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ABSTRACT

An experiment designed to test the generality of Paivio's two factor theory of meaning to sentence comprehension was carried out, and two scoring procedures were investigated: a verbatim score in which sentence elements had to be recalled exactly as they appeared in the original, and a substance score in which synonyms were accepted. The subjects in the experiment were 30 graduate students, 15 of whom were assigned to the Imagery group and 15 to the Verbal group. Ten concrete (high imagery ratings) and 10 abstract (low imagery ratings) sentences were selected for the study (see Appendix for the complete list). The design was 3 x 2 repeated measures design, with repeated measures on the second factor--sentence type (concrete vs. abstract). The first factor was instructional set: Imagery vs. Verbal vs. Rote. With one exception, it was demonstrated that subjects employing verbal and/or imaginal processing techniques will recall more sentence elements than a group instructed to repeat a sentence over and over. The instructional sets had somewhat different effects upon the recall of nouns, verbs, and adjectives. Tables and figures present the results of the experiment. (DB)

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The Effects of Verbal, Imaginal, and Rote Instructional Sets on the Learning of Concrete and Abstract Sentences[1]

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A number of studies completed recently indicate that procedures which insure or make more likely some sort of meaningful processing of sentences will produce retention markedly superior to procedures entailing different sorts of processing. Bobrow and Bower (1969) have shown that requiring Ss to compose a sensible continuation of a sentence results in twice as much recall as requiring Ss to read the same sentences aloud three times. In another experiment, Bobrow and Bower (1969) had one group of Ss give the meaning of homonyms used in sentences and another group of Ss search for spelling errors in the same sentences. Ss who had to disambiguate the meaning of homonyms recalled more than twice as many sentences as the "Spelling" group. Anderson and Hidde (1971) have shown that Ss who rate the image evoking value of sentences recall three times as many sentences on a surprise recall test as Ss who rate the pronounceability of sentences. In a study of intentional sentence learning, Anderson (1971) produced effects comparable to the Anderson and Hidde (1971) data. Finally, Anderson, Goldberg, and Hidde (1971) found that Ss who filled blanks at the end of sentences they read learned significantly more than Ss who read whole sentences.

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[1]Paper presented at the annual meeting of the American Educational Research Association, Chicago, Illinois, April, 1972.

Instructions to form images, to state a reasonable continuation, to fill blanks in sentences, and to disambiguate the meaning of a word all facilitate the recall of sentence content relative to appropriate controls. An essential feature of all these strategies is that for S to successfully perform the task required of him, he must be able to understand the sentence. If a sentence has no meaning to S he will be unable to form a mental image of its content, to produce a sensible continuation, to fill in a deleted content word, or to disambiguate a word meaning. Instructions to repeat a sentence over and over, to search for spelling errors, to rate the pronounceability of sentences, or to read whole sentences aloud do not preclude but also do not require that S understand the sentence. It seems reasonable to conclude, therefore, that procedures which insure or make more likely meaningful processing of sentences will facilitate the long term retention of knowledge.

Relatively little research has been completed on the nature of this "meaningful" processing of sentences or on the possible relationships between sentence characteristics and underlying processes. With respect to the first point, sentence comprehension will here be viewed as the utilization of control processes in short-term storage (Cunningham, 1972b; 1972d). This view is derived, of course, from models of human memory currently popular, especially from the version offered by Atkinson and Shiffrin (1969, 1971). In their model, short-term storage (STS) is equated with conscious awareness. Information is transferred from sensory buffers to STS at which point S first becomes aware of it. It is at this stage that processes under the conscious control of S (e.g. repetition, coding, imagery, etc.) are employed to govern the flow of information to more permanent

memory systems, to perform transformations, elaborations or reductions of the information, or to forget it. In this view, meaningful processing or sentence comprehension occurs when certain classes of control processes are brought to bear on the sentence input.

What control processes are related to sentence comprehension? The research cited above suggests two: imagery and verbal. Bugelski (1970) has argued strongly that sentence comprehension and reading for meaning involve the generation of mental images which are then stored in long term memory. Bugelski himself cites little supporting evidence but recent work on the role of imagery in the solution of three term problems is probably relevant here (DeSoto et al., 1965; Huttenlocher, 1968). According to Bugelski (1970), ".... in reading we are exciting within ourselves a succession of rapid, fleeting images, some of which we name, and others with which we do not bother" (p. 324). He also minimizes the role of linguistic or verbal factors in reading: "The problem of communication is not one of finding the right words, but one of finding words that mean the same thing; that is, words that give rise to the same imagery and feeling in all persons involved" (pp. 324-25). Interestingly, Bugelski's position is very similar to that held by Huey (1907) in a landmark text on reading. But is imagery the only control process?

Another class of processing strategies that seems relevant might be labeled verbal or linguistic processing. Smith (1971) and Neisser (1967) both regard reading for meaning as a process of generating and confirming verbal expectancies. The source of these expectancies is our knowledge of the language and its redundancies and our memory of what has already been said or read. In effect we guess what the information contained in

the sentence should be based on our knowledge of prior context and of language and then selectively sample from the visual or verbal stimulus to confirm our guess. Smith (1971) argues that readers could not first identify completely every letter or word they are reading and also comprehend what they are reading. Reading speed studies show that readers can read far faster than an identification model would predict (Smith, 1971). This view argues strongly, then, for a verbal processing strategy underlying comprehension. The linguistic models of sentence comprehension (e.g., Sachs, 1967) also emphasize verbal processes and provide further support for their importance.

Some of the studies reviewed above support the validity of an imagery construct (e.g., Anderson and Hidde, 1971) and some suggest a verbal processing construct (e.g., Bobrow and Bower, 1969). Which should we choose? Perhaps both are involved. Perhaps the appropriateness of a particular control process depends upon the nature of the material being processed.

Support for a two process view of sentence comprehension can be found in the paired-associate learning literature. Paivio and his colleagues (see Paivio, 1969; 1971 for a review of this research) have conducted extensive investigations into the role of mental imagery in paired-associate learning and have shown that this strategy is functionally related to a concrete-abstract stimulus dimension. That is, concrete stimuli, such as the noun "house," readily evoke non-verbal images as effective mediators of paired-associate learning whereas abstract nouns such as "fate" do not. Verbal mediation is presumably not affected by variations in the concrete-abstract dimension. Paivio has investigated implications of these notions in a number of experiments.

