

Language Acquisition: The Child's Spontaneous
Descriptions of Events in Time

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1969



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Preface

I wish to thank all those who helped me during the course of my work on the present study. Dr. Margaret Donaldson and Roger J. Wales of the S.S.R.C. Cognition Project, University of Edinburgh provided invaluable support: it was due to them that I was able to collect data from all the children attending the Nursery School. My next acknowledgement, naturally, is to the children who spent so much of their time talking.

I am particularly grateful to both my supervisors: to Professor John Lyons for his patient supervision (long distance) and his extremely helpful criticisms throughout the writing of my thesis, and to Roger Wales for his supervision and, in particular, for first arousing my interest in Psycholinguistics.

Lastly, I am most indebted to my husband, Herbert H. Clark, who provided encouragement, advice on statistics, suggestions on many stages of the manuscript, and a fund of psychological information, all of which was most helpful.

I would also like to thank the Department of Psychology, Carnegie-Mellon University, Pittsburgh, for 'housing' me during my absence from Edinburgh. Finally, I would like to thank Mrs. Betty Boal for the long hours she put in while typing the manuscript in its final form.

Abstract

There are many different ways of describing a series of events in time; for instance, (a) X happened and (then) Y happened, (b) X happened before Y happened, (c) Before Y happened, X happened, (d) After X happened, Y happened, and (e) Y happened after X happened. Three principles -- order of mention, derivational simplicity and choice of theme -- are proposed to account for how adults choose temporal descriptions in various contexts. The principles are all supported by psychological and linguistic data. These three principles serve as the basis for a developmental hypothesis which predicts the order of appearance of the syntactic constructions used by young children to describe events in temporal succession. It predicts that the main stages that will appear in the children's descriptions during an early period of language acquisition are, first, compound descriptions, as in (a) above, then complex descriptions with a subordinate clause in second position, as in (b) and (e), and lastly, complex descriptions with the subordinate clause in first place, as in (c) and (d).

This hypothesis is confirmed by data collected over a six-months period from fifteen three-and-a-half year-old children, some of whom had just begun to use temporal subordinate clauses in their speech. The principal subordinate conjunctions that were used by the majority of the children in this study are when, if and because. A number of other temporal conjunctions also appeared but their use was not so widespread.

Developmentally, the notion of time seems to start with the recognition that events happen at particular times (i.e. at lunchtime)

and to progress successively to the relating of these events simultaneous with, preceding and following each other. Evidence that temporal subordinate clauses develop in this order is provided by the types of temporal adverb and conjunction used in the very early stages of language acquisition.

I. Introduction: Theories of Language Acquisition.

1.0 In this thesis, I shall attempt to answer two closely related questions: How does a child of 3;6 - 4 years describe events in time (i.e. the relations involving before, after, and simultaneous with)? and, Is there any developmental sequence in the type of description given as a result of constraints imposed by the process of language acquisition? I shall present evidence that there is a developmental sequence, and that the child's repertoire of temporal description types appears to depend on the stage he has reached in the language-acquisition process. In presenting background material for the problem, and in discussing previous studies that touch on it, I have followed approximately the following plan: in the first four chapters I have presented the general background to the problem in language acquisition, and in particular the theoretical issues that arise if one accepts a Chomskyan linguistic theory together with a mentalistic outlook on psychology in general, and on language-acquisition in particular. In the second chapter, the philosophical sources of the different concepts of time are briefly explored, and the confusion between 'subjective' and 'objective' time is discussed in relation to some psychological studies. The next two chapters describe and evaluate some past studies of the acquisition of language and of the concept of time in children. In the fifth chapter, I have introduced three principles which can be used to classify adult descriptions of events in time; the three principles are backed up by psychological evidence. It is from these principles that my developmental hypothesis is indirectly derived. Data supporting the hypothesis are presented in Chapter VII after a brief description of the subjects

and data-collection methods. A linguistic analysis of temporal Adverbial clauses is then proposed and its applicability to the developmental study is assessed. Finally, the two main sentence-types used in temporal descriptions ('compound' and 'complex' sentences) are compared from a linguistic point of view.

1.1 For some time, empiricist theories of mind have dominated psychology. The empiricist claims that the content of the mind (acquired knowledge) is derived only from learning (experience), and that any internal structure is merely the result of associating sensory ideas. The mentalist (rationalist) position was strongly maintained in the seventeenth century, especially by such writers as Descartes, Herbert, Cudworth and Locke. Leibnitz, for instance, did not distinguish at all sharply between innate and learned, saying that "The mind leans upon these [innate] principles every moment, but it does not come so easily to distinguish them and to represent them distinctly and separately, because that demands great attention to its acts.... Thus it is that one possesses many things without knowing it..." (1949:74). Humboldt (1836) applies rationalist views to the special case of language learning and decided that language could not be taught; however, the conditions under which language will develop spontaneously in the mind on its own can be presented: the form of a language (the schema for its grammar) is largely given (i.e. innate) although it will not be available without appropriate experience to set the language-forming operations in action. Such rationalist views contrast with the empiricist notion that language appears adventitiously, either by "conditioning" with reinforcement (Quine, 1960; Skinner, 1957), or by imitation (Wittgenstein, 1953)

with drills and explanations, but in each case independently of any innate structure. The empiricists have assumed that only the procedures and mechanisms for the acquisition of knowledge constitute an innate property of the mind. The form of the knowledge acquired is quite free. The rationalist, on the other hand, has assumed that the general form of any system of knowledge is fixed in advance as a general disposition of mind, and that the function of experience is to realize this structure and to carefully differentiate it from others.

Although rationalist and empiricist views cannot always be sharply distinguished, particular versions of theories can usually be contrasted and presented as explicit hypotheses about the acquisition of knowledge in specific areas, e.g. the innate structure of a language acquisition device. Learning theory, in the empiricist tradition, has concentrated on the question of species-independent regularities in the acquisition of items in some "behavioural repertoire" which is manipulated under experimental conditions (cf. Miller and Dollard, 1941; Mowrer, 1950; Skinner, 1957). On the whole, learning theory has looked at tasks that are extrinsic to the organism's cognitive capacity (Skinner, 1957) rather than looking at the structure of the cognitive ability underlying observable behavior (cf. for example, Newell, Shaw and Simon, 1958).

Behaviourist (learning) theories of language acquisition (Miller and Dollard, 1941:82s.; Mowrer, 1950: ch. 23; Skinner, 1957) have claimed that the necessary condition for learning language is the arrangement of the contingencies of reinforcement by the verbal community in which the child finds himself: "A child acquires verbal behavior when

relatively unpatterned vocalizations, selectively reinforced, gradually assume forms which produce appropriate consequences in a given verbal community" (Skinner, 1957:31), and, in a more general context: "Differential reinforcement shapes up all verbal forms, and when a prior stimulus enters into the contingency, reinforcement is responsible for its resulting control.... The availability of behavior, its probability or strength, depends on whether reinforcements continue in effect and according to what schedule" (ibid.:203-204). However, it is extremely difficult to define Skinner's (1957) view of reinforcement, which appears to be so wide in its application as to become vacuous; for example, after defining some observable types of reinforcement, Skinner appeals to "automatic self-reinforcement" in those cases where there is nothing observable: "A man talks to himself... because of the reinforcement he receives" (ibid.:163), "the child is reinforced automatically when he duplicates the sounds of airplanes, streetcars..." (ibid.:164), "the young child alone in the nursery may automatically reinforce his own exploratory verbal behavior when he produces sounds which he has heard in the speech of others" (ibid.:158), "the speaker who is also an accomplished listener 'knows when he has correctly echoed a response' and is reinforced thereby" (ibid.:68)¹.

The behaviourist approach to language acquisition has recently been challenged by linguists such as Chomsky (Chomsky, 1959, 1965; Miller and Chomsky, 1963) and philosophers such as Katz (1966) and Moravcsik (1967); they argue (as mentalists) that language is

¹Cf. also Chomsky, 1959, for a very detailed critique of the empiricist position.

both too complex and too abstract in its structure (cf. Lashley, 1951) to be acquired by a child without some innate knowledge, which must almost certainly take the form of certain universal (linguistic) principles. Chomsky, in considering the importance of the processes involved in language acquisition, points out that the first step is to characterize the specific patterns imposed by the language; subsequently "it should be possible to derive from a properly formulated grammar a statement of the integrative processes and generalized patterns imposed on the specific acts that constitute an utterance" (1959:56). The corollary to this, of course, is that "A general linguistic theory... must therefore be regarded as a specific hypothesis, of an essentially rationalistic cast, as to the nature of mental structures and processes" (1965:53; cf. also Chomsky, 1959, 1962, 1964). In Chomsky's view, most Bloomfieldian linguistics has been too empiricist in its outlook in that it has assumed that general linguistic theory consists merely of a set of procedures for determining the grammar of a language from a corpus of data. General linguistic theory should, however, mirror something of what we, as speakers of a language, know about its structure. Such knowledge as we have cannot be induced from the application of step-by-step operations such as segmentation, classification, slot-filling and substitution procedures, or association, etc., of any type which has so far been developed within linguistics, psychology or philosophy. The limitations on previous linguistic theories which are taxonomic are that they are unable to say anything about how we use language: "...such speculations have not provided any way to account for or even express the fundamental fact about the normal use of language,

namely the speaker's ability to produce and understand instantly new sentences that are not similar in any way to those previously heard in any physically defined sense and in terms of any notion of frames or classes of elements, nor associated with those previously heard by conditioning, nor obtainable from them by any sort of "generalization" known to psychology or philosophy" (Chomsky 1965:58). The behaviourist tack, which is to avoid the problem by assuming that the language acquisition device works on very simple lines, will never tell us anything about how a language is structured nor how it functions. It is, therefore, necessary to construct a model of language that is complex enough to account for language acquisition while at the same time being general enough to have a universal application. The construction of a general (universal) model for language acquisition to account for the structures that are "learnt" during a period of roughly eighteen months (between the ages of $2\frac{1}{2}$ and 4) must of necessity posit some innate structures, and these in turn must be related to those aspects of language that are universal. Otherwise, it is difficult to see how any model to account for all language acquisition could be constructed.

What arguments, though, can the mentalist produce to support his contention that language can only be learnt because of the presence of innate structure(s) in the mind? The assumption behind any such claim is that there exist a number of features common to all languages (Greenberg, 1966)² which allow the child to extract the relevant

²However the study of surface structure for universals (e.g. Greenberg, 1963) will only reveal statistical tendencies, not deep structure universals; Cf. Chomsky, 1965:118; Fillmore, 1968:2.

information at some level and then gradually to differentiate the finer points of structure that are peculiar to each language. Chomsky (1965) proposes that "the structure of particular languages may well be largely determined by factors over which the individual has no conscious control and concerning which society may have little choice or freedom.. it may well be that the general features of language structure reflect, not so much the course of one's experience, but rather the general character of one's capacity to acquire knowledge -- in the traditional sense, one's innate ideas and innate principles" (1965:59).

Chomsky (and likewise Lenneberg, 1967, and McNeill, 1966) is led to the mentalist position by his re-definition of the problems in linguistics. Traditionally, the role of the grammar was to assign to each of an infinite range of sentences a structural description which would show how the sentences were understood. The grammarian's task was not defined, though, in the sort of terms used above, but as the description of a language. Traditional grammars concentrated on the structural descriptions that can be given, but they did not make explicit the underlying regularities in the language, e.g. the relations between different sentence-types. Although the idea of universal grammar has been current for a long time (Chomsky, 1966; Salmon, 1969), among twentieth century linguists (besides e.g. Hjelmslev, Jakobson and Kurylowicz) Chomsky has recently been the most emphatic in stating the necessity of supplementing the grammar of a particular language by a universal grammar, and of dealing explicitly with the creative side of language. Both the creativity (the ability to both generate and understand infinitely many new sentences) and universal grammar are considered central concerns of linguistics by Chomsky and the Transformational

Generative group: "A theory that aims for explanatory adequacy incorporates an account of linguistic universals, and it attributes tacit knowledge of these universals to the child. It proposes, then, that the child approaches the data with the presumption that they are drawn from a language of a certain antecedently well-defined type, his problem being to determine which of the (humanly) possible languages is that of the community in which he is placed. Language learning would be impossible unless this were the case. The important question is: What are the initial assumptions concerning the nature of language that the child brings to language learning, and how detailed and specific is the innate schema (the general definition of "grammar") that gradually becomes more explicit and differentiated as the child learns the language? For the present we cannot come at all close to making a hypothesis about innate schemata that is rich, detailed and specific enough to account for the fact of language acquisition. Consequently, the main task of linguistic theory must be to develop an account of linguistic universals that, on the one hand, will not be falsified by the actual diversity of languages, and, on the other, will be sufficiently rich and explicit to account for the rapidity and uniformity of language learning, and the remarkable complexity and range of the generative grammars that are the product of language learning" (Chomsky, 1965:27-28).

One of the tasks then of a linguistically adequate theory is the construction of an "acquisition model" for language (Chomsky, 1965; Katz, 1966). The language acquisition device (LAD) must consist of the various linguistic universals. McNeill (1966) has discussed two which must be included: the hierarchy of categories (ie. NP, VP, etc.) and the basic grammatical relations (subject-of, object-of, etc.).

There may well be others. LAD, first of all, has as input primary linguistic data; this material is scanned for distinctions that match those distinctions drawn from the hierarchy of categories. As the input is natural language, some of the (universal) distinctions are bound to be present. Whenever such a distinction is observed, it is incorporated into LAD's own grammar that is in the process of being constructed. The primary input serves the purpose of making LAD choose between various universal distinctions between categories. At the same time, LAD also looks for sentence-patterns corresponding to the basic grammatical relations. This is not independent of the search for hierarchical structure. The role of the primary data to which the child is exposed is to direct LAD's attention to the relevant features (the universal ones) of the language: "... the role of experience is primarily to provide the data against which predictions and thus hypotheses are judged. Experience serves not to provide the things to be copied by the mind, as on the empiricist's account, but to help eliminate false hypotheses about the rules of the language" (Katz, 1966:278 fn.28). LAD has therefore to be equipped with the specific aspects of linguistic "competence" which cannot be induced from speech, i.e. appropriate generic grammatical classes and hierarchical structures.

Chomsky (1965) made an important distinction between competence and performance in language (this is a distinction somewhat similar to that drawn by de Saussure between langue and parole, 1948). Competence is the speaker-hearer's knowledge of his language, and performance is the actual use of language in concrete situations. Competence, as specified by the linguistic theory is the knowledge in the mind of the idealized

speaker-hearer, unaffected by "grammatically irrelevant" considerations such as memory limitations, lack of attention, errors, etc. which occur frequently in performance. A competence grammar, then, is an idealized version of what the speaker is familiar with in everyday speech. The linguistic grammar (transformational generative) is meant to represent this competence. In addition, the competence grammar is assumed to be a part of the "performance grammar": CG "=" LG (where "=" means "equivalent in some way"). Although, in adult speech, there is a check on what are extraneous performance factors, like length of attention span, memory, bad hearing, etc., which can be abstracted from the linguistic (phonological, syntactic and semantic) component of the speaker's utterances to make up the Linguistic Grammar, it is not clear whether the CG is in fact underlying the performance grammar directly. There are many extra-linguistic factors in performance (situational and contextual cues, shorter processing time for certain deletion constructions, etc) which appear to indicate that there may not be a one-to-one correspondance between the complexity of CG and whatever processes are used in performance: there may well be performative shortcuts where the derivational complexity of the Linguistic Grammar does not correspond to the psychological complexity of performance. I think there is no reason to expect that there will necessarily be a direct correspondance, although much early psychological work as well as some of the developmental studies of language appear to have worked under this assumption (Miller, 1962; Miller and McKean, 1964; Mehler, 1963; Brown and Hanlon, in press). The correspondance between the two is probably at least a partial one, but there are several points at which it seems

that an "abstract performance grammar" must diverge from the linguistic grammar which characterizes competence, (cf. Watt, in press, for further discussion).

The problem then, for both the linguist and for the child learning language, is to decide from the data of performance (primary linguistic data) what the underlying system of rules is that is being put into practice in performance. The immediate difficulty, it seems to me, is that the induction of rules would seem to depend crucially upon the identity of the competence grammar and whatever the linguistic processing device is that appears in performance. Clearly, an abstract performance grammar must at some point also incorporate the competence grammar, possibly in such a way as to be a reference device when the abstract performative grammar on its own is not adequate (in this way, as Watt suggests, the competence grammar would be an "archival" competence grammar).

Given the theoretical problems of the relations between competence and performance grammars, there arises a further question: what is the relation between the Competence Grammar and the child's IAD? McNeill (1966) implicitly subscribes to the notion that the child's IAD is fully included in the adult's Competence Grammar: "We have in the basic grammatical relations another reason that adults find children's speech interpretable: all children's sentences are generated by simple rules -- or their inversions -- that also exist in adult grammar" (1966:51). This view has been contested, very cogently, by Watt (in press) who claims that there must be a more complex relation between the child's construction of a grammar (an "Abstract performance grammar")

and the Competence as represented economically by the Linguistic Grammar. Watt bases his argument on the fact that if the child's Competence Grammar is contained in the adult's, there are conflicts between what is the simplest grammatical rule, and the developmental sequence in ontogeny. If the Linguistic Grammar of the adult has to be re-adjusted to include the child's rules, there is a loss of simplicity in the LG (and hence in the CG too, if it is isomorphic with the LG). Thus, the real problem that remains to be investigated in detail is whether linguistic complexity, defined as some measure in the LG, corresponds in every case to the psychological complexity of language. It seems more likely that there are certain performance considerations (as in the case of truncated passives, and deictic reference) where the linguistically more complex form is in fact performatively (psychologically) simpler.

It would seem then that the child first has to acquire some form of performance grammar, which should, in the mentalist view, incorporate those universal features and hierarchy of categories that allow the child to induce something about the structure of his language; it is possibly only later that the child also incorporates the adult competence grammar as a part of his knowledge about his language.

II. Philosophical Time and Some Psychological Studies: Survey

2.0 Philosophers, among others, have asked many questions about time: does time exist apart from objects? Is time a construct of the mind? Does time move, or do objects 'move' (i.e. change) in time? Is time a continuum, or a series of static states? Is order fundamental to time? How is order related to duration? What are past, present and future? Are they merely reflexions of our experience of time? How can

the present be defined in relation to the past and future? Are past and future related to earlier and later in time?

2.1 The first real attempt to analyze time was made by Aristotle. In his Physics, he defines time as the "number of movement in respect of 'before' and 'after'." Motion is an attribute of any substance, and time in turn is an attribute of motion. Time itself is not motion, but the measure of motion, which includes all growth and alteration. Without motion there is no time. Motion is potentially time and becomes time in actuality when its temporal succession is noted and measured by some sentient being. Time is no more made up of 'now' moments than a line is made up of mathematical points. Instead, time is made up of a finite number of parts, each of which can be divided up infinitely many times (Ross, 1930). Plotinus (in the Third Ennead) raises a number of objections to Aristotle's notion of time. His main point is that 'before' and 'after', if they are to refer to temporal relations, must mean before and after in time rather than in the space traversed. Aristotle was aware of the circularity of his argument, for he wrote at one point that "we measure the movement by the time and vice-versa". In fact some cyclical process is chosen to serve as our clock and equal temporal intervals are defined in terms of the cyclical events which comprise the clock. Real numbers are correlated with the events comprising the clock; the larger the number, the later the event, and then the date and duration of other processes or states are determined by correlating them with the numbered events on the clock. The definition of any clock involves temporal notions as well as spatial ones since a clock is defined as a closed material system which will return to exactly the same state in which it found itself at some earlier instant of time.

St. Augustine, in his Confessions (1948:XI) discusses his dilemma with respect to time: although he has immediate experiential knowledge of time and knows how to use all the temporal expressions in his language concerning past, present and future, he is still unable to give a verbal definition of time itself (Si nemo a me quaerat, scio; si quaerenti explicari velim, nescio. - xv). There is no straightforward way of defining time ostensively. For St. Augustine, neither the past nor the future exists, only the present really is. We cannot say that past time is long because it does not exist now. What we must mean by such statements is that when the past (future) was (will be) present, it is long. However, this is impossible because the present has no finite duration. St. Augustine's solution is to say that time is a "protraction" of the mind, and in measuring time, we really measure a certain expanse of our conscious memory. Time past and time future then only exist as 'memory' and 'expectations', both of which are present things (xx). Furthermore, time is subjective or psychological; it exists in the human mind which remembers, considers and expects (xxviii). Time order is apprehended in the experience of one event's following another, although the flow of duration is in some way external to the individual. St. Augustine's argument is still a circular one, since we cannot define what we mean by 'memory' or 'anticipation' without making an explicit reference to a past or future event in time which is remembered or anticipated.

The mediaeval philosophers, like St. Augustine, held that there was no time before the Creation since time is only with things existing and is perceived in the measure of one duration by another.

They distinguished between one duration which was referred to another (and thus measured) as in the time of that other duration, but when talking of the duration or process (motion) of something in isolation, they spoke of it as being with time. For example, Anselm defined time as motion, whether of growth or of change in things, and as the measure of one duration by another (Russell, 1945).

Newton believed in a space composed of points and a time composed of instants which had an existence independent of the bodies and events that occupied them. In defining time, he states that "An absolute, true and mathematical time, of itself, and by its own nature, flows uniformly on, without regard to anything external". Kant also (in the Critique of Pure Reason) saw time as unrelated to objects, defining it as a universal aesthetic structure which was transcendental to objects. Objects in themselves, which are the cause or source of our sensations, are not knowable; they are not in space or time, nor are they substances. Space and time are subjective; they are part of our perception of things. Because of this, we can be certain that whatever we experience will exhibit the characteristics dealt with by geometry and the science of time. Thus Kant reverses Aristotle's position since he begins with the logical priority of time as a form of our sensibility, and then he argues from the continuity of time to the continuity of change. Kant emphasizes the continuity of consciousness in anticipation, preserving and repeating, as the indispensable ground for the mind's forming any concepts. Therefore, time is the necessary condition for there being any human meaning. Locke, Berkeley and Hume all claimed that time was apprehended only through experience, but Hume, for instance, puts all

knowledge about the future together with all observed portions of the past and present only as probabilistic or uncertain because our knowledge of them depends on inferences drawn from empirical data that are not demonstrable (Of knowledge and probability). Both spatio-temporal and causal relations are included here by Hume because knowledge about them also is only based on probability (Smart, 1964).

Twentieth century philosophers have realized that the problem of defining time is not just one problem, but is closely linked to a group of questions which concern different concepts like truth, identity, causality, change and knowledge (cf. Gale, 1967). The relation between these different questions and the nature of time itself is found in the temporal relations of before, after, and simultaneous with and the tensed distinctions between past, present and future. For example, "Can statements about the future be true now, and, if so, does this entail fatalism?" "Can our present actions have past effects, and, if not, why not?" "Can an individual who does not yet exist be identified now?" (Gale, 1967:viii).

Wittgenstein (1953:42ff.; 1958:6,26ff.) takes the stand that the question asked by philosophers such as St. Augustine is a very strange one: "What is time?" They are not enquiring about any natural science, and St. Augustine, for instance, knows what time is in that he understood it in different contexts and used temporal words correctly in different contexts (Waismann, 1967). Wittgenstein proposes that St. Augustine has lost himself in the language because of surface grammatical analogies between temporal expressions and expressions referring to objects and events, i.e. He lives in the house beside He lives in the

past. Our use of language can dispel St. Augustine's paradox about the present (Findlay, 1967).

Early in the twentieth century, McTaggart (1908) wrote a paper in which he argued that the two different ways of conceiving time, (a) as the dynamic process of becoming (A-series), which is concerned with the past, present and future tenses; (b) as a series of equal states (B-series) designated by the relations before, after and at the same time as, were completely incompatible, and therefore time itself (as defined by previous thinkers) had no reality. Many efforts have gone towards resolving McTaggart's paradox (Gale, 1968). Goodman (1951), for instance, points out that "The 'past', 'present', and 'future' name no times. Rather the 'is past at', the 'is present at', and the 'is future at' are themselves tenseless two-place predicates that may respectively be translated by the tenseless predicates 'is earlier than', 'is at', and 'is later than'." ['is at' is the same as 'is simultaneous with'] (1951:295). Russell (1903), whose theory is defended by Goodman, developed a theory of time based on what McTaggart called the B-determinations (from the B-series). He argues that A-determinations are notions derived from psychology, since to understand them reference has to be made to consciousness (cf. St. Augustine and others). To understand what is referred to as the 'past', we have to make one of our past experiences an object of experience, while to understand the 'present' we have to refer to one of our sensations since 'to be present' is to be the object of a sensation. Since A-determinations are psychological, then temporal becoming is also psychological. The temporal becoming of a physical event can be analyzed

in terms of its having different B-relations (states before, after or simultaneous with) with a series of mental events consisting of expectation, perception and memory experienced by a single mind (1903: esp.458-476).

Different philosophers, then, claim that time (or one aspect of it) originates from within the mind via experience. We experience successions of events, which take on an order in time. Others also say that time has an existence outside objects, and that time itself is unaffected by objects. Others have pointed out the relation between time and change or motion, and thence between time and space. Duration is more difficult to categorize because many arguments hinge on whether time is conceived as a continuous flow or as a linear array of discrete instants, or as some relation between these two concepts. Nonetheless, there can be little duration which does not involve change in some way, so within durations as well as between them, there must be a perceptible order in time. Order in time, realized both in the tensed distinctions of past, present and future, and in the relations between different events or states with respect to one another (before, after, simultaneous with), is fundamental to the perception and understanding of time from a psychological point of view. Order in time itself is, of course, dependent on a prior recognition of points in time. Philosophers have been concerned mainly with the concept of time and its definition, and not so much with the words used, whereas psychologists have not always distinguished between the language and the concept.

2.2 Psychologically, the apprehension of time includes the perception of points in time and their order, the estimation of time-periods,

memory and the ability to make inferences or predictions, linguistic coding and the reflections of spatial representation of time in language. Psychologists have studied those aspects of time that are more 'clock'-like in most detail: the inherent, physiological rhythms and cycles. These cycles can be measured in the same way that the earth's rotation can be measured, and are as regular, unaffected by environmental conditions. However the length of the feeding-sleeping cycle, for instance, can be changed from a twelve hour to a twenty hour cycle. This aspect of the psychological study of time could be compared to the physical examination of time, the periodicity of certain movements from the stars down to a pendulum. Fraisse (1963) reviews the results from a large number of studies of biological time in animals and concludes that nearly every species has various diurnal or seasonal rhythms. These rhythms are often referred to as a "physiological clock" since they are not dependent on periodic changes in environment (Renner, 1965). Man likewise has periodic rhythms regulating pulse, blood-pressure, body temperature, protein levels, and the functions of different organs like the liver and kidneys (Fraisse, 1963:27f.). This form of time is what we will call objective or 'clock' time, here of a biological or physiological type, of which we are not usually aware.

Clock-time is 'registered' objectively by the use of clocks, calendars, schedules and social conventions, e.g. mealtimes, coming-of-age, etc. Clocks comprise highly structured, segmented systems with different points shown in relation to each other schematically. It is against these clocks that events are compared, either in order to name the point in time at which they occurred or to 'measure' their duration

by the amount of movement on the clock. All clocks and calendars are derived from natural periodicities such as the repeating cycles of seasons. Although some divisions of time are very clearly delimited, e.g. lunar months, day and night, etc., some of the smaller divisions, like weeks, hours and minutes are arbitrarily derived by segmenting larger time periods.

Secondly, there is subjective or personal time. At one level this kind of time can be characterized by comments such as "That took a long time" or "The day went by in a flash". There is experimental evidence for the fact that such judgments do not correspond to the objective duration. For instance, the time spent learning a single task seems shorter than the same amount of time spent learning several shorter tasks identical in character (Harton, 1939). Also the serial order of two events experienced within a very short period of time may seem reversed if attention is directed to one rather than the other (Lee, 1949). In the same way, the weaker of two simultaneously presented stimuli will seem to be the later of the two.

Clearly, subjective time and objective time must share some common ground: the common ground is probably provided by the most tangible aspects of the objective time system, i.e. perception of the difference between day and night, feelings of hunger, tiredness, etc. which are available without direct recourse to a clock. Otherwise, psychologically, subjective time covers both perception of time and estimations of duration (measured against a clock, or certain points on a clock), the recognition of points in time and the serial relation between the points in time, awareness of the passage of time and the

duration of stated periods, both simultaneous and overlapping, codification of different perspectives in time and the way in which this affects the conceptualization of time, e.g. in spatial terms (cf. Bull, 1960:18, axes of orientation for the perspective of the speaker re events and also re the 'area' in time, i.e. past, present or future, of the utterance).

Even if subjective time must touch common points with objective (clock) time, it is not isomorphic with it since it does not have to do with the calendrical representations of time. It is dependent, though, on language (just like calendar time) for 'coding' the different perceptions of time, both in terms of the relations of events to one another and in respect to a very precise, structured set of names for the calendar, i.e. "It took more than two minutes to do", "It happened about three hours after lunch". The relations are expressed in terms of before, after, and simultaneous with, and in addition may be referred to the calendar or clock for further specificity. There are other non-calendrical reference points that are relational: today, tomorrow, yesterday, now, then, first, etc. which may vary in number and type from language to language. These reference points all have to do with the position in time of the utterance relative to the events being described at any one point in time. Judgments and estimations are related to the calendar by convention so as to give the listener a reasonably clear indication of the objective frame of reference and of how the subjective estimations correspond to the very structured 'clock' we use everyday to give events a location in time that is identifiable by others.

Thus subjective time is related to clock (objective) time

through language because of the use of language to relate subjective judgments to the calendar. This does not involve any physical correspondance between what is called a day after watching a clock for twelve hours and what a person feels has been a period of twelve hours duration. The processes used in judging subjective time are internal ones while those used to judge objective time are all derived from external phenomena. The internal processes of understanding time must involve language use, memory, an internal representation of a temporal framework (most probably based on the clock time used by the surrounding community), ability to recognize points in time and their serial order, duration and passage of time, and the different temporal perspectives, i.e. the position in time of the utterance in relation to the event just described. Some processes could well be time-specific, but those like memory, emotion and language will influence the processes specific to understanding time in differing degrees, depending on the situation and the culture. For instance, the degree to which time is spatialized within a particular language, i.e. the number of spatial terms which have been incorporated as adverbs or conjunctions of time, may affect the conceptual framework to which time-relations are related (cf. further in Chapter VIII below). Similarly, whether a language has a tense system or an aspectual system, or a combination of the two, may likewise affect the concepts of past, present and future, or, at least, their relation to each-other (cf. eg. Whorf, 1950).

