation drawn from observations over a ten year period. In these, she demonstrated the importance of representation, symbolisation and playfulness in the development of literacy, mathematics, science and technology. According to Wood and Attfield (1996), awareness of such 'schemas' provides educators with a window into learning and development, with BERA (2003) suggesting that they allow a focus on the ways in which children develop concepts and on the language they use, providing educators with a basis for curriculum planning which draws on the children's own learning agendas. Further investigation into these behaviours in blind children may therefore reveal areas of thinking and learning in which development could be encouraged through play.

2.8 CONCLUSIONS

All 8 categories of play behaviour found in sighted children were also found in the group of young blind children studied here. However, the results from this study indicated that while functional play was distributed evenly across all ages, other categories of play were differentially distributed across age levels: the older the child, the more constructive, collaborative and fantasy play behaviours were exhibited, whereas the younger the child, the more exploratory, imitative, repetitive and receptive play behaviours were exhibited. There were some exceptions to this developmental trend but these were rare. Considerable variations within age groups were found in the frequency with which each play behaviour was exhibited, however, and it is possible that these variations were a function of developmental stage and not age.

The specifics of the play context also appeared to affect the type of play behaviours the children evidenced. For example, adult-structured play with the younger children involved the use of language to promoted sharing of interests (singing songs, and turn taking), whereas with the older children adult play mainly involved storytelling and encouraging construction activities. These findings may be attributed to recommendations on play with blind children for parents and teachers of blind children. For example, the Scottish sensory Centre (1999) suggests, vocalisation and assisting with differentiation of sounds should be encouraged in young visually impaired children by: making sounds and using noise making toys. Also Sonksen and Stiff (1991), in their developmental guide for parents and professional advisors suggest promoting body awareness. In the free play situation (alone and without adult intervention), the younger children were observed to explore and play repetitively with any object or toy within their immediate environment while the older children played mainly with functional toys or engaged in water and sand play. Free play with other children was rarely seen in the younger children although two of these children were observed playing well with their older siblings. Some of the children in the older group interacted well and both initiated and joined in play with other children.

Reactions to the toys introduced by the researcher at the end of each session varied. Two of the younger children in the study (Participants O and P) either ignored or showed tactile defensiveness to the toys. Nielsen, 1996 states, tactile perception can be disturbed if the child's hand is guided, which could ultimately lead to tactile defensiveness. It is argued, this occurs because the child's haptic receptors may be activated by the touch and pressure of the adult's hand, thus bringing to the child information that has nothing to do with the object or the environment that the child is supposed to perceive. From this point of view it is not surprising that visually impaired children withdraw their hands, or become unwilling to touch anything at all. (Nielsen, 1992, 1996; Van der Poel, 1997).

The remaining 4 younger children explored, played repetitively and functionally with the toys. These findings are in accord with the suggestions in the literature (Chapter 1 p 21) that young children need repetition and may need to practise to fully develop their skills.

The older children all took great interest in the toys and, with the exception of the form board and doll, played well with the researcher's toys.

Study 1 was initially designed purely to assess whether blind children were capable of exhibiting the full range of play behaviours exhibited by sighted children, and not to assess to what extent these play behaviours were produced, nor to relate production to developmental stage. Given the findings reported above, it was decided to extend observations of the study children for a further 6 months in order to:

i) obtain more, in-depth information on their play profiles, and

ii) to investigate any relationship between production of each of the 8 categories of play and developmental stage

iii) to explore the role of schemas in play development.

The extended observations to be discussed in Study 2 (Chapter 3) was designed to explore any relationship between the emergence of categories of play and stages in for example, cognitive motor, language and social development. It also discusses and explores the nature and function of repeatable patters of play in these blind children

CHAPTER 3

THE PLAY BEHAVIOUR OF YOUNG BLIND CHILDREN AND ITS RELATIONSHIP TO DEVELOPMENTAL STAGES

STUDY 2.

3.1 INTRODUCTION

Study 1 was designed to ascertain whether or not young blind children are involved in the same types of play behaviour as those reported in the literature for sighted children. Data were reported from 15 of the 16 blind children deemed to be 'educationally blind' but with no additional cognitive impairments. The children were observed in a number of different play contexts over a period of 9 months for the presence of the following 8 types of play behaviour: fantasy, exploratory, functional, repetitive, constructive, imitative, collaborative, and receptive.

All eight types of play were found to be present in the group of children but not all of the children exhibited each of the play behaviours being studied. Differences in the number and type of play behaviours exhibited both between and within age groups were noted and it was evident that different play contexts evoked different types of play behaviours. Fantasy play was only observed in 10 of 15 children (7 of the older group and 3 of the younger group) and constructive play was observed in only 7 of 15 children (6 of the older group and 1 of the younger group). Imitative play was restricted to 3 of the children in the younger group in the study but all of the children were involved to varying degrees in functional, exploratory and receptive play. However, the children hardly ever entered independently into receptive play and only showed interest in books with tactile illustrations, although some of the older children were attentive when stories were read to them. Collaborative play was observed in 12 of the 15 children but the younger children predominantly played collaboratively with only adults or siblings while the older children collaborated mainly with other children in play.

Study 1 established the frequency with which each play behaviour was exhibited by each child but it was noted that the frequency within different categories varied at an individual level and also across study children. In order to allow more in-depth developmental investigation of emerging play patterns, monthly visits and video recordings of 15 of the 16 children were therefore continued for a further 6 months; visits were discontinued to Participant J as it was clear from Study 1 that he no longer met the criterion of no cognitive deficit. The extended period of study for each of these 15 children provided a mean of 5.2 additional observation sessions per child (range 3 to 6). In order to provide objective standardised measures of current developmental status and to allow exploration of any relationship between the emergence of categories of play and stage in cognitive development, two developmental assessments were carried out for each child on entry to Study 2. All children were again tested with the Reynell-Zinkin Developmental Scales for Young Visually Handicapped Children (first used 9 months previously in Study 1) and then, one week later, with the Oregon Skills Inventory for Visually Impaired and Blind Preschool Children, an assessment battery which specifically aims to recognise the unique developmental difficulties faced by young children with visual handicaps (Brown et al, 1991 – see below).

As well as investigating in greater depth the developmental aspects of the emergence of specific play behaviours in blind children, this extended study, Study 2, also sought to explore the role of schemas in the development of the children's play. As already noted in Study 1, a number of the children had been observed involved in 'repeatable' patterns of play behaviour. Piaget called these patterns of behaviour *schemes*, behaviours into which experiences are assimilated and which in turn adjust to accommodate this new experience. Piaget and Inhelder (1969) refer to operational thoughts, or 'schemes of action', as '.... the structure or organisation of actions as they are transferred or generalised by repetition in similar or analogous circumstances' (p4). Athey (1980), utilising Piaget's framework of schemes in a study of sighted preschool children, refers to these repeatable patterns as 'schemas'. Nicholls et al (1986) cite an example of an enveloping 'schema' in which a child was always carefully wrapping things up, describing it as follows:

> *"For instance she wrapped her clay pancake up (it was too hot to hold) when she had covered up the windows of her model house she said, "Now it's dark inside". She covered a worm with sand saying; "You know they live under*

the sand... at night he'll be asleep". She wrapped 'sausages" in tin foil to "cook" them. (p2)"

A schema has been described as a pattern, demonstrable during play through a child's actions or language, which reveals the characteristics of his or her thinking and learning (Wood and Attfield 1996). The child may appear to be simply playing with a variety of toys but a pattern may link these seemingly disassociated activities:

> *'Observing the dominant network of schemas of a particular child at a particular time helps the early childhood educator to respond effectively during the early years of education' (Bruce, 1992, p.43).*

Although schemas are described as repeating patterns of behaviour they are different from repetitive play in that in repetitive play the child repeatedly performs the same action with the same object. In 'schemas' actions are transferred or generalised by repetition, not with the same object, but in similar or comparable circumstances, with the function being to master new concepts and practice them, thereby allowing progression to the next level of understanding (Wardle, 1999). Schemas indicate the child's focus in an activity. For example, in Study 1 a blind child aged 3 years 9 months was observed playing in the home corner - putting things into bags, packing boxes with toys, filling cupboards and loading a pram with dolls; his focus was enveloping - exploring 'inside'. In order to explore the nature and function of these 'schemas' in blind children, Study 2 aimed to explore repeatable patterns of behaviour such as this in more detail.

The purpose of Study 2 was therefore threefold:

1. to explore in greater depth the extent to which young blind children are involved in different categories of play behaviour at different chronological ages.
2. to investigate the relationship between categories of play and developmental stages.
3. to explore the nature and function of repeatable patterns of play behaviour ('schemas') in blind children.

3.2 METHOD

Participants

15 of the 16 blind children who participated in Study 1 participated in Study 2 (visits to Participant J were discontinued – see above). Details of these 15 blind children and the criteria for inclusion can be found in Chapter 2 (pp 55-58).

3.3 PROCEDURE

In Study 1, monthly visits were made to schools, nurseries or the child's home, with each visit lasting 1.5 to 2 hours. During this time the children were video recorded in play. Both spontaneous play and adult- and researcher-structured play were observed, using naturalistic settings. This provided between 3 and 10 observation sessions per child. In Study 2, visits to the 15 children were continued for a further six months, following the same procedure for collection of data.

3.4 PLAY MEASURES

Naturalistic play

The three contexts used to observe naturalistic play in Study 1 (see pp 61) were replicated in Study 2: adult-structured play, free play alone and free play with other children. The eight play behaviour categories specifically investigated also mirror Study 1 (see Table 2.3, pp 63 to 64); fantasy, exploratory, functional, repetitive, constructive, imitative, collaborative and receptive

Researcher-structured play

As in Study 1, in the final ten minutes of each visit the researcher introduced a number of toys specifically selected for properties with the potential to evoke the categories of play under investigation. The toys introduced to the children are as previously described in Chapter 2 (see pp 61 to 62). Again these sessions were not videorecorded; the only observations available were informal and unstructured notes from the researcher's diary

Repeatable patterns of play behaviour

The study sought to establish the number and type of repeatable patterns of play behaviour exhibited by each child with a view to identifying those with a schematic basis. In order to identify and recognise repeatable patterns of play behaviour, the features described in Figure 3.1 - drawn from Nicholls, Sedgewick, Duncan, Curwen, and McDougal (1986) - were used as a guide (see over).

Figure 3.1

A schema spotter's guide

Enveloping
This is often an extension of enclosure. Objects, space or the child herself are completely covered. She may wrap things in paper, enclose them in pots or boxes with covers or lids, wrap herself in a blanket or creep under a rug.

Paintings are sometimes covered over with a wash of colour or scrap collages glued over with layers of paper or fabric.

Circularity
Circles appear in drawings and paintings as heads, bodies, eyes, ears, hands, feet etc. They are also used in representing animals, flowers, wheels, the sun, and a wide variety of other things.

Semi-circularity
Semicircles are also used graphically as features, parts of bodies and other objects. Smiles, eyebrows, ears, rainbows and umbrellas are a few of the representational uses for this schema as well as parts of letters of the alphabet

Radial
Again commonly found in paintings and drawings. Spiders, suns, fingers, eyelashes and hair often appear as a series of radials.

Rotation
A child may become absorbed by things which turn e.g. taps, wheels, cogs and keys. She may roll cylinders along, or roll herself. She may rotate her arms or construct objects with rotating parts in wood or scrap materials.

Connection
Scrap materials may be glued, sewn, fastened into lines; pieces of wood are nailed into long connecting constructions. String, rope wool etc. are used to tie objects together. Drawings and paintings sometimes show a series of linked parts.

Ordering
A child may produce paintings and drawings with ordered lines or dabs; collages circularity or constructions with items of scrap carefully glued in sequence. She may place blocks, vehicles or animals in lines and begin to show interest in largest' and 'smallest'.

Transforming
A child may become interested in materials which change shape, colour, consistency etc., e.g. ice melting, potatoes cooking, clay hardening, paint mixing.

Correspondence
There is often evidence of this schema in scrap collages and constructions where a child may, for example, glue a button inside each bottle top or place a piece of paper inside each cup of an egg box.

Functional dependency
Although causal relationships are not fully appreciated, interest may be seen in the dependency of one function upon another. For example, a child may draw a lift with a button beside it and say, "you have to press this for the lift to come" or pretend to turn an ignition key "so that that the engine will start.

Figure 3.1 continued

Transporting
A child may move objects or collections of objects from one place to another, perhaps using a bag, pram or truck.

Positioning
A child may be interested in placing things in particular positions e.g. on top of something, around the edge. Paintings and drawings also often show evidence of this.

Orientation
This schema is shown by interest in different viewpoints, as when a child hangs upside down or turns objects upside down.

Dab
A graphic schema used in painting randomly or systematically to form patterns or to represent, for example, eyes, flowers, buttons etc.

Horizontality and Verticality
A child may show evidence of particular interest by actions, such as, climbing, stepping up and down or lying flat. These schemas may also be seen in construction, collages or graphically. After schemas of horizontality and verticality have been explored separately the two are often used in conjunction to form crosses or grids. These are very often systematically explored on paper and interest is shown in everyday objects e.g. cooling trays, grills and nets.

Diagonality
Usually later than the previous schemas, this one emerges via the construction of ramps, slides and sloping walls. Drawings begin to contain diagonal lines forming roofs, triangles and zig zags.

Enclosure
A child may build enclosures with blocks, lego, large crates etc. perhaps naming them boats, ponds or beds. The enclosure is sometimes left empty, sometimes carefully filled in. An enclosing line often surrounds paintings and drawings while a child is exploring this schema.

[Taken from Nicholls et al (1986), *Rumpus Schema Extra* (pp 15-16)

3.5 DEVELOPMENTAL MEASURES

Two measures were used to assess the children's current developmental status, both specifically designed for use with visually impaired children: the Reynell-Zinken Development Scales for Young Visually Handicapped Children (Reynell, 1979), as in Study 1, and The Oregon Skills Inventory for Visually Impaired and Blind Preschool Children (Brown et al, 1991).

The Oregon Skills Inventory was designed to enable individual developmental progress in eight developmental areas to be accurately and objectively recorded for young blind and visually handicapped children, with a view to this information then being used to tailor suitable developmental interventions. It comprises 640 items and covers the age range birth to 6 years. The areas assessed are:

- cognition
- language
- self-help
- socialisation
- fine motor
- gross motor

with two new sections having been added in the fifth edition (1991) of the Inventory:

- vision
- compensatory skills.

These latter two sections were added because the original 6 sections, as in a number of other developmental scales adapted to suit blind children, were considered to penalise a child with no vision unfairly. In some sections, for instance, it was impossible for the totally blind child to score 100%, no matter how gifted the child. The two newer sections are intended to go some way towards recognising and valuing skills, which are unique to the blind child.

The Reynell Zinken Mental Development Scales, already administered to all children at 3 months into Study 1 (see p 59), were re-administered on entry to Study 2, i.e. 9 months after the first observation session. These second sets of Reynell-Zinken scores allowed a direct assessment of each child's developmental progress over the interim 9 months. The Oregon Skills Inventory was administered to each child at the same time point, in a separate session one week later.

3.6 DEVELOPMENTAL ASSESSMENTS RESULTS

Reynell-Zinken scores: Table 3.1 (below) shows the Reynell-Zinken scores achieved by all 15 children 3 months and one year after recruitment to the research. As can be seen from Table 3.1 (see over), three children were performing either well below or well above age equivalent levels at one or both age points: Participant N performed up to 21 months above the levels expected for blind children of her age on some of the Reynell-Zinken scales, whereas Participants D and E performed as much as 19 months below the levels expected for blind children of their ages. Play behaviour in all three of these children continued to be observed but it was decided that data from the Participants D and E would need to be excluded from the main analyses in this follow-up study as, contrary to the assessment of the initial referring professionals, they appeared to be showing evidence of general developmental delay. These two children in any case provided very limited additional data, producing very little play behaviour in any of the eight play categories over the extended period of observation. Some notes are provided below; however, on those play behaviours which were observed (see pp 158-164). Participant N, by contrast, was performing well above age norms and therefore clearly meeting the study criterion of no cognitive impairment. Unfortunately she too had to

Table 3.1 Reynell-Zinken scores achieved by all 15 children 3 months and one year after recruitment to the research.

Participant	Age	SA	SM	EE	VC	EL (S)	EL(C)
Reynell-Zinken at 3 months							
A	6.5	18 (5.0)*	23 (5+)*	12 (5+)*	36 (5+)*	22 (5+)*	18 (5.3+)*
B	6.3	18 (5.0)*	23 (5+)*	12 (5+)*	36 (5+)*	22 (5+)*	18 (5.3+)*
C	5.3	18 (5.0)*	23 (5+)*	12 (5+)*	36 (5+)*	22 (5+)*	18 (5.3+)*
D	5.3	17 (3.8)	19 (4.2)	11 (4.0)	22 (4.0)	18 (4.2)	11 (4.3)
E	4.1	15 (3.2)	15 (3.1)	9 (3.0)	18 (3.5)	15 (3.4)	8 (3.10)
F	4.0	18 (5.0)*	23 (5+)*	12 (5+)*	30 (4.11)	22 (5+)*	18 (5.3+)*
G	3.11	17 (4.0)	18 (3.11)	12 (5+)*	27 (4.7)	22 (5+)*	16 (5.3+)
H	3.10	16 (3.8)	17 (3.8)	10 (3.6)	19 (3.7)	16 (3.7)	8 (3.10)
I	3.9	16 (3.8)	18 (3.11)	10 (3.6)	18 (3.5)	16 (3.7)	11 (4.3)
K	2.9 [2.6]	11 (2.0)	12 (2.4)	8 (2.6)	9 (1.10)	9 (1.10)	0 (<2)
L	2.9 [2.6]	10 (1.10)	12 (2.4)	6 (1.11)	9 (1.10)	9 (1.10)	0 (<2)
M	2.6 [2.3]	13 (2.6)	11 (2.1)	8 (2.6)	12 (2.6)	11 (2.5)	5 (3.4)
N	2.0	12 (2.3)	13 (2.6)	7 (2.2)	16 (3.2)	14 (3.0)	3 (2.11)
O	1.9 [1.6]	7 (1.2)	7 (1.1)	3 (1.5)	8 (1.7)	9 (1.10)	0 (<2)
P	1.7 [1.3]	8 (1.4)	8 (1.4)	4 (1.7)	7 (1.2)	6 (0.10)	0 (<2)
Reynell-Zinken at 1 year							
A	7.2	18 (5.0)*	23 (5+)*	12 (5+)*	36 (5+)*	22 (5+)*	18 (5.3+)*
B	7.0	18 (5.0)*	23 (5+)*	12 (5+)*	36 (5+)*	22 (5+)*	18 (5.3+)*
C	6.0	18 (5.0)*	23 (5+)*	12 (5+)*	36 (5+)*	22 (5+)*	18 (5.3+)*
D	6.0	18 (5.0)*	22 (5.0)	12 (5+)*	32 (5.1)	21 (5.0)	15 (5.2)
E	4.10	16 (3.8)	18 (3.11)	12 (5+)*	25 (4.3)	18 (4.2)	13 (4.8)
F	4.9	18 (5.0)*	23 (5+)*	12 (5+)*	36 (5+)*	22 (5+)*	18 (5.3+)*
G	4.8	18 (5.0)*	23 (5+)*	12 (5+)*	36 (5+)*	22 (5+)*	18 (5.3+)*
H	4.7	17 (4.0)	20 (4.5)	12 (5+)*	25 (4.3)	18 (4.2)	11 (4.3)
I	4.6	18 (5.0)*	22 (5.0)	12 (5+)*	31 (4.11)	20 (4.9)	14 (4.11)
K	3.6	16 (3.8)	15 (3.2)	10 (3.6)	18 (3.5)	14 (3.0)	5 (3.4)
L	3.6	16 (3.8)	15 (3.2)	9 (3.0)	18 (3.5)	14 (3.0)	4 (3.2)
M	3.3	18 (5.0)*	17 (3.8)	12 (5+)*	18 (3.5)	16 (3.4)	6 (3.7)
N	2.9	15 (3.2)	15 (3.2)	10 (3.6)	18 (3.5)	16 (3.4)	5 (3.4)
O	2.6 [2.3]	12 (2.3)	14 (2.9)	8 (2.6)	14 (2.11)	14 (3.0)	2 (2.8)
P	2.4 [2.0]	13 (2.6)	15 (3.2)	11 (3.6)	13 (2.9)	11 (2.2)	1 (2.3)

Key: SA = social adaptation; SM = Sensory motor understanding; EE = Exploration of the environment; VC = Response to sound and verbal comprehension; EL (S) = Expressive language: structure; EL(C) = Expressive language: vocabulary and content.
The age equivalents in years and months for the Reynell-Zinken scales are given in parenthesis. Under chronological age corrections for prematurity (children below 3 years) are given in parenthesis. * = Ceiling. Greyed values: children who were subsequently excluded from most analysis.

be excluded from the main analyses of the data gathered within Study 2 as she was identified as having some degree of functional vision in the course of the study. As such, she also now fell out with the inclusion criteria for the research studies.

As Table 3.1(above) shows, the Reynell-Zinken scores for 3 of the remaining 12 children, Participants A, B and C, had already reached ceiling on all the developmental scales when they were first tested, 3 months after recruitment to the research project and did so again on re-testing. Participants F, G and M each scored at or above the level expected for blind children in all or most areas at both time points. The remaining six children initially showed considerable variation within profiles, scoring below the level expected for blind children in some areas but not in others. On first testing, scores below developmental norms were as follows in the six areas tapped by the Reynell-Zinken scales:

social adaptation:	Participant H (-2 mths)
	Participant I (-1 mth)
	Participant K (-6 mths)
	Participant L (-8 mths)
	Participant O (-4 mths)
sensorimotor understanding:	Participant H (-2 mths)
	Participant K (-2 mths)
	Participant L (-2 mths)

	Participant O (-5 mths)
exploration of the environment:	Participant H (-4 mths)
	Participant I (-3 mths)
	Participant L (-7 mths)
	Participant O (-1 mth)
response to sound and verbal comprehension:	Participant H (-3 mths)
	Participant I (-4 mths)
	Participant K (-8 mths)
	Participant L (-8 mths)
	Participant P (-1 mth)
expressive language: structure:	Participant H (-3 mths)
	Participant I (-2 mths)
	Participant K (-8 mths)
	Participant L (-8 mths)
	Participant P (-5 mths)
expressive language: vocabulary and content:	Participant K (-6 mths)
	Participant L (-6 mths)

Nine months later, 1 year from the start of the research project, Participants F and G joined Participant A, B and C in reaching ceiling on all the developmental scales. Participants I, M, O and P all scored at or above the level expected for blind children.

The remaining three children, Participants H, K and L, again showed mixed profiles on the behaviours being assessed, scoring below the level expected for blind children as follows:

social adaptation:	Participant H (-7 mths)
sensorimotor understanding:	Participant H (-2 months),
	Participant K (-4 mths)
	Participant L (-4 mths)
exploration of the environment:	Participant L (-6 mths)
response to sound and verbal comprehension:	Participant H (-4 mths)
	Participant K (-1 mths)
	Participant L (-1 mths)
expressive language: structure:	Participant H (-5 mths)
	Participant K (-6 mths)
	Participant L (-6 mths)
expressive language: vocabulary and content:	Participant H (-4 mths)
	Participant K (-2 mths)
	Participant L (-4 mths)

However, it needs to be noted that the age levels given for raw scores in the Reynell-Zinken manual are deemed to be only approximate and these 3 children scored less than 7 months below age levels on some measures and age appropriate on others. As such, these children were considered suitable for inclusion in the analysis.

Oregon Skills Inventory scores: Table 3.2 shows the Oregon scores for all children initially entered into Study 2, taken 1 year into the research project. The Oregon scores for the 2 children already identified by the Reynell-Zinken as potentially showing some

Table 3.2 Oregon scores achieved by all 15 children one year after recruitment to the research

Participant	Age	Comp	Cog	Lang	S/help	Social	G/motor	F/motor
A	7.2	61 (5-6)	105 (5-6)	97 (5-6)	90 (5-6)	63 (5-6)	85 (5-6)	68 (5-6)
B	7.0	61 (5-6)	105 (5-6)	97 (5-6)	90 (5-6)	63 (5-6)	85 (5-6)	67 (5-6)
C	6.0	60 (5-6)	105 (5-6)	97 (5-6)	90 (5-6)	63 (5-6)	85 (5-6)	69 (5-6)
D	6.0	44 (4-5)	74 (4-5)	68 (4-5)	83 (5-6)	48 (4-5)	60 (4-5)	60 (5-6)
E	4.10	29 (3-4)	45 (3-4)	48 (3-4)	52 (3-4)	48 (3-4)	56 (3-4)	46 (3-4)
F	4.9	42 (4-5)	92 (5-6)	80 (5-6)	88 (5-6)	63 (5-6)	85 (5-6)	66 (5-6)
G	4.8	44 (4-5)	73 (4-5)	88 (5-6)	76 (5-6)	63 (5-6)	85 (5-6)	58 (4-5)
H	4.7	29 (3-4)	56 (4-5)	56 (3-4)	59 (4-5)	48 (4-5)	54 (3-4)	49 (4-5)
I	4.6	44 (4-5)	74 (4-5)	81 (5-6)	83 (5-6)	55 (5-6)	60 (4-5)	60 (5-6)
K	3.6	28 (3-4)	41 (3-4)	46 (2-3)	46 (2-3)	40 (3-4)	47 (3-4)	40 (3-4)
L	3.6	29 (3-4)	45 (3-4)	48 (3-4)	47 (2-3)	43 (3-4)	48 (3-4)	42 (3-4)
M	3.3	30 (3-4)	54 (3-4)	46 (2-3)	27 (2-3)	48 (5-6)	68 (3-4)	48 (3-4)
N	2.9	30 (3-4)	54 (3-4)	48 (3-4)	48 (3-4)	42 (3-4)	68 (3-4)	48 (3-4)
O	2.6 [2.3]	19 (2-3)	36 (2-3)	42 (2-3)	36 (2-3)	35 (3-4)	33 (2-3)	26 (2-3)
P	2.4 (2.0)	22 (2-3)	38 (2-3)	30 (2-3)	46 (2-3)	30 (2-3)	41 (2-3)	28 (2-3)

Key: Comp = Compensatory skills; Cog = Cognitive; Lang = Language; S/help = Self help Social = Socialisation; G/motor = Gross motor and F/motor = Fine motor. Under chronological age the correction for prematurity for children under 3 years of age are given in parenthesis. The age equivalents in years and months for the Oregon scores are given in parenthesis Greyed values: children who were subsequently excluded from most analysis.

degree of cognitive impairment - Participants D and E - confirm this initial assessment. Participants D and E performed between 2 months and 19 months below the level expected for blind children of their age, thus showing evidence of general developmental delay. Participant N, the child identified as now having some functional vision, performed between 2 months and 14 months above the level expected for blind children.

Of the remaining 12 children entered into Study 2, Participants A, B and C reached at or near ceiling on all the developmental scales and Participants F, G, I, M, O and P scored at or above the level expected for blind children. The remaining 3 children showed mixed profiles on the behaviours assessed, scoring below the level expected for blind children as follows:

compensatory:	Participant H (-7 months)
language:	Participant H (-7 months)
gross motor:	Participant H (-7 months).
language:	Participant K (-6 months)
self help:	Participant K (-6 months)
self help:	Participant L (-6 months)
language:	Participant L (-4 months)

However, as all of the children scored at age appropriately levels on the cognitive scale and 3 children (Participants H, K and L) scored less than 7 months below age levels on some measures and age appropriate on others, all 12 children were considered suitable for inclusion in the analysis on the basis of this assessment.

3.7 ANALYSIS

Taking both Study 1 and Study 2 together, 168 videotaped play sessions of the 12 study children were available for analysis, representing records of their play behaviour over a

15 month period of data collection. The number of sessions recorded with each individual child ranged from 13 to 16 (mean 14; sd 1.21 - see Table 3.3). The total number of videotaped sessions varied due to illness, school/nursery holidays and periods when a child was not involved in any form of free play. Although the videotapes of three of the initially selected 15 children are excluded from the main analyses below, the videotapes plus diary observations of all 15 children were included in the analysis of repeatable patterns of behaviour (schemas) and in researcher notes.

Table 3.3 Description of the 12 blind children included in Study 2, age at first observations Study 1 and Study 2, age at exit from Study 2 and number of taped sessions for each child

		Age at first observation				
Participant	Sex	Study1	Study 2	Age at final observation	Total Number of taped sessions	Group
A	m	6.4	7.2	7.8	16	Older
B (CP)	f	6.3	7.0	7.6	15	Older
C (CP)	f	5.3	6.0	6.6	13	Older
F	m	4.0	4.9	5.3	14	Older
G (LP)	m	3.10	4.8	5.2	15	Older
H	m	3.10	4.7	5.1	14	Older
I	f	3.9	4.6	5.0	12	Older
K	m	2.9(2.6)	3.6	4.0	12	Younger
L	m	2.9(2.6)	3.6	4.0	12	Younger
M	f	2.6(2.3)	3.3	3.9	15	Younger
O	m	1.9(1.6)	2.6(2.3)	3.0	15	Younger
P (LP)	m	1.7(1.3)	2.4(2.0)	2.10(2.6)	15	Younger

Key: CP = Colour perception, LP = Light perception. () = Correction for prematurity for children under 3 years of age. The ages given are in years and months

Kappa values for inter-rater reliability for the 8 categories of play behaviour and for the presence of adult-structured play, free play alone and free play with other children have already been given in Chapter 2 (p 65). Using Pearson product moment correlations, inter-rater reliabilities for duration of each category of play were also calculated using the same sub-sample of data. Duration was established using frame-by-frame analysis of videotapes (30 frames per second) with behaviours lasting less than 1 second discounted. Satisfactory levels of agreement were achieved for all 8 categories: fantasy: $r = .90$, $p < .001$; exploratory: $r = .88$, $p < .001$; functional: $r = .87$, $p < .001$; repetitive: $r = .83$, $p < .01$; constructive: $r = .88$, $p < .001$; imitative: $r = .80$, $p < .01$; collaborative: $r = .84$, $p < .001$; receptive: $r = .93$, $p < .001$; other' behaviours : $r = .92$, $p < .001$.

Frequency and distribution of play behaviours

Following the criteria for identification of the 8 categories of play behaviour in Study 1 (see pp 63 to 64), a play profile was constructed as follows:

i) a count was taken for each child of the frequency with which each play behaviour was exhibited this was then averaged over visits:

For Participant A, for example, this produced the following profile:

Number of exploratory play behaviours overall =12

Number of visits overall = 15

Number of exploratory play behaviours each visit =12/15 = 0.8

ii) to allow progress to be measured, the length of time spent[1] in each play behaviour in each part of the research was calculated, (Study 1 and Study 2):

For Participant A, for example, this produced the following profile:

Number of visits study 2 = 6

Time recorded at play at each visit in minutes: 20, 25, 16, 30, 40, and 10

Total play observed =141 minutes

Time recorded at fantasy play at each visit in minutes: 3 + 7 + 0 + 12 + 15 and + 7.

Total fantasy play observed = 44 minutes.

iii) the percentage of the overall time in each play behaviour was tabulated for each child.

For Participant A, for example:

Total fantasy play observed =44 minutes

Total play observed =141 minutes

Fantasy play as a percentage of overall time recorded at play

= 44/141x100=31.2%.

iv) a count was taken of the number of times each play behaviour was exhibited by each child in a) the adult-structured situation and b) the free play situation (alone and with other children) and then calculated as a percentage of the total of each category exhibited for each child.

[1] There was no minimum duration stipulated for a given play behaviour to be counted as a specific play category.

For Participant A, for example, this produced the following profile:

Number of fantasy play behaviours overall =11

Number of fantasy play behaviours in adult-structured play = 2

Number of fantasy play behaviours in free play = 9

Adult-structured fantasy play as a percentage of total number of fantasy play exhibited

= 2/11x100=18.2%.

Fantasy play in the free play situation as a percentage of total number of fantasy play exhibited

= 9/11x100=81.8%.

v) a count was also taken of the number of times free play (with other children) and free play (alone) was observed and calculated as a percentage of overall number of free play observations in each study (there was no minimum duration for a behaviour to be counted as free play).

For Participant A, for example, this produced the following profile for Study 1:

Total number of free play behaviours observed =20

Free play alone =13

Free play with other children = 7

Percentage free play alone = (13/ 20) x 100 = 65%

Percentage free play with other children= (7/ 20) x 100 = 35%

Researcher-structured play

Following the same format as Study 1, these more informal sessions were not video-recorded but the behaviours of the children when playing with these toys were noted in the research diary.

Longitudinal analysis of play behaviours

Using the figures derived by the above calculations, a comparison was made between the number of play behaviours exhibited in each category produced in Study 1 and Study 2.

For the younger children, for example, this produced the following profile:

Total mean fantasy play behaviours Study 1 = 6

Number of visits Study 1 = 9

Mean number of fantasy play behaviours each visit = 6/9 = .67

Total fantasy play behaviours Study 2 = 12

Mean number of visits Study 2 = 6

Mean number fantasy play behaviours each visit = 12/6 = 2

% difference between Study 1 and Study 2

2 - .67 = 133/ .67 *100 = 198%

Repeatable patterns of behaviour

Repeatable patterns of behaviour were deemed to be present if 3 or more play behaviours were exhibited which matched the schemas listed in Figure 3.1 (see pp 92 to 93). There was no minimum duration for a pattern of behaviour to be counted as a repeatable pattern of behaviour as a schema-related action could at times be extremely brief (e.g. drawing a circle while within a circularity schema).

Ten minute extracts from each of the 168 sessions were randomly selected for reliability analysis by a second researcher to establish inter-rater coding reliability. Each 10-minute extract was scored for the presence or absence of each of the 17 repeatable patterns of behaviour listed in Figure 3.1. An acceptable inter-rater reliability between the two researchers was reached for the majority of the 8 kinds of schemas produced (Kappa: enclosure 1; enveloping 1; ordering 1; transporting .77; diagonality 1; functional dependency .54; positioning (opening/closing) .47 and circularity 1).

Developmental measures x play behaviours

As the number of visits to each child varied, the mean length of time a child spent on play and on each play behaviour was calculated and these figures then correlated with the Oregon and the Reynell-Zinken measures for each child at the two time points.

In the case of Participant (A) again, for example, this produced the following for Study 1:

Number of visits = 6

Time recorded at play at each visit in minutes: 20, 25, 16, 30, 40, and 10

Total play observed =141 minutes

Mean play over all visits = 141/6 = 23.5 minutes

Time recorded at fantasy play at each visit in minutes: 3, 7, 0, 12, 15, and 7.

Total fantasy play observed =44 minutes

Mean play over all visits = 44/6 = 7.3 minutes.

3.8 RESULTS

Analysis of the extent of involvement in each of the 8 categories of plays behaviours.

Table 3.4 (see over) shows the frequency of each play category over the full 15 months of observations and how it varied as a percentage of each child's overall play. As data analysed incorporated data already examined in Study 1, the presence of all 8 categories of play was to some degree expected although these data draw on a slightly smaller sample of blind children, with slightly different mean ages at entry and exit (see Table 3.3 above). In discussing these play profiles in the greater detail allowed by this extended study, comparisons are again made by contrasting the profiles of

Table 3.4 Overall frequency each play behaviour was exhibited and percentage time spent on each(n=12), over 15 months: study 1 (9 months duration) and study 2 (6 months duration)

participant	Age at first observation year/month	Fantasy		Exploratory		Functional		Repetitive		Constructive		Imitative		Collaborative		Receptive		Total•		Other^	
		N	% time	N	% time	N	% time	N	% time	N	% time	N	% time	N	% time	N	% time	N	% time	N	% time
A	6.4	11	21.1	6	2.7	12	17.2	0	0.0	6	15.5	0	0.0	12	22.2	5	12.3	72	100.6	20	9.6
B	6.3	11	25.0	2	1.1	12	25.0	0	0.0	6	9.4	0	0.0	5	27.2	7	15.3	81	113.2	24	10.2
C	5.4	13	15.0	8	7.5	9	14.2	0	0.0	15	24.2	5	2.5	16	30.8	6	15.8	92	112.2	20	2.2
F	4.0	12	30.0	16	11.1	12	26.7	0	0.0	8	11.7	0	0.0	16	31.0	5	10.1	82	125.7	13	5.1
G	3.10	12	25.0	10	13.3	9	10.6	0	0.0	7	17.8	0	0.0	11	2.3	4	18.2	70	107.6	17	20.4
H	3.10	1	2.5	23	34.0	15	24.1	4	5.8	2	20.0	0	0.0	2	5.0	6	22.4	67	124.1	14	10.3
I	3.9	9	17.0	11	17.5	13	15.4	0	0.0	1	2.5	0	0.0	3	6.6	4	20.6	57	104.8	16	25.2
K	2.9(2.6)	0	0.0	9	10.5	11	13.8	9	5.5	1	1.1	1	3.3	5	7.7	5	20.0	61	100.0	20	38.1
L	2.9(2.6)	1	1.1	5	12.8	7	16.6	11	21.0	0	0.0	1	1.1	2	3.3	6	18.1	55	100.0	22	26.0
M	2.6(2.3)	8	15.8	11	21.1	9	8.9	8	9.2	2	5.6	0	0.0	4	5.8	4	15.4	56	101.0	10	19.2
O	1.9(1.6)	9	2.7	17	24.3	6	6.7	2	0.2	0	0.0	13	8.0	13	4.4	6	15.6	94	100.0	28	38.1
P	1.6(1.2)	0	0.0	32	26.0	20	11.7	4	1.9	0	0.0	6	1.9	7	4.4	5	20.2	94	100.0	20	33.9

Key: For children age 3 years and under, correction for prematurity is included in brackets
• The total time spent in play behaviour in some cases is greater than 100% as two or more types of play may have been evident at any one time
^Other = times when the children were inactive, engaged in stereotypical behaviour or talking.
Also reported in Ferguson and Buultjens (1995)

older children (N = 7; age 3 yrs 9 months - 6 yrs 4 months at entry; mean 4 yrs 9 mths, s.d.14mths) with those of the younger children (N = 5; age 1 yr 6 months - 2 yrs 9 months at entry; mean 2 yrs, 3 mths, s.d.7mths).

Fantasy play

With the exception of Participant H who exhibited fantasy play only once, this constituting only 2.5% of his play behaviour, the older children were involved to a greater extent than younger children in fantasy play. They each exhibited fantasy play between 9 and 13 times, with this constituting between 15%% and 30% of their overall play. The younger children by contrast exhibited fantasy play between 0 and 9 times, representing between 0% and 16% of their overall play. As in Study 1, there were exceptions to this developmental trend. One child aged 2 years 3 months at entry (Participant M), when prompted by older child, exhibited fantasy play behaviour 8 times throughout the 15 months of observation, accounting for 15.8% of her overall play behaviour. A second child aged 1 year 6 months at entry (Participant O), exhibited fantasy play 9 times throughout the 15 months of observation; however, fantasy play constituted only 2.7% of his overall play behaviour and was verbally expressed.

Exploratory play

There were no differences in number of times exploratory play was exhibited (2 to 32 times) in the two age groups, but most of the older children typically spent less time on this activity than the younger children (1.1% to 34% and 10.5% to 26% respectively).

Again, Participant H, in the older group was the exception to this trend: as Table 3.4 shows he spent a good deal more of his time in this play behaviour (34%) than the other six older children. Exploratory play moreover was often exhibited in parallel with other forms of play in the older children; in contrast, exploratory play was dominant in younger children, with any attempts to introduce other types of play being met with resistance while exploration was taking place (features regularly documented in the researcher's diary). For example, Participant O was observed exploring the properties of a push-along toy, when his mother tried to attract his attention toward a musical toy; all attempts to draw his attention were ignored. On another occasion Participant L was observed investigating the properties of the door of a toy dolls house despite the nursery teacher calling his name several times and asking him to "come to the story corner" he made no response and continued with his exploration of the dolls house.

Functional play

The frequency with which functional play was exhibited varied across age groups: the older children exhibited functional play from 9 to 15 times, the younger children exhibited functional play from 6 to 20 times. However, the older children spent more of their overall play time on this activity than the younger children (10.6% to 26.7% and 6.7% to 16.6% respectively).

Repetitive play

Of the older group of children, only Participant H (4 yrs. 1 mth at entry) exhibited repetitive play (4 times and 5.8% of his total play) over the 15-month period of observation. As in Study 1 the younger children often played repetitively, both as their main form of play and within other forms of play (as noted in the researcher's diary). Throughout the 15 months of the observations repetitive play occurred between 2 and 11 times in total, representing 0.2% to 21% of total play.

Constructive play

As in fantasy play the older children exhibited constructive play to a far greater extent than the younger children, 1 to 15 versus 0 to 2 times respectively. Constructive play also constituted a greater percentage of the older children's overall play 2.5% to 24.2% and 0% to 5.6% respectively. One younger child (Participant M: 2 yrs 3 mths at entry) was observed to play constructively on two occasions. However, this was for a very short period and in both cases was prompted and assisted by an older child.

Imitative play

As the results in Table 3.4 show, only Participant C in the older group of children exhibited imitative play behaviour; this was observed on 5 occasions, constituting 2.5% of her overall play. In contrast, 4 of the 5 younger children exhibited imitative play (between 1 to 13 times), with this constituting between 1.1% and 8% of their overall play.

Collaborative play

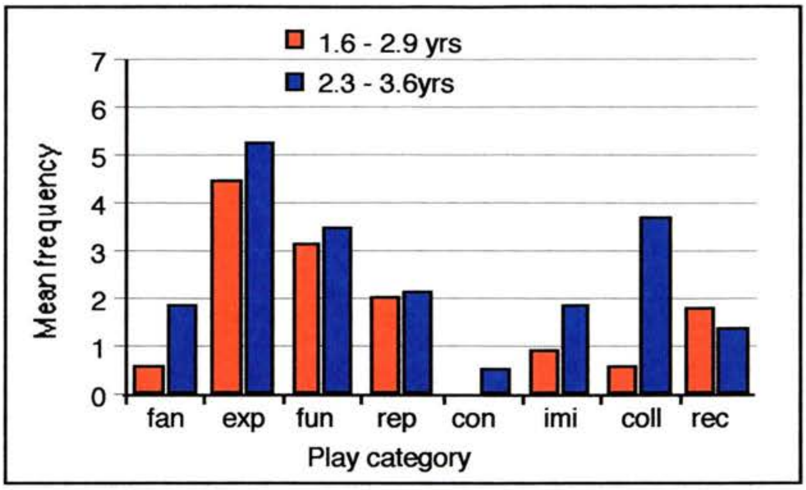
Although collaborative play constituted a greater percentage of the older children's overall play behaviour (2.3% to 30.8%) and was in general exhibited more frequently in the older children (2 to 16 times), the two youngest children in the study were seen to play collaboratively 7 and 13 times. However, this constituted only 4.4% of their overall play behaviour.

Receptive play

This kind of play was distributed evenly across all age ranges being exhibited between 4 and 7 times and constituted 10.1% to 22.4% of overall play behaviour.

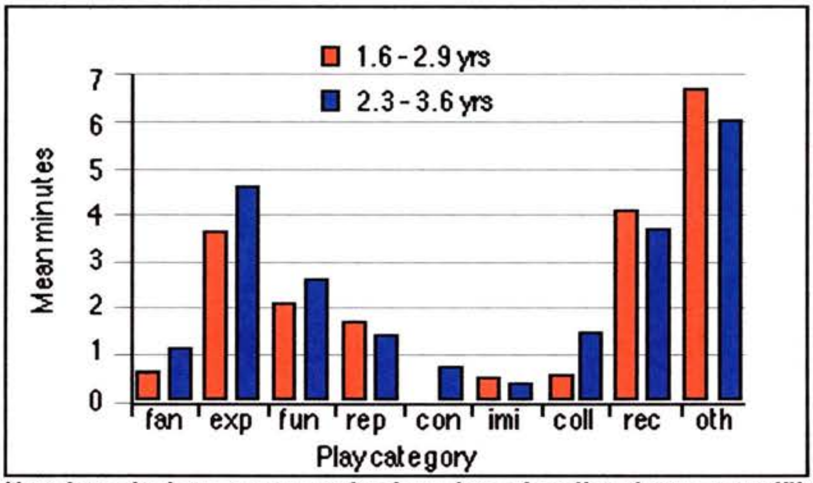
3.9 LONGITUDINAL ANALYSIS OF PLAY BEHAVIOURS

Figures 3.2 and 3.3 (over) compare the mean frequency of each play category exhibited by the younger children and the mean time spent in each play category in Study 1 and in Study 2. It can be seen that the greatest changes in play profiles between Study 1 and Study 2 relate to collaborative, constructive, fantasy and imitative play behaviours, with these rising in terms of mean frequency from 0.67 to 4 times, 0 to 0.6 times, 0.67 to 2 times and 1 to 2 times respectively. Exploratory, functional and repetitive play behaviours also increased but to far lesser extent: 4.8 to 5.6 times, 3.4 to 3.7 times, and 2.2 to 2.3 times respectively. There was a decrease in the number of times receptive play was exhibited over time.



Key: fan =fantasy, exp = exploratory. fun = functional, rep = repetitive,
con = constructive, imi = imitative, coll = collaborative, rec = receptive

Figure 3.2 Mean frequency of each play behaviour exhibited (younger group) (n = 5)



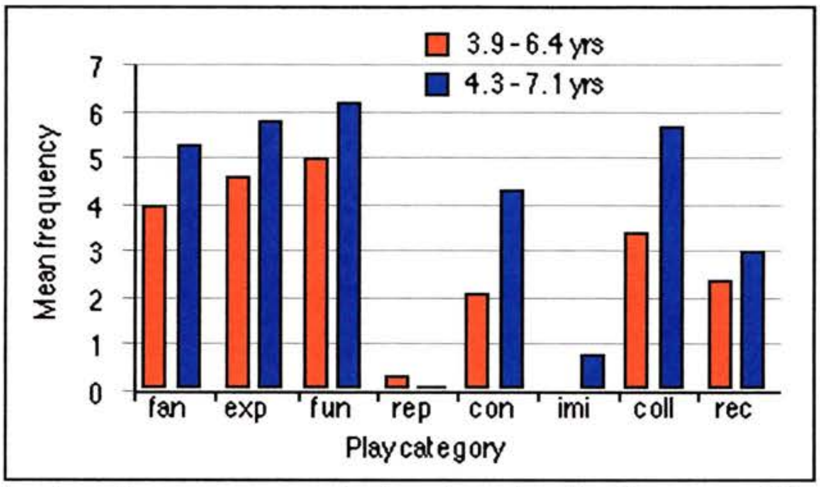
Key: fan = fantasy, exp = exploratory, fun = functional, rep = repetitive,
con= constructive imi = imitative, coll = collaborative, rec = receptitive

Figure 3.3 Mean time in minutes spent in each play behaviour (younger group) (n = 5)
(Data adjusted for total observation time per visit)

Between Study 1 and Study 2, mean time spent in collaborative, constructive, fantasy, exploratory and functional play increased from 0.69 to 1.54 minutes, 0 to 0.82 minutes, 0.74 to 1.22 minutes, 3.72 to 4.66 minutes, and 2.22 to 2.74 minutes respectively. There was a decrease in the time spent in imitative, repetitive and receptive play, from 0.6 to

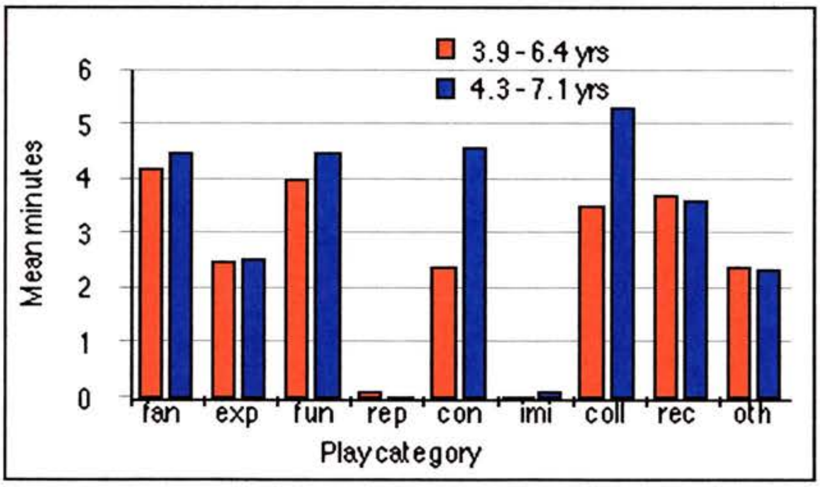
0.5, 1.8 to 1.5 and 4.14 to 3.78 minutes respectively. 'Other' behaviours decreased from 6.8 to 6.1 minutes.

