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ABSTRACT

The purpose of this study was to examine the effects of varying the semantic content of active and passive sentences along a dimension of "personalness" on the comprehension of those sentences by preschool age children. The study focuses on a current linguistic controversy dealing with the relative adequacy of syntax-based and semantics-based theories of linguistic competence, evolving an hypothesis of "adaptive egocentrism" based on Piaget's theories of language development and preoperational thought. The subjects--homogeneous with regard to economic status, heterogeneous in race with non-white subjects distributed across age and sex groups--consisted of 120 children selected from five nursery school day-care centers in Ypsilanti and Ann Arbor, Michigan. Two experiments are reported in this study. Both lend support to the "adaptive egocentrism" hypothesis proposed by Piaget. (RB)

SEMANTICS, SYNTAX, AND SENSE:

TESTING AN "ADAPTIVE EGOCENTRISM" HYPOTHESIS

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The purpose of the present study is to examine the effects of varying the semantic content of active and passive sentences along a dimension of "personalness" on the comprehension of those sentences by preschool age children. The study focuses on a current linguistic controversy dealing with the relative adequacy of syntax- and semantics-based theories of linguistic competence, evolving an hypothesis of "adaptive egocentrism" based on Piaget's theories of language development and preoperational thought.

Syntax-based linguistic theories, exemplified by Chomsky [1957, 1965] and the generative grammarians [e.g., Lenneberg, 1967; Katz & Postal, 1964], conceptualize the meaning of sentences [SLIDE 1] as deriving from their underlying grammatical relations which are considered innate and universal. Such theories would predict that sentences of identical deep and surface structures will be equally well understood regardless of semantic content as long as selectional restrictions are observed and vocabulary is controlled. Sentences of similar deep structure but varying surface structures--for example, active and passive forms--will be equally well understood only if the learned transformational rules are controlled.

Semantics-based theories, such as those proposed by Lakoff [1969] and McCawley [1968], agree with the transformational nature of language, but

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[] Brackets indicate supplemental information, not to be read.

argue that the underlying base is semantic rather than syntactic, originating with a proposition or intention. Various writers in this school have also argued with the rigidity of Chomsky's notions of selectional restrictions and ordered transformations. The semantic-based position would predict that semantic variations and extralinguistic factors could systematically influence comprehension, although specification of relevant semantic factors has been limited.

Slobin [1966] demonstrated that the semantic feature of reversibility of sentences influenced the ease with which children could respond to a picture-verification task. While Savon and Perchonak [1965] and others had shown active sentences to be easier to process than passive sentences, Slobin's subjects had no more difficulty verifying non-reversible [SLIDE 2] passive sentences than actives. The expected differences in performance between active and passive sentences were only observed with reversible sentences; that is, sentences in which either noun could logically be the actor.

Slobin also observed that true negative sentences were much more difficult to verify than false negatives. Others [e.g., Gough, 1966; Hayhurst, 1967; Herriot, 1969] have confirmed the effects of variations in the semantic features of reversibility and veracity in sentence processing performance.

In the present study, a dimension of "personalness" was explored as a relevant semantic feature. Personal sentences [SLIDE 3] describe a parent-child interaction utilizing the subject's name and his own parental labels as the nouns. Impersonal sentences contain familiar--that is, easily identified--human and animal characters as nouns. This personal dimension was

selected on the premise that one could extend Piaget's construct of egocentrism, as well as his position on language and thought, to make predictions of preoperational children's performance on the present task.

Egocentrism research has focused on the inability of the child to perform cognitive tasks because of the saliency of the child's own perspective. Typical of this research has been Piaget's [1955] observations of children's language behavior, and the work on spatial relations tasks by Piaget & Inhelder, 1956). This focus on the non-adaptive aspects of egocentrism, however, may not fully describe the intellectual development of the child. Since Piaget's general position is that development is adaptive, preoperational egocentrism may serve an adaptive function for a limited period of the child's development. My hypothesis then is that maximizing the opportunity for a child to bring his own perspective to bear on the solution to a cognitive task will maximize his ability to assimilate the requirements of the task to his existing cognitive structures. In the context of the present investigation, the child's ability to cognize the meaning of a stimulus sentence dealing with himself will be greater than his ability to cognize the meaning of similar sentences dealing with others, even when the "others" are familiar characters which he can readily identify.

