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SENTENCE RECOGNITION AS A FUNCTION OF ADJECTIVE PREDICATIVE RELATIONSHIPS

BY

RANDA D. SUNUNU

Submitted in Partial Fulfillment of the Requirements
of the Degree of Master of Arts in the
Department of Psychology of the
American University of Beirut

Beirut - Lebanon

June, 1975

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ABSTRACT

Using the Bransford, Barclay and Franks (1972) idea that sentence memory involves the formation of wholistic semantic descriptions (WSD) of situations, it was hypothesized that four sentence types would be falsely recognized with decreasing confidence in the order which follows: a) sentences without an adjective, b) sentences in which the adjective was closely related to (essentially redundant with) the information given by the verb, c) sentences in which the adjective was relevant to the 'context' of the verb, and d) sentences in which the adjective was unrelated to the verb. It was of interest to see whether novelty of information, based on Ehri and Muzio (1974), or the degree of context, based on Brewer and Harris (1974), or an amalgamation of the two would best predict the ordering of the above mentioned types of sentences in terms of confidence ratings when the sentences were correctly identified.

Sixteen sentence frames were selected from scalings by native English speakers, such that a) the three adjective types belonging to each frame fell in three separate regions on a relatedness-to-verb scale, and b) the adjectival categories were equated on sentence imagery, adjective imagery and frequency. In the experiment proper, 32 Ss were presented with every four of the 16 sentence frames in a different adjectival condition during acquisition. The four frames within any one adjectival condition on the acquisition list were

equally distributed among the four adjectival categories on the test list. Sixteen different acquisition/test lists were constructed such that each sentence frame appeared once under each of the 16 acquisition/test conditions. The Ss' task was to decide whether or not they had seen the sentences before and to rate simultaneously their confidence in their responses.

Results showed that the sentences without an adjective and those with a related adjective were each correctly rejected (falsely recognized) with significantly less confidence than those with an unrelated adjective, thus partially supporting the hypothesis based on WSD formation. The mean confidence in correct identification of the adjectival categories were ordered according to the pattern expected on the basis of information novelty of Ehri and Muzio (1974), although only the sentences lacking an adjective were correctly identified with significantly less confidence than those with an unrelated adjective.

Results were discussed in relation to the WSD formulation of Bransford et al. (1972), the sentence imagery variable, the frequency-recognition effect and the memory for adjectival predication idea.

CHAPTER I

INTRODUCTION

The history of the experimental study of memory may be described as a movement from the study of artificial verbal units to that of more natural and increasingly meaningful units. Ebbinghaus designed nonsense syllables to minimize any prior verbal associations, so he could study the processes of memory, pure and unaffected by prior experience and individual differences. Later these artificial units were replaced by words. Interest centered on the factors which facilitated or hindered the acquisition and retention of words in memory, such as interitem associative strength, frequency, category-clustering, subjective organization and imagery. The advent of Chomsky's linguistic theories with their emphasis on generative syntax of sentences stimulated much research aimed at testing the psychological reality of Chomsky's sentence transformational rules. Several studies showed that transformations were indeed used in laboratory language experiments, such as verbatim recall, but cast doubt on their validity when language was used in a more natural, functional way, such as evaluation of the truth of a statement. Soon it became clear that performance with the various syntactic transformations depended on the semantic purpose for which the transformations were used. A number of models derived from Chomsky (1957, 1965), based largely upon his notion of deep structure (meaning), were proposed.

More recently Bransford and Franks have focused on a quite different

approach to sentence memory, which takes into consideration both stated and implied information. Their approach can be regarded as a revival of the ideas of Bartlett (1932), who, on the basis of his work with stories and folktales, suggested that what is stored in memory is a schematic impression. Bartlett claimed that remembering consists of an imaginative reconstruction based on the organized, general schemata of our past experience combined with a few prominent details of the remembered event. Bartlett's claim stood in marked contrast to the prevailing view (still, as a matter of fact, present today) that it was specific traces that were stored in memory, in which case, remembering could only occur with the retrieval or reactivation of those fixed traces. Bransford and Franks draw a similar distinction between what they call the "constructive" approach and what they call the "interpretive" approach.