Figures 3.4 and 3.5 compare the mean number of times each play category was exhibited



Key: fan = fantasy, exp = exploratory, fun = functional, rep = repetitive, con= constructive imi = imitative, coll = collaborative, rec = receptive

Figure 3.4 Mean number of times each play behaviour exhibited (older group) (n = 7)

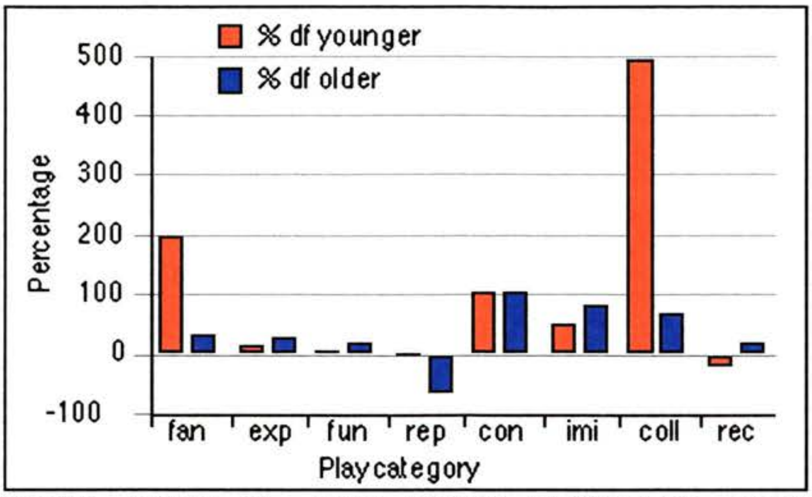


Key: fan = fantasy, exp = exploratory, fun = functional, rep = repetitive, con= constructive imi = imitative, coll = collaborative, rec = receptive

Figure 3.5 Mean time in minutes spent in each play behaviour (older group) (n = 7 by the older children and the mean time spent on each type of play in the periods covered by Study 1 and 2. The following play behaviours increased in mean frequency over the two studies: fantasy (4 to 5.3 times), functional (5 to 6.2 times), constructive (2.1 to 4.3 times) and collaborative (3.4 to 5.7 times). Exploratory, receptive and imitative play behaviours also increased in frequency but this was to a lesser extent, from 4.6 to 5.8 times, 2.4 to 3 times, and 0 to 0.8 times respectively. There was a slight decrease in mean frequency of repetitive behaviour from (0.3 to 0.1 times).

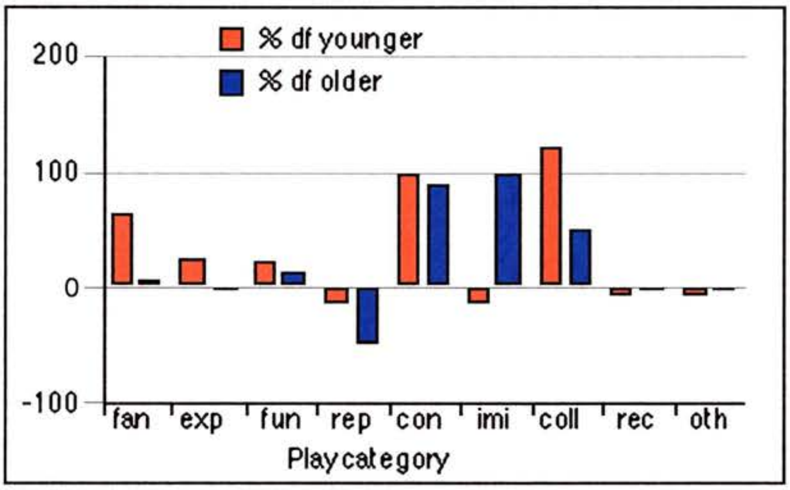
Between Study 1 and Study 2, mean time spent in fantasy, functional constructive and collaborative play increased in duration from 4.3 to 4.5 minutes, 4 to 4.6 minutes, 2.4 to 4.6 minutes and 3.6 to 5.4 minutes respectively. Exploratory and imitative play behaviours also increased in duration but again, as with the frequency, this was to a lesser extent, from 2 to 2.3 minutes, and 0 to 0.2 minutes respectively. Receptive, repetitive and other play behaviours decreased in duration, from 3.8 to 3.6 minutes, 0.4 to 0.2 minutes and 2.4 to 2.2 minutes respectively.

Figures 3.6 and 3.7 (see over) show the percentage difference between Study 1 and Study 2 in both frequency and time spent in each play behaviour, for both the younger and older children.



Key: fan = fantasy, exp = exploratory, fun = functional, rep = repetitive
con= constructive imi = imitative, coll = collaborative, rec = receptive

Figure 3.6 Percentage difference between study 1 and study 2 in frequency of each play behaviour (n=12)



Key: fan = fantasy, exp = exploratory, fun = functional, rep = repetitive,
con= constructive imi = imitative, coll = collaborative, rec = receptive

Figure 3.7 Percentage difference between study 1 and study 2 in time spent in each play (n=12)

In the younger group of children fantasy, constructive, imitative and collaborative play, behaviours were shown to increase in mean frequency by 198%, 100%, 50% and 497%, respectively, with fantasy, constructive and collaborative, play increasing in average duration by 65%, 100% and 123%, respectively. However, there was a decrease of 17%

in time spent in imitative play over this same period. Exploratory, functional and repetitive play behaviours also increased in frequency, but to a lesser extent, 17%, 9%, and 5% respectively, with mean time spent in exploratory and functional play increasing by 25% and 23% respectively. There was a decrease in receptive play behaviour, in both number of times exhibited and time spent in this activity, a decrease of 21% and 8.7% respectively. Although there was an increase in the number of times repetitive play was exhibited there was a decrease of 17% in amount of time spent in this activity. The length of time spent in 'other' behaviours also decreased by 8%.

In the older group of children the greatest increase in both frequency and time spent in these activities was in constructive and collaborative play behaviours. These increased in mean frequency by 105% and 68%, respectively, and in mean duration by 95%, 50%, respectively. To a lesser extent fantasy, functional and exploratory behaviours also increased in both frequency and in time spent on play in these categories: by 35 % 24%, and 26%, respectively and by 6%, 13%, and 0.77% respectively. Although receptive play increased in mean frequency by 10%, there was a 3% decrease in mean time spent in this activity. Only one child in the older age group was observed to play repetitively; over time, this decreased in mean frequency by 66%, with time spent decreasing by a similar amount (64%). Although Figures 3.6 and 3.7 show an increase for imitative play in the older children, it was not observed in any of the older children in Study 1, however, in Study 2 Participant C exhibited imitative play on 5 separate occasions, for a very short period of time (total for all 5 = 1minute 48 seconds).

Mixed-model ANOVAs were carried out on the data from all 12 children on a) frequency of each play behaviour (Table 3.5), and b) time spent in each of the 8 play behaviours, with age grouping as a between-subjects factor and testing point (Study 1 v Study 2) as a within-subjects (repeated measures) factor.

Frequencies of episodes of the 8 play categories across time and age groups

Although there was a significant increase in the time spent in functional play over the two studies, there was no significant difference in the frequency of this type of play for either age group or across time (Table 3.5). However, significant main effects were found over testing point for fantasy ($p<.030$), collaborative ($p<.016$) and constructive ($p<.003$) play, indicating a significant increase in the number of times these three play behaviours were exhibited over the 15 month period of observation for these 12 children; there were no significant changes over testing point for any of the other 6 categories of play.

Table 3.5 Results of the mixed ANOVAs for frequency of occurrence of each of the play categories.

	Main effect of testing point		Main effect of age group		Testing point by age	
Play	F	p	F	p	F	p
Fantasy	1,10 = 6.37	<.030	1,10 = 5.45	<.042	1,10 = 0.51	NS
Exploratory	1,10 = 0.90	NS	1,10 = 0.28	NS	1,10 = 0.44	NS
Functional	1,10 = 1.45	NS	1,10 = 0.32	NS	1,10 = 0.66	NS
Repetitive	1,10 = 0.002	NS	1,10 = 15.96	<.003	1,10 = 0.06	NS
Constructive	1,10 = 15.33	<.003	1,10 = 7.83	<.019	1,10 = 3.76	<.081
Imitative	1,10 = 0.23	NS	1,10 = 4.81	<.053	1,10 = 0.16	NS
Collaborative	1,10 = 8.33	<.016	1,10 = 0.71	NS	1,10 = 1.39	NS
Receptive	1,10 = 1.40	NS	1,10 = 0.77	NS	1,10 = 4.82	<.053

NS = not significant

Although significant main effects of age group were found for fantasy ($p<.042$), repetitive ($p<.003$) and constructive ($p<.019$) play and with imitative play approaching but just failing to reach significance ($p<.053$), there were no significant main effects of age group for the remaining four categories of play. Also, as Table 3.5 shows, there was no age x testing point interactions.

Table 3.6 Mean frequencies (with sds) of play behaviours exhibited at each visit (study 1)

	fant	expl	func	repe	cons	imit	coll	rece
Younger /study1								
Exhibited	.12	.60	.72	.44	.00	.40	.12	.36
S.D	.18	.38	.22	.30	.00	.46	.08	.15
Older/study1								
Exhibited	.59	.66	.74	.04	.29	.00	.50	.31
S.D	.30	.36	.13	.11	.31	.00	.42	.15

Key: fant = fantasy, expl = exploratory, func = functional, repe = repetitive, cons = constructive Imit = imitative, coll = collaborative, rece = receptive, S.D = standard deviation

Table 3.7 Mean frequencies (with sds) of play behaviours exhibited at each visit (study 2)

	fant	expl	func	repe	cons	imit	coll	rece
Younger /study 2								
Exhibited	.42	.62	.74	.46	.10	.40	.80	.28
S.D	.52	.43	.59	.32	.14	.54	.77	.04
Older/study 2								
Exhibited	.76	.84	.90	.03	.63	.11	.80	.49
S.D	.27	.69	.2	.08	.36	.30	.40	.27

Key: fant = fantasy, expl = exploratory, func = functional, repe = repetitive, cons = constructive Imit = imitative, coll = collaborative, rece = receptive, S.D = standard deviation

However, while the ANOVA suggests that in some of the categories of play, there were no significant differences in frequency over the 15 months period of observation, the means and standard deviations given in Tables 3.6 and 3.7 (above) show 5 of the 8 play behaviours - fantasy, exploratory, functional, constructive and collaborative play - increasing in frequency of occurrence over the 15 months period of observation, with the greatest increase being in fantasy and collaborative play in the younger children and in constructive and collaborative play in the older children.

Time spent in the 8 categories across time and age groups

Table 3.8 presents the results of the mixed ANOVAs on time spent in each of the 8 play

Table 3.8 Results of mixed ANOVAs for duration

	Main effect of testing point		Main effect of age group		Testing point by age	
Play	F	p	F	p	F	p
Fantasy	1,10 = 5.03	<.048	1,10 = 8.87	<.014	1,10 = 0.07	NS
Exploratory	1,10 = 2.86	NS	1,10 = 2.18	NS	1,10 = 2.34	NS
Functional	1,10 = 17.77	<.002	1,10 = 5.90	<.036	1,10 = 8.02	<.01
Repetitive	1,10 = 2.77	NS	1,10 = 4.91	<.051	1,10 = 1.25	NS
Constructive	1,10 = 3.92	<.076	1,10 = 10.03	<.001	1,10 = 0.69	NS
Imitative	1,10 = 0.18	NS	1,10 = 3.21	NS	1,10 = 2.53	NS
Collaborative	1,10 = 15.96	<.002	1,10 = 4.62	<.057	1,10 = 1.84	NS
Receptive	1,10 = 3.13	NS	1,10 = 0.15	NS	1,10 = 0.98	NS
Other	1,10 = 6.19	<.032	1,10 = 21.26	<.001	1,10 = 5.35	<.043

categories in Study 1 and Study 2 sessions. Significant main effects over testing point were found for fantasy ($p<.048$), functional ($p<.002$) and collaborative play ($p<.002$), indicating a significant increase in time spent in these three play behaviours over the15 month period of observation for these 12 children. Constructive play showed a similar but non-significant trend ($p<.076$). 'Other' behaviours also showed a significant main effect of testing point ($p<.032$), indicating a significant decrease in time being spent in such behaviours over the 15-month period of observation.

There was also a significant main effect of age group for fantasy (p<.014), functional (p<.036), constructive (p<.001) and 'other' behaviours (p<.001). However, as Table 3.8 shows, there was a significant age x testing point interaction for functional play. (p<.01). A Tukey post hoc test performed on age x testing point for functional play proved to be non-significant.

Table 3.9 Mean time spent in play behaviours at each visit (Study 1)

	fant	expl	func	repe	cons	imit	coll	rece	other
Younger / study1									
Mean	0.74	3.72	2.22	1.80	0.00	0.87	0.69	4.14	6.80
S.D	1.44	1.54	0.57	1.98	0.00	1.08	0.68	0.66	1.51
Older / study1									
Mean	3.97	2.49	4.07	0.20	2.44	0.00	3.60	3.84	2.54
S.D	2.00	1.66	1.52	0.53	2.27	0.00	3.38	0.73	1.64

Key: fant = fantasy, expl = exploratory, func = functional, repe = repetitive, cons = constructive, imit = imitative, coll = collaborative, rece = receptive. S.D = standard deviation

Table 3.10 Mean time spent in play behaviours at each visit (Study 2)

	fant	expl	func	repe	cons	imit	coll	rece	other
Younger /study 2									
Mean	1.28	4.66	2.74	1.45	0.82	0.22	1.54	3.78	6.10
S.D	2.03	1.79	1.00	1.46	1.52	0.30	0.65	0.83	1.06
Older / study 2									
Mean	4.40	2.59	4.60	0.11	4.64	0.26	5.43	3.73	2.47
S.D	1.85	2.53	1.63	0.30	3.09	0.68	3.68	0.93	1.54

Key: fant = fantasy, expl = exploratory, func = functional, repe = repetitive, cons = constructive, imit = imitative, coll = collaborative, rece = receptive. S.D = standard deviation

The means for time spent in each of the 8 play behaviours for Study 1 and Study 2 shown in Tables 3.9 and 3.10 (above) demonstrate a similar trend to the means in Tables 3.7 and 3.8 (above), with time spent in 5 of the 8 play behaviours - fantasy, exploratory, functional, constructive and collaborative play - increasing over the 15 months period of observation, with the greatest increase in time being in exploratory, constructive and collaborative play in the younger children and in constructive and collaborative play in the older children.

Within subjects comparison of play behaviours

The above analyses have looked at data at group and at age level but have so far not touched on individual profiles in any of the 12 children who provided data for both Studies 1 and 2. Tables 3.11 and 3.12 (below) therefore show the mean frequency of occurrence and mean time spent in each of the 8 types of play as observed in each of the 12 children in the study over the 15 month period of data collection.

Table 3.11 Mean frequency of play behaviours study 1 and study 2 (Older children) N = 7

Participant	Age	study	fantasy	exploratory	functional	repetitive	consructive	imitative	collaborative	receptive
A	6.4 - 7.2	1	0.8	0.3	0.7	0.0	0.3	0.0	0.9	0.3
	7.3 - 7.9	2	0.7	0.5	1.0	0.0	0.5	0.0	0.7	0.3
B	6.3 - 7.1	1	0.7	0.1	0.9	0.0	0.3	0.0	0.2	0.4
	7.2 - 7.8	2	0.8	0.2	0.7	0.0	0.5	0.0	0.5	0.5
C	5.4 - 6.2	1	0.9	0.6	0.6	0.0	0.9	0.0	0.9	0.6
	6.3 - 6.9	2	0.8	0.5	0.7	0.0	1.2	0.8	1.3	1.0
F	4.0 - 4.9	1	0.7	0.9	0.7	0.0	0.4	0.0	0.9	0.3
	4.10 - 5.4	2	1.0	1.3	1.0	0.0	0.7	0.0	1.3	0.3
G	3.10 - 4.7	1	0.6	0.7	0.6	0.3	0.1	0.0	0.6	0.2
	4.8 - 5.2	2	1.0	0.7	0.7	0.2	1.0	0.0	1.0	0.3
H	3.10 - 4.7	1	0.0	1.1	0.9	0.3	0.0	0.0	0.0	0.2
	4.8 - 5.2	2	0.2	2.2	1.2	0.2	0.3	0.0	0.3	0.7
I	3.9 - 4.6	1	0.4	0.9	0.8	0.0	0.0	0.0	0.0	0.2
	4.7 - 5.1	2	0.8	0.5	1.0	0.0	0.2	0.0	0.5	0.3
Mean frrquency of play behaviours study 1 and study 2 (Younger children) N = 5										
K	2.9 - 3.6	1	0.0	0.1	0.7	0.4	0.0	1.1	0.1	0.3
	3.7 - 4.1	2	0.0	0.3	0.8	0.8	0.2	0.0	0.7	0.3
L	2.9 - 3.6	1	0.0	0.4	0.6	0.8	0.0	0.2	0.2	0.4
	3.7 - 4.1	2	0.2	0.8	0.3	0.7	0.0	0.0	0.0	0.3
M	2.6 - 3.3	1	0.4	0.6	0.6	0.7	0.0	0.0	0.2	0.2
	3.4 - 3.10	2	0.7	0.5	0.7	0.3	0.3	0.0	0.3	0.3
O	1.9 - 2.6	1	0.2	0.8	0.6	0.2	0.0	0.6	0.1	0.6
	2.7 - 3.1	2	1.2	0.7	0.2	0.0	0.0	1.3	2.0	0.2
P	1.6 - 2.3	1	0.0	1.1	1.1	0.1	0.0	0.3	0.0	0.3
	2.4 - 2.10	2	0.0	1.2	1.7	0.5	0.0	0.5	1.0	0.3

Table 3.12 Mean time study 1 and study 2 (Older children) N = 7

Participant	Age	study	fantasy	exploratory	functional	repetitive	consructive	imitative	collaborative	receptive	Other
A	6.4 - 7.2	1	4.7	0.6	3.3	0.0	3.1	0.0	4.7	2.6	2.0
	7.3 - 7.9	2	4.5	0.5	4.2	0.0	3.6	0.0	4.8	2.2	2.2
B	6.3 - 7.1	1	6.3	0.4	6.7	0.0	2.2	0.0	6.7	4.2	2.7
	7.2 - 7.8	2	7.0	0.2	7.0	0.0	3.0	0.0	8.6	4.2	2.8
C	5.4 - 6.2	1	4.8	2.4	3.9	0.0	2.2	0.0	7.8	4.4	0.7
	6.3 - 6.9	2	3.7	1.8	4.5	0.0	3.0	1.8	11.0	4.7	0.7
F	4.0 - 4.9	1	4.9	2.3	5.0	0.0	2.1	0.0	5.6	3.1	1.0
	4.10 - 5.4	2	5.7	2.2	5.8	0.0	2.6	0.0	7.2	3.0	1.0
G	3.10 - 4.7	1	4.0	3.0	2.0	0.0	3.0	0.0	0.4	3.8	4.0
	4.8 - 5.2	2	5.0	2.3	2.3	0.0	4.3	0.0	0.5	3.5	4.2
H	3.10 - 4.7	1	0.0	5.2	4.5	1.4	0.0	0.0	0.0	4.3	2.1
	4.8 - 5.2	2	1.1	7.8	5.4	0.8	10.0	0.0	2.6	4.8	1.7
I	3.9 - 4.6	1	3.1	3.5	3.1	0.0	0.0	0.0	0.0	4.5	5.3
	4.7 - 5.1	2	3.8	3.3	3.0	0.0	1.3	0.0	3.3	3.7	4.7
Mean time study 1 and study 2 (Younger children) N = 5											
K	2.9 - 3.6	1	0.0	2.0	2.5	1.2	0.0	1.6	1.4	4.3	7.9
	3.7 - 4.1	2	0.0	2.2	3.0	1.0	0.6	0.0	1.6	3.6	7.2
L	2.9 - 3.6	1	0.0	2.1	3.0	5.0	0.0	0.0	1.6	3.9	5.7
	3.7 - 4.1	2	0.5	3.4	4.0	3.6	0.0	0.6	0.0	3.6	5.0
M	2.6 - 3.3	1	3.3	5.0	1.9	2.3	0.0	0.0	1.3	3.8	4.7
	3.4 - 3.10	2	4.8	5.7	2.7	2.2	3.5	0.0	1.7	4.0	5.0
O	1.9 - 2.6	1	0.4	4.5	1.5	0.1	0.0	1.3	0.8	3.5	8.0
	2.7 - 3.1	2	0.8	5.5	1.2	0.0	0.0	1.6	0.5	2.7	7.0
P	1.6 - 2.3	1	0.0	5.0	2.2	0.4	0.0	0.3	0.0	5.2	7.7
	2.4 - 2.10	2	0.0	6.5	2.8	0.4	0.0	0.5	2.3	5.0	6.3

Figures 3.8 to 3.16 graph the percentage change in both frequency and mean time spent in each play behaviour for all 12 children from the 9 month period of observation in Study 1 (age 1.2 to 6.4) to the 6-mth period of observation in this study (age 2.4 to 7.3 at first observation). The data shown in Figures 3.8 to 3.16 do not include any play data from the initial familiarisation sessions in Study 1 (see Chapter 2, p. 62). The ages given in Figures 3.8 to 3.16 are corrected for prematurity for Participants K, L, M, O and P.

Fantasy play

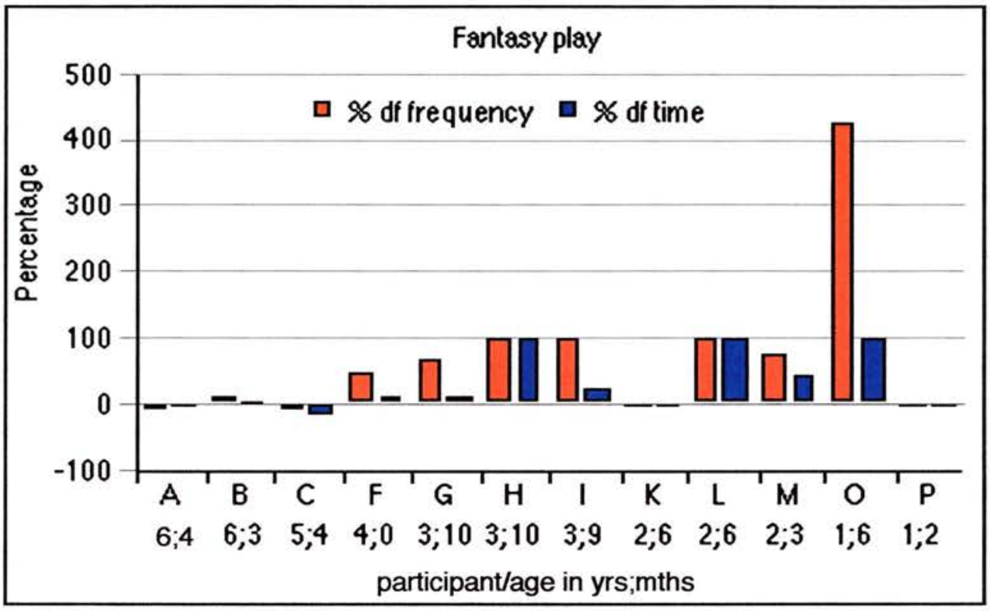


Figure 3.8 Percentage difference between Study 1 and Study 2 in both frequency and duration of fantasy play (n=12)
Note: Data were taken from the first observation in Study 1: age range 1.2 to 6.4 yrs (duration 9 mths) to the final observation Study 2, age range 2.4 to 7.8 (total duration 15mths). The ages given for Participants K, L, M, O and P are corrected for prematurity.

As Figure 3.8 shows, with the exception of Participant K and Participant P who did not exhibit any form of fantasy play throughout either period of observation, the greatest increase in fantasy play behaviour occurred mainly in the youngest children, those aged 1.9 to 4.yrs at first observation: Participants F (50%), G (67%), H (100%), I (100%), L

(100%), M (75%) and O (450%). Although these 7 children also showed an increase in the amount of time spent in fantasy play, Figure 3.8 shows a lower percentage change over time for participants F (11%), G (11%), I (23%), M (45%) and O (100%). Participant L and H did not exhibit any form of fantasy play behaviour in the 9 months of observation in Study 1; in the 6 months of observation in Study 2, however, it first became evident in these two participants (at 3yrs 8mths and 4yrs 8 months respectively), although it was still a small percentage of their overall play behaviour. The three oldest children (Participants A, B and C) either decreased or increased only minimally both the frequency of occurrence and the time spent in fantasy play (A: -12.5% and -4.2%, B: 12.5% and 4.5%; C -11% and -22% respectively). The youngest age at which fantasy play was observed was 1year and 9 months (Participant O).

Exploratory play

As Figure 3.9 (see over) shows, four of the seven oldest children (A, C, F and G) increased the frequency of their exploratory play behaviours although, there was a decrease in the time spent in this type of play behaviour in all four children. Participant B showed a decrease in both frequency and duration of this type of play behaviour. With the exception of Participant M, who decreased in frequency and Participant K who decreased in duration, the remaining five children all increased their engagement in exploratory play on both measures over time.

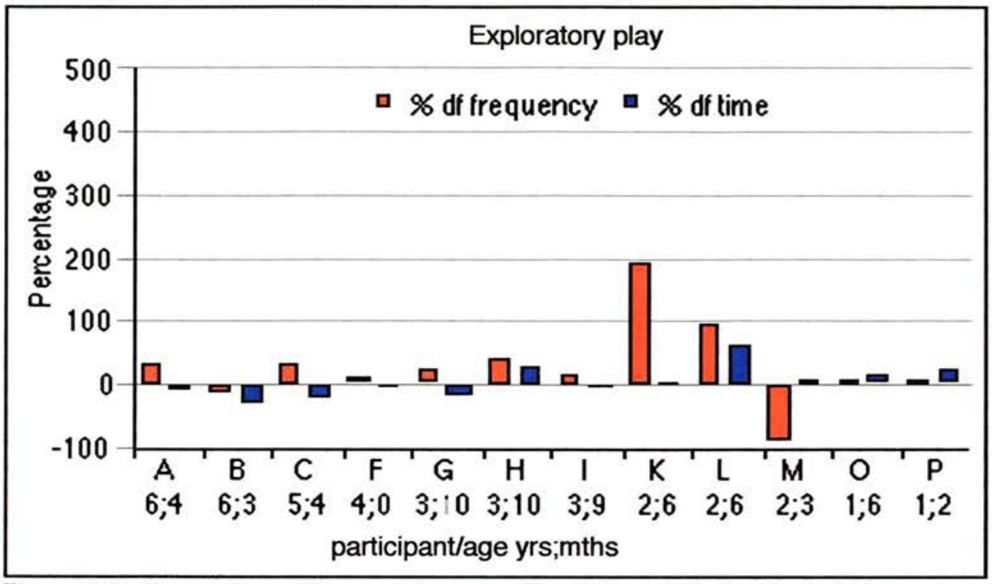


Figure 3.9 Percentage difference between Study 1 and Study 2 in both frequency and duration of exploratory play (n=12)

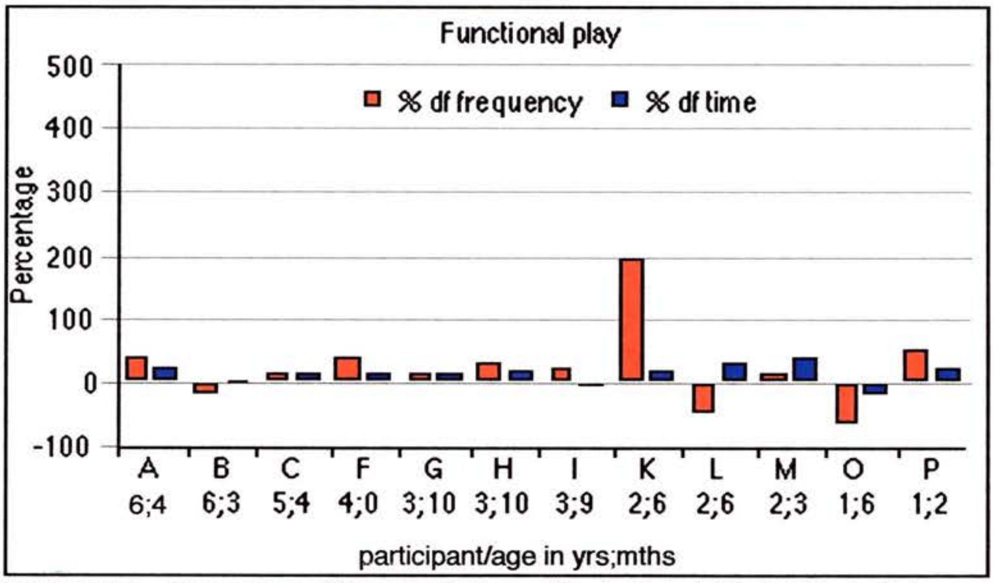


Figure 3.10 Percentage difference between Study 1 and Study 2 in both frequency and duration of functional play (n=12)

Note: Data were taken from the first observation Study 1: age range 1.2 to 6.4 yrs (duration 9 mths) to the final observation Study 2, age range 2.5 to 7.8 (total duration 15mths). The ages given for participants K, L, M, O and P are corrected for prematurity.

Functional play

As Figure 3.10 (above) shows, with the exception of Participant B who decreased the frequency of her functional play, most of the oldest participants (A, C, F, G, H and I) showed a small increase in both frequency of functional play and time spent in this activity. Two of the younger children (L and O) showed a decrease in their frequency of functional play and one child (K) increased his functional play by 200%.

Repetitive play

As Figure 3.11 shows, only one of the older children in the study exhibited repetitive

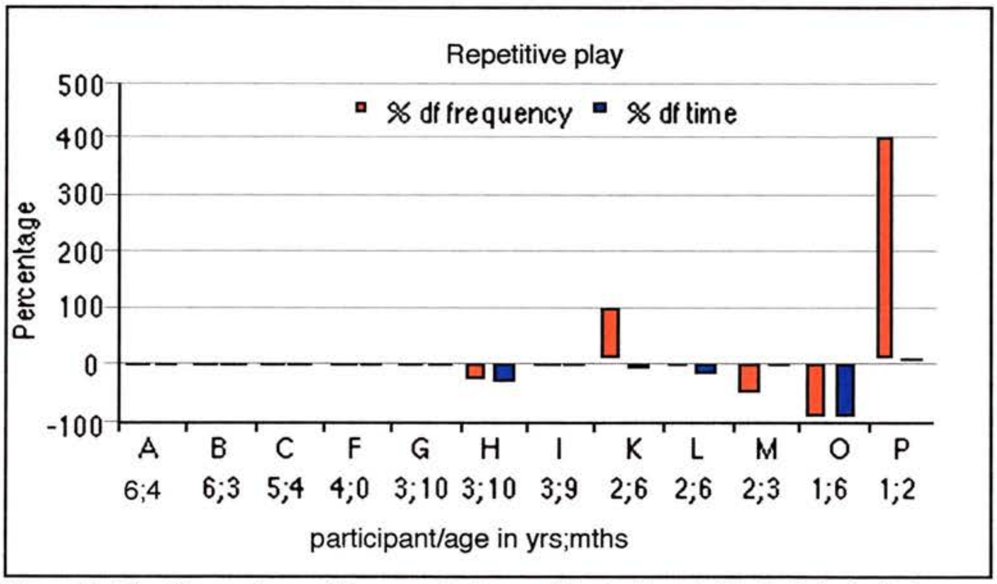


Figure 3.11 Percentage difference between Study 1 and Study 2 in both frequency and duration of repetitive (n=12)

Note: Data were taken from the first observation Study 1: age range 1.2 to 6.4 yrs (duration 9 mths) to the final observation Study 2, age range 2.5 to 7.8 (total duration 15mths). The ages given for participants K, L, M, O and P are corrected for prematurity.

play behaviour throughout the 15 months of observation (Participant G) and this child showed a decrease over time in both the time spent in this type of play and in the frequency in which it is exhibited. Two of the younger children (K and P) increased the number of repetitive play behaviours exhibited but the length of time spent in this activity remained the same. The remaining three younger children (L, M and O) decreased both frequency and the amount of time spent in this type of play.

Constructive play

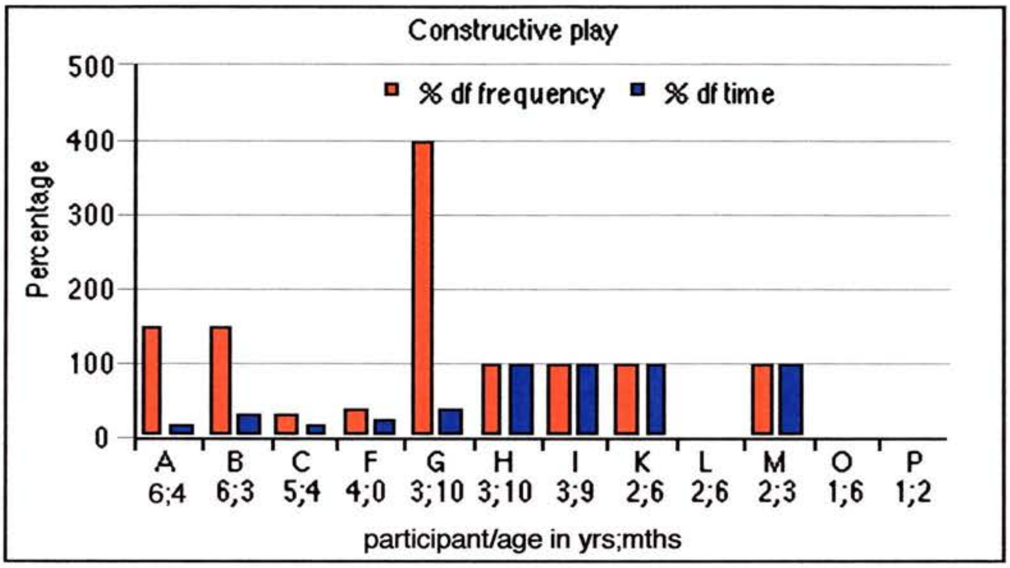


Figure 3.12 Percentage difference between Study 1 and Study 2 in both frequency and duration of constructive play (n=12)

Note: Data were taken from the first observation Study 1: age range 1.2 to 6.4 yrs (duration 9 mths) to the final observation Study 2, age range 2.5 to 7.8 (total duration 15mths). The ages given for participants K, L, M, O and P are corrected for prematurity.

The pattern of change over time for constructive play was variable across participants (Figure 3.12), with the greatest increases in the frequency of this type of play behaviour occurring in five of the older children (A, B, G, H and I). Although the frequency of this type of play behaviour increased between 100% and 400% in these five children, the time spent in this activity increased to far lesser extent (16% to 100%). Two of the younger children (K and M) did not exhibit any form of constructive play in Study 1 and were first observed to play constructively in Study 2 at age 3 yrs 8 months and 3yrs 6 months respectively. The remaining three younger children (L, O and P) did not exhibit any form of constructive play throughout the 15 months of observation.

Imitative Play

As Figure 3.13 (below) shows, only one of the older children (Participant C) exhibited imitative play and this was only evident and of short duration in Study 2. Participant M did not exhibit imitative play in either study and Participant K although exhibiting imitative play in Study 1 did not exhibit any of this form of play in Study 2; the remaining three younger children participants (L, O and P) showed an increase in both the number of times exhibited and the amount of time spent in this type of play over time.

Collaborative play

As Figure 3.14 (below) shows, with the exception of Participant L, who did not exhibit any collaborative play in Study 2, and Participant B, who increased her collaborative play 150%, the greatest increase in collaborative play behaviour occurred in the children aged 2.4 to 4.8 (at first observation this study), in both number of times exhibited: G (67%), H (100%), I (100%), K (600%), M (50%), O (1650%) and P (100%), and to a lesser extent, time spent in this activity: G (25%), H (100%), I (100%), K (14%), M (30%), O (50%) and P (100%).

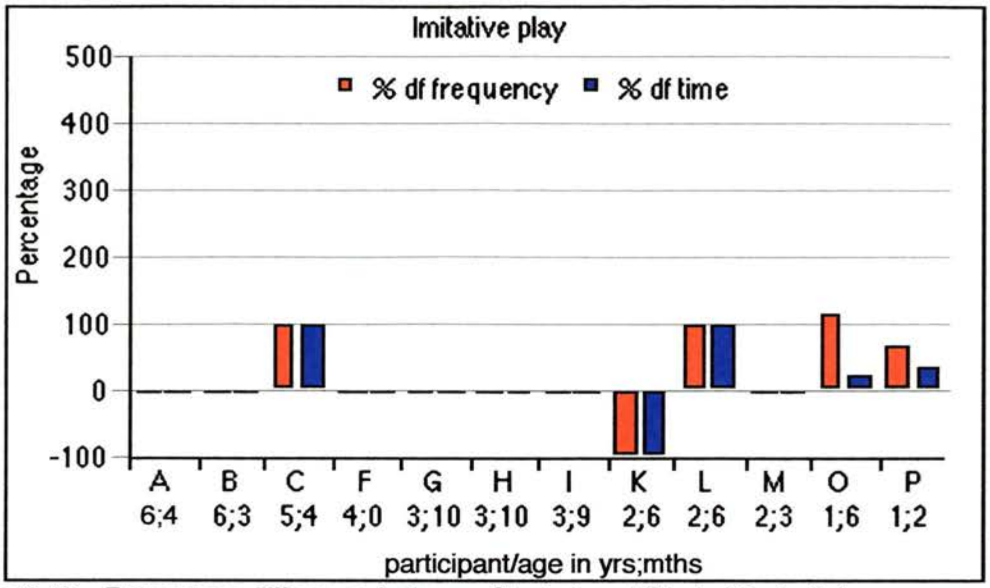


Figure 3.13 Percentage difference between Study 1 and Study 2 in both frequency and duration of imitative play (n=12)

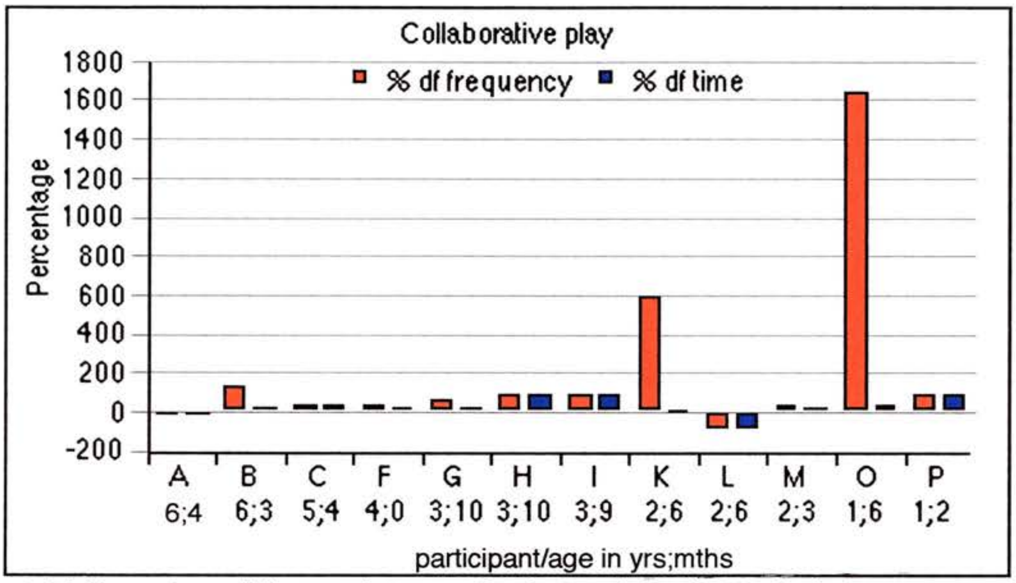


Figure 3.14 Percentage difference between Study 1 and Study 2 in both frequency and duration of collaborative play (n=12).

Note: Data were taken from the first observation Study 1: age range 1.2 to 6.4 yrs (duration 9 mths) to the final observation Study 2, age range 2.5 to 7.8 (total duration 15mths). The ages given for participants K, L, M, O and P are corrected for prematurity.

However, Participants H, I and P did not exhibit any form of collaborative play in the 9 months of observation in study 1, this type of play was first exhibited in these 3 participants at 4years 8months, 4years 8 months and 2years 6 months respectively. The three remaining children, Participants A, C and F (aged 4yrs 10mths to 7yrs 3mths), either decreased or minimally increased both the time spent in this activity and the number of times collaborative play was exhibited: -22% and 2%, 44% and 28%, 44% and 29% respectively.

Receptive play

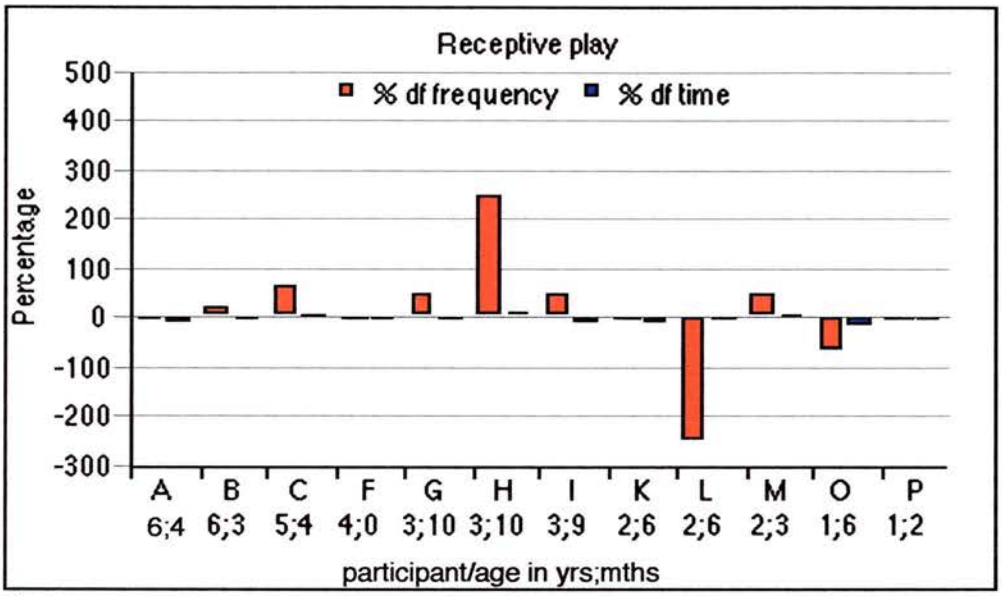


Figure 3.15 Percentage difference between study 1 and study 2 in both frequency and duration of receptive play (n=12)

Note: Data were taken from the first observation Study 1: age range 1.2 to 6.4 yrs (duration 9 mths) to the final observation Study 2, age range 2.5 to 7.8 (total duration 15mths). The ages given for Participants K, L, M, O and P are corrected for prematurity.

As Figure 3.15 shows, only Participant M from the younger group of children increased both time spent and number of receptive play behaviours exhibited. The remaining four younger Participants (K, L, O and P) showed either no change or a decrease in the amount of time spent in receptive play and in the number of receptive play exhibited. Receptive play showed a variable pattern of change across the older participants.

<u>Other behaviours</u> (inactivity, talking, stereotypical behaviour etc.)

Play behaviour was often interrupted by, for example, short periods of inactivity, the child talking to the researcher or other children and stereotypical behaviour (notes from researcher's diary). A count was taken of the time each child spent in these activities and calculated as a percentage of the overall observation time.

Figure 3.16 shows the changes in time spent in these activities between the two studies. Five of the children showed a decrease in the time spent in these other activities: Participants H -19%, I -11%, K -9%, L -5% O- 12.5. Participants M and P from the

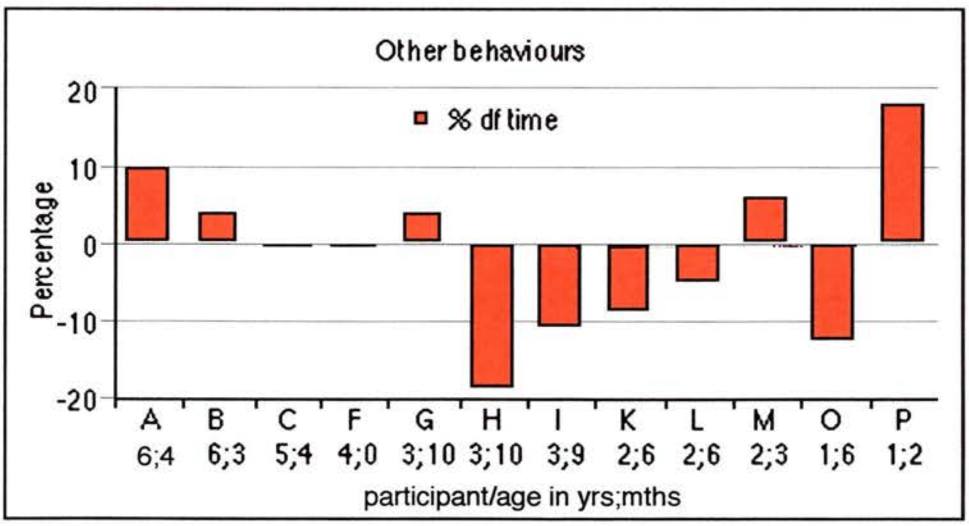


Figure 3.16 Percentage difference between Study 1 and Study 2 in the duration of other non play behaviours exhibited during observation (n=12)
Note: Data were taken from the first observation Study 1: age range 1.2 to 6.4 yrs (duration 9 mths) to the final observation Study 2, age range 2.5 to 7.8 (total duration 15mths). The ages given for Participants K, L, M, O and P are corrected for prematurity.

younger group of children and Participants A, B and G, three of the older children, all increased the time spent in these other activities; however it was noted that in Participants M and P, the other behaviours mainly consisted of stereotypical behaviour and periods of inactivity, whereas in the older children play was mostly interrupted by talking (notes from researcher's diary).

Adult-structured v free play

The results in Table 3.13 (see over) show the number of times each play category was exhibited and the percentage of overall time spent on each category when play was adult-structured.[2] The results in Table 3.14 (p 138) show the number of times each play category was exhibited and the percentage of overall time spent on each play in the free play situation. Comparisons are once again made between the older children (age 3 yrs 9 months to 6yrs 4 months) and the younger children (age 1 yr 6 months to 2 yrs 9 months).

Fantasy play

The results in Table 3.13 show that the younger the child the more likely fantasy play will be adult-structured. Fantasy play was rarely seen in the free play situation in children less than 3 years. In the older children by contrast (with the exception of 2 children), most of the fantasy play observed was in the free play situation.

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[2] A count was taken only of those play behaviours structured by adults with the intention of eliciting a specific form of play. Researcher structured play was not included in the count. Play episodes observed in parallel with the intended form of play were not counted.

Table 3.13 Frequency of each play behaviour exhibited (N) and percentage time spent on each (% time) when adult structured (n = 12)

participant	Age at first observation year/month	Fantasy		Exploratory		Functional		Repetitive		Constructive		Imitative		Collaborative		Receptive		Total•
		N	% time	N	% time	N	% time	N	% time	N	% time	N	% time	N	% time	N	% time	N
A	6.4	2	18.6	0	0.0	3	24.8	0	0.0	2	37.6	0	0.0	7	67.8	3	82.5	17
B	6.3	2	27.3	0	0.0	3	25.6	0	0.0	2	22.8	0	0.0	3	59.5	3	60.6	14
C	5.4	2	13.5	0	0.0	2	22.3	0	0.0	5	19.4	5	100.0	12	74.4	4	79.8	30
F	4.0	3	9.2	0	0.0	2	16.5	0	0.0	4	50.3	0	0.0	8	49.5	4	86.4	21
G	3.10	4	16.2	0	0.0	3	33.4	0	0.0	4	43.8	0	0.0	7	62.2	3	92.5	21
H	3.10	1	100.0	0	0.0	10	65.2	0	0.0	1	49.6	0	0.0	2	100.0	5	94.3	19
I	3.9	5	55.6	0	0.0	11	85.0	0	0.0	1	100.0	0	0.0	2	66.8	3	87.3	18
K	2.9 (2.6)	0	0.0	0	0.0	7	63.8	0	0.0	1	100.0	1	100.0	5	100.0	5	100.0	23
L	2.9 (2.6)	1	100.0	0	0.0	4	57.6	0	0.0	0	0.0	1	100.0	2	100.0	6	100.0	13
M	2.6 (2.3)	6	75.7	0	0.0	5	55.5	0	0.0	2	100.0	0	0.0	4	100.0	4	100.0	21
O	1.9 (1.6)	9	100.0	7	41.2	5	83.2	0	0.0	0	0.0	5	38.2	10	76.4	6	100.0	42
P	1.6 (1.2)	0	0.0	10	31.2	5	25.0	0	0.0	0	0.0	3	50.6	3	42.8	5	100.0	26

NB: For children age 3 years and under, correction for prematurity is included in brackets. •Total number of all play behaviours exhibited when in the adult structured situation. Data includes all observations from study 1 (9 months) and all observations from study 2 (6 months). Age ranges at final observation ranged from 2 yrs 9 mths to 7yrs 8 mths.