These studies (see Paivio, 1969) have shown that concrete stimuli are easier to recall than abstract stimuli, other things being equal, and that both verbal and imaginal mediation instructions produce recall superior to appropriate controls. Paivio and Foth (1970) compared the relative effectiveness of verbal and imaginal mediation instructions on concrete word pairs and on abstract word pairs. Since concrete stimuli arouse non-verbal images readily, imagery instructions ought to facilitate the retention of those pairs as compared to verbal mediation instructions. Abstract pairs do not evoke such images readily so presumably imagery instructions should be ineffective or somewhat inhibitory as compared with the more appropriate verbal mediation instructions. Using a "production" technique in which Ss actually produced overtly their images and verbal mediators, the expected interaction between instructional set and stimulus characteristics was observed. Paivio and Foth (1970) also collected data on the availability of mediators by noting the length of time necessary to begin overt production of mediators. These data also confirmed an expected interaction with imagery latencies being shorter on concrete pairs, but longer on abstract pairs than verbal mediator latencies. Both sets of data provide strong support for Paivio's (1969) theory.

On the basis of these and other data, Paivio (1969, 1971) has argued that any model of meaning (and perhaps comprehension) will entail at least two factors. His theory states that the meaning of concrete materials is tied closely to the non-verbal images aroused by such materials while the meaning of abstract materials is tied more closely to the verbal stimuli themselves. If it is the case that two meaning processes are viable, then perhaps two comprehension strategies are also viable. The present experi-

ment is designed to test the generality of Paivio's (1969) two factor theory of meaning to sentence comprehension.

One manner of investigating the validity of imagery and verbal constructs is to explicitly direct Ss to consciously employ those strategies while learning. If these instructions have an effect on sentence comprehension, one would expect that groups using these strategies would remember more sentences (hence have comprehended more) than groups told to use strategies which are not presumed to govern comprehension. In addition, if verbal elaborations and images are indeed distinct and generally non-overlapping strategies, then one ought to observe differential effectiveness of the strategies on concrete and abstract sentences.

In addition to the above named factors, two scoring procedures were investigated: a verbatim score in which sentence elements had to be recalled exactly as they appeared in the original and a substance score in which synonyms were accepted. Elsewhere, I have argued (Cunningham, 1972a) that verbatim and substance scoring procedures reflect somewhat different aspects of sentence retention and consequently both need to be collected in studies of this type. Specifically it was expected that the verbatim score would be more sensitive to variations in verbal processing while the substance score would best index variations in imagery processing.

Method

Materials. One hundred sentences of the form "The (adjective) (noun) (past tense verb) a(n) (adjective) (noun)" were taken from a pool originally generated by Begg and Paivio (1970). Fifteen graduate students from an educational psychology course rated these sentences on a seven point scale

of image arousing value following a procedure very similar to that used by Paivio, Yuille, and Madigan (1968). Fifteen different students from the same course rated the sentences on the degree to which the sentence "made sense." Any sentence which received a "makes nc sense" rating was eliminated from the pool. From the remaining sentences, ten concrete (high imagery ratings) and ten abstract (low imagery ratings) sentences were selected. These two sets were balanced as closely as possible on number of letters, syllables, and Thorndike-Lorge (1944) word frequencies. A sample concrete sentence would be "The jagged stone shattered a clear window." The sentence "The additional fact settled a major disagreement" was a typical abstract sentence. The complete list of the experimental sentences may be found in the Appendix. Individual sentence elements were not separately scaled for concreteness prior to the experiment but ratings were collected at a later time. Students (n = 18) were solicited from a graduate student dormitory for this rating task.

Subjects. The experimental Ss were 30 graduate students participating to fulfill an educational psychology course requirement and randomly assigned to treatment conditions upon appearance for the experiment.

Design and Procedures. The design was 3 x 2 repeated measures design with repeated measures on the second factor, sentence type (concrete versus abstract). The first factor was instructional set: Imagery vs. Verbal vs. Rote. Ss in the Imagery group were instructed to bring to mind a vivid mental image of the event described in each sentence. The Verbal group was instructed to make up and say aloud a sensible continuation sentence for the sentence they were shown. Thus, if Ss were shown the sentence "The fat woman ate a red apple," a sensible continuation might be

"Then she took a nap." The third instructional set, designated Rote, directed Ss to repeat the sentence over and over again. Ten Ss learned the ten concrete and ten abstract sentences using one of these three strategies.

The E presented sentences typed on 3 x 5 inch file cards one at a time at a ten second rate. The presentation was paced by audible clicks from a tape recorder. Two random orders of the twenty sentences were constructed with the restriction that no more than three sentences of any one type, concrete or abstract, could occur in a row. Analysis revealed no order differences and data on this variable will not be reported. Testing was accomplished by dittoing the first three words of a sentence on [illegible] sheets of paper. These sheets were randomized using a third random order and stapled into booklets. Subjects were instructed to complete the sentences using the exact words of the original sentence if possible or, if necessary, words that meant the same thing as the original. The test was self paced but timed. The recall time data showed no significant difference among conditions and will not be considered below.

Results

Analyses of variance were conducted on arcsin transformations of the proportion of concrete and abstract sentence elements correctly recalled. Separate analyses were conducted on the recall of nouns, adjectives, and verbs using two levels of strictness: (1) verbatim, in which the noun, verb, or adjective which actually appeared in the original sentence had to appear in the recall, and (2) substance, in which synonyms were accepted. Six analyses were therefore conducted.

As expected, significantly ($p < .01$) more nouns, verbs and adjectives from concrete sentences were recalled than abstract sentences in all analyses. This effect was quite large with F's (1, 27) ranging from 115 to 261. One reason for this huge difference was the extremely low level of recall for abstract sentences (See Figures 1-6).

Ss using the imagery strategy recalled significantly more ($p < .05$ using Newman Keuls) nouns than the Rote group on both verbatim and substance scoring as did the Ss using the verbal strategy. (See Figure 1 and Figure 2) The Imagery group recalled more nouns than the Verbal group on both substance and verbatim scoring although the difference was significant ($p < .05$) only on the substance score,, the score presumed to be more sensitive to imagery manipulations. There was no evidence of a disordinal interaction between processing strategies and sentence type as would be suggested by the Paivio and Foth data (1970).