The interpretive approach assumes that Ss perform a phrase-structure analysis of a sentence, in order to arrive at the deep structure and tap the meaning of the sentence. When remembering a sentence, it is necessary to consult or retrieve the stored deep structure, which contains the original sentence information or meaning.

In support of the interpretive approach, and the importance of within-sentence semantic factors, Sachs (1967) presented Ss with 24 taped passages, following each one with a recognition sentence which the Ss were to identify as being either "identical" to the sentence they had just heard, or as being "changed". After rating their confidence in

their responses, they were to identify the changes as either due to meaning (semantic) or to form (syntactic). She found that Ss were equally confident in their correct identification of both the semantically and syntactically changed sentences when no intervening material occurred between the original and the test sentences. However, when 80 or 160 syllables intervened between them, recognition of semanticity remained high, while recognition of syntactic changes had dropped to almost chance levels. She concluded that the original form or structure of the sentence is stored only long enough for the sentence to be understood. Understanding occurs with the extraction of the meaning, following a process of semantic interpretation. It is the information contained in the sentence, or the sentence meaning, that is finally stored and subsequently recalled, rather than the actual sentence form by which the meaning was conveyed.

Rohrman (1968) studied recall of tachistoscopically presented subject and object nominalizations (e.g., growling lions, and digging holes, respectively). Both have the same surface structure, but the latter have more complex deep structures, complexity being measured by the number of nodes in their respective phrase-markers. He found that recall was significantly greater for the former nominalizations than for the latter, and argued that deep structure can better account for recall than surface stucture. He suggested that deep structures serve as the memory representation of sentences.

Paivio (1971) modified Rohrman's method by systematically varying the level of imagery for both types of nominalizations. High imagery nominalizations were better recalled than low imagery, but there was no effect of nominalization type. He correlated recall scores with attributes of nominalizations, and found that noun imagery was the best predictor of recall, followed by nominalization imagery and participle imagery, while nominalization type received the lowest (nonsignificant) correlation. He concluded that nominalization memory could not be accounted for by deep structure complexity, but that imagery levels was a possible interpretation.

In advancing the constructive approach to sentence memory, Bransford, Barclay and Franks (1972) assume that Ss use the linguistic information from sentences together with their knowledge of the world to construct wholistic semantic descriptions (WSDs) of situations. As the WSDs consist of more information than is provided by the linguistic input, a deep structural analysis is not sufficient to describe all of the information actually available to the listener. They empirically tested this approach by presenting Ss with sentences, which consisted of the same deep structures, but which admitted of different semantic descriptions. Then their Ss were asked to recognize similar sentences, which differed in terms of whether or not they matched those descriptions. For example, the sentence (1) "three turtles rested on a floating log, and a fish swam beneath them", (all underlining in sentences is that of

the present writer) implies that "...the fish swam beneath it" (the log). This implication is not derived from the linguistic input alone, but only from the linguistic input in conjunction with one's knowledge of spatial relationships. In contrast to this, the sentence (2) "three turtles rested beside a floating log, and a fish swam beneath them", does not mean, by inference, that "...the fish swam beneath it" (the log). Bransford et al. found in accordance with their prediction that Ss presented with sentences of type (1) above, tended to falsely recognize similar sentences that had only a pronoun change (e.g., it replacing them in the original sentence), while correctly rejecting the same sentence when they had originally seen sentences of type (2).

Bransford et al. make the claim that this result is not what the interpretive approach would predict. They contend that the interpretive approach predicts no difference in sentence recognition as a function of the pronoun changes, because Ss store the linguistic information underlying the input sentence only, and therefore they would remember what was said exactly, and would not fill in themselves what could be inferred to be true. They concluded that linguistic representation by itself cannot account for the information the listener derives upon hearing a sentence. They suggested that people, rather than sentences, carry meaning. Sentences are simply a source of information which Ss integrate with and/or utilize to change their existing cognitive knowledge.