Table 3.14 Frequency of each play behaviour exhibited (N) and percentage time spent on each (% time) when in the free play situation (n = 12)

participant	Age at first observation year/month	Fantasy		Exploratory		Functional		Repetitive		Constructive		Imitative		Collaborative		Receptive		Total•
		N	% time	N	% time	N	% time	N	% time	N	% time	N	% time	N	% time	N	% time	N
A	6.4	9	81.4	6	100.0	9	75.2	0	0.0	4	62.4	0	0.0	5	32.2	2	17.5	35
B	6.3	9	72.7	2	100.0	9	74.5	0	0.0	4	77.2	0	0.0	2	40.5	4	39.4	30
C	5.4	11	86.5	8	100.0	7	77.7	0	0.0	10	80.6	0	0.0	4	25.6	2	20.2	42
F	4	9	90.8	16	100.0	10	83.5	0	0.0	4	49.7	0	0.0	8	50.5	1	13.6	48
G	3.10	8	83.8	10	100.0	6	66.6	0	0.0	3	56.2	0	0.0	4	37.8	1	7.5	32
H	3.10	0	0.0	23	100.0	5	34.8	4	100.0	1	50.4	0	0.0	0	0.0	1	5.7	34
I	3.9	4	44.4	11	100.0	2	15.0	0	0.0	0	0.0	0	0.0	1	33.2	1	12.7	19
K	2.9 (2.6)	0	0.0	9	100.0	4	36.2	9	100.0	0	0.0	0	0.0	0	0.0	0	0.0	22
L	2.9 (2.6)	0	0.0	5	100.0	3	42.4	11	100.0	0	0.0	0	0.0	0	0.0	0	0.0	19
M	2.6 (2.3)	2	24.3	11	100.0	4	44.5	8	100.0	0	0.0	0	0.0	0	0.0	0	0.0	25
O	1.9 (1.6)	0	0.0	10	58.8	1	16.8	2	100.0	0	0.0	8	61.8	3	23.6	0	0.0	24
P	1.6 (1.2)	0	0.0	22	68.8	15	75.0	4	100.0	0	0.0	3	49.4	4	57.2	0	0.0	48

NB: For children age 3 years and under correction for prematurity is included in brackets •Total number of all play behaviours exhibited when in free play situation. Data includes all observations from study 1 (9 months) and all observations from study 2 (6 months). Age ranges at final observation ranged from 2 yrs 9 mths to 7yrs 8 mths.

Exploratory play

Exploratory play was distributed evenly across all ages during free play and was only observed in adult-structured play with the two youngest children, whose parents actively encouraged exploration of objects within the environment. In the older children, exploratory play was mostly observed in parallel with other forms of play whereas in the younger children exploratory play was typically their only form of play (see Chapter 2 p 69 and p75-76).

Functional play

As Tables 3.13 and 3.14 (above) show, the 5 oldest children in the study spent most of their functional play time in the free play situation (66.6% to 83.5%) whereas the majority of the younger children spent most of their functional play time (55.5% to 83.2%) in the adult-structured situation. The one exception was a 16 month-old child (age at observation), who was observed in his own home, was secure in familiar surroundings, was very active, and could crawl and who was therefore able to gain access to the functional toys/materials without the aid of an adult (notes from researcher's diary).

Repetitive play

This type of play was only observed in the free play situation and mostly in the younger children.

Constructive play

Constructive play was only observed in 8 out of the 12 children at any point over the 15 months of the study. Of these, the three oldest children (5.4 yrs to 6.4 yrs) spent most of this time (62.4% to 80.6%) in the free play situation (Table 3.14). The middle three children aged between 3 yrs 10 months to 4 yrs spent approximately half (49.7 to 56.2%) of this time in free play. One older child, aged 3 yrs 9 months at first observation, and one of the younger children, although observed in constructive play, did so only when play was adult-structured.

Imitative play

Only 5 of the children in the study were involved in this type of play and it was mostly adult-structured. Two of the younger children did exhibit imitative play in a free play context but only when prompted by their older siblings (notes from researcher's diary and see Table 3.15 over).

Collaborative play

Across all age levels collaborative play was most frequently observed during adult - structured play. Although the older children in the study were involved in collaborative play with other children, only the two youngest children were observed to play collaboratively in the free play situation and only when prompted by their older siblings (notes from researcher's diary and see Table 3.15 p 141). However, these two children were observed playing in their own home and so there were no opportunities to observe them playing collaboratively with other children. Although the remaining three younger children attended a special educational nursery for the visually impaired and opportunities to play collaboratively with other children therefore did exist, they showed no interest in engaging in this type of play.

Receptive play

Across all ages this form of play was mostly observed in the adult-structured situation (60.6% to 100%). It was noted, during adult-structured play, receptive play was mainly in the form of storytelling and singing with the older children. The younger children showed very little interest during storytelling time, although they were active and attentive when adults were encouraging singing and reciting nursery rhymes. During free play, some of the older children chose to listen to taped music. Only the three oldest children in the study were observed to freely examine tactile illustrations in books (notes from researchers diary).

Free play with other children

As will be recalled from Study 1, free play with other children was found to be infrequent, although in a minority of cases this was possibly an artefact of the environment within which observations were carried out rather than necessarily being due to any inherent inability or desire to play with other children. Observational contexts were identical for all but one child in this extended study.

As Table 3.15 shows (over), only 5 of the 7 older children and 2 of the 5 younger children were involved in free play with other children in Study 1. By the end of Study

2, all seven of the older children had demonstrated free play with other children,

Table 3.15 Number and percentage of free-play alone and free-play with other children in Study 1 and Study 2

Participant Older group	Age	Study	Alone (%)	Other Children (%)	Total	Place observed
A	6.4 - 7.2	1	13 (65%)	7 (35%)	20	School for deaf/blind
	7.3 - 7.9	2	9 (60%)	6 (40%)	15	School for deaf/blind
B	6.3 - 7.1	1	8 (50%)	8 (50%)	6	School for deaf/blind
	7.2 - 7.8	2	7 (43%)	7 (50%)	14	School for deaf/blind
C	5.4 - 6.2	1	12 (75%)	4 (25%)	16	Integrated school
	6.3 - 6.9	2	10 (38%)	16 (62%)	26	Integrated school
F	4.0 - 4.9	1	7 (47%)	8 (53%)	15	Own home + I N*
	4.10 - 5.4	2	10 (30%)	23 (70 %)	33	Integrated nursery
G	3.10 - 4.7	1	8 (67%)	4 (33%)	12	Integrated nursery
	4.8 - 5.2	2	8 (40%)	12 (60%)	20	Integrated nursery
H	3.10 - 4.7	1	13 (100%)	0 (0%)	13	Nursery for VI children
	4.8 - 5.2	2	18 (86%)	3 (14%)	21	Nursery for VI children
I	3.9 - 4.6	1	8 (100%)	0 (0%)	8	Nursery for VI children
	4.7 - 5.1	2	8 (73%)	3 (27%)	11	Nursery for VI children
Younger group						
K	2.9 - 3.6	1	8 (100%)	0 (0%)	8	Nursery for VI children
	3.7 - 4.1	2	12 (86%)	2 (14%)	14	Nursery for VI children
L	2.9 - 3.6	1	9 (100%)	0 (0%)	9	Nursery for Vi children◊
	3.7 - 4.1	2	10 (100%)	0 (0%)	10	Nursery for Vi children◊
M	2.6 - 3.3	1	13 (100%)	0 (0%)	13	Nursery for VI children
	3.4 - 3.10	2	10 (84%)	2 (16%)	12	Nursery for VI children
O	1.9 - 2.6	1	10 (77%)	3 (23%)	13	Own home (sibling)
	2.7 - 3.1	2	8 (73%)	3 (27%)	11	Own home (sibling)
P	1.6 - 2.3	1	15 (88%)	2 (12%)	17	Own home (sibling)
	2.4 - 2.10	2	26 (84%)	5 (16%)	31	Own home (sibling)

Key: VI = Visually impaired; * = integrated nursery

between 3 and 23 times, representing between 14% and 70% of all free play behaviours. By the end of Study 2, the younger group of children were still less involved than the older group in this form of play at this stage, although 4 of the 5 younger children were observed playing with other children between 2 and 5 times. However, all of the younger children spent a far higher percentage of their free play time in free play alone (73% to 100%) than in play with other children (0% to 27%). Setting appeared to affect the number of times play with other children was observed. For example, 3 of the older blind children (Participants C, F, G) observed in integrated nursery/schools spent a much higher percentage of their free play involved in play with other children (62%, 70% and 60% respectively) than the remaining four older children (A, B, H and I) who were observed in specialist school/nursery for sensory/visually impaired children (40%, 50% 14% and 27% respectively).

3.10 THE RELATIONSHIP BETWEEN OVERALL PLAY BEHAVIOUR AND DEVELOPMENTAL STAGES IN YOUNG BLIND C HILDREN.

a) Age x play behaviours.

Table 3.16 (see over) shows the correlations between chronological age and i) the mean frequency with which each of the 8 categories of play was exhibited, and ii) mean percentage time spent within each category of play. As can be seen from Table 3.16, time spent on collaborative play behaviour, calculated over the 15 month period of observation, shows a significant positive correlation with chronological age ($r = .78$ $p<.001$) and time spent on exploratory play behaviour shows a significant negative correlation with age ($r =.71$, $p<.01$). Although there are no significant correlations between age and the other 6 play categories, the data show a trend of the older children exhibiting and spending more time on fantasy, constructive and functional play behaviours and the younger children spending more time in exploratory, repetitive and imitative play (see Figures 3.2 to 3.5, pp.114-115).

Table 3.16 Correlations between chronological age and the mean number of times each play behaviour is exhibited and the percentage time spent on each(n = 12)

Play behaviour	% time	N
Fantasy	.64	.70
Exploratory	-.58	-.71*
Functional	.03	.59
Repetitive	-.42	-.42
Constructive	.68	.62
Imitative	-.48	-.51
Collaborative	.26	.78**
Receptive	.23	-.48

Statistical significance ** p<0.001 * p<0.01

The literature suggests that there are associations between types of play and developmental stages in sighted children. The correlations shown in Tables 3.17 and 3.18 in this study on the relationship between types of play and developmental stages in blind children, with the effect of age partialled out, seem to confirm the suggested association. However, although the sample size in the study reported here is small (12 Participants), Bonferroni corrections (Bonferroni, 1936) were applied to the correlation outcomes to take account of the number of correlations by adjusting the p-value (6 in the Reynell-Zinken test and 7 in the Oregon test). While caution has been exercised in relation to the strength of the claims made in this study by the application of these adjustments, reciprocal caution with respect to the impact of these corrections on small sample size is also necessary.

The Bonferroni correction, when applied to a data set that is too small, will control the probability of a Type I error (rejecting the null hypothesis when the null hypothesis is true) but will correspondingly increase the probability of a Type II error (accepting the null hypothesis when the null hypothesis is false). Additionally, if the alpha level is lowered and the beta level is maintained in the design phase of a study, the sample size will require to be increased to maintain the power of the study. (Perneger, 1998; Feise, 2002; Rothman, 1990; Bender and Lange1999). The Bonferroni correction will therefore cause a substantial loss in the precision of research findings and may lead to important findings being ignored. A balance must therefore be struck. Therefore, although Bonferroni corrections are given (in brackets alongside p-values in the text) the uncorrected correlations have also been given (pp. 146-154). The dilemma is well expressed by Bender and Lange (1999):

> *"In exploratory studies without prespecified hypotheses there is typically no clear structure in the multiple tests, so an appropriate multiple test adjustment is difficult or even impossible. It is therefore perhaps preferable that data of exploratory studies are analysed without multiplicity adjustment. However, "significant" results based on exploratory analyses should be clearly labelled as exploratory results. To confirm these results, the corresponding hypotheses have to be tested in confirmatory studies"* (p. 600)

b) <u>Reynell-Zinken developmental measures x play behaviours</u>

Table 3.17 (see over) shows the correlations between scores on the Reynell-Zinken Developmental Scales for Young Visually Handicapped Children taken 1 year after entry to the study, and both the number of play behaviours exhibited and the percentage of time spent on each for the 12 children shown in Table 3.3. In the discussion of the analysis that follows, Bonferroni p -value corrections are given in brackets.

Fantasy play

Fantasy play was significantly correlated with most of the scores on the Reynell-Zinken, for example:

Time x Reynell-Zinken: SA: r=.62, p=.023 (.14); SM: r=.56, p=.040 (.24); EE: r=.57, p=.034 (.24); VC: r =.66, p=.015 (.09); EL (S): r=.75, p=.004 (.024); EL(C): r =.84, p=.001 (.006).

Frequency x Reynell-Zinken: SA: r =.45, ns; SM: r=.37, ns; EE: r=.30, ns; VC: r=.74, p=.005 (.03); EL (S): r =.78, p=002 (.012); EL(C): r=.78 p=.002 (.012)).

As can be seen above, both the number of times fantasy play was exhibited and the amount of time spent in this activity were significantly correlated with verbal comprehension (VC), expressive language structure (EL (S)), expressive language content (EL(C)) and exploration of the environment (EE). The amount of time spent in fantasy play was also significantly correlated with social adaptation and sensory-motor understanding. These results suggest that level of language may be a limiting factor in the blind child's ability to indulge in fantasy play rather than the fact that s/he cannot see, although of course language development may itself be delayed as a result of lack of sensory visual input (Anderson et al 1993).

Table 3.17 Correlations (with age partialled out) between scores on the Reynell-Zinken Development Scales for Young Visually Handicapped Children, both frequency of play behaviours exhibited and percentage time spent on each (n=12).

Reynell	SA		SM		EE		VC		EL(S)		EL(C)	
Play category	N	%Time	N	%Time	N	%Time	N	%Time	N	%Time	N	%Time
Fantasy	.45	.62*	.37	.56*	.30	.57*	.74**	.66*	.78**	.75**	.78**	.84**
Exploratory	.23	.33	.24	.07	.05	.11	.32	.003	.20	.16	.29	.10
Functional	.13	.25	.12	.47	.04	.18	.04	.06	-.16	.04	.03	.03
Repetitive	-.27	-.18	-.33	-.19	-.11	-.12	-.65*	-.53*	-.62*	-.44	-.70*	-.53*
Constructive	.40	.54*	.55*	.38	.42	.51*	.84**	.57*	.61*	.58*	.64*	.47
Imitative	-.53*	-.59*	-.29	-.36	-.61*	-.56*	.28	.05	-.02	-.13	-.02	-.22
Collaborative	.08	.07	.35	.47	.08	.03	.80**	.56*	.57*	.20	.58*	.35
Receptive	-.59*	-.03	-.30	-.20	-.62*	.05	-.16	-.49	-.39	-.27	-.47	-.37

Statistical significance (Bonferroni corrections are given in brackets) **$p<.005$ (0.03) *$p<.05$ (0.30)

Key
Social adaptation (SA).
Sensorimotor understanding (SM).
Exploration of the environment (EE).
Response to sound and verbal comprehension (VC)
Expressive language: Structure (EL/S).
Expressive language: Vocabulary and Content (EL/C).

Exploratory play

As Table 3.17 (above) shows, there were no significant correlations between exploratory play behaviour and any of the scores on the Reynell-Zinken. However, Table 3.16 (p143) shows the amount of time spent on exploratory play behaviour was significant negatively correlated with age. As a number of children in this study had reached 'ceiling' on many of the Reynell-Zinken scores, it is possible that they had mastered the skills required to play at a high level with new toys and were able to transfer knowledge gained from one situation to the other, thus requiring less time for exploration. However, it is suggested in the Reynell-Zinken manual that the maturity level concerned with the basic manipulative, locomotor and reflex functions will to some extent set limits on the performance of those activities which require intellectual ability. As exploration may be limited due to poor mobility in the very young child and may be less necessary in the older child, quantitative analysis of the child's exploratory behaviour may reveal 'a zone of development' within which a plan of education based around play behaviour could assist the child in making the fullest possible use of such abilities.

Functional play

There were no significant correlations between functional play behaviour and any of the scores on the Reynell-Zinken.

Repetitive play

Repetitive behaviour was negatively correlated with both the Reynell-Zinken expressive language scores and verbal comprehension scores and i.e. the higher the scores on verbal comprehension the less time was spent on repetitive behaviour (VC: $r = -.65$, $p = .015$ (.09); EL (S): $r = -.62$, $p = .021$ (.13); EL (C): $r = -.69$, $p = .009$ (.054)). An inability to communicate desires and needs may be behind this reversion to repetitive behaviour in blind children.

Constructive play

Constructive play behaviour showed significant positive correlations with verbal comprehension, expressive language (structure), both in terms of the number of times it was exhibited (VC: $r = .84$, $p = .001$ (.006); EL(S): $r = .61$, $p = .023$ (.14)) and the percentage of time spent in this play behaviour (VC: $r = .57$, $p = .035$ (.21); EL(S): $r = .58$, $p = .03$ (.12). Significant correlations were also found between time spent on constructive play and social adaptation, and exploration of the environment scores (SA: $r = .54$, $p = .04$ (.24); EE: $r = .51$, $p = .05$ (.30)) and on the number of constructive play behaviours exhibited and sensorimotor understanding scores (SM: $r = .55$, $p = .04$ (.24)). As many of the incidences of constructive play behaviour observed involved collaboration with other children or required an adult's intervention, social competence, a degree of mobility and a certain level of verbal understanding may be necessary before the blind child can enter into constructive play behaviour in the early stages of his or her development.

Imitative play

Imitative play behaviour showed significant negative correlations with both time and frequency of exploration of the environment and social adaptation scores: (EE: $r = -.56$, p = .03 (.18); r = -.62, p = .02 (.12)) and (SA: r = -.59, p = .03 (.18); r =-.53, p = .05 (.30)) respectively.

Collaborative play

Both length of time spent and frequency of occurrence of collaborative play behaviour showed significant correlations with higher scores on verbal comprehension: r = .56, p = .04 (.12) and r = .80, p = 002 (.012)) respectively. Also the frequency of this category significantly correlated with expressive language (EL(S): r =.57, p = .036 (.22): EL(C): r =.58, p = .03(.18)) scores. These findings suggest that those with lower scores on the Reynell-Zinken are capable of entering into collaborative play, but of a much shorter duration. This may indicate an increase in the quality as well as quantity of collaborative play as the child gets older.

Receptive play

The frequency of receptive play behaviour showed significant negative correlations with scores on social adaptation and exploration environment SA: r =.-.59, p = .03 (.18); EE: r =-.62, p = .02 (.12). There were no significant correlations between receptive play behaviours and any other Reynell-Zinken scores.

c) <u>Oregon developmental measures x play behaviours</u>

Table 3.18 shows the correlations between scores on the Oregon Skills Inventory for Impaired and Blind Preschool Children and both the number of play behaviours exhibited and the percentage time spent on each. In the discussion of the analysis that follows, Bonferroni p -value corrections are given in brackets.

<u>Fantasy play</u>

Fantasy play was significantly correlated with most of the scores on the Oregon, i.e. the greater the frequency of fantasy play and the more time spent on this activity, the higher the scores on the Oregon:

Time x Oregon: COM: $r = .44$, ns; COG: $r = .72$, $p = .007$ (.049); LAN: $r = .67$, $p=.01$(.07); SH: $r = .38$, ns; SOC: $r = .84$, $p = .001$ (.007); GM: $r = .84$, $p = .001$ (.007); FM: $r = .70$, $p = .009$ (.063).

Frequency x Oregon: COM: $r = .41$, ns; COG: $r = .68$, $p = .01$ (.07); LAN: $r = .74$, $p = .005$ (.035); SH: $r = .29$, ns; SOC: $r = .70$, $p = .008$ (.056); GM: $r = .60$, $p = .034$ (.24); FM: $r = .50$, ns.

These results are similar to the findings from the Reynell-Zinken analysis, with cognition, social, language and gross motor correlated with fantasy play behaviour. Fine motor scores, although correlated with the amount of time spent in fantasy play behaviour, were not correlated with its frequency. This might suggest that the child's physical ability was not the limiting factor in ability to participate in this type of play behaviour but may be a limiting factor in the amount of time spent in fantasy play.

Table 3.18 Correlations (with age partialled out) between scores on the Oregan Project for Visually Impaired and Blind Preschool Children, number of play behaviours exhibited and percentage time spent on each (n=12). .

Oregan	Compensatory		Cognition		Language		Self Help		Social		Gross Motor		Fine Motor	
Play category	N	%Time	N	%Time	N	%Time	N	%Time	N	%Time	N	%Time	N	%Time
Fantasy	.41	.44	.68*	.72*	.74**	.67*	.29	.38	.70*	.84**	.60*	.84**	.50	.70*
Exploratory	-.24	.60*	.14	-.21	-.16	-.21	-.34	-.05	-.18	-.09	-.05	-.21	-.11	-.11
Functional	-.35	-.52	-.01	-.11	-.32	-.33	.29	.22	-.34	-.04	-.13	.12	.08	.30
Repetitive	-.30	-.25	-.55*	-.41	-.62*	-.43	-.48	-.64	-.31	-.13	-.20	-.14	-.16	-.03
Constructive	.56*	-.05	.70*	.17	.54*	.21	.36	.08	.53*	.37	.63*	.38	.53*	.27
Imitative	-.14	-.003	-.16	-.06	-.11	-.04	-.07	-.06	-.32	-.35	-.32	-.43	-.47	-.52*
Collaborative	.36	.32	-.64*	.69**	.54*	.11	.41	.30	.34	.14	.40	.29	.17	.27
Receptive	-.37	-.21	-.28	-.58*	-.50*	-.17	-.23	-.01	-.58*	-.32	-.57*	-.46	-.60	-.23

Statistical significance (Bonferroni corrections are given in brackets) **p<.005 (.030) *p<.05 (.30)

Exploratory play

The higher the scores on compensatory skills, the less time was spent in exploratory play (COM: r =-.57, p = .04 (.28)). However there was no correlation between compensatory skills and the frequency with which exploratory play was exhibited.

Functional play

Although association between gross and fine motor abilities and functional play behaviour might have been expected, no significant correlations were found with the scores on either of these Oregon motor skills measures, or indeed on any of the Oregon measures. These results are similar to the findings in the Reynell-Zinken analysis.

Repetitive play

There were significant negative correlations between frequency of repetitive play behaviour and cognition, language and self help ((COG: r =-.55, p = .04 (.28), LAN: r =-.62, p = .02 (.14); SH: r = -.66, p = .013 (.09).

Constructive play

Significant positive correlations were found between the number of times constructive play behaviour was exhibited and compensatory (COM: r = .56, p = .04 (.28)), cognition (COG: r = .70, p = .009(.06), language (LAN: r = .54, p = 04 (.28), social (SOC: r = .53, p = .05 (.35)), gross motor (GM: r =.63, p = 02 (.08)), and fine motor (FM, r =.53, p = .05 (.35)) scores. These results suggest that constructive play behaviour was associated with good language, socialisation and motor skills.

Imitative play

There were no significant correlations between imitative play behaviour and any of the scores on the Oregon. These results are again similar to the findings in the Reynell-Zinken analysis.

Collaborative play

The greater the frequency of collaborative play and the more time spent on this activity, the higher the cognitive scores: $r = .64$, $p = .02$ (.14) and $r = .70$, $p = 009$ (.06). The number of times collaborative play was exhibited was significantly correlated with language (LAN: $r = .54$, $p = .05$ (.35)). These results suggest that while those with lower scores on the Oregon are capable of entering into collaborative play, the amount of time spent in this activity may be limited by verbal ability.

Receptive play

There were significant negative correlations between the number of times receptive play behaviour was exhibited and social (SOC: $r = -.58$, $p = .03$ (.21)), gross motor (GM: $r = -.57$, $p = .04$ (.28); fine motor (FM, $r = -.60$, $p = .025$ (.17) and language (LAN: $r =.50$, $p =.05$ (.35)).

3.11 RESEARCHER-STRUCTURED PLAY[3]

As in Study 1, the older children all played appropriately with the remote control car, showing awareness of its automatic function; they also collaborated with the researcher in playing with the battery - operated rolling ball. They read and listened to the stories from tactile books; played transiently with the slinky exploring its properties; and eagerly examined, discussed and explored the box of household items. Although the older children showed very little interest in the formboards and doll in Study 1, when prompted by the researcher in Study 2, Participants A, B, C, F and G all attempted construction of the formboards and displayed fantasy play behaviour with the doll. Although these children did display fantasy play, the properties of the doll in itself did not appear to stimulate this form of play in these blind children, fantasy play was entered into mainly verbally and only when it was by the researcher. Perhaps the properties of the doll in itself did not possess symbolic meaning for these blind children.

In Study 1 the two youngest children in the study ignored and showed tactile defensiveness to a number of the toys introduced by the researcher. However, in Study 2 all of the younger children explored and played repetitively with the slinky, tactile books and box of household items; played functionally with the rolling ball and the car (pushing both manually) but again, as in Study 1, showed no interest in their automatic function and made no attempt to play with the formboards or the doll. These two

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[3] As already noted p 90, these sessions were not videorecorded; the only observations available were those noted in the researcher's diary. Commentary is therefore restricted to subjective analysis of notes and no quantitative analyses are attempted.

children were only 18 months and 21 months old at first observation and as these toys were introduced to them by the researcher, perhaps fear of the unknown caused them to be reluctant to play with the toys; by the final observation they were 3years (2yrs 9mths corrected for prematurity) and 2years 9months (2yrs 5 mths corrected for prematurity) and both maturation and familiarity with the researcher may have moderated their fearfulness, allowing them to explore more freely.

3.12 REPEATABLE PATTERNS OF BEHAVIOUR ('SCHEMAS')

Earlier in this chapter, Nichols et al's schema spotter's guide was presented (see pp.92-93). Using this as a basis for identification, Table 3.18 lists the different types of repeatable patterns of behaviour observed over the course of the 16 months period of study and the number of children involved in each type. As will be recalled, although 1 child had to be excluded from the main analyses of Study 2 (see p 62), play data were gathered on all 15 children initially recruited. The schema analysis presented here is based on the Schema spotters guide described above (pp. 92-93). Only three children (Participants H, K, and O) out of the 15 children whose play was monitored over the 15-month period were not observed engaging in repeatable patterns of behaviour. Age was not a significant factor in either the number or type of repeatable patterns exhibited. One child aged at 21 months at entry, for example, exhibited three different varieties of repeatable patterns in her play while two of the five-year-olds exhibited only one. However, transporting and positioning (opening/closing) patterns were most frequently observed in the younger children.

Examples of these repeatable patterns of behaviour (Table 3.19) included Participant G's enclosure and enveloping play behaviours. He was observed playing with a farmyard. His major focus was in building a fence around the animals in one session while in another he built an enclosure with large blocks. These repeatable behaviours were extended to enveloping when in the play corner under a blanket, saying he was going to bed, or inside the enclosed coat rack pretending he was on a bus, hiding toys in

Table 3.19 Types of repeatable patterns of behaviour observed and the number of children involved. (n=15)

Pattern	No of children	Participant
Enclosure	1	G
Enveloping	1	G
Ordering	1	C
Transporting	6	N, I, P, M, G and B
Diagonality	1	A
Functional dependency	3	N, F, E
Positioning (Opening/closing)	4	N, L, M and P
Circularity	1	B

cupboards, and putting toys/objects into boxes. Participant B's repeatable patterns of behaviour centred on circularity. She spent a great deal of time experimenting with things with circular characteristics e.g. wheels, buttons and rings; she was also observed on several occasions making circles and round shapes from play dough.

The seven patterns of behaviour identified in this study parallel those described amongst the 17 'schemas' found in sighted children by Nicholls et al (see Figure 3.1 – pp. 92-93).

The remaining 10 'schemas' described there were not exhibited by any of the young blind children in this study. However, as a number of the schemas observed in sighted children appear to be visually led (for example, dab and radial schemas are often represented graphically in drawings and paintings), it perhaps would not be expected to find these in graphical form in blind children.

The list of schemas given in Figure 3.1 was not seen as exhaustive and other schemas may be observed according to Nicholls et al. (1986). For example, in the study reported here, four of the younger blind children were observed occupied in a repeatable pattern of behaviour, described here as Positioning ('Opening and Closing'), in which these children were observed systematically opening and closing doors, boxes, toys with lids, handbags from the play corner, etc. These behaviours appeared to be a major focus in their play.

Although many of the schemas observed in this group of young blind children were similar to those reported by Athey in sighted children (Athey 1990), there were differences in both the way schemas presented themselves and the types of schemas exhibited. As 'schemas are based upon senses and movement' (Nicholl et al 1989; p5), these differences could be attributed to lack of vision. It may therefore be necessary for blind children to represent their schemas using their remaining senses, hence in different ways to sighted children.

3.13 ADDITIONAL OBSERVATIONS: THE RESEARCHER'S DIARY

Over the 16-month period of video-recording of the children's play-related behaviours, additional observations were made by the researcher outwith the period of formal video recording and recorded in a researcher's diary. These observations also revealed patterns of behaviour and strategies which appeared to be assisting the children in making sense of their environment. Gerhardt (1982) suggests that the blind child might use objects as a means of exploring space. One child clearly used this method, as the researcher's notes indicated. Participant G (aged 3 yrs 7 at entry to study) was initially visited in his own home where he was found to be very sociable, secure in his own environment, exhibited most forms of play and played well with his sister. On starting mainstream nursery school, he initially spent most of his unstructured play throwing objects around the room in what appeared to be an indiscriminate fashion. This behaviour, which was considered disruptive by the nursery staff, was discouraged. Closer examination revealed what appeared to be systematic and purposeful behaviour, as the following example illustrates:

> *(Participant G) is playing with a plastic dinosaur; he throws it across the room, stills, and listens for the toy to drop. Having heard where the toy dropped, he then accurately goes to the spot retrieves the toy and tactually examines the area around where the toy dropped. He goes on to repeat the same procedure many times, throwing the toy to different areas of the room.*

This activity took place without exception while he was alone, away from the nursery staff and other children. Any attempts by the other children or staff to interrupt this routine was met with resistance. This procedure became less and less frequent as Participant G grew more familiar with his surroundings and the general routine of the nursery.

With other children, a number of different strategies were used to help them identify people and elements of their surroundings, as the following examples illustrate:

> ***Sound:*** *On one occasion on leaving the classroom to go to lunch with Participant A, he remarked, "You have left your video camera on". Puzzled, I asked how he knew, as the camera was on a table, inside a bag, some 4-5 metres away. "I can hear it" he replied.*
>
> ***Smell:*** *It was morning break and the children were having their snack. Participant A offered to swap his crisps with the person who had a chocolate biscuit. The boy with the chocolate biscuit hid it and then denied having one, to which Participant A replied, "You have - I can smell it".*
>
> *When I arrived in the nursery, Participant I would hear only the door closing or my footsteps. Before I had the opportunity to speak to her she would rush over, smell the sleeve of my jacket or sweater and only then*

refer to me by name and say "hello". Participant I could accurately identify most familiar people in this way.

These children devised their own strategies to explore, achieve spatial awareness and make sense of their surroundings. These findings suggest a need to consider the use of cognitive strategies in spatial orientation and the potential for incorporating these into play with games and rules, thereby assisting the blind child in achieving spatial awareness in the most efficient manner.

It was noted in the example described above of Participant G who used his own play strategies to explore an unfamiliar environment that he resisted any interruption to this exploratory routine. As involvement in this form of exploratory play was seen to resist any attempts by adults to interrupt it, and it was mainly observed in the free play situation, perhaps the recognition by teachers and parents that blind children need time and encouragement to explore methodically the objects in their environment may help blind children to consolidate the properties of objects and their environment more completely and more effectively.

A number of authors have reported that blind children exhibit clear delays in symbolic play (Sandler and Wills, 1965; Fraiberg and Adelson, 1973; Troster and Brambring, 1994; Hughes et al 1998; Lewis et al 2000). In this study evidence of symbolic play was found as early as 21 months. However, it was expressed more in symbolic use of language and sound imitation than in object play, was of short duration, and was mostly evident when prompted by an older child or an adult, as the following examples show:

> *When Participant P (at age 21 months) was asked to pretend he is a monster, he complies and makes monster noises. He can sing several nursery rhymes and plays on words by deliberately missing a line, waiting for a reaction from his mother, then laughing.*

> *Supervised by the nursery teacher two blind children Participant M (aged 2 years 8 months) and Participant I (aged 4 years 2 months) are playing with a doll a bath and a sponge... I is pretending to bath the doll. M is resisting any attempts by the nursery teacher to get her to join in. I hands M the sponge and asks her to wash the dolly's face; she first pretends to wash her own face and then the doll. Further attempts to get M to join in are resisted.*

Brambring (1995) suggests one way to make it easier for blind children to develop symbolic understanding is to make the movement of the play action and reality, rather than the features of the play object, similar. For example, when a child touches a toy swing, symbolic understanding may eventually be facilitated if the child performs the swinging movement with his or her fingers on the toy swing. Perhaps it is not the toy swing (the object), but the swinging (the movement) that may enable blind children to relate this play to the reality they have experienced. In the study reported here, a number of children used movement as a means of expressing pretence. For example, in the case of two blind 6-year-old children:

Participant A and Participant B were playing outside (aged 6 yrs 9 mths and 6 yrs 7 mths respectively). They were pretending to be on a shopping trip. Participant A had a rubber tyre on wheels and he used the movement of the tyre to symbolise a car taking him to the shops.

Although all of the children observed in this study were involved in constructive play and collaborative play, these types of play were mostly exhibited in the adult-structured situation. However, a few episodes of collaboration and construction were observed in the free play situation. For example:

Participant A and Participant B (aged 6 yrs 8 mths and 6 yrs 6 mths respectively) were playing with a remote control car in the gymnasium. After 10 minutes of turn-taking, they decided to make a ramp for the car. There was some discussion on how this should be done then 2 pieces of wood were selected and set up as a ramp and play continued using the ramp and remote control car for a further 10 minutes.

Participant G (aged 4 yrs 1 mth) was observed to collaborate, both verbally and physically, with sighted children in constructing an aeroplane in a room dedicated to large wooden and plastic materials.

Perhaps the environment, which in both cases was a large open space containing very little in the way of obstacles or distractions, allowed these children to become involved collaboratively without the distractions of having to avoid obstacles.

Art as a creative form - for example, painting, drawing, collage, model making and card making - was never seen in any of the children in the free play situation, and was only reluctantly undertaken when it was part of an adult-structured activity. As an activity all of the children required constant assistance with the materials and appeared to derive little pleasure from the end result, as the following example of one 4 year old blind child observed making an Easter card in an integrated nursery setting illustrates:

A number of children were gathered around a table with the art materials in the centre. The sighted children were busy selecting and gluing materials on to their cards. Participant H aged 4yrs was being assisted by a nursery teacher. After a few unsuccessful attempts to glue the art materials on to the card, which had been selected for him by the nursery teacher, Participant H sat back in his chair, began 'eye poking' and, despite being prompted by the nursery teacher, refused to continue.

If not constantly supervised, many of these younger children reverted to stereotypical behaviour. Researcher notes showed these children to be more interested in exploring the qualities of the art materials than producing an artistic creation. Also, the children clearly experienced a great deal of difficulty in locating the art materials, in making sense of what the materials were, and in working with glue and scissors, all of which appeared to cause frustration and a reluctance to participate in future art sessions. Any attempts the children did make to become involved in these forms of art ceased after a number of failures.

Most of the children in the study enjoyed games with music and storytelling. However, if they were not continually prompted in these activities, they quickly dropped into stereotypical behaviour. This stereotypical behaviour may have resulted from the lack of visual clues as to who was speaking or who was being spoken to, perhaps making them feel anxious or unsure and thus inadvertently excluding them from the activities.

With the exception of one 2 year old who had access to a number of very good tactile illustrations and who took a great deal of pleasure from 'reading' the books herself (Participant N - found to have some colour vision and so not included in the statistical analyses), the blind children under 3 years in this study showed very little interest in books or being read to (storytelling time), although they all enjoyed singing. The older children participated best in reading sessions with adults when there were accompanying tactile illustrations. On the whole they were unable, like their sighted peers, to spontaneously choose a book to read because of the dearth of children's storybooks with tactile illustrations.

3.14 DISCUSSION

Based on the findings in Study 1 on the eight observed play behaviours in young blind children, this study initially set out to explore in greater depth the extent to which young blind children are involved in each of these different categories of play behaviour at different chronological ages and at different developmental stages. This study also explored the nature and possible role of repeatable patterns of behaviour ('schemas') in the play of this group of young blind children.

As in Study 1, all of the types of play behaviour categorised in the literature on play in typically developing children were identified in the group of young blind children studied here over an extended period of time. However, the extent to which young blind children proved to be involved in the different categories of play behaviour varied both within and across participants and across age groups. Fantasy, collaborative, functional and constructive play were shown to increase with age in most of the participants (in 9 of the 12, 11 of the 12; 10 of the 12 and 9 of the 12 children respectively) over the 15 month period of data collection. In contrast, only one of the older children was involved in imitative play and only one in repetitive play, with these forms of play mainly confined to the younger age group. Although exploratory play spanned the age range in terms of the number of times it was exhibited (mean frequency = .75 older and .61 younger children), most of the older children typically spent less time on this activity than the younger children (mean = 2.5 and 4.2 minutes respectively) and it formed a far smaller percentage of the older children's overall play, (11% older =19% younger). Receptive and 'other' behaviours both decreased over the 15 month period of data collection.

These findings are consistent with the suggestions in the literature on play in sighted children that during the period from birth to approximately 2 years of age, exploration is the predominant form of play with objects (Pellegrini and Boyd, 1993). It is argued that in the course of development exploratory behaviour begins to decline with age because there is less uncertainty in the world that needs to be understood; exploratory behaviours are consequently gradually replaced by functional play and various forms of pretend play which signal the ability to use symbolic thought processes (Belsky and Most, 1981). However, in this study, it was noted that although exploratory behaviour was a small proportion of the blind children's overall play behaviour, this form of play continued to exist in parallel with other forms of play. Perhaps it is necessary for the blind child to remove uncertainties via tactile exploration whereas for the sighted child these uncertainties would be resolved through vision and would go unnoticed as exploration.

As reported earlier, Hughes et al (1998) found in their study that symbolic play constituted only 4% of the blind preschool child's overall play behaviour. In the study reported here, with the exception of one child (Participant H) with delayed mobility who had just started walking independently and was mainly involved in exploratory behaviour, fantasy play in the remaining 6 oldest preschool children accounted for a far higher percentage of their overall play (15% to 30%). However in the younger children, those less than 3 yrs, with the exception of one child who when observed was paired with an older blind child while the nursery teacher encouraged them in fantasy play, the findings were similar to those of Hughes et al.

There were a number of differences in the fantasy play behaviours reported here for blind children and the fantasy play reported in the literature for sighted children. Fein (1986), in a review of the literature on pretend play in sighted children, found the frequency of pretend play in comparison to other types of play relatively low in preschool children, increasing in frequency from 12% at 14 months to 32% at 48 months then decreasing in frequency to around 10% at 5 yrs. The observations in this study show fantasy play to be a much smaller proportion (0 to 2.7%) of play behaviours in 4 of the 5 younger blind children between 1yr 6 months and 2 yrs 9 months. However, fantasy play was shown to increase in both frequency and time spent (frequency: 9 to13; time spent: 15% to 30% of their overall play) in 5 of the 7 older blind children (3 yrs 9 months to 6 yrs 4 months). As both the quantity and quality of fantasy play in most of the older blind children was observed to continue to increase beyond the age of 4 perhaps there is a need to allow for this when the child begins formal education. Troster and Brambring (1994) suggest that perhaps "symbolic play is expressed in sound or language, rather than with material objects" (p.429). Considering the findings from this study, the reported delays in symbolic play in blind children may not so much be delays in development as differences in developmental pathways; some of the younger children clearly were using language and sounds as a means of expressing pretend play, albeit of short duration, a trend which continued into the older age group, where verbal statements frequently were used to explain intentions in pretend play. As Lewis et al (2000) suggest, "It seems likely that previous observations of delays in the development of pretend play in children with VI are due to performance rather than competence difficulties" (p.462).

In sighted children functional play constitutes 50% of play at 3 years of age and decreases, as the child grows older (Klugman and Fasoli, 1995). In the study reported here, functional play represented from 6.7 to 26.7% of all play behaviour for this sample of blind children (age at start of study: 19 to 77 months; age at final observation: 34 to 92 months) and increased over the 15 months of observation These findings are in accordance with findings from Lewis et al (2000), who reported delays in the functional play of 18 visually impaired children aged 21 to 86 months.

A number of studies have suggested that visually impaired children spend less time playing with other children than their sighted peers (Priesler, 1993; Fraiberg, 1977), that they are relatively passive and uninvolved in nursery school settings (Preisler, 1993), and that they are more interested in interacting with adults than in playing with toys

(Parsons, 1986a). Schneekloth (1989) reported that preschoolers with visual impairments spend one-third of their time interacting with adults while sighted children spend most of their time interacting with other children. Similarly, Erwin and Hill (1993) found young blind children spent approximately twice as much time playing alone compared to children with low vision and four times as much time as sighted children.

In this study, although many of the children did prefer to play alone, by the end of the 15 month period of observation 11 of the 12 blind children had been observed in play with other children. By the end of Study 2, the older children had demonstrated free play with other children between 3 and 23 times, representing between 14% and 70% of all of their free play behaviours. However, the younger group of children were less frequently observed playing with other children, between 2 and 5 times, representing between 14% and 27% of all free play behaviours. As was suggested earlier, frequency of opportunities for social interaction and play setting appeared to have a considerable effect on the absence or presence of play with other children. For example, the 3 older blind children who were observed in integrated nursery/schools spent a higher percentage of their free play involved in play with other children (62%, 70% and 60% respectively) than the remaining four older children (A, B, H and I) who were observed in specialist school/nursery for sensory/visually impaired children (40%, 50% 14% and 27% respectively).

These findings are similar to those from a study on social interaction by D'Allura, Russello and Cardinali (1998) which compared the social interaction skills of children with visual impairment in an integrated setting (with sighted children) and children with visual impairment in a self-contained setting (with other visually impaired children). It was found that the visually impaired children in the integrated setting spent less time in solitary play, a greater proportion of time interacting with other children, and were more likely to initiate interactions with other children than with adults than the children in the special education nursery.

Older siblings and other children were observed to play with and in encourage play in the younger participants studied here (observations from researcher's diary). Vygotsky (1978) points out the importance of interaction within the zone of proximal development, where an expert and a novice work together at a level just beyond that of the novice. Bruce (1992) suggests that there are benefits in allowing typically developing children to play in groups of different ages, with adults not interrupting the play but encouraging and assisting by supplying materials or moving obstructing furniture. Observations in this study suggest that blind children may also benefit from play with older children and it is perhaps important that the young blind child is not isolated by intrusive, dominant and constant adult presence.

The findings in this study indicate that the younger the child, the more likely fantasy play needs to be adult-structured, however. Fantasy play was rarely seen in the free play situation in children less than 3 years. The five oldest children in the study showed most of their fantasy playtime in the free play situation. These findings are in contrast to the findings of a study by Preisler (1997) who, in her observations of eight blind children aged between four and six years, reported that with only a few exceptions these children were observed to engage in symbolic play only when with adults. A number of factors may have contributed to this difference in findings. In the study reported here, pretence with objects and pretence by verbal means alone (without objects) was counted as evidence of pretend play. In Preisler's study, although it is not clear, pretend play with objects appeared to have been used as the sole measure of pretend play. In addition, Preisler points out that when her study children were reviewed 10 years later, three had subsequently been diagnosed as autistic and there was considerable variation in emotional, social and cognitive development in the five others (Preisler 1997). Moreover, the blind children in Preisler's study were initially recruited within the age range 3 months to 24 months and selected as a group of children with no known additional functional disabilities. However, many learning and movement disorders may not become apparent until much later (Bishop 1991, Wood et al, 2000). For example, in a study of 45 congenitally blind children born in Norway between 1970 and 1985 without any known damage to the central nervous system beyond that entailed by the visual impairment, only 52% had normal function by the age of 6 years, 26% had moderately deviant development and 22% strongly deviant development (Brandsborg, 2003).

In blind infants, these discrepancies in findings may in part be due to the difficulties in assessing levels of development and thus identifying cognitive impairment:

"...Older age groups can be assessed with verbal tests that permit a "fair" comparison between blind and sighted children" ... it is difficult.... to make a fair comparison in infants and preschoolers, as most cognitive achievement in this age range can be assessed only with tasks based on advanced manual skills and good spatial representation... In sighted children, the tasks actually do assess cognitive understanding, while in blind children the same tasks assess their fine motor skills or their spatial abilities" (Brambring and Troster, 1992; p106).

A further complicating factor is that children with visual impairments are frequently children with neurological vulnerabilities e.g. septo-optic dysplasia, prematurity associated with cerebral haemorrhage, agenesis of the corpus callosum, congenital rubella syndrome, and the like. They may also be at increased risk of developing autism and other neurological disorders (Pawletco, 2002). A high percentage of the blind children studied here and in other research have retinopathy of prematurity and a number of studies suggest premature children both with and without visual impairment are at risk of developmental delays. For example, in Peterson et al's (2000) study of the brains of 25 eight-year-old preterm children without visual impairment, findings suggested that when premature brains develop outside of the womb, they are vulnerable to developmental disturbances. They concluded that preterm birth is associated with regionally specific, long-term reductions in brain volume and that morphological abnormalities are, in turn, associated with poorer cognitive outcome. Given the difficulties in assessing developmental levels in infancy and the possibility that some of these children may have developed cognitive impairments over time, the question arises as to which disability is contributing to the reported delays in play behaviour, the visual impairment or associated neurological difficulties.

Delays are also reported in the collaborative play of blind children with their peers (Erwin and Hill, 1993; Parson, 1993; Preisler, 1993). In the study reported here, although the two youngest children were observed in collaborative play during free play with other children, collaborative play was mainly observed in the younger children during adult-structured play. However, the collaborative play observed in the two youngest children, while not adult-structured, did take place only while they were playing with their older siblings. Although the five oldest children in this study did spend most of their collaborative play time with adults, in the free play situation a number of the children were observed to play collaboratively with other children.

In free play younger children rarely interacted with other sighted or blind children of the same age group. However, a number of the children observed at home did interact with their older siblings and the older children in mainstream nurseries and schools interacted more frequently with other children in the free play situation than those in schools for the visually impaired. This may have been because in the schools/nurseries for the visually impaired many of the children had multiple disabilities and therefore the opportunities for interacting in play were limited. As the play behaviour of the two youngest children was observed in their own homes, there were few opportunities to observe them playing with other children. However, the parents of these two children indicated to the researcher that although they interacted well with their siblings at home, they showed no interest in initiating interaction with other children, either in their own home or outside of it.

The results reported here show a reduction in the amount of time spent in receptive play for 8 of the 12 blind children in this study; the remaining four children only marginally increased the time spent in this behaviour. It was noted receptive play mainly involved adults either reading or singing with the children. As the younger children in this study became more active and where able to explore and play unaccompanied, the need for parents to keep their child amused by reading or singing to them was reduced. Similarly, as the older child in the nursery became more confident of his/her surroundings nursery teachers tended to read less to these children.

There was also a reduction in play behaviours being interrupted by, for example, periods of inactivity, the child talking to the researcher or other children, or stereotypical behaviour. It was noted that during periods of inactivity, some of the children seemed to be stilling to listen to sounds within their environment. The children often stopped playing to talk to the researcher or other children, perhaps as a result of the lack of visual clues as to who was present. It also seemed that stereotypical behaviour frequently occurred at times when the toy/activity no longer held any interest for the child. The reduction in these behaviours over time perhaps reflects an increase in confidence and in the ability to become engrossed in play.

This study sought to investigate the relationship between categories of play and developmental stages. A number of the categories of play investigated did correlate with scores on the Reynell-Zinken and the Oregon, with either higher or lower scores on these associated with the duration and/or frequency of exhibition of play behaviours.

The amount of time spent in fantasy play, for example, was positively correlated with scores on, cognition, social, language, gross motor, fine motor scores and social skills. Similarly, constructive play behaviour was positively correlated with fine motor abilities, language and social skills. Collaborative play was also positively correlated with language scores and cognition. As was noted earlier, as the children in the study who participated in fantasy play, constructive play and collaborative play did so mainly only when interacting verbally with either another child or adult, it is perhaps necessary for the blind child to first have good social and language skills before they can take part in these three forms of play.

In contrast, repetitive behaviour was negatively correlated with expressive language scores, cognition, and self help scores. As was suggested earlier, these findings may be the result of an inability to communicate desires and needs resulting in a reversion to repetitive behaviour in blind children. Although there were also negative correlations between imitative play and exploration of the environment and social adaptation scores, only three of the children were involved in this type of play. There were also negative correlations between receptive play behaviour and social, gross motor, fine motor and language scores. In terms of chronological age while there were no correlations between age and receptive play there was a negative trend, with the younger children more involved in this type of play than the older children. These findings may be attributed to nursery teachers and parents more frequently reading stories to the younger children, while the older children were more involved in other forms of play (observations from the researcher's diary).