No significant differences between treatment groups in the recall of verbs was observed with verbatim scoring while with substance scoring, Imagery and Verbal groups recalled more verbs than the Rote group ($p < .05$) but did not themselves differ. (See Figure 3 and Figure 4) Interestingly, no verb synonyms were given in the Rote group; that is, for this group, the verbatim score equaled the substance score. In this analysis there was a pronounced but nonsignificant tendency for the Verbal strategy to exceed the Imagery group especially on abstract sentences, but the low level of recall of abstract sentence verbs may have obscured this effect.

Similarly, Imagery and Verbal groups recalled significantly ($p < .05$) more concrete and abstract sentence adjectives than the Rote group.

With substance scoring only the imagery-rote difference reached significance ($p < .05$) but the verbal-rote difference was very nearly significant ($.10 > p < .05$). Both differences were significant ($p < .05$) on the verbatim score. There was some evidence (a non significant trend) of an interaction between instructional set and sentence type on both substance and verbatim scores. (See Figure 5 and Figure 6) Imagery seemed more effective than verbal only on concrete sentences. This is the sort of result predicted by Paivio's (1969) theory. The fact that it occurred with adjectives but not nouns was surprising to say the least.

Results of the scaling of sentence elements taken after the experiment had been completed are summarized in Table 1. Also listed is the mean whole sentence rating. Intercorrelations of these measures are shown in Table 2.

Discussion

With one exception (verbs-verbatim scoring) it was demonstrated that subjects employing verbal and/or imaginal processing techniques will recall more sentence elements than a group instructed to repeat a sentence over and over. Presumably both the verbal and imaginal techniques require subjects to meaningfully encode (to comprehend) the sentence whereas subjects asked to repeat words need not engage in such activity. Both imagery and verbal processes seem implicated in sentence comprehension. Moreover, it appears that instructions to utilize these processes differentially influence recall of sentence elements of concrete and abstract sentences. Imagery instructions facilitate the recall of <u>both</u> concrete and abstract sentence nouns and concrete sentence adjectives as compared to the verbal strategy. Verbs and abstract adjectives

were not significantly influenced differentially by imagery and verbal techniques.

The results of this study had not been completely anticipated. I had assumed (rather naively perhaps) that by treating sentences as unitary stimuli, by securing imagery ratings on sentences as a whole rather than individual elements, that the pattern of recall for nouns, verbs, and adjectives would be somewhat similar. This was true only with respect to the concrete-abstract main effect. The instructional sets had somewhat different effects upon the recall of nouns, verbs, and adjectives.

With respect to verb and adjective recall, several factors may have contributed to their observed differences with noun recall and among themselves. First, much less work has been done with these elements. Noun imagery is theoretically related to concreteness, the ease with which the noun can be pictured. Verbs and adjectives would seem to require somewhat different theoretical rationales since referents are less easy to specify. Second, the differences in rated concreteness of the individual sentence adjectives and verbs is less than that for nouns (See Table 1). These smaller differences in rated imagery may have obscured some of the predicted effects.

It is also likely that sentences are not recalled in the unitary manner I had assumed and that different control processes might be applied differentially to sentence elements. Thus, a verbal technique might stimulate verb recall but be less effective for nouns. The opposite might be true for nouns. Perhaps alternative codes are used for the storage of sentence elements. Or perhaps one dominant technique

(e.g., imagery) may be applied to a greater or lesser extent to all sentence elements. The strongest effect of imagery seems to be on nouns; verbs and adjectives may be influenced only to the extent to which they are related to the noun. Thus "woman" is a fairly concrete word but "fat woman" would likely receive a still higher imagery rating. An "eating fat woman" might be perceived as even more concrete. In the case of concrete sentence adjectives at least, it appears possible that such a phenomenon is occurring. Abstract sentence adjectives appear largely unaffected by the manipulations explored in this study. Perhaps their being paired with nouns did not add to the concreteness of sentence.

Two other experiments have been completed subsequent to this one and these data should be considered as well (Cunningham, 1972c). With respect to concrete sentence adjectives, the findings are consistent: imagery is the more effective technique. But with abstract sentence adjectives, one experiment favors imagery on both verbatim and substance scores, another favors a verbal process on the verbatim score but not on the substance score, while a third experiment (this one) shows no difference on either score. No explanation has been found for these differences.

Some differences across the three experiments also occur with verb recall. For the verbatim recall of abstract sentence verbs, the data agree: recall is consistently higher for the verbal strategy. Although this finding is statistically significant in only one experiment, its stability across three experiments lends to its support. Substance recall of abstract sentence verbs, however, is less clear. This experiment

shows a slight but non-significant advantage for the verbal technique but in the two subsequent experiments a significant advantage is shown for the imagery technique. The latter two experiments represent improvements in experimental design over this one so those data are more likely to be valid. One interpretation of this finding is that imagery stimulates the production of verb synonyms to a great extent. In one experiment, in fact, almost all abstract verbs on sentences learned with imagery were recalled as synonyms; that is, verbatim recall for abstract sentence verbs learned with imagery was practically zero. For substance recall, then, encoding the meaning of abstract verbs used in these studies is more closely related to imagery than verbal processing. Subjects seem to translate abstract sentence verbs when using imagery, perhaps toward something more concrete and easier to picture.

Concrete sentence verbs were expected to follow the pattern of concrete sentence adjectives and nouns. Imagery was presumed to facilitate the recall of concrete sentence verbs and this facilitation should show most clearly on the substance score. This expectation was not supported in any experiment. In fact, in one experiment imagery was slightly superior to verbal processing on the verbatim score but not the substance score. The rated imagery value of concrete verbs is relatively low, however, and perhaps the predicted effects were obscured.

Noun recall was the variable originally of most interest and the one which is most closely related to the research and theory of Paivio. As specificd above, it had been expected on the basis of Paivio's (1969) theory and from the results of Paivio and Foth (1970) that imagery would exceed verbal processing especially on the substance recall of concrete

nouns, while for abstract nouns, the verbal strategy would exceed imagery especially on verbatim recall. But noun recall was facilitated by imagery more than verbal processing for both concrete and abstract sentences. One might argue that while the sentences as a whole were rated concrete or abstract, the predicate nouns themselves were all relatively concrete. But as Table 1 clearly shows, there was a substantial difference in the rated imagery value of predicate nouns.

