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COGNITIVE LEVELS AND PRODUCTION OF THE PASSIVE VOICE SENTENCE

by

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ABSTRACT

Reversible operational schemes as described by Piaget were studied in Kindergarten and Grade I children's production and comprehension of the passive voice sentence. From the responses to three conservation tasks: elementary number, matter, and length, 18 non-conservers, 16 transitional conservers and 14 conservers indicated the presence of three passive voice forms: Transitional, Conceptual, and Syntactical in their production responses. Analysis of production scores demonstrated that the levels of production of passive voice forms corresponded to the children's cognitive levels. On the comprehension tasks, scores indicated a tendency for the comprehension of passive voice sentences to correspond with only the lower cognitive levels. As expected, on identification tasks comprehension of neither the active or passive voice sentences correlated with cognitive levels.

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CHAPTER 1

Introduction

Within the past decade, language and language development have not been studied in isolation but, as McNeil (1970, p. 72) observed from his extensive review of literature, language studies are increasingly relying on theory and empirical evidence drawn from the cognitive area, Bruner (1966), Chomsky (1966), and Whorf (1956) have provided impetus for this trend. Sinclair de-Zwart (1964) pointed out that in the terms "cognition" and "language," cognition precedes language for a basic reason, namely, to indicate that cognitive development is a prerequisite to linguistic development. This trend implies a recognition of the fact that structures of thought influence structures of language. This study focused on the relationship between reversible operations as defined by Piaget's theory and the syntactical structure of the passive voice sentence.

Research in the area of both language development and of Piagetian theory indicated that, at approximately ages five to six, a change in the young child's thinking processes becomes apparent. In language development this change is reflected in the child's ability to understand and use certain linguistic structures. The literature suggests that the child comprehends linguistic features before he can actually produce them spontaneously. For example, among five- to seven-year-olds, reports indicated that younger subjects comprehended the passive voice sentence in identification or imitation-type tasks, but found it more difficult to produce the passive voice sentences either verbally or in action.

According to Piaget's theory, at approximately ages five to six, the child relies less on sensorimotor and perceptual content, and more on representational and abstract content. This newly-developing awareness may be observed in the manner in which the child handles conservation tasks. The concept of conservation implies the logical necessity of using relevant past information in making a present judgement. The evidence from research in language development and cognitive development implies that the child's ability to use complex sentence patterns appropriately coincides with his ability to deal logically with past and present events in his environment. It can be argued, therefore, that the operations involved in comprehending and producing the passive voice sentence are not unlike the operations characteristic of conservation, specifically, reversibility. This study investigated the necessity for the attainment of reversible operations for the production of the passive voice sentence.

Cognitive Theory

Reversible Operations

The development of operational schemes as described by Piaget begins with the sensory motor period. During infancy, the functioning of the operational schemes is limited to sensorimotor content, that is, the cognitive structures are action schemes with no internal representation. With the onset of language, the external can be represented internally but the schemes are not yet reversible. Rather, the child's thought is preoperational or prelogical. Hence, the two- to six-year-old

characteristically describes objects and events as he sees them at the present moment, not as they are or were a few minutes previous. In addition, he is capable of seeing them only from his point of view (egocentricism). Furthermore, he considers only one aspect or dimension of an object at a time, for example, a bead is either yellow or wooden. He cannot understand that it can be yellow and wooden at the same time.

Concrete operational thought develops at about six or seven years of age. The child's operational schemes now become reversible; that is, in judging the present event he can take into account what the situation was before it was transformed. Hence, he can describe the reality and not just the present appearance. For example, if a ball of clay is flattened into a pancake, he will state that the amount of clay has not changed, it is just in a different shape, and he will prove it by rolling the pancake back into a ball. He can thus reverse his thinking and be said to conserve the amount. Furthermore, this child can consider two dimensions of the object simultaneously and indicate that the breadth of the pancake compensates for the height of the ball. In the identical situation, the preoperational child would describe only what he sees after the transformation and would describe it in terms of only one dimension. Hence, he would say either there is more clay in the pancake because it is bigger than the ball, or there is less clay in the pancake because it is not as high as the ball. Though the concrete operational child can think reversibly, his thought is limited to operational schemes that can be demonstrated through concrete manipulations. This behavior

is illustrated in the conservation of liquids experiment in which, to prove that the quantity of water remains the same, this child needs to pour it back into the original container.

Though the essential characteristic of a reversible operation is the ability to recognize the constant amid transformations, Piaget describes three forms of its expression. The first form generally evident in children's thinking involves the maintenance of the identity element. For example, a child will justify his recognition of identity by saying "We haven't added or taken anything away." The second form involves reversibility by inversion; for example, "You have only got to roll up the sausage and you'd see there's the same amount to eat." The third and the latest appearing form is reversibility by compensation of reciprocal relationships; for example, "We haven't added or taken anything away."