In many psychological studies it is not clear whether the concept of time studied consisted merely of an ability to produce all

the calendar names that are prescribed by convention, or whether it involved such operations as the recognition of points in time and their relations of sequence. The latter processes have rarely been distinguished from the naming of points on the calendar. Dobson (1954), for instance, seems to have confused clock time (objective) with subjective time (the processes involved in knowledge of time). He assumed that time-disoriented schizophrenics (who are so classified if unable to name the days of the week, or the year, correctly) would do more poorly on a task involving time features than normals or than those schizophrenics who did not suffer from disorientation. In fact, he found no difference between the three groups. I think this must be because the ability to name various items on the calendar may have very little to do with one's ability to judge duration or the serial order of events. Fraisse (1952) found that such disorientation held for calendar time (i.e. days and year), but not for the different hours of the day. Patients were aware of the sequence of bed-making, visits, meals, etc. as of the fundamental organic rhythms, i.e. sleeping and waking. Fraisse also found that such time-disoriented patients were able to give the correct hour to within sixty minutes (equivalent to the degree of accuracy in normal adults). This is surprising because it would suggest that some parts of calendar or clock time are more basic than others. The estimation of time itself is possibly an organic, rhythm-connected process and hence is unaffected by the loss of certain lexical items such as 'Tuesday', 'June', etc. The question then, it seems to me, is why are the only lexical items affected those that are not so closely linked to biological rhythms? As yet, we have no answers, nor do we

have any real knowledge of how cognitive processes (and, in particular, linguistic coding) might be related neurologically to a physiological process.

Most psychologists, in studying time, have started (like James, 1890) from the premiss that the concept of time is built up through individual experience; in addition, they seem to have assumed that there is only one 'time'. The distinction between subjective and objective time has been largely ignored, and therefore the potentially different processes that may be involved in their understanding have not been taken into account.

This duality of time has been discussed by some philosophers who contrast cosmic (physical - objective) time and human (psychological - subjective) time. For Bergson, this was the distinction between clock time and "real" duration (1959), while Heidegger contrasted the two as primordial time and 'vulgar' understanding of time (Barrett, 1967). This duality is, to some extent, reflected in language: there are sets of lexical items naming calendar time and also items naming points in time and the relations between them. In considering the concept of time, the psychologist has not only to look at the relevant cognitive processes such as memory, but has also to ask to what extent the grammatical and lexical structure of our language determines our view of time.

In the present study, I shall be concerned with some basic relations (in subjective time) which underlie the eventual understanding of objective time. These basic relations seem to be the first thing learnt by the child acquiring the notion of time. The relations

consist of 'before', 'after' and 'simultaneous with'. From past developmental studies of time (e.g. Decroly and Degand, 1913), it seems that the latter relation -- simultaneous with -- is the first one that children learn. Next, they learn the notion of 'before', and lastly, that of 'after'. These studies of time will be discussed in the next chapter.

III. The Acquisition of the Concept of Time: Survey.

3.0 Decroly (1932), in discussing studies of time, stressed the importance of language as a clue to the developing concept. He pointed out that "... Le rôle du langage est ici d'une telle importance pour faciliter le contrôle du développement que dans toutes les recherches faites, c'est surtout l'évolution du vocabulaire temporel qui sert de critère" (1932:174). This is also true of most subsequent research. In the following section, I shall discuss the different types of study that have been done on the small child's developing concept of time. The research that has been done can be classified roughly under four headings: firstly, the vocabulary studies which are specifically concerned with the vocabulary of time as well as some that deal with the general increase in vocabulary with maturation in individual children. Secondly, a number of detailed longitudinal studies (biographies) of individual children and their language development. (These two groups will be treated together in the following discussion.) Thirdly, a group of studies, still dependent on the language used by children, which have looked at how relations in time are described, and finally, some studies of slightly older children, in which the separation of the concepts of time and space and the recognition of duration have been examined. This

last group does not look directly at language, but is dependent on it in investigating the children's concepts.

3.1 The vocabulary studies (e.g. Boyd, 1914; Nice, 1915; Court, 1920) do give a fairly good indication of the temporal vocabulary at certain ages, but have one insurmountable drawback: nowhere in the vocabulary studies is there ever any indication of whether the child was using the word correctly or even appropriately. There are seldom any examples of the sentences in which the temporal words are used, and, where there are, it is impossible to gauge the degree of 'correctness' without any detailed knowledge of the context of the utterance. From this point of view, biographical studies like Decroly's (1913, 1932) are invaluable.

However, a number of the biographical studies (Deville, 1890, 1891; Grégoire, 1941; Preyer, 1908) cover too short and too early a period of linguistic development. For instance, Preyer (1908) kept records only for the first three years, and it seems that it is only later that the concept of time is substantially reflected in language. Deville (1890, 1891) likewise kept records only for the first two years, concentrating heavily on the sounds and words used by the child. Leopold (1949), on the other hand, kept an extremely detailed phonetic record for his first child for her first two years, and continued to keep a fairly detailed diary of her speech until her fifth or sixth year (as she got older, the diary - beyond the sixth year - consists mainly of the peculiarities observed in her bilingualism). Stern and Stern (1928) made numerous observations of speech in context and kept detailed notes on the speech, including temporal references, until their children

were five and half or six years old. Decroly (1913, 1932) takes into account the most detailed contexts, and does not just present the words (e.g. Bush, 1914, and Boyd, 1914) nor the percentages of temporal words at different ages (e.g. Nice, 1915). The data from one child are presented, in their contexts, in great detail so as to illustrate exactly how some terms are confused or misunderstood by the child at different ages.

3.11 Verb tense

Stern (1924) and Stern and Stern (1928), in discussing the use of the verb in German to indicate time, point out that children at first (1;0 - 1;6) do not make any distinction of tense, using the same verb form (which the Sterns call the infinitive) to refer to past, present and future events. A past tense form, which may be regarded as marked¹ in contrast with the non-past (present and future), emerges about six months later. The past participle appears at about two years old, but the imperfect forms do not appear until 3;0 or 3;3. The future is at first referred to by the non-past verb form, but later an adverb such as "tomorrow" is added. The future tense appears at about 3;3 in the children's speech. Leopold (1949) found the same sequence, at slightly earlier ages: the past tense was used fairly frequently by 2;3, and the future tense came in subsequently between the ages of 2;4 and 2;6. The smaller gap between the appearance of the past tense forms and the future could be due to a difference of structure between German and English. Court (1920), in presenting a little data

¹'Marked' and (further on) 'unmarked' are used throughout this study in the Prague School sense of these terms, cf., e.g. Greenberg, 1966; esp. 9.3 below.

for an English-speaking child, claims that the child used all three tenses (past, present and future) by the age of 2;9. She gives no information about the prior differentiation of the tenses. Gvozder (1949) found that adverbs like "soon" appeared at about the same time as the future tense in his son's speech (in Russian).

Adams (1938) studied the verb forms used by twelve four-year olds. Their speech records were compared to an adult speech sample. Adults shows a slightly larger percentage of simple present tense verbs, 59.4 to 56.3%, but the four-year olds used a much larger percentage of progressive present verb forms: 17.0 to 5.0%. Among the present progressive forms, he noted that "I'm going to.." was particularly frequent. The future (will) made up about 10% of each child's verb forms at age four. The simple past was found about as often as in adult speech: 11.8% in the children, versus 10.5% in the adults. However, past references were all to the immediate past; only four children referred to any time earlier than the previous day in Adams' data. Most of the 'compound' tenses (Adams' terminology, e.g. 'he will have been', 'they had been intending', etc.) were missing completely together with all the passive verb-forms.

To summarize, the past tense is the first to be differentiated from the 'unmarked' form of the verb: this is true of English, French and German in the studies considered. Next the future is differentiated from the present by the use of an adverb with the 'unmarked' form of the verb (Stern and Stern, 1928), or by some meaning-equivalent form, i.e. "I'm going to..", (Decroly, 1932), and then by the future tense itself (Stern and Stern, 1928; Leopold, 1949).

3.12 Global notion of time

A number of investigators have noticed that the child's first use of temporal adverbs is global in nature: an adverb referring to the near future (e.g. soon) will be used to refer to the future in general, and sometimes even to refer to the past in general too, that is, to any time that is distant from the child. Thus the first adverbs used are indeterminate in meaning although adults use the same words very precisely (Stern and Stern, 1928). For example, the first meanings attached to today, tomorrow and yesterday are generally equivalent to now or soon, after(wards), and before or earlier (Decroly, 1932; Leopold, 1949). These concepts become more precisely defined with time; as the child gets older, he begins to understand not only that such words have to do with clearly delimited "spaces" in time, but also that they are relative to other points in time, e.g. the changing relation of "tomorrow" to any one named day of the week. In the case of one child studied by the Sterns, at 2;5 - 2;6, "Moagen" (for Morgen: tomorrow) and "Moagen mittag" were used indiscriminately to indicate a vague future. "Gestern" (yesterday) was similarly used to indicate a vague past. By 3;0 - 3;3, this child (Hilde) appeared to use "Morgen" more accurately, insofar as she is now aware that it means a lapse of between the moment of her utterance and the event she refers to. However there is an added point of confusion here for German-speaking children because "Morgen" does have the meaning morning as well, and is frequently used with an immediate past connotation in such expressions as "Heute Morgen" or "diesen Morgen" (this morning). For example, Hilde, 3;5, asked "Ach das Tannenbaum hat ja Morgen ebrennt?", which

can be translated either as 'Did the Christmas tree burn tomorrow?' or as 'Did the Christmas tree burn (this) morning?'. Stern points to the former interpretation only and cites this as an example of the child's confusion. In the context, the event had apparently occurred previously, so, in fact, it is not clear to me whether the child really confuses the two meanings of "Morgen", or whether the two meanings cause the adult 'interpreter' difficulty when the modifier ("Heute --" or "diesen --") is omitted. Decroly (1913) also cites the global use, initially, for the expression "la semaine prochaine" (next week). It is used to indicate both future and past at first, e.g. "La semaine prochaine, j'ai ete au cinema" in the context of referring to a past event, (1913:141). Gesell and Ilg (1943, 1946) similarly report global uses of adverbs to begin with.

3.13 Adverbs of time

Gesell and Ilg (1943, 1946) mainly studied the appearance in children's speech of various time words. They tabulated the appearance of "now" at about eighteen months, "soon" by two years, and "when" and "today" by three years old. Later still the child learns "Tomorrow", and after that "yesterday". Other temporal words like "morning", "afternoon", "Tuesday", "week", "two o'clock" and "year" emerge as the child matures, but they are first used in concrete situations e.g. "I am going to school this morning" long before they are used as part of any abstract notion of time e.g. the ability to define what a year is. This progression from concrete exemplar to abstract idea is probably characteristic of concept formation in general. Boyd (1914) finds a form of progression, parallel to that observed in tense

distinctions, in the acquisition of temporal words; adverbs referring to the present and future generally appear in advance of adverbs referring to the ~~present and future generally appear in advance of ad-~~ ~~verbs referring~~ to the past, i.e. now, soon, today, first, all appear before long ago, then, yesterday, after, etc. Nice's (1915) records do not begin until the child is three, so there are both present/future and past reference adverbs in the child's vocabulary already. Stern and Stern (1928) also point out that the expressions referring to present and future like at once, then, now, tomorrow, soon, appear several months before adverbs referring to the past: just then, yesterday, before. Decroly (1913, 1932) noted a similar phenomenon.

There appears to be a general agreement that adverbs referring to the present and future appear earlier than those referring to the past. This is parallel to the finding with respect to verb tense. The present and future seem to be unmarked with respect to the past in adverbs as well.

3.14 Relations in time (a)

One complex temporal relationship for children is the constant relation between yesterday, today and tomorrow. These three never change with respect to each other but they do change with respect to the point in time identified as any one of the three. For instance, the question of a three-and-a-half year old reveals part of the problem: "Where is yesterday - you know, that was 'today' before I went to sleep?" (Court, 1920:83). However, Court at the same time claims that this child understood the relation between the three terms at the age of 2;9. She also claims that this child used "morning", "noon" (mealtime) and

"afternoon" correctly by 3;6. Gesell and Ilg (1943, 1946) report that "today" is generally used by the age of three; next appears "tomorrow", and finally "yesterday". Leopold (1949) unfortunately did not keep any systematic notes as far as temporal expressions were concerned, and only comments at one point that his daughter used "yesterday" correctly by the age of 3;7. Stern (1924) and Stern and Stern (1928) also noted that "Morgen" (tomorrow) appears before "Gestern" (yesterday). However, they also commented that at 4;3, Hilde still sometimes confused the two, although this happened far less often than in previous months. Decroly and Degand (1913) found that both "demain" (tomorrow) and "hier" (yesterday) were used at age three, but usually incorrectly, i.e. both words were used to refer to the future and to the past. "Aujourd'hui" (today) was correctly used by 3;8, and "demain" by 4;2. "Hier" was still used with some uncertainty at the age of 4;8.

Relations in time (b)

A more fundamental relation in time, which underlies that between yesterday, today and tomorrow discussed above is the relation of succession, that is, the order of experience. These relations seem to be observed and made explicit linguistically at an early age. Decroly reports that his subject had the notion of priority in time at the age of 2;11. She used "d'abord" (first) to designate the first in a series. A month later, she began using "avant" (before) as well, in similar contexts. It was three months later that she began using "après" (after), also correctly in context. For example, when sent to see her mother one day, Suzanne instead came back into the room; -"Eh bien! Tu ne vas pas chez ta maman?" - "Mais oui, je va aller après"

(1913:137). By 4;5, she used "avant" to refer to both recent and remote events in the past (cf. 3.12 above).

Thus it appears that of the 'before-after' relations in time, children first grasp those terms referring to points in future time (i.e. tomorrow) and some idea of prior time (before, first), and then later they come to the terms for the corresponding past times, e.g. yesterday, and later times, e.g. after, next. In each case there seems to be a period of initial confusion in which either term is used to apply to either time (to both future and past or to both before and after), then the unmarked term of the pair is correctly learnt and applied (cf. 3.12). After this, the marked term appears and is gradually adopted into the system.

It is not until some time later, between 4;10 and 6;0, that the child evinces much curiosity about the cyclical nature of weeks, months, seasons, etc., or learns the names of the calendar and relates them to one another. His interest in timetables and schedules of all sorts appears generally around 7;0, but it may not be until he is ten that he fully understands historical (clock) time (dating systems, etc.), life-cycle time and objective time in general (Bradley, 1947; Court, 1920; Gesell and Ilg, 1943, 1946).

3.2 The next group of studies is also concerned with the relational aspects of time under various guises. Lewis' (1937) study, rather than describing which temporal words are used, deals solely with the utterances of a very young child (1;1 - 2;2) and the functions of his utterances in context. Lewis is most concerned with the question of reference to objects in the immediate physical environment of the

child, and considers the means by which past and future come to be differentiated and referred to in the child's speech. She points out that most of the work prior to 1930 paid more attention to the acquisition of different grammatical forms (parts of speech, tenses, etc., e.g. Young, 1941) than to the functions of the language itself. One aspect of learning what time is, is the growth of the ability to refer to absent objects: it is this detachment, through adult contact and conversation, that allows the child first to become aware of things outside his immediate environment, and then to refer to events remote in time. "For through conversation, more than any other factor, the child is helped to free his speech from the dominance of the present situation" (1937:45). Through speech contact with adults, the child is able to attend to remoter objects; the adult is also likely to relate the remoteness to distance in time. This will lead to spontaneous reference to the past on the child's part (1937:49; also Decroly and Degand, 1913; Decroly, 1932) when he has been struck by a particular sight or experience. The adult's subsequent questions encourage him to continue such references. Reference to the future seems to develop in much the same way: much of the child's earliest speech is directed towards fulfilling his needs, and thus, from very early on, looks forward. Lewis points out that "this reference to the future is made possible because the future resembles the past, and ... the child's replies at this stage [1;8 - 2;0] are determined by past occasions" (1937:50). Lewis therefore, rather than looking at any vocabulary of time, looks at the functions of some of the child's one- and two-word utterances, and considers how these functions could help to build up the notion of time as

far as past and future are concerned. The factors most stressed here are the child's own manipulative and declarative needs in speaking and the influence of adult reference to past and future.

Grigsby (1932) investigated the developmental trends in various concepts in pre-school children (under six) at different age-levels. He looked at the children's replies to questions about various relationships, causal, part-whole, spatial, temporal, etc. The results as far as the temporal questions were concerned are somewhat meager: the questions were all of the type "When do you get up?" or "When is it time for school?", dealing only with the day's routine. The youngest children's responses showed that even they had some concept of time but it was so vague as to be of no practical help in answering questions about their daily routine. This comprised the most immature stage. (The subjects in the study ranged from 2;8 to 6;4 in chronological age.) Grigsby found that it was not the terminology that caused difficulty here but rather the diffuseness of the concept expressed by the words that made impossible relations in time. At the second stage, the questions were answered by the child's citing incidents that occurred in relation to himself: he is still the centre of his world. The third stage is marked by the citing of incidents of a more impersonal nature. The final stage is characterized by the ability to tell time by the clock. One point to be noted here, which is in accord with other studies, is that "Throughout the three stages in the development of the concept of time, explanations were in terms of incidents which were characterized almost entirely by their spatial attributes" (1932:160). The percentage of children relating different times to simultaneous

incidents rose from 31% in the youngest group to 82% in the oldest of the four groups. Children establish such relations not on a before-after basis but as contiguous (simultaneous) with the event asked about. This was also found by Decroly (1932) in the child's knowledge of the days of the week and different times of the day which were tied to relatively unvarying routines. The fact that this relation was always a contiguous one is partly a function of the questions asked by Grigsby; none of them were of the type "What do you do after (before) Y?" The child clearly acquires his temporal vocabulary some time before his concepts have become very clearly defined. On the whole, Grigsby's results regarding the children's knowledge of calendar time correspond to Gesell and Ilg's (1943, 1946) and to Bradley's (1947) observations that the child gradually 'decentres' in his references to time as he matures.

Bradley (1947), replicating a study by Oakden and Sturt (1922), used a questionnaire to test acquisition of knowledge about time. Unfortunately, the questions were only concerned with specific vocabulary items naming points and durations in calendar time. The children in the study ranged from five to ten years in age. Bradley's results are somewhat parallel to Grigsby's: first the child uses personal references; later he begins to use calendar reference, and finally uses those items referring to durations. The continuous development over time that she found refutes Oakden and Sturt's claim (1922) that there is a sudden spurt of development at age ten or eleven. There have been several other studies of this type: a listing of the ages at which certain conventional (calendar) notions of time are presumed to be present because

of the vocabulary use of the child. Most of the children have been of school age (five and upwards), and the emphasis has been on the acquisition of specific vocabulary items (cf. Farrell, 1953; Friedman, 1944; Pistor, 1939).

Lastly I include two early studies by Piaget (Margairaz and Piaget, 1925, and Krafft and Piaget, 1925). Both these studies looked at the child's ability to order a sequence of pictures to make up a logically or causally coherent story. The first study (Margairaz and Piaget, 1925) is an analysis of the stories children told in relation to two pictures representing the beginning and end of a story: it was therefore a question of understanding the pictures and subsequently constructing a story by deducing the intermediary scenes. The second study (Krafft and Piaget, 1925) showed, according to Piaget, that children are incapable before the age of seven or eight of finding or even looking for the correct order of pictures in even the simplest stories. The procedure was to give the child a certain number of pictures (between four and ten) which represents the essentials of a story. The pictures are presented out of order and the child is asked to change them in any way he wishes so that they are in the right order. Piaget then asked the child to tell him the story which these pictures represented, whatever their order. Piaget thus had some check on how many of the temporal, causal or logical relations between the different events pictures were understood, quite apart from the way in which the child had rearranged the pictures: a correct arrangement did not guarantee a correct understanding of all the relations holding between the different aspects of the story, although a correct recital of the

story did mean that the pictures had been correctly ordered. The children were encouraged to make further changes in the order of the pictures while telling the story if they wished; few did this.

Piaget's subsequent discussion of the results is slightly confusing: he explicitly claims that they were attempting to show that the child under seven or eight could not order a sequence in time; what was shown was that many causal or logical relations immediately perceptible to adults are not immediately available to children. This is not the same thing as being unable to construct a temporal order for a series of events. Piaget makes a distinction at this point between "ordre" (order) and "série dans le temps", (series in time), claiming that the former subsumes the latter and is more complex because it involves causal or logical relations as well. Causal relations can be deduced from the cause-effect relation perceptibly present; it is not quite so clear to me how one should define logical relations: Piaget says they are what adults use when it is not possible to deduce which of two events preceded the other in time (1925:330), and claims that in these instances all the child has to do is to put the pictures in such an order as to render the rest of the story intelligible. The inability to order these pictures in a coherent series by adult criteria, he argues, is due to "l'incapacité de réconstituer une histoire bien ordonnée en partant des données isolées. Ou plutôt, nous chercherons à établir que la difficulté à comprendre la consigne du test tient elle-même à l'absence de la notion d'ordre chez les petits, et non à des difficultés extérieures à la nature de la pensée" (1925:330). More to the point is a subsequent remark of Piaget's (ibid.:331) to the effect that the

children "ne cherchent pas à construire un récit logique". Before the age of seven, there is considerable reluctance to re-order the pictures once they have been given and a story will be constructed around them even if this involves a number of repetitions. Interestingly, if the experimenter reordered the pictures correctly, the child will accept the new order but not alter his story to fit it.

However, I think Piaget's reiterated claim that this inability to make up a coherent story is evidence that the child has no concept of order is not entirely justified: what the child does not yet possess is enough experiential knowledge about the world to reconstruct the most probable (logical?) sequences and to always perceive the causal relations suggested between the pictures. (Piaget has in fact, since, rejected all his early work on causality.) In this respect, the young child's knowledge of order in time could be compared to Vygotsky's (1962) characterization of the child's perception. He perceives things but is still "unconscious" of his perception. In the same way, the child under seven years of age has difficulty in consciously looking at order although he implicitly knows what it is. The implicit knowledge of order, though, in young children, often recognized by the use of "et puis" (and then) is in fact only one aspect of syncretic and subjective thought (cf. Piaget, 1926, ch. 3). That the notion of succession (i.e. the order of experience) in time is present in the child of five and six (if not earlier) is proved by the fact that the children in the same study, given two pictures representing cause and effect, all answered correctly the question "Which happened first?" Thus the youngest (five and six years old) do have a clear idea of before and after even if the

seriation in the stories is very muddled.

It seems to me, then, that Piaget has not proved that the child has no notion of order but only that the child has a certain difficulty in reconstructing and narrating events in order. On the other hand, children of that age do speak spontaneously of events in order with no apparent difficulty, so it is not clear whether Piaget has adequately explained his data or not.

3.3 The final group of studies does not look directly at language at all although the investigators are, of course, dependent on the child's verbal replies for interpreting his concept of time. In a series of studies reported in 1946, Piaget had become more concerned with the separation of the concepts of space and time in children between the ages of six and ten. This separation is dependent on the recognition of the relation between the distance covered and (different) speed(s). Until this separation occurs, order in time is equated directly with spatial order, and duration is equated with the amount of distance covered. This means that the young (six-year old) child will make such (paradoxical to adults) statements as those in the following dialogue:

E: - De l'école à la maison, tu mets combien de temps?

Lin - Dix minutes.

E: - Et si tu cours, tu vas plus vite ou plus lentement?

Lin - Plus vite.

E: - Alors tu mets plus de temps ou moins de temps?

Lin - Plus de temps.

E: - Combien?

Lin - Plus de dix minutes. (1946:39; child aged 6;4)

Children will likewise claim that of two people starting and stopping at the same time, one must have taken longer because he went further. The child of five or six then positively correlates the dimensions of time and distance covered rather than looking for the inverse relation between speed and distance which in turn correlates with time. Piaget reports several experiments designed to explore the gradual acquisition of these relations between speed, distance and time which takes place between 6-7 and 8-9 years. He is chiefly concerned with the 'operations' involved and hence does not look at any linguistic formulations of these 'operations' since he does not consider that language necessarily reflects accurately what is developing on another plane. He does concede though that the only way to study time in younger children (under five) is through language, since one cannot question young children about their operations in the same way one can older children.

Papert and Voyat (1967) investigate some psychological aspects of time: what is the relation between time and perception, or knowledge, and the structure of thought? Their area of enquiry is broadly conceived as "la recherche des systèmes de composition a la base des jugements (dits alors cognitifs) du temps et les rapports entre ces jugements et les jugements directs (dits perceptifs) ou intermédiaire (dits semi-cognitifs)" (1967:131). In studying duration, there are three essential problems:

- 1) the relations between time, speed, and distance
- 2) the relation between time and spatial coordinates
- 3) the very nature of time itself (is time a simple, direct intuition or the result of some such intuition?)

Piaget (1946:273s.) showed that the development of time is

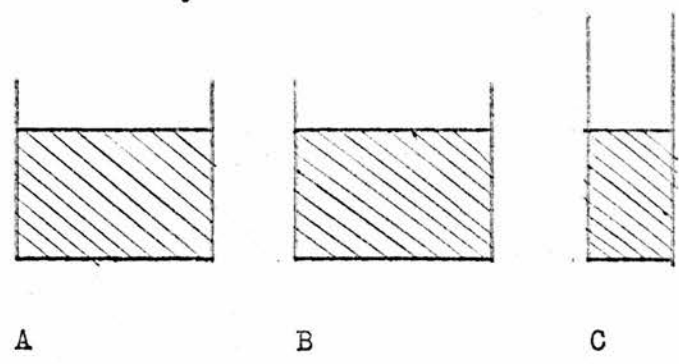
dependent (as are many other domains of cognition) upon the progressive decentration that it implies, i.e. the loss of egocentricity and syncretism on the part of the subject. At first, there is no differentiation of spatial and temporal ideas. The differentiation is subsequently made as a result of distinguishing speeds. Papert and Voyat's study is complementary to Piaget's earlier work for they make duration and its relation to cognitive and perceptual phenomena their central concern. They recognize that there are strictly cognitive elements present even in pre-operational thought, citing for instance (1967:113s.) the global perception of liquids which is sacrificed by the child to a recognition of one dimension only, i.e. the level of the water regardless of the size or volume of the containers. For example, in Figure I below, A and B are judged equal, but when the contents of B are poured into C, then C is judged to hold more than A. Again, apparently working from the same dimension, D is judged to be greater than E, although the reverse in fact is true.

Insert Figure I about here

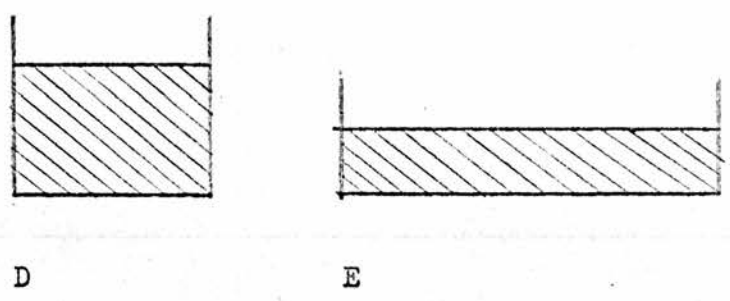
They attempt to show that the notion of time as it develops is characterized by a similar concentration on one dimension only by the child, or on a direct correlation of two factors following such a concentration on only one dimension. For instance, in a task involving equal temporal durations but different speeds and distances covered, 70% of the five-six year-olds correlated more speed with more time (not recognizing the equal durations involved); however, this percentage

Figure I

Judgments of Identity



(a) $A = B = C$



(b) $D < E$

(after Papers & Voyat, 1967)

is entirely reversed in the next age group (seven years) where 77% of the children now equate less speed with more time. This reversal, they claim, indicates that there is a dividing line between the pre-operational and the operational stages in dealing with duration in time.

They thus confirm Piaget's thesis that the concept of duration is gradually constructed from visual and spatial data. In addition, when the child has to judge two synchronous durations, his first stage involves the claim of a direct relation between speed and time; at the second stage, he perceives the inverse relation between the two; it is this that eventually leads him to recognition of the equality of the time intervals. The children may be aware of the simultaneous departures and arrivals and still not deduce equal time duration for each moving object.

This last group of studies actually seems to have more affinity with the philosophical analyses than with the linguistic and vocabulary-oriented studies discussed earlier. The investigators are most concerned with the mental operations needed to grasp certain complex relationships inherent in the adult concept of time.

3.4 There are several interesting facts that emerge from the language (vocabulary) studies as a whole, which will be returned to later. Firstly, children begin early to have a global concept of time, an awareness at an imprecise level of the difference between past, and present and future. In the tense system, the past is the first to be separated. On the other hand, terms referring to the future (but not the past) are liable to appear earlier and to be given a relatively precise meaning before the corresponding past-time term is used as

consistently. The sense of order in time also develops early; the first in a series is pointed out by using "first" or "before". It is only later that the corresponding terms, "later" or "next" are applied in appropriate contexts. Although children do not learn the complete structure of the calendar names until five or six upward, they can name points in time from early on by relating the point in time to a contiguous event in space (and hence also in time). By three or four, the child is able to recognize points in time, and also - to a certain extent - is able to order short sequences of events in time, in his speech. Although the children in Piaget's early studies appeared to find difficulty in narrating such sequences, there is considerable evidence from records of spontaneous speech (e.g. in the present study - Chapter VII) that children are able to do this from three and a half onwards in a non-experimental situation. One notable omission, though, in the studies of temporal vocabulary, has been the lack of interest in the relational words which link clauses so as to indicate the temporal order of the events described. There have been a few studies of sentence-development in young children, in which different clause types are described but there has been no systematic observation of when these temporal clauses develop, or what role they play (if any) in contributing to the notion of time that the child of three or four entertains.