The present sample consisted on 120 children selected from five nursery school - day care centers in Ypsilanti and Ann Arbor, Michigan. Ten boys and 10 girls in each of six age categories, ranging from 2-1/2- to 5-years, were studied. Subjects were homogeneous with regard to economic status, heterogeneous in race with non-white subjects distributed across age and sex groups.

Subjects were required to select the one of a pair of drawings [SLIDE 4]

which corresponded to a stimulus sentence. Example Each child was given four Personal, four Impersonal-Human, and four Impersonal-Animal reversible sentences half of which were passive. Personal-item drawings were sex-appropriate. All nouns were pretested for ease of identifiability. Verbs, appropriate for either human or animal nouns, were constant across semantic conditions.

Results of a four-factor ANOVA [Slide 5] indicated that Personal sentences were significantly better understood than either type of Impersonal sentences which did not differ. The next slide [Slide 6] shows this difference quite nicely. This observation was true for both transformationally simple, that is, active, and complex, or passive, sentences. [Back to Slide 5] Active sentences were better understood than passives, and younger children generally performed more poorly than older children. No differences associated with sex were observed, and none of the variables interacted significantly with each other. More detailed examination of the Age by Syntax interaction, however, revealed [Slide 7] a significant quadratic trend, or "dip", in response to passive sentences around age 3 1/2, replicating a finding reported earlier by Bever [1970], supporting his theory that 3-year-olds equate Noun-Verb-Noun with actor-action-acted upon regardless of voice.

While these results would support the proposed "adaptive egocentrism" hypothesis, a second study was conducted to rule out an alternative hypothesis of "focusing of attention." Turner and Rommetviet [1967, 1968] reported an improvement in children's production and comprehension of passive sentences when their attention was focused on the acted-upon--that is, the logical object--as a stimulus. Huttenlocher, Eisenberg, and Strauss [1968] reported differences in reaction time in response to passive voice instructions in a

toy placement task depending on whether the child was holding the actor- or acted-upon toy. Tannenbaum and Williams [1968] reported similar attention-focusing facilitation in the production of passive sentences by adults.

Since studies in selective attention--for example, Broadbent's 1962 report in Scientific American--suggest that a subject's name is a strong attention-getting device, the results of the first experiment might be attributed to the presence of the child's name in Personal sentences.

To explore this possibility, 36 of the children (six at each age level) were retested on a revised form which contrasted Personal items [SLIDE 8] which had a high probability of occurence in subjects' lives with low probability items which described either the child or familiar unrelated human characters interacting with animals. Nouns from Experiment I were rearranged to form possible, but improbable, items.

Results of Experiment II [SLIDE 9] replicated the original study with significant main effects of Age, Semantic Conditions, and Syntactic Form. Sentences describing interactions [redacted] with high probability of occurence were better understood than those with low probability, regardless of the presence of the subject's name. These results suggest that a perceptual-based "focusing of attention" hypothesis cannot account for superior comprehension of the Personal sentences in the first study. General familiarity, indicated by ease of identifiability, is also unable to account for this outcome since all nouns in both studies were familiar. It appears that direct experience with sentence content is a necessary condition for improved comprehension, supporting the cognitive-based "adaptive egocentrism" hypothesis. Furthermore, these results provide additional empirical evidence for the

reality of a semantic base for linguistic competence and identifies another relevant semantic feature.

While additional exploration into the nature and extent of item personalization is needed--for example, items dealing with parents or siblings rather than subject--the methodological implications of the present research, particularly for developmental psychology, should be considered. The definition of constant stimulus was extended here to include constant relationship of stimulus to subject rather than an absolute constant. Research strategies which personalize the stimulus for the child may well be the key to understanding the transition of the child from one stage of cognitive development to another.

Finally, the implications of these results for educators should not be overlooked. The observation that children comprehend sentences relating to themselves in situations which occur in their real world suggests that "relevance" may be more than a mere ideological abstraction. Although further research is certainly needed to determine the generalizability of the present results, they do suggest that training for the development of cognitive skills--for example, reading--may be facilitated by the use of "personal" learning materials with less emphasis on the story book lives of Dick and Jane.