Further support for this approach comes from Johnson, Bransford and

Solomon (1973). The Ss were read two types of stories during acquisition. Johnson et al. claim that one type implied some "object" (e.g., "...the man drove to work" implies "...the man took his car to work") and the other implied some "probable consequence" of the action (e.g., "the spy threw the document into the fireplace..." implies that "the spy burned the document..."). Then Ss had to recognize which test sentences they had originally heard. The test sentences were either identical to the original, inconsistent with it, or they were potentially true by implication for the experimental group. The control group saw the same "inference" test sentences, but these sentences were not true by implication for them. In the examples cited above, their critical acquisition sentences were "...the man walked to work" and "the spy pulled the secret document from the fireplace..." The experimental group tended to falsely recognize inference sentences more often than did the control group. They interpreted these results as being consistent with the idea that understanding depends on both what is heard and on what this information implies, given S's particular state of knowledge. They thereby extended the finding of Bransford et al.(1972) concerning the knowledge of spatial relationships to that of the knowledge of objects and consequences, thus strengthening the generalization that Ss use their "knowledge of the world" along with purely linguistic information to construct WSDs of situations.

In a similar vein, Loftus and Palmer (1974) provided some evidence for the interaction between language and memory. They showed Ss films

of car accidents, and then gave them a questionnaire in which the critical question was "about how fast were the cars going when they smashed (vs. collided, hit, contacted, bumped) each other?" The Ss gave higher estimates of the speed at which the cars were traveling when the word "smashed" was used than when the words "collided", "bumped", "hit" or "contacted" were used in that order. One week later, the Ss were asked more questions concerning the accident, among which was the critical question "did you see any broken glass?" The Ss who had been asked the "smashed" question were also more likely to assert that they had seen broken glass than those Ss who had been asked the "hit" question. Loftus and Palmer proposed that memory for some complex event involves the integration of information from the original perception and from external post-hoc sources. They suggested that Ss formed a mental representation of the perceived car accident. Upon hearing the "smashed" question, the linguistic information (external and post-hoc) that the cars smashed, interacted with their stored representation of the accident. The accident they finally remembered was one that was more serious than the one they had originally perceived, and consequently Ss were more likely to imagine that they had seen broken glass. Thus, one could say that knowledge of the implications of two cars 'smashing' into each other interacted with the stored representation of the input ~~xx~~ information to result in a WSD of a much more serious accident than what was actually perceived, even to the point of believing that glass had been broken.

Working with a different method and different materials, but a similar explanation, Haviland and Clark (1974) showed that Ss' comprehension of sentences cannot rely on linguistic input alone, but entails the assimilation of the new information in sentences to an existing body of information in memory. They proposed a"Given-New strategy" in the process of sentence comprehension. Listeners identify what the speaker expects them to know (Given), in order to locate its antecedent in memory. If there is no antecedent, an appropriate one must be constructed. Only then can the information the speaker does not expect the hearer to know (New) be attached to and integrated with what the hearer does know, and thereby be understood. This resembles the idea of WSD formation. Here the linguistic information (New) is assimilated to one's prior knowledge of the world (antecedent of Given) to result in a WSD and in comprehension. They presented Ss with pairs of "context" and "target" sentences. The "context" sentences could contain either a "direct antecedent" to the "target" sentence, or an "indirect antecedent" to the "target" sentence. For example, half of their Ss saw the target sentence "the beer was warm" preceded by the direct antecedent sentence "we got some beer out of the trunk", while the other half saw it preceded by the indirect antecedent "Andrew was especially fond of beer". Their Ss comprehended target sentences much faster when they had been preceded by a direct antecedent sentence, than when they had been preceded by an indirect one.