IV. Sentence Structure in Language Acquisition: Survey

4.0 The studies that I shall discuss below comprise past attempts to measure language development. They have produced fairly accurate measures based on the average length of the child's utterances, but other factors have not, until recently, been taken into account.

For instance, the correlation between different sentence-types or types of subordinate clause and utterance length is not very high, yet the variety of sentence-types in the child's speech is probably more indicative of his language skill. I shall consider here some of the linguistic factors which may affect the young child's ability to describe events in time.

The indices that have been used to evaluate language development fall into two main groups. First, there are studies of utterance-length (usually counted in words). There is a reasonable correlation between utterance-length and language development for the first ten years or so (few studies have looked at older children in terms of this criterion although some work has been done comparing High School written composition with adult writing, e.g. Bushnell, 1930; Seegars, 1933). The other main index of development has been the vocabulary count. Different studies of vocabulary are sometimes difficult to compare as the authors have collected material over different time periods, and have used very disparate ways of classifying their data. Some vocabulary studies have also looked at the incidence of the parts of speech, e.g. Nice, 1915; Young, 1941. The indices used in previous studies are taken at their face value in the following summary although many of them raise questions of definition, e.g. 'sentence', 'word', etc., which have yet to be satisfactorily settled. I have used 'utterance' rather than 'sentence' in discussing most of these studies (cf. Lyons, 1968:171-172).

4.1 Nice (1925) was one of the first to study the relations between utterance-length and other aspects of language development. She related different stages in length to general vocabulary growth. She

had earlier (1915) done a vocabulary study of one child in which all the vocabulary up to the age of 1;6 years was recorded; added to this were one month records kept just prior to the child's third and fourth birthdays. Vocabulary data were collected in a similar way by Boyd (1914) who looked at the vocabulary present in 1250 utterances collected at the end of the child's second, third and fourth years. The vocabulary was classified under various headings, e.g. nouns, adjectives, conjunctions; each area of vocabulary showed an increase with age. Bush (1914) and Court (1920) presented their less extensive data in a similar way; these two studies were also based on records from one child alone. Smith (1926) gave detailed statistics on the vocabulary and utterance-length of the pre-school child. This investigation was followed up (1935) by a special study of different factors which influenced the development of utterance-length in pre-school children; in particular, she showed that children tend to use longer utterances when talking to adults than when talking to other children.

Davis (1937b) compared developmental curves based on the mean of the five longest utterances used by each child and curves showing the proportion of one-word responses with the curves of mean utterance-length. She claimed that the mean of the five longest utterances showed linguistic development more clearly than any other single measure. This is largely because there are so many one-word responses (e.g. answers to questions) at the earlier stages of language development. On the other hand, the number of such responses declines with age, so it is possible that Davis' claim could best apply only over a three- to four-year period (between the ages of three and six

approximately). McCarthy (1930) gives further data on utterance-length and also includes some data on the kinds of utterances used at different ages by pre-school children. McCarthy (1946) summarizes most previous studies of utterance-length (cf. 1946:520-521, Table 4) and also compares her own work with that of Day (1932) and Davis (1937a), looking at the percentages of different types of utterances used at different ages (1946:525, Table 6). Davis (1937a) followed the methods of Day (1932) and of McCarthy (1930) in her comparison of the linguistic skills of twins, singletons with siblings and only children. In this study, Davis compared her norms for length of utterance, type of utterance and frequency of the different types of clause with those of previous research. Several other studies have also pointed to the significance of environmental factors, especially of socio-economic conditions, for language development (cf. Davis, 1937a; Templin, 1953).

LaBrant (1933, 1934) used a 'subordination index' as a measure of development; she counted the number of finite predicates i.e. clauses containing a finite verb form, in children's compositions, and divided the number of subordinate clauses by the total. She was particularly interested in the relation of subordination to chronological age, mental age and I.Q., and studied the distribution of subordinate predicates according to the function of the clauses in which they occurred (i.e. adverbial, adjectival, noun clause, etc.). She also attempted to show further qualitative differences between the grammatical forms used by younger and older children (Grades 4 - 12), (cf. also Anderson, 1937).

Young (1941) was concerned with the incidence of different parts of speech occurring in young children's conversations. She presents data on 74 children and also summarizes the results of several

other studies. Her main concern is to make the different studies equivalent by reconciling differences of definition of the grammatical terms used. She attempts to collate the different studies, using Jespersen's Essentials of English Grammar (1933) as a source for definitions of the word-classes. Carroll (1939) studied adjectives as a class in children between about 2;6 and 5;0 years. He found that both definite and indefinite adjectives (excluding the articles) increased in number with age, but the latter showed the greatest increase. For the articles, the use of "a" leveled off between 3;6 and 4;6, but for "the", there was a sharp rise in the age-range studied (3;6 - 5;0). These results are confirmed by the data in Young (1941). More recently, Brown (1957) undertook to show how a grammatical practice, the allocation of words to one or another part of speech, could affect cognition. In his paper, Brown compared the percentages of parts of speech used by adults to those used by children, and showed that nouns used by young English-speaking children are more reliably the names of things and verbs the names of actions than is the case in adult speech. Children also use the part of speech membership of new words as a clue to their meaning.

Finally, a few studies have been done using linguistic factors as indices of development in a general, social sense in children. For instance, Goodenough (1938) collected samples of the spontaneous conversations of 203 children in two psychologically dissimilar environments. Each sample of speech (fifty consecutive responses) was analyzed with respect to the frequency of usage of certain specified pronouns. As a whole, the percentage of pronouns in the data showed little

consistent change with age or sex after the age of three. Some pronouns, though, did show changes both with age and with the conditions of observation, e.g. the children used first person singular pronouns (including possessives) far more often when playing with other children than when alone with an adult, while third person pronouns with non-personal antecedents (it, they) showed the opposite proportions.

"Neuter" third person pronouns decreased with age; this was most probably because the child usually used these pronouns in place of the name of an unfamiliar object. Another study done by Fahey (1942) investigated the type of questions that children ask, but more from the pedagogical point of view than from the developmental one. He summarizes some of the literature, and reports that the earliest and most numerous statistical analyses of questions were concerned with the chronological age at which various question-forms and interrogative words were first noticed in children learning to speak (Boyd, 1916; Davis, 1932). There is, however, no great agreement among the different reports as to the order of appearance of the different interrogative words, except that "why" questions are said to be the last to appear.

The main indices, then, that have been studied are utterance-length, vocabulary growth, parts of speech (including increase or decrease in use of particular items), and different utterance-types. In the next section, I will examine the studies that have looked in detail at the latter: the development of different utterance-types, and their incidence at different stages of development in language. Unfortunately, there have been very few studies of oral speech: this aspect of language development has mainly been studied through written

language. As most attention has been concentrated on written English, the children studied have been older, at least of an age to write (7;0 or 8;0 upwards). Nonetheless, such studies can give us some indications of the tendencies children have in using various utterance-types at different ages.

4.2 Guillaume (1927a), in talking of the child's earliest utterances -- one- and two-word sentences, -- claimed that although these utterances can be called "predicates of the situation" and have some psychological unity (derived from the fact that the child uses similar utterances in like situations), "cette unité [de langage] n'a pas encore celle d'un organisme grammatical obéissant aux lois d'une langue définie" (1927a:7). However, it now seems that, even at this early a stage in language acquisition, the child already uses some 'rules of grammar', although the earliest rules may indeed be language universal rather than language particular.

Evidence for this point of view is found in some recent studies of children's early utterances (at the two-word stage) which have shown that such utterances do not consist of random pairs of words; the selection of words to form the utterances is rule-governed. Braine (1963a), (Brown and Fraser, 1963; Brown and Bellugi, 1964) and Ervin (1964) have all collected data from young children. Braine's subjects are the youngest, none of them producing any two-word utterances before the study began. His data come from records kept by the parents of the children. Both Brown's and Ervin's subjects are older, using some two-, three- and even four-word utterances at the time when they began to record the data. Braine, Brown and Ervin all found that the children



seemed to select words from primitive grammatical classes in a fixed order. One class was fairly restricted in size and its contents (which vary from child to child) have been called variously "pivot", "modifier" or "operator". The other class contains all the other vocabulary of the child: the "open" class. Utterances were made up of a Pivot + Open or of an Open + Open pair of items. The Pivot class contains relatively few members and is slow to acquire new ones, whereas the Open class contains a large number of different items which can be added to freely. Because of their smaller number, the Pivot class words are all used more frequently than Open class words. Braine (1963b) points out that, in fact, the Pivot words in this respect resemble 'function'¹ words in adult speech. However, it is just these 'function' words which are omitted by children at the two-word stage ("telegraphic speech", cf. Brown and Bellugi, 1964), and besides, the child's Pivot class contains both 'function' and 'content' words according to an adult classification. In other words, the child is not reflecting adult word frequency in the items chosen to form the Pivot class; nor is he reflecting an adult grammatical categorization. The child cannot, therefore, be imitating any part of adult speech in setting up the Pivot-Open class distinction. (This absence of imitation is further borne out by the different word-order that is frequently observed in children at this stage, e.g. "allgone milk" vs. (adult) "the milk is all gone". Given that the child is not imitating, (imitation was the most frequent

¹i.e. preposition, articles, etc. vs. nouns, etc. ('content' words); Cf. Fries, 1952.

explanation in the nineteenth and early twentieth centuries of language acquisition), nor choosing the more frequent words from adult speech, it is very unlikely that he is able to infer from adult speech what the generic categories are from which he could gradually sort out the adult categorization of parts of speech (McNeill, 1966).

Braine (1963a, 1963b, 1965) claims that the Pivots are words for which the child has learned a fixed sentential position. The imbalance between the Pivot and Open classes comes from the fact that, at first, the position of only a few words is known. As a result, many P + O sentences will use the same few Pivots with high frequency combined with a large number of Open class words that are less frequent. However, if the initial selection of Pivot class words is based on word-position alone, there should be a random assortment of words as members; this does not appear to be the case. In addition, it would be difficult on this basis to account for the pairs of utterances which differ only in having contrasting word-order, e.g. "carry Mommy" and "Mommy take", interpreted in both instances as an instruction to the child's mother (Braine, 1963b:338). Braine gives the name "contextual generalization" (1963b, 1965) to the process by which the child learns language on the basis of positional cues of the words relative to each other. He claims that the knowledge of position is generalized by the child, and that, therefore, language acquisition can be explained as a form of response generalization, relying on the stimulus-response paradigms of learning theory. Braine's position, and in particular, the theoretical basis of his stand, are severely criticized by Bever, Fodor and Weksel (1965). Braine based part of his argument on the simple active

declarative form of sentence which he considers the basic sentence-type in the grammar and which, he claims, predominates in the child's linguistic environment. However, data examined by Bever et al. failed entirely to support the latter claim: out of a sample of parental speech to small children consisting of 432 utterances, 258 were fully grammatical, and of these only 46 were simple declaratives. There is no reason, therefore, to suppose that a preponderance of this sentence-type helps the child learn English. The other point that Bever et al. contest is that the simple, active declarative sentences are the base form of all other sentence types: this is not so. It would appear that Braine assumed that all other sentence-types derive from the kernel sentence (Chomsky, 1957) as Harris (1951) has stipulated. But the kernel sentence itself does not produce any other sentence-type: it is the underlying string which can become any one of a number of different sentence types in surface structure. Chomsky (1957) defined the kernel as the set of kernel sentences which were the result of applying only obligatory transformations to the kernel strings. These particular distinctions have now, however, been superseded (Katz and Fodor, 1963; Chomsky, 1965). Bever et al. also discuss in detail the question of sentential position, pointing out that there are so many heterogeneous expressions that can occur at any given position within the sentence that it would be no easier for the child to rely on sentential position than on, say, learning adult grammatical categories to facilitate the acquisition of language. Another argument against any great stability in the order of the elements in surface structure is that order is one of the things most likely to change with transformations, e.g.

cleft-sentence forms. Bever et al. take a mentalistic stand (like Chomsky, 1965; Katz, 1966; etc.), pointing out that the complexity of language is such, and the relations between deep and surface structure so indirect, that the child could not hope to learn anything unless he already has some innate knowledge of language universals. It is these universals that help the child select broad generic categories, for instance, which later develop into the parts of speech hierarchy used by adults (cf. also McNeill, 1966).

Schlesinger (1967), though, has pointed out that Bever et al.'s criticisms are based on the premiss that the child, on learning his native language, has first to acquire those skills and competences which he will eventually use when he has acquired an 'adult' mastery of language. However, as Schlesinger points out: "there seems to be no reason why the end product of a prolonged and very complex learning process must be acquired directly rather than through various detours" (1967:398). The mentalist position on language acquisition is not really strengthened by just pointing out the weaknesses of the empiricist position (Chapter I above); when the mentalist claims that 'x is innate', x has still to be accounted for. Schlesinger (1968) suggests that the deep structures with which the speaker and hearer operate are not exactly those which currently figure in generative grammar: they do not contain information about grammatical categories nor about order. That sort of information is introduced through transformations which change the deep structure into surface structure. He also argues (in press) that the speaker's linguistically relevant intentions must serve as input. The Input-marker contains concepts and the relations between the concepts (I assume that this would, for example, include theme. Cf. 5.13 below). The

speaker realizes the concepts as words and as the grammatical relations between words, such as inflection and word-order.

In Table I, the data show the Pivot class of one child from each of the three studies mentioned earlier (Braine, 1963a; Brown and Bellugi, 1964; Ervin, 1964). The evidence for classifying words together (bracketting) is always distributional; two words are considered to belong to the same grammatical class if their privileges of occurrence are the same. At the two-word stage, children do not only produce utterances consisting of Pivot + Open. In fact, the Pivot word

 Insert Table I about here

is optional: (P) + O, where O is generally a noun (N). Another utterance-type consists of two Open class words: O + O, but two Pivot class words never occur together to form an utterance. As the different categories emerge, the rules set up to account for the structure of the child's utterances become more complex. The Pivot class members are gradually differentiated into different classes which end up corresponding to the adult hierarchy. A factor which may contribute to this differentiation of the Pivot class is that different Pivot words may fulfil different functions; Slobin (in press) claims that some Pivot words are used to modify or qualify the Open class noun, e.g. Eng.: my ---, pretty ---, allgone ---; Ger.: mein ---, armer ---, alle ---; Russ.: --- khoroshaya, --- bo-bo (cf. Table II). (The dash indicates the usual position of the Open class word in such utterances.) A second function of the Pivot word is to locate an object, e.g. Eng.: there ---, here ---, see ---; Ger.: --- da, da-is ---; Russ.: --- tam. The Pivots can also

describe an act, in the sense of attributing directionality: Eng.: ---
away, --- on, --- come; Ger.: --- an, --- aus; Russ.: --- upala,
 --- tprua. Finally, the Pivot class words can indicate a demand or
 desire on the child's part, e.g.: Eng.: more ---, give ---; Ger.:
mehr ---, bitte ---; Russ.: esche ---, day ---. The data given in

 Insert Table II about here

support of this idea is still quite fragmentary. It may be quite
 plausible, though, to suggest that the child's first differentiation
 among members of the Pivot class may be along the lines of the different
 functions filled by certain of its members.

Brown and Bellugi (1964) examined the emergence of different
 grammatical classes from the Pivot class of one child over the course of
 five months. During this time, five grammatical classes appeared:
 articles, adjectives, demonstrative pronouns, possessive pronouns,
 and a residual Pivot class (P_3) which contained other, 'nother, one,
all and more. Each new class appeared as the subdivision of one of
 the Pivot classes in a process of gradual differentiation. At the be-
 ginning of the five month period of study, the child's Pivot class con-
 sisted of my, that, two, a, the, big, green, poor, etc. (cf. Table I,
 centre column). At that stage, his P + O sentences could be repre-
 sented by the rule:

i) $(P_1) + O$

(Parentheses indicate that the choice of an item is optional.) At the
 second stage, both the articles (a, the) and the demonstrative pronouns
 (this, that) had become separate classes, leading to the rule:

Table II (from data in Slobin, in press)

Pivot structures in English, German and Russian.

Function of Pivot	Language:		
	English	German	Russian
Modify, qualify	pretty --- my --- allgone --- big --- other ---	armer (poor) -- mein (my) --- alle (allgone) ---	--- bo-bo (hurt) --- khoroshaya (good) --- tyu-tyu (allgone)
Locate, name	there --- here --- see --- it --- that --- --- on there --- up there	--- da (there) da-is (there is) --- gukuk (see) ---	--- tam (there)
Describe act	--- away --- on --- off --- it --- do --- come I ---	--- bah (away) --- an (on) --- auf (on) --- aus (off)	--- tprua (walk) --- bay-bay (sleep) --- upala (fell down) --- bukh (fell down)
Demand, want	more --- give ---	mehr (more) -- bitte (please) ---	eshche (more) --- day (give) ---

ii) (Dem) + (Art) + (P₂) + O

By the end of the five month period, adjectives appeared both before and after nouns; also, the possessive (my) has become a separate class. The child's grammar now needed three rules to describe it:

iii) a. (Art) + (Adj) + O

b. $\left. \begin{array}{c} P \\ 3 \\ Poss \\ Dem \end{array} \right\} + O$

c. (Art) + O + (Adj)

(Braces indicate that one of the enclosed items must be chosen. However, rule (ii) suggests that utterances like that the my book as well as that a green book could occur. Also, rule (iii-b) seems to exclude utterances such as that my book, etc. So it is questionable on distributional grounds as to how satisfactory these rules would be if applied to other data.

Another illustration of the increasing complexity in the structure of the child's sentences can be found in the rules necessary to describe the development of the Auxiliary and its relation to Negatives and Questions in English. Klima and Bellugi (1966) made a detailed study of three children's data in which they found a very consistent development of negatives and questions; this consistency led them to claim that they were studying the children's competence directly: this issue will not be taken up here as I have already indicated some of the pitfalls that are to be found in the search for competence in developmental studies (cf. 1.1). Klima and Bellugi's claim is based on a description of the children's output which can no more provide a

true characterization of competence than such a description in the case of an adult. However, the stages in development of these constructions are probably due to the children's observance of similar if not identical rules to those proposed by Klima and Bellugi.

In the earliest stages (two- to three-words utterances), the negatives and a growing class of interrogative words occur at the beginning of the utterance, modifying the sentence as a whole. At the next stage, (2), the auxiliary first appears, always in conjunction with a negative, e.g. can't, don't. It is only after this stage that the modals and do appear inverted with the subject in interrogative sentences, but only in Yes/No questions for the moment; there is still no inversion in questions introduced with an interrogative word, where, what, etc. At the same time (stage 3), modals (but not do) appear independently of negative and interrogative structures. It is only after this stage, (3), that the inversion of the auxiliary verbs extends to questions which begin with an interrogative word. Negation is still tied to the auxiliary verb at this stage, but the relation between negation and indefiniteness has yet to be established, e.g. the children use not some rather than not any. The rules which describe the development of the negatives are closely allied to those which describe the interrogative structures in the children's speech.

Such syntactic rules as those in Klima and Bellugi (1966), by accounting for the data, are descriptive rules, but, interestingly, the appearance of the rules changes at each stage to a form which more nearly resembles the equivalent adult rule (Klima and Bellugi, 1966; cf. also Menyuk, 1963, 1964). Thus, although it is very difficult (if not impossible) to extrapolate from a description of performance

to the underlying competence possessed by the child, the developmental changes in performance are good indicators of changes in the child's grammar which, in becoming increasingly complex as new utterance-types develop, mirror more accurately the distinctions in language which the adult speaker observes. Such rules are not merely a descriptive device for, in some way, they do reflect the creative use of rules in language; for example, some of the child's verb forms can be accounted for by positing a rule to deal with past tense endings. The child himself will add the regularly required 'past' morpheme (usually /ed/) even to nonsense syllables in contexts requiring a past tense. Berko (1958) was the first to demonstrate the presence of these actively-used rules in children's speech. She presented children with a variety of pictures depicting items which she 'named' with nonsense syllables; then, by asking for descriptions of various kinds, she elicited a number of different morphological endings which obeyed regular rules in the children's speech. Similar work on the role of rules in language acquisition, based on a feature analysis of speech sounds, has been done in phonology by Anisfeld (Anisfeld and Tucker, 1967; Anisfeld, Barlow and Frail, 1968).

The elaboration of rules such as those described by Klima and Bellugi (1966) eventually leads to the description in terms of rules of the many different utterance-types found in adult English. In the next section, I will examine some of the literature dealing with 'compound' and 'complex' utterances in children's speech.

4.3 Although it has recently been stated more than once that the child is in possession of all the main construction-types in English by the age of five (e.g. McNeill, 1966), not very much work has

been done on the development of specific 'compound' and 'complex' utterances (to use the traditional labels) in children's speech. Moreover, little of the work on English that has been done in this area has looked at records of oral speech; the majority of studies have considered written English, which immediately puts their youngest subjects in the seven- or eight-year old group. The children's written English is not necessarily an accurate reflection of their speech, although it is likely to mirror certain tendencies, i.e. preferences for some structures over others.

Among the studies of younger children (1;10 upwards, where the records are necessarily oral in nature), Bloch's (1921, 1924) studied the emergence of subordination (complex utterances). He stated that many utterance-types are in fact present long before the necessary subordinating conjunctions are explicitly used, e.g. "J'ai peur ça tombe" (1924:34). He emphasized the fact that one has to know the exact circumstances of the utterance (the physical context) and the child's current state of linguistic development and knowledge in order to interpret such utterances as rudimentary sentences and as subordinate clauses of various types. "...Progressivement les idées se subordonnent, même en l'absence du terme de subordination: ce qui le prouve, c'est la comparaison de phrases coexistantes où cette relation est exprimée, et aussi la nécessité du sens" (1924:32). Bloch's insistence on the latter point (nécessité du sens) is of course closely tied to the need to take into account the entire context of the child's developing speech, something which Slama-Cazacu (1961, 1965) has also emphasized. Bloch pointed out that: "Dans le courant de la troisième année, mes enfants sont devenus tous les trois aptes à composer des

groupes exprimant des circonstances de cause, de temps, le but, l'hypothèse, mais ils ont tous les trois commencé régulièrement par la simple juxtaposition, et même quand ils ont acquis les conjonctions appropriées, il n'est pas rare qu'ils aient continué à s'en passer" (1924:35). Guillaume (1927b) agrees with Bloch that: "Dans la liaison de deux propositions la conjonction est d'abord latente: 'Donne le couteau [pour] couper la belle dame', 'Tu vas voir [comme je] fais la musique. Elle veut pas [que je] le fais' etc." (1927b:217). Grégoire (1941, 1948) likewise agrees that French-speaking children do not use many conjunctions until the end of the third year (2;8 - 3;0) when they still seem to be omitted quite frequently. Slama-Cazacu (1965) also agrees about the time of appearance of complex utterance-types, in Roumanian; it occurs around the age of three years. Woodcock (1934), in looking through nursery school language records for 17 children found that the conjunction why, because, and so, with if coming slightly later, all appeared between 2;8 and 3;0 years. These data agree with those discussed by Bloch (1924), Guillaume (1927b), and Grégoire (1948), that the subordinate clause seems to appear first between 2;6 and 3;0, even though the conjunctions may still be sporadically omitted. According to Bloch's data for French, the child begins using parce que (because) at 2;6 - 3;0, and quand (when) at about 2;10 - 3;0. Si (if) also appears at about 2;10 though it is implied by the overall context as early as 2;6. The time period covering the appearance of the conjunctions appears to correspond very closely to both Woodcock's and Slama-Cazacu's data. Woodcock also concluded from the contextual data that the relations expressed by the conjunctions were actually present earlier on, often from 2;2 upwards, although they were not marked in any overt manner. The actual beginning of causal

expression is largely obscured, Woodcock claimed, by the use of pre-forms such as and instead of so (that), or by the complete omission of the conjunctions.

Nice (1925) reported only one or two compound and complex sentences per 50 utterances recorded from each child, and McCarthy (1930) merely stated that the number was very small in pre-school children, (i.e. under 6;0) although it increased in older groups. O'Shea (1907) tried to determine the order of appearance of the conjunctions in his own children but came to no definite conclusions, convinced that "none of the conjunctions expressing refined shades of meaning is employed with precision before the fifth year". He was presumably defining 'precision' from an adult viewpoint. Another study of one child's speech was done by Boyd (1926-7). Taking the speech of one child between the ages of three and eight years, Boyd distinguished the kinds of utterance used at different ages and the development of different types of clause according to three main grammatical categories: noun, adjective and adverbial. He then, however, compared the child's speech, thus analysed, to adult conversation as portrayed in novels! On the whole, no really systematic analysis of the compound and complex utterances used by young children was attempted before Davis' (1937a).

Davis (1937a) made extensive oral records for three groups of children, whose average ages were 5;6, 6;6 and 9;6 years. She first analysed the mean numbers of subordinate clauses per 100 sentences, and found that the percentage increased considerably with age (cf. Table III).

 Insert Table III about here

Table III (after Davis, 1937a: Table 43)

Mean number of subordinate clauses per 100 sentences.

Age	twins		singletons		only children	
	boys	girls	boys	girls	boys	girls
5;6	6.7	7.8	7.8	7.7	10.1	15.1
6;6	10.4	13.3	8.9	10.0	12.8	14.4
9;6	16.4	14.0	17.3	18.8	28.2	20.6

Among the complex utterances (those containing a subordinate clause), she found that adjectival clauses seemed to be the least important. However, of the noun clauses and the adverbial clauses, the former decreased during the early school years (between 6;6 and 9;6) while the the number of adverbial clauses increased considerably. The reason for the increase in the latter group could be just due to increased precision in the use of language rather than to a true functional variation, i.e. earlier on, the subordinate relation may have gone unexpressed altogether. The adverbial clauses fall into eight groups: time, place, condition, cause, manner (including comparatives), purpose, result and concession. In the 5;6-year old group, the largest category is time, the next largest being cause, and then condition. By 6;6, the largest category is cause, followed by time, and then condition; this ranking among the three largest categories is maintained in the 9;6-year old group. The overall distribution of the different adverbial clauses, by age, is shown in Table IV.

 Insert Table IV about here

Stormzand and O'Shea (1924) found a similar distribution of adverbial clauses in written material for 9;0 - 10;0-year old children: 52% of the adverbial clauses were time clauses, 26% were condition, and 13.1% were cause. LaBrant (1933), Stormzand and O'Shea (1924), and Boyd (1926-7) all agree with Davis' finding about the importance of the time clauses. These clauses make up between 20 - 50% of all the adverbial clauses used by child and adult subjects in both spoken and

Table IV (after Davis, 1937a: Table 50)

Percentage distribution of different types of adverbial clauses

Group	time	place	condit.	cause	manner	purpose	result	concess.
boys	31.6	4.4	17.5	18.4	7.9	9.6	7.9	3.5
girls	25.6	8.4	9.9	28.8	7.8	8.4	9.4	1.6
boys	22.6	0.0	18.9	28.3	18.9	5.7	5.7	0.0
girls	21.7	1.7	16.7	28.3	10.0	5.0	15.0	1.7
boys	21.6	2.0	14.9	31.1	8.1	13.5	6.7	2.0
girls	22.4	2.7	10.8	39.3	4.4	10.2	9.1	1.0

written English.

Of the conjunctions as a whole, Davis found that coordinating conjunctions are used approximately five times as often as subordinating ones. And accounts for 84% of all coordinating conjunctions at 5;6 and at 6;6 years, and for 88% at 9;6 years. But makes up 10% of the total number of coordinating conjunctions at 5;6 years, 11% at 6;6 and 5% at 9;6 years. Of the subordinating conjunctions, because, if and although are the most frequent. (Davis did not include any temporal conjunctions among the latter, although elsewhere she counts them as subordinating conjunctions.) In a later article, inspired by Heider and Heider (1940), Davis (1941) examined the position of the subordinate clause in the sentence. Heider and Heider (1940) suggested that there might be particular difficulty in placing a subordinate clause (in written English) at the beginning of a sentence, because of interrupting the main thought by a qualification or by the expression of a possibility. The Heiders suggested this to account for the differences in usage between deaf and hearing children who were asked to write the story of a short film they had all been shown. Davis (1941) found that clauses of time and condition usually introduced the main clause. She also found that the placing of the subordinate clause first was correlated with greater linguistic development: it was used by the older children (9;6 years) more often. It was also correlated to some extent with intelligence: it was only used by the more intelligent children in the 5;6-year old group. The total percentage of time clauses occurring before the main clause in her data, though, was considerably smaller than the 90% found by Heider and Heider (1940). In her younger group (5;6), time clauses preceded the main clause in 45%

of the instances, following it in 55% of them; in the oldest group (9;6), the time clauses preceded in 57% of the instances, following in 43% of them. For the youngest group, conditional clauses preceded 76% of the time, and followed 24% of the time. Bushnell (1930) got similar results in comparing the oral and written compositions of 15-16 year-old children. In the oral compositions, time clauses preceded the main clause in 78% of the instances, while in the written, this happened in 60% of the instances. The oral conditional clauses preceded in 80% of the instances, and the written ones in 67% of them. There seem to be similar tendencies, therefore, in both oral and written English as far as clause-position is concerned, although the numbers are higher for oral English.

The two main studies of written English are those of LaBrant (1933, 1934) and Heider and Heider (1940). LaBrant studied compositions written by children in Grades 4 to 9 (aged approximately 10 - 15) and Grades 9 to 12 (15 to 18 years) which she compared to some adult writing. Her main unit of analysis was the finite predicate (a clause), which was classified into two principle categories, main and subordinate. She computed an index of subordination for each individual by dividing the number of subordinate clauses by the total number of (written) clauses. The clauses used by the first group of subjects (grades 4 to 9) were also classified as adverbial (time, condition, cause, etc.), substantive (noun clauses), or adjectival in type. In looking at the functions of the subordinate clauses used by this group, LaBrant found that the distribution of the dependent clauses remained fairly constant with age. However the content of these subordinate clauses became more

exact with the maturation of the children, e.g. time clauses changed from when being used in every instance to the more precise after, while, etc. She also found that the time clauses were more frequent than all the noun clauses or than all the adjectival clauses together, and more than twice as frequent as any other adverbial clause. Heider and Heider (1940) made a quantitative analysis of the differences in (written) sentence structure between deaf and hearing children. The age-range of the hearing children was from 8 - 14 years, that of the deaf from 11 - 17 years. Apart from utterance-length and ratios of compound and complex utterances to simple ones (in which the hearing were the most advanced), a comparison of the seven kinds of subordinate clause that occurred most frequently in the data showed that the differences between deaf and hearing children did not correspond entirely to the differences between younger and older children. However, to take only the data on the hearing children, the percentages of both compound and complex utterances increased with age, though not very greatly (cf. Table V).