Prior to the Paivio and Foth (1970) experiment, the interaction between noun concreteness and instructional set which is clearly predicted from Paivio's (1969) two factor theory could not be produced by Paivio or his associates. In their study, Paivio and Foth (1970) argued that one reason for this failure was that Ss were adopting processing strategies other than those they were instructed to employ. Thus Ss instructed to use imagery on abstract pairs soon learned how inordinately difficult such a strategy was for that type of pair and shifted to a verbal strategy. Likewise, a verbal strategy is less efficient on concrete pairs so Ss in the verbal group might have shifted to an imagery strategy. In an attempt to circumvent this tendency, Paivio and Foth (1970) employed a "production technique" in which Ss had to reproduce in writing the verbal or imaginal mediation they were employing. When this methodology was adopted, the interaction was clearly demonstrated. Ss in the present experiment did report such strategy shifts in a post experiment questionnaire and these shifts may have obscured the predicted interaction. However, two experiments employing the Paivio and Foth (1970) methodology have been conducted and both have confirmed the finding of the present experiment with respect to nouns (Cunningham, 1972c).

But neither this experiment nor the later ones in this series (Cunningham, 1972c) can be regarded as adequate tests of the generality of Paivio's (1969) theory in that only one verbal processing strategy was investigated: sentence continuation. This technique requires the subject to make up a sentence which could reasonably follow from the presented sentence. It is possible that at recall the continuation and the presented sentence become confused. Other verbal techniques need to be explored. One currently being investigated is verbal paraphase.

In conclusion, the application of information processes constructs to sentence comprehension does appear to have some utility. In this study, comprehension has been conceived as the utilization of control process in STS. The characteristics of some of the possible underlying processes have been examined. It appears that the relationship of these strategies to sentence characteristics and to particular sentence elements is not a simple one. Other techniques need to be explored and further clarification of the relationships of verbs and adjectives to imagery is also necessary.

References

Anderson, R. C. Encoding processes in the storage and retrieval of sentences. Journal of Experimental Psychology, 1971, 19, 338-340.

Anderson, R. C., Goldberg, S. R. and Hidde, J. L. Meaningful processing of sentences. Journal of Educational Psychology, 1971, 62, 395-399.

Anderson, R. C. and Hidde, J. L. Imagery and sentence learning. Journal of Educational Psychology, 1971, 62, 526-530.

Atkinson, R. C. and Shiffrin, R. M. Human memory: A proposed system and its control processes. In K. W. Spence and J. T. Spence (Eds.), The psychology of learning and motivation, Vol. 2, New York: Academic Press, 1968, 90-195.

Atkinson, R. C. and Shiffrin, R. M. The control of short term memory. Scientific American, 1971, 224, 82-90.

Begg, I and Paivio, A. Concreteness and imagery in sentence meaning. Journal of Verbal Learning and Verbal Behavior, 1969, 8, 821-827.

Bobrow, S. A. and Bower, G. H. Comprehension and recall of sentences. Journal of Experimental Psychology, 1969, 80, 455-461.

Bugelski, B. R. The psychology of learning applied to teaching (2nd ed.) New York: Bobbs-Merrill, 1971.

Cunningham, D. J. The retention of connected discourse. Review of Educational Research, 1972a, (in press).

Cunningham, D. J. Reading from a verbal learning perspective. Newark, Delaware: International Reading Association, 1972b, (in press).

Cunningham, D. J. The effects of imagery and sentence continuation instructions on the recall of concrete and abstract sentences. Paper presented at the Annual Meeting of the Midwest Psychological Association, Cleveland, Ohio, May, 1972c.

Cunningham, D. J. Information processing strategies and reading. Paper presented at the Annual Meeting of the American Educational Research Association, Chicago, Illinois, April, 1972d.

Desoto, C., London, M., and Handel, S. Social reasoning and spatial paralogic. Journal of Personality and Social Psychology, 1965, 2, 513-521.

Huey, E. B. The psychology and pedagogy of reading. New York: MacMillan, 1908.

Huttenlocher, J. Constructing spatial images: A strategy in reasoning. Psychological Review, 1968, 75, 550-560.

Neisser, U. Cognitive psychology. New York: Appleton-Century-Crofts, 1967.

Paivio, A. Mental imagery in associative learning and memory. Psychological Review, 1969, 76, 241-263.

Paivio, A. Imagery and verbal processes. New York: Holt, Rinehart, and Winston, 1971.

Paivio, A. and Foth, D. Imaginal and verbal mediators and noun concreteness in paired associate learning: The elusive interaction. Journal of Verbal Learning and Verbal Behavior, 1970, 9, 384-390.

Paivio, A., Yuille, J. C., and Madigan, S. Concreteness, imagery and meaningfulness values for 925 nouns. Journal of Experimental Psychology, Monograph Supplement, 1968, 76 (1, Pt. 2).

Sachs, J. S. Recognition memory for syntactic and semantic aspects of connected discourse. Perception and Psychophysics, 1967, 2, 437-442.

Smith, F. Understanding reading. New York: Holt, Rinehart, and Winston, 1971.

Thorndike, E. L. and Lorge, I. The teacher's word book of 30,000 words. New York: Teachers College, Columbia University Press, 1944.