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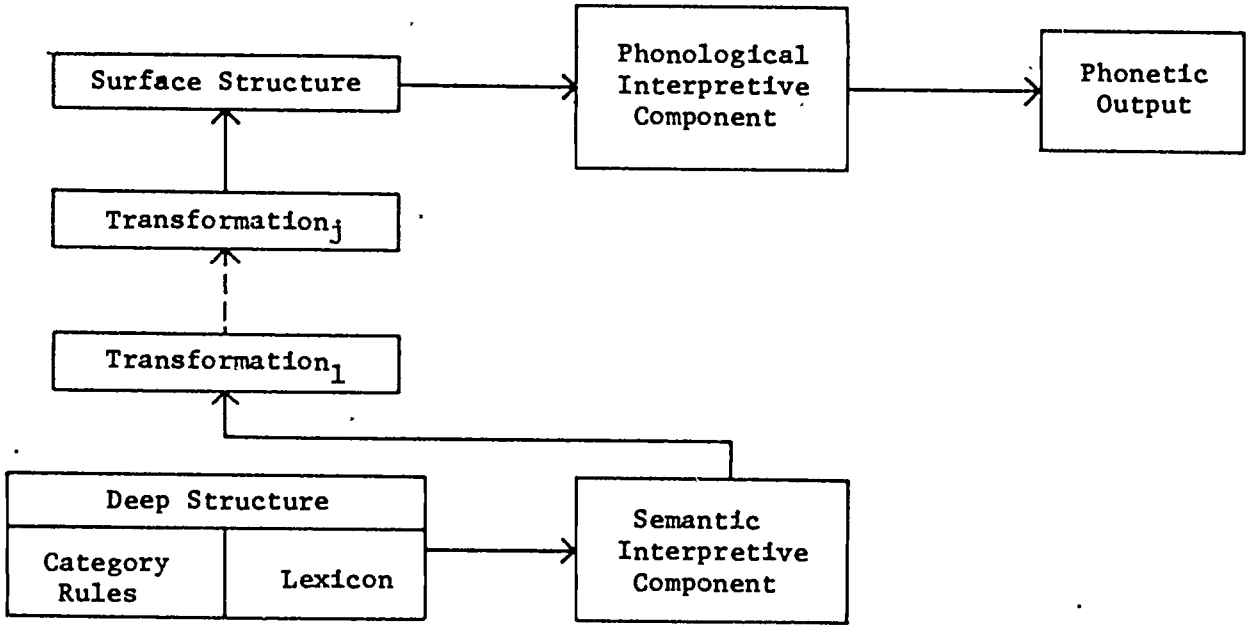


SCHEMATIC DIAGRAM OF PROCESSING PATH OF A SENTENCE ORIGINATING IN DEEP STRUCTURE AND EMERGING IN PHONETIC OUTPUT

(Adapted from Chomsky, 1972)

SENTENCE FORMS

	REVERSIBLE	NON-REVERSIBLE
ACTIVE	The girl chased the boy.	The girl watered the flower.
	The boy chased the girl.	*The flower watered the girl.
PASSIVE	+The girl was chased by the boy.	*The girl was watered by the flower.
	+The boy was chased by the girl.	The flower was watered by the girl.