 Insert Table V about here

Of the different types of adverbial clauses, the time clauses are the most frequently used, occurring twice as often as the next most frequent clause type (noun clauses introduced by 'that'). In 90% of the instances, the time clause preceded the main clause while causal clauses always followed. If the temporal conjunctions are considered, though, most of them occurred introducing the clause in both first and second position (although the first position was more frequent): when,

Table V (after Heider & Heider, 1940: table III)

Percentage type of sentence at different ages for hearing children

	Age: 8	9	10	11	12	13	14
Sentence-type:							
i) simple	53	45	40	36	30	27	27
ii) compound	31	36	38	38	41	42	43
iii) complex	8	9	12	13	13	14	12

while, as, after, and before all occurred in both positions; as soon as occurred only in first position, and until only in second position. The hearing children used, in all, fourteen different forms (of which the above are the seven most frequent, in rank order) to introduce temporal clauses, as compared to the deaf's five: when, after, while, until, as soon as (in rank order of frequency). Also, in the deaf children, there was a less marked tendency to place the time clause first: 75% of the instances as opposed to the hearing children's 90%. (Both these percentages are very high compared to the other data cited above; it is possible that this is due to the composition task set the children: a narrative description of the events shown in a short film. In spontaneous speech, other than story-telling, and in non-narrative writing, there seems to be a lower percentage of time clauses.)

To sum up, the studies of very young children (between 2;0 and 5;0 approximately) find that the subordinate clause of various types is implicitly present by the middle to end of the third year; some of the subordinating conjunctions also appear at that time, although the child may still omit the conjunction at times. Both at this stage, and much later (around 9 - 10 years old), compound utterance-forms are more frequent than complex (subordinate clause) ones. Of the different types of subordinate clauses in the speech and writing of the older children studied (from 5;6 upwards), there seems to be a consensus that the adverbial clauses are the most frequent. Of the adverbial clauses, clauses of time, cause and condition make up the three largest groups in the children's speech between the ages of 5;6 and 9;6. The time clauses are the most frequent at first though causal clauses become about as frequent

later. The subordinate clause occurs in both first and second position with respect to the main clause, but there is a preference for first position in time and condition clauses compared to a preference for second position among causal clauses.

In the final section of this chapter, I will consider a few studies which suggest that it is the child's conception of order in time which may cause him comparative ease or difficulty in dealing with certain linguistic constructions.

4.4 There is a certain amount of work which has related the chronological order of the events or facts being described to the language they are described by. Minkus and Stern (1923) suggested that it was difficult at certain stages in language development to deal with sentences which speak of events out of time-order or in any way counter to one's expectations. They examined the difficulty of different conjunctions, both coordinate and subordinate, in German, for children aged 11;6, 12;6, 13;6 and 15;6 years. They found that the order of relative difficulty remained unchanged by age, although each category did improve with age. The different conjunctions were presented in utterance-completion tasks. The question of temporal sequence in the two clauses, as well as the relationship of their content (i.e. casual, conditional, etc.), was very important. Minkus and Stern found that the difficulty of causal constructions in which the temporal sequence was interrupted was greater than that of the instances where it followed the direct temporal sequence.² They also found that sentences involving

² However Clark and Clark (forthcoming) found that there is a marked tendency for adults to recall 'because' clauses better in second place as opposed to 'when' clauses, which are better recalled in first place

concessive conjunctions which serve to contradict the expectations resulting from the content of the first clause were particularly difficult. LaBrant (1934) found that this type of sentence was extremely rare, even in 18 year-olds. Piaget (1926, 1928) obtained results similar to those of Minkus and Stern with children between the ages of six and nine, also in utterance-completion tasks. For instance, when children were asked to complete the utterance 'The man fell off his bicycle because ...', they appeared to assume that the first event mentioned was the first event. This assumption on their part would explain why the utterance was so frequently completed by the children's introduction of an event which would logically follow rather than precede: 'The man fell off his bicycle because he broke his arm'. It is evident from such responses that the children ignored the meaning of the conjunction which would have told them that the first event mentioned was actually the second event in time. In the utterance-completion tasks, then, the children appear to have based their responses on assumptions about the time sequence, seeing it as directly related to the order in which a series of events is described. In their spontaneous speech, though, one rarely finds this type of mistake, even when the chronologically second event is described first. Piaget's explanation is that: "In his language, the child frequently omits from between his successive judgments such relations as we would expect to find, and is content to juxtapose these judgments without any conjunctions or simply by

in a memory experiment. The errors for 'because' clauses mainly consisted of repositioning of the subordinate clause after the main clause, while 'when' errors were the inverse of this, i.e. repositioning of the subordinate clause in first place, where the stimulus sentence had had it in second place.

means of the term 'and'" (1928:224). It is apparently this replacement by 'and' that causes the child to make mistakes of succession.

Piaget claimed, at that time, that all relations in the early stages of language development (his youngest subject in this series of studies, however, was already over five) are either unmarked altogether, (i.e. there is merely juxtaposition of two utterances) or the utterances are linked by 'and'. If the relation between the utterances is an adversative (contrary-to-expectation) one, the utterances may be linked by 'but'. All the non-adversative relations, expressed by subordinating conjunctions, develop from 'and', and all the adversative ones from 'but'. Werner and Kaplan (1963) maintain a similar hypothesis, but claim that the development of explicitly causal conjunctions is characterized by a stage during which the relations are seen as temporal rather than causal. The description of the events will, at this stage, follow the order in which the events are experienced. If this derivation for the causal clause were correct though, I think it is somewhat strange to find a preference for the causal clause in second position (Clark and Clark, forthcoming) in English. Werner and Kaplan assume that because-clauses always occur in first position in adult speech, but do not cite any data in support of their position. However, it does seem to be true that children describe events in order where they are perceived as being related in time. Thus, when the notion of causality is acquired, it must overlay the time relation that was recognized previously.

Werner and Kaplan further claim that for a long period of time in the early stages of language acquisition, all the dependency relations are expressed explicitly by coordinate conjunctions linking the

clauses. They claim that this arises through the child's strong tendency to transform intrinsically subordinate relationships, such as causality or conditionality, into more concrete relations of a purely spatio-temporal nature. Again, the relation between coordinate clauses and temporal relations is not supported by any data, so it is very difficult to assess what is meant by 'concrete relations' here. Indeed, data showing that children begin using subordinate relations very early on (cf. 4.3) appear to contradict Werner and Kaplan's hypothesis. In addition, the spatio-temporal aspects of English are largely dependent on the system of prepositions and adverbials, which can hardly be called 'coordinate' in nature. It is possible that some of the confusion in Werner and Kaplan's discussion comes from their too close an identification of language structure with the structure of thought, or even of images; for example, they talk of the simple coordination of thoughts compared to the subordination of one thought to another, implying that this does not occur until the child uses coordinate and subordinate utterance-types in an adult way.

Piaget, on the other hand, has recently modified his position in this respect, saying that the relation between language and thought is not close enough for us to assume that one can study thought processes directly by means of language; thus, linguistic differences are not explanations of cognitive differences but are, to some degree, reflections of them (1950). In his comments on Vygotsky (1962), therefore, Piaget rejects much of his earlier work: "It took me some time to see, it is true, that the roots of logical operations lie deeper than the linguistic connections, and that my early study of thinking

[1926, 1928] was centered too much on its linguistic aspects" (1962:5).

The hypothesis (in Piaget, 1926, 1928; and Werner and Kaplan, 1963) that most subordinate relations develop from and, with the adversative ones coming from but, is not supported by data from the studies discussed above. The main subordinate conjunctions appear very early on, barely two or three months after the appearance of and (at 2;8 - 3;0 years), whereas Piaget's subjects were already over five, or older, in the data he reports. In spontaneous speech, moreover (especially in in the present study), children appear to use the subordinate conjunctions correctly, as far as can be judged from the context of their use, though it is quite possible that, at the age of three, the child does not attach the exact adult meaning to any particular conjunction he uses. It may be that Piaget was misled by the large proportion of coordinate to subordinate conjunctions in children's speech at that stage; Davis (1937a) found that compound utterances were about five times as frequent as complex ones in children between 5;6 and 9;6 years, and in Heider and Heider (1940), the ratio of compound utterances to complex ones was three or four to one for 8;0 to 14;0 year-old (hearing) children.

Of the subordinate clauses that have been studied, the adverbial clauses of time are significantly more important than any other clause type (cf. 4.3). There seems to be a progression towards more precise indication of exact time relations as the child gets older; LaBrant (1933) found that, in written material, the time clauses ranked as follows for frequency of usage and increase in age: when (used in almost every instance by her younger group of subjects); after; until,

before; while; as soon as; as. A similar progression has been remarked, less formally, by others, e.g. O'Shea (1907). Finally, a number of studies (e.g. Heider and Heider, 1940; Davis, 1941; etc.) have pointed out that time clauses in the majority of instances occur in first position in the utterance. In addition, the figures supporting this in Davis (1941) suggest that in the youngest group (5;6) the inverse is true, i.e. the time clause more often occurs in second position to begin with. The clause-position will be investigated in this study by looking at extensive data from still younger children. The tendency for the time clause to occur first in older children is very likely to be related to the observance of time-order among the events described. The majority of temporal conjunctions in English refer to the first event, and therefore the subordinate clause which they introduce would have to be placed first if the time-order of the events was to be reflected in the clause order in language.

It is clear from the studies of children's notions of time (cf. Chapter III above) that the idea of order is present very early on, during the third year, and we have seen above that this notion of order appears to be reflected directly in some cases in the sentence structures used to describe time. I will further assume that the tendencies observed in the data cited above are reflections of some underlying organizational principles which operate when one is describing events in time. I shall claim that such principles play a role both in adult speech and in the ontogenetic development of utterances used to describe events in time.

V. Three Principles and a Developmental Hypothesis.

5.0 In this chapter, I shall outline three principles which interact to determine which of several possible descriptions an adult may give of two events in serial order in any particular context. The three principles are supported by both linguistic and psychological data, some of which are discussed following the relevant principle. These three principles also affect the child's use of the different description-types. They do not, however, directly predict any order of acquisition unless the function of each description-type in English is taken into account. In the second part of this chapter, the specific predictions which can be made in the case of a developmental hypothesis will be set out in some detail, before discussion of the subjects and data (in chapter VI).

5.1 The three principles will be discussed in turn under the headings: order of mention, derivational simplicity, and choice of theme.

5.11 Order of mention The first principle is that the order of mention, the order in which two events are described by a speaker, is 'simpler' when it coincides with chronological order, i.e. the order in which the events are perceived or are believed to have happened by the speaker.

In English, order of mention may or may not coincide with chronological order. First, if the speaker uses only single clauses, the only way that he can recount a succession of events is by keeping to the chronological order of their occurrence:

E/ (1) He opened the door. He came in. He sat down. He picked up a book from the table. He began to read.

The same applies if the speaker uses compound sentences¹ to describe a succession of events:

(2) He opened the door and he came in.

Event 1 must be described before event 2. But events may be mentioned out of chronological order if the speaker uses an appropriate temporal conjunction between the clauses. For example, we can speak of the result before mentioning the cause:

(3) He took a taxi because he missed the bus.

The compound clause construction (with coordinate and) in (2) is therefore simpler than (3) by the principle of order of mention.

There is psychological evidence which supports this principle by showing that people prefer to use a linguistic description of events in which order of mention corresponds to chronological order. Clark and Clark (1968), in a memory experiment, found that subjects remembered best the meaning of those sentences in which order of mention coincided with chronological order. In addition, the subjects often made errors by interpreting order of mention as equivalent to chronological order when they had forgotten the appropriate conjunction. Thus the sentences in which temporal order was best remembered were of the type:

(4) He came in and he shut the door.

(5) After he came in, he shut the door.

¹Compound sentences are defined as two clauses joined by a 'coordinate' conjunction such as and, and then, so, or but in the present data. Cf. Chapter IX, below, for further discussion.

(6) He came in before he shut the door.

rather than the alternative descriptions:

(7) He shut the door but first he came in.

(8) He shut the door after he came in.

(9) Before he shut the door, he came in.

Groethuysen (1935-36) also found that adults would recount the events of the preceding day in the order in which they occurred, i.e. in chronological order. Fraisse (1963) discusses many studies which show how difficult it is for adults to repeat a sequence of digits or letters just heard in any other order than the one in which they were perceived. Children, likewise, repeat any such list in the order given, unquestioningly. Also, in an experiment in which pairs of sentences that described a series of two events were compared, Katz and Brent (1968) found that both adults and children (Grades 1 and 6) tended to prefer those sentences in which the order of mention coincided with the chronological order of the events, e.g.

(10) The boy fell off the bicycle and he broke his leg,

was preferred to the (incorrect) order:

(11) The boy fell off his bicycle because he broke his leg.

(82% of Grade 1 responses preferred form (10); 100% preferred it in the other two groups.) There also appeared to be a clear preference in all three groups for temporal over causal constructions when chronological order of mention was adhered to, e.g.

(12) When he turned the switch, the room got dark,

was chosen on average, for the three groups, 83% of the time over:

(13) Because he turned the switch, the room got dark.

Finally, the preference for chronological order in the order of mention could explain why children make the mistakes they do in some sentence-completion tasks (e.g. Piaget, 1926, 1928; cf. 4.4 above). When they are asked to complete sentences like 'The man fell off his bicycle because....', the children assumed that the first clause describes the first event, and they therefore expected to fill in the second of two events in their completion of the sentence. Therefore, they would complete the sentence without taking any notice of the meaning of the conjunction. Their assumptions overrode the information offered by the presence of the conjunction.

5.12 Derivational simplicity The second principle is that of derivational simplicity. This notion of simplicity applies only to the so-called complex sentences, i.e. those with a main and subordinate clause:

- (14) They arrived after the play had begun.
- (15) He was late because the road was closed.
- (16) When Tom got in, he opened all the windows.

Simplicity here refers to the number of steps (transformations) in the derivation of a sentence from its deep structure. Derivational simplicity is seen in the case where the only difference between two sentences with identical meaning and with almost identical surface structure is the clause-order, i.e.:

- (17) He got up from his chair when he saw the door open.
- (18) When he saw the door open, he got up from his chair.

The principle of derivational simplicity states that the first of these sentences, (17), is transformationally simpler because the second, (18),

has undergone an additional transformation which has preposed the subordinate clause into first position in the sentence. This principle therefore is dependent on a particular model of grammar (Chomsky, 1965) for its formulation.

Linguistically, the source of the subordinate clause can be shown to be an adverbial or adjunct constituent of the predicate phrase. For example, the sentence He arrived when it was dark has a high level constituent structure like that of He arrived then (cf. Lees, 1961; a similar analysis is suggested in Smith, 1961, and in Doherty and Schwartz, 1967). The subordinate clause is derived from a node in the phrase-marker to the right of the matrix sentence into which it is subsequently embedded (see Figure II). Figure II is essentially taken from Chomsky (1965), but is modified in the light of evidence discussed by Lakoff and Ross (1966). In this derivation, the subordinate clause is first

 Insert Figure II about here

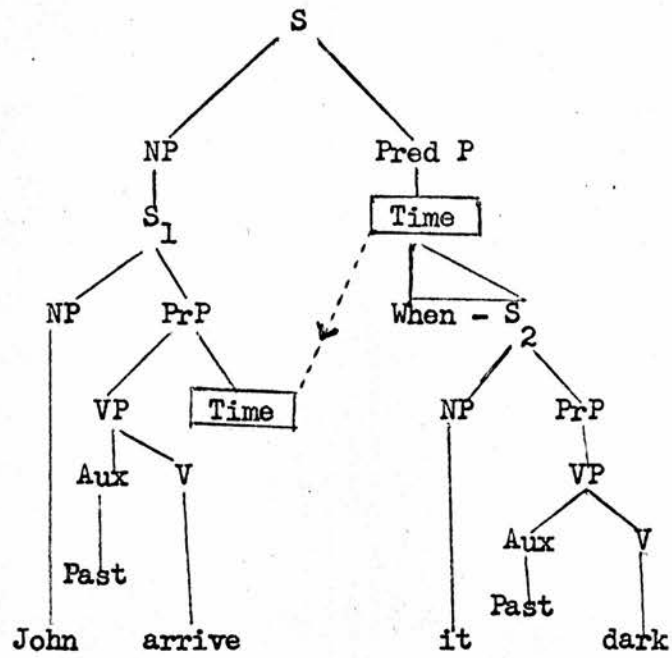
attached to the predicate phrase of the main clause by an embedding transformation (see dotted line in Figure II); it is only after this that it may be preposed into first position.²

Additional evidence for this derivation of the surface structure position of the subordinate clause comes from one explanation of the pronominalization and proverbalization rules within the sentence in

²The possible sources of the subordinate clause itself, apart from its sentential position, are discussed in some detail in Chapter VIII below, where the different conjunctions used to introduce subordinate temporal clauses are analyzed.

Figure II

Derivation of subordinate clause position



English. Consider the following examples:

- (19) John came in when he finished cutting wood.
- (20) When John finished cutting wood, he came in.
- (21) When he finished cutting wood, John came in.
- (22) He came in when John finished cutting wood.

In (19), (20) and (21), John and he may refer to the same person. However, in (22), John and he must refer to different people. To exclude (22), then, as an instance of intra-sentence pronominalization, we may assume that pronominal reference can only be anaphoric -- i.e. referring to someone or something which has already been mentioned -- and at the same time that this pronominalization can take place either before or after the preposing transformation, as, for instance, in (20) and (21). The restrictions on (22), with anaphora, are only explicable if the subordinate clause is derived from a high level constituent to the right of the main clause. Proverbalization works in the same way:

- (23) He jumped over the fence after he decided to do so.
- (24) After he decided to do so, he jumped over the fence.
- (25) After he decided to jump over the fence, he did so.
- (26) He did so after he decided to jump over the fence.

As with pronominalization above, the proverbalization (do so) in (26) must refer to something other than jump over the fence. There are other problems which arise in connection with anaphoric reference, but these problems are not related to the derivation of the subordinate clause as such (cf. discussion in Lakoff, 1968). Given these facts supporting the derivation of the subordinate clause from a constituent to the right of the main clause in deep structure, we can conclude that the simpler

form of sentence with a subordinate clause is the one with the subordinate clause second, i.e. to the right of the main verb. A later transformation can then prepose the subordinate clause, as (16), (18), etc.

Derivational simplicity is not dependent on the chronological order of mention because, in English, the subordinate temporal clauses can describe either the first or the second event, e.g.

(27) He ran round the garden after he got out of the pool.

(28) He went swimming before he ran round the garden.

However, for the majority of temporal conjunctions (when, since, after, etc.) the subordinate clause describes the first event:

(29) He came home when he was ready.

(30) He will pick up the mail if Tom fetches him.

(31) He read the book after he heard about the reviews.

In (29) - (31), the simpler derivational form does not allow chronological order of mention. Event 2 in each instance is described before event 1. There are, however, two subordinating conjunctions in English which do make the chronological order of mention and the derivationally simpler form correspond, before and until:

(32) He ran across the road before he picked up the ball.

(33) He banged on the door until he was let in.

Although the 'simpler' sentence with a subordinate clause is derived to the right of the main clause, this does not mean that subordinate temporal clauses necessarily occur in second position in surface structure, particularly when 'performance' considerations (e.g. choice of theme, 5.13 below) intervene. However, Clark and Clark (1968) did find that there was a preference for the subordinate

clause in second position, e.g.

(34) He came in before he shut the door.

rather than:

(35) Before he shut the door, he came in.

This preference interacts with the one for descriptions in chronological order (see above, 5.11). The fact that the derivationally simpler form of sentence has the subordinate clause second, though, does have developmental consequences (cf. for instance, data discussed in Chapter IV above).

5.13 Choice of theme This is the choice made by every speaker when he decides what he is going to talk about. Any communication in English is organized into theme and rheme. The theme is the first member of the sentence and is the "subject" of the utterance. The rheme comprises the information about the theme.

There are certain general properties of themes. In English, the theme is generally the (animate) subject of the sentence, but it may also be the object of the verb (the surface structure subject) in passive sentences (Svartvik, 1966). In Wh-questions, the theme is the interrogative word, and in clauses beginning with 'link' words (adjuncts) like therefore, so, however, then, the adjunct is the theme. Theme is not only a within-sentence choice, but also one that acts across sentences; the rheme or part of the rheme of one sentence is often repeated in the theme of the following one. Such sequences in language provide a natural link between different utterances. Compare:

(36) I saw a man. The man was mending a box.

(37) I saw a man. The box was being mended by the man.

The first of these sequences is more 'natural' than the second where

there is no rhematic-thematic continuity between the two successive utterances.

Theme has mainly been discussed in terms of its occurrence within the clause (Mathesius, 1928; Firbas, 1959; Halliday, 1967a, 1967b). However, I shall extend this notion and claim that, within the utterance, the theme of a sentence can be a whole clause rather than one word or phrase. This is substantiated by the fact that many (subordinate) clauses can occur in a "deleted" form, leaving a word or phrase as theme:

(38) After I had lunch, I saw Joan.

(39) After lunch, I saw Joan.

(40) I ate lunch. Then I saw Joan.

In (39), the theme of the sentence is the adverbial phrase, After lunch, but in the context suggested by (38) above, this is most probably derived (in adult speech) from the clause, After I had lunch.³ Thus, the whole clause when preposed, can act as the theme. In (40), the theme of the second sentence, Then, takes the place of the first sentence; this example again shows the relation between clause and adjunct as theme. The underlined words are thematic.

Theme can be chosen independently of both chronological order and derivational simplicity. If the speaker chooses the first event as his theme, he will use the simpler order of mention. With this constraint, he may select a simple coordinate sentence,

³Although there may be some ambiguity with regard to the deleted elements, i.e. After lunch in (39) could be understood as After they had lunch, I saw Joan or as After she had lunch, I saw Joan, etc., I do not think that this affects the status of After lunch as the theme of (39). It is, therefore, still equivalent functionally to the full clause in (38).

(41) He closed the door and he went out.

a derivationally simple subordinate construction,

(42) He closed the door before he went out.

or a derivationally complex one,

(43) After he closed the door, he went out.

But if the speaker chooses the second event as his theme, he must use a sentence with the more complex order of mention. Here he may select an adversative coordinate sentence,

(44) He went out but first he closed the door.

a derivationally simple construction,

(45) He went out after he closed the door.

or a derivationally complex one,

(46) Before he went out, he closed the door.

We should keep in mind, however, that conjunctions like before are uncommon in English; (42) and (46) are used only in limited contexts.

Furthermore, adversative or contrary-to-expectation constructions like

(44) are very rarely used by young children, and are understood only with difficulty by older children (cf. data discussed in 4.4 above).

This suggests that the speaker's choices may actually consist of (41) and (43) for simpler order of mention, and of (45) for complex order of mention in most contexts.

One last point should be made about the difference between compound (coordinate clause) and complex (subordinate clause) constructions. Let us take the instance in which the choice of theme makes the order of mention for both constructions the same as the chronological order:

(47) I saw George and I went home.

(48) After I saw George, I went home.

The relation between the two events described in (48) is far closer than in (47); I shall call this relation the contingency relation between events. In (48), my going home is contingent on, or follows from (in my mind), my seeing George. With a coordinate conjunction between the two clauses (as in (47)), though, there is not necessarily any such relation between the two events. Contingency between events is found where one event (described in the main clause) is dependent on the other event (in the subordinate clause); in coordinate clauses, both events have an equal status, therefore one cannot be said to be overtly "contingent", in this way, on the other. Thus, where the choice lies between the coordinate- or subordinate-type of construction in describing events in chronological order, the presence or absence of contingency between the two events as they are perceived by the speaker may determine which description-type is used. The existence of this contingency relation is presumably one criterion adult speakers use for deciding between (47) and (48).

The effect of theme on how people normally produce utterances has been shown experimentally by Prentice (1967). In her study, a subject was cued with either the word for the actor or for the object in a situation. Next, the situation itself, portrayed in a slide, was presented to the subject. The subject was then asked to describe the picture he had been shown. Her data, as might have been expected, show that when the subject was cued with the actor, he produced a majority of active utterances containing the word-order actor-object, while, given

the object as a cue, he more often used the word-order object-actor and produced a large number of passive utterances. Tannenbaum and Williams (1968) obtained similar results in a study where the subject's attention was first focussed on either the subject or the object of a situation which was then presented pictorially. Each picture was marked with an A or a P indicating that the subject was to describe it with an active or passive sentence. The latencies for producing an active or passive description were then observed. Passives always took longer than actives even when the focus was the object; however, the passive took less time to generate when the focus was the object than when it was the subject. Turner and Rommetveit (1968) did a similar experiment with children, using pictures of one or two nouns in an utterance as cues in a memory experiment for active and passive sentences. They found that 72% of the errors were due to the children taking the noun presented in the Retrieval-cue picture as the theme of the sentence they recalled.

Theme, then, is largely dependent on the context, whether this consists of cuing or focussing beforehand as in the studies discussed above, whether the context is what has occurred previously in a conversation, or whether it is the physical situation -- objects and other people -- which surrounds the speaker. The recognition of theme, and its place at the beginning of the sentence is probably one of the factors which precedes the learning of various linguistic structures, including, of course, descriptions of successions of events.

5.2 From these three principles I propose an hypothesis which predicts the following stages of development in the child's progress towards adult-like descriptions of events in time:

- (1) The child uses short sentences, describing the events in chronological order.
- (2) He uses compound sentences (coordinate clauses), still describing the events in chronological order.
- (3) He recognizes, at some time prior to (4), that the order theme-rheme is the usual (unmarked or simpler) one in English.
- (4) He develops an alternative to the coordinate clause construction for when the second of two events is his theme; this involves a non-chronological order. He uses a main clause followed by a (potential) subordinate clause. At first, the conjunction may be omitted.
- (5) After the conjunctions are freely used in (4), the contingency relation between the events is recognized, much as the unmarked theme was in (3).
- (6) In appropriate thematic contexts, the subordinate clause is moved to first position so that the order of mention again reasserts itself so as to correspond to the chronological order observed in (1) and (2).

This hypothetical sequence of stages in development is derived from the three principles -- and their assignments of simplicity -- but not directly so. In addition to the principles themselves, we consider the functions of the description-types. First, consider an adult trying to choose among He ate and he left, He left after he had eaten, and After he had eaten, he left. For the adult, He ate and he

left is simplest: it has the simpler order of mention and no derivational complexity. But there is no way of differentiating the simplicity of the other two constructions. He left after he had eaten is simpler derivationally, whereas After he had eaten, he left is simpler in order of mention. We have no a priori reason for deciding whether derivational simplicity takes precedence over order of mention or vice versa. There is no evidence that I know of for deciding which principle is most important psychologically in determining difficulty in adult speech.

In children, though, we have functional reasons for differentiating all three description-types, for we must answer the question, Why does a particular form develop at all? In the child, as in the adult, He ate and he left is simplest. This compound sentence develops to indicate two related events occurring in succession; the only principle operating here is order of mention. With this perfectly adequate way of describing two events, why should the child develop either of the other two constructions? The first reason is that he comes to recognize what theme is and finds occasion to talk about the second event rather than the first. He needs an alternative order of mention, one that is not chronological. So he acquires the use of He left after he had eaten, which allows him to have the second event as his theme. In using this form, however, he learns that it also implies a contingency relation. Later, when he wishes to imply contingency and retain the chronological order in the order of mention, he acquires the third description-type, After he had eaten, he left. Thus, for functional reasons, the child develops He ate and he left first, He left after he

had eaten second, and After he had eaten, he left last. This, in brief, is the argument for the hypothesis I have presented. I will now consider the reasons for each stage in detail.

In stage (1) when the child begins to describe a succession of two events in time, he does it by using 'simple' utterances, one sentence per event; these sentences follow the chronological order of the events in the order of mention. This assumption is based on the child's limited memory span, observations of his linguistic knowledge, and his utterance-length in the early stages of language acquisition. At stage (2), he begins to coordinate clauses, joining two or more of his utterances by and, and then or so: He opened the door and he came in. He still talks about events in the order in which they occurred.

Somewhere in the first stage, the child begins to realize that the theme of an utterance is always the thing that is mentioned first. Gruber (1967) has discussed the unordered "topic-comment" construction (from which theme-rheme develops) in the speech of one 2 - 2;6 year-old child. The child used both topic-comment and comment-topic freely: fire truck there; all broken wheel (1967:49, 50). The utterances given in his data, though, never refer to more than one event. Leopold (1949, 3:70) pointed out that utterances in which his children's word-order differed from the adult word-order were comparatively rare; when this occurred, it usually indicated some emphasis on the first item mentioned, the 'psychological subject' of the utterance. Stern and Stern (1928:201) noted that young children used word-order rather than stress in German for emphasis (cf. also Chomsky, 1965:222). These observations are further evidence of the recognition of theme or topic in utterances.

Once the child recognizes that the order theme-rheme (earlier topic-comment) is the usual one for the English sentence, he will look for an alternative construction when he wishes to talk about the second of two events. The second event is mentioned first as theme and is followed by the first event. He now chooses the construction with the subordinate clause second. The conjunctions may, at first, be omitted (cf. 4.3 above), i.e. You're not going in my box - you'll get stuck (A.G., in present data). In such cases, the intonation patterns usually differentiate these forms from the simple short sentences. The primitive subordinate clauses are preceded by a main clause which does not have sentence-final (falling) intonation, while each clause in the chronological series of short sentences does have sentence-final intonation and is thus a complete utterance in itself: "He came in. He closed the door. He sat down." Subordinating conjunctions begin to appear around 2;6 - 3;0 years (Bloch, 1921; Woodcock, 1934; etc. Cf. Chapter IV).