Table 1

Mean Imagery Ratings for Major Sentence Elements and for Whole Sentences for Concrete and Abstract Experimental Sentences (Where 1 = Low Imagery Rating and 7 = High Imagery Rating)

	Concrete Sentences	Abstract Sentences
Subject Adjective	5.45	3.56
Subject Noun	6.07	3.40
Verb	5.37	3.38
Predicate Adjective	5.29	3.40
Predicate Noun	6.11	3.25
Whole Sentence	6.59	3.03

Table 2

Intercorrelations Among Imagery Ratings for Major Sentences Elements and Whole Sentences on Experimental Sentences

	SA	SN	V	PA	PN	WS
Subject Adjective		.72	.78	.84	.82	.82
Subject Noun			.81	.77	.82	.94
Verb				.71	.82	.89
Predicate Adjective					.86	.82
Predicate Noun						.93
Whole Sentence						

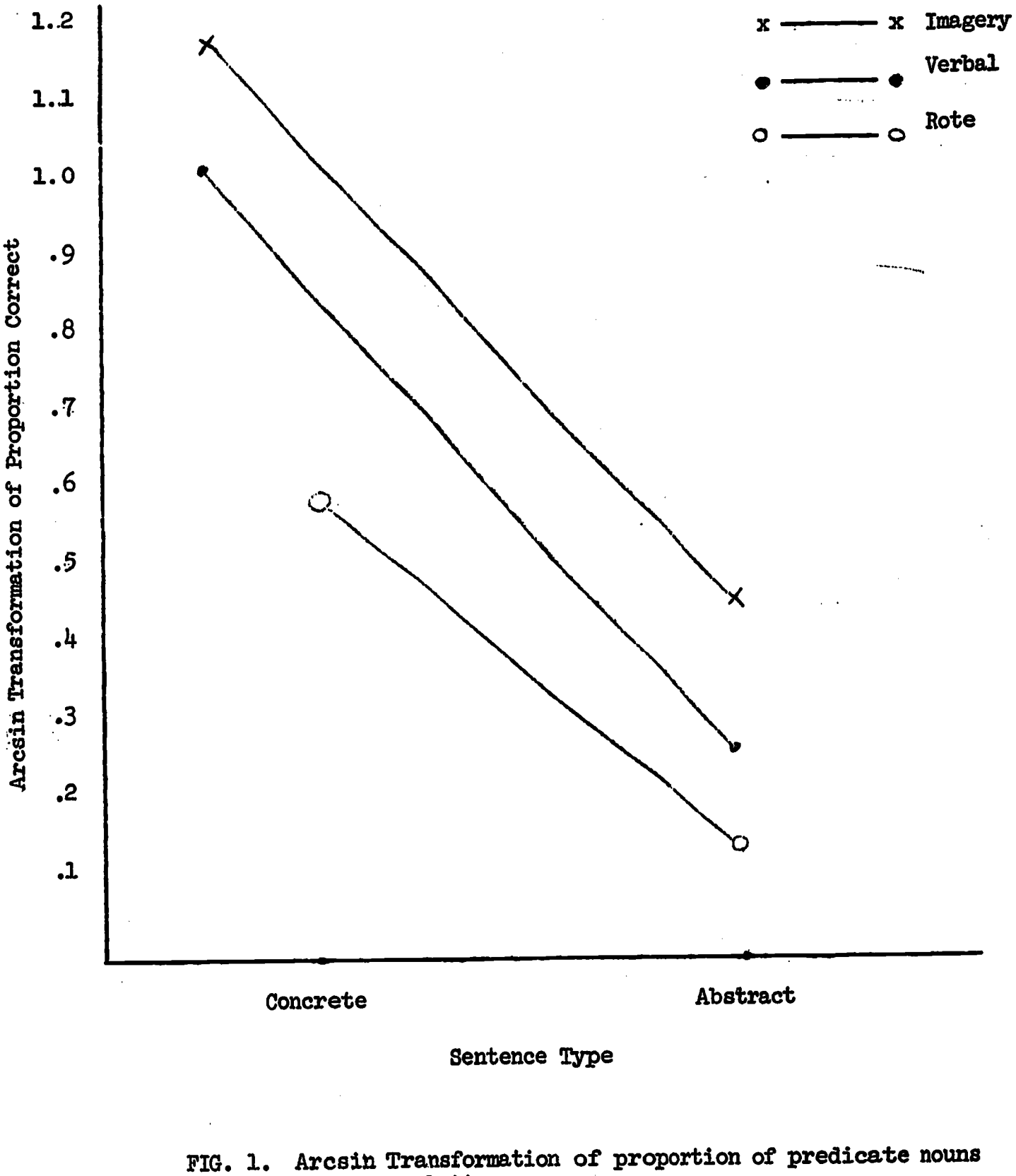

FIG. 1. Arcsin Transformation of proportion of predicate nouns correctly Recalled - verbatim score.