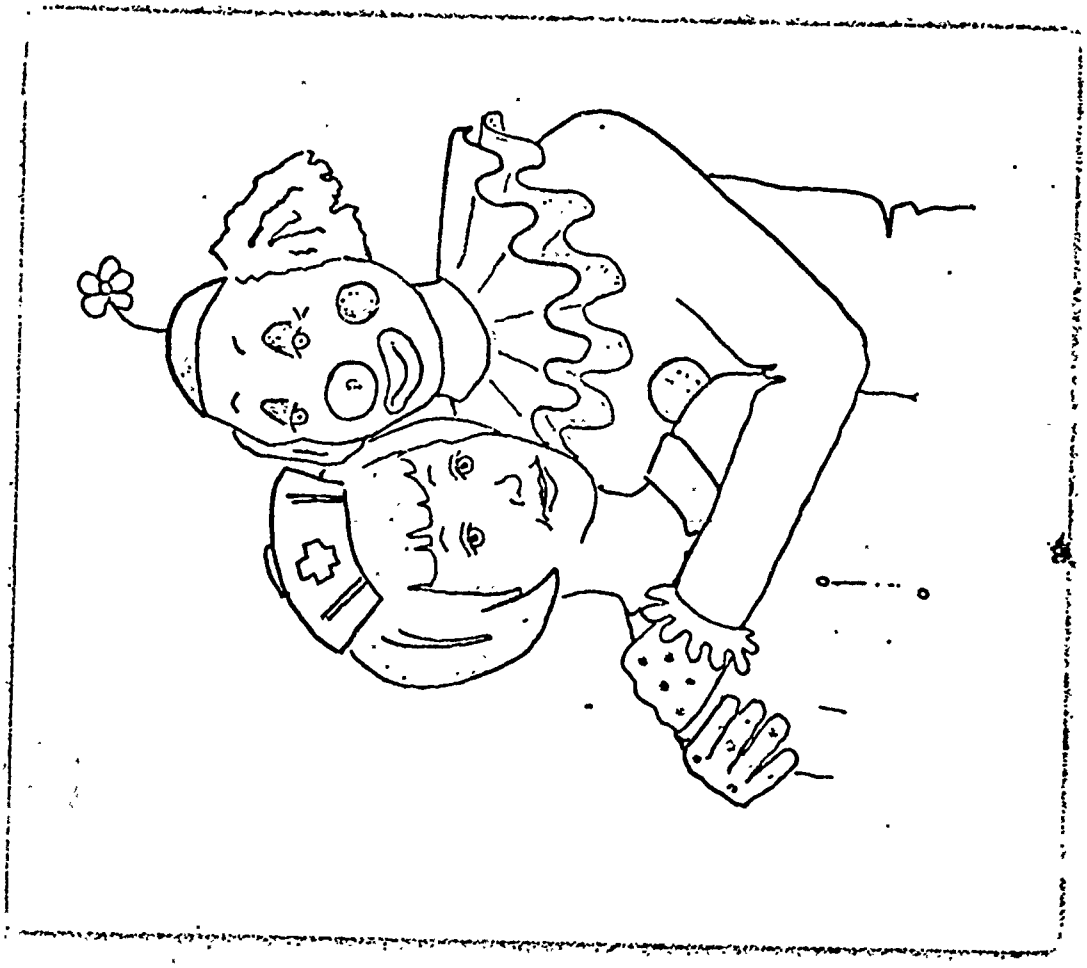
*Anomolous sentences observed by Slobin (1966) and others to be as easily verified in a picture-comprehension task as their meaningful counterparts, regardless of voice.