Conservation Concepts

Concepts of conservation in general, and conservation of physical quantities in particular, indicate the presence of underlying operational systems characterized by transformational properties. Their acquisition is attested to by the appearance of astonishingly similar arguments (i.e., identity, compensation by reciprocity and cancellation through reversibility). The particular interest of conservation tasks is the fact that they elicit judgements and arguments expressing these forms of reversibility. The three stages found in the development of the concepts of conservation are generally described in the following manner. The first stage is characterized by a number of answers and arguments indicating

an absence of conservation. In the second stage, responses of an intermediate type take the form of vacillation indicative of a semireversible operational understanding. True conservation is acquired in the third stage at which time reversibility by compensation and inversion are evident.

The essence of conservation concepts lies in the understanding that a certain quantitative property remains unchanged during transformation and that acquisition is in a constant chronological order. Research at Geneva (Piaget and Inhelder, 1941) has shown that children acquire the conservation concepts in the following order: discontinuous quantities, continuous quantities (liquids, solid matter such as modeling clay), and then length. The standardization studies undertaken in Geneva (Inhelder, Bärbel, Sinclair and Bovet, 1974) and by other researchers in various countries confirm this order, although the actual ages at which children acquire these concepts may vary with differences in individual capacities, in educational standards and in cultural environment. However reversible operations emerge through the conservation tasks in a relatively constant sequence. It has been found (Inhelder, Sinclair and Bovet, 1974; Costello, 1974) that specific conservation tasks, i.e., elementary number conservation (small collections), conservation of quantity of matter, and conservation of length, applied to a given population establish subject groupings corresponding to the three response stages.

The common characteristic of the first stage, in which children do not have the concept of conservation of quantity, is that they focus

either on the action carried out (for example, flattening of the modeling clay) or on the resulting appearance of the material. In the elementary number conservation problem, it is the change in position of the counters, resulting in a "longer" line, that causes the difficulty. In the conservation of length problems it is the tendency to make ordinal judgements based on ideas of going beyond, overtaking, etc. Such children neglect the fact that the final appearance of the material is determined by the action which brought about the change.

The responses of the intermediate stage are generally characterized by vacillation between nonconservation and conservation arguments. It is this stage that marks the point in development whereby the child begins to establish relationships between some of the features of the experimental material. Initially, these relationships are partial and are restricted to a few features only. In elementary number conservation, understanding of numerical correspondence may be acquired at a level corresponding to that of quotity, which Greco (1962) describes as constituting a semioperational scheme quite distinct from the concept of numerical quantity, but more advanced than the total irreversibility that precedes it. Similarly, a semioperational understanding of continuous quantities can be acquired before an understanding of the multiplicative relationships between the dimensions of the flattened clay and the elongated sausages is achieved. For example, if a child thinks that there is more modeling clay when it is made into a sausage, "because the sausage is longer," he has noted, apparently, the initial dimensional equality of

the two quantities of clay, and their subsequent inequality, but has failed to relate the two comparisons.

Also characteristic of the intermediary stage is the child's apparent capability of mentally returning to the starting point of the experimental situation. The child predicts that there will once again "be just as much to eat" although he judged that at present the quantity (of clay) has increased or decreased as a result of the change in shape. According to Inhelder (1974, p. 33) this type of judgement is called "empirical reversibility," i.e., it permits the possibility of an effective return to the initial state, to distinguish it from logical reversibility. The main difference between this reversal and logical reversibility is that, although the return action is the inverse of the transforming action, it neither cancels out this transformation nor compensates for it. It is merely a second action which, for the child, is completely independent of the first. Piaget (1970) elaborates upon this idea of a possible inverse action as being a system of a semilogical nature. Apparently the child establishes a series of one-way relationships of the type $y_1 = f(x_1)$ where x_1 is the action of lengthening the clay ball, y_1 is the decrease in thickness and f = the functional relationship between y_1 and x_1. The child then establishes $y_2 = f(x_2)$, where x_2 is the inverse action of flattening the sausage into a ball and y_2 is the reduction in length. At this level, however, these two covariations, or functions, are still envisaged successively and are not yet coordinated into a single system which will transform the covariations of dimensions into compensations between dimensions.