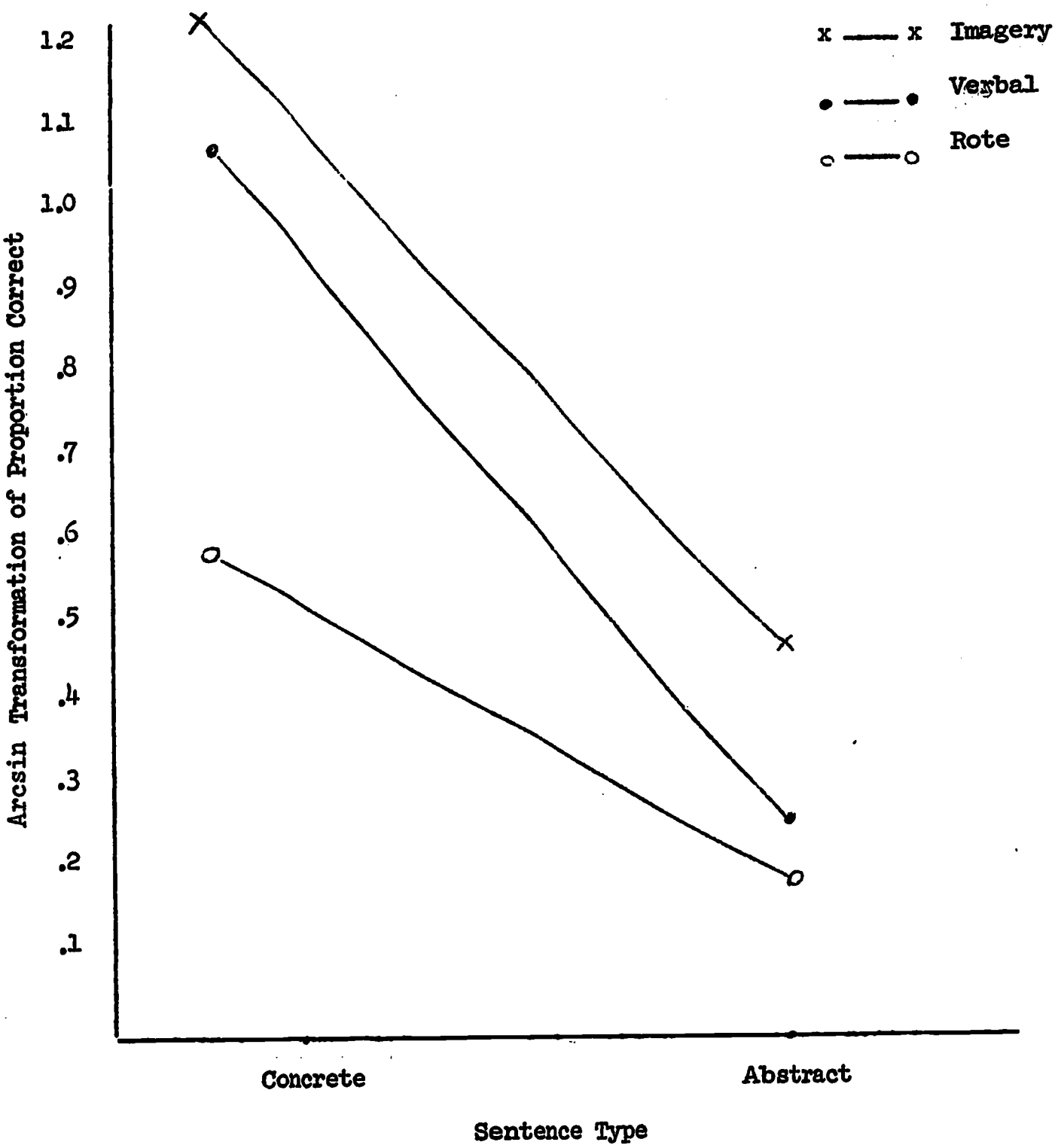

FIG. 2. Arcsin Transformation of proportion of predicate nouns correctly recalled - substance score.

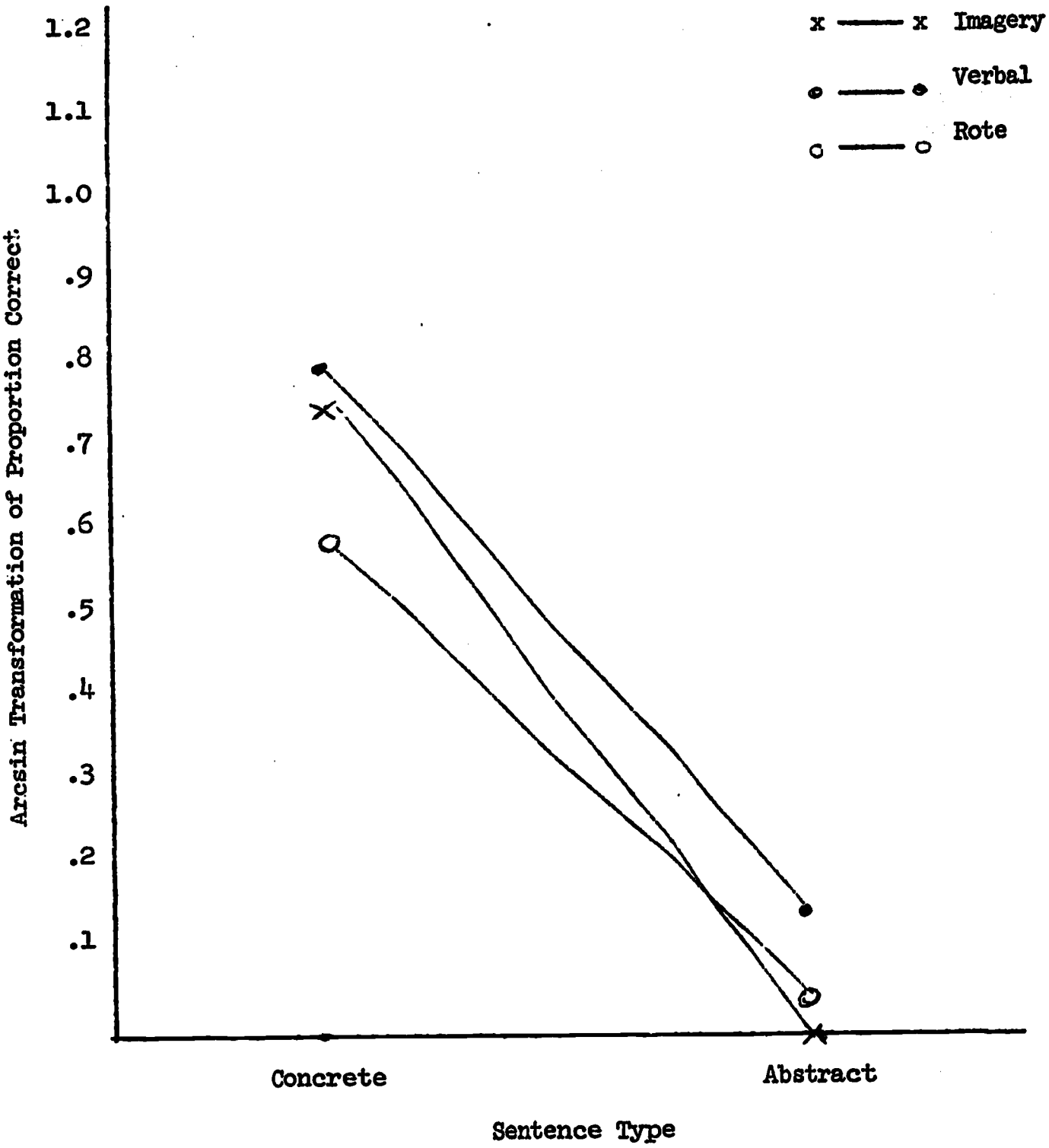

FIG. 3. Arcsin Transformation of proportion of verbs correctly recalled - verbatim score.