Along somewhat similar lines, Offir (1973) gave Ss taped passages,

following each with a test sentence, which Ss were asked to identify as having been seen before or as having been changed. Original and test sentences could be either nonpresuppositional, such as "a Sioux Indian he befriended represented the Chief", changed to "he befriended a Sioux Indian who represented the Chief", and vice-versa; or presuppositional, such as "that Sioux Indian he befriended represented the Chief", changed to "he befriended that Sioux Indian who represented the Chief", and vice-versa. The distinction between presuppositional and nonpresuppositional sentences is very simple. The two propositions in the nonpresuppositional are both asserted. Thus, there is no semantic - communicable- difference between the two forms of the nonpresuppositional given above; which proposition is asserted first in a sentence depends only on the particular emphasis of the speaker. However, in the presuppositional sentences only one of the same basic propositions is asserted, while the other is presupposed. The two forms of the presuppositional given above, therefore, do not communicate the same thing, as they assert different things. The form that the speaker uses depends on what he can assume the listener already knows. Since the forms of the nonpresuppositional sentences can replace each other with no loss of information, the twin form should be falsely recognized more often than the second form of the presuppositional, which reverses the communication intention of the speaker. Wording changes (the rearrangement of the order of the two propositions) that affected the presuppositions a speaker makes of his listener's state

of knowledge were recognized more often than similar wording changes that did not affect presuppositions. She interpreted this as support for the idea that listeners construct semantic representations (WSDs), which include sentence meaning and other kinds of contextual information, such as presuppositions of the speaker. Ss base their recognition of a test sentence on how congruent it is with their semantic and contextual information, stored as part of their WSD.

Of the elements within a sentence that play a large part in conveying the meaning of a sentence, verbs have been found to perform a central role in several experiments. Healy and Miller (1971) showed that Ss judge sentences in which the verb is missing to be more unacceptable (i.e., less likely to be uttered by a native speaker of English) than sentences in which the noun is missing. The Ss were able also to correctly locate the place of the missing main verb in sentences significantly more often than that of the missing subject noun. Jurca (1971) presented Ss with a set of sentences, in which the subject and object nouns were ambiguous in meaning. After studying these sentences, Ss were given another set of sentences, in which either the meaning of the nouns or that of the verbs, or both, were the same or different. The Ss recalled significantly more object nouns, when cued with the subject nouns, in those sentences where the verb had retained the original meaning but the nouns differed in meaning, than in those sentences in which the meaning of the nouns remained the same while that of the verb was different. Therefore, the

meaning of the verb determined to a larger extent whether the sentence was remembered than did that of the nouns.

The powerful role of the verb in sentences was recognized and put to use by Ehri and Muzio (1974). They constructed sentences in one part of their study, in which the adjectives were either strongly related to the verb (e.g., "..washed the dirty mirror") or weakly related to it (e.g., "gazed into the dirty mirror"). The adjectives modified either the subject or the object nouns, which in turn served as the recall prompts. The Ss recalled more adjectives that were unrelated to the verb than adjectives that were related to the verb. Although they had intended to determine which model could better account for memory for adjectives, they viewed their results as being consonant with both the interpretive and constructive theories, although perhaps more straightforwardly so for the latter. They argued that for the constructive approach sentence meaning is represented at a nonlinguistic, conceptual level. Thus, the unrelated adjective would be represented distinctly and separately; while the related would not be so represented, since they would be assimilated to the broader verb meanings and therefore harder to recall. The interpretive, deep structure approach would represent adjectives and verbs separately in memory irrespective of their semantic ties with each other. However, they suggested that if Katz and Fodor's 1964 variation of the interpretive approach is accepted, it could be argued that dictionary and projection rules perform a semantic interpretation which is stored, and if the semantic markers for the verbs encompass the meanings of reltaed adjectives, then, again, related adjective memory would be poorer.

In contrast to the dimension of information novelty, the importance of context was emphasized by Harris and Brewer (1973) and Brewer and Harris (1974). They investigated the recall of deictic aspects and deictic elements in sentences, such as verb tense, deictic verbs, place adverbs, demonstrative adjectives, articles and temporal adverbs. These deictic categories, by definition, must be interpreted with reference to a particular time, place, person, or discourse context in order to be properly understood. For example, in "the driver's license expired last week", the hearer does not know when this was spoken, and so he still does not know when the driver's license expired. In "Oum Kulthum died last week", the hearer does know when this was uttered, as he already knows when the famous singer died. They found that recall of deictic words in sentences was poorer than nondeictic words only in the absence of an appropriate deictic context (as in the first example above); while when a deictic context was present (as in the second example), the difference in recall disappeared.