At stage (4) when the child begins to use the construction with the subordinate clause second, he has an alternative to the coordinate clause construction. He can now make either the first or the second of two events the theme of his utterance: "He picked up the book and (he) sat down" or "He sat down when he'd picked up the book". These two constructions are functional alternatives in describing time sequences, and this contrast provides the motivation for the child's learning to use subordinate clauses at all. If there were no need to speak of events other than in the order in which they occurred, there would also be no reason at all to have any construction with the temporal subordinate clause second in the language.

The question which now arises is why, in that case, is there a sentence-type with the subordinate clause preposed? Isn't this a redundant structure given the presence of the coordinate clause construction where the theme is also the first event? Compare "He opened the door and (he) came in" and "After he opened the door, he came in". The coordinate sentence is less specific in describing the relation between the two events, whereas the subordinate clause (After..) is very specific and contrasts with when, as, since, while, etc. The contingency relation of when, since, after, etc. cannot be expressed by a coordinate clause construction in a compound sentence (cf. 5.13 above). Earlier, there is no need for a thematic equivalent to the coordinate clause construction, but there is a functional need for a thematic alternative to the coordinate construction. The child does not need to develop the construction with the subordinate clause first until he wishes to describe more specific temporal relations than those indicated by and or and then. The child, at this stage, (6), is normally between 3;6 and 4;6 years old.

A corollary to the predictions about the emergence of the subordinate clause in second position with its subsequent, optional, transference to first position, concerns the particular conjunctions that are used. Is there any sequence of appearance for particular conjunctions? The few investigators who have considered this question have come to no firm conclusions, and say only that they observed an increase in specificity of meaning over time, i.e. the children, as they grew older, began using conjunctions with a specific rather than a general meaning (cf. Chapter IV, especially 4.3, above). This

development is reflected in the frequency of use of each conjunction. From this point of view then, I would predict that the least marked of the conjunctions (the ones simplest in meaning and with the fewest syntactic constraints) should appear first and be used most frequently to begin with. When should therefore appear in all the protocols. It is the least marked of the temporal conjunctions since it also serves as the interrogative pronoun as well as the relative, and, in addition, it can indicate a simultaneous point in time or be semantically equivalent to the conjunction 'after'. When imposes no aspectual constraints on the verbs which occur with it, although it does require tense concord. Other conjunctions, like before and after are restricted aspectually and therefore have at least one extra degree of marking not apparent in when. The other conjunctions all appear to have additional features and therefore enjoy different degrees of marking; however, it is very difficult -- if not impossible -- to predict which types of marking take precedence developmentally over others, and therefore, beyond predicting that when should occur earlier than the other conjunctions in all the protocols, little more can be said here (cf. Chapter VIII below).

As far as the main hypothesis is concerned, there are three stages which would give it very tangible support: the presence of utterances illustrative of stages (2), (4) and (6) appearing in that order, in the protocols. The utterances representing these three stages will be examined in the first part of the data analysis in Chapter VII. The data will also be examined to find out if there is a discernible progression in the use of the different subordinating

conjunctions (cf. Chapter VIII). In the next chapter, I shall give a brief account of the subjects in this study, and of the methods of collecting and analyzing the data before proceeding to the analysis itself.

VI Subjects and data.

6.1 The subjects in the present study were fifteen children attending a Nursery School run by the Social Sciences Research Council Cognition Project at the University of Edinburgh. The Edinburgh Cognition Project (directed by Dr. Margaret Donaldson and Roger J. Wales) is a study of the development of cognitive and linguistic skills in children between the ages of three-and-a-half and five years. All the children selected to attend the school came from the same socio-economic background -- lower to lower-middle class -- and therefore had neither deprived nor very intellectually stimulating homes. Typical parental occupations were plasterer, miner, laboratory technician. Most of the children had either younger or older brothers and sisters. The children's Stanford-Binet test scores on entering the school ranged from 92 to 127. At entry to the school, all the children were within a few months of 3;6 years of age. Nine of the children were boys, the other six girls. They came daily to the Nursery School, which was set up for the purposes of research, and spent two and a half hours there every weekday morning.

During a typical morning, the children would spend nearly an hour in free-play, with two or three adults in attendance. Then, after a milk-break, someone would read them a story and ask them about their activities of the preceding day or week-end. They then played outside if the weather was fine, or took part in communal songs and games (if they wished) for the rest of the morning. During the morning, some children might be taken out individually for testing on various cognitive tasks being investigated by the members of the Cognition Project.

The School started at the beginning of February, 1967; five of the children began attendance immediately (A.G., W.J., S.R., B.L., N.W.), one more began in March (L.C.), and the remaining nine (B.F., C.W., M.F., G.S., C.L., L.I., B.H., N.A., M.C.) in April, 1967, when the Summer Term began.

6.2 The main body of data used in this study was collected by the author between the beginning of February, 1967, and the end of June, 1967 (when the Summer Term ended). Some additional data were collected during the following School year (September, 1967 to June, 1968) by Anne Grieve. These are used to provide some supplementary evidence for my hypothesis in the case of those children whose language had not developed as far as the others' by June, 1967. These two collections of data will be referred to as Data (i) and Data (ii) respectively.

Most of the data were collected on tape, using a portable Sony tape-recorder. The children's spontaneous speech was recorded for varying intervals, often five or ten minutes at a time, though sometimes less, depending on the noise level in the Nursery, the children's activities (whether they stayed sufficiently "in range" of the microphone), and their desire to talk. The children were sometimes recorded individually, when one was playing alone with something, but more often in small groups (two to five) playing with the same toy(s), i.e. Lego (small, fitted plastic bricks), Pla-doh (plasticene-like soft modelling clay) or jig-saw puzzles at the various small tables set up for such activities. There was also a sand-tray indoors (and a sand-pit outside), a Wendy-house, a bookcorner (where the morning story was usually read), painting easels, and a water-tub in the room. In addition, there

was a piano in one corner and a chute nearby, as well as assorted large-size wooden building blocks and three "boxes"; the latter were large wooden cubes with one side missing and a circular opening opposite the missing side. The children used them for climbing in and out of, as tunnels when laid on their sides, or for climbing on with one stacked on top of another. The boxes were fitted with a microphone terminal for recording as the children would often sit inside talking to each other. However, these microphones were not installed until the second term of 1967, so the present author did not take much advantage of recordings of this form.

As the recordings were extremely difficult to transcribe sometimes (because of the background noise: the Nursery was situated in a very resonant room), detailed notes were kept whenever possible of both the speech and its exact context, e.g. which child, what he was playing with, where he was in the room, who he was talking to (whether an adult or another child), whether he was answering a question or making spontaneous observations as part of a conversation with the group around him. So as to be as accurate as possible, the tapes were transcribed the day they were made by the author; the children's voices were all identified; the parts of the tape that were inaudible because of extraneous noise were omitted unless the notes were detailed enough to fill the gap. The transcript of each day's tape was then collated with the notes taken at the same time, the two together making up the full transcript from which the data analysis was made. Great emphasis was laid on the detailed notations about the child's physical environment as much of the transcript would be uninterpretable without

this kind of information. Any members of the Cognition Project, of course, had the added advantage of knowing what Pla-doh was or where the sand was in the room. The notes on the context allowed some checking of certain descriptions by the child from the point of view of accuracy. However, in studying descriptions of temporal order, complete accuracy on the child's part could seldom be checked, especially in those instances where the description is dependent on a reconstruction in memory. In such instances, the fact that a time-order was remembered, as long as it was not totally improbable, was accepted as an adequate reconstruction. The contextual notes also took in unusual phonetic forms in some of the children's speech (e.g. S.R.'s), and anomalous intonation patterns (e.g. W.J. in some topic-comment or comment-topic utterances) which were noted opposite the appropriate utterance in the main transcript. The full transcripts were later sorted into separate ones for each child,¹ with each utterance typed under the data-heading so that it could easily be found in the original transcript.

The first set of data (Data (i)), collected by the author, which is the main source for this study, consists of 4882 utterances fairly evenly distributed among the fifteen children. The second set of data, (ii), much less evenly distributed among the children, consists of 3208 utterances. (The utterance boundaries were determined by intonation patterns, reflected by the punctuation in the transcripts.)

In Data (i), the data are divided up into four parts for

¹I am greatly indebted to the Secretary of the Cognition Project for typing the individual transcripts, from Data (i) during the summer of 1967.

convenience of analysis, each part covering a period of three to four weeks. There are two periods in the first term (five children in the first, six in the second), and two during the second term (fifteen children in each). The data collected in the first period from each child will be referred to as I (Roman numeral), those in the second as II, and so on. Some children (those who began school at the beginning of the second term) only have I and II in their protocols, while others have I - IV. For those children present during four periods, there was a gap of a month between II and III; similarly, for the one child present for three periods, there was a gap of a month between I and II. Otherwise the periods were consecutive.

In Data (ii), the data are again divided up for convenience, this time into eight periods, each covering three to four weeks. There are two periods for each child in the first term (Autumn 1967), then a gap of about one month; three periods in the second term (Spring 1968), followed by another gap of one month, then three more periods in the last term (Summer 1968). Data for each child in Data (ii) are numbered I through VIII, though some children have nothing in some periods, owing to sustained illness and absence from school (e.g. A.G.). Fewer data were collected during the second year although the overall period of collection covered a longer span.

6.3 In analyzing the data, all the sentences which were temporal descriptions were labelled either A ('compound' utterance), B ('complex' utterance with the subordinate clause second) or C ('complex' utterance with the subordinate clause first). The criterion for compound utterances was that the two clauses be joined by and, and then, or so; in

addition, there were a few instances where but was used as the conjunction in a temporal description.² Coordinate predicates in which the subject of the second clause had been deleted were also counted in this group: (A), i.e. He jumped over the box and fell down. The criterion for subordinate clauses in complex utterances was that they be introduced by one of the following (temporal) conjunctions: after, before, when, while, till (until), since, if, unless, because (cf. Chapter VIII). Each instance of A, B and C from the individual protocols was typed onto an IBM card, and the card was subsequently coded on a keypunch for various kinds of information. For example, each child was given a number so as to identify his data; the two sets of data ((i) and (ii)) were coded as was the utterance-type: A, B, or C. In addition, the coding showed which conjunction was used, which tense (past or present), whether the tense was the same in both clauses of the utterance, whether progressive or perfective aspect was used in either or both clause(s), and whether there was any sort of temporal adverbial present in either or both clause(s). This coding simplified the sorting of data for the children as a whole, and for overall counts of different construction-types in Data (i) and (ii). Other data counts (not involving the compound and complex utterances) were made directly from the transcripts.

In the Tables, each child's protocol is 'named' by his initials wherever individual comparisons are being made. Otherwise, the data periods (Roman numerals) are used, or the two different sets of data, Data (i) and Data (ii).

²Elsewhere, I have referred to these conjunctions as 'coordinate' conjunctions. Cf. Chapter IX,

VII Results.

7.0 In this chapter, I will present the general results from an analysis of the data, and show how they support the hypothesis set out in Chapter V. First, I shall give various statistical aspects of the data, and then cite examples of typical utterances which illustrate the roles of each of the three principles in the hypothesis I have proposed.

7.1 The three constructions which would provide the most convincing evidence for the development sequence (cf. 5.2) are the compound utterance and the two complex utterances, one with the subordinate clause second, the other with it first. To fully support the hypothesis, they should appear in the following order:

- (1) compound (temporal) utterance -- type A;
- (2) complex utterance, with temporal subordinate clause in second position -- type B;
- (3) complex utterance with temporal subordinate clause first -- type C.

Table VI lists the occurrences of these utterance-types for each child and for each period within Data (i).

 Insert Table VI about here

If there is a developmental progression in the appearance of constructions A, B, and C, there are a number of possible forms that this progression could take. For example, the progression could go

Table VI

Syntactic Constructions present in the Children's Speech.

Data (i)

Protocols	I	II	III	IV
S.R. (3;8)**	∅ *	A, B	A, B	A, B
A.G. (3;6)	A, B	A, B	A, B	A, B
W.J. (3;4)	A, B	B	A, B	A, C
B.L. (3;5)	A	A	A, B, C	A, B
N.W. (3;3)	A, B	A, B, C	A, B, C	A, B, C
L.C. (3;5)	A	A, B	A, B, C	
B.F. (3;3)	A	A, B		
C.W. (3;6)	A, B	A, B		
M.F. (3;4)	A, B, C	A, B		
G.S. (3;4)	A	A		
C.L. (3;6)	A, B	A, B		
L.I. (3;4)	A, B, C	A, B		
B.H. (3;9)	∅	∅		
N.A. (3;6)	A, B	A, B, C		
M.C. (4;0)	A, B, C	A, B		

* ∅ - none of the three temporal constructions present.

** Age at which child entered Nursery School. Mean age was 3;6 years.

from A to B to C ($A > B > C$), or vice versa, $C > B > A$. On the other hand, the development could go from the simultaneous appearance of any two of the above constructions to the other one, e.g. $(A, C) > B$, or conversely from any one to the other two, e.g. $B > (A, C)$. Or, only one or two of the three may develop at all. The possible developmental progressions are shown in Table VII. Opposite each category are noted the protocols which illustrate that particular progression. For example, let us take W.J.'s protocol: in I, he has A and B; in II, B alone; in III, A and B again, and in IV, he has A and C. This protocol goes into the category $(A, B) > C$ since A and B occur at the same time, and both occur before C.

 Insert Table VII about here

The progression in the development of the syntactic forms A, B, and C predicted that the sequence should go from A, the compound utterance form, to B, the construction with the subordinate clause second, to C, with the subordinate clause in first position. For the hypothesis to be verified, there are three specific predictions to be confirmed: i) A, coordinate clause construction must precede B, subordinate clause second; ii) A must precede C, subordinate clause first, and lastly, iii) B must precede C.

Each of these predictions is fully supported by the data. In particular prediction (i), that A appears earlier than B, is supported by four of the protocols (B.L., L.C., B.F., G.S.), and is refuted by none of them. The small number of protocols supporting this prediction

Table VII

Possible Developmental Progressions in the Description
of Temporal Sequences.

Possible Progressions	Protocols	Total
A > B > C - - - - -	L.C. - - - - -	1
A > C > B		
B > A > C		
C > A > B		
C > B > A		
B > C > A		
(A, B) > C - - - - -	W.J., N.W., N.A. - - - - -	3
A > (B, C) - - - - -	B.L. - - - - -	1
(A, C) > B		
B > (A, C)		
C > (A, B)		
A > B - - - - -	B.F. - - - - -	1
A > C		
B > C		
C > A		
B > A		
C > B		
(A, B, C) - - - - -	L.I., M.C., M.F. - - - - -	3
(A, B) - - - - -	S.R., A.G., C.W., C.L. - - - - -	4
(A, C)		
(B, C)		
A - - - - -	G.S. - - - - -	1
B		
C		
∅ - - - - -	B.H. - - - - -	1

was due to the fact that most of the children had already acquired both forms A and B by the time the data were collected. Prediction (ii), that A appears before C, is supported by eleven protocols, and, again, refuted by none. The eleven protocols are firstly L.C., W.J., N.W., N.A. and B.L. in which A did precede C. In addition, all the protocols in which C has not yet appeared, but where A is present, also support this prediction, i.e. S.R., A.G., C.W., C.L., B.F. and G.S. The last prediction, (iii), that B precedes C, is borne out by nine of the protocols, and likewise refuted by none of them. Four of the protocols (L.C., W.J., N.W. and N.A.) showed that C appeared later than B, and five implicitly support the prediction (S.R., A.G., C.W., C.L. and B.F.) since C has not yet appeared there at all. Subjects M.F., L.I., B.H. and M.C. neither support nor refute any of these predictions.

Additional, but less extensive data (Data (ii)) were collected from all the children during the following school year (September 1967 to June 1968). There is little to be gleaned from the data for those children who had already acquired all three constructions by June 1967, the last period in their protocols (cf. Table VI). Five of the seven remaining children, though, did acquire the constructions they were lacking. A.G., C.W. and C.L. went from (A, B) to (A, B, C) within the next six to twelve months. B.H., who had not used any of these constructions prior to June 1967, acquired all three in the order $A > B > C$ in the next eight months, and G.S. went from A to (A, B). Only two children showed no change (S.R. and B.F.), continuing to use only (A, B). (This lack of visible change could be an artefact of the very sparse data that were collected for some of the children in

Data (ii).) Thus, the five children who did show development provide further confirmatory evidence for the hypothesis proposed here. The levels of significance by a sign test for the confirmation of each of the specific predictions are, respectively: (i) $A > B$, with six cases confirming and none disconfirming, $p < .016$; (ii) $A > C$, with thirteen cases confirming and none disconfirming, $p < .001$; and (iii) $B > C$, with thirteen cases confirming and none disconfirming, $p < .001$. (The numbers of confirmatory cases include some from Data (ii) for the children who had not shown all the stages in Data (i).)

7.11 There was a fairly high correlation between average utterance-length for the last period of data collected (Data (i)) and the number of temporal construction-types used by each child. Opposite each child's average utterance-length for the last period, it was noted whether he used no temporal constructions (\emptyset), one (A), or two (A, B), or all three (A, B, C), (cf. Table VIII). The correlation coefficient between utterance-length and the number of construction-types used (0, 1, 2, or 3) was .64 (significant at $p < .01$).

 Insert Table VIII about here

Although this correlation is fairly high, it is not perfect. Utterance-length does not seem to be directly connected with the development of different syntactic structures, although it is clearly correlated with the child's linguistic development (cf. Chapter IV above). It is possible that there is only an indirect relation between increasing utterance-length and increasing derivational complexity (see Brown and Hanlon, in press) in spite of the close relation between

Table VIII

Average Length of Utterances in Morphemes in Data (i).

	Protocol	I	II	III	IV	Increase over time studied
a)	S.R.	4.54	5.05	5.35	6.10	1.56
	A.B.	4.20	4.38	5.56	5.48	1.28
	W.J.	4.77	4.80	5.30	6.37	1.60
	B.L.	3.86	4.42	4.93	5.00	1.14
	N.W.	5.35	5.25	6.26	7.45	2.10
	L.C.	3.70	4.68	4.70		1.00
b)	B.F.	5.06	4.90			-0.16
	C.W.	4.80	4.92			0.12
	M.F.	4.46	6.17			1.71
	G.S.	3.91	3.97			0.06
	C.L.	4.56	5.17			0.61
	L.I.	5.60	6.04			0.44
	B.H.	4.18	4.60			0.42
	N.A.	6.12	6.67			0.55
	M.C.	5.35	6.36			1.01

utterance-length and the presence/absence of specific items such as function words, or the auxiliary in negatives and questions (Klima and Bellugi, 1966). This indirect relation could be the reason for the absence of compound and complex temporal clause constructions in B.H.'s protocol, and also, for example, why S.R., in the last period of recording (IV), has an average utterance-length of 6.10 morphemes as opposed to L.C.'s 4.70 morphemes when, at the same time, L.C. produced all three constructions (Table VI) and S.R. only produced two of the three. The children's utterance-length in morphemes was calculated using as nearly as possible the criteria of Brown and Bellugi (1964). The details of their procedure can be found in Slobin (1967:18-20).

7.12 The number of different interrogative pronouns (why, where, how, when, what, which, who, whose) in each child's protocol was also tabulated for Data (i). There appeared to be a fairly clear order of appearance in the children's speech as a whole: what and where occurring in all the protocols (even those for B.F. and G.S. who seemed to be the 'youngest' as far as language acquisition was concerned). Next in order appeared who (in ten of the protocols), followed by why (five protocols); next came how, whose and which for some children (these three did not appear in any stable order, and were found in only six protocols altogether -- how in three; whose in three, and which in one). Finally, when appears (always after what and where, and optionally after who) in five protocols. The correlation coefficient between the number of interrogatives used (a possible total of eight) and the number of different temporal descriptions (0, 1, 2, or 3) used by each

child was calculated; it showed no relation between the two: $r = -.04$. This could be due to the method of data collection, since the sampling was not entirely systematic.

In addition, because of the linguistic derivation of the temporal subordinate clause (see below, Chapter VIII) as a form of relative, the number of relative pronouns used in each protocol (Data (i)) was also counted. The relative pronouns counted were why, where, how, when, what, which, that, who, whose, making a possible total of nine. No child used them all during the time-period covered by Data (i). The order of appearance in the children's speech of the relatives appears to differ slightly from the order remarked for the interrogatives. What and where, though, are again the first to appear (in twelve and ten protocols respectively); when comes in next (in twelve protocols), followed by how (five protocols), and then who, that, which and whose in no discernable order in three protocols. For the relative pronouns, the correlation coefficient with the number of different temporal constructions used by each child was .36 ($p < .10$).

7.13 Table IX supplements Table VI by tallying the occurrences of each construction, coordinate clauses (A), subordinate clauses second (B), and subordinate clauses first (C). The number of occurrences of each construction, A, B, and C in Data (i), was compared with the total number of utterances in the data for that period, and with the number of children using each construction. There is, predictably, an increase in the proportion of these constructions over time out of the total sample of speech collected. In periods I and II, the three constructions make up approximately 4% of the total number of utterances,

while in periods III and IV, they make up 8% of the total. Only those instances in which a conjunction was present were counted.

 Insert Table IX about here

There were, however, several instances in each period of data of sentences with an implicit subordinate clause second. The child's intonation seemed to indicate that the second clause was subordinate to the first (cf. Lyons, 1968:179-180), for example: You're not going to go in my box - you'll get stuck, or We can both go in together - there's enough room. This usage seems to occur most often in subordinate clauses where because would be supplied by adult speakers. A similar thing happens with the coordinate conjunction so. Although here, there is no intonational evidence, it is clear from the context that the second event in time is a consequence of the first, e.g. It's too hot for you just now, I'll put it in the little oven to cool it off (regardless of the strange function attributed to the oven!). Note that adults, too, often do not use these conjunctions. The addition of these 'potential-conjunction' forms (or at least those recognized as such) to the numbers in Table IX would not significantly alter the ratio of temporal descriptions to total speech in any one period.

A similar increase in the proportion of temporal descriptions out of total speech is found in Data (ii) where in periods I and II, the three constructions make up 9.1% of the total sample of utterances (see Table X). During the second term (III, IV, and V), the

 Insert Table X about here

Table IX

Frequency of constructions A, B, and C in Data (i) for each period, I - IV.

Period	No. of Utterances			Total Utterances	No. of Children			Total Children
	A	B	C		A	B	C	
I	62	33	3	2427	13	9	3	15
II	43	28	3	1673	13	12	2	15
III	19	15	8	473	6	6	3	6
IV	12	8	3	309	5	4	2	5

Table X

Frequency of Constructions A, B, and C in Data (ii) for Periods I - VIII.

Period	No. of Utterances			Total Utterances	No. of Children			Total Children
	A	B	C		A	B	C	
I	24	15	3	482	9	8	1	15
II	27	8	9	462	9	4	4	14
III	37	17	6	354	8	6	4	14
IV	57	36	14	493	6	10	7	14
V	24	13	7	355	7	9	4	14
VI	22	5	3	216	6	2	2	14
VII	40	26	5	395	9	8	5	15
VIII	35	32	10	451	12	11	6	15

proportion increases to 17.6%, then decreases slightly in the last term (periods VI, VII, and VIII) to 16.7% of the total speech sample. There is therefore a large increase over time between the first term (I and II) of Data (i) where the temporal descriptions made up just over 4% of the total number of utterances, and the last term (VI, VII, VIII) of Data (ii) where such utterances make up 16.7% of the total.

The proportion of subordinate clauses (both B and C) out of the total temporal descriptions (A, B and C) shows a steady increase over time, going from 37% in I, Data (i) to 54% in VIII, Data (ii). The proportion of subordinate clauses in first position (C) out of the subordinate clauses as a whole (B and C) also increased from an average of 18% in Data (i) to an average of 28% in Data (ii) over a time period of approximately eighteen months (cf. Table XI).

 Insert Table XI about here

7.14 If we look at the number of temporal descriptions which maintain the chronological order of the events in their order of mention, we find that there is very little difference between Data (i) and Data (ii). There is a minuscule increase in the percentage of utterances which have a chronological order of mention: 66.5% of the temporal descriptions in Data (i), as opposed to 68.4% of the temporal descriptions in Data (ii). In each of the two sets of data, the majority of the compound utterances (construction-type A) have chronological order, as do all the complex utterances with the subordinate clause first (C). Of the complex utterances with the subordinate clause second (B), only those clauses introduced by until or before have a chronological order of mention. Of the utterances in Category A, most pairs of clauses had the same tense in each, with a few pairs

Table XI

Proportions of Compound (A) to Complex (B and C) Utterances
in Data (i) and (ii).

Period	A	:	B	:	C	% Subordinate Clauses	% of C in B + C
Data (i)							
I	62	:	33	:	3	37	11
II	43	:	28	:	3	42	10
III	19	:	15	:	8	55	35
IV	<u>12</u>	:	<u>8</u>	:	<u>3</u>	48	27
Total	136	:	84	:	19		
Average						<u>41</u>	<u>18</u>
Data (ii)							
I	24	:	15	:	3	43	17
II	27	:	8	:	9	39	53
III	37	:	17	:	6	38	26
IV	57	:	36	:	14	47	28
V	24	:	13	:	7	43	35
VI	22	:	5	:	3	29	37
VII	40	:	26	:	6	44	19
VIII	<u>35</u>	:	<u>32</u>	:	<u>10</u>	54	24
Total	266	:	152	:	58		
Average						<u>44</u>	<u>28</u>

containing a past tense verb followed by a present tense one. In a few instances, it was difficult to tell whether the child had made a 'mistake' by omitting the tense marker on the first verb (i.e. present tense in first clause, followed by past tense in second), whether he did not consistently observe the tense agreement rule, or whether he had made an order of mention mistake. There were, in fact, some clear cases of non-chronological order of mention in compound utterances where the child's ordering of the events he describes is made clear by the adverbs and/or the tenses used in each clause, e.g. It's mended now but it was broken, with some stress on 'was'. In general, the children used tense agreement in an adult manner in the complex utterances (B and C). Although there are occasional 'missing' tense markers in B- and C-type constructions also, there usually appears to be no ambiguity over the order of mention. The numbers of each construction type with a chronological order of mention are shown in Table XII.

 Insert Table XII about here

The number of occurrences of each construction is approximately doubled in Data (ii) for compound utterances (construction-type A) and for complex utterances (construction-type B). The complex utterances (C), though, are tripled in number in Data (ii). The overall proportions of utterances with chronological order of mention in each category do not change, however, in spite of the increased number of C-type utterances, because there are far fewer instances, relatively speaking, of B-utterances (with until or before) than there are in Data (i).

The reason why C has 100% chronological order of mention (95% in Data (i))

Table XII

Percentage of Constructions with Chronological
Order of Mention.

Type	Data (i)			Type	Data (ii)		
	Number	Total	%		Number	Total	%
A.	127	136	93	A.	260	266	98
B.	14	84	17	B.	8	153	5.3
C.	18	19	95	C.	58	58	100

because of one instance of before being preposed) is that only when and if of all the conjunctions used in second place are preposed; these two (when and if), when preposed, make the utterances chronological in their order of mention. The one instance of before occurring in first position in Data (i) was never backed up by any similar instances; before and until are never preposed elsewhere in any of the data. The unique instance of before₁ could be due to sampling in the data collection, but that explanation is not very satisfactory when we look at Data (ii) where there are no instances of before being preposed at all. This is not true of other 'rare' conjunctions, e.g. after.

The majority of the compound and complex construction-types used by the children observed a tense agreement rule: 'if the first verb used is in the present (past) tense, the second is to be in the same tense'. In Data (i), 86% of the compound utterances have the same tense in each clause; the ratio of present to past tense is approximately 13:5. In the complex utterances, 88% of B have the same tense (ratio of present to past is 4:1) and 79% of C have the same tense in both clauses (ratio of present to past 2:1). In Data (ii), 97% of the compound utterances contain the same tense in each clause, but the ratio of present to past tense has reversed, 2:7, for there are over three times as many past tense temporal descriptions as present tense ones. The same tense in each clause was found in 83% of the B-type constructions where the proportion of present to past tense was 5:4 (this is likewise a change from Data (i)). All the C-type constructions observed the tense rule, and the proportion of present to past tense in these constructions was 2:3. Like the case of A in Data (ii), the ratio of present to past in C is also a reversal from the data in

Data (i). The differences seem to be due to a greatly increased use of the past tense by all the children. There is, however, an artefact in the method of data-collection in Data (ii) which possibly accounts for some of the apparent increase in the use of the past tense: much of the data was collected at a time in the morning when the children were being asked what they had been doing the afternoon or day before -- their replies, quite naturally, were in the past tense.

7.15 The totals of the different temporal description-types for each period in each set of data according to the conjunctions used are shown in Tables XIII and XIV. The most frequent coordinate conjunction in Data (i) is and which occurs 109 times in descriptions of events in time, in contrast to a total of only 27 occurrences for the other three

 Insert Table XIII about here

coordinate conjunctions. Of the subordinate conjunctions occurring in second position (following the main clause in the sentence), when and because are the most frequent (29 and 27 instances respectively), followed by if and until (9 and 11 instances). Of the subordinate conjunctions occurring first, when is the most frequent (12 instances, followed by if (with only 4 instances). Apart from one instance of before, no conjunctions other than when and if ever occur in first place.

In Data (ii), and is still the most frequent coordinate conjunction, occurring 202 times versus 84 instances for the other coordinate conjunctions; the ratio of and to the other three has slightly

 Insert Table XIV about here

Table XIII

Totals of Different Temporal Conjunctions for Each Period in Data (i).

Conjunction	I	II	III	IV	Totals
and	55	33	12	9	109
and then	-	3	1	1	5
(and) so	4	6	6	2	18
but	3	1	-	-	4
<u>2</u> when	13	9	4	3	29
while	1	-	1	-	2
if	4	5	-	-	9
because	12	8	4	3	27
until, till	2	4	3	2	11
before	1	1	1	-	3
after	-	1	1	-	2
unless	-	-	1	-	1
<u>1</u> when	2	1	6	3	12
while	-	-	-	-	-
if	1	2	1	-	4
because	-	-	-	-	-
until	-	-	-	-	-
before	-	-	1	-	1
after	-	-	-	-	-
unless	-	-	-	-	-

decreased compared to Data (i). When and because continue to be the most frequently used subordinate conjunctions introducing the clause in second place (65 and 68), followed by if (10). The subordinate clause in first place is introduced most often by when (43 occurrences), and otherwise by if (13). After was the only other conjunction that was preposed, once.