The semilogical system of one-way dependencies does not yet involve quantitative invariants, but only an idea of qualitative identity. At this point, the child in unable to distinguish between certain invariant and variant properties of an object. For example, the child will reply that "it's the same clay" even though he judges that the quantity has increased or decreased. For the child of this level, the permanent properties of objects are qualitative in nature and are observed directly, whereas for the child with reversible operations, quantity is conserved. Because of the inability to coordinate the actions, the intermediate stage child might keep changing his mind in one situation, or he might answer correctly in one situation and wrongly in another equally difficult situation. Inhelder et al (1974) report that prediction of which questions or experimental situations will elicit correct or wrong answers is impossible.

At the third level, the child maintains conservation of quantity and justifies it by arguments based on logical identity, reversibility by cancellation of the change, and by compensation between dimensions. The latter argument is based on an understanding of the reciprocity of the relationships, for example, every increase in length implies a corresponding decrease in thickness.

For the concrete operational child, every action has two aspects (Piaget and Garcia, 1971): it has a material result, which constitutes its causal part, and it requires very general coordinations, which constitutes its logical part. Piaget remarks (Piaget and Garcia, 1971) that the lack of true reversibility of the semilogical structures is due to

the primacy of causal actions over deductive operations. In addition, it has been found (Inhelder, Sinclair and Bovet, 1974, p. 34) that there is undoubtedly a continuity from the semilogical and qualitative identities to logical operations and conservation of quantities.

Concepts of conservation, therefore, are generated by logical systems of mental operations and are governed by very regular laws of development. These concepts are neither preformed in the child nor axquired by means of simple observation of real events, but are the product of a process of equilibration which effects development from irreversible to reversible operational schemes. The original conservation studies (Piaget and Inhelder, 1941) revealed that the child's initial understanding of conservation is based on a general undifferentiated concept of invariance which provides the basis for subsequent, more specific, quantifications and measurements.

Development of Syntax: The Passive Voice

In reviewing the literature on the development of syntax, a striking correspondence emerges between the age at which the child demonstrates reversible operations and the age at which he can produce a passive voice sentence. Only the four aspects of language development research that refer directly to this relationship are reviewed.

First, prior to 1960, a major portion of language development research concentrated on syntactic development in the two- to five-year age period. Since 1968, researchers (McCawley, 1968; Chomsky, 1969) have suggested that later language development is equally as basic and certainly warrants study.

The second aspect is that comprehension of language features occurs earlier in development than does production of the same features (McNeil, 1966). Evidence from empirical research and observational studies verify this claim (Fraser et al, 1963; Kessel, 1970; Turner and Rommetveit, 1967). In addition, the majority of studies was devoted to children's production rather than to their comprehension of speech. This was attributed to the unresolved methodological issues surrounding the study of comprehension. Until the ICP (Imitation, Comprehension and Production) Test (Fraser, Bellugi and Brown, 1963) was generally adopted, the lack of methodological clarification limited the empirical information describing the comprehension of speech.

The third aspect concerns methodology which subsequently has been employed in language development research. Three methods appear in the literature: 1) naturalistic observation (the sampling of the child's speech in households (Brown, 1969), 2) traditional experimental situations employing standardized techniques, such as the ICP Test or modifications thereof (Menyuk, 1963; Slobin, 1966a), and 3) Paiget's clinical method (Kessel, 1970).

Fourthly, the apparently increasing interest in relating linguistic development to intellectual development (Sinclair-deZwart, 1967; Slobin, 1966) has become a controversial issue.

With regard to the first aspect, research, such as that by Chomsky (1969) and many others, demonstrated a certain number of sentence patterns which children do not master until the age of eight or beyond. Sentences that depart from the actor-action-object pattern and sentences in which

the description of events does not follow their actual temporal succession, continue to be incorrectly understood and avoided in production. Though contentives have acquired a stable meaning and operator-like words have been introduced, the child's speech still seems to resemble the relationship between the linguistic representational model and reality. In particular, the child seems to equate order properties of the linguistic model with properties of the events and objects described. Beyond the age of eight or nine, children no longer exhibit this general tendency. Confirmation of these findings was obtained by Kessel (1970) and Cromer (1970). Kessel, using the "clinical method" of Piaget, obtained similar age norms for the easy/eager distinction. For example, in "John is eager to please," it is apparent that the perceived subject and the logical subject coincide, i.e., John is the actor. But in "John is easy to please," the perceived subject is not the logical subject, i.e., someone other than John does the pleasing. Cromer (1970) investigaged the sentence "John is easy to see" and found that only children with a maturational age of almost seven years were able to recognize the grammatical structure of the apparent subject, "John".