The present experiment was intended to examine the role of both information and context in the processing and storing of sentences in memory, by comparing recognition confidence of sentences which differed only in the presence of the adjective and the relation of the adjective to the verb, as illustrated below.

B The assistant cooked the vegetables.

R The assistant cooked the raw vegetables.

RV The assistant cooked the frozen vegetables.

U The assistant cooked the cheap vegetables.

In sentence type B, the adjective is absent (blank: B); in R, the adjective is somewhat redundant with, and almost implied by the verb (related: R); in RV, the adjective is functionally and informatively related to the verb (relevant: RV); and in U, the adjective is totally unrelated to the verb - the adjective has no functional, semantic connection with the verb - (unrelated: U). The present experiment presented Ss with a set of sentences, which satisfied the four adjectival conditions just described. Then Ss were presented with another set of sentences, half of which were the same as those they had seen before (hence, they were old) and half of which were different from those they had encountered previously (hence, they were new). A new sentence always involved onlya a change in the adjectival condition, so that, for example, a particular sentence that S had seen as a B would be seen the second time as a U. The Ss were asked to indicate whether or not they recognized the sentences and to simultaneously rate their confidence in their estimates.

For new (changed adjective type) sentences, it was predicted that the ordering of the sentence types in terms of decreasing confidence in false recognition would be B, R, RV, U. B is expected to be most confidently (and often falsely) 'recognized', because it is the most congruent

with the WSD formed from the original sentence, as only one piece of information present in the original WSD is absent. E should come next as a source of confusion for Ss, because although it adds or substitutes some information, this information would have been implicitly coded in the original WSD, it being implied by the verb in the original WSD. RV should come next, because its information was not implied, but is related and relevant to the context of the verb in the original WSD. U should be least confidently falsely recognized, providing as it does novel information which is not even related to the context of the verb and the action in the original WSD, and therefore it should seem to Ss the least plausible in, and the least consonant with, the original WSD. The same ordering of sentence types in terms of decreasing proportions of Ss who give incorrect identifications was expected in but the trend would be less pronounced, since the confidence scale represents an expansion of this binary scale.

For old (repeated) and new (changed) sentences, different explanations for sentence memory would predict a different ordering of the sentence types both in terms of increasing confidence in correct recognition, and to a lesser extent, in terms of increasing proportions of Ss who correctly identify the sentences. If correct recognition depends upon the extent to which adjectives provide information independent of and unrelated to the verbs, the sentences should be ordered as follows: R, RV, U, from worst to best (Ehri and Muzio, 1974). If it

is the extent to which adjectives conform to, and are compatible with, the "context" established by the verb, or the degree to which the adjectives are related to the verb, the sentences should be ordered as follows: U, RV, R, from worst to best (Brewer and Harris, 1974, and Harris & Brewer, 1973). If both adjective relevance to the context of the verb and adjectival provision of novel information are important factors in sentence recognition accuracy, it was hypothesized that the order would be R, U, RV, from worst to best, based on the following rationale: once a certain amount of information is present, its relation to a context can become a factor. Thus, although the adjective in R fits into the context of the verb, it provides little new information, being redundant with the information already implied by the verb. The adjective in U does provide novel information, but this information is only remotely relevant to the verb. Its relevance could be actualized only in the context of other sentences or clauses. However, the adjective in RV provides new information which at the same time is relevant to the context of the verb.

It was considered of interest also to see how memory for sentences without adjectives (B) compared with memory for sentences with adjectives. Memory for B could be better or worse depending on whether the information provided by the adjective either burdened memory with an additional item to be retrieved, or caused the sentence to be all the more vivid and hence easily remembered.

CHAPTER II

METHOD

Subjects.

Thirty-two native English speakers (16 males, 16 females) were tested on a voluntary basis from the student body at the American Community School in Beirut. The majority (12) were in the 10th grade, nine were in the 9th, eight in the 11th and three in the 12th.

Stimuli.