Although it would be expected to find an association between gross and fine motor abilities and functional play behaviour, there were no significant correlations found with any of the scores on the Oregon or the Reynell-Zinken. These findings could be a product of the type of toy to which the blind children in this study appeared to be most attracted: many functional toys have sound or music attached, qualities which the blind child, when given a choice, shows most interest in. In this study, although the choice of toy for some of the younger children was limited due to poor mobility, it was noted that when functional toys with music were made available to these children they showed a great deal of interest in them.

There were no significant correlations between exploratory play and any of the scores on either the Reynell-Zinken or the Oregon. However, there was a significant correlation between both frequency and time spent in exploratory play and age, with the younger the child being, the more exploratory play was observed. One possible explanation for these correlations is that the younger blind children need to gain experience of their environment through exploration before moving on to other forms of play.

Despite the caveats mentioned earlier in this chapter on the use of Bonferroni corrections on small sample sizes (p144), the impact of these corrections strengthened the claims for some of the relationships. For example, after Bonferroni corrections, there were significant correlations between: fantasy play scores and language, social and cognitive developmental scores; and constructive play scores and language, cognitive and gross motor developmental scores.

The exploration of repeatable patterns of play behaviour ('schemas') in this study showed that most of the children exhibited some variation on repeatable patterns of behaviour. Being aware of these patterns of behaviour may help in identifying the way a child is learning at any point in time and allow this information to be put to use in teaching or during playtime, whether in school or at home. Examples of repeatable patterns which were identified in the play of some of the young blind children in this study included: circularity or fascination and experimenting with things which had a variety of circular characteristics (wheels, buttons, rings, sausage shapes and all the activities that go along with them); enclosure and its extension enveloping (characterised by the child concentrating on activities such as going into covered areas or enclosed space, opening and closing doors, putting objects in containers with lids or wrapping or covering themselves or toys with a blanket); and transporting or methodical carrying of objects from one place to another. Closer examination of any child's behaviour may therefore reveal systematic and purposeful self-structuring of learning experiences, forms of play which could be helpful to parents and nursery staff in understanding and encouraging behaviour which might otherwise be considered stereotypical or disruptive. Adults may be able to extend these behaviours of the children in their care by introducing suitable materials and using relevant language or conversations. By encouraging the child to "explore" their schemas to the full, he or she may then leave them happily behind and move into the next stage of learning.

3.15 CONCLUSIONS

The findings reported in this chapter confirm that the eight play behaviours which parallel those most frequently described in the literature on play in typically developing children can also be observed in blind children and have added information on the time spent in each of these contrasting kinds of play at differing developmental stages. It was noted that although the length of time spent in collaborative, functional and fantasy play was greater in the older group of children, some of the younger group of children were also able to participate in these types of play when encouraged by older children and adults. It was also shown that that there were positive correlations between collaborative, constructive and fantasy play behaviours and developmental measures, and negative correlations between receptive, imitative and repetitive play and developmental measures. There were no correlations between functional play and chronological age or any of the developmental measures.

However, although exploratory play did not correlate with any of the developmental measures it did correlate with chronological age, the younger children being more involved in this type of play than the older children. As the observations reported here indicate, the blind children studied were frequently involved in periods of intense exploration which for many appeared to take precedence over all other types of play. Any attempts by teachers or parents to introduce other types of play during this stage were met with resistance. As Bruce (1992) has pointed out:

> *"Froebel, Montessori and Steiner all believed that there are certain stages in development which require appropriate and sensitive handling. They all assert that each stage is important in its own right, and should not be accelerated but enriched at that level" (p24).*

Intervention at this stage therefore may be more beneficial to blind children if it is in the form of encouraging exploration, naming of objects in the environment, and assisting the child in using strategies more efficiently.

In a similar vein, a number of studies described by Smith and Cowie (1989) suggest that there are benefits in encouraging fantasy or sociodramatic play through play tutoring. Perhaps targeted encouragement of these behaviours, based on identification of the different types of symbolic play behaviour exhibited (i.e. whether expressed in sound or in movement), could be of some benefit to the blind child in promoting this developmentally important kind of play.

Dweck (1978) used the term 'learned helplessness' to describe children who believe they lack ability and feel frustrated in many skills-based activities. Although the children in this study did not necessarily lack ability, they did have difficulty with many of the materials they were working with, and there were clear signs of frustration, perhaps because they were being given the wrong materials or because these were being presented to them in the wrong way. While most preschoolers are rosy optimists who believe they can succeed at any task just because they want to (Stipek, Roberts, and Sanborn, 1984; Stipek and MacIver, 1989), learned helplessness has been observed in sighted children as young as four (Heyman, Dweck, and Cain, 1992; Smiley and Dweck, 1994). It might therefore not be surprising if blind children were to stop attempting new tasks, revert to stereotypical behaviour and ultimately act as if helpless in situations such as artwork.

Perhaps the reluctance shown by the children in this study towards this particular type of play activity (see researcher's notes, pp. 163-164) is understandable when one considers creativity as imaginativeness and the ability to make something original or as the formulation and expression of an idea which is novel and useful to the creator (DeSelms, 1982). The attempted production of artwork under the circumstances described above appeared neither imaginative and original nor novel and useful to the blind child. The end result of artwork like this may well appear meaningless and may not be appreciated by the blind child, aesthetically or otherwise. It is suggested in the literature that during play children feel successful when they engage in a task they have defined for themselves and that in creativity materials should be concrete, real, and relevant to the lives of young children (Piaget, 1962; Smith, 1986; Fromberg, 1998, 2002; Isenberg and Jalongo, 2000; Jensen, 1999). Perhaps if blind children were given materials which were more concrete, real, and relevant to their available senses, and were allowed to spend some time exploring these materials, they might then define their own art forms and derive greater pleasure from this activity.

One other problem that was evident for the blind children studied here was the lack of motivation to play with the toys available to them. As in Preisler's (1997) study, the toys most frequently found in the nursery/schools and the child's home were typically commercially produced and designed to be visually attractive. Although some of the toys available to the children in the schools for the visually impaired did contain elements which could stimulate senses other than vision, very few of the toys available to the blind children in the integrated school/nursery settings contained tactile, auditory or olfactory elements which could stimulate senses other than vision. From the observations from the researcher's diary, the type of toy the blind children appeared to be most interested in were functional toys with sound or music attached, qualities which the blind child, when given a choice, showed most interest in.

Although there were very few observations of children spontaneously choosing a book to read (see p164), the one child who had access to a number of very good tactile illustrations took a great deal of pleasure from 'reading' these books. It was also noted the older children participated best in reading sessions with adults when there were accompanying tactile illustrations. On the whole they were unable, like their sighted peers, to spontaneously choose a book to read because of the dearth of children's storybooks with tactile illustrations.

Although there is a great deal of rhetoric in the literature on the type of toys suitable for blind children, many of these studies are based only on observations of blind children's preferences for certain toys and on a belief that certain toys/materials stimulate senses other than vision. The study reported here suggests that blind children prefer books with good tactile illustrations and hence it could be argued that books with illustrations which are more accessible to blind children may be of literary benefit. However, again there are no studies known to the author which have directly compared literary outcomes for books without illustrations (reading to the child) versus books with tactile illustrations. Closer, more controlled observation of blind children reading/being read to using different methods might well reveal areas where intervention could be of educational benefit to the young blind child.

Current practice suggests that early intervention for children with visual impairments is based on a deficit model, with intervention strategies addressing delays. As Tobin (1998) argues, however, the job of researchers and practitioners is:

> *'to identify, more precisely where and when handicap can arise, and then to devise methods for removing or reducing the effects. This can be done in many ways not least by the close observation of babies, children and*

adults who are blind to discover how they themselves restructure the environment' (p113).

The time to intervene is before the delay occurs, with the goal being to **prevent** the delay, if possible (Bishop, 1998). The next chapter therefore presents the findings from a study which investigated differences and similarities in how blind and sighted children play when presented with standard versus 'blind-friendly' toys and materials.

CHAPTER 4

A COMPARISON OF THE PLAY BEHAVIOUR STRATEGIES OF YOUNG BLIND AND SIGHTED CHILDREN: STUDY 3 (PART 1)

4.1 INTRODUCTION

In Study 1 and Study 2 the children were observed mainly with the toys typically available to them in the nursery/school. However, it was noted that certain toys appeared to have more appeal to these blind children - for example, musical toys, tactile books and toys with a tactile element - and to engage them differentially. Observations of the children's routine and play-related behaviour also revealed patterns of behaviour and strategies which appeared to be assisting these children in making sense of their environment. Without detailed observation, many of these non-visual strategies of the blind child to engage in symbolic (and other forms of play) may go unnoticed and indeed may be thought of as disruptive or stereotypical behaviour. Past research has emphasised a deficit model when comparing play behaviour in blind and sighted children. A closer analysis of the strategies used by both sets of children, however, may reveal areas where development could be enhanced by identifying strengths rather than weaknesses in the approaches of blind children to opportunities for play.

In Study 2, it was shown that the younger blind children were able to participate, albeit to a small extent, in fantasy play when encouraged by other children and adults. A study by Lewis, Norgate, Collis and Reynolds (2000) on symbolic play in visually impaired children used The Test of Pretend Play (Lewis and Boucher, 1997) and the Symbolic Play Test (Lowe and Costello, 1988) to demonstrate how children with visual impairments were more likely to produce symbolic play in structured rather than unstructured settings. They suggested that the reported delays in the development of pretend play in blind children could be due to performance rather than competence difficulties.

The third study in this thesis was therefore designed to allow a closer investigation of how young, educationally blind children (3 to 6 yrs) and age-matched sighted children played with toys/books and art materials which either had or lacked tactile, olfactory and musical features. The Reynell-Zinkin Developmental Scales for Young Visually Handicapped Children and the Oregon Skills Inventory for Visually Impaired and Blind Preschool children were once again administered to each child at the beginning of the 15 month period of data collection[1] in order to provide objective standardised measures of current developmental status. This process was repeated in the middle of the study as mild improvements or deterioration in visual function have been shown to occur over time in some blind children (Cass, Sonksen and McConachie, 1994; Luoma, Herrgard, and Martikainen, 1998; Mercuri, Anker, Guzzetta, Barnett, Haataja, Rutherford, Cowan,

[1] The period of data collection was limited to 15 months to maintain consistency of setting (at the conclusion of the 15 months data collection 4 of the 6 nursery children in the study progressed from nursery education to primary education).

Dubowitz, Braddick, and Atkinson, 2004) and many learning, movement, emotional and social disorders may not become apparent until after formal education has begun (Bishop, 1991; Preisler, 1997; Bhutta, Cleves, Casey, Cradock, and Anand, 2002; Brandsborg, 2003). A third measure, the Test of Pretend Play (TOPP) was also administered to assess the children's current level of symbolic play. This was administered only once, at the beginning of the study.

Research Questions

1. Are there areas in play development that show differences in the strategies used by blind and sighted children while playing?
2. What use if any are tactile, auditory and/or olfactory strategies to blind children in promoting play?

Aims and Objectives

The purpose of the research was:

- To investigate further the relationship between play behaviour and development in young blind children, relating findings to those from Studies 1 and 2.
- To compare the play behaviour of young blind children with the play behaviour of young sighted children.
- To evaluate the implications for current educational practice of any differences in play behaviour between the two groups of children.

Hypothesis:

When given materials to play with which are considered 'blind friendly', blind children will perform the play tasks faster, spend more time on task and less time off task than with standard play materials (materials without sensory properties, designed for use by sighted children). It is also predicted that, during play: blind children will ask more questions and make more statements than the sighted children, with this varying in both groups depending on the properties of materials presented

4.2 METHOD

Participants

The blind children for this study were recruited through mainstream and specialist nurseries/playgroups/schools throughout Scotland using the network of contacts established in Study 1 and Study 2. All 22 regional education services replied giving details of the children within their region who met the research criteria (as set out in Study 1, pp 55-56). Seven blind children, aged one to six years of age, were identified and can be assumed to be the total of such children known to educational services in Scotland within this age range. Permission from the nurseries, schools, parents and all relevant authorities was sought and obtained for 6 of the 7 blind children identified. Following developmental assessment by the researcher, 2 of the children (aged 1 yr and 2yrs 4 mths) were not included in this research as each performed below the level expected for a blind child of his/her age on the Reynell Zinken Mental Development Scales and were therefore suspected to have cognitive impairments.

Table 4.1 DETAILS OF THE 8 CHILDREN IN THE STUDY

PARTICIPANT	SEX	DIAGNOSIS	Age at first observation YEAR/MONTH
Ab	m	Retinopathy of prematurity (LP)	6.02
As	m	Sighted	6.02
Bb	f	Retinal dystrophy	3.11
Bs	f	Sighted	3.11
Cb	f	Retinal dystrophy	3.11
Cs	f	Sighted	3.10
Db	m	Bilateral under development of the optic nerve (LP/CP)	3.02
Ds	m	Sighted	3.02

Key: b + blind; s = sighted CP = Colour perception LP = Light perception

Table 4.1 provides details of the remaining 4 blind children, 2 boys and 2 girls, who took part in the study. The three younger children attended mainstream nursery schools; the oldest child attended a mainstream primary school. The two girls who participated (Participants Bb and Cb) were monozygotic twins. Their retinal dystrophy was genetic in nature, their degree of visual impairment was similar and there was no evidence of any other mental or physical impairment associated with the genetic abnormality. The girls' progression to mobility and language were above average for blind children. They walked unaided at 13 months and 15 months respectively, well in advance of norms for blind children (a survey by RNIB (1992) has shown that whereas most non-disabled children can walk by 18 months, one third of blind and partially sighted children are still not walking by two years of age). The older boy had already taken part in Studies 1 and 2 (Participant Ab here; Participant P in the earlier studies) but as he still fell within the targeted age range and met all the inclusion criteria, this seemed appropriate. Parental reports suggested that he walked unaided at 15 months, well in advance of norms for blind children. There were no reported physical or mental impairments associated with his retinopathy of prematurity, and he scored at or above the level expected for blind children on the Reynell-Zinken and Oregon developmental tests carried out in Study 1 and Study 2 (see Chapter 3, p 96 and p 100). The youngest boy in the study, whose bilateral under development of the optic nerve was congenital had no other associated mental or physical impairment, and was reported (by the parent) to have walked unaided at 18 months, again well in advance of norms for blind children.

Permission was also obtained to work with 4 sighted children, matched to the blind children for age, sex, family circumstances, nursery/school placement and approximate developmental status. It was the considered opinion of the relevant teacher/nursery teachers that these children were each average to above average developmentally – this was confirmed subsequently - see p203-211 below. Eight children in total therefore took part in the study: 4 blind children aged between 3 years 2 months and 6 years 2 months at entry to the study and 4 sighted children aged 3 years 2 months to 6 years 2 months at entry (mean age/s.d. both groups: 4 yrs 3 mths /15 mths).

For each participating blind and sighted child permission was sought from parents to obtain background medical and family information from the person in charge of the nursery or school. This information covered: number of siblings, position in family, visual impairment diagnosis (including any light perception, colour perception, or evidence of functional vision) and details of attendance at nursery or school. All four blind children had one sibling, as did each of the four sighted children. It was thought important to match the blind and sighted children on this family variable as the literature suggests that there are a number of benefits when children grow up with siblings; for example, they can typically negotiate peer relationships better and often show enhanced social and interpersonal skills (Vygotsky, 1976; Ladd and Hart, 1992; Downey and Condron, 2004).

4.3 PROCEDURE

Visits were made to the relevant nurseries/school where video recordings were carried out of the children in structured and free play in a number of different contexts over a period of 15 months; the timing between visits ranged from 1 to 4 weeks. Initially, one to two visits were made to each child to allow the researcher time to familiarise herself with the child and the nursery or school. Each subsequent visit lasted 1/2 to 2 hours for the duration of the 15 month period of data collection. Observations were made of the children engaging in exploratory, constructive (including creative), functional, fantasy and receptive play, 5 of the 8 categories of play behaviour already identified as present in the repertoires of the sample of blind children who participated in Studies 1 and 2. Creative play was investigated in Studies 1 and 2 as a component of constructive play; however in Study 3 it was treated as a separate category, giving a total of 6 play behaviours to be investigated. Repetitive play and imitative play, which were most frequently observed in children under 3 years of age in Study 1 and 2, were not included in this study, as the children being studied were all over 3 years of age; it was therefore felt that these two forms of play would not yield sufficient data to allow comparative evaluations. Collaborative play was not included in this study as each of the 8 children's play behaviours were being studied individually. Toys made available for play were grouped in relation to the research questions and to the different types of play, and were introduced to the children as described below. Order of presentation of opportunities to engage in each of the targeted categories of play was fixed.

4.4 PLAY MATERIALS

Exploratory play

Exploratory play was examined in Study 1 and 2 in both free play and researcher-structured situations. In this study, in order to allow comparisons to be made between blind and sighted participants and across performances on different play materials, exploratory play was examined using a box of household items, each having different properties. Most of the items in the box were familiar to the children from their everyday environment. Some of the materials were chosen for differences in sensory properties, some were chosen on the basis of requiring fine motor abilities, and others were items in which the function of the potential play material might not be obvious. Initially, 4 colleagues were asked to place 60 items[2] into the following six categories: items which required manipulation (opening/closing element); items which were similar but tactually different; items which were different in function but with a similar tactile element; items with an olfactory element; items for which function was not obvious and items for which function was obvious. Of the 60 items there was 100% agreement on 31 items, therefore these 31 items were selected and placed in the exploratory box to represent each of the 6 categories as follows:

A. *Items which required manipulation (opening/closing element)*

Boxes:

- box with metal-hinged lid (contained musical toy activated by touch).
- wooden cigar box with hinged lid (empty).
- cardboard ring box with push-on lid (contained hair clasp).

Handbags:

- handbag with clasp opening, with credit cards, perfume box and purse)
- handbag with zip opening (empty)

B. *Items which were similar but tactually different*

- wool scarf and chiffon scarf
- measuring tape and leather belt
- wooden spoon and plastic measuring spoon
- flannel and sponge
- wrapping paper and foil

C. *Items which were different in function but with a similar tactile element*

[2] Selected from Urosevic and Cross (2000) Creating Educational Toys and Activities for Children who are Blind or Visually Impaired Canadian National Institute for the Blind

- shoe brush
- hairbrush
- toothbrush
- clothes brush

D. *Items with an olfactory element*

- deodorant stick
- perfumed tin
- baby powder container
- bar of soap

E. *Items for which function was not obvious*

- metal ringed egg cup
- torch
- pizza cutter
- woollen hat

F. *Items for which function was obvious*

- rubber gloves
- comb
- straw
- scissors

Exploratory play was presented to all of the children in the first month of data collection (see Appendix A). All of the items for exploratory play were contained in a cardboard box 30 x18 x18ins, which was placed on the floor of the playroom. The children were simply encouraged to play with the items in the box; no explicit instructions were given on how to interact with the materials. The researcher sat on the floor, to one side and slightly behind the child, and only minimal response was made to any approaches by the child.

Up to 30 minutes was allowed for each child to explore the materials in the box. Items replaced in the box were removed by the researcher. If a child asked "what is it"? The researcher answered, "What do you think it is". If the child did not know, the researcher encouraged the child to think about it; if the child still did not know, the researcher then gave an explanation of the item.

Constructive play

The materials selected for constructive play once again had different tactual, visual and aural sensory properties in order to allow comparisons to be made between blind and sighted participants and across performances on different play materials. A few of the play materials were considered unsuitable for the youngest children, and so only the two oldest blind and sighted children participated in these particular play activities (see below).

1) The materials used (with tactual, visual and aural properties) were:

- Standard (Visual): Jigsaw puzzle with 5 large sections (all children).
- 'Blind friendly' (Tactual): Formboard with 5 sections (all children).
- 'Blind friendly' (Aural): Musical formboard with 5 sections (all children).

2) The materials used were:

- 'Blind friendly' (Tactual): Pegboard toy used (Participants As and Ab only)
- 'Standard (Visual): Hammer and nail toy (Participants As and Ab only)

The materials for constructive play were presented over a five week period (Appendix A), in the second month and third month of data collection, with order of presentation alternated across participants within each group of children. The constructive toys were presented to the children in the following order: In each case the researcher sat on the floor, to one side and slightly behind the child, and only minimal response was made to any approaches by the child.

Week 1: jigsaw puzzle to Participants Ab, As, Bb and Bs; musical formboard to Participants Db and DS and wooden formboard to Participants Cb and Cs.

Week 2: jigsaw puzzle to Participants Db, Ds; musical formboard to Participants Ab, As, Cb and Cs and wooden formboard to Participants Bb and Bs.

Week 3: jigsaw puzzle to Participants Cb and Cs; musical formboard to Participants Bb and Bs and wooden formboard to Participants Ab, As, Db and Ds

Week 6: hammer and nails and week 8 pegboard to Participants Ab and As

Constructive play 1

Up to10 minutes was allowed for each child to complete each puzzle.

Constructive play 2

The two different constructive toys were presented to Participants As and Ab on separate visits. Fifteen minutes were allowed for each child to complete each task.
If the child refused to interact with or showed periods of disinterest in the play materials, he/she was encouraged to continue. If after 5 minutes the child still refused to interact with the materials play was abandoned.

<u>Creative play</u>

Although creative play is often included in the literature as a component of constructive play, teaching staff in nurseries and schools frequently structure creative play as a separate art form, using paints, crayons and other art materials. It is therefore described in this research as a separate category from constructive play.

Some of the creative materials used in Study 3 were chosen specifically to have differing sensory properties, including tactual, visual and olfactory characteristics. Other materials were items (still with some sensory properties) which would be familiar to the child from their everyday environment. These different materials were presented to the children in order to allow comparisons to be made between blind and sighted participants and across performances on different play materials

Materials included:

General materials

Adhesives

- glue stick, blutac and double sided tape.

Materials with highly specific sensory properties

Visual

- coloured Paper (4 colours) and coloured pens (6 colours)

Tactual /Visual

- coloured straws, coloured buttons, leaves and coloured feathers

Tactual

- wool, felt, sand paper, pasta (3 shapes) and lollipop sticks

Olfactory

- coffee beans and scented pens (6 colours)

Observations from the researcher's diary (teacher reports, parent reports and researcher observations) of the blind children in Study 1 and 2 indicated that any attempts to become involved in any form of art typically ceased after a number of failures. These children clearly had difficulties with locating or manipulating materials, and in working with glue and scissors. They usually required a great deal of assistance to enable them to persevere with activities like drawing or painting, which appeared to cause frustration and engender a reluctance to participate in future art sessions. It was therefore decided to compare responses to artwork presented under the following 2 conditions:

- Standard: a flat tabletop
- 'Blind friendly': a framed sketch box easel with a drawer in the front

Reports from parents and teachers confirmed all 8 participants in this study were unfamiliar with the easel as a media for the type of artwork presented in this study. Art was for the most part carried out on a flat tabletop in the nurseries and schools these participants attended.

A4 card was available in both settings with potential creative materials contained in boxes alongside the child in the tabletop condition and in a drawer in front of the child in the easel condition. As month 4 included school and nursery holidays, creative play was presented to the children between the 5th month and 6th month of data collection. The two groups of children were divided in half and order of presentation of the creative materials alternated across groups. The art materials were presented with the easel first to 4 of the children (2 blind and 2 sighted) with art materials on the tabletop 4 weeks later; the remaining 4 children (2 blind and 2 sighted) were presented with these two conditions at the same time intervals but in reverse order (Appendix A). In each case the researcher sat on a chair to the side and slightly behind the child, responding only minimally to any approaches by the child. The materials were presented to the children; they were given a few minutes to examine them and ask questions, and then were asked to make a picture. Up to 20 minutes was allowed for each child to complete his or her picture. If the child refused to interact with or showed periods of disinterest in the materials he/she was encouraged to continue. After completion of each picture, each child was asked "tell me about your picture". A note was taken of each response.

Functional play

Again the materials were chosen for differences in sensory properties to allow comparisons to be made between blind and sighted participants and across performances on different play materials. The two toys presented to the children to elicit functional play were similar in structure (both had cause/effect properties) but different in that only one played music when operated.

Materials used were:

- Standard: pop-up toy without music
- "Blind friendly" pop-up toy with music

The materials for functional play were presented in the 7th and 8th month of data collection. The two groups of children were divided in half and order of presentation of the functional materials alternated across groups. The pop-up toy with music was presented first to 4 of the children (2 blind and 2 sighted) with the pop-up toy without music presented 4 weeks later; the remaining 4 children (2 blind and 2 sighted) were presented with these two conditions at the same time intervals but in reverse order (Appendix A). As in the other play contexts, the researcher sat on a chair to the side and slightly behind the child and again responded only minimally to any approaches by the child. Up to 20 minutes was allowed for each child to play with each toy. If the child refused to interact with or showed periods of disinterest in the materials he/she was encouraged to continue.

Fantasy play (Pretend play)

To allow comparisons across blind and sighted Participants and comparisons in performance between conditions, this activity was split into the following two contrasting conditions.

- Standard: The children were presented with the play materials and no instructions were given on how to interact with them.
- 'Blind Friendly': The children were presented with the materials and told it was Tinky Winky's birthday and we were going to have a party.

Materials provided were:

- a table
- Teletubbies figure (soft material) (4)
- miniature tea set (with pots, cutlery, dishes etc).
- box of tissues
- 5 boxes of varying sizes (matchbox to cigar box).
- toy car
- toy telephone

As month 10 included school and nursery holidays, the materials for fantasy play were presented in the 9^{th}, 10^{th} and 11^{th} month of data collection. The two groups of children were again divided in half and order of presentation of the two conditions alternated. The standard condition was presented first to 4 of the children (2 blind and 2 sighted) with the 'blind friendly' condition presented 4 weeks later; the remaining 4 children (2 blind and 2 sighted) were presented with these two conditions at the same time intervals but in reverse order (see Appendix A). As in the other play contexts, the researcher sat on a chair to the side and slightly behind the child and again responded only minimally to any approaches by the child. Up to 20 minutes was allowed for each child to play with the materials. If the child refused to interact with or showed periods of disinterest in the materials he/she was encouraged to continue.

Receptive play (books)

Three stories were read to each child on three separate occasions. The storybooks were similar in length and in number of words per page. Two storybooks were from the Ladybird series of books for children age 3-4 and 5 years and were not familiar to the children. In the third story, the characters (Teletubbies) were familiar to all of the children but the story was not (the parents and nursery/teaching staff were asked if the child had read or seen any of these books). The researcher parsed each story to outline the setting, theme, characters, plot episodes, and resolution (see Appendix B) for example of parsed story). Prompts were limited to "Then what happened?" or "What comes next?". Probed recall comprehension tests were administered to each child. The test included ten questions focusing on story structure, including setting, theme, plot episodes, and resolution. The different contexts within which each story was told were designed to allow for comparisons to be made both between the recall of blind and sighted children and between the recall of standard and 'blind friendly' stories. The children were read the three stories individually, with timing of the presentation varied within group as follows.

Books used:

- Standard: Walter's Red Star (with visual pictures).

- 'Blind friendly': Cats Cradle (with tactile pictures)
- 'Blind friendly': Teletubbies: Po's Magic Watering Can with props (hand bag, ball, hat, flower, watering can).

The researcher sat to the right hand side of the child and read the stories. The child was allowed to look at the pictures, handle the props and feel the tactile pictures. They were then asked to recall as much of the story as possible, with up to 5 minutes allowed for recall. The researcher then allowed the child to have the book again and asked the child ten questions relating to the main character, the plot and the resolution of the story (see Appendix C), with up to 1 minute allowed for each answer

The materials for receptive play were presented over a seven-week period in the 12th and 13th month of data collection, with order of presentation of the receptive material alternated across participants within each group of children (Appendix A). The receptive toys were presented to the children in the following order:

Week 1: Walter's Red Star to Participants Ab, As, Bb and Bs; Cats Cradle to Participants Db and DS and Po's Magic Watering Can to Participants Cb and Cs.

Week 4: Walter's Red Star to Participants Db, Ds; Cats Cradle to Participants Ab, As, Cb and Cs and Po's Magic Watering Can to Participants Bb and Bs.

Week 3: Walter's Red Star to Participants Cb and Cs; Cats Cradle to Participants Bb and Bs and Po's Magic Watering Can to Participants Ab, As, Db and Ds.

4.5 DEVELOPMENTAL MEASURES

Two measures were used to assess the children's current developmental status, at entry to the study and again at mid-point of the 15-month study. Both measures were specifically designed for use with visually impaired children, as in Study 2: the Reynell-Zinken Development Scales for Young Visually Handicapped Children (Reynell, 1979) and The Oregon Skills Inventory for Visually Impaired and Blind Preschool Children (Brown et al, 1991).

4.6 DEVELOPMENTAL ASSESSMENTS RESULTS

The Reynell-Zinken Scales

The Reynell-Zinken Scales have been fully discussed in Chapter 2 (see pp 58-59). This developmental test consists of 5 subscales: social adaptation (SA) sensorimotor understanding (SM); exploration of the environment (EE); response to sound and verbal comprehension (VC); expressive language: structure (EL/S) and expressive language: vocabulary and content (EL/C). There are a total of 114 test items and the test covers the age range birth to 5+ years. Although the Reynell-Zinkin Developmental Scales were developed for use with young visually impaired children, the authors also developed age levels for sighted children. These were estimated from standardised scales for sighted children and then checked by testing a small sample (43 children) of fully sighted children on the Reynell-Zinken Scales.

Reynell-Zinken scores: Tables 4.2 and 4.3[3] show the Reynell-Zinken test scores achieved

Table 4.2 Reynell-Zinken test scores at beginning of study (n=8)

Participant	Age	SA	SM	EE	VC	EL/S	EL/C
Ab	6; 02	18* (5)	23* (5+)	12* (5+)	36* (5+)	22* (5+)	18* (5;03+)
As	6; 02	18* (2)	23* (3;06)	12* (3;09)	36* (4+)	22* (4;10)	16* (4;00)
Bb	3; 11	18* (5)	19 (4;02)	11 (4;00)	26 (4;06)	22* (5+)	11 (4; 03)
Bs	3; 11	18* (2)	23* (3;06)	12* (3;09)	36* (4+)	22* (4;10)	16* (4;00)
Cb	3; 11	18* (5)	19 (4;02)	11 (4;00)	25 (4;04)	22* (5+)	11 (4;03)
Cs	3; 10	18* (2)	23* (3;06)	12* (3;09)	36* (4+)	22* (4;10)	16* (4;00)
Db	3; 02	18* (5)	18 (3;11)	10 (3;06)	24 (4;00)	16 (3;07)	09 (3;11)
Ds	3; 02	18* (2)	23* (3;06)	12* (3;09)	28 (3;03)	18 (3;04)	11 (3;03)

Key: SA = Social adaptation; SM = Sensorimotor understanding; EE = Exploration of the environment; VC = Response to sound and verbal comprehension; EL/S = Expressive language: structure; EL/C = Expressive language: vocabulary and content ; * = Ceiling, and () = Age equivalents

by the 8 children in Study 3 at the beginning of the study and middle of the 15-mth period of data collection.

Table 4.3 Reynell-Zinken test scores in the middle of study (table 4.2 + 7 months) (n=8)

Participant	Age	SA	SM	EE	VC	EL/S	EL/C
Ab	6; 09	18* (5)	23* (5+)	12* (5+)	36* (5+)	22* (5+)	18* (5;03+)
As	6; 09	18* (2)	23* (3;06)	12* (3;09)	36* (4+)	22* (4;10)	16* (4;00)
Bb	4; 06	18* (5)	23* (5+)	12* (5+)	32 (4;11)	22* (5+)	14 (4;11)
Bs	4; 06	18* (2)	23* (3;06)	12* (3;09)	36* (4+)	22* (4;10)	16* (4;00)
Cb	4; 06	18* (5)	23* (5+)	12* (5+)	31 (4;11)	22* (5+)	14 (4;11)
Cs	4; 05	18* (2)	23* (3;06)	12* (3;09)	36* (4+)	22* (4;10)	16* (4;00)
Db	3; 09	18* (5)	23* (5+)	12* (5+)	33 (5+)	20 (4;09)	13 (4;08)
Ds	3; 09	18* (2)	23* (3;06)	12* (3;09)	35 (4;00)	20 (4;01)	16* (4;00)

Key: SA = Social adaptation; SM = Sensorimotor understanding; EE = Exploration of the environment; VC = Response to sound and verbal comprehension; EL/S = Expressive language: structure; EL/C = Expressive language: vocabulary and content. * = Ceiling and () = Age equivalents

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[3] Note: the ceiling scores/age equivalents for sighted and blind groups are different (see pages 205-206).

Within the blind group of children, Participant Ab reached ceiling on all the developmental scales on both tests. This was to be expected, as at 6 years and 2 months he was older than the maximum age equivalent for blind children of 5+ years on the Reynell-Zinken Scales. Participants Bb and Cb reached ceiling on social adaptation and expressive language structure at the beginning of the study and by the middle of the study reached ceiling on social adaptation, sensory motor understanding, expressive language structure and exploration of the environment. For the remaining scales these two children scored between 3 and 7 months above the level expected for a blind child. Participant Db reached ceiling on social adaptation at the beginning of the study and reached ceiling on social adaptation, sensory motor understanding and exploration of the environment by the mid-point of the study; he also scored between 3 months and 13 months above the level expected for blind children on the remaining three Reynell-Zinken Scales.

Within the sighted group of children, Participant As, Bs and Cs reached ceiling on all the developmental scales on both tests. Again this was to be expected for Participant As, as at 6 years and 2 months he was older than the maximum age equivalent for sighted children of 4+ years on the Reynell-Zinken Scales. It was also to be expected for three of the scale scores for Participants Bs and Cs (social adaptation, sensorimotor understanding and exploration of the environment) as the sighted normative scores on the Reynell-Zinken Scales are limited to age equivalents of: 2 years, 3 years 6 months, and 3 years 9 months respectively for these three scales. However, on the remaining three scales - response to sound and verbal comprehension; expressive language: structure and expressive language: vocabulary and content - these two children scored between 2 months and 10 months above the level expected for a sighted child. Participant Ds also scored at ceiling on three of the scales (social adaptation, sensorimotor understanding and exploration of the environment). Again this was expected for social adaptation as normative scores are limited to age equivalents of 2 years on this scale; however, for the other two scales on which he reached ceiling, he scored between 4 and 7 months above the level expected for a sighted child and for the remaining three between 1 and 2 months above the level expected for a sighted child.

In sum, 3 of the 4 blind children in the study scored above the level expected for their chronological age on all the developmental areas on Reynell-Zinken scales on both tests. Although the 4th blind child was older than the maximum age equivalent of 5+years, the Reynell-Zinken scores which were taken in Studies 1 and 2 suggested at that time he was progressing along an age appropriate course in all developmental areas. Three of the 4 sighted children in the study also scored above the level expected for their chronological age on all the developmental areas on both the Reynell-Zinken tests. Although the 4th sighted child again was older than the maximum age equivalent of 4+ years, school reports suggested his developmental level was above average for his age. From the above, it is obvious that it was difficult to reach any firm conclusion on the developmental status of the sighted children from their scores on the Reynell-Zinken scales. Any direct comparison between blind and sighted children was also not possible: as explained above, the sighted normative scores on the Reynell-Zinken Scales are limited to age equivalents much younger than those given for blind children. For these reasons a second test, the Oregon Skills Inventory for Visually Impaired and Blind Preschool Children, was administered to all eight children in the study.

Oregon Project

As already described in Chapter 3 (see pp 94-97), The Skills Inventory of the Oregon Project for Visually Impaired and Blind Preschool Children comprises 640 items which are assigned to eight developmental areas: cognition; language; self-help; socialisation; fine motor and gross motor abilities; compensatory; and vision. It covers the age range birth to 6 years, with each of the eight areas covered arranged into developmentally sequenced age categories: 0-1 yrs, 1-2 yrs, 2-3 yrs, 3-4 yrs, 4-5 yrs, and 5-6 yrs.

Although the Oregon Project for Visually Impaired and Blind Preschool Children was specifically designed with blind and partially sighted children in mind, the Oregon manual states, "the age levels in the skills inventory are based upon norms set by sighted children" (p 9). It was therefore considered suitable to use with both blind and sighted children. As a number of items in the Oregon scales are coded "may not be appropriate for a totally blind child" (e.g. "names 3 colours on request"), these items were scored as accomplished as suggested in the Oregon skills inventory manual (p18). There are also a number of items in the Skills Inventory that "may be appropriate only for a child who will be a Braille reader" and therefore not appropriate for a sighted child (e.g. 'can read own name in Braille'). For the purposes of this study these items were also scored as accomplished in the sighted child. As the group being studied contained both blind and sighted children, the children were not tested on compensatory or vision items, firstly, because compensatory skills are specific to a child who most likely will be a Braille reader, and secondly, the section on vision is specific to a child with some vision (none of the Study 3 children had any functional vision).

As these tests were carried out to assess the current developmental status of each child and the repeated test was to check for any regression in development (see p 209), each child was tested with items within the age range pertaining to their chronological age at that point in time (e.g. for Participant Ds, whose chronological age was 3 years 9 months, the testing age category was from 3 to 4 years and the total possible score for, e.g. the cognition scale, was 63).

Oregon test scores: Tables 4.4 and 4.5 (see over) show the Oregon test scores achieved by the 8 children in Study 3 at the beginning of the study and middle of the 15-mth period of data collection. As with the Reynell–Zinken scales, it can be seen that Participants Ab and As reached ceiling on all the developmental areas in the Oregon tests for the age category from birth to 6 years, both at the beginning and in the middle of the data collection. Again this was to be expected as at the beginning of the study both were 6 years 2 months and therefore marginally older than the maximum age equivalent of 6 years.

Table 4.4 Oregon test scores at beginning of study (n=8)

Subject	Age	Cog	Lang	S/help	Social	G/motor	F/motor
Ab	6;2	105* (6;0)	97* (6;0)	90* (6; 0)	63* (6;0)	85* (6;0)	69* (6;0)
As	6;2	105* (6;0)	97* (6;0)	90* (6;0)	63* (6;0)	85* (6;0)	69* (6;0)
Bb	3;11	54* (4;0)	63* (4;0)	58* (4;0)	42* (4;0)	56* (4;0)	48* (4;0)
Bs	3;11	54* (4;0)	63* (4;0)	58* (4;0)	42* (4;0)	56* (4;0)	48* (4;0)
Cb	3;11	54* (4;0)	63* (4;0)	58* (4;0)	42* (4;0)	56* (4;0)	48* (4;0)
Cs	3; 10	54* (4;0)	63* (4;0)	58* (4;0)	42* (4;0)	56* (4;0)	48* (4;0)
Db	3; 2	43 (3;4)	55 (3;7)	55 (3;9)	36 (3;6)	51 (3;6)	43 (3;6)
Ds	3; 2	43 (3;4)	54 (3;6)	56 (3;10)	37 (3;7)	51 (3;6)	44 (3;7)

Key: Age = Age when child was tested in years and months; Cog = cognition; Lang = language; S/help = self-help; Social = socialisation; G/motor = gross motor and F/motor = Fine motor. () = Age equivalents in years; months and * = Ceiling for age category (each subject tested only within appropriate age category e.g. for Bb age 3;11 therefore tested in age category 3 to 4 years.

Table 4.5 Oregon test scores at the middle of study (Table 4.4 + 7 months) (n=8)

Subject	Age	Cog	Lang	S/help	Social	G/motor	F/motor
Ab	6;9	105* (6;0)	97* (6;0)	90* (6; 0)	51* (6;0)	85* (6;0)	69* (6;0)
As	6;9	105* (6;0)	97* (6;0)	90* (6;0)	51* (6;0)	85* (6;0)	69* (6;0)
Bb	4;6	65 (4;7)	79* (5;0)	73* (5;0)	51* (5;0)	70* (5;0)	58* (5;0)
Bs	4;6	72 (4;11)	79* (5;0)	73* (5;0)	51* (5;0)	70* (5;0)	58* (5;0)
Cb	4;6	68 (4;7)	79* (5;0)	73* (5;0)	51* (5;0)	70* (5;0)	58* (5;0)
Cs	4;5	72 (4;11)	79* (5;0)	73* (5;0)	51* (5;0)	70* (5;0)	58* (5;0)
Db	3; 9	54* (3;10)	63* (3;11)	58* (3;9)	42* (4;0)	56* (4;0)	48* (4;0)
Ds	3; 9	54* (3;10)	59 (3;10)	58* (4;0)	42* (4;0)	56* (4;0)	48* (4;0)

Key: Age = Age when child was tested in years and months; Cog = cognition; Lang = language; S/help = self-help; Social = socialisation; G/motor = gross motor and F/motor = Fine motor. () = Age equivalents in years; months and * = Ceiling for age category (each subject tested only within appropriate age category e.g. for Bb age 4;6 therefore tested in age category 4 to 5 years.

The Oregon test carried out at the beginning of the period of data collection (Table 4.4, see above) shows Participants Bb, Bs, Cb, Cs all reaching ceiling on all the developmental areas in the age category from birth to 4 years, placing them at least one month above their chronological age. The Oregon test carried out in the middle of the period of data collection (Table 4.5, see above) shows these Participants to be between 1 month and 7 months above their chronological age in all the developmental areas in the age category from birth to 5 years. At the beginning of the study Participants Ds and Db scored between 2 months and 8 months above the level expected for their chronological age on the developmental areas in the age category from birth to 4 years. Seven months later these two children continued to develop accordingly in all areas: Participant Db reached ceiling on cognition, language, self-help and social scales and scored 2 months above his chronological age for gross motor and fine motor in the age category from birth to 4 years; Participant Ds reached ceiling on cognition, self-help, social, gross motor and fine motor scales and scored 1 month above his chronological age for language in the age category from birth to 4 years.

In sum, 3 of the 4 blind children in the study scored above the level expected for their chronological age on all the developmental areas on both occasions of Oregon testing. Although one blind child was older than the maximum age equivalent of 6 years, the Oregon test scores taken in Study 2 indicated that at that time he was progressing along an age appropriate course in all developmental areas. Three of the 4 sighted children in the study also scored above the level expected for their chronological age on all developmental areas in both Oregon testing sessions. Although one sighted child was again older than the maximum age equivalent of 6 years, school reports recorded his developmental level at above average for his age.

The Test of Pretend Play (ToPP)

A third measure, new to the research, the Test of Pretend Play (ToPP), was used to assess the children's current level of symbolic play. This allows symbolic play to be assessed in both structured and unstructured free play conditions. There are two versions of the test using structured conditions: a Nonverbal Version (recommended for children under three years of age) and a Verbal Version, the version used[4] in the study reported here. This has four different sections that examine the following different aspects of symbolic play:

Section 1: Self with everyday objects.

This examines the child's ability to make reference to an absent object when supported by everyday objects. This section has a maximum score of 2 and uses a bowl and spoon for testing. For example:

> The tester puts the bowl and spoon in front of the child and asks, "What can you do with these" if the child performs an appropriate action they pass at the elicit level and score 2. If they fail at this level the tester then goes on to instruct; "show me how you eat your breakfast" if they pass at this level the score is 1.

[4] Where vision was necessary for the child to understand what was expected of them, the researcher modified the instruction given to the blind children e.g. encouraging the child to tactually examine the ToPP toys/materials.

Section II: Toy and non-representational materials.

This assesses the child's ability to substitute one, two, three and four pieces of non-representational material for pretend play with a doll. There are a number of items in this section: a doll, a yellow top, red cloth, blue cloth white counter, black box, brown stick, round white tub, white board, wooden box and cotton reel. This section has a maximum score of 8. For example:

> The tester puts the doll and yellow top in front of the child and asks "What can dolly do with this" if the child performs an appropriate action with the doll e.g. putting the top on the dolls head, pretending it is a hat, they pass at the elicit level and score 2. If they fail at this level the tester then goes on to instruct; "show me how the dolly puts on her hat" if they pass at this level the score is 1.

Section III: Representational toy alone

This examines the child's ability to make reference to an absent object, attribute an imagined property to a toy, substitute a toy for another object and make a toy carry out a sequence of actions without play materials (scripted play). Section 3 has a maximum score of 12 and uses only a teddy bear for testing. For example:

> The tester sits the teddy down as if he were sitting in a car and makes the noise of a car going along, as if teddy was driving a car, the tester then passes teddy to the child and encourages the child to repeat the action, if they pass at this level they score 1, the tester than asks the child "what else can the teddy do"? If the child performs an appropriate action with the teddy they score 2

Section IV: Self alone

This also has a maximum score of 12 but has no associated materials used to test level of symbolic play. It examines the child's ability to substitute him/herself for another object or person, make reference to an absent object, attribute an imagined property to him/herself and to carry out a sequence of actions without play materials (scripted play). For example:

> The tester pretends she is eating ice cream. If the child copies they pass at this level and score 1, the tester than asks the child "what else can you do"? If the child performs an appropriate action they score 2.

Table 4.6 shows the ToPP age equivalents for all 8 children in the study. These scores

Table 4.6 Raw scores on the four sections of the ToPP

Subject	Age Months (yr/mth)	Section I	II	III	IV	Total	Age equivalents Months
Ab	74.5 (6; 02)	2	6	12	12	32	83.6^
As	74.3 (6; 02)	2	8	12	12	34*	87.9 ^
Bb	47.5 (3; 11)	2	4	9	5	20	57.8
Bs	47.4 (3; 11)	2	6	9	6	23	64.2
Cb	47.5 (3; 11)	2	4	9	5	20	57.8
Cs	46.6 (3; 10)	2	6	9	5	22	62.1
Db	38.5 (3; 02)	2	4	6	3	15	47.0
Ds	38.2 (3; 02)	2	4	6	3	15	47.0

Key: * = Ceiling;
^In the standardised sample of the ToPP no children were tested above the age of 6 yrs1.5 mths; these age equivalents should therefore be interpreted with caution.
Note : Subjects' age equivalent scores are given in months to allow ease of compatibility with ToPP norms

indicate that all 8 children in this study were capable of taking part in pretend play at levels appropriate to their chronological ages.

4.7 ANALYSIS

A category system for qualitative and quantitative microanalysis of the content of the 132 videotaped sessions of play produced in the six different play contexts over the 15 month period of data collection was developed and then applied to all recordings.

The researcher viewed all of the videotapes taken of each child, using a 30 frames per second frame-by- frame analysis and a pen and paper coding form to record all observed play behaviours. The minimum duration for coding behaviours was no less than 5 frames. In order to establish inter-rater reliability, two play sessions, one from a blind child and one from a sighted child, were randomly selected for each of the 6 play categories being studied and re-analysed by a second researcher using the same coding criteria. An inter-rater reliability of between 80% and 95% across all play behaviours was reached. Cohen's Kappa (Cohen, 1960) as follows:

Exploratory play:

a) On task/off task /select/explore materials. Kappa = .72

b) Strategies used to explore materials. Kappa = .70

Constructive play:

a) On task/ off task/total /examine at completion. Kappa = .65

a) Select, examine and place each section. Kappa = .82

b) Stages to complete. Kappa = .88

Creative play:

b) On task/off task /select/explore materials. Kappa = .78

c) Type of materials used. Kappa = .90

Functional play:

a) On task/off task /examine /function. Kappa = .80

b) Task-related questions and task-related statements. Kappa = .70

Fantasy play:

a) Simple pretend. Kappa = .78

b) Complex pretend. Kappa = .74

c) pretend play materials used. Kappa = .84

Receptive play:

a) Story recall (Morrow). Kappa = .78

b) Story recall (probed). Kappa = .68

4.8 RESULTS AND DISCUSSION

Developmental measures

Table 4.7 and Table 4.8 (see over) show the group means and standard deviations for the blind and sighted children for both of the Oregon tests carried out at the beginning and the middle of the study. Although there is a small difference in the group means (see

Table 4.8) between the blind and sighted children, Mann Whitney U tests revealed that there were

Table 4.7 Oregon test scores for blind (n=4) and sighted (n= 4) children taken at the beginning of Study 3.

	Cog	Lang	S/help	Social	G/motor	F/motor
			Sighted			
Mean	64.0	69.3	65.5	46.0	62.0	52.3
SD	(27.8)	(19.0)	(16.4)	(11.6)	(15.5)	(11.4)
			Blind			
Mean	64.0	69.5.	65.3	45.8	62.0	52.0
SD	(27.8)	(18.7)	(16.6)	(11.8)	(15.5)	(11.6)
			Mann-Whitney U tests			
p	ns	ns	ns	ns	ns	ns

Key: Cog = cognition; Lang = language; S/help = self-help; Social = socialisation; G/motor = gross motor and F/motor = Fine motor. SD = standard deviation and ns = not significant.