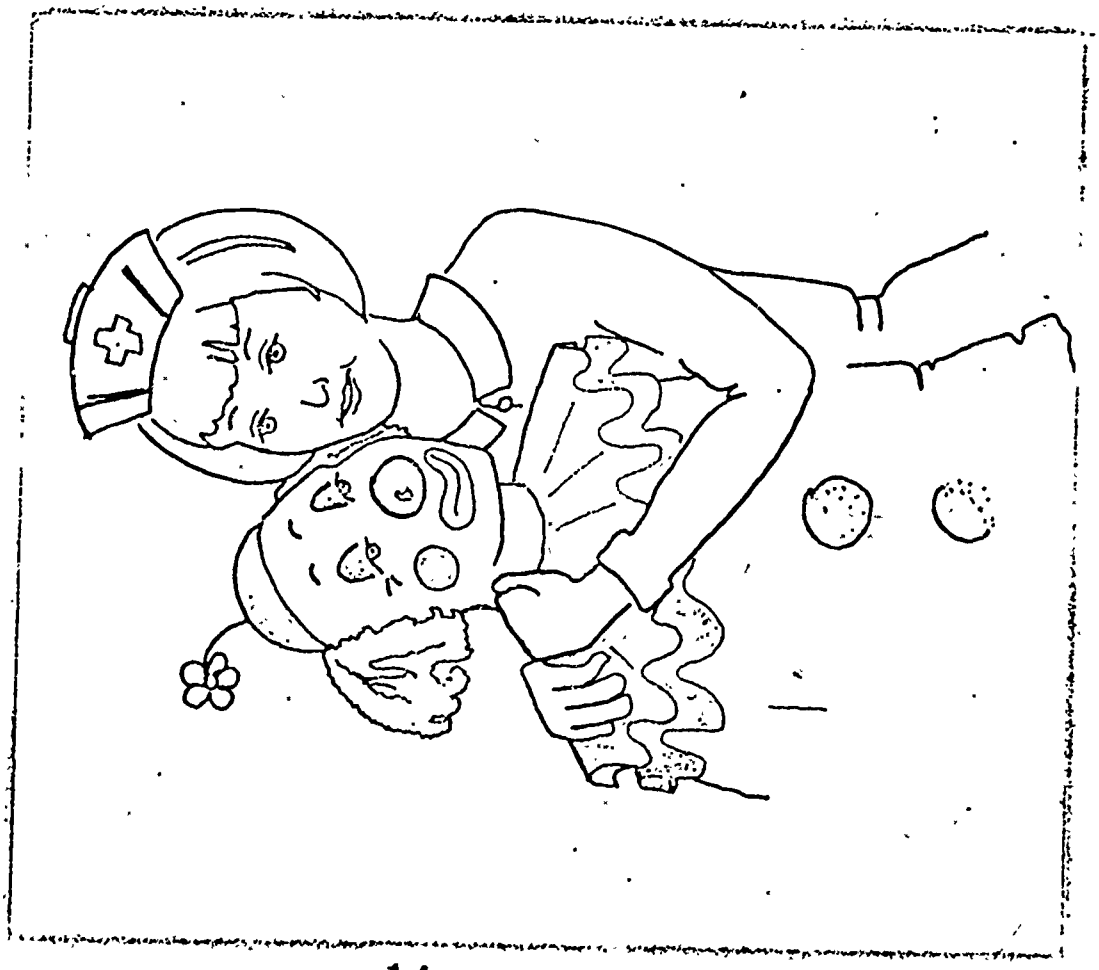
+Meaningful sentences found to be more difficult to verify than their active voice counterparts.

EXAMPLES OF PERSONAL AND IMPERSONAL SENTENCES

	ACTIVE	PASSIVE
PERSONAL:	*Julie is splashing Mommy.	*Mommy is being splashed by Julie.
IMPERSONAL:		
HUMAN	The cowboy is chasing the Indian.	The Indian is being chased by the cowboy.
ANIMAL	The horse is pushing the elephant.	The elephant is being pushed by the horse.

*Sample sentences for a subject named Julie who referred to her mother as Mommy in a pre-test interview.