The number of children who used each conjunction in Data (i) and (ii) as a whole is shown in Table XV. The largest number of children used those conjunctions which are the most frequent in the data. Although this is not surprising, it does indicate that there is an overall consistency in the acquisition of the conjunctions since there is no other a priori reason to expect all the children to begin with the same conjunctions, and then to gradually learn the rest of the conjunctions belonging to the temporal set (see 5.2 above). The most significant increases are in the number of children who come to use and then in Data (ii) compared to those in Data (i), and the number

 Insert Table XV about here

of children who come to use when in first position in Data (ii), as compared to those using it in Data (i). Overall, there is a general increase in the number of children who begin to use certain conjunctions (compare each child's column from Table XVI to that in Table XVII). since several of them are in the process of acquiring construction-types B and C during the course of data-collection for both Data (i) and (ii), (cf. 7.1 above, esp. Tables VI and VII).

The range of different conjunctions used by each child, in each set of data as a whole, are set out in Tables XVI (Data (i)) and

Table XV

Number of Children Using Each Conjunction

	Conjunction	Data (i)	Data (ii)
	and	14	14
	and then	4	10
	(and) so	9	5
	but	4	7
<u>2</u>	when	11	13
	while	2	-
	if	7	4
	because	11	9
	until, till	6	3
	before	3	3
	after	2	2
	unless	1	-
<u>1</u>	when	6	12
	while	-	-
	if	3	4
	because	-	-
	until	-	-
	before	1	-
	after	-	1
	unless	-	-

XVII (Data (ii)). One child (B.H.) uses no conjunctions in temporal descriptions at all in Data (i) though by the end of Data (ii), he uses and, and then, when₂, if₂, because₂, and when₁. (Subscripts on the conjunctions indicate pre- and post-position with respect to the main clause.) All the children using construction-type A (compound utterance with the two clauses joined by a coordinate conjunction) use and in Data (i); only four (B.L., L.C., C.L., and L.I.) use and then, nine use (and) so (S.R., W.J., L.C., N.W., M.F., C.L., L.I., N.A. and M.C.), and only four use but (A.G., N.W., L.I., M.C.). I should emphasize, at this point, that these figures apply only to the temporal descriptions in the children's speech. I have not counted instances of conjunctions used where there was no temporal description involved. Of the children using construction-type B (complex utterance with the subordinate clause)

 Insert Table XVI about here

in second place), eleven out of thirteen use when₂ (S.R., A.G., W.J., L.C., N.W., C.W., M.F., C.L., L.I., N.A., M.C.), and eleven out of thirteen use because₂ (S.R., A.G., W.J., B.L., N.W., B.F., C.W., C.L., L.I., N.A. and M.C.). Seven of the children use if₂ (S.R., A.G., N.W., C.W., M.F., N.A. and M.C.), and six use until₂ (A.G., W.J., N.W., M.F., L.I. and N.A.). The remaining conjunctions are used by a minority of the children: while₂ (S.R. and W.J.), before₂ (L.C., N.A. and M.C.), after₂ (L.C. and C.W.), unless₂ (N.W.). Eight of the children in Data (i) use construction-type C (complex utterance with the subordinate clause first), and out of the eight, six use when₁ (W.J., B.L., L.C., N.W., L.I. and M.C.), the three use if₁ (N.W., M.F. and N.A.). One child (L.C.) also uses before₁ on one occasion (cf. 7.14).

In Table XVII (Data (ii)), there is surprisingly little data for some children e.g. S.R., W.J., and C.L. which would give a misleading impression of the children's speech development, at least as far as temporal descriptions are concerned, unless Data (i) has already been studied. There is always a danger in this sort of developmental study that the data are being collected too late to reveal the phenomena that one is interested in. It seems as though there must always be an optimal period in which to collect particular data, and outside that period, too early or too late, the developmental sequence may not be seen at all. Of course, a large number of studies are necessary first to pin-point these optimal periods. I hope in this study, in particular with Data (i) to have pin-pointed an important period in the development of subordinate clauses, and related this development to descriptions of time. Of the two children who did not use construction-type B in Data (i), both (G.S. and B.H.) now use when₂, and B.H. also uses if₂.

 Insert Table XVII about here

Only three children use until₂ (L.C., C.W. and L.I.); three use before₂ (N.W., B.F. and L.I.) and two use after₂ (M.F. and N.A.). Of the children who did not use construction-type C in Data (i), four more now use it (A.G., C.W., C.L. and B.H.), and a total of twelve children use when₁ (A.G., C.W., M.F., C.L., B.H. and N.A. in addition to the six using this conjunction in Data (i)). Three more children (C.W., L.I. and M.C.) also use if₁ in Data (ii), and one (L.I.) uses after₁.

Taking the most widely used conjunctions (and, when₂, if₂, because₂, when₁, and if₁), we find that there seems to be the following

Table XVII

Number of Conjunctions used by Each Child in Data (ii).

Conjunction	SR	AG	WJ	BL	LC	NW	BF	CW	MF	GS	CL	LI	BH	NA	MG
AND	-	11	1	10	21	42	1	7	25	3	7	17	8	26	24
and then	-	4	-	2	-	4	-	2	2	1	-	6	1	12	2
(and) so	-	-	-	-	-	4	-	1	1	-	-	2	-	1	-
but	-	1	-	1	-	5	-	2	-	-	-	3	-	5	2
when	1	2	-	4	5	18	-	10	4	2	-	2	2	10	5
while	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
if	-	2	-	-	1	-	-	-	-	-	-	-	2	5	-
because	-	-	-	4	2	6	-	3	16	-	5	-	7	15	10
until	-	-	-	-	1	-	-	1	-	-	-	1	-	-	-
before	-	-	-	-	-	1	1	-	-	-	-	3	-	-	-
after	-	-	-	-	-	-	-	1	-	-	-	-	-	1	-
unless	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
when	-	2	2	5	1	9	-	1	4	-	1	7	2	4	5
while	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
if	-	-	-	-	-	-	-	1	-	-	-	2	-	9	1
because	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
until	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
before	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
after	-	-	-	-	-	-	-	-	-	-	-	1	-	-	-
unless	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-

2

1

ranking in order of appearance in the children's speech (based on the order of appearance of conjunctions in each period within each set of data):

- (1) and
- (2) when_2 , because_2
- (3) if_2
- (4) when_1 , if_1 .

Occasionally a somewhat different order of appearance is found. Although and always appears first, because₂ and if₂ may appear before when₂, or when₂ and if₂ appear before because₂. Also when₁ or if₁ occasionally appear at the same time as because₂ or if₂. In the protocols as a whole, and appeared first in six (S.R., B.L., L.C., B.F., G.S. and B.H.). When₂ appeared before when₁ in nine (S.R., A.G., W.J., N.W., C.W., M.F., G.S., C.L. and N.A.), and both appeared within the same period in three protocols (L.C., B.H. and M.C.); in these three cases, the two conjunctions appeared within a week or so of each other, and, in fact, when₂ was the first noted in each protocol. However, as the occurrence of both falls into the same period of data, they have not been counted with the other nine above. Because₂ appears before any proposed conjunction in eight of the protocols (S.R., A.G., W.J., B.F., C.W., G.S., C.L., B.H., N.A.), and in the same period as when₁ or if₁ in four protocols (B.L., N.W., L.I. and M.C.). If₂ precedes if₁ in seven of the ten protocols containing if (S.R., A.G., L.C., N.W., C.W., B.H. and M.C.), and appears in the same period as if₁ in three others (M.F., L.I., N.A.). However, as in the case of when₂ and when₁, within the same period of data if₂ precedes if₁ in each of

these three instances.

7.2 Having looked at some general statistical features of the data, I would now like briefly to illustrate each of the stages proposed in the hypothesis (5.2) and show how the three principles I proposed earlier play a part in the child's development of temporal descriptions. The examples I shall quote from the protocols (Data (i)) are representative of the data as a whole.

7.21 At stage (1) we expect to find short sentences describing events in chronological order. Although there are not very many examples in these data, this is clearly the first stage and has been reported in other studies of younger children (e.g. Bloch, 1924; Guillaume, 1927; Stern and Stern, 1928; Leopold, 1949). One particular context in which the present group of children used these short sentences was as the accompanying monologue to tasks such as building with blocks or making jig-saw puzzles. These commentaries were necessarily in chronological order, and therefore may be one of the sources of chronologically ordered descriptions. For example, S.R., doing a puzzle: Does it go there? This bit goes there. This bit goes there. Where does this one go? and so on until he finished the puzzle. Similarly, B.L., first asking me to build a tower for him, said: Build my building? Please. That one (pointing to a block). Just a bit more there. Here. That one (indicating each time where he wanted the blocks to be placed). Later on, speaking to another child, he comments on the blocks: That's go there. That one can go there? Those go up. Go there. And this goes up too. Watch that fall. (The occupation for the day was building towers up till they fell.) Another child,

N.A., who used a mixture of short sentences and coordinate clauses, talking about a visit to the sea and his swimming, said: I went too far and I couldn't get back again. I paddled to Egypt. I saw a ship [ship]. And I was clever and paddled to Mummy. This utterance is divorced from its physical context, unlike the commentaries above, since N.A. is saying what he recalls and not commenting directly on a sequence of actions before his eyes.

There is considerable evidence at this and later stages that children are aware of the temporal order of two events. To give one instance from these data as an illustration: A.G., when playing on the boxes one morning, called out: I'll fall off and jump, but immediately corrected himself, I'll jump and I'll fall. Later the same day, I want to get on there (onto the box). I'll jump. I'll fall. - No, you won't. - I will, I will fall. I can't stand up. It was very clear from the context that A.G. was perfectly well aware of the sequence involved in jumping and falling while playing on the boxes. This would account for the correction he made of his earlier utterance.

7.22 Although and is used before this stage by the child, it seems to be always with the meaning and '&'. The ampersand (&) implies an unordered sequence, so that "Y & X" is exactly equivalent to "X & Y". The other meaning of and 'and subsequently' is derived from its use in conjoining simple sentences which describe events in chronological order. At first, the child merely uses and '&' to join the short sentences describing events in order, but as the child is constrained to keep the chronological order in his order of mention (as long as he wishes to indicate sequence), and takes on the meaning of 'and subsequently' in such contexts. At the same time, the order of mention

constraint rules out the possibility that and could instead take on the meaning of 'and previously', the other alternative.

Hence, at stage (2), the succession of events in time is usually clearly stated in compound-sentence constructions. The children made commentaries, recounted past actions and occasionally referred to immediate future sequences. S.R.'s I wonder if I can hold this on my head and get down (speaking about a toy he was trying to balance as he climbed off the box), and A.G.'s I want to look at them (some visitors) and come back in are two utterances typical of this type. L.I.'s protocol contains several examples in which the chronological succession is further stressed by the use of temporal adverbs: I'll finish SOON and somebody else can have them (referring to the shapes used to cut out Pla-doh), and to Mrs. B.: FIRST you'll have your coffee and THEN we'll go outside (to the playground).

Of the temporal adverbs used by the children in Data (i), the commonest were now (87 instances), then (18), again (37), today (22) and yet (17 -- always used in combination with a negative) in the non-compound and non-complex (temporal) utterances. In the latter, the most frequent adverbs were now, then and again; now occurred most often in the first of a sequence of two clauses, then and again occurred usually in the second of two clauses (as in L.C.'s utterance cited above). In Data (ii), the most frequently used temporal adverbs were now (33), today (33), yesterday (30), then (21), last time/night (21), after (sometimes followed by a noun) (15), again (13) and one day (17). In the compound and complex utterances, then (still used most frequently in the second of two clauses) has become far more frequent than any other adverb of time, including both now and again. In both sets

of data, more temporal adverbs occur in the compound temporal descriptions than in the complex (subordinate clause) ones. This could be because 'and' or 'but' has little inherent temporal meaning, and the adverb is a means of making the temporality explicit.

7.23 Although attention to theme is apparent in many of the children's utterances, it is so closely bound to the physical context, the nursery school, that it is difficult to demonstrate convincingly to anyone unfamiliar with the details of that context. I have therefore selected a number of examples to illustrate stage (3) -- choice of theme -- which are more dependent on the linguistic context, what various people were talking about, than directly on the physical setting. That children do attend to context is shown by their use of pronominalization in referring to someone or something mentioned in a previous utterance. For example, Mrs. B. - Has anyone seen William this week? - I saw HIM a few days ago. - Is he feeling better? - HE said no but I said yes (N.W.). Similarly, during a slight altercation, S.R. and B.L. had the following exchange: - Knocked they books down. Steven'll pick THEM up. - No, I'll not. You knocked some of THEM down so you'll pick THEM up. (Pronouns referring to someone or something already mentioned are capitalized.)

There are many examples in the children's speech which show that they also choose theme from context. In these cases, the rheme or part of the rheme of the preceding utterance is taken up as the theme of the following one; this process may directly influence the choice of construction, i.e. a subordinate clause second instead of a coordinate clause construction. The relation between the rheme of one utterance and the theme of the next is demonstrated in the following

example. To begin with, A.G. takes his initial theme from the physical context: he is holding up a biscuit which he refers to deictically, That's a biscuit I got from my Granny. I goed to see HER. SHE'S in the ward. SHE'S sick (she was in hospital). The capitalized pronoun in the rheme of his second utterance (her) becomes the theme (capitalized she) in the following ones.

Another example: one morning, N.W. was screaming rather loudly; Mrs. B. - Don't scream, Nicola. - Why not? They're screaming when the ball goes (a game being played by some of the other children nearby). In this instance, it is N.W.'s choice of 'they're screaming' as her theme that makes her use a subordinate clause in second place. Her utterance would have sounded rather odd had she used a compound sentence with two coordinate clauses instead, e.g. "Why not? The ball goes and they scream", as there would be no direct link between Mrs. B.'s remonstrance and N.W.'s protest. If she had alternatively used something like "Why not? They scream and the ball goes", the relation between the children's actions and the ball's is no longer evident.

7.24 There are a number of other examples in which choice of theme decides whether a subordinate clause is used in second place, at stage (4). One morning when several of the children were playing with the 'car' (a pile of blocks, one of which had a steering wheel attached to it), and B.L. was taking the part of the policeman but not using the right signals, S.R. jumped up, saying: No, this (holding up his hand appropriately) is what a policeman looks like when a car stops. Another time, A.G., trying to prevent M.F. from touching the piano keys while he was playing, called to Mrs. B.: He's to wait till I've finished. Another day when L.I. asked for some Pla-doh shapes to play

with, C. W. answered: You can have one of my ones after I've finished.

An interesting example which shows both the adverb (adjunct) position at the end of the clause and the rheme of one utterance taken as the theme of the following two-clause utterance is L.I.'s: We've never been out today, but we'll go out when Mrs. Bruce comes back. The adjunct in the first clause is today; been out is the rheme which becomes the theme in the second of the three clauses. The occurrence of the subordinate clause in second position here is clearly governed by the thematic choice.

7.25 In support of stage (6), I will cite a few examples of subordinate clauses occurring in first position. W.J., who was constructing a garage from Lego (small plastic bricks), pointed to it and explained: When the train stops, this is where it goes. N.W. used this construction on several occasions, e.g. If wee Brian's naughty to me, I'll smack him, and another time, using compound sentences as well: My mummy's got two baths in the house and when I was a little baby, I used to go in the bath and I still go in the bath. On the same topic, which preoccupied all the children one week, M.C.: When I was a baby, I got washed in a basin. An interesting utterance was produced by L.C.: Before I went home for tea, I buyed something for tea-time. This particular construction was very unusual, and was the only example in all of the protocols of a conjunction attached to the second event and placed first (cf. 7.14). Such sentences are marked (complex) in two respects: for order of mention and derivational simplicity. In English, there are only two conjunctions, before and until, which produce this doubly marked form of construction. None of the children ever preposed any clause introduced by until in the present data.

Finally, I would like to point out that unlike some early utterance-types used in children's speech, the different constructions used in making temporal descriptions throughout the different stages in development do not supplant each other as the child's linguistic knowledge is extended. In fact, the constructions introduced at the different stages hypothesized here are all to be found in adult speech. For instance, although stage (1)-type constructions (a series of short simple sentences; cf. 5.2 above) are rare, they do appear when a radio commentator describes a football game or a race: he resorts to simple chronologically ordered utterances. A novelist may do the same thing to give an impression of suspense. Clearly the function of stage (1) may be slightly different in adult speech, but this type of construction is still present. It goes without saying, of course that the other syntactic constructions are also present in adult speech: the compound utterances from stage (2), the complex ones with the subordinate clause second from stage (4), and the complex ones with the subordinate clause in first place from stage (6).

7.3 To sum up, the main hypothesis about the order of appearance of particular syntactic constructions is fully confirmed in the children's data. The individual predictions are highly significant statistically in all three cases: for $A > C$ and $B > C$, $p < .001$, and for $A > B$, $p < .016$. There are no disconfirming cases among the protocols. The principles (cf. 5.1) all appear to be validated: the children seem to be aware of chronological order and to pay attention to theme in the context of their speech. Derivational simplicity also has an effect developmentally since B-type constructions (with the subordinate clause second) always appear before C-type constructions (with

the subordinate clause first) throughout the data (cf. examples in 7.2).

There are five subsidiary findings: first, as in past studies (4.1), the children's average utterance-length is fairly highly correlated with their language development. In the present instance, I took the number of temporal description-types (A, B, C, or \emptyset) in their speech as a measure of their development. Since the correlation is by no means perfect (.64, $p < .01$), it seems to me that length is a somewhat gross indicator of language development. Length does not discriminate the presence or absence of particular constructions, except in a very rough way; for example, Klima and Bellugi (1966) found that questions and negatives did not really develop until the auxiliary verbs were used. The presence of the Aux could be shown by average utterance length, but no more detailed constructions connected with the auxiliary could be predicted from length alone.

The second subsidiary finding is that the number of interrogative pronouns used by the children has a slightly negative correlation with the number of different temporal constructions used. This lack of correlation possibly shows the relative independence of the learning of interrogatives and of temporal conjunctions. On the other hand, the number of relative pronouns used has a positive, though not very high, correlation (.36, $p < .10$) with the temporal constructions. This is to be expected since many temporal constructions are closely related, linguistically, to relative pronouns (cf. chapter VIII for further discussion).

The third point is that the percentage of utterances with chronological order of mention (5.11 above) is practically the same

in both sets of data. Nearly all the compound utterances (A) and the complex ones with the subordinate clause first (C) are in chronological order, i.e. event 1 is described first, followed by event 2. Not surprisingly, nearly all the complex utterances with the subordinate clause second (B) are not in chronological order since event 2 is usually necessarily described first.

Fourthly, the majority of temporal descriptions have the same tense in each clause. This is true for an average of 81% in Data (i) and 96% in Data (ii). Nearly 75% of the compound utterances are in the present tense in Data (i), but only 25% are in the present in Data (ii). For the complex utterances, approximately 80% and 65% respectively are in the present in Data (i), as opposed to 55% and 40% in Data (ii). There is, therefore, a very large increase in the proportion of past-tense temporal descriptions in Data (ii), especially in compound utterances.

Lastly, the order of appearance of the most widely used conjunctions seems to be fairly stable in all the children's protocols: and appears first, followed by when₂, because₂ and if₂, which, in turn, are followed by when₁ and if₁. In addition, a subordinate conjunction being used in second place, in every instance, preceded its being used in first place in an utterance; for example, when₂ always preceded when₁ in the protocols. Therefore, the prediction that B-type constructions occur before C-type ones is true not only for the conjunctions as a whole, but also for each one individually.

There are, in addition, two distinct differences between Data (i) and Data (ii). They are the increased use of and then and of when₁

in Data (ii). 'Then' in and then is an overt mark of temporal sequence when combined with the coordinate conjunction and. Its increased use may signal the child's growing awareness of the difference in meaning between the true coordinate and (&) and 'and + sequence' (cf. further 9.1 below). The increase in usage of when₁ reflects the larger number of children who have gone through the stages hypothesized (5.1) by the end of the period covered by Data (ii). Because of the general sampling problems with this kind of data, it is not possible to claim an absolute overall increase over time (between Data (i) and Data (ii)) in the number of different conjunctions used and the number of children using them, although this also appears to be the case.

Many previous studies of older children have commented on the importance of temporal (subordinate) clauses, e.g. Stormzand and O'Shea (1924), Boyd (1926-7), LaBrant (1933) and Davis (1937a). In adult speech and writing, temporal clauses make up between 20% and 50% of all the adverbial clauses used (cf. 4.3). In the present study (with children aged 3;6 - 4;6 years), there is a marked increase in the percentage of temporal descriptions in the total speech. In Data (i), this increase goes from 4% to 8% of the total number of utterances recorded, and, in Data (ii), from 9.1% to 17.6% to 16.7% at the end of the third term (June 1968). The proportion of subordinate adverbial clauses out of the total temporal descriptions in this study is 37% in Data (i), increasing to 54% in Data (ii). These percentages indicate that the temporal adverbials (which make up, on average, nearly half of the temporal descriptions) very early comprise an important utterance-type in children's speech.

The most frequent conjunction in Data (i) is and. It occurs four times as often as all the other coordinate conjunctions together, and three to four times as often as the most frequent subordinate conjunction. These proportions are very close to those found in previous studies, e.g. Davis (1937a), cf. also 4.3 above; coordinate and subordinate conjunctions as a whole, though, appear in almost equal proportions. Davis, however, found that, in the speech of 5;6 - 9;6 year-olds, coordinating conjunctions occurred almost five times as often as subordinating ones.

The fact that the largest number of children use the most frequently occurring conjunctions points to an overall consistency in the acquisition of particular items. This was predicted in the case of when (5.2); in addition, earlier studies have observed that because and if are also among the first subordinating conjunctions to appear in children's speech between the ages of 2;0 and 3;0 years (Bloch, 1921, 1924; Guillaume, 1927b; Woodcock, 1934; Slama-Cazacu, 1965; cf. 4.3 above). I therefore expected that the majority of the children would use these two conjunctions, at least, as well as when. In Data (i), the most frequent subordinating conjunctions are in fact when₂ and because₂, which occur equally often. Next come if₂ and until₂. Of the subordinating conjunctions found in first position, when₁ is nearly three times as frequent as if₁. In Data (ii), and occurs three times as often as all the other coordinating conjunctions together. When₂ and because₂ still occur with about the same frequency, followed by if₂. In first position, when₁ occurs just over three times as often as if₁. There are not very large changes,

therefore, in the proportions of different conjunction-types to each other in the two sets of data.

What many earlier studies, like those above and all the vocabulary studies (Boyd, 1914; Smith, 1926; cf. further 4.1 above) do not indicate is how the conjunctions were used: did the children use them in appropriate contexts? Did they observe tense and aspect restrictions? Did they place their subordinate clauses in first or second position in the utterance? These are some of the questions which I think have been answered in the present study, at least insofar as the usage of 3;6 - 4;6 year-olds is concerned.

VIII Analysis of Temporal Conjunctions.

8.0 Before I talk about more details of the children's data, it is worthwhile looking at a syntactic analysis of the adult forms of temporal subordinate clauses (the coordinate constructions will be discussed in the next chapter). Such an analysis may help to explain why children use the particular conjunctions they do (cf. Tables XVI and XVII) and why certain subordinating conjunctions should be common to nearly all the protocols in Data (i). The temporal conjunctions that appear earliest, developmentally, are when₂, because₂, if₂ and until₂, when₁ and if₁ in Data (i), and, in Data (ii): when₂, because₂, if₂, when₁ and if₁ (cf. 7.15; 7.3). These are the conjunctions that occur most frequently and are most widely used by the fifteen children in this study.

Traditionally, adverbial clauses have been classified on a semantic basis according to the type of adverbial conjunction introducing the subordinate clause. I would also claim that causal and conditional clauses are psychologically related to temporal clauses because of the time relations between the events described in each type of utterance. In addition, temporal clauses are closely related to adverbials of place (cf. 2.2; 3.3 above), besides being related to the temporal prepositional phrases and temporal adverbs, e.g.

- (1)
- i. He came in when he heard the gong.
 - ii. He came in before lunch.
 - iii. He came in then.

In this analysis, I will attempt to clarify some of the relations which hold between temporal adverbs, prepositional phrases and

conjunctions by positing certain features which have to be present in the subcategorization of the category Adverbial in the deep structure of the sentence (Chomsky, 1965) in order to allow the occurrence of either an adverb (of time or place), or of an adverbial prepositional phrase (composed of a Preposition followed by a Noun Phrase), or of its related conjunction introducing the embedded subordinate clause.

I shall discuss the derivation of the conjunctions in an unformalized Transformational Generative framework for convenience, although a more 'abstract' case-grammar (with later segmentalization rules for the derivation of prepositions, etc.) might ultimately be more suitable for a complete developmental model of language acquisition (cf. Fillmore, 1968; Schlesinger, in press). The difference between the two forms of grammar, though, is irrelevant for my purposes here.

8.1 If we take the Phrase structure rules for the base component suggested by Chomsky (1965:102):

- (2) i. $S \rightarrow NP \widehat{\text{Predicate-Phrase}}$
 ii. $\text{Predicate-Phrase} \rightarrow \text{Aux} \widehat{\text{VP}} (\text{Place}) (\text{Time})$

the optional Place and Time in (2ii), he states, will serve to introduce all those Adverbial Phrases which occur outside the Verb Phrase, and are associated with the full Predicate-Phrase. In English, however, Time and Place are very closely related. To show this relationship for the segment of English grammar that I wish to discuss, I will therefore replace the rule in (2ii) by:

- (3) $\text{Predicate-Phrase} \rightarrow \text{Aux} \widehat{\text{VP}} (\text{Adverbial})$

As in (2ii), this rule associates the Adverbial with the full Predicate-Phrase. The change from (Place) (Time) in (2ii) to Adverbial in (3)

will account syntactically for the close relation between:

- (4) i. on Tuesday/Thursday, etc.; on the first of the month;
 ii. in the morning; in March; in 1960;
 iii. at lunch (time); at two o'clock; at the end of the day;

and

- (5) i. on the roof; on Mont Blanc;
 ii. in the house; in Paris;
 iii. at the theatre; at home.

All the above examples involve the Prep^{NP} rewriting rule. The simple adverbs seem to show a similar relation to the Prep^{NP} forms and to the conjunctions:

- (6) i. at that place - there - where
 ii. at that time - then - when.

If Chomsky's Phrase structure rule (2ii) were retained, there would be no way of indicating, at this (most general) level, the relations between Place and Time. In fact, in the present formulation, all the Prepositions contain the feature [+Locative] in their subcategorization rules. This is justified by the fact that all the temporal 'conjunctions' appear to be derived from spatial prepositions, e.g.:

- (7) i. before - in front of
 ii. behind - after (aft = back)
 iii. until - up to, close to
 iv. at, on, in - locative prepositions

The presence of such spatial prepositions in temporal conjunctions and in temporal prepositional phrases is partly due to the conceptualization of time implicit in the structure of English.¹ Time

¹I am particularly indebted to H. H. Clark for much discussion of this phenomenon.

The complex symbols for Det and N in the environment of Prep [+Locative] are subcategorized, in the case of Det for [\pm Definite], i.e. 'on the next day' versus 'once upon a time'. In addition, Det is subcategorized for [\pm Proximal]: 'at this time' versus 'at that time'. Otherwise Det is subcategorized as elsewhere in the grammar, e.g. deletion of Det in the environment ___N[+Proper] or [+Abstract]. N is subcategorized as [+Locative [+Time]]. The feature [+Locative] is posited as the head of this hierarchy (cf. Figure III) so as to exclude nouns like 'anger', 'fear', etc. which would otherwise have to be characterized as [-Time] when, in fact, they appear to have no spatial features at all. This is why the feature name is not taken to be [+Place], but [\pm Time] under [\pm Locative]. It is possible that

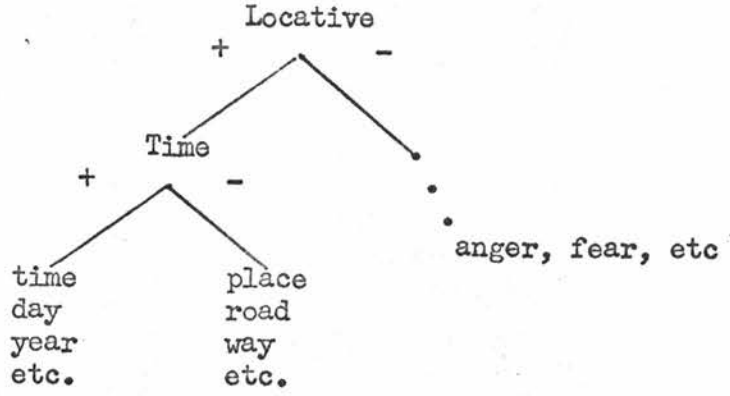
 Insert Figure III about here

this hierarchy of features is parallel in other respects to the hierarchy proposed by Chomsky (1965:85) for the features of N. For instance, all nouns that have the features [+Locative [-Time]] will also have the feature [+Concrete].

The CS for Prep contains a number of different features which are not necessarily all organized hierarchically. First of all, all the prepositions appearing in the rewrite of the category Adverbial are [+Locative]. The Prep can also be [+Simultaneous]; for instance, [+Simultaneous] would result in a Prep terminal node such as at, on, in, during, but not before, after, etc. which are specified by [-Simultaneous]. If the Prep contains the feature [-Simultaneous], then there is a further division, [\pm Prior] which will result in items

Figure III

Some of the subcategorization features of N:



like before and after. Finally, there is the feature [+Terminative]. If [+Terminative] is one of the defining features, it can result, for example, in until (in combination with [+Prior]) or in after (with [-Prior]). If [+Simultaneous] is combined with [+Terminative], the event is punctual; with [-Terminative], it is durative. The feature complexes of some common temporal (spatial) prepositions are shown in Figure IV.