Table 4.8 Oregon test scores for blind (n=4) and sighted (n= 4) children taken in the middle of study 3. (Table 4.7 + 7months)

	Cog	Lang	S/help	Social	G/motor	F/motor
			Sighted			
Mean	75.0	76.5	71.8	51.5	70.3	58.0
SD	(21.5)	(15.3)	(13.3)	(08.7)	(11.8)	(08.7)
			Blind			
Mean	74.5	77.3	71.5	51.0	67.3	56.8
SD	(21.6)	(14.2)	(13.4)	(08.8)	(12.9)	(09.5)
			Mann-Whitney U tests			
p	ns	ns	ns	ns	ns	ns

Key: Cog = cognition; Lang = language; S/help = self-help; Social = socialisation; G/motor = gross motor and F/motor = Fine motor. SD = standard deviation and ns = not significant.

no significant differences on any of the six developmental areas assessed. These results concur with the findings from Brown et al's (1986) preliminary use of the Skills Inventory with sighted children, which indicated that visually impaired and blind preschool children who have no additional handicaps reach many important developmental milestones at the same age levels as sighted children milestones at the same age levels as, sighted children

Table 4.9 ToPP test scores for blind (n=4) and sighted (n= 4) children

	I	II	III	IV	total
			Sighted		
Mean	2.0	6.0	9.0	6.5	23.5
SD	(0.0)	(1.6)	(2.5)	(4.0)	(7.9)
			Blind		
Mean	2.0	4.5	9.0	6.3	21.8
SD	(0.0)	(1.0)	(2.5)	(4.0)	(7.2)
			Mann-Whitney U tests		
p	ns	ns	ns	ns	ns

Table 4.9 shows the group means and standard deviations of scores in the four sections, and in total scores, for the Test of Pretend Play. There were differences between the blind and sighted children in their total mean scores (mean = 21.8 and 23.5 respectively), with 3 of the sighted children achieving higher total scores than their blind counterparts, but this difference was not statistically significant. As Table 4.6 (see p 213) shows, these differences are mainly attributable to the blind children achieving lower scores in section 2 of ToPP. There were no differences between the scores on the TOPP for the two youngest children, Participants Ds and Db. These scores indicate that all 8 children in this study were capable of taking part in pretend play at levels appropriate to their chronological ages

<u>Exploratory Play</u>

For exploratory play, a count was taken of the total time taken to complete the task. A count was also taken of the time each child spent: on task, off task, and in selecting items from the box and exploring items from the box; these values were then re-calculated as a percentage of the total time spent on the task. . For example:

a) Percentage times on and off task were calculated for Participant Ab as follows:

- Total time to complete task = 796 seconds
- Time on task = 774 seconds
- Percentage time on task = 774/796 (100) = 97.2%
- Percentage time off task = 2.8%

Total time to complete the task was calculated from the time the child was presented with the materials to the completion of the exploration of all the materials in the box or until the child abandoned or refused to continue with the task. Time off task was calculated as the time taken for all other behaviours not related to either selecting or exploring items.

b) For Participant Ab, percentage time to explore materials was calculated as below:

- Total time = 796 seconds
- Time taken to explore materials = 690 seconds
- Percentage time to explore materials = 690/796 x (100) = 86.7%

Time to explore materials was counted from the moment the child began to either visually or/and tactually examine the item until it was discarded.

c) Percentage time to select materials by Participant Ab was calculated thus:

- Total time to complete task = 796 seconds
- Time taken to select materials = 84 seconds
- Percentage time to select materials = 84/796 x (100) =10.6%

The time for selection was counted from the moment the child moved their hand towards the box until an item was selected and removed from the box.

Analysis: *A 3-staged approach to data analysis was taken:*

Analysis 1.
Data were analysed for time on task, time off task, total time, time taken to select the materials and time taken to explore the materials for each child. Comparisons were made across the two groups of Participants, blind and sighted.

Analysis 2.
Data were analysed for the time each child took to examine each of the six categories of materials and comparisons were made both within Participants and across the two groups of Participants, blind and sighted.

Analysis 3.
Data were analysed for the number of task-related question asked; number of task-related statements made; number of times an item was correctly identified; number of times an item was incorrectly identified; number of times correct functional use of an item was demonstrated or described; and number of times "What is it?" questions

were asked within each of the six categories. Again, comparisons were made both within Participants and across the two groups of Participants, blind and sighted, for the variables described above.

Analysis 1: *Time to complete task.*

The on task time, off task time, total time, total time spent in exploration and total time taken to select the items in the box for each of the 4 sighted and 4 blind children are shown in Table 4.10.

Table 4.10 The exploratory behaviour of blind (n =4) and sighted (n =4) children (time in seconds)

Participant	Vision	On task	Off task	Total time	Time to explore	Time to select
Ab	blind	774	22	796	690	84
As	sighted	418	10	428	403	15
Bb	blind	699	248	947	571	128
Bs	sighted	552	13	565	514	38
Cb	blind	1222	453	1675	1118	104
Cs	sighted	784	3	787	732	52
Db	blind	1273	22	1295	1168	105
Ds	sighted	379	7	386	363	16
Group mean and standard deviation						
M	blind	992	186.25	1178.25	886.75	105.25
SD	blind	297.3	207.30	391.57	300.55	17.99
M	sighted	533.25	8.25	541.50	503.00	30.25
SD	sighted	182.85	4.27	180.63	165.49	8.98

Age did not appear to be a predictor of length of time spent on any of the variables measured. All 8 children completed the task within 30 minutes and all children explored all of the items. The overall time spent on the task by some of the children was as little as 6 minutes; others took longer. Time on and off task was therefore calculated as percentages of total time to complete the task. Table 4.11 (see over) shows the outcomes of Mann Whitney U tests (one tailed) comparing differences between the blind and sighted children on percentage time on task, percentage time off task, total time, percentage time taken to select each item and percentage time taken to explore each item.

There were significant group differences on percentage total time taken to complete the task ($p<0.01$), percentage time taken to select items ($p<0.01$), and percentage time taken to explore items ($p< 0.01$), with the blind children taking longer in each case (Table 4.11). However, there was very little difference between two of the blind children and

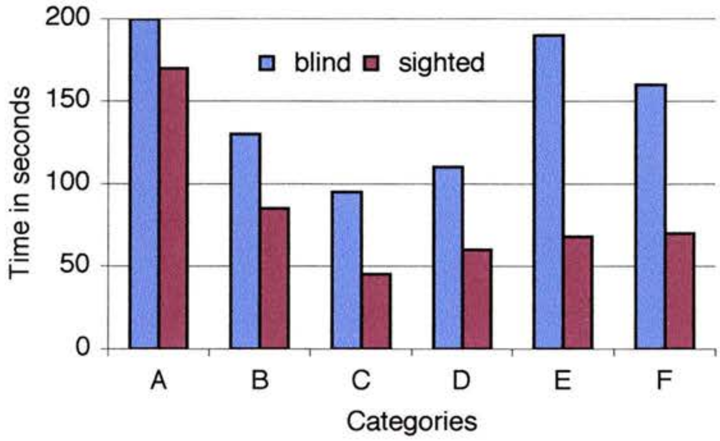
Table 4.11 Differences between the exploratory behaviour of blind (n =4) and sighted (n =4) children (Mann-Whitney U test)

	% On task	%Off task	Total time	%Time to explore	% Time to select
U	3.00	4.00	0.00	0.00	0.00
Z	-1.45	-1.16	-2.31	-2.32	-2.31
p	0.08	0.12	0.01	0.01	0.01

the sighted children in time spent off task, but the two other blind children (Participants Bb and Cb) spent considerably longer off task than the other children (see Table 4.10). The differences between the blind and sighted children in time on task did not reach significance, although the blind children again took longer to select and explore the materials.

Analysis 2: *Time to explore materials.*

The times taken to explore each of the six categories of materials were separately analysed, firstly to assess any similarities or differences in this variable across categories and secondly to assess any similarities or differences across the two groups of children. Comparisons were made using a Mann-Whitney U test (one-tailed).



Key: A = manipulation; B = tactually different; C = tactually similar; D = olfactory element; E = function not obvious; F = function obvious.

Figure 4.1 The mean time for blind (n=4) and sighted (n=4) to explore each of six categories

As Figure 4.1 shows, there were some significant differences between the exploratory behaviours of the blind children and sighted children when analyses focussed on the different categories of objects available. For each of the six categories of materials, the blind children took longer than the sighted children to explore the materials.

As Table 4.12 (see over) shows, however, this difference was only significant in the case of those items which were different but with a similar tactile element ($p<0.01$), those in which the function was obvious ($p<0.02$), and those in which the function was not obvious ($p<0.01$). The blind children took significantly longer in each case to explore these items.

Although the blind children took longer than sighted children to explore items in which

Table 4.12 Differences between the six exploratory behaviours of blind (n =4) and sighted (n =4) children (Mann-Whitney U test)

	A	B	C	D	E	F
U	7.00	4.00	0.00	6.00	0.00	1.00
Z	-0.29	-1.15	-2.32	-0.58	-2.31	-2.03
p	0.38	0.13	0.01	0.28	0.01	0.02

Key: A = manipulation; B = tactually different; C = tactually similar; D = olfactory element; E = function not obvious; F = function obvious.

the function was obvious, the difference was far less than the difference in the time taken to explore items in which the function was not obvious. This would suggest that when the tactile properties of an object are obvious to the blind child there is less need for exploration and the gap between blind and sighted children in levels of sophistication in play narrows. This is not surprising: sighted children have visual clues as to the possible function of an article and are immediately aware if they are not familiar with the function and can therefore seek confirmation or assistance as to its function more rapidly than the blind child.

Analysis 3: *Strategies used to explore materials.*

A count was taken of the number of task-related questions each child asked and the number of task-related statements they made. Comparisons were again made between the blind and sighted children using a Mann-Whitney U test. Each child's speech and behaviour throughout the task was also analysed for: number of times an item was correctly identified; number of times an item was incorrectly identified; number of times correct functional use of an item was demonstrated or described; and number of times "What is it?" questions were asked within each of the six categories. As each category contained a different number of items, responses were totalled for each then re-calculated as a percentage of the total number within the given category. For example, the percentage time for the blind group in Category A (items which require manipulation - 5 items) was calculated as follows:

- Total = 10 of a possible 20
- Percentage of total = 10/20 * 100 = 50 %

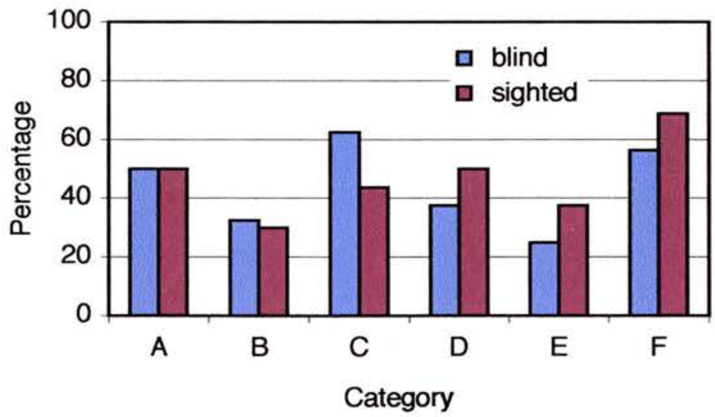
Table 4.13 Difference between blind (n =4) and sighted (n =4) children on the total task-related questions and statements

Questions				Statements			
Subject	Total	Subject	Total	Subject	Total	Subject	Total
Ab	14	As	5	Ab	55	As	19
Bb	12	Bs	9	Bb	10	Bs	32
Cb	27	Cs	14	Cb	73	Cs	55
Db	56	Ds	11	Db	69	Ds	22
Total:	109		39		207		128
Mann-Whitney U test							
U	0.50				3.50		
Z	-2.10				-1.15		
p	0.03				0.13		

Table 4.13 (above) shows that the blind children asked significantly more questions than the sighted children ($p < 0.03$). Although there was no significant difference between the blind and sighted children in the number of task-related statements each made, there was a clear trend for the blind children to make more such statements making on average

twice as many of these as the sighted children. It was noted, rather than immediately engaging with the materials, the blind children typically asked what the materials were if this was not immediately obvious to them. Even if they thought they knew what the materials were, they usually confirmed this by making some comment about it, e.g. "That's a handbag", or " Is it a hand bag", seeking clarification. It was noted that when the sighted children volunteered information about the materials, they tended to look towards the researcher, possibly looking for a positive or negative reaction to the information volunteered, and hence eliminating the need for verbal clarification.

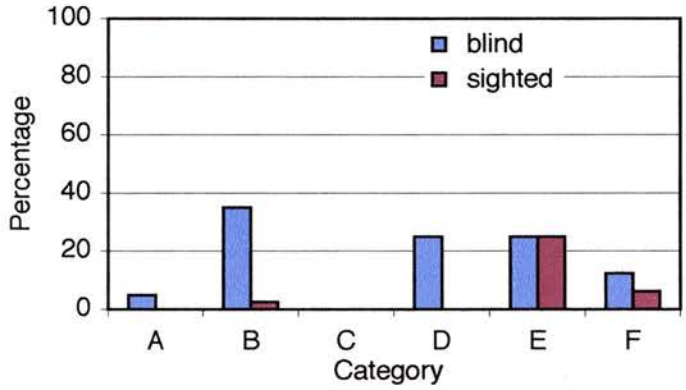
Figures 4.2 to 4.5 show the percentage of times the blind and sighted children volunteered: correct descriptions of the items within each category; incorrect descriptions of the items within each category; correctly demonstrated or described the functional use of each item; and the percentage of task-related questions asked within each category.



Key: A = manipulation; B = tactually different; C = tactually similar
D = olfactory element E = function not obvious; F = function obvious

Figure 4.2 Percentage correct descriptions given

As Figure 4.2 (above) shows, the blind and sighted children identified the same percentage of items in category A (items which require manipulation) and there was very little difference between the two groups of children in category B (items which are tactually different). In category C (items which are tactually similar), the blind children identified more items than the sighted child, with this pattern reversed for categories D (items with olfactory element), E (items in which the function may not be obvious) and F (items in which the function may be obvious).



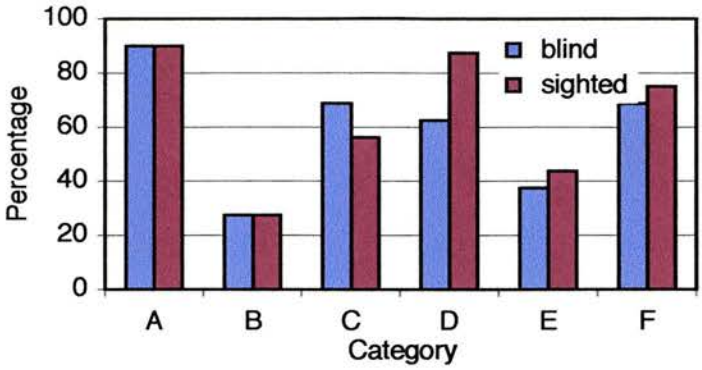
Key: A = manipulation; B = tactually different; C = tactually similar
D = olfactory element E = function not obvious; F = function obvious

Figure 4.3 Percentage incorrect descriptions given

As Figure 4.3 shows, there were a number of differences and similarities between the bind and sighted children in terms of the percentage of incorrect descriptions of the items within each category volunteered. In categories B (items which are tactually different) and D (items with olfactory element), the blind children gave considerably more incorrect descriptions of the items. There were very few incorrect descriptions in categories A (items which require manipulation), C (items which are tactually similar) and F (items in which the function may be obvious) in either group and as expected both sets of children gave a much larger percentage of incorrect descriptions in category E (items in which the function may not be obvious); however, there was no difference between the two groups in the number of incorrect descriptions given in this latter category. Overall the blind children volunteered more incorrect descriptions of the items than the sighted children but in some areas there were no clear differences between the response of the blind and sighted children.

As Figures 4.2 and 4.3 (above) show, there was very little difference between the blind and sighted children in the number of correct descriptions given but the blind children volunteered considerably more incorrect descriptions within this category. In category D, the sighted children volunteered more correct information than the blind children and less incorrect information. It may be in the areas were the sighted children gave fewer incorrect descriptions they were using visual clues as to the identity of the item and either volunteered only correct information or did not feel it necessary to volunteer any information. In category C, although there was no difference between the blind and sighted children in the number of incorrect descriptions given, the sighted children volunteered less correct descriptions in this category again, perhaps because they felt more confident in identifying items from the visual clues present and did not feel the need to volunteer any information; lacking these visual clues, the blind children may have required verbal clarification.

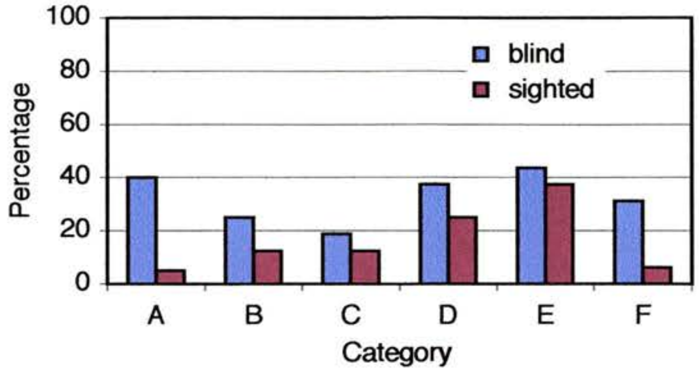
Figure 4.4 shows the percentage of times correct functional use of an object was demonstrated or described within each category of play object. There were again a number of differences and similarities between the bind and sighted children.



Key: A = manipulation; B = tactually different; C = tactually similar
D = olfactory element E = function not obvious; F = function obvious

Figure 4.4 Percentage times correct functional use of an item was demonstrated

In category D (items with an olfactory element), the sighted children identified the functional use of the items much more accurately than the blind children. 87.5%, and 62.5% of the time respectively. In category C (items which are tactually similar) the blind children identified the functional use of the items more frequently than the sighted children: 68.75% and 56.25 respectively. There was very little difference between the blind and sighted children on the remaining four categories.



Key: A = manipulation; B = tactually different; C = tactually similar
D = olfactory element E = function not obvious; F = function obvious
Figure 4.5 Percentage times 'what is it'? was asked

Figure 4.5 shows the percentage number of "what is it" questions asked by both groups of children. In each of the 6 categories the blind children asked more questions than the sighted children.

The greatest differences occurred in relation to categories A (items that require manipulation) and F (items in which the function is obvious). It was noted that for category A, although the blind children appeared to be aware, for example, that it was a box or a bag they were examining, they sought clarification as to the type of box or bag. This clarification was presumably not necessary for the sighted child who could use visual clues as to the properties of the item. However, when visual clues were of little use in identifying the function of objects, the children asked equal numbers of questions. For example, in category E (items in which the function is not obvious), both sets of children asked higher percentages of questions than in any other category, with frequency broadly similar across child groups.

Constructive play: 1[5]

The three different puzzles were presented to the children on separate visits. A 2-staged approach to data analysis taken:

> *Analysis 1.*
> Data were analysed for time on task, time off task, total time and time taken to examine at completion for each of the 3 puzzles. Comparisons were made across the two groups of Participants, blind and sighted and comparisons were made between each of the 3 puzzles
>
> *Analysis 2.*
> Data were analysed for both the frequency of and time taken to select, examine and place each section in the puzzles and again comparisons were made both within participants and across the two groups of participants, blind and sighted.

Total time to complete was calculated from the time the child was presented with each puzzle to the completion of the puzzle or until the child abandoned or refused to continue with the task. The time for selection was counted from the moment the child moved their hand towards the puzzle sections until a section was selected. The time to examine included the period after a section had been selected, when the child either tactually or visually examined the section before placing it. The time to place included the period after a section had been selected/examined and the child moved his/her hand towards the board with the intention of placing the section until the section was placed in the board. After all sections of the puzzle were successfully placed, the time each child

[5] Only two blind children completed the jigsaw puzzle and the formboard tasks. For these two tasks, the small numbers precluded statistical analysis.

took to either visually or tactually examine the completed puzzle was recorded. Time to examine after completion was not counted as a component of the total time to complete.

Analysis 1: *Time to Complete*

A count was taken of the time (in seconds) each child spent on task and off task for each of the three puzzles. On task and off task totals were then added together to give total time to complete the task for each of the three puzzles. A count was also taken of the number of sections completed in each puzzle and on completion of each puzzle. A within Participants comparison was made on the time taken to complete each of the three puzzles and a between Participants comparison then made across the two groups of children, blind and sighted. These comparisons were made to ascertain whether the characteristics of the three different puzzles affect the following variables: speed at which they are completed, length of time on task, length of time off task, length of time to explore the play materials and the length of time they take to explore the materials after completion.

As Table 4.14 shows, of the children who completed Task 1 (the puzzle), Participant Ab, the oldest blind child, took longer (304 seconds) than all of the other children to complete. It was also noted, however, that he talked to the researcher throughout the task, on topics unrelated to the task. It can reasonably be surmised from this that he demonstrated less dedication to the task than the other children, none of whom talked off

Table 4.14 Time to complete a jigsaw puzzle for blind (n =4) and sighted (n =4) children

Subject	On task	Off task	Time to complete	Completed	Time to examine after completion
Ab	304	0	304	5	16
Bb	57	21	78	0	0
Cb	22	50	72	0	0
Db	194	24	218	5	11
As	43	0	43	5	4
Bs	63	9	72	5	12
Cs	71	0	71	5	5
Ds	45	0	45	5	5

Note: The time is given in seconds

task. The two blind children who completed the puzzle took significantly longer than any of the sighted children, with the youngest blind child (Participant Db) taking significantly less time than the oldest blind child. It might have been expected that the oldest child would complete the task more rapidly than the youngest child. However, despite having spent more time off task, the youngest child still took significantly less time to complete the task. It is not clear why the youngest child performed better than the oldest child but it could be that his colour perception assisted him in this task, or that the oldest blind child progress was limited by his lack of commitment to the task. The two blind children who completed the puzzle also took longer (16 and 11 seconds) than their sighted matches (4 and 5 seconds) to examine the puzzle after completion. As this puzzle and its component parts did not have clearly defined boundaries it perhaps proved more difficult for the blind child to use tactual means to locate and place the sections in the puzzle. The two blind participants who did not complete the puzzle, Participants Bb and Cb, demonstrated very little interest in the puzzle, despite constant prompting. These children made little attempt to place the pieces in the puzzle and only appeared to be interested in examining the individual properties of the five sections. Both children spent a great deal of time off task and both refused to continue with the task, after 78 and 72 seconds respectively. They also displayed stereotypical behaviour (eye poking, hand flapping and body rocking) both on and off task (22 episodes lasting 32 seconds in total and 12 episodes lasting 50 seconds in total respectively), for example attempting to place a section in the jigsaw puzzle with one hand and eye poking with the other hand. As with Participant Ab, these two blind children also talked to the researcher throughout the task on unrelated topics. It is uncertain whether lack of ability or lack of interest in the task caused these children to behave in this way.

As Table 4.15 (see over) shows, of the children who completed Task 2, the wooden formboard, Participant Db, the youngest blind child, took longer than all of the other children (171 seconds). However, there was very little difference between the time he took to complete the task and the time taken by the oldest blind child (155 seconds). It was noted that Participant Ab expressed more interest in this task than in the jigsaw puzzle task.

Table 4.15 Time to complete a wooden formboard for blind (n =4) and sighted (n =4) children

Participant	On task	Off task	Time to complete	Completed	Time to examine after completion
Ab	155	0	155	5	18.5
Bb	53	40	93	0	0.0
Cb	99	32	131	0	0.0
Db	171	0	171	5	11.0
As	16	0	16	5	0.0
Bs	29	0	29	5	17.2
Cs	57	6	63	5	20.0
Ds	38	0	38	5	0.0

Note: The time given is in seconds

Although there were differences between the 4 sighted children in the time taken to complete this puzzle, the differences were small and with the exception of Participant As, who completed the puzzle in 16 seconds, these differences did not appear to be age related. Again, there was a considerable difference in the time to complete this puzzle between the 2 blind and 2 matched sighted children (155 and 171 seconds and 16 and 38 seconds respectively). No comparisons were possible between the other two matched pairs as again Participants Bb and Cb did not complete this puzzle. Although Participant Cb spent more time on task and did attempt to place some of the pieces into the formboard, the behaviour of these two children on this task was similar to their behaviour with the jigsaw puzzle: both displayed stereotypical behaviour, both spent a considerable time off task, and despite being discouraged, both talked at length off task.

Reports from the support teachers of these two children indicated that this behaviour was characteristic of both children; it was suggested they both were of a determined nature and if an activity did not appeal to them, they would frequently refuse to take part. Again, it remains uncertain whether lack of ability or lack of interest in this task caused these children to behave in this way.

Table 4.16 shows the time on task, time off task, total time to complete, number of sections completed and the time taken to examine the musical formboard after completion for the 8 children, 4 blind and 4 sighted. Again, age did not appear to be a predictor on time on any of the variables: the youngest blind child took less time than the other three blind children to complete the task and although the oldest sighted child completed the task faster than the other three sighted children, the differences were

Table 4.16 Time in seconds to complete and examine a musical 5-section formboard and number of sections completed (n = 8)

Participant	On task	Off task	Time to complete	Completed sections	Time to examine after completion
Ab	144	6	150	5	40
Bb	250	0	250	5	24
Cb	202	18	220	5	16
Db	82	0	82	5	35
As	35	3	38	5	34
Bs	39	4	43	5	20
Cs	67	0	67	5	34
Ds	45	0	45	5	2
Difference between blind (n= 4) and sighted (n=4). Mann Whitney U test					
U	0	6	0	8	5
Z	- 2.31	- 0.58	- 2.31	0	- 0.87
p	0.01	0.56	0.01	1	0.43

small. There was a significant difference between the blind and sighted children on time to complete ($p<0.01$) and time on task ($p<0.01$). Once again, all four sighted children completed the puzzle in a faster time than the sighted children. There were no differences between the groups in the amount of time spent off task or in time taken to examine the puzzle.

Table 4.17 (below) shows the percentage differences between the total time taken by the 2 blind children (Participants Ab and Db) and the 4 sighted children (Participants As, Bs, Cs and Ds) who completed each of the three puzzles as follows:

- jigsaw puzzle v the wooden formboard
- jigsaw puzzle v the musical formboard
- wooden formboard v the musical formboard

It can be seen that all six children completed the wooden formboard more rapidly than

Table 4.17 Percentage difference between time taken to complete each of three puzzles (n=8)

Subject	Jigsaw v Wooden formboard	Jigsaw v Musical formboard	Wooden formboard v Musical formboard
Ab	96.1	111.1	7.6
Bb	N/A	N/A	N/A
Cb	N/A	N/A	N/A
Db	13.5	136.6	108.6
As	107.0	22.9	-54.0
Bs	117.0	61.5	-25.6
Cs	24.6	6.0	-14.9
Ds	18.4	0.0	-15.6

N/A = Did not complete puzzles

the jigsaw puzzle and the musical formboard more rapidly than the jigsaw puzzle. A comparison of the matched pairs in jigsaw v wooden formboard condition shows a far greater difference between conditions for the oldest matched pair of blind and sighted children (Participants Ab and As - 96.1% and 107% respectively). In the comparison of times taken to complete the wooden formboard and the musical formboard, the two blind children both showed an improvement in their performance in the latter condition, completing the musical formboard in less time than the wooden formboard. However, all four of the sighted children took more time to complete the musical formboard than the wooden formboard. Although the blind children took less time to complete the musical formboard than the other two puzzles, as Table 4.16 (p 235) shows, they still needed significantly longer times on task and in total time to complete the task, greater than in the sighted children. These results suggest the properties of the musical formboard may have facilitated the blind children performance in this task but impeded the sighted children's performance. All four blind children also appeared to be more motivated in the musical formboard task: they showed eagerness to complete each section, perhaps anticipating the musical feedback. In contrast, the sighted children were observed to inspect the physical and musical properties of each section visually, impeding their progress towards completion of the task. The analysis, which follows, was carried out to ascertain where in the process of completing the puzzles these differences between the blind and sighted children occurred.

Analysis 2: *Strategies used to complete puzzle*

Both the frequency of and time taken to select, examine and place each section in the puzzles were analysed, firstly, to assess any similarities or differences in responses to the three puzzles and secondly, to assess any similarities or differences across the two groups of children. As two of the blind children (Participants Bb and Cb - twins) did not complete task 1 (the jigsaw puzzle) or task 2 (the wooden formboard), comparison across the two matched groups of children was only possible for task 3, the musical formboard. Mann-Whitney U tests were used in all comparisons.

A count was taken of the time (in seconds) taken to select, examine and place each section for each of the three puzzles. As the total time to complete the puzzles varied amongst the children time, taken to select, examine and place each section was calculated as a percentage of their overall time on task.

For example in the jigsaw puzzle:

Percentage time to select was calculated for Participant Ab as follows:

- Time in secs on task = 304
- Time in secs selecting = 20
- Percentage time to select = 20/304 x 100 = 6.5%

Percentage time to examine was calculated for Participant Ab as follows:

- Time in secs on task = 304
- Time in secs to examine = 123
- Percentage time to select = 123/304 x 100 = 40.5%

Percentage time to place was calculated for Participant Ab as follows:

- Time in secs on task = 304
- Time in secs to place = 161

• Percentage time to place = 161/304 x 100 = 53%

Figures 4.6, 4.7 and 4.8 (see over) show the percentage of total time on task taken by blind and sighted children to select, examine and place sections in a jigsaw puzzle, a musical formboard and a wooden formboard.

As Figure 4.6 shows, the two sighted children spent a higher percentage of their time (25.8% and 17.7%) selecting the 5 sections for the jigsaw puzzle than the blind children

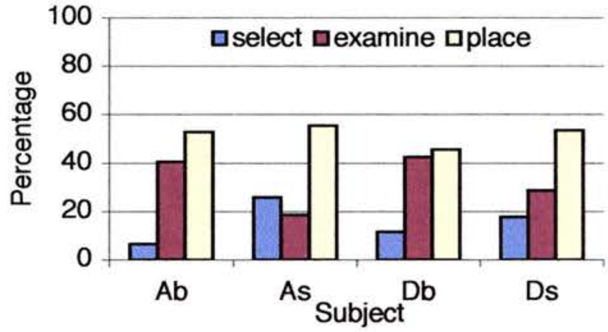


Figure 4.6 Percentage time taken to select, examine and place 5 pieces in a jigsaw puzzle

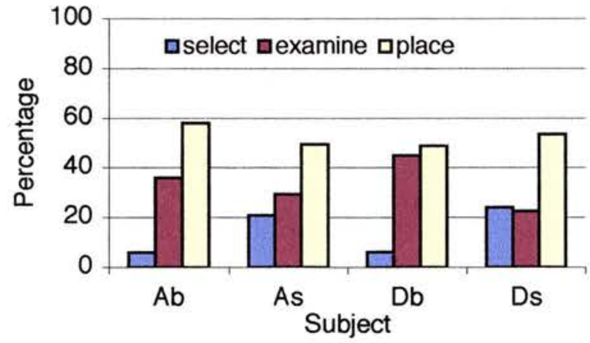


Figure 4.7 Percentage time to select, examine and place 5 pieces in a wooden formboard

did (6.6% and 11.7%), with the blind children spending a higher percentage of their time (40.5% and 42.6%) examining the puzzle than the sighted children did (18.7% and 28.8%).

Although the differences are very small as Figure 4.7 (above) shows, the two sighted children again spent a higher percentage of their time (21% and 24%) in selecting the 5 sections for the wooden formboard than the blind children (6% and 6.2%) and the blind children spent a higher percentage of their time examining the puzzle than the sighted children (36% and 45% versus 29.5% and 22.6%). The oldest sighted child (Participant As) used a lower percentage of his time placing the sections in the wooden formboard than the youngest sighted child (Participant Ds) but this pattern was reversed for the two blind children, with the oldest child taking longer to place each section.

Figure 4.8 shows the time taken to select, examine and place each section of the musical formboard as a percentage of total time on task for the 4 matched pairs of blind

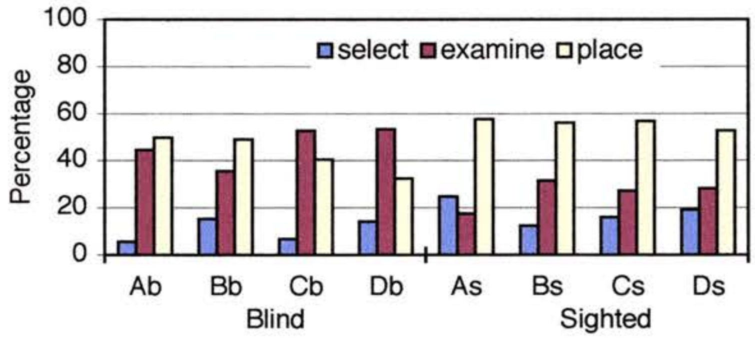


Figure 4.8 Percentage time taken to select, examine and place 5 pieces in a musical formboard

and sighted children. Mann- Whitney U tests (one tailed) carried out shows a significant difference between blind and sighted children in the percentage time taken to place the pieces in the musical puzzle ($U = 0$; $Z = -2.31$; $p < 0.1$). Although there were no significant differences between the blind and sighted children on time to select pieces for the puzzle ($U = 2$; $Z = -1.73$; $p < 0.8$,), three of the four sighted children used a higher percentage of their time to select the pieces than the blind children and all of the sighted children used a higher percentage of their time to place the pieces. There was also a significant difference between the blind and sighted children in their percentage examination time ($U = 0$; $Z = -2.31$; $p < 0.1$), with all four of the blind children using a higher percentage of their time to examine the puzzle than the sighted children.

Table 4.18 gives the raw scores for the 2 matched pairs of blind and sighted children on time taken to select, examine and place pieces in the jigsaw puzzle and in the wooden formboard and Table 4.19 (see over) gives the raw scores for all 4 matched pairs of children on time taken to select, examine and place pieces in the musical formboard.

Table 4.18 Raw scores for time to select, examine and place (time in seconds)

Jigsaw				Wooden formboard			
Participant	Select	Examine	Place	Participant	Select	Examine	Place
Ab	7	123	161	Ab	9.3	55.8	89.9
Db	24	82	88	Db	10.6	76.9	83.5
As	11	8	24	As	3.4	4.6	8.0
Ds	8	13	24	Ds	9.0	8.6	20.4

In the jigsaw puzzle task (Table 4.18), the two blind children, Participants Ab and Db, took 15.3 and 6.3 times respectively longer than their sighted matches to examine the puzzle; they also took 6.7 and 3.7 times longer to place each piece. However there was less of a difference in the time taken to select each piece, Participant Db took 3 times longer than Participant Ds and the situation was reversed for the other two Participants with the sighted child (Participant As) taking longer (11 seconds to select each piece) than the blind child (Participant Ab) who took only 7 seconds to select each piece. For the wooden formboard task, with the two blind children taking 12.2 and 8.9 times longer than their sighted matched participants to examine the puzzle, and 11.23 and 4.1 times longer to place each piece. Again there was much less difference in the time taken to select pieces: 2.7 and 1.2 times longer.

In the musical formboard task (Table 4.19), although the blind children still took longer than the sighted children to complete this puzzle on most of the measures: differences between the two blind children who completed all three puzzles (Participants Ab and Db) and their matched sighted participants was noticeably less on most measures, the blind children respectively taking 10.4 and 3.5 times longer than their sighted matches to examine the puzzle, 3.5 and 1.1 times longer to place each piece, and Participant Db took 1.36 times longer to select a piece than Participant Ds. Again, as with the jigsaw

Table 4.19 Raw scores for time to select, examine and place (time in seconds)

Musical formboard							
Subject	Select	Examine	Place	Subject	Select	Examine	Place
Ab	8.20	64.20	71.5	Bb	38.4	88.8	122.3
Db	11.60	43.60	26.4	Cb	13.5	106.5	82.0
As	8.70	6.20	20.3	Bs	6.1	10.4	21.7
Ds	8.52	12.52	23.5	Cs	8.1	20.8	38.1

puzzle the situation was reversed for Participants As and Ab, with the sighted child (Participant As) taking longer than the blind child (Participant Ab) to select each piece.

Differences were more marked for the two blind children who had not completed the jigsaw puzzle or the wooden formboard (Participants Bb and Cb). These two blind children respectively took 8.5 and 5.1 times longer than their sighted matched Participants to examine the puzzle and 5.6 and 2.2 times longer to place each piece. Again there was very little difference in the time taken to select the pieces by Participants Cb and Cs (Cb took1.6 times longer; Participant Bb took 6.3 times longer than her sighted match, however.

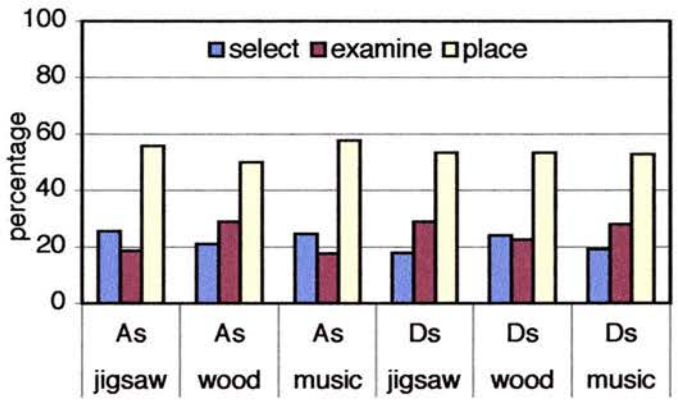


Figure 4.9 Percentage time taken to select, examine and place pieces in each of three puzzles for 2 sighted children

A within participants comparison of the percentages of time taken to select, examine and place the pieces in all three puzzles shows very few differences for the two sighted children (Figure 4.9). These two sighted children appeared to be equally motivated in all three tasks, perhaps their motivation being inspired by the desire to see the completed puzzle.

Figure 4.10 shows the percentage time to select, examine and place pieces in all three puzzles for the two blind children who completed all three puzzles. As with their

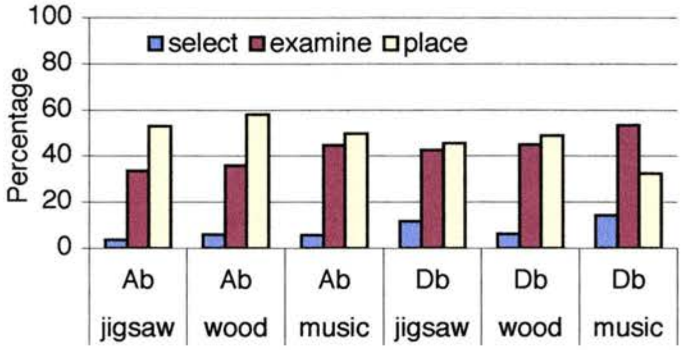


Figure 4.10 Percentage time to select, examine and place pieces in each of three puzzles for 2 blind children

sighted matches, there was very little difference between the jigsaw and the wooden formboard in percentage times to examine, select and place pieces. However, in comparing the differences in percentage times between the musical formboard and the jigsaw puzzle conditions there were a number of differences in the time taken to select, examine and place each section. In the musical formboard task Participants Ab and Db took longer to examine the pieces (2.3% and 10.1% longer respectively), took less time to place the sections (5.6% and 13 % less respectively), and took more time to select the sections (3.3% and 2.9% longer respectively) than in the jigsaw puzzle task. Again there were a number of differences in the time taken to select, examine and place the sections in the musical formboard versus the wooden formboard conditions. In the musical formboard condition Participants Ab and Db took longer to examine the pieces (8.6% and 8.4 % longer respectively), took less time to place the sections (8.3% and 16.4 % less respectively), and Participant Db took 8% more time and Participant Ab took 0.3% less time to select the sections than in the wooden formboard task. Perhaps spending more time examining the board and the pieces of the puzzle allowed these blind children to place the pieces more effectively. As was noted earlier, these same children did not appear to be motivated to work on the conventional formboards, but did appear to be motivated by the musical formboard.

Constructive Play: 2[6]

A count was taken of: time on task; time off task; total time to position each peg/shape (total time = time to select + time to examine + time to place). Nb in these two tasks, the small numbers precluded statistical analysis were carried out.

Frame-by-frame analysis was carried out. The time for selection was counted from the frame in which the child moved their hand towards the peg/shape until the peg/shape was selected (the frame in which the child has the shape in his/her hand). Time to explore peg/shape/board was counted from the frame in which the child began to either visually or tactually examine the peg/shape/board until the frame where the child showed intention to move their hand to either select or place the peg/shape. Total time to complete the task was calculated from the time the child was presented with the

[6]Note: Small numbers precluded statistical analysis.

materials to the completion of the task or until the child abandoned or refused to continue with the task. Time off task was calculated as the time taken for all other behaviours not related to the task.

A count was also taken of the number of stages taken to position each peg/shape (select + examine + place). For example, for Participant Ab, the following shows each stage taken to position peg 1:

- stage 1 = select,
- stage 2 = examine peg,
- stage 3 = discard selection,
- stage 4 = select peg,
- stage 5 = place peg

Total = 5 stages

As Table 4.20 shows, both of these children placed all 14 pegs in the pegboard and used the hammer and nails to attach all 8 shapes to the wooden board in the hammer and nails condition. Both the blind and the sighted child spent considerably more time off task in

Table 4.20 Time to complete each of two constructive toys for 1 blind and 1 sighted child

Subject	On task	Off task	Total time to complete	Number Completed (m)	Time to examine
			Hammer and Nails		
Ab	471	132	603	8 (58.8)	35
As	323	100	423	8 (40.4)	34
			Peg board		
Ab	290	47	337	14 (20.7)	69
As	232	25	257	14 (16.6)	68

Note: The time given is in seconds (m) = mean time to complete each.

the hammer and nails condition. Although the blind child took longer off task than the sighted child in both of these constructive tasks, when taken as a percentage of total time spent in this activity, the sighted child took slightly longer off task in the hammer and nails than the blind child (23.6% versus 21.9% respectively) and the blind child somewhat longer off task than the sighted child in the pegboard condition (13.9% and 9.72% respectively). Overall, although both children appeared to show less enthusiasm for the hammer and nails task, there was very little difference between these two children in their apparent commitment to the tasks. However, the blind child took 180 seconds (29.9%) longer than the sighted child to complete the hammer and nails task and 80 seconds (23.7%) longer to complete the pegboard task. There was very little time difference between these two children on the time taken to examine their construction after completion.

Although overall the sighted child did not take as long as the blind child to complete each task, as Table 4.21 shows, the sighted child did take longer to select but less time to examine and to place the 8 shapes in the hammer and nails condition; in the pegboard

Table 4.21 Overall time to select examine and place pieces in a board for two constructive toys. n=2

Subject	Select	Examine	Place	Stages
HAMMER AND NAILS				
Ab	40	196	235	54
As	97	28	198	22
PEG BOARD				
Ab	65	108	119	43
As	60	18	154	30

Note: The time is in seconds. Stages = number of stages to complete task condition he took less time than the blind child to select and examine but more time to place the 14 pegs. It took the blind child a total of 54 stages to select, examine and place the 8 shapes in the hammer and nails condition and 43 stages to select, examine and place the 14 shapes in the pegboard condition; in contrast, it took the sighted child only 22 and 30 stages respectively. Most of the stages for the blind child involved exploration of the board and the pegs/shapes. For the sighted child each step in positioning the pegs/shapes amounted to two to three clearly defined stages, for example: stage1 = select, stage 2 = place, or, stage 1 = visually examine, stage 2 = select, and stage 3 = place. For the blind child, the number of steps taken to position each peg/shape was greatly extended, with the stages to position each in there final location less well defined and ranging in number between 2 and 7. If the time taken up in tactually examining the shapes and board were removed from the on task time, there would be considerably less difference between the blind and sighted child in time taken to complete each task, as the following examples illustrate:

Example 1. Hammer and nails

- Blind child 471(on task time) – 196 (examine time) = 275
- Sighted child 323 (on task time) – 28 (examine time) = 295

Example 2. Pegboard

- Blind child 337 (on task time) – 108 (examine time) = 229
- Sighted child 257 (on task time) – 18 (examine time) = 239

However, as Table 4.21 shows (see above), the sighted child took 57 seconds longer than the blind child to select the shapes in the hammer and nails condition, apparently visually exploring the shapes in parallel with selecting one.

Further analysis of the time taken to select each of the 8 pieces in the hammer and nails condition and the 14 pieces in the pegs condition showed that most of this variation in

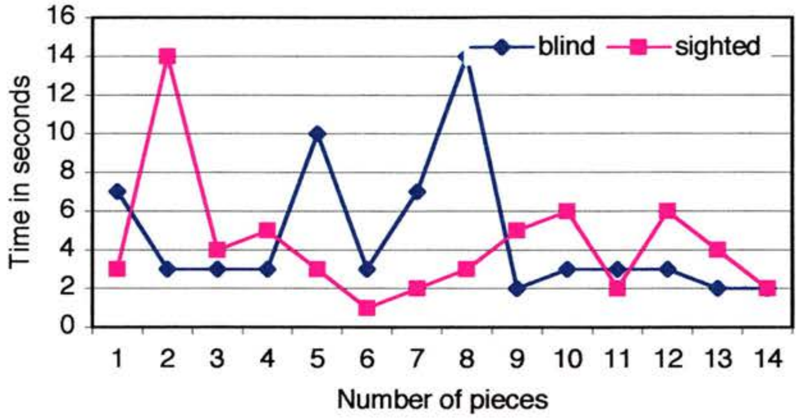


Figure 4.11 Time to select in a pegs task (n=2)

selection time for the sighted child occurred in the selection of shape 2 and shape 4 for the hammer and nails condition and shape 2 for the pegs condition; most of the variation in the pegs condition occurred in the selection of pegs 5 and 8 for the blind child (see Figures 4.11 and 4.12).

It seemed from the videotapes that the sighted child was visually examining in parallel

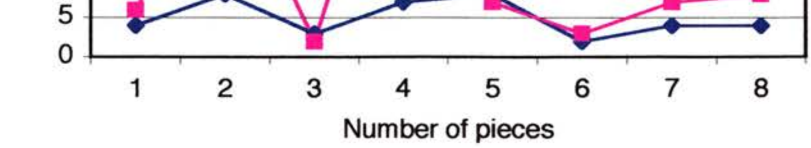


Figure 4.12 Time to select in a hammer and nails task (n=2)

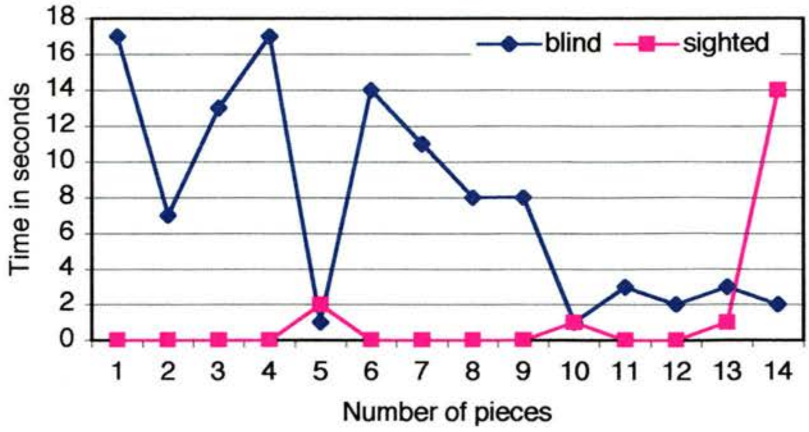


Figure 4.13 Time to examine in a pegs task (n=2)

with selecting these shapes whereas the blind child was tactually examining the surrounding area with one hand while selecting pegs 5 and 8 with the other hand, but for all other shapes placed there was very little difference between the blind and sighted child on time taken to select in either the hammer and nails condition or the pegs condition.

Further analysis of the time taken to examine each of the 8 pieces for the hammer and nails condition and the 14 pieces for the pegs condition showed that the blind child took considerably longer than the sighted child to examine the board and most of the pieces (see Figures 4.13 (above) and 4.14 (see over)). Although there was very little variation in the sighted child's performance in both conditions, he did visually and tactually examine the board and the first two shapes in the hammer and nails task, and the board and the final piece in the pegboard task. The blind child also spent more time tactually examining these first two to three shapes in hammer and nails task, however, his performance was variable over the pegs task.