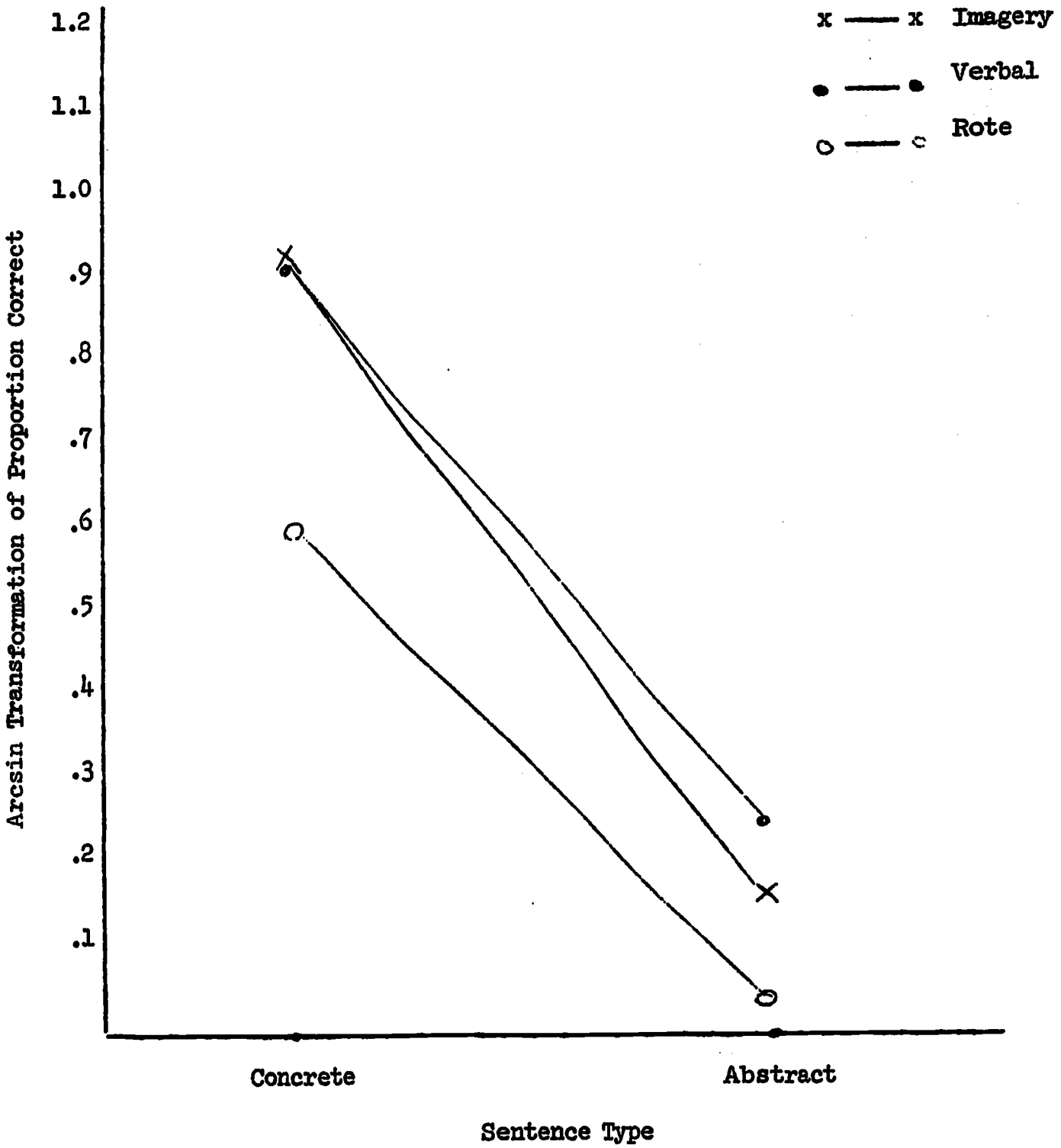

FIG. 4. Arcsin Transformation of proportion of verbs correctly recalled - substance score.