In respect to the second aspect, observational study and empirical research have reaffirmed the notion of the child's comprehension of linguistic features preceding spontaneous production (Flavell, 1963; McNeil, 1966; Piaget, 1953; Sinclair-deZwart, 1969; Turner and Rommetveit, 1967). Sentence structure is one linguistic feature in which the child's comprehension can be observed to precede production. An example is the

expression of active as opposed to passive voice, which involves a distinctly different sentence order.

Investigations of spontaneous speech (Leopold, 1953) report the late appearance of the passive voice sentence in language development. Harwood's (1959) observational study of preschool children found no occurrence of the syntactical passive voice-sentence in spontaneous speech of children with an average age of five years, eight months. (A sample of 12,700 spontaneous utterances were analyzed.) The past-participle form was used, that is, "It's broken," or "It's hurt." Additional observational studies (Kahane, Kahane & Saporta, 1958; and Slobin, 1966b) suggested that the passive voice sentence structure has not been observed until after seven to eight years of age. Correspondingly, Menyuk (1963) found that 14 out of 14 nursery school children could repeat the passive, while only 5 of these spontaneously produced passive voice forms. Fraser, Bellugi, and Brown (1963) using imitation, comprehension and production tasks, found that three-year-old children were correct only one-half of the time on their imitations of reversible passive-voice sentences. On tasks of comprehension and production very few subjects responded correctly to the passive voice sentences. Apparently, imitation of the passive voice sentence precedes its comprehension, which in turn, precedes its production in the tasks employed.

Another study employing the ICP Test (Turner and Rommetveit, 1967) investigated 48 children at five age levels (nursery school, 4.32 years; kindergarten, 5.87 years; first grade, 7.00 years; second grade, 8.11 years; and third grade, 9.00 years) for their ability to imitate,

comprehend and produce active and passive voice sentences which were reversible and nonreversible. Three relevant points emerged from this study. First, on ICP tasks, significantly more errors were made in the processing of the passive voice than the active voice sentences and in the processing of reversible than in the nonreversible sentences. Second, errors frequently involved the inversion of actor and acted-upon elements in both reversible and nonreversible sentences. Third, a developmental trend was apparent for the experimental tasks. The imitation task was relatively easy for even the youngest subjects. The comprehension task presented difficulties for the nursery school and kindergarten children, and the production task was the most difficult for the nursery school, kindergarten and grade one subjects. The difference in the degree of difficulty in these experimental tasks coincided with that reported by Fraser et al (1963). The fatigue factor would seem to have been rather unlikely as the experimental session lasted only about seven minutes. In addition, any effect of practice from the first to the last task would have tended to make the final task easier, which was not the case. In another study, Brown et al (1969) controlled for order of presentation and still found a marked effect due to tasks. An alternative explanation must be sought to explain the order of difficulty of these experimental tasks. Furthermore, it has been reported (Bem, 1970; Hayhurst, 1967; Huttenlocker, 1964; Slobin, 1964, 1966) that, among five- to seven-year-olds, the younger subjects comprehended the passive voice sentence in identification- or imitation-type tasks, but found it more difficult to produce the passive voice sentence either verbally or in action. It

appears that the type of task and the age of the child are variables in the comprehension and production of the passive voice sentence.

The third aspect noted earlier involved a discussion of the methodology prevalent in language development research. A review of the literature indicated that the ICP Test has been acknowledged as one of the acceptable methods for studying the emergence of linguistic features. In this test comprehension is operationalized as the correct identification of pictures named by contrasting sentences. For example, the experimenter says, "Here are two pictures, one of a boy pushing a girl, and the other of a girl pushing a boy," with care being taken not to show which picture goes with which sentence. The child is then asked to point to the picture that illustrates one of the sentences: "Show me the picture of... 'The girl is pushed by the boy'." The test of production begins in the same way, but instead of asking the child to point to the picture corresponding to a sentence, he is asked to furnish a sentence for a picture. Production was operationalized, therefore, in two ways: (a) the correct imitation of contrasting features in sentences without evidence of understanding and (b) the correct production of contrasting features in sentences applied appropriately to pictures. Production, in the second sense, proved to be less advanced than comprehension in the 12 three-year-old subjects in the study of Fraser et al (1963). Production in the sense of imitation was more advanced than comprehension. The subjects processed each passive voice sentence as though it were in the active voice. For example, in the sentences, "The girl is pushed by the boy," and "The boy is pushed by the girl," the subjects gave an

incorrect response that perfectly preserved the form of the sentence, but exactly reversed the correct patterns of application to the pictures.