Figure 4.14 Time to examine in a hammer and nails task (n=2)

Analysis of the time taken to place each of the 8 pieces for the hammer and nails task and the 14 pieces for the pegs task showed very little difference between the blind and sighted child in time taken to place 13 of the 14 pegs in the pegboard (see Figures 4.15

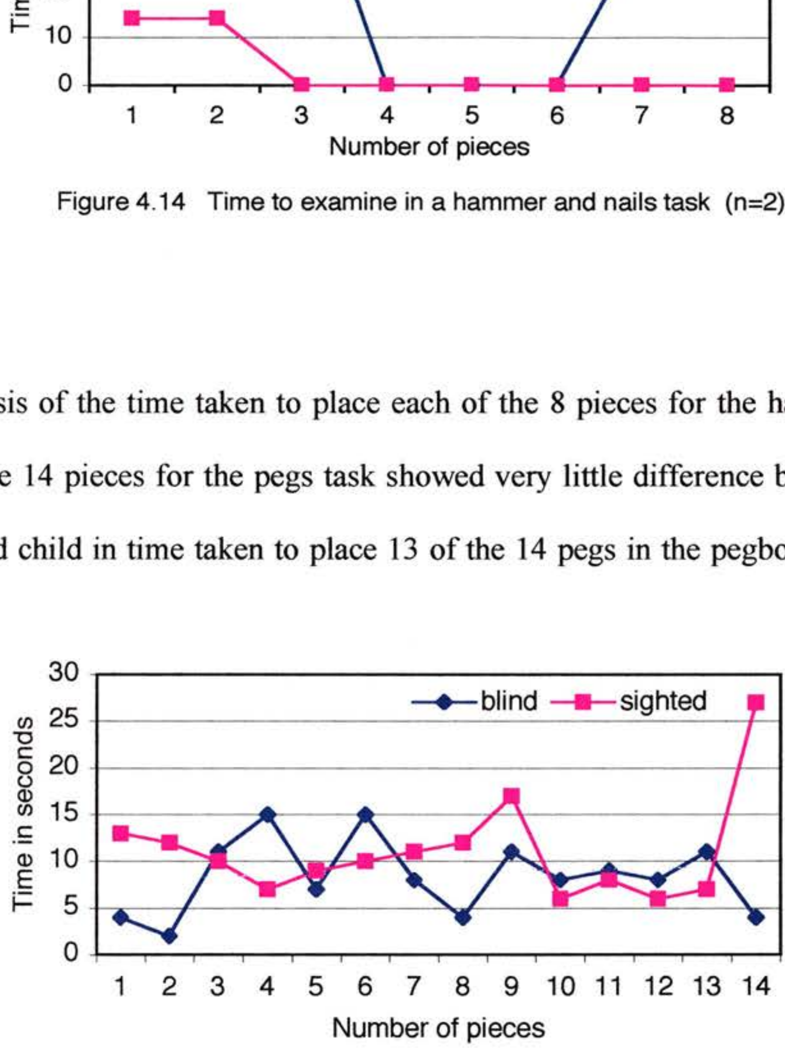


Figure 4.15 Time to place in a pegs task (n=2)

and 4.16); however, the sighted child did take considerably longer placing and readjusting the final peg. Again, there was very little difference between these two children in time to place most of the pieces in the hammer and nails task. Both children took longer to place the first piece, presumably learning the intricacies of using a hammer and nails, and the blind child took longer than the sighted child to place the final two pieces.

Although the blind child did take longer to complete the two tasks and the two children

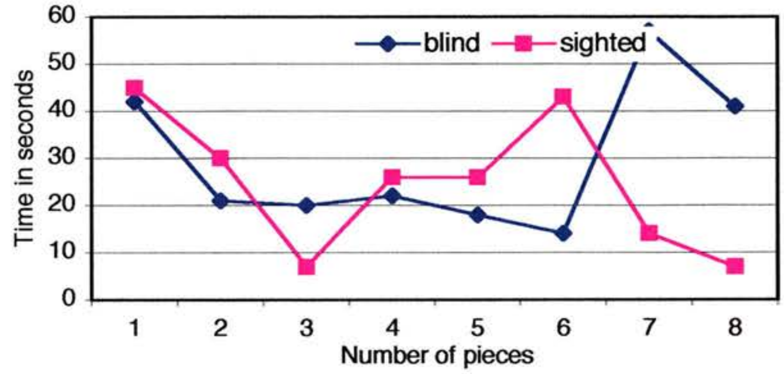


Figure 4.16 Time to place in a hammer and nails task (n=2)

used different methods in their process of completing the tasks, it was obvious that they were equally motivated and equally capable. The findings suggest that the sighted child used a multisensory approach, examining visually in parallel with either selection or placing. For the blind child it was necessary to examine the shapes/pegs separately and tactually, thereby preventing any parallel functioning with either selection or placing. Lacking the ability to take a multisensory approach to these tasks, it is perhaps not surprising the blind child took much longer than the sighted child to complete both tasks.

Creative play

A count was taken of the number of art materials used by each child; the time each child took to examine each of the art materials; the length of time on task (actively involved with the task); and the length of time off task (e.g. child inactive or engaged in unrelated talk). Total time was calculated as time on task + time off task. Time on task, time off task, and time taken to examine the art materials were then calculated for each individual child as a percentage of their total time. For example:

a) Percentage time on/off task was calculated for Participant Ab as follows:

- Total time to complete task = 512 seconds
- Time on task = 407 seconds
- Percentage time on task = 407/512 x 100 = 79.4%
- Therefore percentage time off task = 20.6%

b) Percentage time to examine art materials for Participant Ab was calculated as below:

- Total time to complete task = 512 seconds
- Time taken to examine art materials = 333 seconds
- Percentage time to examine art materials = 333/512 x 100 = 65%

Frame-by-frame analysis was carried out. The time for selection was counted from the frame in which the child moved their hand towards the art materials until the selection was made (the frame in which the child has the art material in his/her hand). Time to examine was counted from the frame in which the child began to either visually or tactually examine the selected art material to the frame where the child showed intention to place the art material on the paper. Total time to complete the task was calculated from the time the child was presented with the materials until the child decided he/she had completed his/her artwork. Time off task was calculated as the time taken for all other behaviours not related to the task.

A 3-staged approach to data analysis was taken:

Analysis 1.
Data were analysed within Participants to allow comparison of performance under the two conditions of creative play: 1) standard (the flat tabletop) and 2) 'blind-friendly' (the framed sketch box easel with a drawer in the front)

Analysis 2.
Comparisons were made across the two groups of Participants, blind and sighted, under the two conditions of play.

Analysis 3.
An analysis of the number and type of materials used by each child under the 2 conditions of play was carried out and comparisons made firstly, between conditions and secondly, across the two groups of children.

Analysis 1: *Time to complete*

Table 4.22 Differences between play behaviours in standard and 'blind-friendly' conditions: Blind children (N=4) (time in seconds)

	% On task	% Off task	Total time	Materials utilised	Time to examine
			Standard		
M	80.5	19.25	577.5	6.75	48.75
SD	(2.38)	(2.22)	(194.47)	(2.99)	(15.17)
			'Blind-friendly'		
M	87.25	12.75	629.25	11.5	38.75
SD	6.55	6.55	80.72	.58	11.32

Key: M = mean % time and mean number of materials. SD = standard deviation.

Table 4.22 shows the mean results for the blind children and Table 4.23 (see over) shows the results for the sighted children under both conditions of testing, standard and 'blind-friendly'. As the means in Table 4.22 shows there were a number of differences in the performance of the blind children under the two contrasting conditions. When using the 'blind friendly' condition for their artwork they spent a higher percentage of their time on task and a lower percentage of their time off task than when playing creatively under standard conditions. They also used more art materials and took less time to examine the materials. In contrast, as the results in Table 4.23 (see over) show, when using the 'blind friendly' condition for their artwork the sighted children spent a lower percentage of their time on task and a higher percentage of their time off task when playing creatively under standard conditions. Again in contrast the sighted children used fewer art materials, however, as with the blind children, these sighted children also took less time to examine the materials in the 'blind friendly condition.

Table 4.23 Differences between play behaviours in Standard and 'Blind-friendly' conditions: Sighted children (N=4)

	% On task	% Off task	Total time	Materials utilised	Time to examine
			Standard		
M	87.75	12.25	551.25	16.75	28.5
SD	(2.36)	(2.63)	(275.70)	(7.68)	(5.07)
			'Blind-friendly'		
M	79.0	21.0	508.5	12.00	23.0
SD	(7.79)	(7.79)	(158.49)	(5.35)	(9.27)

Key: M = mean % length of time and mean number of materials. SD = standard deviation

Analysis 2. *Comparisons between blind and sighted children*

The Mann-Whitney U test was again used to evaluate differences between performances under the two conditions between groups, firstly for the standard condition (Table 4.24)

Table 4.24 Differences between blind (n =4) and sighted (n =4) children in the Standard condition (Mann-Whitney U test).

	On task	Off task	Total time	Materials	Time to explore
U	0.00	0.00	7.00	1.00	1.00
Z	-2.31	-2.31	-0.29	-2.02	-2.02
p	0.01	0.01	0.40	0.04	0.04

and then for the 'blind-friendly' condition (see Table 4.25)

There proved to be significant differences between the groups when art work was carried out in the standard condition, with the blind children spending a significantly lower percentage of their time on task ($p<0.01$), a significantly higher percentage of their time off task ($p<0.01$), and a significantly higher percentage of their time exploring the

Table 4.25 Differences between blind (n =4) and sighted (n =4) children in the 'Blind friendly' condition (Mann-Whitney U test).

	On task	Off task	Total time	Materials	Time to explore
U	3.50	3.50	4.00	8	1.00
Z	-1.31	-1.31	-1.51	0	-2.02
p	0.10	0.10	0.13	1	0.04

materials ($p<0.05$). There were also significantly fewer materials used by the blind children than the sighted children in this condition ($p<0.03$) but no significant difference between the blind and sighted children in the total time taken to complete the task.

These differences suggest that when artwork was carried out using a flat table-top, the blind children were less committed to the task than the sighted children. These results are perhaps not surprising given that it has already been noted (in the researchers diary) that the blind children who participated in Study 2 were reluctant to undertake this form of artwork, appeared to experience difficulty in locating materials, and showed obvious signs of frustration. After a very short period of time two of the children, decided they had completed their artwork, with some of the others repeatedly reverting to stereotypical behaviour in mid-play.

There were no significant differences between the blind and sighted children when artwork was carried out in the 'blind-friendly' condition, either in the percentages of time off task and on task or in the total time taken to complete the task (see Table 4.25 above). Although the sighted children used significantly more materials than the blind children in the standard condition (67 versus 27), there were no significant differences in the number of materials used in the 'blind friendly' condition (48 versus 46). However, there was a difference in the time taken to explore the materials, with the blind children taking significantly longer than the sighted children ($p<0.05$).

These findings suggest that in 'blind friendly' condition the blind and sighted children were equally committed to the task, but it is inevitable perhaps, given the lack of vision, that the blind children would take longer to explore the materials. The differences between performance under the two conditions therefore appear to be in task engagement, with the blind children being less committed to the task than the sighted children when it is presented in the flat tabletop (standard) condition.

Table 4.26 gives the total number of times each type of material was used by both blind and sighted children under the two conditions of testing. As Table 4.26 shows, the

Table 4.26 Total materials used by the blind and sighted children

Visual	Blind	Sighted	Olfactory	Blind	Sighted
Coloured paper	6	37	Coffee beans	13	6
Coloured pens	0	16	Scented pens	4	13
Total	6	53	Total	17	19
Tactual /Visual	Blind	Sighted	Tactual	Blind	Sighted
Straws	9	10	Wool	13	8
Buttons	5	0	Felt	4	4
Leaves	5	4	Sandpaper	5	1
Feathers	3	2	Pasta	2	5
Lollipop stick	4	6			
Total	26	22	Total	24	18

sighted children used considerably more visual (53 versus 6) and a small number more olfactory (19 versus 17 materials than the blind children and the blind children used more tactual (24 versus 18) and tactual/visual (26 and 22) materials than the sighted children. Overall, however, the sighted children used more materials than the blind children (112 versus 73). However, these differences in the total number of materials used were mainly attributable to differences in the flat tabletop condition. Here, the sighted children used 64 materials and the blind children only 27, whereas in the easel condition the sighted and blind children used 48 and 46 respectively.

Analysis 3 *Type of materials used*

A count was taken of the number and type of materials used by each child in the flat tabletop (standard) and sketch box easel ('blind friendly') conditions. A Mann-Whitney U test was used to compare blind and sighted children on 'blind friendly' and. standard presentations for each of the four categories of art materials.

Raw scores for the number of materials used by each child in both conditions are given in Appendix D.

Table 4.27. Materials used to produce a picture in standard and 'blind-friendly' conditions by blind (n=4) and sighted (n=4) children (Mann-Whitney U test)

	Visual	Olfactory	Tactual /Visual	Tactual
		Standard		
U	0.00	1.00	7.50	5.50
Z	-2.31	-2.02	-0.15	-0.74
p	0.01	0.04	0.50	0.30
		'Blind-friendly'		
U	0.00	5.00	1.00	6.00
Z	-2.31	-0.88	-2.02	-0.60
p	0.01	0.20	0.04	0.30

Comparisons between the two groups of children in each of the two conditions revealed significant differences in the standard condition for visual ($p<0.01$) and olfactory ($p<0.05$) materials, with the sighted children using significantly more of these materials than the blind children (see Table 4.27 above). There were no significant differences between the two groups of children in the number of tactual and tactual /visual materials used.

In the 'blind friendly' condition, the sighted children used significantly more visual materials than the blind children ($p<0.01$) and the blind children used significantly more tactual/visual materials than the sighted children ($p<0.05$). Although the blind children used more tactual and olfactory materials than the sighted children (11 versus 8 and 16 versus 11 respectively), these differences were not significant.

It would seem then that there are a number of differences between the blind and sighted children in choice of materials when carrying out artwork. Materials with predominantly visual properties perhaps offer very few affordances for the blind child whereas olfactory, tactual and tactual/visual materials provide information through other senses, enabling connections to be made between materials and adding meaning to the artwork.

The sighted children used mainly glue as their adhesive of choice in the standard, flat tabletop condition; blind children used both glue and blutac. Both sets of children used blutac as their main form of adhesive in the 'blind friendly", sketch box easel condition. These differences in choice of adhesives used perhaps reflect differences in the intricacies of the two situations for the two groups of children: the blind children found it difficult to control the glue pot in either context and attempts by both sets of children to glue the materials on to a vertical surface proved unsuccessful.

Children's descriptions of their completed art

The following are the descriptions of their completed art given to the researcher by each of the eight children:

Participant	Condition	Description
Ab	Easel	"I've made a bonfire can you smell it" "Its in the garden and that's the fence going round it" "That's the flowers and its got grass and a bird and up there that's the sky with stars" "That's a kite its going to blow away" "That's a coffee string"
	Flat	"I've put the paper on the straw" "Look it's staying up. Look it's staying up" "It will blow in the wind"
Bb	Easel	"It's a picture of a cup of coffee, my granny drinks coffee"
	Flat	"I don't know"
Cb	Easel	"That's a coat and that's a tree and talcum powder on the paper, can you smell it?"
	Flat	"Its crumply paper and a straw to drink with"
Db	Easel	"I made a tree for Kieran" "Look its finished now it has leaves and a trunk" "That's a tree and that's the leaves" "That's a branch and that's an apple"
	Flat	"Its blutac, lots and lots of blutac"
As	Easel	" It's a picture of a wee bird"
	Flat	"That's the Sheep, that's the fence, that's the hut, that's the flowers and that's the grass".
Bs	Easel	"That blue bit's the sky and that silver shapes the moon and all this at the bottom that's the field"
	Flat	"The cotton wool is snow" "The paper ribbons are spaquetti" "The spaquetti is round the diamonds" "it smells like orange"
Cs	Easel	"That's a wee cloud" "this smells of cherry orange, its cherry orange" " That's just a fancy bit It goes all round the picture, see" "That's a star"
	Flat	"That's an ice lolly and that's a car"
Ds	Easel	"A soldier it's a soldier"
	Flat	"I don't know"

As can be seen from the above descriptions, the blind children described their artwork in greater detail in the 'blind-friendly' condition than in the standard condition. This may be because they used significantly more materials in the blind friendly condition and therefore had more ideas as to the content and structure of their completed work. The descriptions given by the sighted children were typically equally detailed in both the standard and 'blind-friendly' conditions.

Researcher observations of the creative play of the blind children

Participant Ab (boy, aged 6yrs 8 months):

In the standard condition, Ab used 10 materials, which he constructed into a 3D shape using only a small section of the card available to him. Although he did not give a description of what his picture was supposed to be, he did describe its function. Stereotypical behaviour (body rocking) was observed on 3 occasions, totalling 100 secs, 11.5% of the total time taken for him to complete his picture. In the 'blind-friendly' condition he selected 11 materials, using 1 hand to check the boundaries of the frame before placing each material, thus allowing himself to use most of the card available to him. There was no evidence of stereotypical behaviour in the 'blind-friendly' condition.

Participant Bb (girl, aged 4 yrs 6 months):

In the standard condition, Participant Bb used 6 art materials and glue to fix the materials to the card, with all 6 pieces stuck on the bottom left corner of the card. She frequently lapsed into stereotypical behaviour, with 11 separate episodes of eye poking and/or hand flapping. The time spent in stereotypical behaviour for this child totalled 233 seconds, 45.5% of the total time she took to complete the picture. She could not give a description of her artwork under this condition. However, she gave a clear explanation of her artwork in the 'blind-friendly' condition and used 12 materials, twice as many as the standard condition. As with Participant Ab, she used her left hand to check the boundaries of the frame before placing the material on the card, and again most of the card available to her was utilized. Although four episodes of stereotypical behaviour were observed, these lasted only lasted 26 seconds in total, 6.9% of the time she took to complete her picture.

Participant Cb (girl, aged 4 yrs 6mths):

Participant Cb made use of 3 materials in the standard condition. These were again used to construct a 3D shape, with one placed on top of the other and again only a small section of the card utilized. Glue was used as her main fixative. When asked "tell me about your picture", she gave an explanation only of the materials she had used. She was observed in stereotypical behaviour for a total of 53 seconds (5 episodes), with this taking the form of body rocking and eye poking. Stereotypical behaviour constituted 11.7% of the time this participant took to complete the picture. In the 'blind-friendly' condition, by contrast, she used 12 art materials, four times as many as the standard condition, and gave a clear explanation of the topic of her picture. Again behavioural similarities can be drawn with the other blind children under this condition: the boundaries of the frame were first checked before placing the material on the card and most of the card available to this participant was used. Stereotypical behaviour was observed for a total of 27 seconds (5 episodes), again taking the form of body rocking and eye poking but constituting only 3.95% of the time taken to complete the picture.

Participant Db (boy, aged 3 yrs 9 mths):

Participant Db was the youngest blind child in the study. Although he used 8 art materials in the standard condition, his description of his completed picture alluded only to the blutac (not always used as a fixative, sometimes used as material for the picture). He was also observed to use the same method as some of the other blind children of layering the materials one on top of the other and using only one small section of the card available to him. No stereotypical behaviours were observed in this blind child in either the standard or the 'blind-friendly' condition or indeed at any time throughout the study. In the 'blind-friendly' condition he used 11 art materials, slightly more than in the standard condition, and gave a clear explanation of the topic of his picture.

In sum: When asked to produce a picture in the 'blind friendly' condition, the blind children in this study used more materials, utilized more of the card, did not attempt to layer the materials, gave a clearer explanation of the contents of their picture, and spent less of their time in stereotypical behaviour than in the standard condition. A variety of factors may have contributed to these findings. The properties of the 'blind-friendly' easel, for example, may well have been central for a number of reasons:

1. the easel was framed, possibly making it easier for the blind child to locate the boundaries of the card to position the materials better.

2. the materials were located to the front of the child and in separate compartments, possibly making it easier for the blind child to locate them.
3. the vertical positioning of the card, with the materials located at front and below the card, perhaps made it easier for the blind child to position his/her selected materials.

If, as suggested, these properties of the easel allowed the blind child to select and place a greater number of materials more easily and more effectively on their picture, they were perhaps then able to concentrate more on the topic of their artwork, and ultimately have a more realistic topic for their completed artwork, without the frustrations associated with locating and placing materials in the standard condition, the flat tabletop.

Functional play

A count was taken of the number of times each child used the toy functionally correctly (using the toy for its intended purpose i.e. pressing a button which opens the pop-up section); the time taken to examine the toy; time on task (actively involved on task); and time off task (e.g. inactive or unrelated talk). The total time taken was calculated as time on task + time off task; total time for some of the children was as little as 29 seconds while others took longer. Time on task, off task, and time taken to examine the toy were therefore each calculated as a percentage of total time taken by each child. For example:

a) Time on/off task and percentage time on/off task was calculated for Participant Ab as follows:

- Total time to complete task = 111 seconds
- Time on task = 101 seconds
- Percentage time on task = (101/111) x 100 = 91%
- Time off task =100% - 91% = 9%

The percentage of the total time on task Participant Ab took to examine the toy was calculated thus:

- Time on task = 101 seconds
- Time taken to examine toy = 75 seconds
- Percentage time to examine toy = (75/101) x 100 =74.3%

Frame-by-frame analysis was carried out. The time taken to use the toy functionally correctly was counted from the frame in which the child moved his/her hand towards the button on the pop-up toy. Time to explore peg/shape/board was counted from the frame in which the child began to either visually or tactually examine the toy until the frame where the child began to move his/her hand towards either the button to open the pop-up section or towards the open pop-up section to close it. Total time to complete the task was calculated from the time the child was presented the toy until the child abandoned or refused to continue with the task. Time off task was calculated as the time taken for all other behaviours not related to the task.

Again a 3-staged approach to data analysis was taken:

Analysis 1.
Data were analysed within participants to allow comparison of performance under the two conditions of functional play: 1) standard (non-musical pop-up toy) and 2) 'blind-friendly' (musical pop-up toy).

Analysis 2.
Comparisons were made across the two groups of participants, blind and sighted, under the two conditions of play.

Analysis 3.
An analysis of number of task-related questions each child asked and the number of task-related statements each child made was carried out and comparisons made firstly, between conditions and secondly, across the two groups of children.

Analysis 1 Time *to complete*

As Table 4.28 shows, Participant Cb spent 215 seconds on task in the non-musical

Table 4.28 Scores on non-musical popup toy (n= 8)

Subject	On task (%)	Off task (%)	Total time	Number of Functions (m)	Total time to Function (%)	Total time to examine (%)
Ab	101 (91%)	10 (09%)	111	18 (1.4)	25 (26%)	75 (74%)
Bb	55 (56%)	44 (44%)	99	10 (2.8)	28 (51%)	27 (49%)
Cb	215 (86%)	35 (14%)	250	112 (0.9)	101 (47%)	114 (53%)
Db	127 (98%)	3 (02%)	130	24 (2.2)	52 (41%)	75 (59%)
As	24 (83%)	5 (17%)	29	10 (1.9)	19 (79%)	5 (21%)
Bs	115 (81%)	27 (19%)	142	40 (1.8)	74 (64%)	41 (36%)
Cs	79 (72%)	22 (28%)	101	42 (1.5)	64 (81%)	15 (19%)
Ds	76 (76%)	24 (24%)	100	26 (2.1)	56 (74%)	20 (26%)

Key : (m) mean time for each function in seconds condition and used the toy functionally 112 times. However, it was noted that this child opened and closed the same section of the toy repetitively, exacting pleasure from the 'click sound' made by this opening and closing action. Participants As and Bb spent the least amount of time on task (24 and 55 seconds respectively) and both of these children used the toy functionally only 10 times. Bb spent most time off task (44 seconds) but both children showed very little interest in the toy or its function. There was a great deal of variation amongst the other five children on times spent on and off task and in number of times the toy was used functionally, but neither age nor visual status appeared to be a predictor of these differences. However, the 4 blind children took considerably longer than the 4 sighted children to examine the toy, but once again age was not a predictor of time taken.

Table 4.29 Differences between behaviour of blind (n =4) and sighted children (n =4) with a non-musical Pop-up toy (Mann-Whitney U test 1 tailed)

	%On task	%Off task	Total time	Function	%Time to examine
U	4.00	4.00	5.00	8.50	0
Z	-1.15	-1.15	-.87	0	-2.31
p	0.13	0.13	0.40	1	0.01

A between groups analysis (see Table 4.29, above) revealed no significant differences between the blind and sighted children on length of time on task, off task, total time or number of times the toy was used functionally. The blind children, however, took significantly longer than the sighted children to examine the toy ($p<0.01$).

In contrast, as Table 4.30 (see over) shows, there was a great deal of non-age related variation in performance amongst the eight children when presented with the musical pop-up toy time on time on task, time off task, total time, the number of functions, time to function and time to examine in the musical toy condition. There were also a number of group differences. As Table 4.31 shows, as expected, there were significant differences in percentage time spent on task ($p<0.05$) and off task ($p<0.05$), with the blind children spending more time on task and less time off task. As with the non-musical toy the blind children spent significantly more time examining the toy.

Table 4.30 Scores on musical popup toy (n= 8)

Subject	On task (%)	Off task (%)	Total time	Number of Functions (m)	Total time to Function (%)	Total time to examine (%)
Ab	58 (100%)	0 (0%)	58	12 (1.1)	13 (22%)	45 (78%)
Bb	312 (80%)	75 (20%)	389	61 (1.2)	75 (24%)	237 (76%)
Cb	355 (100%)	0 (0%)	355	50 (1.8)	92 (26%)	263 (74%)
Db	55 (100%)	0 (0%)	55	12 (1.2)	14 (25%)	41 (75%)
As	16 (55%)	13 (45%)	29	10 (0.9)	9 (56%)	7 (44%)
Bs	65 (93%)	5 (7%)	70	26 (1.3)	34 (52%)	31 (48%)
Cs	54 (87%)	8 (13%)	62	22 (1.8)	39 (72%)	15 (28%)
Ds	78 (76%)	18 (24%)	96	23 (1.6)	36 (46%)	42 (54%)

Key : (m) mean time for each function

Table 4.31 Differences between behaviour of blind (n =4) and sighted (n =4) children with a musical Pop-up toy (Mann-Whitney U test)

	%On task	%Off task	Total time	Function	%Time to examine
U	1.00	1.00	6.00	6.50	0.00
Z	-2.02	-2.02	-.58	-.44	-2.31
p	0.04	0.04	0.56	0.33	0.01

Analysis 2. *Comparisons of blind and sighted children on standard and 'blind-friendly' toys.*

Table 4.32 Mean play behaviours on non-musical and musical pop-up toy Sighted children (N=4) and Blind children (N=4)

	% On task%	Off task	Total time	Function	Time to examine
			BLIND CHILDREN		
			Non-musical		
M	82.75	17.25	147.50	1.83	58.83
SD	18.50	18.50	69.51	0.84	11.11
			Musical		
M	95.00	5.00	214.25	1.25	75.75
SD	10.00	10.00	182.69	0.50	1.71
			SIGHTED CHILDREN		
			Non-musical		
M	78.00	22.00	93.00	1.82	25.5
SD	4.97	4.97	46.94	0.25	7.59
			Musical		
M	77.75	22.25	64.25	1.50	43.50
SD	16.72	16.72	27.62	0.58	11.12

Table 4.32 shows the means and standard deviations outcomes under the two conditions for four blind children and four sighted children (musical pop-up toy versus non-musical). When playing with a musical rather than non-musical pop-up toy, the blind children spent a higher percentage of their time on task (95 v 82.75) and a lower percentage of their time off task (5 v 17.25). They also took more time to examine the musical toy than the non-musical toy (75.5 v 58.8). In contrast, as the results in Table 4.32 show, there were few differences in functional play with the two types of pop-up toy in the sighted children in time on (77.5 v 78) or off task (22 v 22.5) or in the time taken to operate (function) the toy (press button to open pop-up section or close pop-up

section). However these sighted children took less time overall in the musical task and, as with the blind children, took more time examining the musical toy.

Analysis 3. *Questions and task-related statements*

A count was taken of the number of task-related questions each child asked and the

Table 4.33 Total number of questions and statements blind (n =4) and sighted (n =4) in a non-musical and musical task

	Questions		Statements	
	non-musical	musical	non-musical	musical
Subject	Total	Total	Total	Total
Ab	2	1	1	3
Bb	6	5	4	21
Cb	3	18	14	24
Db	5	1	4	1
Total:	**16**	**25**	**23**	**49**
As	0	0	0	4
Bs	0	2	4	7
Cs	0	0	3	3
Ds	2	0	2	6
Total:	**2**	**2**	**9**	**20**
	(Mann-Whitney U test. One-tailed)			
U	0.50	2.00	4.00	7.50
Z	-2.23	-1.79	-1.15	-0.15
p	0.02	0.07	0.24	0.88

number of task-related statements made under the two conditions of testing.

As Table 4.33 shows, the blind children asked significantly more questions than the sighted children about the non-musical pop-up toy, although there was a trend with the blind children asking more questions than the sighted children about the musical toy, this was not significant. The blind children also produced more task-related statements in both conditions, although this latter trend again was not statistically significant in either case.

Fantasy (pretend) play

As will be recalled from the Methods section, this activity was split into two conditions, presented 4 weeks apart: one in which the materials were presented but with no instructions given on how to interact with the materials (free play) whereas in the other the children were presented with the materials and told it was Tinky Winkie's birthday and that we were going to have a party (initiated play). Behaviours were coded as follows:

Simple pretend:

- Pretend self - pretence behaviour directed toward self with pretence element apparent (e.g., raise cup to lip; tip cup, make drinking sounds, tilt head)
- Pretend other – pretence behaviour directed away from child toward other (e.g., feed teletubby with spoon, put car on floor and make car noise)
- Pretend speech – pretend reflected in the narrative but no actions performed on objects

Complex pretend:

- Substitution self - using a "meaningless" object in a creative or imaginative manner in activities directed toward self (e.g. drink from pot) or using an object in a pretence act in a way that differs from how it was previously used by the child

- Substitution other – same as substitution self, but with action directed toward agent other than self, typically teletubby or researcher
- Sequence no story – sequence of pretend actions (e.g., pretending to put thing into pot and stirring)
- Sequence story - same as sequence of pretend actions but with narrative
- Pretend speech – no actions.

The above coding of pretend play was based upon a system developed by Belsky and Most (1981) in a cross-sectional investigation of the development of play in sighted children. Again, frame-by-frame analysis was carried out.

A 4-staged approach to data analysis was taken:

Analysis 1.
A count was taken of frequency of pretend play behaviours in each of the above categories produced in the free play condition by the blind and sighted children and comparisons made within and across groups.

Analysis 2.
A comparison was made between frequency of play behaviours in each of the above categories in the free play versus initiated play conditions within and across groups.

Analysis 3.
A count was taken of the number of times each child used each of the pretend play materials and comparisons made within and across participants.

Analysis 4.
Notes were made of the children's narrative during their fantasy play.

Analysis 1 *Frequency of fantasy (pretend) play behaviours*

The number of play behaviours produced in the free play condition by the blind and sighted children appeared to be age-related within the two groups (see Table 4.34). The

Table 4.34 Number of times each behaviour was exhibited in fantasy play (freeplay) (n=8)

	Pretend			Substitution		Sequence		
Particip	Self	Other	Speech	Self	Other	No story	Story	Total
Ab	3	2	4	1	1	3	1	15
Bb	4	0	1	0	0	0	0	5
Cb	2	0	2	0	0	0	0	4
Db	3	0	1	0	0	0	1	5
Total	12	2	8	1	1	3	2	29
As	8	2	3	1	2	3	3	22
Bs	4	1	1	2	3	3	2	16
Cs	6	1	2	1	0	2	1	13
Ds	6	1	1	1	0	1	1	11
Total	24	5	7	5	5	9	7	52
Difference between blind (n=4) and sighted children (n=4) Mann Whitney U test (two-tailed)								
U	0.50	3.50	7.50	0.50	5.00	3.00	1.50	2.00
Z	-2.20	-1.37	-0.15	-2.06	-0.87	-1.65	-1.86	-1.74
p	0.03	0.17	0.87	0.04	0.32	0.13	0.06	0.08

oldest child in the blind group produced 9 pretend, 2 substitution and 4 sequence which equalled a total of 15 pretend play behaviours, whereas the youngest blind child produced 4 pretend, 0 substitution and 1 sequence, a total of 5. In pretend self and sequence story, they both produced the same amount and kind of pretend play behaviours. In the sighted group of children, the oldest sighted child also produced the greatest number of pretend play behaviours (22), whereas the youngest child produced only 11. With the exception of substitution self, where both the youngest and oldest child produced the same amount of behaviours, and substitution other, where Participant As produced fewer behaviours than Participant Bs, the oldest sighted child produced more pretend play behaviours in all of the other categories coded.

<u>Analysis 2.</u> *A comparison of free play versus initiated play conditions*

At group level, with the exception of pretend speech, the sighted children produced more pretend behaviours than the blind child in all categories examined (see Table 4.34). There were significant difference for pretend self ($p<0.03$), and substitution self ($p<0.04$), with sequence story ($p<0.06$) and total number of pretend play behaviours ($p<0.08$) showing a trend but not reaching significance.

In the initiated fantasy play condition, the numbers of play behaviours again appeared to be age-related within groups (see Table 4.35). The oldest blind child produced more pretend behaviours overall than each of the younger blind children (71 and 54 ,62 and 43 respectively), and this held for all categories except for pretend other and sequence story. In pretend other, the youngest child produced more behaviours than the other three blind children and in sequence story, he produced the same number of behaviours as two of the older children. In the sighted group of children the oldest sighted child again produced the greatest number of pretend play behaviours, 51, whereas the younger 3 children produced 42, 38 and 38. With the exception of pretend speech, where the youngest child produced the greatest number of pretend behaviours, frequency of pretend play was age-related in all other categories.

Table 4.35 Number of times each behaviour was exhibited in initiated pretend play (n=8)

	Pretend			Substitution		Sequence		
Subject	Self	Other	Speech	Self	Other	No story	Story	Total
Ab	6	5	46	4	6	3	1	71
Bb	4	4	39	1	5	0	1	54
Cb	3	6	42	4	7	0	0	62
Dd	2	7	26	2	5	0	1	43
Total	15	22	153	11	23	3	3	230
As	7	7	19	1	10	3	4	51
Bs	5	8	14	0	8	4	3	42
Cs	4	5	16	0	4	4	5	38
Ds	4	4	20	0	5	2	3	38
Total	20	24	69	1	27	13	15	169
Difference between blind (n=4) and sighted children (n=4) Mann Whitney U test								
U	4.00	6.50	0.00	0.50	7.00	1.00	0.00	0.50
Z	-1.18	-0.44	-2.31	-2.25	-0.30	-1.95	-2.38	-2.03
p	0.26	0.66	0.01	0.02	0.72	0.06	0.01	0.04

In the free play condition, the sighted children performed better in all categories of pretend play whereas in the initiated condition the blind children produced significantly more pretend behaviours overall than the sighted children (230 and 169 respectively,

$p<0.04$). This difference was mainly attributable to the blind children's performance in pretend speech, however, with the blind children producing 153 instances of pretend speech whereas the sighted children produced only 69 ($p<0.01$). The blind children also performed significantly better than the sighted children in the substitution self category, 11 versus 1 instances respectively ($p<0.02$). As in the free play condition, the sighted children produced more pretend self, pretend other, sequence no story and sequence story than the blind children. However, this difference was only significant for sequence story ($p<0.01$).

The results above reveal a number of significant differences between the blind and sighted children on these two tasks. In the free play condition, although the blind children examined the play materials, they showed very little interest in translating the information gained into pretend action. In the initiated play condition, both sets of children produced more pretend play behaviours and both groups of children appeared to be equally motivated in this condition. In pretend play where simple actions were directed towards themselves and in pretend speech, the blind children performed better than the sighted children. However, the blind children did less well in pretend play where actions were directed towards a "meaningless" object, or where actions were directed toward an agent. Given that children early in development mostly pretend on the basis of what they have seen others pretend to do or actually do, it is perhaps not surprising that these blind children directed their pretence actions towards themselves and in their speech were not motivated to direct their pretence to actions directed towards a "meaningless" object or towards an agent as both of these are visually-led behaviours and therefore have very little meaning to the blind child.

Further analyses were carried out to ascertain whether there were significant differences between performance on pretend play in the free play condition and pretend play across groups. Tables 4.36 and 4.37 (see over) show the means and standard deviations of frequencies of production of each of the categories of pretend play under the two conditions of testing, freeplay and initiated play. Tables 4.36 and 4.37 (see over) show that both the blind and sighted groups performed better in the initiated pretend play condition than in the freeplay condition (mean frequency pretend play 57.50 and 7 and

Table 4.36 Differences between play behaviours on initiated pretend play and pretend play in the free-play condition for blind children (N=4)

	PRETEND			SUBSTITUTION		SEQUENCE		
	Self	Other	Speech	Self	Other	No story	Story	Total
				Free				
M	3.00	0.50	2.00	0.25	0.25	0.75	0.50	7.25
SD	0.82	1.00	1.41	0.50	0.50	1.50	0.58	5.19
				Initiated				
M	3.75	5.50	38.25	2.75	5.75	0.00	0.75	57.50
SD	1.71	1.29	8.66	1.50	0.96	0.00	0.50	11.90

Key : M= mean number of pretend behaviours. SD = standard deviation.

42.5 and 15.50 respectively). The greatest increase in mean scores in both groups of children was for the category pretend–speech (blind: 2 versus 38.25); sighted 1.75 versus 17), with the increase in the blind far greater than in the sighted children. Both the blind and sighted children showed similar increases in their scores between the two conditions on pretend–other (from 0.5 to 5.5 and 1.25 to 6 respectively) and on substitute-other (from 0.25 to 5.75 and from 1.25 to 6.75 respectively).

The blind children's mean scores for substitute–self also increased between the two conditions, from 0.25 to 2.75. However, although the blind children increased scores between the two conditions on pretend-self (from 3 to 3. 75) and on sequence-story (from 0.5 to 0.75). There was a minimal decrease in the mean scores for Sequence- no story (from 0.75 to 0).

Table 4.37 Differences between play behaviours on initiated pretend play and pretend play in the free-play condition for sighted children (N=4)

	PRETEND			SUBSTITUTION		SEQUENCE		
	Self	Other	Speech	Self	Other	No story	Story	Total
				Free				
M	6.00	1.25	1.75	1.25	1.25	3.00	1.75	15.50
SD	1.63	0.50	0.96	0.50	1.50	1.41	0.96	4.80
				Initiated				
M	5.00	6.00	17.25	0.25	6.75	3.25	3.25	42.25
SD	1.41	1.83	2.75	0.50	2.75	0.96	0.96	6.13

Key : M = mean number of pretend behaviours. SD = standard deviation.

As with the blind children, the sighted children increased their mean score in sequence–story from 1.75 to 3.25. However, the sighted children also increased their scores between the two conditions for sequence-no story (from 3 to 3.25) whereas the blind children decreased their scores in this same category. Sighted children decreased their mean scores between the two conditions in pretend-self from 6 to 5 and in substitute–self from 1.25 to 0.25. Although the pretend play reported here was not structured to a great extent in the initiated play condition, giving these children a topic to structure their pretend play around stimulated more pretend play behaviours in both groups of children.

The findings reported above show that the greatest increase in mean scores in both groups of children was for pretend–speech, with the blind children showing a much greater increase than the sighted children. It will be recalled that the blind children observed in Study 2 rarely exhibited spontaneous pretend play with objects and any pretence observed was most often verbal in expression. The use of 'meaningless objects' in the free play condition perhaps contributed to these blind children's lack of enthusiasm. In contrast, in the initiated play condition, when given a topic around which to structure their pretend play, the children appeared more motivated to engage in pretend play and produced more play behaviours, albeit mainly in their speech. Perhaps giving these blind children a topic allowed them to become more involved in pretend play, assisting them by adding meaning to some of the objects available to them in their pretend play.

Analysis 3 *Fantasy play materials*

As three of the blind children used very few if any of the materials in a pretend way in the free play condition, a count was taken of the number of times each child used each of the fantasy play materials in the initiated play condition only. A comparison was then made of the number of fantasy play materials used in the two groups of children. As Table 4.38 (see over) shows, the sighted children used significantly more materials than the blind children: 105 and 80 respectively ($p<0.05$). This difference in total number of materials used was mainly attributable to the number of times tissues were used (18 and 12 respectively p< 0.02), the teaset (27 and 7 respectively - p<0.02) and the teletubbies (12 and 8 respectively - p<0.05). The blind children also used the telephone and the car more frequently than the sighted child (11 versus 8 and 20 versus 15 respectively) but these differences were not significant. These findings are in accord with the suggestions

Table 4.38 Number of materials used by each child in a pretend mode (n =8)

Subject	Tissues	Boxes	Car	Telephone	Teaset	Teletubbies	Total
				Blind			
Ab	4	5	6	4	3	3	25
Bb	3	4	3	1	2	2	15
Cb	3	6	4	4	1	2	20
Db	2	7	7	2	1	1	20
Total	12	22	20	11	7	8	80
				Sighted			
As	5	7	4	2	10	3	31
Bs	5	8	2	2	8	4	29
Cs	4	5	5	3	4	4	25
Ds	4	4	4	1	5	2	20
Total	18	24	15	8	27	13	105
				Mann - Whitney U test			
U	0.00	6.50	5.00	5.50	0.00	0.50	0.50
Z	-2.10	-0.44	-0.89	-0.72	-2.10	-1.89	-2.01
p	0.02	0.40	0.20	0.25	0.02	0.05	0.04

in the literature that the blind child may express symbolic play in sound or movement. As the findings above show, these blind children used the car and the telephone in their fantasy play more frequently than the sighted children, the car to express movement symbolically and the telephone to express their pretence in sound. As was suggested in

Study 2, if blind children are given materials which are more concrete, real, and relevant to their available senses, they are then able to become more involved in fantasy play – and other kinds of play- in a much more meaningful way.

Analysis 4 *Narrative*

Although it appeared apparent from their speech that during initiated fantasy play the blind children knew the uses for the miniature tea set, pots, pans, knives forks and spoons, their actions did not always show this. For the most part they did not use the individual toys as they should be used nor used them in combination while telling their story. Most interacted with just one toy at a time and did not appear to be interested in making more than two items interact. The relating of a fantasy play storyline for these children appeared to be quite clear, with human characteristics attributed to the imaginary people in their story (for example, being happy or disappointed, touching, smelling or tasting) but very little effort was made to translate the story into physical actions. The story was often centered around the toy the child was holding at that moment with little if any attempt being made to use that toy in an appropriate manner, as the following scenario with Participant Bb, while holding a teapot, shows:

> "I'm making a drink for La La's friends– a milkshake
>
> "Do you want some Po"
>
> "Oh Po you've spilt some"

Participant Bb was evidently able to imagine the Teletubbies in a scenario but was not driven to translate this into pretend actions. Perhaps this is not surprising given that the early pretend play of typically-developing children is mostly based on what they have seen others pretend.

The above findings, as with those from Study 2, are in agreement with those of Lewis et al (2000) who suggests that the reported delays in the development of pretend play in blind children may be due more to performance than competence difficulties.

Receptive play

A 2-staged approach to data analysis was taken:

Analysis 1.
A comparison was made between the scores of the blind and sighted children in each of the 3 conditions of storytelling: Walters red star (visual) Cat's cradle (tactual) and Po's magic watering can (props).

Analysis 2.
The second analysis compared performance in the two groups of children as follows:

- Condition 1 (visual) x Condition 2 (tactual)
- Condition 1 (visual) x Condition 3 (props)
- Condition 2 (tactual) x Condition 3 (props)

Analysis 1 *A comparison between groups in each of the 3 categories of stories* :

Table 4.39 Blind and sighted children's scores on story recall in the visual condition (Walter's Red Star)

Subject	Setting	Theme	Plot	Resolution	Sequence	Total	Probed recall
				Blind			
Ab	1.40	1.00	0.43	1.00	1.00	4.83	6.00
Bb	1.00	0.00	0.28	1.00	1.00	3.28	4.17
Cb	1.40	0.00	0.14	1.00	1.00	3.54	5.70
Db	1.00	0.00	0.28	1.00	0.00	2.28	3.33
Total	4.80	1.00	1.13	4.00	3.00	13.92	19.20
				Sighted			
As	1.40	1.00	0.43	1.00	1.00	4.83	6.73
Bs	2.20	1.00	0.57	1.00	1.00	5.77	4.17
Cs	1.60	0.00	0.28	1.00	1.00	3.88	4.66
Ds	1.40	0.00	0.14	1.00	0.00	2.54	5.20
Total	6.60	2.00	1.51	4.00	3.00	17.04	20.80
				Mann -Whitney U test (one tailed)			
U	1.50	6.00	6.00	8.00	8.00	4.50	6.50
Z	-1.86	-0.68	-0.60	0.00	0.00	-1.02	-0.44
p	0.06	0.49	0.54	1.00	1.00	0.30	0.66

As Table 4.39 shows, although there were no significant differences in the visual condition, the sighted children produced scores which were either equal to or better than the blind children in all areas. These findings suggest that although the sighted children had the advantage of visual clues to aid story retelling, these visual clues had little or no impact on performance. In both groups of children, the youngest child in each group achieved the lowest scores.

Table 4.40 Blind and sighted children's scores on story recall in the Tactual condition (Cat's Cradle)

Subject	Setting	Theme	Plot	Resolution	Sequence	Total	Probed recall
			Blind				
Ab	2.33	1.00	0.50	2.00	2.00	7.83	7.83
Bb	2.00	0.00	0.33	1.00	1.00	4.33	4.50
Cb	1.33	0.00	0.33	1.00	1.00	3.66	5.33
Db	2.66	1.00	0.50	1.00	0.00	5.16	5.66
Total	8.32	2.00	1.68	5.00	4.00	20.98	22.64
			Sighted				
As	2.66	1.00	0.83	2.00	1.00	7.49	8.33
Bs	2.33	1.00	0.66	1.00	1.00	5.99	5.83
Cs	2.00	0.00	0.50	1.00	1.00	4.50	4.50
Ds	1.33	0.00	0.66	1.00	0.00	2.99	4.33
Total	8.32	2.00	2.65	5.00	3.00	20.97	23.80
			Mann - Whitney U test				
U	8.00	8.00	1.00	8.00	6.50	8.00	7.50
Z	0.00	0.00	-2.10	0.00	-0.50	0.00	-0.15
p	1.00	1.00	0.02	1.00	0.65	1.00	0.88

Table 4.41 Blind and sighted children's scores on story recall in the Props condition (Po's magic watering can (Teletubbies))

Subject	Setting	Theme	Plot	Resolution	Sequence	Total	Probed recall
			Blind				
Ab	4.00	1.00	0.71	2.00	1.00	8.71	8.32
Bb	2.33	1.00	0.43	2.00	1.00	6.76	6.98
Cb	3.33	1.00	0.43	1.00	1.00	6.76	5.32
Db	2.66	1.00	0.43	1.00	1.00	6.09	5.66
Total	12.32	4.00	2.00	6.00	4.00	28.32	26.28
			Sighted				
As	3.66	1.00	0.86	2.00	1.00	8.52	8.33
Bs	2.66	1.00	0.43	2.00	1.00	7.09	5.33
Cs	3.33	1.00	0.57	1.00	1.00	6.90	5.66
Ds	2.33	1.00	0.29	1.00	0.00	4.62	4.33
Total	11.96	4.00	2.16	6.00	3.00	27.12	23.64
			Mann -Whitney U				
U	7.50	8.00	7.50	8.00	6.00	7.00	6.50
Z	-0.15	0.00	-0.15	0.00	-0.58	-0.29	-0.44
p	0.88	1.00	0.88	1.00	0.32	1.00	0.66

In the tactual condition, as Table 4.40 (see above) shows, there were differences between group totals in the categories plot recall, probed recall and recall of sequence. Whereas the sighted children achieved higher group scores for both plot recall and probed recall, the blind children achieved higher group scores for recall of the sequence of the story. This difference was mainly attributable to the oldest blind child, however, and only plot recall showed group differences which were significant ($p<0.02$), the blind children recalling significantly fewer plot episodes than the sighted children. Again these findings suggest that although the sighted children have the advantage of visual clues to aid story retelling, these visual clues have a significant effect only on plot settings and very limited impact on all other measures of retelling of stories.

In the props condition (Table 4.41, see above), although the blind children achieved higher scores on setting, sequence, probed recall and total scores, there were no significant differences between the blind and sighted children on any of these scores. As with the other two conditions, in both the blind and sighted groups, the oldest child in both cases achieved higher scores than the youngest child in a number of the categories.

Analysis 2: *A comparison of group scores between 3 categories of stories*

Further analyses were carried out to ascertain whether there were any differences in story recall across the three conditions: books with visual properties, with tactile elements and with props.

Table 4.42 shows the means and standard deviations for the blind children for each of three conditions (visual, tactual and props) in the categories of setting, theme, plot episodes, resolution, and sequence.