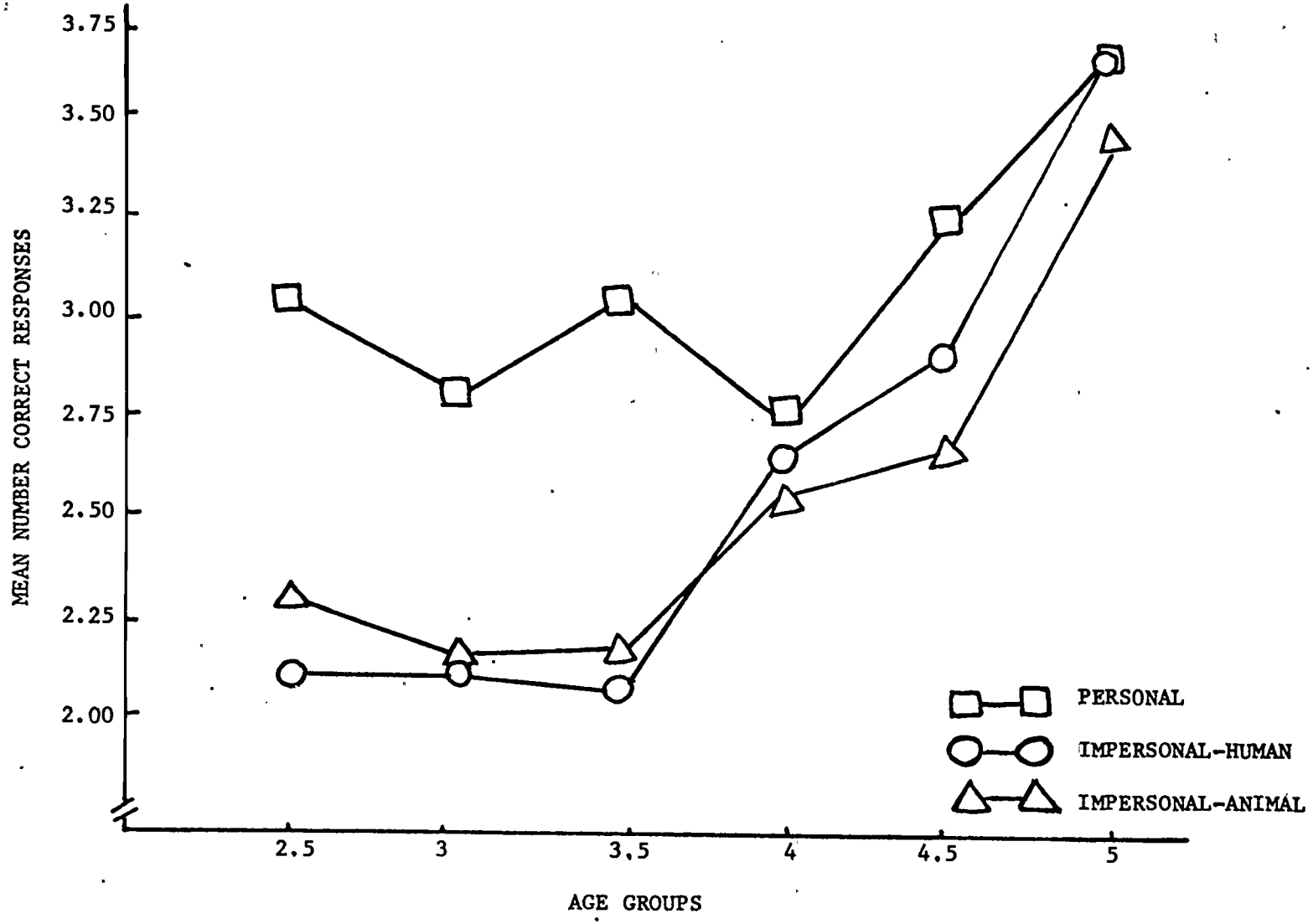


SUMMARY OF ANALYSIS OF VARIANCE BY AGE AND SEX OF Ss UNDER THREE SEMANTIC CONDITIONS AND TWO LEVELS OF SYNTACTIC COMPLEXITY: EXPERIMENT I

(n = 10 per cell)

Source of variation	ss	df	ms	F
Between subjects	104.97	119		
Age (A)	32.38	5	6.48	10.15**
Sex (B)	0.07	1	0.07	0.11
Age X Sex	3.60	5	0.72	0.72
Subjects within groups	68.92	108	0.64	
Within subjects	233.50	600		
Semantics (C)	11.42	2	5.71	19.17**
Age X Semantics	5.00	10	0.50	1.68
Sex X Semantics	0.41	2	0.20	0.68
Age X Sex X Semantics	3.85	10	0.39	1.30
C X subjects within groups	64.33	216	0.30	
Syntax (D)	26.84	1	26.84	64.26**
Age X Syntax	2.80	5	0.56	1.34
Sex X Syntax	0.17	1	0.17	0.41
Age X Sex X Syntax	3.85	5	0.58	1.39
D X subjects within groups	45.11	108	0.42	
Semantics X Syntax	0.30	2	0.15	0.50
Age X Semantics X Syntax	1.29	10	0.13	0.43
Sex X Semantics X Syntax	0.72	2	0.36	1.19
Age X Sex X Semantics X Syntax	3.63	10	0.36	1.19
CD X subjects within groups	64.74	216	0.30	