Slobin (1966) performed an experiment with subjects aged six, eight, ten, twelve and twenty years in which the truth of sentences had to be judged against pictured scenes. The pictures presented situations which were either reversible in that the object of the action could also serve as the subject, or nonreversible in that the object could not normally serve as the subject. A picture of a dog chasing a cat or a boy pushing a girl depicted a reversible action, whereas a nonreversible action was depicted in such pictures as "a girl watering flowers" or "a boy raking leaves." Slobin expected and found that verifications were less accurate and took longer with passive than with active voice sentences. The problem of verification was simplified in the nonreversible picture in which the subject could be only the logical performer of the action, and the object, the logical recipient of the action. Aside from the fact that errors considerably diminished with age, differences between age groups were not significant. It appears necessary, therefore, to work with still younger subjects if age differences are to be demonstrated.

Hayhurst (1967) studied the efforts of three groups of subjects, aged five, six and nine years, to produce true passive and passive-negative sentences as descriptions of pictures. Production was measured by an imitation-type task in which the subject first repeated model sentences describing the set of pictures. The subjects were then required to "Make up a sentence about this picture which is exactly like these ones we did together." The sentences were passive and passive-negative,

with or without expressed actors; the subject and object in the former being either reversible or nonreversible. The results indicated that errors in construction declined with increasing age and were fewest in sentences without expressed actors. The most common error was to change the passive sentence into its active form. The younger subjects tended to have problems with both comprehension and production, whereas among the older subjects problems were primarily with production. Comprehension tasks, therefore, tended to take the form of picture-sentence recognition tasks and/or imitation-type tasks requiring verbal repetition. Production tasks usually involved the use of visual prompters to elicit a verbal response. Furthermore the assertion that understanding precedes production was taken to mean that some utterances were ordinarily comprehended before any utterances were produced. There is strong empirical support for this contention if production of an appropriate response is accepted as evidence that an utterance has been understood. Fraser et al (1963) suggested there were only two kinds of appropriate response reported common for children: (a) when an utterance made a reference, the child sometimes identified the referent and (b) when an utterance was intended to be an imperative, the child sometimes performed the designated action. In both cases the stimuli are verbal with the response being either verbal or physical. In the studies discussed, there were no tasks in which the child described a physical action, or performed a physical action other than pointing.

The techniques introduced by Huttenlocher, Eisenberg, and Strauss (1968) for the study of comprehension required the placement of one object relative to another stationary one. The comprehension of active and passive statements by 48 fourth grade boys and girls was assessed with this technique. One situation involved the manipulation of a moveable truck relative to one in a fixed position. Comprehension was assessed by the correctness of the subject's response to a statement such as, "The red truck was pushed by the green truck." Analysis of the results indicated the occurrence of longer reaction times and more errors in situations requiring the subject to place the moveable truck in response to a passive voice statement. Apparently, comprehension was easiest when a correspondence existed between the perceived actor in the situation and the logical subject of the experimenter's statement. This was consistent with previous studies showing that passive voice statements tended to be more difficult to comprehend than active voice statements (e.g., Slobin, 1966).

Finally, the fourth aspect in which apparent interest in relating linguistic development to cognitive development was considered, the research indicated that at approximately age five, a change in the young child's problem-solving behavior becomes apparent (Bem, 1970; Huttenlocher, Eisenberg & Strauss, 1968; Weir, 1964). This change was reflected in his ability to understand and use certain linguistic structures in task-oriented situations. Huttenlocher and Strauss (1968) indicated that the child's ability to use complex sentence patterns appropriately coincided with his ability to deal logically with events in his environment. Thus, the research by

Huttenlocher and Strauss (1968) suggested that the young child did not understand a relational statement unless the grammatical subject of the instruction corresponded to the logical actor in the external situation. For example, when the block that the child was asked to place was the grammatical subject of the sentence, the two corresponded, and the task presented no problem. However when the block that the child was asked to place was the grammatical object of the sentence, this correspondence was absent, and the child seemed unable to comprehend the meaning of the instruction. Once again, the results indicated that nursery school children, aged 4½ years, were less proficient than first graders, aged 6½ to 7 years, when confronted with tasks assessing the comprehension of the passive voice sentence.

In summary, the following four points are relevant to the perspective of the present study. First, sentences that depart from the actor-action-recipient pattern, and sentences in which the description of events does not coincide with their actual temporal succession, continue to be misunderstood and avoided in production until the age of eight or beyond. Second, the notion that comprehension of the passive voice precedes its production has been reaffirmed from observational studies, as well as in experimental research. Third, the age-related patterns of response which have emerged from the tasks of imitation, comprehension and production are suggestive of the development of an underlying cognitive operation. Fourth, the occurrence of the young child's ability to use complex sentence patterns appropriately, coinciding with his ability to deal logically with events in his environment, is reflected by a change in his