 Insert Figure IV about here

I shall also suggest that Adverbials that appear either as Adverb or as Prep NP have a number of features in common. This is shown by their semantic (featural) identity in some contexts, as well as by their syntactic properties, e.g.

- (11) i. at that time - then
 ii. at this time - now
 iii. during this/that time - meanwhile

In the same way, we can derive late and early as adverbial realizations of the features which also occur in the forms after and before. The inherently comparative nature of the temporal construction becomes clearer if we compare:

(12) He left earlier (later) than I did.,

with the alternative form:

(13) He left before (after) I did.

Historically, the form of the comparative with than is derived from a temporal construction in Middle English. Than is a variant of then, from O.E. þonne = 'at the time (that)'. Before than and then

Figure IV

CS realizations for some temporal prepositions:

<u>at</u>	Prep ---> CS/___(Det) N	[+Locative] [+Simultaneous] [+Terminative]
<u>on</u>	Prep ---> CS/___(Det) N	[+Locative] [+Simultaneous] [+Terminative]
<u>in</u>	Prep ---> CS/___(Det) N	[+Locative] [+Simultaneous] [-Terminative]
<u>before</u>	Prep ---> CS/___(Det) N	[+Locative] [-Simultaneous [+Prior]] ([+Terminative])
<u>after</u>	Prep ---> CS/___(Det) N	[+Locative] [-Simultaneous [-Prior]] ([+Terminative])
<u>until</u>	Prep ---> CS/___(Det) N	[+Locative] [-Simultaneous [+Prior]] [+Terminative]
<u>during</u>	Prep ---> CS/___(Det) N	[+Locative] [+Simultaneous] [-Terminative]

became differentiated as to function, one found instances like:

- (14) "That is no more then is our commission" (Marlowe, The Jew of Malta, 1.251, c.1590).

A comma before then makes the originally temporal nature of such comparatives clearer:

- (15) "Yet of the two, the Pen is more noble, then the Pencil"
(Ben Jonson, Discoveries, p. 59, 1641).

(Cf. further Curme, 1931:274). Temporal clauses and comparative structures were, therefore, related diachronically. Evidence for the synchronic relation is provided by examples such as (12) and (13) above.

In the rule Adverbial \rightarrow Prep NP, there is no recursive device, yet several [+Time] Adverbials can occur in the surface form of the sentence. Likewise, there may be combinations of [+Time] and [+Place]² Adverbials in the same surface sentence, e.g.

- (16) He arrived in Paris yesterday at three o'clock in the morning.

There do not seem to be any surface structure ordering restrictions between [+Time] and [+Place]. However, there does seem to be a preference for (a) the [+Place] Adverbial(s) to precede the [+Time] one(s), (b) the more general Adverbial to precede the more specific one -- the latter often being the one referring to the smaller unit of time, and (c) all the [+Place] Adverbials to be contiguous, and all the [+Time] ones to be contiguous within the utterance. In order

²[+Place] is of course equivalent to [-Time] (Figure II), and is only used for the sake of clarity in discussing the traditionally named Place and Time Adverbials.

to allow the occurrence of several Adverbials modifying the Predicate-Phrase as a whole without introducing a recursion rule, I would suggest that there is just one (optional) Adverbial per #S# in the base component. This avoids a syntactic limit on recursion; however, recursion would always be possible according to the semantic principle of part-whole inclusion, i.e. at the nth second of the pth minute.. hour.. day.. week.. month.. year, etc. The part-whole inclusion relation is probably derived from restrictive relative clauses, e.g. He arrived on the first of May from He arrived on the first and May has a first day. This, of course, would provide further evidence for the relation between locative and possessive constructions (cf. Lyons, 1967). This would still mean that each surface structure Adverbial is derived from a different base string. Where any two or more #S#s have an identical NP VP structure, the two #S#s can be conjoined with deletion of the second NP VP (cf. a similar proposal in McKay, 1968). Provided that the Adverbials are not of the same subtype³, the 'conjoining elements' (in deep structure) are then also deleted. Hence, I would derive (16) from roughly the following base strings:

- (17)
- a. He arrived in Paris
 - b. He arrived yesterday
 - c. He arrived at three o'clock
 - d. He arrived in the morning

³Adverbials of the same subtype refer to the same kind of time-period: i.e. today, yesterday, tomorrow, a day, Tuesday; an hour, sixty minutes; morning, afternoon, evening; etc.

Next, the transformation to conjoin the base strings with identical NP VP's is applied, followed by the deletion of redundant NP VPs:

(18) T-conjoin: He arrived in Paris + he arrived yesterday +
he arrived at three o'clock + he arrived in the morning

(19) T-delete identical NP VP's after first occurrence in
conjoined strings: He arrived in Paris + yesterday + at
three o'clock + in the morning.

The last step in the derivation of (16) is:

(20) T-deletion of +: He arrived in Paris yesterday at
three o'clock in the morning.

In allowing the occurrence of several Adverbials in this way, though, there are some co-occurrence restrictions which have to be applied when several [+Time] or [+Place] Adverbials occur together. While (16) above is quite acceptable, (21) below has to be excluded:

(21) *he left last night in the afternoon.

From (21), one would infer that the afternoon is a part of the night, when in fact these two time periods are incompatible, while, in (16) there is no incompatibility between 'yesterday' and 'in the morning'.

The restrictions on the co-occurrence of adverbials can be characterized partly in terms of not allowing two Adverbials of the same subtype as in:

(22) *he came yesterday today

unless they are overtly joined on the surface by a conjunction like and:

(23) He came yesterday and today.

In other words, the T-deletion of + in (20) does not apply in these instances. If there are more than two Adverbials of the same subtype conjoined on the surface, then we must allow optional replacement

of and by ', ' between all except the last two occurring in succession. In the case of (21) however, this is not an adequate restriction because 'last night' and 'in the afternoon' are not Adverbials of the same subtype. Therefore, I propose that in addition, the CS for the lexical item 'afternoon' must contain a feature like [+Diurnal] which would block the T-conjoin (18) when the Adverbial in the first #S# in the base contains the contradictory feature [-Diurnal] ('night'). Words like 'yesterday', the names of days, etc. which can refer to the whole twenty-four hour period would contain the feature [Diurnal] with no plus or minus value on it, thus allowing combinations like:

- (24)
- i. yesterday evening
 - ii. tomorrow morning
 - iii. Tuesday morning/afternoon/evening/night

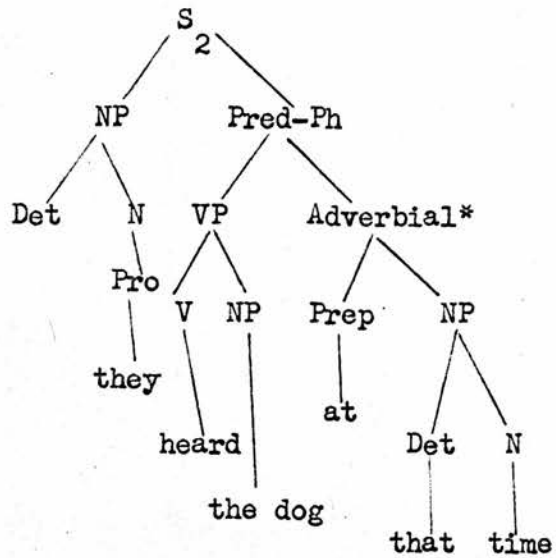
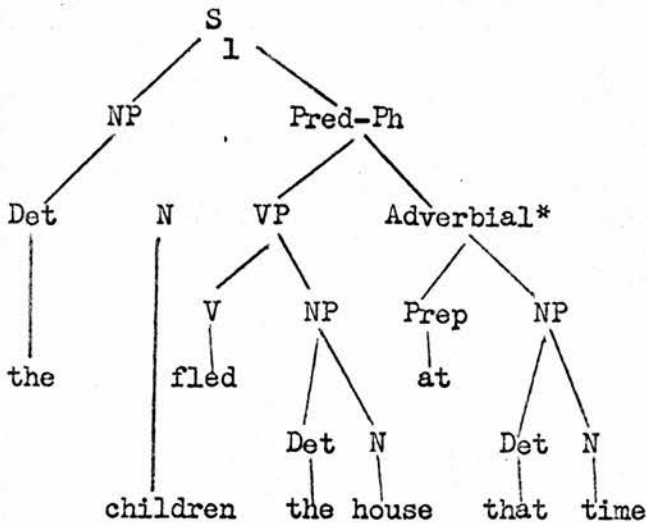
The two main constraints seem to be first, more than one Adverbial of the same subtype can only occur with overt conjunction in the surface structure sentence, and, secondly, the Nouns that are subcategorized as [+Time] must also contain some selectional features which restrict their co-occurrence with certain other (incompatible) [+Time] Nouns.

The compatibility of features constraint is also needed in determining whether or not the Relativization transformation can take place when a sentence (S_2) is embedded in the Adverbial of the matrix sentence (S_1). In Figure V, the Adverbials are marked with a star * where the features of Prep NP in each sentence have to be compatible with each other. The compatibility involves the minimal number of

 Insert Figure V about here

Figure V

Phrase-structure tree for embedded temporal #S#.



features necessary to specify identity of times and the existence of no contradictory features. For instance, (25) is derived from the two base strings (25 ii a and b):

- (25) i. He came home when he had finished work.
 ii. a. He came home at that time
 b. He had finished work at that time

The first transformation to be applied is the preposing transformation which acts on (25iib):

- (26) T-prepose adverb: at that time he had finished work
 (27) T-relativization: at that time \implies Wh-at that time
 (28) T-embed: He came home at that time at which time he had finished work.

\implies He came home when he had finished work.

Although 'at that time' can be deleted after T-rel and T-embed have taken place (cf. Kuroda, 1968), this is largely because it is always recoverable from the context. This is in contrast to:

- (29) He left home the month (that) he finished school.

which is not equivalent, semantically, to:

- (30) He left home when he finished school.

The relativization rules are fairly well known so I will not go into them further here beyond pointing out that, as elsewhere, the identity of the NPs, i.e. their compatibility, is the necessary pre-condition for embedding the subordinate (temporal) clause in the Adverbial of the matrix sentence.

The relative pronoun in temporal clauses can take several forms:

- (31) at/before/after (etc.) the time $\left\{ \begin{array}{l} \text{at which} \\ \text{when} \\ \text{that} \end{array} \right.$

At which is generally replaced by when or that. In Middle English, that was used to introduce any subordinate clause, and it appeared after who, when, where, before, while, until, if, because, etc.

(Jespersen, 1927:77; Curme, 1931:209; Kruisinga, 1932:400ff.). In Modern English, that is used to introduce temporal (or causal or conditional) clauses only after NP:

- (32)
- i. after the time that - *after that - after
 - ii. on the condition that - *on that - (if)
 - iii. for the reason that - *for that - (for), because

Previously, therefore, 'the time' in (32i) was deleted; at present, both 'the time' and 'that' are deleted. Either that or when may occur after Prep NP. If when appears as the relative after a punctual or durative NP, Prep NP may be deleted entirely:

- (33)
- i. He was coming downstairs when the bell rang. (at the time)
 - ii. They stayed inside when the children were asleep. (during the time)

When is ambiguous, therefore, between a punctual and a durative interpretation in many contexts. If the Prep is not punctual or durative, but [-Simultaneous], then both NP and Rel are deleted, and the Prep alone functions as a conjunction introducing the embedded clause:

- (34) He came home before it got dark. (before the time at which/that)

In a few instances in English, there are separate lexical items which may be used as the conjunction forms instead of the longer Prep NP Rel forms, e.g.

- (35)
- i. during the time that - while
 - ii. at the time that - when

I should perhaps point out here that there are three ways of distinguishing when used (i) to introduce a complement and (ii) as a conjunction. First of all, the when conjunction introducing a subordinate clause dominated by the node Adverbial in the matrix sentence can always be preposed:

- (36) i. They fled when they saw the tree beginning to fall.
 ii. When they saw the tree beginning to fall, they fled.

This clause-preposing transformation cannot be applied to a complement clause (except under conditions of Object preposing for stylistic reasons):

- (37) i. He knew when they would arrive.
 ii. *When they would arrive, he knew.

Secondly, the complement, but not the Adverbial clauses, can have a cleft-sentence form:

- (38) i. What he knew was when they would arrive.
 ii. *what they fled was when they saw the tree beginning to fall.

(Cf. also Jacobs and Rosenbaum, 1968:208-211). The third way of distinguishing the two types of when was pointed out by Jespersen (1924:264-265): when (conjunction) is followed by a verb in which the time-indicator does not have to be fully specified (cf. also Chapter IX below). For example, in (39), the first when is the complement form, the second is the conjunction:

- (39) 'We do not know when he will come, but when he comes, he will not find us ungrateful.' (Jespersen, *ibid.*)

The absence of 'time-indicators' in the tense of the verb in the subordinate clause is very frequent after conjunctions of time (and

condition), e.g.:

- (40) i. We will go away before he arrives. (will have arrived)
 ii. He had crept down the fire-escape after he heard their voices. (had heard)

The tense itself is the same though, in each clause: present in (40i), and past in (40ii). The rule for tense will be further discussed in 9.2 below.

Of all the temporal conjunctions, when seems to be the most general in meaning. With the feature [+Simultaneous], when refers to an event or state that occurs at the same time as the event or state being described in the main clause. However, when can also be specified as [-Simultaneous] if the event so described ends before the event in the main clause, i.e. it contains the features [-Simultaneous[-Prior]] so that when is equivalent in meaning to after. Examples of these two meanings are:

- (41) i. He was running when he tripped. [+Simultaneous]
 ii. The door opened when he had knocked twice.
 [-Simultaneous[-Prior]]

Poutsma (1929:666-7) points out that when occasionally occurs after a negative main clause where one usually expects before ([+Prior]), e.g.

- (42) He had scarcely walked a mile when he turned back.

However, this when seems to me to be ambiguous between [-Simultaneous [+Prior]] and [+Simultaneous] combined with a negative:

- (43) i. When he turned back, he had not walked a mile. (at the time that)

ii. He had not walked a mile before he turned back.

(before the time at which)

The unmarked (simpler) form of when is the one with the underlying feature [+Simultaneous] and its marked form is [-Simultaneous]. But within the marked form, there is a further subdivision which distinguishes, for example, between before and after: [+Prior], one of which ([+Prior]) is unmarked with respect to the other. Although the linguistic evidence for this secondary marking is not very clear in English, developmentally, it seems that children begin by using words like first, before, Fr. d'abord, avant (Decroly and Degand, 1913; cf. further Chapter III above). Before, however, does not seem to be used as a conjunction much earlier than after is (cf. Table XVIII, and discussion of data in 8.2 below).

How are the causal and conditional clauses to be included under the rewrite of the Adverbial? To begin with, I propose that they should be derived in the same way from Prep NP so that they contain all the [+Time] features of the Prep and that, in addition, they contain the features [+Cause] or [+Condition] in the subcategorization of NP. If shares the features of 'on (the) condition that' and because shares the features of 'for the reason that'.⁴ Therefore, the features in the CS of if will look approximately like:

- (44) [+Locative]
 [-Simultaneous]-Prior]]
 [+Terminative]

⁴Further evidence that causal conjunctions are probably locative in origin is seen in examples like: 'John trembled out of anger' and 'Pete trembled from fear', where out of and from are both [+Cause].

•
•
[+Condition]

and those for because will look like:

- (45) [+Locative]
[-Simultaneous[-Prior]]
[+Terminative]

•
•
[+Cause]

Other conjunctions like as and since that were originally temporal, but are now frequently used with an indeterminately temporal-causal interpretation have optionally added the feature [+Cause] to their CS. Such temporals assume their causal force because "what precedes an act is naturally construed as its cause" (Curme:1931:314). When can likewise imply cause or condition, the latter especially in general 'timeless' statements and instructions, e.g.:

- (46) { When } you turn on the tap (A), raise the lever (B).
 { If } }

The former (causal) interpretation is shown in:

- (47) { When she fell down, she hurt herself.
 { Because

Kruisinga points out that "such shiftings [in meaning], especially of conjunctions denoting time or place, are common in other languages; and, indeed, in English itself, in other classes of words" (1932:465). These shifts in meaning are generally due to inferences made by the

hearer, as suggested by Curme (1931:314); such inferences, therefore, based on our knowledge of the world, are very important in the interpretation of temporal conjunctions. In the following sentences:

- (48)
- i. He broke the lock when he was trying to lever it open.
 - ii. He broke the lock because he was trying to lever it open.

the hearer may infer that the reason given (because - 48ii) is co-occurrent with the time of the event. In the same way, the hearer will infer from (48i) that the lock broke as a result of the action described in the temporal clause.

A final observation about the conjunctions is that those conjunctions which contain a set of features corresponding to those in Prep NP (35), are the ones which may occur with just an Adjective (as well as just an NP) following them, rather than a full sentence, e.g.:

- (49)
- i. when happy (when a child)
 - ii. if tired (if a carnivore)
 - iii. because worried (because a tyrant)
 - iv. while capsizable (while an acrobat)

In these instances, the Adjective or NP following the conjunction generally refers to the subject of the main clause, e.g.:

- (50) When a child, he used to collect snails.

These constructions differ from the Prep alone used as a conjunction

(34) which cannot be followed by an Adjective:

- (51)
- i. *before yellow
 - ii. *after wide-awake
 - iii. *during tall

Whether this constraint on Prep is due to the absence of any NP features

I do not know, but if all the features combined from Prep and NP do appear in the specification of the (semantically) equivalent conjunction, this is at least one distinct difference between the underlying featural structures of the constructions in (49) and (51).

This is a very brief sketch of some of the considerations in dealing with conjunctions, prepositional phrases and adverbs which are derived from the Adverbial node in the Predicate-Phrase. Throughout this discussion, I have assumed a grammar approximately of the form proposed by Chomsky (1965). I now wish to look at some more details of the children's data to see if their usage corresponds in any way to the forms that are 'simpler' in the adult grammar. For instance, those adverbs and conjunctions with the feature [+Simultaneous] are unmarked beside those which are [-Simultaneous]. Some types of marking, I assume, will show up in developmental data since the unmarked form is frequently less specific or has fewer constraints on its range of meaning than its marked counterpart (cf. Bierwisch, 1967; Donaldson and Wales, in press; Clark, in press).

8.2 The lexical items containing unmarked features (the '+' values in my notation) appear to be simpler than those containing marked features for language processing tasks (cf. Clark, 1968). If this simplicity of the linguistic description is also reflected in the acquisition of language, there are some specific predictions that can be made. Conjunctions with [+Simultaneous] should precede the appearance of [-Simultaneous] ones. Similarly, [-Simultaneous[+Prior]] conjunctions should precede [-Simultaneous[-Prior]] ones, and lastly [+Terminative] should precede [-Terminative]. The principal conjunction with the meaning [+Simultaneous] in the protocols is when;

only in a few instances does it appear to be equivalent, instead, to after. This backs up, indirectly, some of Decroly's data (1913; cf. Chapter III) in which he found that children very early on learnt to associate particular events to particular 'times' in a regular routine. It would seem quite natural to me that in learning to use subordinate clauses, children should also take the simplest instance first, the form expressing the 'simultaneous with' relation in time (cf. 3.2), and only later begin to use the before-after relations of succession in time (cf. also Grigsby, 1932). When in its other functions -- as interrogative and as relative introducing a complement -- is also [+Simultaneous] rather than [-Simultaneous [-Prior]].

As we saw in 7.14 above, when is the commonest conjunction and appears in most of the protocols. It is also the conjunction that is most frequently preposed to first position in the utterance (cf. Tables XVI and XVII). This would indicate that when is the first subordinate conjunction to go from being used in constructions with the subordinate clause second (B) to constructions with the subordinate clause first (C). The only other [+Simultaneous] conjunction that occurs in the data is while; however, it was used by only two children (S.R. and W.J.) in Data (i), and by none in Data (ii). While is more complex than when, although it is [+Simultaneous], because it is also [-Terminative]. This complexity is possibly also reflected in Piaget's (1946) studies that found that the meaning of duration is learnt rather later than that of simultaneity.

Apart from the specific predictions based on the featural analysis, two of the three principles combined, order of mention and

derivational simplicity, would also predict that conjunctions like before and until in second position should be easier or simpler.

This is because an utterance with one of these conjunctions is derivationally simpler (5.12) and it describes the events in chronological order (5.11). These two conjunctions are the only two in which these principles coincide. This can be seen in the data. Before appears in three protocols in Data (i), but only in one (L.C.'s) does it occur in first position as well as in second. In Data (ii), it appears in three more protocols in second position only. Until appears in six protocols in Data (i) and in two more in Data (ii). There are no instances at all of until being preposed. Since chronological order is maintained in descriptions using these two conjunctions, why are they needed? Why is and or and then not used instead? There seems to be no thematic reason here to introduce a subordinate clause. However until does mark a very specific contingency relation (5.13) in that it means that the first event is terminated by the occurrence of the second event. This relation cannot be indicated by and. Before also contains the feature [+Terminative], although the relation between the two events is not exactly equivalent to that with until.

Of the [-Simultaneous[-Prior]] conjunctions, the children use after, if and because. After, which is marked in relation to before and until since it contains the feature [-Prior], only occurs in two protocols in Data (i) and in two more in Data (ii). L.I.'s protocol (Data (ii)) is the only one in which after appears in first position. Elsewhere, it always introduces the subordinate clause in second position. Before and until are used in a larger number of protocols (six and eight) throughout the two sets of data than after

is (four protocols). However, in adult speech when may also be [-Simultaneous[-Prior]] and it is impossible in the present data to separate those descriptions in which when is actually equivalent in meaning to after from all those in which it has the meaning [+Simultaneous].

The two other conjunctions that contain the features [-Simultaneous[-Prior]] are because and if. These both have a slightly different status from the purely temporal conjunctions, but I would argue that psychologically, at least, they are related by the time relations inherent in the understanding of cause and condition at the most elementary level. In addition, the subordinate clauses they introduce can be derived linguistically in the same way as the temporal clauses. Because of the features which appear in it, we would expect if to resemble after and when, as indeed it does. It appears more frequently than after in the data, in seven protocols in Data (i); in three of these it occurs in first as well as in second position. In Data (ii), it appears in second place in two additional protocols, and, in three others, it is now also used in first position. If, therefore, seems to be much closer to when as far as the children's usage is concerned in that it is used first in second position and is later preposed to first position. Except for one instance of before and after being preposed, when and if are the only two conjunctions used in C-type constructions by this group of children (3;6 - 4;6). There is only one instance of unless being used, in second position, in the whole data (N.W.). Intuitively, unless seems to be more complex than if, especially as if...not could be used instead.

In theory, because should also resemble when. However, this [-Simultaneous[-Prior]] conjunction shows a somewhat different pattern of usage. It appears in eleven protocols in Data (i) and in three more in Data (ii) (cf. Table XVI). The only child not using it was G.S. whose only subordinate conjunction (in Data (ii)) was when. Because, despite its wide usage, never occurs in first position in the utterance. This contrasts with when, which is also very widely used, and to if which is somewhat less frequent than because. Poutsma claims that, in adult speech, because most often occurs in second position because it is "the weightiest member of the sentence" (1929:682). This, he says, is because the because-clause contains information that is assumed by the speaker to be unknown to the hearer. If, on the contrary, the speaker were to use since (with a causal meaning), he would place it first as he assumes then that the reason is already known to his hearer. Although this differentiation between because and since may be a viable one, I have found no-one who agrees on the distinction Poutsma has drawn. The basis of it seems to have been the theme-rheme difference (cf. 5.13, and 10.0 below) where the rheme introduces 'new' information unknown to the hearer. It might be possible to test this by collecting data from older children who do use since and also to sample a wider number of adult English-speakers than I have done. However, it has usually been current written usage that has been to used to back up descriptions in traditional grammar, and there may be considerable differences between spoken and written constructions (cf. examples cited in Poutsma, 1929:682ff.). For the moment, all I can say is that because does not show the typical sequence of development of the conjunctions for it never occurs in first position. It is, however, used among the first subordinate conjunctions to appear by

the majority of children in this study. Because and when occur in the same protocols with about the same frequency, if we only count second position occurrences. When, however, is the most frequently used subordinate conjunction overall, if we count both second and first position occurrences.

As all the temporal conjunctions in English can be derived from spatial prepositions in Prep NP (8.1 above), I would expect to find a number of the spatial prepositions used as such before the children begin to use them as conjunctions with an embedded sentence. I shall first give some examples of how they are used prepositionally in the data. After occurred in contexts like: after you; after them; after tomorrow; and after Carmen came Lesley. Before occurred prepositionally: I was before you, Grant, and also as a sentence-final 'adverb' as in You've not seen it before, eh? (S.R.). The sentence-final 'adverb' before appears less frequently in the children's speech than first with a similar meaning: You do it first (B.L.); he threw it all on the floor first (S.R.); I want to finish this first (C.W.); I'll make another first (N.A.). There were also a few instances of later on (equivalent to 'after' or 'afterwards'), as in We'll do it later on (M.C. (cf. discussion in 3.14b above; also Table XVIII).

After is used prepositionally (followed by a Noun Phrase) in six protocols in Data (i), and in two others, it is used as a conjunction. In Data (ii), five more children use after as a preposition, and one more uses it as a conjunction. Therefore, a total of eleven children use after as a preposition while only three use it as a conjunction during the period of data collection. Out of the eleven using it as

 Insert Table XVIII about here

a preposition, eight use only the prepositional form; one uses the prepositional form and later begins to use the conjunction, and one uses both the preposition and conjunction in the same set of data. Two cases go against my hypothesis: one protocol (L.C.) contains only the conjunction, and one protocol shows the conjunction being used before the preposition (C.W.).

Before is used by five children in Data (i); of these children four used it as a preposition or as a sentence-final adverb, and one of them as a conjunction. In Data (ii), five more children use before as a preposition, and three more begin using it as a conjunction. Overall nine children use before as a preposition and four use it as a conjunction. Out of these, five children only use the preposition, one uses the preposition and later uses the conjunction, and one uses both the preposition and conjunction in the same set of data. Four children appear to go counter to the hypothesis: three use only the conjunction, and one uses the conjunction before he uses the prepositional form.

Until is slightly different from the two other prepositions we have considered in that it does not appear as a preposition at all in Data (i) although six children use it as a conjunction. In Data (ii), two children use it prepositionally, e.g. Two weeks till ma holiday (B.L.), till tomorrow (M.F.), and two more children begin using it as a conjunction. Overall, the preposition appears in two protocols and

Table XVIII

Children using particular conjunctions and prepositions in
Data (i) and Data (ii).

Child:	Conjunctions						Prepositions					
	after		before		until		after		before		until	
	(i)	(ii)	(i)	(ii)	(i)	(ii)	(i)	(ii)	(i)	(ii)	(i)	(ii)
S.R.	-	-	-	-	-	-	+	-	+	-	-	-
A.G.	-	-	-	-	+	-	+	+	-	+	-	-
W.J.	-	-	-	-	+	-	-	-	-	-	-	-
B.L.	-	-	-	-	-	-	+	-	-	-	-	+
L.C.	+	-	+	-	-	+	-	-	-	-	-	-
N.W.	-	-	-	+	+	-	+	-	+	+	-	-
B.F.	-	-	-	+	-	-	-	-	-	-	-	-
C.W.	+	+	-	-	-	+	-	+	-	+	-	-
M.F.	-	-	-	-	+	-	-	+	-	-	-	+
G.S.	-	-	-	-	-	-	-	+	-	-	-	-
C.L.	-	-	-	-	-	-	+	+	-	+	-	-
L.I.	-	-	-	+	+	+	-	-	-	-	-	-
B.H.	-	-	-	-	-	-	-	+	-	+	-	-
N.A.	-	+	+	-	+	-	-	+	-	+	-	-
M.C.	-	-	+	-	-	-	+	+	+	-	-	-

the conjunction appears in eight. As far as the hypothesis is concerned, it is supported by the child who uses only the preposition, and also by the child who uses both preposition and conjunction in the same set of data. It is not supported, though, by the eight children who use only the conjunction.

Thus, in support of the hypothesis that the prepositional forms appear earlier than the conjunctions, there are ten protocols using after, seven using before and two using until, while against it, there are two protocols using after, four using before and eight using until. The hypothesis seems to be confirmed in the case of after, and possibly in that of before. Until, it should be noted, is not spatial in the same way that the other two prepositions are. This is possibly the reason for the apparent difference in usage. However, the amount of data is not sufficient to confirm the generality of this phenomenon for all prepositions that are used as conjunctions. I think it is likely that more systematic data should be collected both from the present age-group and from younger children in order to find proper confirmation of this hypothesis. In addition, more data on adverbs like "now", "then", and on prepositional phrases containing locatives like at, on and in, as the adverbial and prepositional forms equivalent semantically (though not functionally) to when are also needed to confirm the developmental sequence: adverb and prepositional phrase before conjunction.

8.3 To sum up, the main points of the linguistic analysis should be kept in mind while considering the children's data. First the subordinate temporal clauses are derived from prepositional phrases with

embedded relative clauses, e.g.

(52) It began to rain when he arrived. (at the time at which)

(53) The children came home before they were expected. (before
the time at which)

From examples like (52) and (53) above, it is evident that there are two types of subordinating conjunction, those that come directly from prepositions (as in (53)), e.g. after, since, before, until, etc., and those that come from an adverbial relative like when or while. These two types, though, are closely related by the underlying features that are found in all temporal conjunctions.

Thirdly, the prepositions used in temporal expressions can be subcategorized by a number of different features. These features are of the type [+Simultaneous], [+Prior] (which is hierarchically dependent on [-Simultaneous]), [+Terminative]. The meaning attached to these features is generally evident from the name. For instance, the two values of the feature [Terminative] contrast punctual (+) with durative (-) events. There are also some optional features like [+Cause], [+Condition], etc. which may appear in the subcategorization of some of the prepositional phrases that are [+Locative[+Time]].

Lastly, the relation between time and space is very important in the conceptualization of time in English. All the prepositions in the prepositional phrases, for instance, are locative in origin (as their features indicate, cf. Figures III and IV).