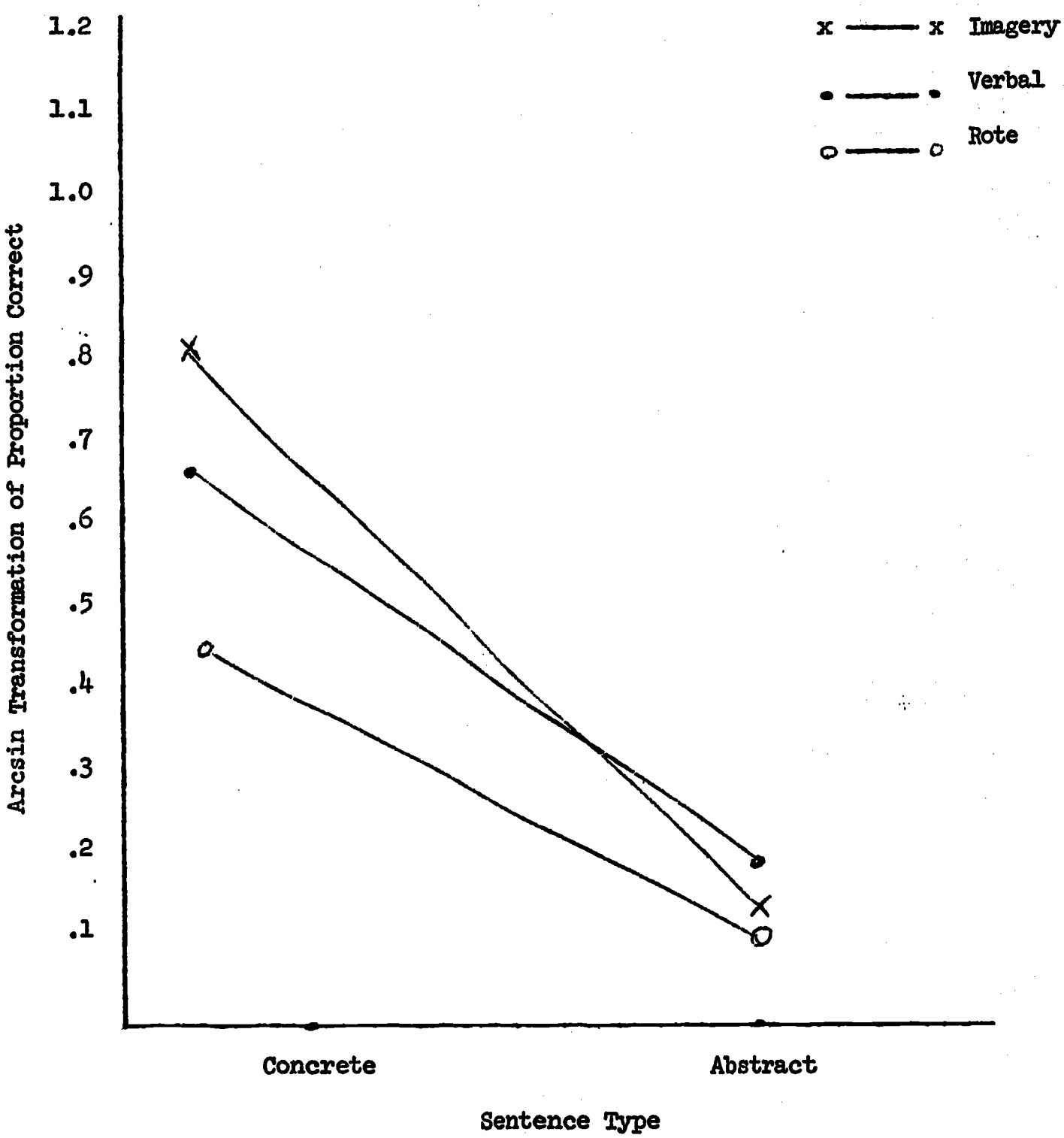

FIG. 5. Arcsin Transformation of proportion of predicate adjectives correctly recalled - verbatim score.

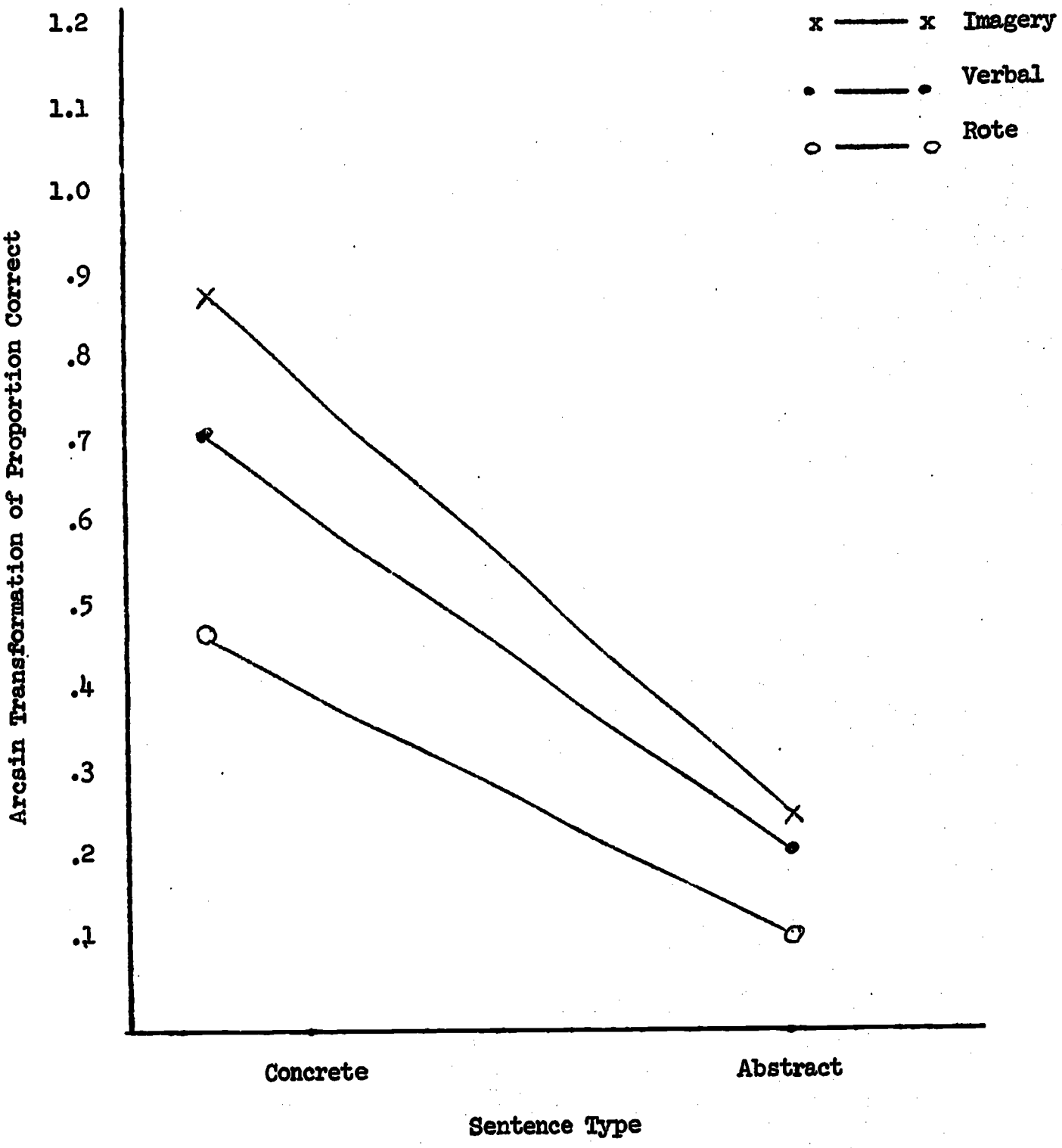

FIG. 6. Arcsin Transformation of proportion of predicate adjectives correctly recalled - substance score.

Appendix

Concrete and Abstract Experimental Sentences

CONCRETE

The muscular blacksmith	lifted	a	bulky	hammer
The arrogant gentleman	smoked	a	rancid	cigar
The savage storm	flattened	a	beautiful	flower
The young singer	caressed	a	pretty	girl
The fat woman	polished	a	red	apple
The rickety stagecoach	crossed	a	winding	river
The rampaging elephant	trampled	an	orderly	caravan
The bright headlight	illuminated	a	gloomy	street
The active volcano	destroyed	a	majestic	forest
The jagged stone	shattered	a	clear	window

ABSTRACT

The final decision	nullified	a	prior	committment
The actual quotation	lacked	a	rational	foundation
The solemn creed	encouraged	an	excessive	devotion
The thrifty business	registered	an	average	profit
The last crisis	created	a	real	necessity
The current effort	concluded	a	productive	program
The minor change	modified	a	basic	measure
The careful study	resolved	an	open	question
The main assembly	noticed	an	unnatural	pause
The additional fact	settled	a	major	disagreement