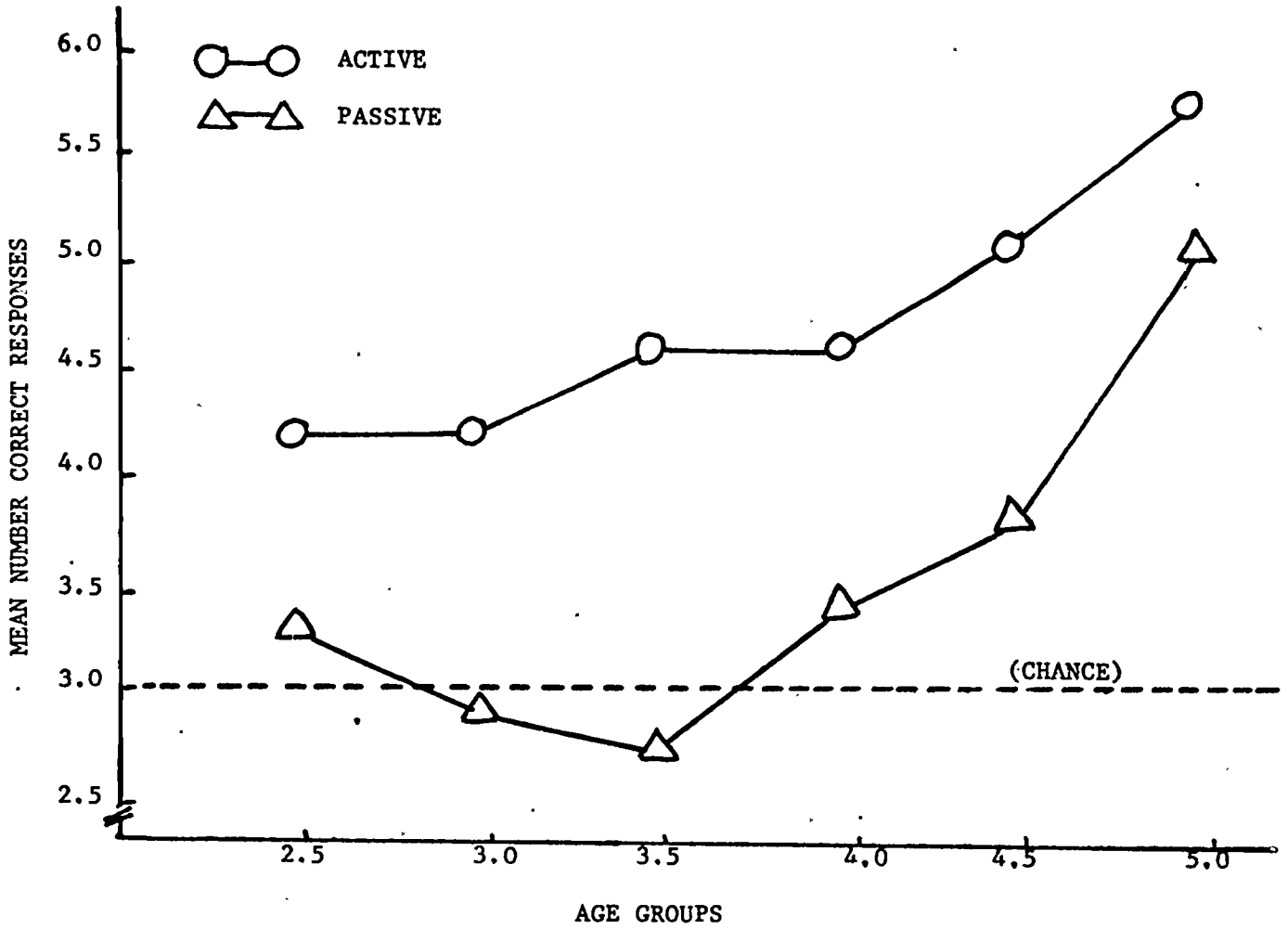
**p<.001



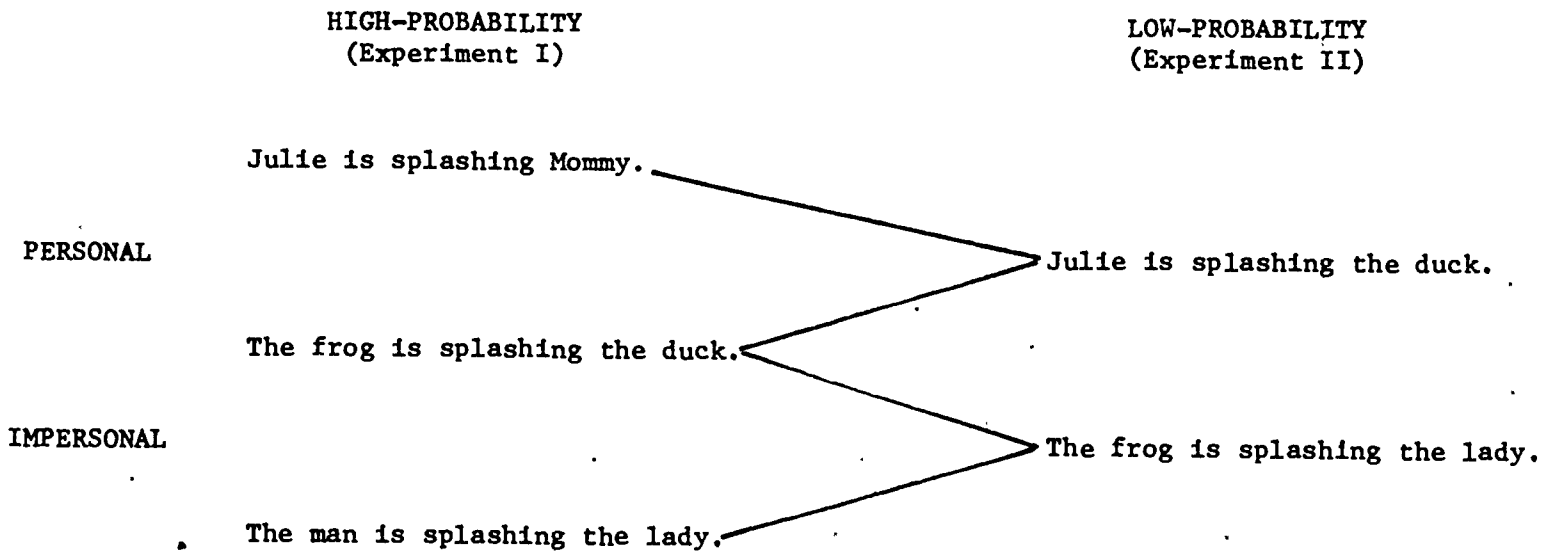
Mean number correct personal and impersonal sentences (Experiment I) as a function of age.

MEAN NUMBER CORRECT ACTIVE AND PASSIVE SENTENCES AS A FUNCTION OF AGE

(Experiment I)



SCHEME FOR CONSTRUCTION OF LOW-PROBABILITY SENTENCES



SUMMARY OF ANALYSIS OF VARIANCE BY AGE AND SEX OF Ss UNDER THREE SEMANTIC CONDITIONS AND TWO LEVELS OF SYNTACTIC COMPLEXITY: EXPERIMENT II

(n = 3 per cell)

Source of variation	ss	df	ms	F
Between subjects	31.15	35		
Age (A)	12.21	5	2.44	4.22*
Sex (B)	2.24	1	2.24	3.87
Age X Sex	2.81	5	0.56	0.97
Subjects within groups	13.89	24	0.58	
Within subjects	59.00	180		
Semantics (C)	2.84	2	1.42	13.48**
Age X Semantics	0.77	10	0.08	0.38
Sex X Semantics	1.24	2	0.62	2.94
Age X Sex X Semantics	2.04	10	0.20	0.96
C X subjects within groups	10.11	48	0.21	
Syntax (D)	6.00	1	6.00	16.42**
Age X Syntax	4.05	5	0.81	2.22
Sex X Syntax	0.17	1	0.17	0.47
Age X Sex X Syntax	1.34	5	0.27	0.73
D X subjects within groups	8.77	24	0.37	
Semantics X Syntax	0.37	2	0.19	0.58
Age X Semantics X Syntax	3.58	10	0.36	1.13
Sex X Semantics X Syntax	0.85	2	0.43	1.34
Age X Sex X Semantics X Syntax	1.64	10	0.16	0.52
CD X subjects within groups	15.23	48	0.32	

*$p < .01$

**$p < .001$

(NEG-LS)