These aspects of the linguistic description have been important in the developmental interpretation of the children's data. In particular, in using temporal clauses, the children appear to acquire [+Simultaneous] forms (like when) before they use [-Simultaneous]

ones (like after or until). Next, of the [-Simultaneous] conjunctions, the children use [+Prior] ones (like before or until) earlier than the [-Prior] ones (like after). Both these results are featurally in accord with many previous vocabulary studies which have recorded the data of appearance of particular items, e.g. Boyd (1914), Court (1920), and Gesell and Ilg (1943, 1946); cf. further Chapter III.

Thirdly, there is a certain amount of evidence which suggests that those prepositions that are also used as conjunctions appear first in their function as prepositions, and only later are they also used as conjunctions. The development of the subordinate conjunctions appears, therefore, to depend on the featural content of particular lexical items. The items containing the unmarked forms of each feature are those that are acquired first, e.g. now: [+Simultaneous] before yesterday: [-Simultaneous]. This seems to be true for the simple temporal adverbs (cf. data in Chapter III) as well as for prepositional phrases and conjunctions. The developmental sequence for these three categories, from the point of view of the featural analysis, goes from the expression of the 'simultaneous with' (at) relation in time (cf. also 7.22) to the expression of priority (before, first), and then to the expression of succession (after) (cf. 2.1, 3.2 above).

Thus, I have suggested that young children (from the age of 2;0 or 2;6 upwards) first acquire some understanding of the spatial relations which are identified by spatial prepositions ([+Locative [-Time]]). As the child becomes aware of time in a primitive way, e.g. the identification of two events that occur in the same place,

at the same time, and the subsequent recognition of before-after relations, he begins to extend the use of these prepositions to temporal events on the basis of an equivalence, for example, between after you (in time) and after/behind you (in space, e.g. in a queue). The simplest locative relations should be learnt first, and should also be the first to be extended from spatial situations to apply to temporal events. The simplest locatives are in, on and at, which are ultimately related to when (containing the same features that underlie the prepositions). Later, the children will similarly extend the range of prepositions like before and after to mean both space and time (cf. Piaget, 1946; Papert and Voyat, 1967; 3.3 above). Unfortunately, very little is known about the relative difficulties of understanding different spatial relations; furthermore, there is not very much known about the order of appearance of the different prepositions as a whole which children begin to use at about 2;0 and 2;6 years. There is a need both for collection of spontaneous speech data (with notes on comprehension and context) in this area and for experimentation to find out which spatial relations are the first to be understood by the child.

Lastly, there is very strong evidence in my data that the subordinate clause first occurs in second position in the utterance. This finding is confirmed by Davis' (1937a) data in which she noticed a tendency in the youngest group of children (5;6) to place more of their temporal subordinate clauses in second position (55%) than in first. The older children placed most of the temporal clauses in first position. This trend was predicted by my hypothesis (5.2 above). The

temporal clause, whatever the conjunction, is never preposed until the child learns to use it in second position (cf. results in 7.1 above).

This was true of all the temporal clauses in the present data.

IX Coordination and Subordination in Sentences.

9.0 Throughout this study, I have talked about coordinate and subordinate conjunctions (and constructions). What are the linguistic differences between these two types of structure, and what criteria are used in assigning a conjunction to one or the other class? Although the only construction-types that have been considered here are those used to describe events in time, their classification is based on the traditional distinction between coordination (parataxis) and subordination (hypotaxis). This distinction rests on such syntactic features as the 'sequence of moods and tenses' in the classical languages. Although such distinctions have frequently been challenged within a more general framework of linguistic theory, I shall retain the terminology in talking about two groups of conjunctions:

- (a) coordinate: and, but, for, or;
- (b) subordinate: when, after, before, until, if, unless, because, since, as, while, etc.

9.1 Chomsky (1957) proposed the following definition (although 'type') has never been precisely defined): "If S_1 and S_2 are grammatical sentences, and S_1 differs from S_2 only in that X appears in S_1 , where Y appears in S_2 (i.e. $S_1 = \dots X \dots$ and $S_2 = \dots Y \dots$), and X and Y are constituents of the same type in S_1 and S_2 respectively, then S_3 is a sentence, where S_3 is the result of replacing X by X and Y in S_1 (i.e. $S_3 = \dots X \text{ and } Y \dots$)" (1957:36). Gleitman (1965) though found that this formulation was inadequate to account for some forms of coordination in English (cf. also Dik, 1968:74-92, for further criticism). Dik has suggested the following general definition: "A

coordination is a construction consisting of two or more members which are equivalent as to grammatical function, and bound together at the same level of structural hierarchy by means of a linking device" (1968:25)¹. Dik's definition of coordination does not imply anything about other types of constructions, and he rejects an exclusive dichotomy between coordinative and subordinative constructions. The term subordination is generally used in constructions where a clause functions as a modifier (e.g. Chatman, 1964:326 fn.15). Members of a coordination need not have equivalent grammatical structure but they must be equivalent in grammatical function. Function here is used in Longacre's sense: "By function is meant the particular office or role of one distinguishable part of a construction type in relation to other parts of the same construction" (1965:65). Therefore, coordinate conjunctions "function as signs that the structures they link are functioning as equals" (Strang, 1962:173).

Coordinating conjunctions or particles show a fairly high degree of resemblance in their usage in many languages and appear to cover a similar semantic range (cf. Dik, 1968:271-281). However, there is little agreement traditionally in the literature on how to distinguish coordinating conjunctions from other adverbial, subordinating conjunctions. There are a number of heuristic tests, though, which distinguish these two types of conjunction.

The first test is based on the premiss that two members of a conjunction can never be joined by more than one coordinate conjunction. To confirm whether or not a particular particle is a coordinate conjunction, therefore, one tests to see whether the particle can follow

¹ Cf. Marouzeau's formulation, 1951:63.

another conjunction which is already established as a coordinate conjunction. Compare:

- (1) i. He was ill because he had eaten bad food.
 ii. He was ill because he had eaten bad food and because he was hungry.
- (2) i. He was ill for he had eaten bad food.
 ii. *He was ill for he had eaten bad food and for he was hungry.

By this criterion, because (1ii) is not a coordinate conjunction while for (2ii) is, since two coordinate conjunctions cannot occur together. The sequence 'and and' is excluded for the same reason, as are the sequences 'and but' and 'and or':

- (3) *He shut the creel and John picked up the rods and and they climbed up the bank.
- (4) *He went into the house but he left the door open and but he didn't reappear for half an hour.
- (5) *He climbed the hill or he went fishing and or he was in town.

A second test for coordination vs. subordination is that a noun in a subordinate clause preceding its main clause can refer pronominally to the latter (cf. 5.12 above, and also Gleitman, 1965:274 fn. 21):

- (6) Because he arrived late in Chicago, John missed his connection.

(where John and he refer to the same person). This pronominal reference is not possible in a coordinate construction where the pronominalization precedes its nominal referent:

(7) *He arrived late in Chicago and John missed his connection.

as opposed to:

(8) John arrived late in Chicago and he missed his connection.

A third test is constituted by the permutability of the members of a coordination (except in the case of for). Their permutation remains grammatically and semantically equivalent to the original form of the sentence:

(9) i. The children played outside and the dog slept on the steps.

ii. The dog slept on the steps and the children played outside.

This equivalence is due to the fact that and is not regarded as one unit with its following clause, i.e. there are no coordinate structures of the form:

(10) *And the dog slept on the steps, the children played outside.

(Cf. also Ross, 1967:1671.) This does not apply to one-clause utterances which frequently begin with and, where, from a phonological point of view, the and is a part of its following clause. The instance in (10) is a two-clause sentence making up one phonological unit as far as intonation is concerned. It is in these instances that and is unlike the subordinate conjunctions since it cannot be preposed. In both (9i) and (9ii), the semantic and grammatical equivalence is dependent on and having the meaning of the logical constant $\&$, where 'A & B' equals 'B & A.' Staal (1968), however, has pointed out that there are two kinds of and, one of which is used to coordinate clauses without any ordering (as in the examples above), the other one being used to

relate clauses in sequence. The latter and is equivalent in meaning to and then or and subsequently. Ryle (1954) also points out that 'and + sequence' has at least two meanings, though both are dependent on sequence in time:

(11) She took arsenic and fell ill (in consequence)

(12) She fell ill and took arsenic (subsequently)

(Cf. Ryle, 1954:118). The 'and + sequence' is also used in reduplication:

(13) He ran and ran and ran.

(Cf. further Watt, 1968).

In contrast to (10) above, the subordinating conjunction is felt to be one unit with its following clause (cf. derivation discussed in 8.1 above); the conjunction together with its clause can therefore be preposed:

(14) i. He dived into the pool when they shouted.

ii. When they shouted, he dived into the pool.

iii. The bus arrived late because the roads were flooded.

iv. Because the roads were flooded, the bus arrived late.

Also, the content of subordinate clauses and their main clauses cannot be permuted and the sentence remain semantically equivalent (compare the coordinate construction in (9i) and (9ii)), for instance:

(15) Dick ran out of the house before Jim got downstairs.

is not equivalent to:

(16) Jim got downstairs before Dick ran out of the house.

The 'tests' described above which I have used to differentiate between coordinate and subordinate conjunctions may also be used

secondarily to distinguish between coordinate conjunctions and certain adverbial modifiers which (like subordinate conjunctions) may follow a coordinate one (as in (lii) above), e.g.:

- (17) Tim fell off his bicycle (and) therefore he came home covered in mud.

Although therefore may occur after an (optional) and like because in (lii) above, the clause as a whole may not be preposed (cf. (10) above) and remain semantically equivalent. Nor may the therefore-clause be preposed at all unless it refers back to a preceding utterance; in this respect, it differs from the subordinating conjunctions in (14) above. These adverbial modifiers e.g. thus, therefore, hence, so, etc., have sometimes been called coordinators in 'sequence signals' (Fries, 1952:248), or 'sentence adverbials' (Sledd, 1959:202).

As I have been interested principally in the descriptions of events in time in this study, I have classified some instances of these 'sentence adverbials' (combined with and) in the data as coordinate conjunctions, e.g. and then and and so, together with and and but.

And appearing alone in the 'compound' temporal utterances in the data appeared to have the meaning 'and + sequence' (cf. 7.2 above). But occurred in only a few instances where a temporal description was involved; neither for nor or appeared at all in such contexts (cf. Tables XIII and XIV in 7.15 above). All the subordinate conjunctions classified in this study fall under the traditional headings of Adverbial clauses (Poutsma, 1929:655ff.; Curme, 1931: 259ff.; Kruisinga, 1932:400ff.) of Time (when, after, before, until, while),

of Cause (because) and of Condition (if, unless). I included Cause and Condition clauses with the Time clauses because of their underlying temporal ordering of the two events or states described (cf. 8.1).

9.2 Both coordinate and subordinate constructions have various tense restrictions on their verbs when the clauses are describing sequences in time. As in most Germanic languages, there are only two tenses that are morphologically distinguished in English: present and past (cf. Jespersen, 1948:26; Bach, 1967). Reference to a future time may be made in a variety of ways: by using the present tense combined with particular adverbials, e.g. tomorrow, next year, etc. (cf. chapter III above; Crystal, 1966) as well as by using modals like can, may, will and shall (Poutsma, 1926:9). Combinations of tense and aspect (Poutsma, 1926:15; Lyons, 1968:315-317) in English may frequently seem redundant when other elements (generally adverbs or conjunctions) are present in the utterance to indicate the time-ordering of the events being described. Conjunctions (cf. 8.1 above) are used to indicate the relations 'before', 'after' or 'simultaneous with' holding between two events. The 'before' - 'after' relations may be indicated by a tense difference, showing that one event happened first, then the other. The presence of a conjunction linking two clauses may make some 'time indicators' redundant.

Tense is not to be confused with time past, present, etc. nor with points in time. The speaker may arbitrarily define his own present time (about which he will use the present tense when he is talking) as a period infinitely extendable forward and/or back in his own perceptions of events, e.g. this week, this year, this decade, etc. where

the present moment is defined by the adverb. The present itself cannot be placed at any one point; it is only definable in terms of past and future time (cf. the philosophical issues in 2.1 above). Tense itself is used to differentiate different points in time, but it is not to be identified with 'areas of time', i.e. the past tense is not necessarily used to refer to past time, nor the future 'tense' to refer to future time (Lyons, 1968:305ff.). Secondary tense distinctions ('time-indicators') may be neutralized after conjunctions, i.e. the future modal and the past perfective need not appear after conjunctions like when (cf. 8.1, (40)).

In coordinate constructions, the second verb (after and, and then or and so) must be in the same tense as the first verb; the only exception to this, when the utterance is describing a sequence in time, is that if the first verb is in the past, the second verb may be in the present or future modal form:

- (18) i. He came in an hour ago and he is going upstairs.
 ii. He came in an hour ago and went upstairs.

If the first verb is present, the second verb may have a modal form, (referring to the future), or else indicate a later time by means of a future-referring adverb:

- (19) I have finished packing and I (will) leave (tomorrow).

If this tense sequence is not observed, it may not be clear that the speaker is indicating sequence in his description. If a coordinate construction is used, the events are generally mentioned in chronological order (cf. 5.11; 7.14; Table XII). This is true for 93% of the compound temporal descriptions in Data (i) and for 98% in Data (ii).

Events could be mentioned out of order in a coordinate construction only if the speaker were to use for, or but first (or but plus some other appropriate adverb indicating priority in time, e.g. earlier on). For never appeared in the present data, although there were a couple of instances of but used with a present tense in the first verb, and a past tense in the second verb, indicating (correctly in the context) that the events were being described in the order 2 - 1 (cf. 7.14).

In subordinate temporal constructions, the verb of the first clause makes a tense restriction on the verb of the second clause. I would suggest that, in fact, these co-occurrence restrictions are imposed after T-rel and T-embed have taken place (cf. Figure V in 8.1), whereby the subordinate clause is embedded into the node dominated by Adverbial in the matrix sentence. If the verb of the matrix is Past, for instance, this tense is automatically assigned to the verb in the subordinate clause. In addition, the conjunctions themselves (through their underlying prepositional features) exercise aspectual constraints. For instance, the conjunctions containing the feature [+Terminative] do not generally allow the occurrence of any verbs with the progressive aspect (be + ing) in the following subordinate clause:

- (20)
- i. He looked out of the window while they were getting out of the car
 - ii. *He looked out of the window until they were getting out of the car.
 - iii. He looked out of the window until they got out of the car (began to get out).

The [+Terminative] feature in the conjunction also restricts the

occurrence of stative verbs and adjectives in the subordinate clause.

(Stative verbs are generally distinguished by whether or not they can take the progressive aspect; only non-stative verbs may do so.

(Cf. further Lakoff, 1966).)

(21) i. *He became very strong after he was tall.

ii. He became very strong when he was tall.

The aspectual restrictions above never apply to coordinate constructions.

Chronological order of mention (5.11; 7.14 above) is not necessary in subordinate constructions because the conjunction itself indicates what the original order of the events in time was. There does seem to be a psychological preference, though, for a chronological order of mention whatever the construction (Table XII).

The tense rule is certainly observed by the children most of the time. On average, the same tense was found in each of the two clauses for 81% of all the temporal descriptions in Data (i) and for 96% of them in Data (ii). In a few instances in Data (i), a past tense verb was followed by a present tense one; this generally happened in coordinate rather than in subordinate constructions (7.14, 7.3 above). All the children in the study used both past and present tense forms, and also used the modal will, as well as such forms as I'm going to, to refer to the future.

9.3 A number of psychologists (notably Piaget, 1926, 1928; Werner and Kaplan, 1963) and linguists (e.g. Sechehaye, 1950:20ff.; Bally, 1944:53ff.) have suggested in the past that the ontogenetic development of linguistic relations progresses from (i) juxtaposition of two (or more) utterances to (ii) coordination of two or more utterances (parataxis), and finally to (iii) subordination of one or two

utterances to a main clause (hypotaxis). The linguistic distinction between (i) juxtaposition and (ii) parataxis has a somewhat unclear status. Juxtaposition has often been regarded as a form of coordination with intonational rather than conjunctive links between the different members of the construction. Tesnière points out that although coordination ('jonction') does not have to have coordinate conjunctions ('jonctifs') present, coordinate conjunctions mean that there must be conjunction (1959:82).

In the present study, one could certainly argue that the child goes through a stage of juxtaposition (cf. stage (1) in 5.2, and 7.21 above) before he begins to use coordinate conjunctions to join clauses. Coordinate constructions are used before subordinate temporal clauses appear. Thus, as far as temporal descriptions are concerned, the above proposal seems quite feasible. However, this is at the level of the clause or sentence; whether this ontogenetic sequence applies also at the level of the noun phrase (as Sechehaye implies), has not (to my knowledge) yet been investigated.

There are further objections to the more specific formulation of this hypothesis by some psychologists (cf. 4.4). Piaget (1926), for instance, claimed that all the relational terms are first expressed as and (or as but if there is the meaning 'contrary to expectation'). The different relations, i.e. time, cause, etc., are only later expressed by using subordinate clauses. The problem with this form of the hypothesis was that Piaget seemed to think that no subordinate relations appeared before the age of 5;0-7;0 years. It is quite clear, though, both from previous data (Chapters III and IV)

and from evidence in the present study, that children of 3;6 - 4;6 use both coordinate and subordinate constructions in their speech. It is, of course, quite possible that, at the same time, some adult concepts that are usually expressed with the same terms do not have the same meaning for the children at this early a stage.

Although the hypothesis about the ontogenetic development of linguistic relations appears to hold for descriptions of time, it is not possible to say that it is therefore confirmed. This is because it was proposed as applying to language as a whole while temporal descriptions merely make up a small sub-set of possible utterance-types. The generality of the hypothesis has yet to be proved. Also, the psychological form of this hypothesis needs revision since the children Piaget discussed, for instance, were already five years old. I suspect that the psychological claims may have been based on the lack of identity between the adult's concepts, of causality, for instance, and the child's. This has led to claims that the child does not have any concept of causality. However, although concepts in the early stages of language acquisition are not isomorphic with words, the structures that the child uses by the age of 3;6 or 4;0 appear to reflect at least a primitive notion of various relational concepts; in the present study, the children all appeared to know how to identify a point in time (by relating to some other -- simultaneous -- event) and many of them were able to relate points in time, that occurred in succession, to each other.

X Conclusion

10.0 We have seen that conjunctions containing unmarked features seem to appear before their marked counterparts (8.3 above), and the same is true for the simpler (vs. the more complex) constructions defined developmentally by the three principles (5.2; 7.1 above). I should like, therefore, in this connection to discuss the notion of marking derived from phonological theory (Trubetsky, 1939; Jakobson, Fant & Halle, 1955; Jakobson & Halle, 1956). I will then present a slight refinement of the original developmental hypothesis that I proposed in Chapter V.

10.1 Up to now, the notion of marking has been used chiefly in phonological theory (cf., e.g. Chomsky & Halle, 1968), and to some extent in morphology and semantics (cf. Greenberg, 1966; Vachek, 1966) where, for instance, the notion of 'neutralization' appears (cf. Bierwisch, 1967; Lyons, 1968:466-467). In addition, Mathesius (1928) studied the characterology of language, ascertaining the 'normal' forms for certain constructions which he then considered to be the more basic sentence-types, for example, in the language. The 'normal state' can be said to correspond to the unmarked form (Jakobson, 1957) whether this applies to word-order, to morphological endings or to phonological features.

In English, every clause is organized into theme and rheme. That is, the basis of the statement, known by the hearer from the previous context, followed by a 'new' fact to be communicated about the theme. Mathesius (1928) based his "functional analysis of the utterance" (cf. also Firbas, 1964b) on these types of relations, rather

than on grammatical units like subject, object, etc.: "In English sentences, accordingly, the theme of the enunciation is expressed as a rule by the grammatical subject and the central part of the enunciation actually [is] made up by the grammatical predicate. A definite, especially personal, subject is preferred to an indefinite one, and where there are two conceptions at hand which may be regarded as items of the prospective enunciation, that one is chosen for the grammatical subject which possesses more actuality" (Mathesius, 1928:59).

In English, the element which is selected as the theme by the speaker is assigned first position in the clause sequence. Where the clause is coextensive with the information unit (cf. Halliday, 1967a, 1967b), there is an association of theme-rheme with given-new. To borrow an example from Morton (1966:15):

- (1) i. I saw a house. The house was built by the man.
 ii. I saw a man. The man built the house.

where part of the rheme of the first sentence (underlined) naturally becomes the theme of the second. Compare (li) and (lii) with the rather odd effect in:

- (2) i. I saw a house. The man built the house.
 ii. I saw a man. The house was built by the man.

In (2), the rheme of the first sentence is 'displaced' from its expected position as theme of the second sentence in each pair. The information pattern is therefore 'given-new, new-given' instead of the 'given-new, given-new' found in (1). In Halliday's analysis (1967a), given-new may be a discourse feature while theme-rheme is not one: "The difference may be summed up in the observation that, in dialogue, 'given' means

'what you were talking about' while 'theme' means 'what I am talking about'; and, as is well known, the two do not necessarily coincide" (1967a:9). While information structures speech so as to relate it to the preceding discourse, thematization is relatively independent of what has been said earlier on.

Each sentence-type typically has an unmarked theme; for instance, the subject of the verb in declarative sentences. Marked themes are generally associated with a particular information structure in which the theme is isolated as a separate information unit. Therefore, in a clause made up of two information units, there is a tendency for the first to contain only the theme which is then 'glossed' by the second. Another name that has been used for the theme-rheme distinction in the above sense is topic-comment (cf. Hockett, 1958; Lyons, 1968: 334ff.). The tendency in English (with an unmarked theme) is to convert the expression of the actual theme into the grammatical subject of the sentence. This is seen in a characteristic feature of English, the frequent use of the passive (Svartvik, 1966) which has generally been regarded by Prague School linguists as a structural device for dissociating the agent and the theme (cf. Mathesius, 1928; also Halliday, 1967a, 1967b). Since the word-order in English is generally fixed, the subject of a clause usually precedes the predicate. Since the subject is strongly identified with the theme of an utterance, the order theme-rheme is usual too (cf. especially Firbas, 1964a, 1964b).

As I indicated above, in Chapter V, I have extended the notion of theme to apply to a whole clause within a composite

sentence¹. Thus, I would claim that the themes of the sentences in (3) are the following (underlined):

- (3) i. He ran away after he had knocked over the hydrangea.
 ii. After he had knocked over the hydrangea, he ran away.

Where a coordinate construction is concerned, the 'sentence adverbial' (e.g. then, therefore) following and is frequently the theme of the second clause, which, otherwise, seems to be independent of the first clause (unlike (3)):

- (4) He knocked over the hydrangea and then he ran away.

However, then in (4) is recapitulating the clause which precedes it, 'He knocked over the hydrangea', and therefore the first clause of the coordinate construction could also be taken as the theme of the utterance as a whole. This is possibly more evident in those constructions which do not have any 'sentence adverbial' introducing the clause after and. Note that in coordinate constructions, such thematization may only really be said to apply when the construction contains a temporal description, i.e. and has to have the meaning 'and + sequence', not and '&' (cf. 9.1 above).

10.2 From the ontogenetic point of view, the three principles proposed in Chapter V can be slightly reformulated in terms of marking for various syntactic and psychological distinctions. These distinctions should reflect the developmental sequence exhibited in the temporal descriptions (cf. 7.1). It may be that the number of marked forms

¹'Composite sentence' is used here as a term neutral between 'compound' and 'complex' sentences, but including both.

(vs. unmarked forms) are in some way allied to psychological complexity in language acquisition.

First, there are two types of marking which apply to sentence structure: (a) whether the construction is coordinate or subordinate (the latter being marked), and (b) a further distinction within the marked form: whether the subordinate clause follows or precedes the main clause. The latter is marked. These two distinctions give us the following matrix:

(5)		<u>coordinate</u>	<u>subordinate</u> ₂	<u>subordinate</u> ₁
	(a)	unmarked	marked	marked
	(b)	-----	unmarked	marked

The second distinction, (5b), is based on the evidence discussed in 5.12 above in support of the principle of derivational simplicity which distinguished between the sentences with the subordinate clause second, and those with it first (cf. also Clark & Clark, 1968, and 8.1 above).

As far as the principle of order of mention is concerned, the simpler order of mention (where it coincides with the chronological order: 1 - 2) is unmarked. This makes most of the coordinate constructions and the subordinate-clause-first constructions unmarked (cf. discussion in 5.11 above). This does not appear to have any direct bearing on the syntactic complexity of the constructions used to describe sequences in time. Nonetheless, it could be said to contribute to the unmarked status of coordinate clause constructions in temporal descriptions because of the general constraint that events are better described in chronological order. If they are not, it is not clear that a sequence is involved. The 'unmarked' order of

mention is preferred psychologically in a large variety of tasks; for instance, it seems to be far easier to recall (cf. studies cited in 5.11 above).

The theme (5.13) may also be unmarked or marked. Where a clause acts as the theme of an utterance, its unmarked form is the main clause in a complex sentence structure, or the first clause in a compound sentence structure. Hence, the choice of an unmarked theme coincides with the syntactically simpler derivational form (5.12), and may, at times, also coincide with the unmarked order of mention (5.11).

10.3 A look at all the data (in Chapters VII, VIII and IX) makes it clear that there is another factor that can be woven into the original hypothesis. Some slight refinement of the developmental sequence (5.2) is possible. Of the three principles, derivational simplicity is the only one that is purely linguistic. The other two, order of mention and choice of theme, might more appropriately be said to apply to 'discourse'. We have just seen, though, that, in terms of marking, the choice of an unmarked theme in a temporal description may coincide with the derivationally simpler construction (in complex sentences). These two principles, therefore, could be put together since they frequently coincide.

In my original hypothesis, I pointed out that if the second event in time were chosen as the theme, the child would probably use a construction with a subordinate clause second. Therefore, the choice of the second event as the unmarked theme 'triggers' the development of the subordinate clause constructions in their derivationally simpler

form. The additional factor here is that and cannot express the meanings of the subordinate conjunctions. Clearly, more than just sequence in time is involved in the use of when, because and if (the subordinate conjunctions that are first used by the children). If it were a question of sequence alone, and could just as easily be used. However, each of these conjunctions expresses some additional relation besides: sequence plus condition is expressed by if, sequence plus cause by because, and simultaneity in time may be expressed by when. Thus, the unmarked theme is usually the second event in the early subordinate clause constructions, but the additional factor involved in the choice of theme is the expression of a relation in time other than simple sequence.

If it were only a matter of the second event in sequence being chosen as the unmarked theme, then after should be one of the first subordinate conjunctions to appear in temporal descriptions. Similarly, where the unmarked theme is the first event, before should appear early on (where the principle of derivational simplicity also applies). After and before are two subordinate conjunctions that express pure time sequence (in contrast to when, because and if). The fact that these two conjunctions do not appear until well after the appearance of when, if, and because is additional evidence for the refinement that I am proposing in the principle of choice of theme.

Why, though, can and not be used whenever the first event is the theme? In the case of until, the first event is the unmarked theme, but the particular relation expressed by the conjunction could not be properly indicated by using and. Furthermore, until also seems

to come in later, after the appearance of when, if and because. This is true of twelve of the protocols, in eight of which it is not used at all, and in four where it only appears after when and because, and sometimes after if as well. The other three protocols show until already being used together with when, if and because so no developmental sequence is discernible.

To sum up, in his earliest temporal descriptions, the child will choose and to express sequence, but later on he may choose the second of two events as his (unmarked) theme in combination with a particular time-relation such as when, if or because. This choice automatically requires him to use the derivationally simpler form of complex sentence. The principle of choice of theme has been slightly refined: it also involves the choice of a time-relation more specific than that supplied by and.

In discussing the three principles in terms of marking and in looking at the first temporal subordinate conjunctions that appear in the children's speech, we must remember that there are at least two levels of marking that interact here. The three principles define the unmarked forms of various syntactic constructions while the individual conjunctions are also unmarked or marked according to the various features they contain (Chapter VIII). The marking in the conjunctions predicts which ones should appear in which sequence and the three principles predict which kinds of syntactic construction will be used first. The order of appearance predicted by the three principles, though, also seems to apply to each conjunction individually; for instance, when always appears in second position before it appears

in first position in an utterance in each of the protocols. This seems to be true for all the subordinate conjunctions that have been looked at in these data.

10.4 In this chapter, I have suggested that marking may reflect psychological complexity, and that differing degrees of markedness (or difficulty) should be a reasonable predictor of language development. There are, however, many different kinds of marking which may apply phonologically, morphologically and lexically as well as syntactically. In this study, we have seen how some lexical and syntactic forms of marking interact in the development of particular constructions in the child's speech. However, we are still far from knowing how all the different forms of marking interact psychologically and how their interaction affects language acquisition as a whole.

The forms of marking that I have mentioned here are only meant to account for a particular subset of the composite sentence structures used by the children. This subset consists of the descriptions that can be used for temporal sequences: events are linked by the basic relations 'simultaneous with', 'before' and 'after' in time. Since the linguistic descriptions of these phenomena (the relations in time) go through a clear developmental sequence (7.1 above), I think that more phenomena of this type should be studied from the point of view of language. For example, there is very little known about the development of deixis in children's speech although psychologists have looked at some aspects of pronoun-use (as in some of the egocentricity measures; cf. Piaget, 1926). There are many sets of relational terms besides the temporal ones that I have looked at here,

e.g. spatial and degree, that have yet to be systematically investigated from the linguistic point of view. A number of studies are needed to pin-point periods of rapid development and change in the child's use and understanding of various terms.

One study that has attempted to do something similar to this is Donaldson and Wales' (in press); this study looks at how 3;6 - 4;0 year-olds use comparatives like more-less, same-different, bigger-wee-er, etc. The children appear to use the unmarked term (more, same, bigger) earlier than the marked one. In addition, the marked term, initially, appears to have the same meaning for the child as the unmarked term. A somewhat similar phenomenon occurs when the child first uses temporal adverbs (cf. Chapter III above).

Most language studies have looked at development without considering the linguistic function of the different constructions that the child is beginning to use. By finding out what lexical items and constructions mean in a functional way to the child, we can find out more about the development of various relational concepts in the child's mind, and also more about the relation between language and the concepts it is used to express.

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