Table 4.42 Blind children's recall of stories with visual and tactual properties and props (N=4)

	Setting	Theme	Plot	Resolution	Sequence	Total	Probed recall
				Visual			
M	1.20	0.25	0.28	1.00	0.75	3.48	4.80
SD	0.23	0.50	0.12	0.00	0.50	1.05	1.27
				Tactual			
M	2.08	0.50	0.42	1.25	1.00	5.24	5.83
SD	0.57	0.58	0.10	0.50	0.80	1.83	1.42
				Props			
M	3.08	1.00	0.50	1.50	1.00	7.08	6.57
SD	0.74	0.00	0.14	0.58	0.00	1.13	1.37

M = mean SD = standard deviation

Visual x tactual

Comparisons between the means for recall of stories with visual and tactual properties (Table 4.42) show an increase in group means in setting (1.20 to 2.08), theme (0.25 to 0.5), plot (0.28 to 0.42), resolution (1 to 1.25), sequence (0.75 to 1), total scores (3.48 to 5.24) and probed recall (4.8 to 5.3). In all cases, the story with tactual properties generated higher recall.

Visual x props

In recall of a story with visual properties versus the recall of a story using props, mean scores were higher in setting (1.20 v. 3.08), theme (0.25 v 1.00), plot (0.28 v 0.50), resolution (1.00 v. 1.50), sequence (0.75 v. 1.00), total scores (3.48 v. 7.08) and probed recall (4.8 v 6.57), The story with props generated higher recall in each case (Table 4.42).

Tactual x props

Group means were higher for the story using props in the areas of setting theme, plot, resolution, total scores and probed recall (see Table 4.42).

The large improvement in setting scores seen when comparing the visual and props condition was not especially surprising as all of the blind children were already familiar with the characters in the book with props. All of these children, however, also made improvements on their recall of the theme and the plot of the story. Even the youngest blind child appeared to benefit from the use of props in the retelling of the sequence of the story, although only the oldest child showed any improvement in his scores on the resolution of the story. By listening to stories read with tactual properties or props these blind children were better able to remember and retell story elements.

Table 4.43 Sighted children's recall of stories with visual, tactual properties and props (N=4)

	Setting	Theme	Plot	Resolution	Sequence	Total	Probed recall
				Visual			
M	1.65	0.50	0.36	1.00	0.75	4.26	5.19
SD	0.38	0.58	0.19	0.00	0.50	1.38	1.11
				Tactual			
M	2.08	0.50	0.66	1.25	0.75	5.24	5.75
SD	0.57	0.58	0.13	0.50	0.50	1.94	1.85
				Props			
M	2.99	1.00	0.54	1.50	0.75	6.78	5.91
SD	0.61	0.00	0.24	0.58	0.50	1.61	1.71

M = mean SD = Standard deviation

Table 4.43 (see above) shows the equivalent data for the sighted children under the same three conditions of story telling.

Visual x tactual

Comparisons between the recall of stories with visual and tactual properties revealed an increase in mean scores in setting, plot, resolution total scores and probed recall, the story with tactual properties generating higher recall in each case, as in the blind children. However, while the blind children also improved scores for theme and sequence when tactual information was present, there was no difference between mean scores in these two conditions for these sighted children.

Visual x props

As with the blind children, when the story was told using props rather than being visually-based, mean scores for the sighted children were higher in the area of setting, theme, plot, resolution, total scores and probed recall for the sighted children.

Tactual x props

Group means were higher for the story using props in the areas of setting, theme, plot, resolution, total scores and probed recall.

Table 4.44 (see over) shows the percentage differences between the three categories of story for total story recall and scores on probed recall. Taken together, the results for both blind and sighted children suggest that children's recall of story is improved if the

Table 4.44 Percentage difference between 3 receptive play conditions for blind (n=4) and sighted (n=4) children

	Visual x tactual	Visual x props	Tactual x props
Total scores			
Blind	20.2	34.1	14.9
Sighted	10.3	22.8	12.8
Probed recall			
Blind	9.6	15.6	6.5
Sighted	5.0	6.0	1.4

story is read using a multi-sensory approach (with additional tactile elements and props). Although both sets of children improved their recall in the tactual and props conditions, the disparity between recall scores for blind and sighted children was reduced when a multisensory approach to reading was adopted.

4.9 CONCLUSIONS

In Study 3 (Part 1), the blind children tested showed a distinct preference for, and functioned significantly better with 'blind-friendly' toys. This study was somewhat lengthy but this was unavoidable if all of the categories of play appropriate to this group of children were to be investigated. The findings reported thus far have provided only cross-sectional comparative data on the development of play with 'typical' versus 'blind-friendly' toys for both the blind and sighted children, leaving unanswered the question whether the differences described above would be reproduced in other sessions and persist over time. It was therefore decided to extend the study for a further two months to allow a longitudinal investigation of some of the play behaviours reported above. Exploratory and constructive play were selected for longitudinal study, with re-testing taking place 13 months after the first sessions had been recorded; time limitations precluded further investigation of the other four play behaviours. The findings from this extension to the study, Study 3 (Part2), are presented in the following chapter.

CHAPTER 5

LONGITUDINAL ANALYSIS OF THE PLAY BEHAVIOUR STRATEGIES OF YOUNG BLIND AND SIGHTED CHILDREN: STUDY 3 (PART 2)

5.1 INTRODUCTION

Study 3 (Part 1) was designed to allow a close investigation of how 4 educationally blind and 4 sighted children, aged 3 to 6 years, played with toys, books and art materials which either had or lacked tactile, olfactory and musical features. The purpose of the first part of Study 3 was to ascertain if tactile, auditory and olfactory strategies might enhance play behaviours in blind children, to compare the play strategies of young blind children with the play behaviour of young sighted children, and to evaluate the implications of any differences in play behaviour for current educational practice.

Following the same format of investigation, the second part of this study also investigated the tactile, auditory and olfactory strategies of blind children and the visual, tactile, auditory and olfactory strategies of sighted children in two play contexts, exploratory play and constructive play, but over two time periods, comparing the results from Study 3 (Part 1) to play behaviours produced 13 months later. In Study 3 (Part 1) 6 categories of play were investigated (exploratory play, constructive play, functional play, creative play, fantasy play and receptive play), time constraints ruled out longitudinal investigation of functional play, creative play, fantasy play and receptive play, although given the findings presented below, these areas of play would also seem to merit longitudinal investigation in the future.

Table 5.1 Age in years and months for exploratory play and constructive play at first and second occasion of testing (n=8).

	EXPLORATORY PLAY		CONSTRUCTIVE PLAY	
Study 3:	(Part 1)	(Part 2)	(Part 1)	(Part 2)
Participant	Age	Age	Age	Age
Ab	6.02	7.05	6.03	7.06
As	6.02	7.05	6.03	7.06
Bb	3.11	5.02	4.00	5.03
Bs	3.11	5.02	4.00	5.03
Cb	3.10	5.01	3.11	5.02
Cs	3.11	5.02	4.00	5.03
Db	3.02	4.05	3.03	4.06
Ds	3.02	4.05	3.03	4.06

Note: Exploratory play observation = Time 1 at 1 month into Study 3, Time 2 at Time 1 + 13 months. Constructive play observation = Time 1 at 2 months into Study 3, Time 2 at Time 1 + 13 months

5.2 METHOD

Participants

All of the children who participated in Study 3 (Part 1) also participated in Study 3 (Part 2) Details of these children and the criteria for inclusion are given in the preceding chapter (pp 187-190). Table 5.1 (above) gives the ages of each of the children at the two time points at which constructive and exploratory play were presented in Study 3 (Part 1) and in this Study 3 (Part 2).

5.3 PROCEDURE

Following the format in Part 1 of this study, monthly visits were continued to the schools and nurseries of the 8 children taking part in this longitudinal study for a further 2 months within which time observations were again made of the children's exploratory

Table 5.2 Exploratory play: age and order of presentation for the two time points in the two groups of children (n=8)

	(Part 1 month 1) Order of presentation		(Part 2 month 13) Order of presentation	
Participant	Age	week	Age	week
Ab	6.02	1	7.03	1
As	6.02	1	7.03	1
Bb	3.11	2	5.00	2
Bs	3.11	2	5.00	2
Cb	3.10	3	4.11	3
Cs	3.11	3	5.00	3
Db	3.02	4	4.03	4
Ds	3.02	4	4.03	4

play and constructive play. The toys and materials for these two types of play were introduced to the children in the order given in Table 5.2 and 5.3.

The materials for exploratory play, presented over a four week period in the first month of longitudinal data collection, were re-presented to all 8 children, 13 months after their first testing with them. The materials for constructive play presented over a four week period to all 8 children in the second month of the data collection period, were again presented to all 8 children, 13 months after collection of the first dataset. Order of presentation of the 3 puzzles was randomised within child groups, as in Part 1 (see Table 5.3).

Table 5.3 Constructive play: age and order of presentation of the three puzzles at the two Time points in the two groups of children. Jigsaw (n=8), Wooden (n=8) and Musical (n=8)

		Time 1 (month 2)				Time 2 (month 14)		
		Jigsaw	Musical	Wooden		Jigsaw	Musical	Wooden
Participant	Age	Order of presentation			Age	Order of presentation		
Ab	6.03	1st	2nd	3rd	7.05	1st	2nd	3rd
As	6.03	1st	2nd	3rd	7.05	1st	2nd	3rd
Bb	4.00	1st	3rd	2nd	5.02	1st	3rd	2nd
Bs	4.00	1st	3rd	2nd	5.02	1st	3rd	2nd
Cb	4.00	3rd	2nd	1st	5.02	3rd	2nd	1st
Cs	3.11	3rd	2nd	1st	5.01	3rd	2nd	1st
Db	3.03	2nd	1st	3rd	4.06	2nd	1st	3rd
Ds	3.03	2nd	1st	3rd	4.06	2nd	1st	3rd

5.4 PLAY MEASURES

Exploratory play

Play measures are described fully in Chapter 4 (see pp 191-194). The exploratory play box included the same 31 items used in Part 1 of this study and 30 minutes were again allowed for each child to explore these everyday household objects. Conditions of testing were identical to those given earlier.

Constructive play

Play measures and materials were described fully in Chapter 4 (pp 194-196). Procedure was identical on this second occasion of testing.

5.5 ANALYSIS

Exploratory play

Analysis 1

Again, a count was taken of the total times spent by each child on task, off task, to completion, in exploration and to select the items in the box. These totals were then calculated as a percentage of each child's overall time.

Differences between the two groups of children, blind and sighted, were analysed using Mann-Whitney U tests

Analysis 2

Times taken to explore each of the six categories of materials were analysed, firstly to assess similarities or differences amongst categories, secondly, to assess similarities or differences between the two groups of children, and thirdly, to assess any differences in behaviours over the two time periods. Comparisons were again made using the Mann-Whitney U test.

Analysis 3

A count was taken of the number of task-related questions each child asked and the number of task-related statements made. Comparisons were again made between the blind and sighted children using Mann-Whitney U tests. Each child's speech and behaviour throughout the task was also analysed for number of times an item was correctly identified, number of times an item was incorrectly identified, number of times correct functional use of an item was demonstrated/described and number of times "What is it?" questions were asked within each of the six categories, with these values then compared with their equivalents in Study 3 (Part 1)

Constructive play

Analysis 1: Time to complete

A within subjects comparison was made on times taken to complete each of the three puzzles. A between subjects comparison was also made of the time taken to complete each of the three puzzles in the two child groups at this second time point, with a comparison then made across the two time periods for each of the groups.

A count was taken of the amount of time (in seconds) spent by each child on and off task for each of the three puzzles, with these added together to give total time to complete the task for each of the three puzzles. A count was also taken of the number of sections completed in each puzzle and, after each child had completed each puzzle, time taken to examine each board was tabulated.

Analysis 2: Strategies used to complete puzzle

Both the frequency and the time to select, examine and place each section in the puzzles were analysed, firstly to assess similarities or differences across the three puzzles, secondly, to assess similarities or differences between the two groups of children, and thirdly, to assess any similarities and differences across the two time periods. As two of the blind children (Participant Bb and Cb - twins) did not complete task 1 (the jigsaw puzzle) or task 2 (the wooden formboard) in either Part 1 or Part 2 of this study, comparisons were possible across two time periods and between groups for only two of the matched pairs of children. All 8 children could be included in the analysis of responses to the musical formboard, however.

5.6 RESULTS

Exploratory play

Analysis 1. Within subjects over time periods

The lengths of time each child spent, on task, off task, total time, total time spent in exploration and total time taken to select the items in the box for each of the 4 sighted and 4 blind children are shown in Table 5.4 (see over). All of the blind children showed a decrease between the two time periods on the following: time on task; time off task; total time; examination time and selection time. Although the 4 sighted children also showed a decrease between the two time periods on: time on task; total time and examination time, they showed an increase time spent off task and in time taken to select items.

At Time 1, as may be recalled, there were significant differences between the blind and sighted children on the total time taken to complete the task ($p < 0.01$), the time taken to select items ($p < 0.01$) and the time taken to explore items ($p < 0.01$), the blind children taking longer in each case (Table 4.11; Table 5.5).

Table 5.4 The exploratory behaviour of blind (n =4) and sighted (n =4) children at two different time points

Time Point ^	On task 1	On task 2	Off task 1	Off task 2	Total time 1	Total time 2	Explore 1	Explore 2	Select 1	Select 2
Blind										
Ab	774	432	22	20	796	452	690	402	84	30
Bb	699	466	248	54	947	520	571	430	128	36
Cb	1222	554	453	62	1675	616	1118	504	104	50
Db	1273	648	22	10	1295	658	1168	600	105	48
Mean	992	525	186	45	1178	570	887	484	105	41
SD	297	97	207	18	392	106	301	89	18	10
Sighted										
As	418	332	10	12	428	344	403	312	19	20
Bs	784	468	3	10	787	478	514	424	34	44
Cs	552	392	13	8	565	400	732	360	32	32
Ds	379	400	7	11	386	411	363	360	22	40
Mean	533	373	8	10	542	383	503	339	30	34
SD	183	31	4	2	181	30	165	25	9	11

Note: ^ Time points separated by 13 months
Key: SD =Standard deviation

Although there was little difference in time off task between two of the blind children and the sighted children at that point, the other two blind children (Participants Bb and Cb) spent considerably longer off task than any of the other children. There were no significant differences, however, between the blind and sighted children's times on task

Table 5.5 Differences between the exploratory behaviour of blind (n =4) and sighted (n =4) children (Mann-Whitney U one tailed)

	% On task	%Off task	Total time	%Time to explore	% Time to select
Time period 1					
U	3.00	4.00	0.00	0.00	0.00
Z	-1.45	-1.16	-2.31	-2.32	-2.31
p	0.08	0.12	0.01	0.01	0.01
Time period 2					
U	0.00	0.00	0.00	0.00	5.00
Z	-2.32	-2.32	-2.31	-2.31	-0.87
p	0.01	0.01	0.01	0.01	0.20

and off task at this time.

At Time 2: when the exploratory materials were presented to all 8 children 13 months later, (Time 2 see Table 5.5 above) there was no longer any difference between time to select, the blind children having reduced the percentage of their overall time spent on this activity. Age affected none of the variables at either Time 1 or Time 2 but it was noted that Participants Bb and Cb spent considerably less time off task, in stereotypical behaviour and in examination and selection at Time 2 (Table 5.4 above).

Table 5.6 Comparisons of exploratory play in blind (n=4) and sighted (n=4) children:. percentage difference in times spent at Time 1 and Time 2

Time	On task	Off task	Total time	Examine	Select
			Blind		
Ab	-41.4	-9.0	-43.2	-41.7	-64.3
Bb	-33.3	-78.0	-45.0	-24.7	-71.9
Cb	-54.7	-86.3	-63.2	-54.9	-51.9
Db	-49.0	-54.5	-49.2	-48.6	-54.3
			Sighted		
As	-20.5	+20.0	-19.6	-22.6	+5.2
Bs	-40.3	+233.0	-52.0	-36.9	+29.4
Cs	-29.0	-38.0	-29.2	-50.8	-0.0
Ds	+5.5	+57.0	+6.5	-0.8	+81.0
			Mann-Whitney U test		
U	1.00	1.00	3.00	4.00	0.00
Z	-2.02	-2.02	-1.44	-1.15	-2.31
p	0.03	0.03	0.08	0.12	0.01

As Table 5.6 (above) shows the percentage differences between the blind and sighted children between Time 1 and Time 2, 13 months later. As Table 5.7 (see over) shows, there was a significant difference between the blind and sighted children in the percentage differences between Time period 1 and Time period 2, on the amount of time on task ($p < 0.05$), and although total time did not reach significance there was a trend the blind children showing a larger decrease in time than the sighted children. There was also a significant difference between the blind and sighted children on selection time and time off task, all of the blind children decreased their time in these two variables whereas, 3 of the 4 sighted children increased their time between the two time periods.

Analysis 2 Materials

Further analysis was carried out to ascertain whether these differences in behaviour between blind and sighted children affected all categories of materials. As Figure 5.1 shows, at Time 1 the blind children took longer to explore each of the six categories of

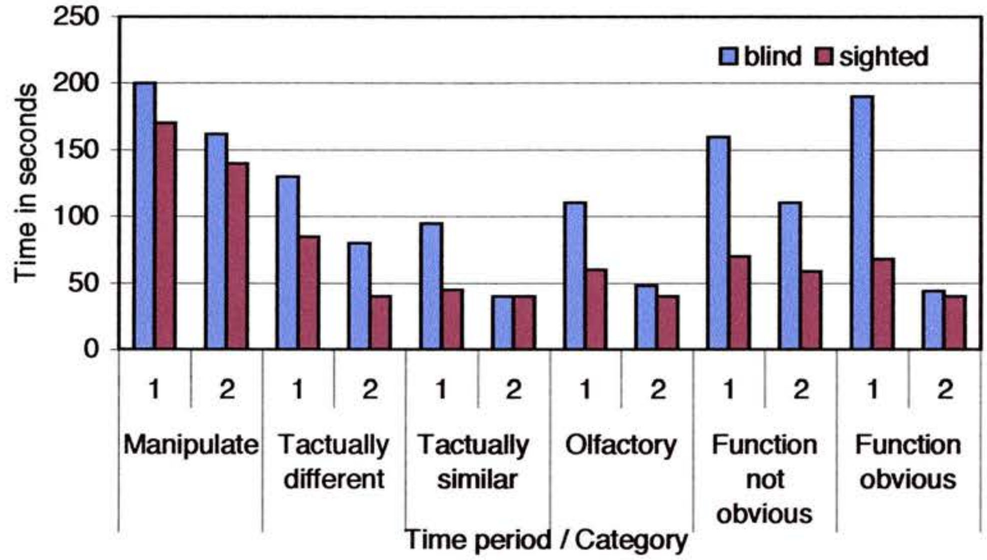


Figure 5.1 The mean time for blind (n=4) and sighted (n=4) to explore each of 6 categories at Time 1 and Time 2

exploratory play materials than the sighted children, however these differences were only significant for items which were tactually similar, items in which the function was obvious and items in which the function was not obvious.

Table 5.7 Differences between blind (n = 4) and sighted children (n = 4) in time spent in each of the six exploratory categories for both Times 1 and 2 (Mann-Whitney U test)

	Manipulation	Tactually different	Tactually similar	Olfactory	Function not obvious	Function obvious
			Time 1			
U	7.00	4.00	0.00	6.00	0.00	0.00
Z	-0.29	-1.15	-2.32	-0.58	-2.31	-2.03
p	0.38	0.13	0.01	0.28	0.01	0.02
			Time 2			
U	6.00	1.00	6.50	6.00	0.00	7.00
Z	-0.58	-2.02	-0.44	-0.58	-2.31	-0.29
p	0.20	0.03	0.33	0.28	0.01	0.38

Again as Table 5.7 (above) shows, at Time 2, there were significant differences in items in which the function was not obvious ($p < 0.01$), there were also significant differences for tactually different items ($p < 0.03$) the blind children taking significantly longer in each case. However, as Figure 5.1 (above) shows At Time 2, there was either no difference or very little difference between the group means in time to explore items which were tactually similar, items with an olfactory element and items in which the function was obvious.

Analysis 3 Strategies used to explore materials.

As Table 5.8 shows, at Time 1 the blind children asked significantly more questions than the sighted children; although they made almost twice as many task-related statements

Table 5.8 Difference between blind (n =4) and sighted (n =4) on the total number of questions and statements

	Questions						Statements				
	Total			Total			Total			Total	
Period	1	2		1	2		1	2		1	2
Ab	14	4	As	5	5	Ab	55	58	As	19	22
Bb	12	5	Bs	9	0	Bb	10	22	Bs	32	42
Cb	27	5	Cs	12	5	Cb	73	68	Cs	55	26
Db	56	10	Ds	11	11	Db	69	72	Ds	22	24
Total:	109	26		37	23		207	220		128	114
				Mann-Whitney U test							
Period	1			2			1			2	
U	0.50			8.00			4.00			3.50	
Z	-2.18			0.00			-1.15			-1.31	
p	0.03			1.00			0.13			0.10	

as the sighted children, this was not statistically significant. At Time 1, rather than immediately engaging with the materials, it will be recalled that the blind children often asked what the materials were if this was not obvious to them; if they knew what the materials were, they confirmed this by making some comment about or seeking clarification. Again as in Study 3 part 1, it was noted that when the sighted children volunteered information about the materials they tended to look towards the researcher, perhaps looking for some reaction as to the correctness of the information volunteered (hence eliminating the need for any verbal clarification).

By Time 2, there was no longer any difference between the blind and sighted children in either the number of task-related statements they made or in the number of questions asked (Time 1: 109 and 39 questions respectively; Time 2: 26 and 23 respectively). Either time or familiarity with the items appeared to have a greater effect in reducing the need to ask for clarification as to the identity of an object in the case of the blind children.

Figures 5.2 to 5.5 show the percentage of times, at Time 1 and at Time 2, that the blind and sighted children volunteered correct or incorrect descriptions of the items within each category and correctly demonstrated or described the functional use of each item, along with the percentage of task-related questions asked within each category.

As Figure 5.2 shows, at both time periods, there was very little difference between the blind and sighted children on the percentage number of items correctly identified in either the manipulation or tactually different categories. In the tactually similar

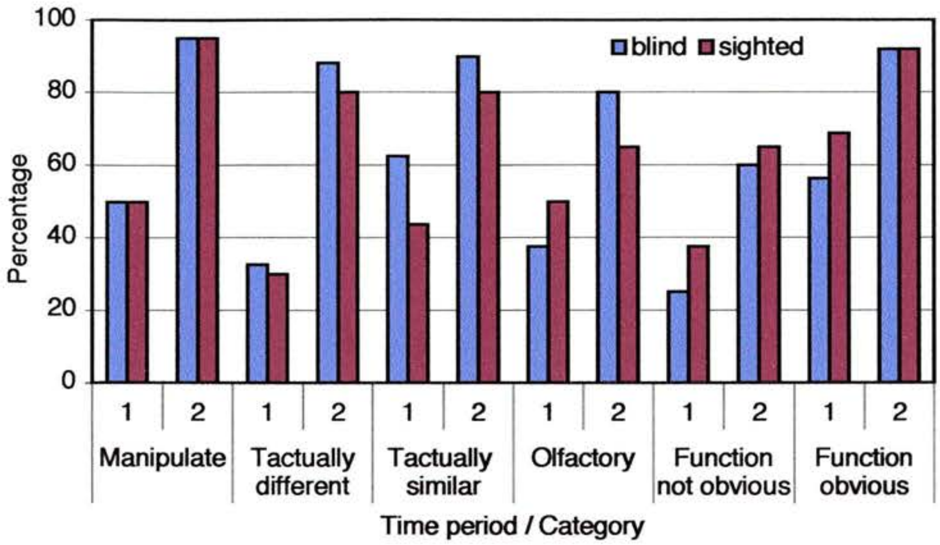


Figure 5.2 Percentage of times an item was correctly identified at two different time points (1 month into study 3 and 13 months later)

category, however, the blind children identified more items than the sighted children at both time points. The sighted children identified more olfactory items at Time 1 but this pattern was reversed at Time 2. For the remaining two categories, function may not be obvious and function obvious, the sighted children identified more items than the blind children at both time points. In Time period 2 all 8 children gave a significantly higher percentage of correct descriptions within each category than in Time period 1.

Figure 5.3 shows the percentage of times both blind and sighted children volunteered incorrect descriptions of the items within each category. There were a number of differences and similarities between the bind and sighted children. At Time 1, for items which were tactually different and items with an olfactory element, the blind children

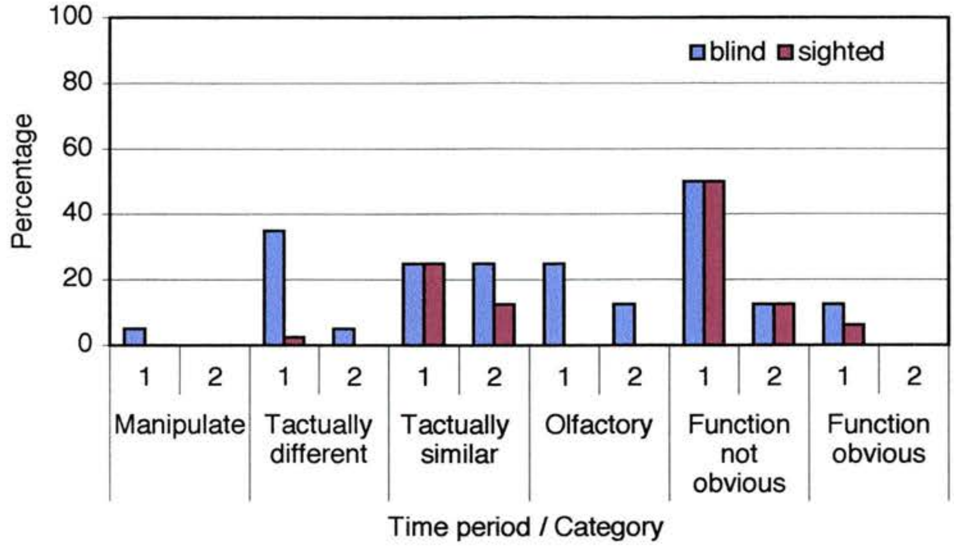


Figure 5.3 Percentage of times an item was incorrectly identified at Time 1 and Time 2

gave more incorrect descriptions of the items but this difference was not so marked by Time 2. At both time points, there were very few incorrect descriptions given by children in either group of the items which required manipulation, the items which were tactually similar or the items whose function was not obvious. As expected, both blind and sighted children were more frequently incorrect in their descriptions of the items whose functions were unclear. Both groups significantly reduced the number of incorrect descriptions given by Time 2, but there was no significant group effect over time. As was suggested in Chapter 4 (p 227) it may be that the sighted children gave fewer incorrect descriptions in those areas where they had access to visual clues as to the identity of the item and thus volunteered either the correct information or did not feel it necessary to volunteer any information.

For the tactually similar items, although there was no difference between the blind and sighted children in the number of incorrect descriptions given, the sighted children volunteered less correct descriptions, again perhaps because they felt more confident in identifying the items from the visual clues present and did not feel the need to volunteer any information; the blind children conversely lacked these visual clues and therefore may have required verbal clarification.

Figure 5.4 shows the percentage of times correct functional use of an object was demonstrated or described within each category. There were again a number of

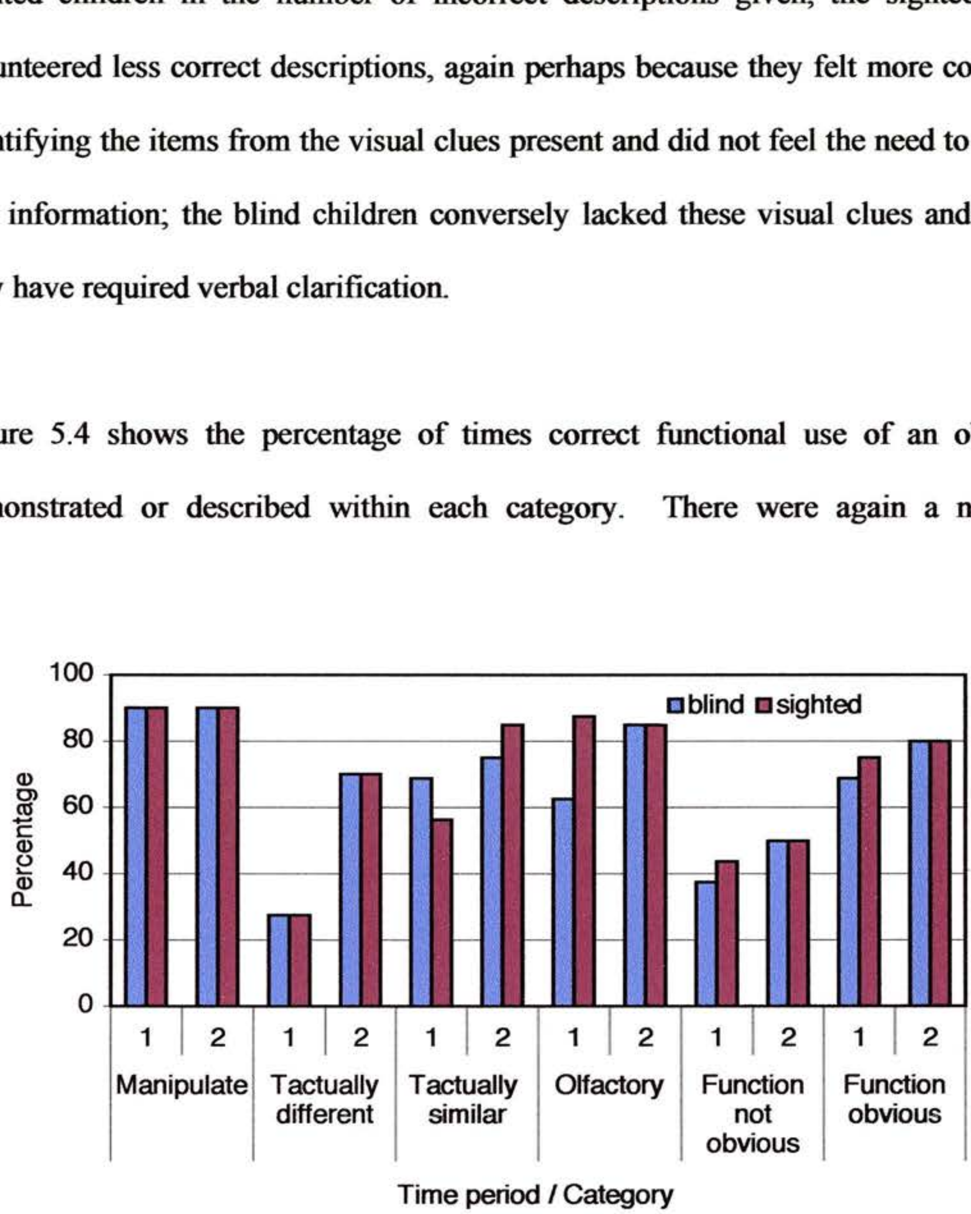


Figure 5.4 The percentage of times correct functional use of an object was demonstrated or described within each category at Times 1 and 2

differences and similarities between the bind and sighted children. Although, in Time 1, the sighted children identified a much higher percentage of the functional use of items with an olfactory element than the blind children, there was no difference between these two groups of children in Time 2. In Time 1 the blind children identified a higher percentage of the functional use of items which were tactually similar. However in Time 2 this situation was reversed with the sighted children identifying a higher percentage than the blind children. It was also shown in Time 1 the sighted children identified more of the items in the category 'function not obvious', and the category 'function obvious' than the blind children. In Time 2 there was no difference between the blind and sighted children in these categories, the blind children having increased their scores by a greater margin than the sighted children. In the 3 categories, number of correct functional uses, manipulation and tactually different there were no differences between the blind and sighted children in either Time 1 or Time 2.

A comparison of the scores for Time 1 and Time 2 shows the blind children achieved higher scores in 5 of the 6 categories between the two time periods. In the 6th category 'items which require manipulation' there was no difference on scores. The sighted children also achieved higher scores in 4 of the 6 categories, in the category 'manipulation' there was no change in their scores and in the category 'olfactory' there was only a slight decrease in their scores.

Figure 5.5 shows the percentage number of times the question "what is it"? was asked by both the blind and sighted groups of children. At Time 1 the blind children asked more questions than the sighted children when exploring objects within each of the 6 categories. The greatest difference between the blind and sighted children occurred for

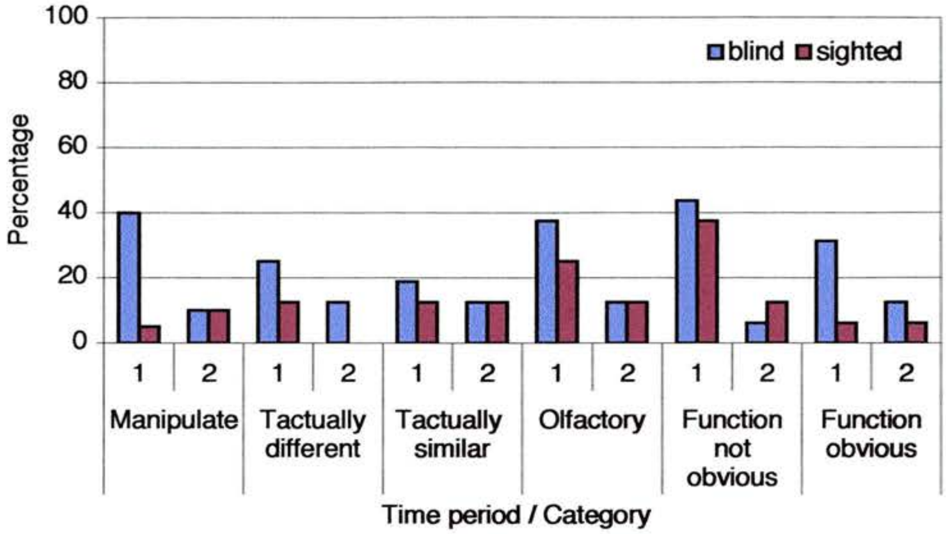


Figure 5.5 Percentage number of times "what is it" ? Type questions were asked within each category at Times 1 & 2

items that required manipulation and items in which the function was obvious; by Time 2, this difference between the two groups of children was reduced. At Time 1 for items in which the function was not obvious, both sets of children asked a higher percentage of questions than in any other category, and the percentage of questions asked by the sighted children, in this category was slightly less than in the blind children. This pattern was reversed in Time 2, with the blind children asking fewer questions and both sets of children asking fewer questions about this category in Time period 2 than they did in Time period 1. As noted earlier it is possible that the sighted child asked for clarification mainly when visual clues to the identity and function of the object were not sufficiently informative.

Constructive play

Analysis 1: Time to complete

Jigsaw puzzle

Table 5.9 (below) shows the time on task, off task, total time and time to examine the puzzle for the 6 children who completed this task at both time points. Again, despite encouragement, Participants Bb and Cb both refused to participate in this task; after tactually examining the puzzle, Participant Cb commented "Oh no not that one again" and Participant Bb said " I don't like that one", "It's too hard" and "Can I have the one with the cat". It is perhaps noteworthy that both these children remembered this puzzle from the previous time it was presented, despite the large intervening gap in time, and from their comments it was obvious that they had no desire to repeat their previous experience. Again it is unclear whether it was of lack of ability that caused these two blind children to refuse to engage with this task or, as their comments suggested, lack of interest, or indeed a combination of both.

Table 5.9 shows that amongst those children who completed the task on both occasions,

Table 5.9 Time to complete the jigsaw puzzle for blind (n =4) and sighted (n =4) at two time points^

Time	On task		Off task		Total time		Completed		Examine*	
Period	1	2	1	2	1	2	1	2	1	2
Ab	304	290	0	40	304	330	5	5	16	12
Bb	57	0	21	0	78	0	0	0	0	0
Cb	22	0	50	0	72	0	0	0	0	0
Db	194	164	24	22	218	186	5	5	11	5
As	43	40	0	0	43	40	5	5	4	8
Bs	63	43	9	0	72	43	5	5	12	9
Cs	71	45	0	0	71	45	5	5	5	7
Ds	45	46	0	0	45	46	5	5	5	6

Note: Time is given in seconds.
Key: * Time taken to examine the puzzle on completion.

Participant Ab, the oldest blind child, took longer than all the other children (304 and 290 seconds on the first and second session respectively). However, as was noted previously, he talked to the researcher throughout the task, demonstrating less dedication than the other children, although some of the other children did talk off task this was for very short periods of time. Both of the blind children who completed the puzzle took longer than all of the sighted children at both time points. At Time 1 the younger blind child took less time to complete this task than the older blind child (304 versus 218 seconds); this difference between these two children was maintained at Time 2 (330 versus 186 seconds) and the added familiarity with the jigsaw puzzle did not seem to make a great deal of difference to the times these two children took to complete this puzzle. The two blind children who completed the puzzle also took longer than three of the sighted children to examine the puzzle after completion in Time period 1; at Time 2, although the oldest child reduced his examination time from 16 to 12 seconds, he still took longer than all the sighted children whereas the youngest blind child, who also reduced his examination time between the two time periods from 11 to 5 seconds, took less time to examine than all of the sighted children.

Wooden formboard

Of the children who completed the wooden formboard, Participant Db, the youngest blind child, took longer than all the other children at both time points (171 and 164 seconds – see Table 5.10see over). However, there was very little difference between the time he took to complete the task and the time the oldest blind child took (155 and 144 seconds) and very little time difference between the two time periods, suggesting again that maturation and familiarity with the puzzle did not appear to have had an effect on time to complete this puzzle for these two children. On both occasions, it was noted that Participant Ab expressed more interest in this task than the jigsaw puzzle and although he still talked during the task, on off-task topics, this was for much shorter periods (wooden formboard Time 1 and Time 2: 21 and 10 seconds respectively; Jigsaw Time 1 and Time 2: 70 and 30 seconds respectively).

Table 5.10 Time to complete the wooden formboard for blind (n =4) and sighted (n =4) at two time points^

Time	On task		Off task		Total time		Completed		Examine	
Point	1	2	1	2	1	2	1	2	1	2
Ab	155	144	0	0	155	144	5	5	18.5	12
Bb	53	0	40	0	93	0	0	0	0	0
Cb	99	0	32	0	131	0	0	0	0	0
Db	171	164	0	0	171	164	5	5	11	5
As	16	28	0	0	16	28	5	5	0	0
Bs	29	33	0	0	29	33	5	5	17.2	10
Cs	57	45	6	0	63	45	5	5	20	17
Ds	38	46	0	0	38	46	5	5	0	16

Note: The time is given in seconds.
Key: ^Time 1 and Time 2 separated by 13 months
* The time taken to examine the puzzle on completion.

Although there were differences between the 4 sighted children in time taken to complete this puzzle, the differences were small at both time points and with the exception of Participant As (who completed the puzzle in 16 and 20 seconds), these differences did not appear to be age related, suggesting that neither maturation nor familiarity with the materials had much effect on outcomes. Once again, there was a marked difference in the times taken to complete this puzzle by the 2 blind and the 2 matched sighted children at the two time points (Time 1: 155 and 171 seconds and 16 and 38 seconds respectively; Time 2: 144 and 164 seconds and 20 and 46 seconds respectively). No comparisons could be made between the other two matched pairs of blind and sighted children as again, despite encouragement, Participants Bb and Cb both refused to participate in this task; their comments again suggested that the memory of their previous encounter with the task underlay this refusal to engage with the task.

Table 5.11 Time to complete the musical formboard for blind (n =4) and sighted (n =4) at Time 1 and Time 2 (time given in seconds)

Time	On task		Off task		Total time		Completed		Examine	
Period	1	2	1	2	1	2	1	2	1	2
Ab	144	104	6	0	150	104	5	5	40	48
Bb	250	120	0	0	250	120	5	5	24	36
Cb	202	108	18	0	220	108	5	5	16	24
Db	82	80	0	0	82	80	5	5	35	32
As	35	32	3	0	38	32	5	5	34	28
Bs	39	33	4	0	43	33	5	5	20	24
Cs	67	45	0	0	67	45	5	5	34	40
Ds	45	44	0	0	45	44	5	5	2	16
Differences between blind and sighted at two time periods (Mann-Whitney U test)										
U	0.00	0.00	6.00	8.00	0.00	0.00	8.00	8.00	0.00	4.50
Z	- 2.31	- 2.31	- 0.58	0.00	- 2.31	- 2.31	0.00	0.00	- 2.31	-1.02
p	0.02	0.02	0.26	1.00	0.02	0.02	1.00	1.00	0.02	0.16

Musical Formboard

Table 5.11(above) shows the time on task, time off task, total time to complete, number of sections completed and the time taken to examine the musical formboard after completion for all 8 children at both time points. Again age did not appear to be a predictor of time taken on any of the variables for the blind children at either time point, with the youngest blind child taking less time than the other three blind children to complete the task on both occasions. Although the oldest sighted child completed the task faster than the other three sighted children, the differences between the four sighted children were small for both time periods; they did, however, appear to be age related, with the oldest child taking less time than the other 3 children (Table 5.11). At Time 1, there was a significant difference between the blind and sighted children on time to complete ($p < 0.02$), time on task ($p < 0.02$) and time to examine the puzzle after completion ($p < 0.02$), with all four sighted children completing the puzzle in a faster time than the blind children and taking less time to examine the puzzle on completion. Although these significant differences for time to complete and time on task were maintained at Time 2, the difference in examination time after completion was no longer significant. There were no differences between the blind and sighted children in the amount of time off task in either time period. Table 5.11 shows a reduction in time off task from Time 1 to Time 2; at Time 1, 4 of the 8 children spent 3, 4, 6 and 18 seconds off task, in Time period 2 these children did not spend any time off task.

Table 5.12[1] compares the percentage differences in overall time taken for each of the three puzzles for the 2 matched pairs of blind children (Participants Ab and Db) and sighted children (Participants As and Ds) as follows:

[1] Only two blind children completed the jigsaw puzzle and the formboard tasks. For these two tasks the small numbers precluded statistical analysis.

- jigsaw puzzle v the wooden formboard
- jigsaw puzzle v the musical formboard
- wooden formboard v the musical formboard

As Table 5.12 shows, at Time 1 for jigsaw puzzle v the wooden formboard all 4 children

Table 5.12 Percentage difference in time taken to complete each of three puzzles (n=8)

	Jigsaw v Wooden formboard		Jigsaw v Musical formboard		Wooden formboard v Musical formboard	
Period	1	2	1	2	1	2
Ab	96.1.	101.3	111.1	178.8	7.6	7.6
Db	13.5	0.0	136.6	95.2	108.6	95.2
As	107.0	100.0	22.9	25.0	-54.0	-37.5
Ds	18.4	0.0	0.0	0.0	-15.6	0.0

Key: ^Time period 1 = 2 month into study 3 and time period 2 = time period 1 + 14 months.

completed the wooden formboard more rapidly than the jigsaw puzzle. However, at Time 2, there was no difference in the time taken to complete these two puzzles for the youngest blind and youngest sighted child. A comparison of the matched pairs for the jigsaw v the wooden formboard showed a far greater difference between these conditions for the oldest matched pair of blind and sighted children. In the comparison between the time taken to complete the jigsaw puzzle and the musical formboard both the blind children and one of the sighted children (Participant As) at both time periods completed the musical formboard more rapidly than the jigsaw puzzle, there was no difference between the time taken to complete both puzzles for Participant Ds in both time periods. In the comparison between the time taken to complete the wooden formboard and the musical formboard, the two blind children (Participants Ab and Db) both showed an improvement in their performance, completing the musical formboard in less time than it took to complete the wooden formboard on both occasions, although there was very little difference between Time 1 and Time 2. Both of the sighted children (Participants As and Ds) took more time to complete the musical formboard than the wooden formboard. Although the blind children took less time to complete the musical formboard than the other two puzzles, as Table 5.12 shows, they still spent significantly longer on task and in terms of total time and time to examine on completion than the sighted children did. These results suggest that the properties of the musical formboard may have facilitated the blind children's performance in this task and impeded the sighted children's performance. All four blind children appeared to be more motivated in the musical formboard task on both occasions of testing; they showed eagerness to complete each section, perhaps anticipating the musical feedback. However maturation and familiarity with the materials seemed to have very little effect on the time taken to complete this puzzle. In both testing sessions, the sighted children were observed inspecting the physical and musical properties of each section visually, with this in turn delaying their progress towards completion of the task. A further analysis was therefore carried out to ascertain where in the process of completing the puzzles there were significant differences in the strategies adopted by the blind and sighted children.

Analysis 2 (strategies)

A count was taken of the amount of time (in seconds) to select, examine and place each

Table 5.13 Times to select, examine and place (in seconds): jigsaw v. wooden formboard

	Jigsaw puzzle						Wooden formboard					
	Select		Examine		Place		Select		Examine		Place	
Period	1	2	1	2	1	2	1	2	1	2	1	2
Ab	7	31	123	148	161	111	9.3	16	55.8	73	89.9	55
Db	24	22	82	70	88	71	10.6	22	76.9	70	83.5	71
As	11	14	8	5	24	21	3.4	10	4.6	3	8.0	15
Ds	8	9	13	11	24	26	9	10	8.6	12	20.4	26

section for each of the three puzzles. Table 5.13 (above) gives the times taken by the 2 matched pairs of blind and sighted children for the jigsaw and wooden formboard in the Time 1 and Time 2 testing sessions. At both time points, the blind children (Participants Ab and Db) spent considerably longer than their sighted matches examining and placing each piece. However the time difference on time taken to select the pieces was not so large. The pattern was similar for the wooden formboard, the blind children again taking longer than their sighted matched to examine and place each piece in the puzzle, but again with very little difference in the time taken to select.

Table 5.14 Time (seconds) to select, examine and place at Time 1 and Time 2: musical formboard

	Select		Examine		Place	
Period	1	2	1	2	1	2
Ab	8.2	7.2	64.2	50.0	71.5	47.0
Bb	38.4	12.0	88.8	52.0	122.3	56.0
Cb	13.5	7.0	106.5	59.0	82.0	42.0
Db	11.6	12.0	43.6	46.0	26.4	28.0
Mean	17.9	9.5	75.8	51.8	75.5	43.3
SD	13.8	2.9	27.6	5.4	39.4	11.7
As	8.7	8.0	6.2	6.0	20.3	18
Bs	6.1	4.0	10.4	10.0	21.7	19.0
Cs	8.1	8.0	20.8	11.0	36.1	26.0
Ds	8.52.	10.0	12.52	12.0	23.5	24.0
Mean	8.0	7.5	12.3	9.8	33.0	21.8
SD	1.4	2.5	6.3	2.4	22.0	3.9
Differences between blind and sighted at two time points (Mann-Whitney U test)						
U	2.50	6.00	0.00	0.00	1.00	0.00
Z	- 1.61	- 0.59	- 2.31	- 2.31	- 2.02	- 2.52
p	0.10	0.30	0.01	0.01	0.03	0.01

Table 5.14 gives the times taken by the 4 matched pairs of blind and sighted children to select, examine and place in the musical formboard condition at Time 1 and Time 2.

Although the blind children still took longer than the sighted children to complete the puzzle on all measures, the difference between the two blind children who completed all three puzzles (Participants Ab and Db) and their matched sighted Participants was reduced on all measures, the blind children only taking 10.4 and 3.5 times longer than their sighted matched Participants to examine the puzzle, and 3.5 and 1.1 times longer to place each piece. Again, there was very little difference in the time taken to select the pieces for the puzzle, the blind children taking the same and 1.36 times longer at Time 1 and Time 2 as shown in Table 5.14. Participants Bb and Cb took 8.5 and 5.1 times longer than their sighted matched Participants (Bs and Cs) to examine this puzzle and 5.6 and 2.2 times longer to place each piece, there was very little difference between Participants Cb and Cs in the time taken to select the pieces for the puzzle but Participant Bb took 6.3 times longer to select the pieces than Participant Bs.

Mann-Whitney U tests on the scores of the two groups of children at the two different time points (Table 5.14) revealed significant differences at Time 1 between the two groups on: time to examine ($p < 0.01$) and time to place ($p < 0.05$) but not on time to select. Again, at Time 2, there were significant differences in time to examine ($p < 0.01$) and time to place ($p < 0.01$).

Table 5.14 shows that both groups of children reduced the mean time to select, examine and place each piece over the two time periods. The standard deviations given in Table 5.14 also show a reduction in variability within the blind children's scores on time to select examine and place and a reduction in variability within the sighted children's scores on time to examine and place but in not on time to select.

Time to select, examine and place each section as a percentage of overall time on task.

Again, although sighted Participants (Bs and Cs) did complete all three puzzles, their matched blind Participants Bb and Cb, did not complete the jigsaw puzzle or the wooden formboard, therefore Figures 5.6 and 5.7 below gives only the comparative data for the two matched pairs who completed all three puzzles (Participants Ab and As and Participants Db and Ds).

Figures 5.6 and 5.7 show the percentage of overall time taken by the 2 blind and 2 sighted children (matched pairs as described above), to select, examine and place sections in the jigsaw puzzle, musical formboard and wooden formboard.

As Figure 5.6 shows, the two sighted children used a higher percentage of their time selecting the 5 sections for the jigsaw puzzle at both Time 1 (25.8% and 17.7%) and

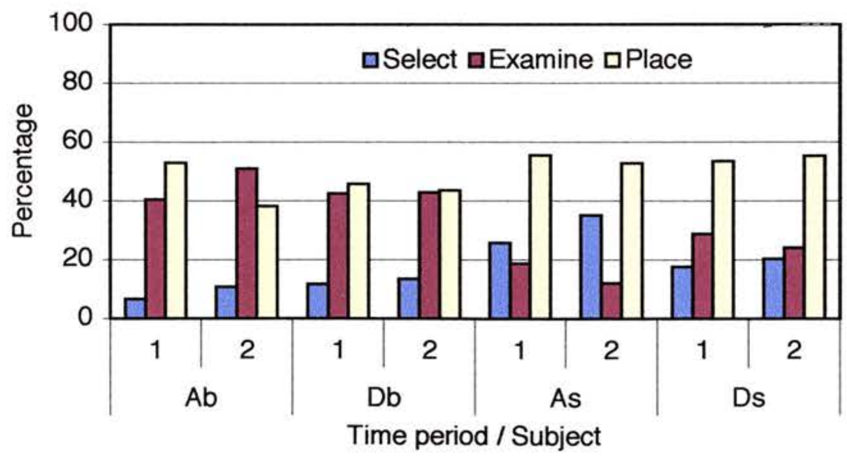


Figure 5.6 percentage time taken to select, examine and place 5 pieces: jigsaw puzzle

Time 2 (35.2 and 20.4) than the two blind children (6.6% and 11.7%, and 10.8% and 13.6% respectively). However, the two blind children used a higher percentage of their time examining the puzzle at both time points (Time 1: 40.5% and 42.6%); Time 2 :51.0% and 42.8%) than the sighted children (Time 1: 18.7% and 28.8%; Time 2:12.0% and 24.2%). The blind children spent a slightly lower percentage of their time placing the pieces than the sighted children. With the exception of Participant Ab (who increased his selection time from 6.6% to 10.8%, increased his examination time from 40.5% to 51% and decreased percentage placing time from 52.9% to 38.2%) there was very little difference in placing times for the other three blind children at the two points of testing.

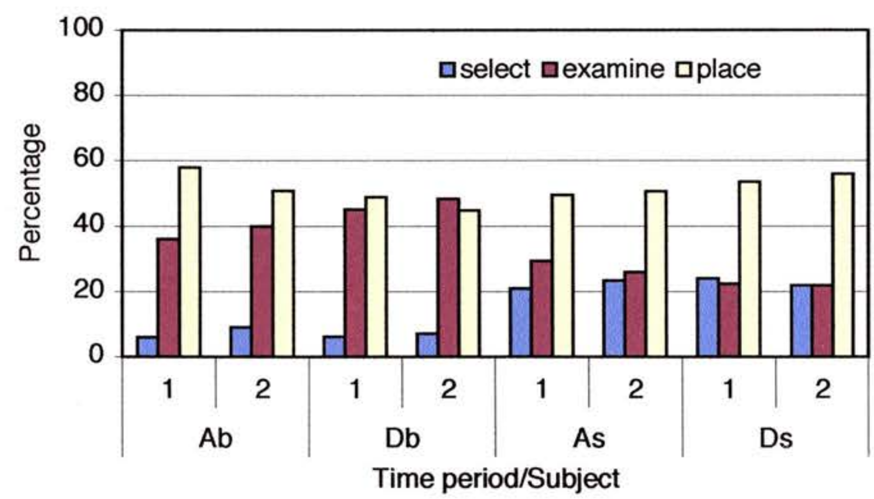


Figure 5.7 Time taken to select, examine and place 5 pieces in the wooden formboard

Figure 5.7 (above) shows the time taken to select, examine and place each section of the wooden formboard as a percentage of overall time on task. Again it can be seen that the 2 sighted children used a higher percentage of their time selecting the 5 sections for the wooden formboard at Time 1 and at Time 2 (As: 21% and 24%; Ds: 23.4% and 22%) than the blind children (Ab: 6% and 6.2%; Db: 9.2% and 7.2%) and that the blind children used a higher percentage of their time examining the puzzle at both Time 1 and at Time 2 (Ab: 36% and 40%; Db; 44. % and 52.2; As: 29.5% and 20.6%; Ds: 26.0% and 22.0%). The oldest sighted child (Participant As) used a lower percentage of his time placing the sections in the puzzle than the youngest sighted child (Participant As) but this was reversed in the case of the blind children, with the oldest blind child taking longer to place each section. Participants Ab and Db both increased their examination time and decreased their selection time between Times 1 and 2 although there was very little difference on these measures for the other two children over the two time periods.

Figures 5.8 and 5.9 (see over) show the time taken to select, examine and place each section as a percentage of overall time on task in the musical formboard condition for the 4 matched pairs of blind and sighted children. There was a significant difference between the two groups of children in the percentage time taken both to select and place the pieces in the musical formboard at Time 1: select: ($U = 2$, $Z = -2.01$, $p<0.05$) and at Time 2 select: ($U = 0$, $Z = -2.31$, $p<0.02$) and Time 1 place: ($U = 0$, $Z = -2.31$, $p<0.02$), Time 2 place: ($U = 0$, $Z = -2.31$, $p<0.02$). Three of the four sighted children used a higher percentage of their time to select the pieces than the blind children and all of the sighted children used a higher percentage of their time to place the pieces. There was also a significant difference between the blind and sighted children in their percentage examination time at both Time 1 and Time 2: (T1 and T2: $U = 0$, $Z = -2.31$, $p<0.02$)

with all four of the blind children using a higher percentage of their time to examine the musical formboard than the sighted children.

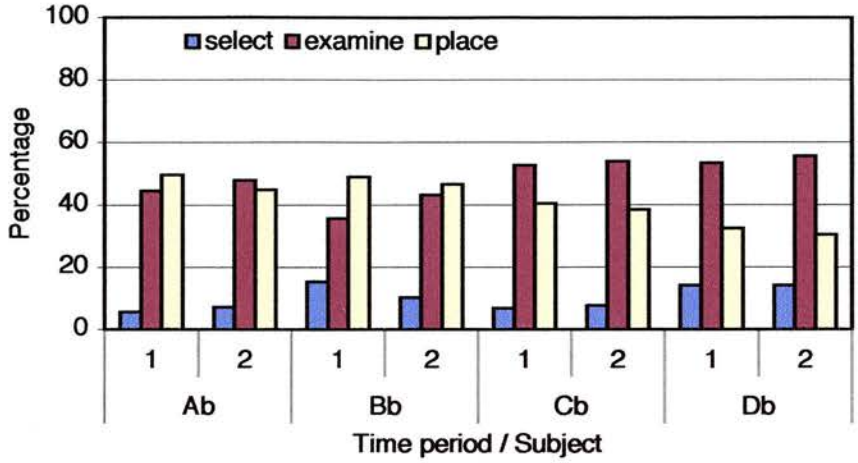


Figure 5.8 Time taken by the 4 blind children to select, examine and place the 5 pieces in the musical formboard

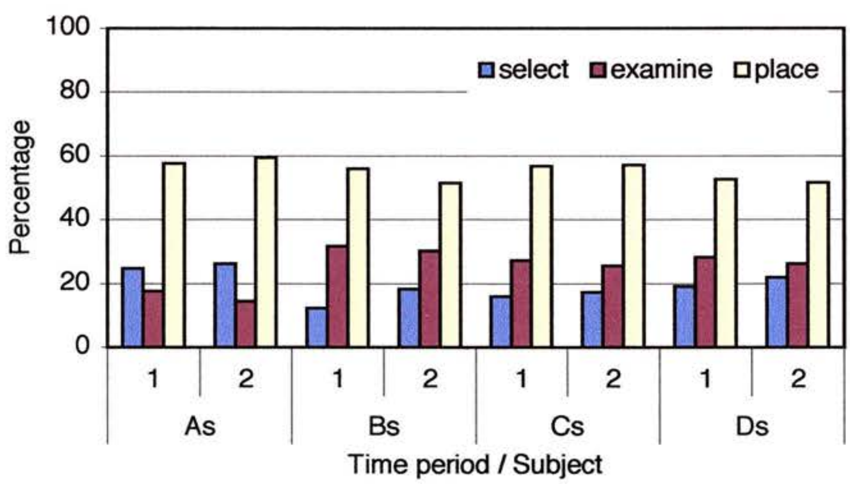


Figure 5.9 Percentage time for 4 sighted children to select, examine and place 5 pieces in a musical formboard

5.7 DISCUSSION

Exploratory play:

Study 3 (Part 1) showed there were a number of differences between blind and sighted children in their exploratory behaviour. Comparing results of the exploratory and constructive play behaviours from Study 3 (Part 1) with the results from this study, allowed an investigation of any differences in the exploratory and constructive play behaviours and strategies of blind and sighted children which emerge over time. The findings reported in this chapter indicate there are a number of differences between blind and sighted children in their approach to exploration of objects, which both persist in some areas and or change overtime in others areas.

In exploratory behaviour all of the blind children showed a decrease between the two time periods on the overall time it took them to explore all the items in the box, this was reflected in a decrease in their off task behaviour, time on task, and the time they took to examine and select the items in the box. The 4 sighted children also showed a decrease between the two time periods on the overall time it took to complete the task, their time on task, and their time to examine the items in the box. It was shown that over time both groups of children decreased their time to explore the box of household items, however the percentage difference between Time period 1 and Time period 2 was larger for the blind children, hence the blind children reduced their exploration time to a far greater extent than the sighted children.

It was perhaps not surprising that these two groups of children spent less time overall to examine the household items, when one considers some of the comments made by the children when they were presented with the box for the second time, for example "Oh I know what that is, it was in the box the last time" hence, familiarity with the items may have ultimately reduced exploratory time, however as was suggested above familiarity with the items had a far greater effect on the blind children.

The sighted children in this study marginally increased the time they spent in off task behaviour and the time they took to select the items. It was noted, in this study that the sighted children spent time visually and tactually searching in the box. As these children were familiar with the box of household items they were perhaps looking for a specific item, this would explain the small increase in selection time for these four sighted children. It was also noted that the sighted children spent slightly longer off task attempting to play with the items functionally or combining selected items in a constructive way e.g. tying the chiffon scarf to the egg cup and swinging this backwards and forwards, for these sighted children the question was not 'what is this'? but 'what can I do with it'? The blind children also handled the items in this way but not to the same extent as the sighted children.

Surprisingly perhaps there were no age effects on any of the variables at either Time 1 or Time 2. It was noted though that Participants Bb and Cb spent considerably less time in stereotypical behaviour at Time 2 and showed a greater decrease in time off task from Time 1 to Time 2 than the other two blind children. The literature suggests that the preschool and early school age years are 'sensitive periods' during which development of tactile understanding is rapid and intensive (Neville, 1995; Röder and Neville 2003; Johnson, 1997) and from this, it could be argued that the development of exploratory skills is extremely important during this period. This period of intensive development could perhaps explain why Participants Bb and Cb, in the 13 month period between Time 1 and Time 2, displayed a much greater reduction in the time they spent off task than the other two blind children, one of whom was younger and one older.

Although both of these girls scored above the level expected on all the Reynell-Zinken and Oregan tests at Time 1, their period of rapid development in exploration discussed above was also reflected in the pattern of development of their Reynell-Zinken scores. For example, at 3 yrs 11months (Time 1) both Participant Bb and Cb scored above the age levels expected for a blind child on sensory motor understanding and exploration of the environment (+3 and +1 month respectively) whereas seven months later, their scores were considerably more above expected blind age norms (+6 and + 12 months respectively). This acceleration in development rate was not apparent in the other two blind children. However, according to Rauschecker and Marler (1987) there is often a great deal of variability in onset and duration of 'sensitive periods' within species. Rauschecker and Marler also suggest that during 'sensitive periods' many kinds of stimulation have the potential to engender neural and behavioural reorganization in the right circumstances. Perhaps, at an earlier stage, the circumstances for exploration were not yet ideal for these two girls and a combination of personality and persistent stereotypical behaviour may have deferred the development of tactile skills until this later stage.

Having established that there were a number of differences between the blind and sighted children firstly, in their strategies of exploration and secondly, over time periods, this study then went on to investigate the different categories of materials and how the children's behaviour towards these changed over time. At the beginning of Study 3, it was shown that the blind children took longer than their sighted matches to explore all six categories of materials. However, these differences were only significant for: items different but with a similar tactile element; items in which the function was obvious and items in which the function was not obvious. Thirteen months later, at Time 2, although the blind children still took longer to explore items in 5 of the 6 categories, there was no longer any significant difference between the two groups of children in those items which were different but with a similar tactile element or for items in which the function was obvious. Again all 8 children in the study reduced exploration time on all six categories of materials. When first introduced to the box of household items the blind children took considerably longer than the sighted children to explore the categories of materials. It would appear that identification of certain materials proved more difficult for the blind children but that performance improved overtime.

In Study 3 (Part 1), group differences were found in the number of questions asked during the period of exploration, with the blind children asking almost 3 times as many questions and making almost twice as many statements (although only the former difference reached significance). Over time, however, there proved to be a reduction in both the number of questions asked and the number of statements made by the blind children but there was no difference over time for the sighted children; the significant differences in these behaviours between the blind and sighted children had also disappeared by Time 2. Perhaps maturity and/or prior knowledge of the items reduced the need for clarification of the materials for the blind children.

There was a significant difference in the number of questions the blind and sighted children asked about the materials but very little difference in the number of correct descriptions given of each item. However, overall the blind children volunteered considerably more incorrect descriptions.

At both time points, there was very little difference between the blind and sighted children on the following:

1) number of items correctly identified in the manipulation and tactually different categories.
2) number of incorrect descriptions of items in the manipulation, tactually similar and non-obvious function categories (as expected, both groups of children gave a high number of incorrect descriptions when the function may not be obvious and very few where the function was obvious

3) demonstration of the correct functional use of manipulation items; tactually different items; items with an obvious function and items whose function was possibly not obvious. For the latter, both sets of children asked a higher percentage of questions than in any other category.

4) number of questions asked (although there were Time 1/Time 2 differences with the sighted children asking slightly fewer questions than the blind children at Time 1 and the blind children asking fewer at Time 2). As stated earlier it was possible the sighted child asked for clarification when visual clues to the identity of the object were not available and function was not obvious.

The study has shown that there were both differences and similarities between blind and sighted children's knowledge of the exploratory materials and their functions and that both groups of children exhibited better comprehension of the items over time.

Constructive play

In constructive play, it had been expected that there would be a substantial reduction in time taken by both the blind and sighted children to complete the jigsaw puzzle and the wooden formboard. Although there was a reduction in the time taken for four of the six children (1 blind and 3 sighted) this was shown to be very small. The difference in performance between the blind and sighted children reported in Part 1 of the study was maintained over time, moreover, with the blind children still taking considerably longer than the sighted children to complete these two puzzles. As they had highly specific visual properties, were designed for 3 year olds and were visually motivating, the sighted children perhaps reached near maximum speed at Time 1 and therefore one would not expect any great improvement over time. In Chapter 3, when discussing the findings from Study 2, it was suggested that the blind children appeared to lack motivation when given toys that did not provide any sensory feedback. These two puzzles were commercially produced and had no tactile, auditory or olfactory elements which could stimulate senses other than vision (Preisler 1993). Without sensory feedback these blind children were perhaps not motivated to complete these puzzles and hence they took considerably longer than the sighted children in both time periods. However as comparisons were possible between only 2 blind and 2 sighted children, it is difficult to draw any definitive conclusions from these results.

As in Study 3 (Part 1), Participants Bb and Cb both refused to participate in the constructive tasks with the wooden formboard and the jigsaw puzzle, despite being given considerable encouragement, both these children remembered this puzzle from the previous time it was presented, and from their comments, it was obvious that they had no desire to repeat their previous experience. Again it is uncertain whether it was lack of ability that caused these two blind children to refuse or lack of motivation or indeed a combination of both. However as both of these children eagerly took part in the musical form board, and both successfully completed it, they did show they could accomplish this form of constructive task if the circumstances suited.

At Time 2, the difference between the two blind children who completed all three puzzles and their sighted matches was greatly reduced on all measures for the musical form board task. When comparing times taken for the two other puzzles, however, these two blind children still took longer than the sighted children on all measures, although there were differences between Time 1 and Time 2 in both groups of children, with time taken to complete the task and time off task in both groups all less at Time 2.

At both Time 1 and Time 2, the blind children performed better when completing the musical formboard, completing it in less time than the wooden formboard and the jigsaw puzzle. This was not the case for the sighted children, where there was very little difference in the time they took to complete all three puzzles, suggesting that for them, there was little difference between these three puzzles in terms of task difficulty. Taken together, these results suggest the properties of the musical formboard may have facilitated the blind children's performance in this task. All four blind children also appeared to be more motivated in the musical formboard task at both time points and showed eagerness to complete each section, perhaps anticipating the musical feedback.

An examination of the component parts of constructive behaviour (time to select, examine and place each section of the puzzle) revealed a number of differences between the blind and sighted children, with these differences maintained over time. At both time points for the jigsaw puzzle task, the wooden formboard and the musical formboard the sighted children used a higher percentage of their time selecting the 5 sections than the blind children and the blind children used a higher percentage of their time examining the 3 puzzles. There was very little difference between the blind children and sighted children in the time taken to place the pieces in the 3 puzzles.

5.8 CONCLUSION

Most previous studies of exploration and object manipulation in blind children suggest that the greatest difficulties arise because training in tactile discrimination and recognition is given too late and no model or strategy for an efficient, effective and socially-appropriate way of tactually exploring objects is provided (Tobin, 1972, Schneekloth 1989 and Reimer, Smit- Engelsman and Siemonsma-Boom 1999). The study reported here revealed considerable variation amongst the four blind children in their levels of exploratory skills and considerable differences over time in some elements of their exploratory strategies. Although the sample was small in size, when one considers the natural range of neurodevelopmental variation that occurs in a typical pre-school and school-aged population, one might expect a similar degree of variation as the sample was specifically chosen to have no cognitive deficits. Past studies of exploratory skills have concentrated on how blind children can be taught to improve their exploratory skill. Fraiberg (1971), for example, maintained that teaching blind children how to obtain rich tactile knowledge was of great importance, suggesting, "if we could "feed" the fingers with all needed tactile input, this would be half the task in teaching the blind child how to explore objects" (p. 390). However, how can this be achieved if, as Nielsen (1996) suggests, "the whole process of development is disturbed or interrupted whenever anybody guides the blind child's hands without his permission.

Incorrect guiding of the hands of blind children may disturb the development of a strategy for tactile orientation, and whenever a sighted person guides or leads the hands of the child, it will be the sighted person's strategy for tactile search that will be used" (p. 29-30). She also says "If the child has started to explore an object and the adult sees that the child's hands are moving in a "wrong" direction ... or if the adult sees that the child omits exploring a certain part of the object... the adult should refrain from taking the child's hands and trying to show him where he should touch or how he should search it" (p. 30). Nielsen concluded that: "The only one strategy for tactile search which is of value for the child who is visually impaired is his own" (p. 31).

The study reported here concentrated therefore on the 'where' and 'when' in the process of exploration, not on the 'how' can blind children be assisted in improving their exploratory skills. The findings have a number of implications for future educational practice. In attempting to answer the question 'where?' in the process of exploration can a blind child improve on their exploratory skills, findings suggest that in their first encounter with new objects, the blind child will require a great deal more time than the sighted child to examine objects and will ask considerably more questions than the sighted child. However, perhaps if they are not hurried at this stage and if they are encouraged to ask questions about the properties of the objects, there will be very little difference between their ability to recognise the properties of most objects on their second encounter with them and that of sighted children. The study also demonstrated that some objects were more difficult for the blind children to identify than others, and again perhaps educators should be aware that for the blind child the properties of some objects make them much more difficult to identify and should provide assistance in these cases only.

In attempting to answer the question 'when?' in the process of exploration can a blind child improve on his or her exploratory skills, it was demonstrated that two of the blind children, spent less time off task, and more time examining the exploratory objects over time. This improvement, from a tactile point of view, took place in the middle of the period between preschool and early school years. However, as has been shown in the literature, there can be a great deal of variation in the timing of 'sensitive periods' in the progression of tactile development; if though educators were to recognise these periods in which tactile development was most active, the children might then be allowed to explore their surroundings more fully, uninterrupted by intrusions from well meaning adults and hence move through this stage more rapidly.

For constructive play, it has been shown that play materials which do not stimulate senses other than vision hold very little interest to blind children and that this lack of interest persists over time. Educators perhaps need to take this into account when providing young blind children with play materials.

As comparisons in this research were made between only a very small number of blind and sighted children and longitudinal analysis was carried out on only 2 of the 6 play behaviours investigated in Study 3 (Part 1), however, it is difficult to draw any definitive conclusions from the findings and it therefore has to be noted that these must be interpreted with caution. They have nevertheless provided some insights into similarities and differences in the development of play behaviours in blind and sighted children and highlighted some areas in which educational practice might benefit from modifications to standard practice in the case of blind children.

Although the studies reported here did not investigate the current nursery/school practices in relation to the teaching of or the materials provided for blind children, the literature suggests in relation to special needs education a variable pattern of practice throughout the United Kingdom. For example, Dunlop (1996) suggests nursery/teacher training is sparse and tends not to focus on the development of skills in teachers in mainstream settings and that there are differences between beliefs, in what is happening, and the facts about what is actually being provided.

Table 5.15 Rating of professional development and the impact of experience on educators' professional insight and knowledge.

Country	Total	High level	Adequate	Poor	Derived from experience
England	24	4	14	6	22
Northern Ireland	20	2	14	4	20
Scotland	26	3	19	4	22
Wales	24	1	19	3	25
Total	94	11	66	17	89

Clough, P., and Nutbrown, C. (2004). Special educational needs and inclusion multiple perspectives of preschool educators in the UK *Journal of early childhood research*, l2, 2, 191–211

In a review of current practice and perspectives on special educational needs and inclusion in the preschool years (Clough and Nutbrown, 2004) which surveyed 94 early childhood educators, it was found very few preschool educators felt appropriately equipped for working with children with learning difficulties. The majority reported that the main part of their understanding and knowledge was derived 'on the job' through experience in teaching young children with special needs as and when such children joined their settings. (see Table 5.15) .

This is particularly pertinent given the move towards inclusive education that sees the majority of visually impaired children attending mainstream schools and not special schools staffed by teachers who have experience of teaching visually impaired children and have specialist information about the needs of visually impaired children and so are able to develop effective teaching strategies. One of the difficulties facing mainstream teachers is that they may only ever experience teaching one visually impaired child. This difficulty is further exacerbated by the range and diverse nature of visual impairments.

CHAPTER 6

OVERVIEW AND CONCLUSIONS

The research presented in this thesis aimed to investigate play behaviour and its development in young blind children. Study 1 addressed the question "Do blind children exhibit the full range of play behaviours exhibited by sighted children? Study 2 was designed to obtain further in-depth information on the play behaviours of the blind child, assessing to what extent different kinds of play behaviours are exhibited and investigating the possibility of a relationship between the emergence and frequency of engagement in specific categories of play and specific developmental stages. The final study, Study 3, was designed to allow a comparative investigation of play patterns when 'typical' versus 'blind-friendly' toys were made available to both blind and sighted children; longitudinal as well as cross-sectional data on play under these contrasting conditions was collected for both groups of children.

Studies 1 and 2 will be discussed together as both studies are linked via the same group of 15 blind children and the same 8 categories of play behaviours. The findings from these interlinking studies have demonstrated that blind children are capable of producing all of the types of play which have been described in the literature for sighted children. However, the younger group of blind children in the studies here showed clear preferences for exploratory and functional play and tended to play mostly alone or with adults. The quantity of the older children's play behaviours were observed to be comparatively evenly spread across 7 of the 8 categories of play, with repetitive play rarely seen in this older group of children. Although adults frequently introduced arts and crafts, receptive play (book reading) and constructive play in nursery contexts, the children rarely spontaneously chose these activities. Study 2 pointed to a number of possible associations between the production of some kinds of play behaviours and current developmental status, with fantasy, constructive and collaborative play associated with higher developmental scores on language cognition, social and motor skills. In contrast, repetitive behaviour was negatively correlated with expressive language scores, cognition, and self help scores. As was suggested earlier, these findings may be the result of an inability to communicate desires and needs resulting in a reversion to repetitive behaviour in blind children. Although, exploratory play was associated with chronological age: with duration and frequency greater in the younger children there were no significant correlations with any of the developmental measures.

The findings from Studies 1 and 2 add to and complement findings from a number of other studies of play and behaviour in young blind children which have reported blind children as having less interaction with peers, a lower frequency of symbolic play in comparison to sighted peers, and a preference for toys or materials with tactile or auditory properties, household items, and natural objects (Adelson and Fraiberg, 1977; Schneekloth 1989; Priesler, Troster and Brambring, 1994; Sandler and Hobson, 2001)

In the studies reported here, free-play alone (i.e. without adult intervention) was rarely observed in the younger blind children but mobility appeared to be a limiting factor. Where mobility was limited, stereotypic behaviour was frequently observed. Sandler (1963) has suggested that at this stage in development there might be a tendency for the blind child to direct his or her activities and feelings inwards. In the younger children observed here, when the parent/caregiver introduced an object into intersubjective play, play with the object was mainly repetitive (tactual and oral).

These findings are in accordance with Sandler and Hobson's (2001) observation that "it often seems difficult for the children to get beyond using their bodies for self-stimulation rather than for relating to the world around them, for identification or exploration" (p212). Play in the younger blind child in these studies who had good mobility, Participant O, usually by contrast involved actively seeking and exploring objects within his environment. A whole new world opens up when a blind child learns to walk.

Findings from studies into the play behaviour of the sighted child indicate that the younger the child, the more of their time is spent in exploration. Clarke-Stewart (1973), for example, found that by 18 months sighted children spend about 50% of their time exploring (this study is discussed fully in Chapter 2, p 76). In a study of the play of eight 2 to 3.5 year olds, Kelly-Vance, Ryalls and Glover (2002) found that exploratory play became more complex with age: at age 2 years simple exploration accounted for 28 % of play behaviours and complex exploration for 33% of behaviours in their sample, whereas at age 3.5 years there was a drop in simple exploration to only 3% with complex exploration rising to 58%.

In the studies reported here this period of intense exploration was seen to extend beyond 3 years of age in the blind child and was still apparent at 5+ years, with the older children often observed in complex exploration, exploring object properties in parallel with other types of play behaviour. A sighted child can take in at a glance the properties of objects of play, creating a visual mental map very quickly; a great amount of exploration is therefore done visually and thus may go unnoticed. For blind children, exploring tactually in parallel with other kinds of play may be necessary in order to assess or remove uncertainties of the properties of potential play objects. This stage of development could therefore perhaps be expedited if parents and educators were to provide more opportunities for exploratory experiences at this stage.

Delays have also been reported in the collaborative play of blind children when with their peers (Erwin, 1993; Parson, 1993; Preisler, 1993). The findings reported here confirmed that collaborative play with peers is rarely seen before 4 years of age, although collaborative play with older siblings and adults was observed much earlier. The duration of collaborative play was positively related to higher developmental scores. However, there were no correlations between developmental status and the frequency with which collaborative play was exhibited. These findings suggest that most of these children were capable of collaborative play, albeit usually of much shorter duration. This may indicate an increase in the quality rather than quantity of collaborative play, as the blind child gets older.

Delays in symbolic play in the blind child have also been widely reported in the literature (Fraiberg, 1977; Rogers & Puchalski, 1984). Hughes et al. (1998) observed the play of 13 preschool children with visual impairments aged between 32 and 52 months and found that over half of the play behaviours observed were in the category of exploration and sensorimotor play, with symbolic play accounting for less than 4% of all observed play behaviours. Although fantasy play constituted a small proportion of the play behaviours in the younger children in the studies reported here, the older children were observed engaging in fantasy play to a far greater extent, both symbolically with objects in their environment and verbally. The greater evidence of symbolic play observed here may have been a consequence of the availability of peer interaction; this may facilitate and promote the production of fantasy play in blind children and be more central to its development than it is for sighted children.

Both Study 1 and Study 2 found that both the frequency of fantasy play and the amount of time spent in this activity were significantly correlated with the language components of the developmental tests. These results suggest that level of language may be the limiting factor in the blind child's ability to indulge in fantasy play rather than the fact that they cannot see, although of course language development may itself be delayed as a result of lack of sensory visual input.

Lewis et al (2000) studied the nature of pretend play in 18 visually impaired children aged between 21 and 86 months, using 2 standardised tests. These researchers found blindness per se did not limit the ability to become involved in symbolic play but did limit the ability to relate different toys and materials together. Their findings also suggested that the emergence and use of symbolic play was strongly related to language abilities.

The results reported here seem to indicate a reduction in the frequency of receptive play over time in the group of young blind children studied. However, it was noted that receptive play mainly involved adults either reading or singing with the children. As the younger children became more active and were able to explore and play unaccompanied, the need for parents to keep their child amused by reading or singing to them was reduced. Similarly, as the older child in the nursery became more confident of his/her surroundings, nursery teachers tended to read less to these children. It was noted that the blind children in the studies here rarely chose a book to read. This is perhaps not surprising as there were very few if any tactile books available for these children in their nurseries or school (researcher's notes).

Although it had been expected that there would be an association between gross and fine motor abilities and functional play behaviour, there were no significant correlations found with any of the scores on the developmental scales. These findings may be attributed to the type of toy the blind children in this study appeared to be most interested in. Many functional toys have sound or music attached, qualities for which the blind child, when given a choice, often shows a marked preference. In contrast, constructive play behaviours, rarely seen in the younger children, were significantly correlated with fine motor abilities, language and social skills. It was noted by the researcher that the children in this study who participated in constructive play did so mainly when collaborating verbally with either another child or adult, suggesting that it is perhaps necessary for the blind child to first have good social and language skills before they can take part in this form of play.

Creative play was analysed in Studies 1 and 2 as a component of constructive play but was treated separately in Study 3 (Chapters 4 and 5). Very few of the blind children spontaneously chose to become involved in creative play. Many theorists maintain that during play children feel successful when they engage in a task that they have defined for themselves and that for creative play to emerge materials need to be concrete, real, and relevant to the lives of young children (Piaget, 1972; Smith, 1985; Weber, 1984; Fromberg, 1998, 2002; Isenberg & Jalongo, 2000; Jensen, 1999). It is perhaps not then surprising that the blind children in the studies reported here proved reluctant to undertake artwork under the standard circumstances described, as the materials used for artwork were highly visual. i.e. neither concrete, real or relevant to a child with visual impairment.

One other problem that was repeatedly evident was the apparent lack of any great motivation in many of the blind children to play with the toys available to them. As in Preisler's (1997) study, the toys most frequently found in the children's nurseries, school and homes were typically commercially produced and designed to be visually attractive.

Very few of the toys available to these blind children contained tactile, auditory or olfactory elements which could stimulate senses other than vision.

Repetitive and imitative play behaviours, as was expected, were mainly found in the youngest participants in the first two studies.

In an attempt to address some of the play problems evidenced by blind children in the above two studies, Study 3 investigated the impact on play patterns in 4 blind and 4 sighted children, aged 3 years 2 months to 6 years 2 months, when 'typical' versus 'blind-friendly' toys were made available in 5 of the play categories described above. Given the findings above, creative play was included in this final study as a separate component of constructive play; hence 6 categories of play were investigated. The nature of this investigation did not accommodate collaborative play and imitative and repetitive play were also excluded as they had been found mainly in children less than 3 years of age.

It was considered important to assess the developmental levels of these young blind children on first entry to Study 3. In a number of previous studies (e.g. Dunlea, 1989; Brown, Hobson, Lee and Stevenson, 1997), developmental tests for sighted children such as the WIPPSI and the WISC have been used to assess developmental levels in the blind participants. As these tests require the processing and handling of visual materials it is clear that the scores achieved by blind and sighted children will not be comparable. In this study the children were therefore assessed using two standardised tests considered suitable for both blind and sighted children, the Reynell-Zinken and the Oregon developmental scales. All of the blind children were assessed twice, at the beginning and the middle of the study, in order to ensure firstly, that they all met the study criterion of absence of cognitive impairment on entry, and secondly, that no significant regression in development was occurring within the period of data collection.

As the Reynell-Zinken scales have an age limit of 2 to 4 years for sighted children and 5+ years for blind children it was not possible to carry out any statistical evaluation of any differences in the scores achieved by these two groups of blind and sighted children as several were scoring at ceiling levels. However, there were no significant differences between the scores they achieved on either the first or second set of scores on the Oregon scales. As was pointed out earlier, these results concur with the findings from Brown et al's (1986) preliminary use of the Oregon Skills Inventory with sighted children which indicated that visually impaired and blind preschool children who have no additional handicaps can reach many important developmental milestones at the same age levels as sighted children (Oregon Manual, 1986; p 9). Although these tests are only partially comparable to more widely used psychometric tests (Sattler 1992), they perhaps reduced the potential for bias in favour of the sighted participants in the findings of this study.

A third test that was carried out all 8 children to asses their level of symbolic functioning, the Test of Pretend Play (ToPP). The ToPP results indicated that both groups of children in this study were capable of taking part in pretend play at levels appropriate to their chronological ages and there were no significant differences between the scores of the blind and sighted children on this test.

All of the above notwithstanding, Study 3 (Parts 1 and 2) found a number of differences between the blind and sighted children in both the strategies they used to interact with materials in exploratory, constructive, creative, functional, pretend and receptive play and in their preferences for, and handling of, materials with differing sensory properties.

In exploratory play, although the blind children spent proportionately more of their overall time than the sighted children in exploring the materials, there were no significant differences in the absolute time they spent either on or off task, in other words, the blind children were shown to demonstrate equal dedication to the task. An analysis of responses to the 6 categories of materials made available for exploratory play showed that although the blind children took longer than the sighted children to explore familiar items, the difference was far less than the difference in the time taken to explore unfamiliar objects. The blind children, however, made almost twice as many task-related statements and asked significantly more task-related question than the sighted children. Overall, the blind children volunteered more incorrect descriptions of items than the sighted children but for some categories of materials there were no clear differences. It may be that in the instances where the sighted children gave fewer incorrect descriptions, they were using visual clues as to the identity of the item and either volunteered correct information only or did not feel it necessary to volunteer any information at all.

In constructive, functional and creative play differences in behaviours were again found, both between the two groups of children and in response to the 'typical' versus 'blind –friendly' toys. When given 'blind–friendly' toys/materials to play with, the blind children demonstrated both a preference for such toys and an improvement in task performance. This pattern was not apparent in the sighted children who showed little if any difference in their handling of the toys in these two conditions.

In fantasy play, the sighted children displayed significantly more pretend behaviours than the blind children. It was observed that when the blind children were given pretend materials to play with, although some of the materials did prompt some pretend behaviour, in the main these children showed very little interest in playing with the materials in a symbolic manner. In contrast, when the play was structured by adding a pretend topic to the play, these blind children displayed significantly more pretend behaviours than the sighted children. It has to be noted, however, that this was mainly attributable to pretend speech; these children still showed very little interest in playing with the materials in a symbolic manner.

For receptive play, it was apparent that the method used in story telling had a significant effect on both the blind and sighted children's recall of story. There was a positive influence on the blind children's story retelling when the story was read using props, suggesting that by making connections between listening to stories and the use of props blind children may be better enabled to remember and retell story elements.

The second part of Study 3 provided a final, longitudinal analysis of two of the categories of play investigated in this thesis: exploratory and constructive play. Ideally, all 8 categories of play would have been investigated longitudinally but both the increasing age of this blind population and time limitations on the research precluded this.

The longitudinal analysis sought to investigate whether the differences and similarities in play behaviour between blind and sighted children identified in the earlier studies persist over time. It also aimed to investigate whether the differences in response to standard versus 'blind friendly' toys and materials persist over time or whether familiarity alone can have a positive impact on engagement and play behaviours. The data collected showed that blind children asked fewer questions and made fewer statements about the properties of the toys on the second occasion of testing. Although both groups of children reduced the time it took them to complete most of the tasks, there still remained a difference between the blind and sighted children in time to completion, with the reduction in time between the two time periods in the main being far greater for the sighted children. Although there were minor changes in the strategies the two groups of children used to complete each task, the basic structure of their strategies tended to persist over time.

In conclusion:

This research has provided comprehensive and detailed information on the early play behaviour of blind children. Studies 1 and 2 have demonstrated that blind children are capable of being involved in all 8 of the categories of play found in typically developing children. They also showed that the emergence of some play behaviours is closely linked to progress in specific developmental areas. Study 3 (Part 1) demonstrated that blind children not only have a distinct preference for 'blind-friendly' toys but also function significantly better with them. Study 3 (Part 2) highlighted the fact that some of the differences between blind and sighted children in play behaviour are not age-dependent and persist over time, but it also highlighted the fact that under the right circumstances of testing, relatively few differences may exist for at least some areas of play at any given age. A preference for 'blind–friendly' toys was shown to persist over time and for most categories of play, however, as did distinctive strategies for engaging in the process of play.

Given the trend in recent years towards integrating children with special educational needs into mainstream education (Department of education Northern Ireland (DENI), 1997; Scottish Office, 1999; National Assembly for Wales (NAW), 2003; Qualifications and Curriculum Authority (QCA), 2000), the findings reported here have a number of implications for future educational practice. A recent investigation by Clough and Nutbrown (2004) of preschool educators' perspectives on inclusive education in preschool settings led them to conclude that most teachers and nursery nurses are broadly supportive of inclusive early education but that,

> "....professional development opportunities for preschool educators was an issue which generated much comment and surprisingly few felt appropriately equipped for working with children with learning difficulties. The majority reported that the main part of their understanding and knowledge was derived 'on the job' through experience in teaching young children with learning difficulties as and when such children joined their settings." (p202).

Findings from fundamental research such as that reported here can hopefully be fed back directly into practice as they suggest ways in which toys can best be introduced to blind children and also which type of toys are most suitable for them. Priesler (1997), in her longitudinal analysis of the social and emotional development of blind children, found that the greatest problem in the play contexts provided for the children in her study was in finding toys that were interesting to them. The findings in this study concur with Preisler's findings but the following suggestions may nevertheless assist blind children in realising their full potential in play:

- If blind children are given materials and toys which are more concrete, real, and relevant to their available senses and are allowed to spend some time exploring these materials, they might derive greater pleasure from their play activities.

- Adults need to play a mediating role if the child's motivation to engage with things he or she cannot see is to be maintained. As Sandler and Hobson (2001) point out:

  > "it is easy to observe how many blind children try to sustain long conversations with their teachers so that they can keep track of the other person. They seem to feel sustained by this contact. It is important to be aware of this aspect of what might otherwise be construed as importuning behaviour" (p202).

- Although the clear separation between symbol and referent is often missing in the play of blind children, it is important for educators to recognize that blind children's symbolic play is often expressed in the production of appropriate noise (for example, at the Teletubbies party, Participant Cb knocked on the table to symbolize the guests arriving at the party). By listening to the children instead of watching them, educators will perhaps come to realize that certain sounds for these blind children may represent an attempt at constructing a pretend behaviour which contains the child's own creation.

One last point is perhaps worth making. Most previous studies of play in blind children have concentrated on symbolic play and have adopted a deficit model of play and there have been few longitudinal analyses of play in blind children which have incorporated all of the types of play investigated above. It is hoped that the findings from the research reported here will have both practical utility and theoretical relevance but the limitations on interpretation of the data collected must be acknowledged. Comparisons were made between a very small number of blind and sighted children and longitudinal analysis was carried out on only 2 categories of play behaviours and as such it is difficult to draw definitive conclusions; findings must therefore be interpreted with due caution. There is clearly a need for a more extensive longitudinal investigation of the play of blind children, one which does not begin from a deficit model and is open to understanding the function of similarities and differences in the development of play in this population of children. This thesis represents a first step in this direction.

Suggested directions for future research on play and blind children

Although there were differences in the responses of blind and sighted children to the toys/materials used in this thesis and these were shown to persist over time, it is important to recognise that these studies were carried out on a very small number of blind children. As the review of the literature in Chapter I pointed out, the population of blind children is highly heterogeneous and consequently the numbers of congenitally blind children who have total blindness is small. These factors make it very difficult to talk about congenitally blind children as a group, but a co-ordinated program of action research studies similar to the studies reported here could lead to a much richer dataset, strengthening the reliability and validity of interpretations of findings.

There have been very few longitudinal studies on development in blind children and this is a vital next step for research in this area. Although some of the data presented here were longitudinal (15 months in study 1 and 2 and 15 months in study 3), Study 3 investigated only two of the 8 play behaviours exhibited, and comparisons between blind and sighted children were made over only two time periods. Research which incorporates all 8 play behaviours, conducted over a longer period of time, may reveal periods in play development where intensive intervention may assist blind children in better understanding of play objects and play events in their environment, enabling them to move on to the next stage in their play development. In the same way, intervention studies which concentrate on areas where blind children show preferences for certain toys/materials and specific areas - for example, in the time taken to select and explore toys/ materials - again might allow such children to progress more effectively in their play development.

Future research on the play development of blind children is clearly necessary, with both fundamental and applied studies required. For findings to impact on practice, effective interventions need to be premised on an understanding of how blindness affects play development.

APPENDIX A

Timetable

Timetable

1) Exploratory play1st month 2) Constructive play 1 2nd 3rd month 3) Constructive play 2

Condition:	(Standard + 'Blind friendly')			Standard Jigsaw	Standard F/board	"Blind friendly" F/board		Standard H/nails	'Blind friendly' Pegs
Participant	Age	Week	Age	Week	Week	Week	Age	Week	Week
Ab	6.02	1	6.03	1	2	3	6.04	1	2
As	6.02	1	6.03	1	2	3	6.04	1	2
Bb	3.11	2	4.00	1	3	2			
Bs	3.11	2	4.00	1	3	2			
Cb	3.11	3	4.00	3	2	1			
Cs	3.10	3	3.11	3	2	1			
Db	3.02	4	3.03	2	1	3			
DS	3.02	4	3.03	2	1	3			

3) Creative play 5th 6th month **4) Functional play 7th 8th month**

Condition:	Standard Table		'Blind- friendly' Easel		Standard Non-music		'Blind- friendly' Music	
Participant	Age	Week	Age	Week	Age	Week	Age	Week
Ab	6.07	1	6.08	5	6.10	8	6.09	4
As	6.07	1	6.08	5	6.10	8	6.09	4
Bb	4.05	6	4.04	2	4.06	1	4.07	5
Bs	4.05	6	4.04	2	4.06	1	4.07	5
Cb	4.04	3	4.05	7	4.07	7	4.06	3
Cs	4.03	3	4.04	7	4.06	7	4.05	3
Db	3.08	8	3.07	4	3.08	2	3.09	6
DS	3.08	8	3.07	4	3.08	2	3.09	6

5) Pretend play 9th 10th 11th month **6) Receptive play 12th 13 th month**

Condition:	Standard Table		'Blind- friendly' Easel		Standard Non-music		'Blind- friendly' Music	
Participant	Age	Week	Age	Week	Age	Week	Age	Week
Ab	7.00	6	7.01	2	7.02	6	7.01	3
As	7.00	6	7.01	2	7.02	6	7.01	3
Bb	4.08	1	4.09	5	4.09	1	4.10	5
Bs	4.08	1	4.09	5	4.09	1	4.10	5
Cb	4.09	7	4.08	3	4.10	7	4.09	4
Cs	4.08	7	4.07	3	4.09	7	4.08	4
Db	3.11	4	4.00	8	4.00	2	4.01	8
DS	3.11	4	4.00	8	4.00	2	4.01	8

APPENDIX B

Morrow story retelling analysis

Parsed Story

Morrow (2001) Story Retelling Analysis

Child's Name___ __________ Age______

Title of Story ____________________________ Date___________

Setting

a. Begins story with an introduction ___

b. Names main character ___

c. Number of other characters named ___

d. Actual number of other characters ___

e. Score for "other characters" (c/d): ___

f. Includes statement about time or place ___

Theme

Refers to main character's primary goal or problem to be solved. ___

Plot Episodes

a. Number of episodes recalled ___

b. Number of episodes in story ___

c. Score for "plot episodes" (a/b) ___

Resolution

a. Names problem solution/goal attainment ___

b. Ends story ___

Sequence

Retells story in structural order: setting, theme,
plot episodes, resolution. (score 2 for proper,
1 for partial, 0 for no sequence evident) ___

Highest Score Possible 10 Child's Score ___

TACTILE STORY

Example of a Parsed Story: Cats Cradle

Setting:

A. Dad is taking Ben to choose a kitten the kitten is on a boat.
B. Characters: Ben , Ben's dad, Pirate(kitten), blue rabbit and the owner of the kittens = 5

Theme:
Pirate didn't like his basket and spent most of the story looking for somewhere else to sleep

Plot Episodes:
Episode one: Ben goes to choose a kitten from a houseboat

Episode two: Pirate is not happy. Ben thinks pirate may be cold so he puts him in the airing cupboard.

Episode three: Pirate is still not happy. Bens Dad thinks Pirate is missing his mum and puts him in a carrycot.

Episode four: Pirate is still not happy, he disappears. Ben and his Dad look everywhere for him.

Episode five: Dad finds Ben in a peg bag on the washing line

Episode six: Dad makes a hammock for Pirate.

Resolution:

A. Ben was missing the movement of the boat
B. Pirate.is happy and sleeps in the hammock

VISUAL STORY

Example of a Parsed Story: Walters Red Star

Setting:
A. Walter is going to school with Andrew. The setting is in a classroom
B. Characters: Walter, Andrew, Miss Nash, Michael, Jane and Heather. = 6

Theme:
Walter the Monkey goes to school with Andrew, he spends most of the story misbehaving. In the end he is good and gets a star.

Plot Episodes:
Episode one: Walter goes to school and meets the teacher.

Episode two: Walter bangs the lid of the desk while the other children are working. Jane gets a green star

Episode three: Walter finds crisps and burst the bag scaring the teacher.

Episode four:. The children are doing art work. Walter sticks a banana to the paper with plasticene. The teacher gives Michael a green star for drawing a space ship.

Episode five: The children all go to the gym

Episode six : Heather had climbed the wall bars and was frightened and Walter rescued her.

Episode seven: Walter is congratulated and given a red star.

Resolution:
A. Walter misbehaves in school
B. In the end Walter is good and gets a red star.

APPENDIX C

Receptive play

Researchers questions

QUESTIONS	SCORE
1. Where did Ben and his Dad get the kitten? Reply: "A ship"	1
2. What was the kittens' name? Reply "Pirate"	1
3. Where did Ben and his Dad put Pirate? Reply "In the airing cupboard"	1
4. Did Ben like it in the airing cupboard? Reply "No"	1
5. Where else did Ben and his Dad put the Pirate? Reply "In a carrycot"	1
6. What did Ben's dad give to Pirate when he was in the carrycot? Reply: "A rabbit"	1
7. Did Ben like it in the carrycot? Reply "No"	1
8. Where did Pirate go next? Reply "The peg bag."	1
9. Did Ben like it in the peg bag? Reply "Yes"	1
10. Then what did Ben's Dad make for Pirate? Reply- "A hammock"	1

APPENDIX D

Creative play: Raw scores

Materials

Raw scores for each child for both artwork done on a tabletop and easel

Visual		Olfactory		Tactual /Visual					Tactual			
paper	pen	scent pen	coffee bean	straw	button	leave	feather	stick	wool	felt	sand paper	pasta
Blind tabletop												
1	0	0	0	0	0	1	1	0	1	0	2	0
1	0	0	0	0	0	0	0	0	2	0	0	0
0	0	0	1	1	0	2	0	1	2	1	0	0
2	0	0	0	1	0	1	1	0	3	0	2	0
4	**0**	**0**	**1**	**2**	**0**	**4**	**2**	**1**	**8**	**1**	**4**	**0**
Sighted tabletop												
9	1	0	0	2	0	0	0	0	0	1	0	0
9	6	4	0	0	0	0	0	3	3	0	0	0
4	0	2	0	0	0	0	0	0	0	1	0	1
4	0	2	0	2	0	4	0	2	4	0	0	0
26	**7**	**8**	**0**	**4**	**0**	**4**	**0**	**5**	**7**	**2**	**0**	**1**
Blind easel												
1	0	0	2	3	2	0	0	2	1	1	0	0
1	0	0	6	2	0	0	0	1	2	0	0	0
0	0	1	2	1	2	0	0	0	2	1	1	1
0	0	3	2	1	1	1	1	0	0	1	0	1
2	**0**	**4**	**12**	**7**	**5**	**1**	**1**	**3**	**5**	**3**	**1**	**2**
Sighted easel												
4	2	3	2	2	0	0	0	0	0	1	1	1
3	5	2	2	1	0	0	0	1	0	1	0	2
2	2	0	2	1	0	0	1	0	1	0	0	0
2	0	0	0	2	0	0	1	0	0	0	0	1
11	**9**	**5**	**6**	**6**	**0**	**0**	**2**	**1**	**1**	**2**	**1**	**4**

Nb total for each child in bold

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