Sixteen sentence frames of the following form were constructed: article, noun, verb, article, noun. In addition, for each sentence frame three of the following types of adjectives (modifying the object noun) were constructed: one adjective was related to the verb (e.g., raw is related and nearly redundant with the verb cook); one was relevant to the verb (e.g., frozen is relevant in a functional way to how one goes about cooking); and the third was unrelated to the verb (e.g., cheap is unrelated to the action of cooking). This makes a total of 64 different sentences; of which 16 contain a related (R) adjective, 16 a relevant (RV) adjective, 16 an unrelated (U) adjective, and 16 do not contain any adjective (blank: B).

The acquisition and test lists consisted of the 16 sentence frames, every four of which represented one of the four adjectival conditions (B, R, RV, U). The acquisition and test lists were constructed in such a way that every four frames representing a single adjectival category on the acquisition list were equally distributed among the four

adjectival categories on the test list. This means that there were 12 different (new) and 4 repeated (old) sentences on the test list. Every three new sentences and each old sentence represented a different adjectival type.

From the master list of 16 sentence frames, 16 different acquisition/test (A/T) lists were constructed, such that each sentence frame appeared once in each of the 16 possible A/T conditions. Thus, two each of the 32 Ss received the same A/T lists, encountering each sentence frame in a different A/T condition. This is best illustrated by the following diagram.

	ACQUISITION			
TEST	B	R	RV	U
B	1. A 2. B 3. C	1. E 2. F 3. G	1. I 2. J 3. K	1. M 2. N 3. O
R	1. B 2. C 3. D	1. F 2. G 3. H	1. J 2. K 3. L	1. N 2. O 3. P
RV	1. C 2. D 3. E	1. G 2. H 3. I	1. K 2. L 3. M	1. O 2. P 3. A
U	1. D 2. E 3. F	1. H 2. I 3. J	1. L 2. M 3. N	1. P 2. A 3. B

The diagram shows the adjectival conditions in which each of the different sentence frames appeared on just three of the 16 A/T lists. The four adjectival conditions are represented by their abbreviations (B, R, RV, U). The 16 sentence frames are designated by the letters A to P. The first sentence frame (letter) in each A/T cell belongs to

the first list, the second to the second list, and the third to the third list. Thus, for example, the S who get A/T list 2, saw frame H with the R adjective during acquisition and with the RV adjective during test.

In addition, eight buffer sentences were constructed along similar lines and distributed among the four adjectival conditions, such that two were B, two were R, two were RV, and two were U during the acquisition phase. All eight remained the same (hence, were old) during the test phase for all Ss. Therefore, the acquisition lists and the test lists each consisted of 24 sentences, 16 critical and 8 buffer sentences. The test list contained 12 old sentences (eight buffer and four repeated critical sentences) and 12 new sentences (all critical).

Standardization of sentences.

The 24 sentence frames used in the final study were obtained after rather careful selection procedures. First, 41 sentence frames, and at least one example of each of the three adjective types per sentence frame, were composed. Then, these 168 sentences were submitted to one group of Ss to be rated for imagery, and to another group of Ss to be rated for adjective relatedness-to-verbs (see Appendix A for the sentences); while the adjectives were submitted to a third group to be rated for imagery (see Appendix B for the adjectives). Forty-nine native English speakers (24 males, 25 females) from the American Community School, most of them in the 11th and 12th grades, voluntarily partici-

pated in the ratings. Twenty-one rated all of the sentence frames in the various adjectival conditions on a 7-point scale depending on the degree to which they thought that the adjectives were related to the verbs (see Appendix C). Fifteen rated the identical sentences on a 7-point scale for imagery, while another 13 rated each of the adjectives for imagery. These Ss received the imagery instructions of Paivio, Yuille and Madigan(1968), with minor appropriate changes (see Appendix D).

Mean relatedness and mean imagery ratings for all sentences and mean imagery ratings for all adjectives were computed. The final 16 sentence frames were chosen using the following criteria: a) that each of their three adjectives fell in three distinct regions on the adjective relatedness-to-verbs scale (R and U at either end, and RV in the middle of the scale); b) that the mean imagery rating of the sentences of the three adjectival categories were approximately equal (differing from each other by not more than .20 points); c) and that both the mean imagery ratings and the mean frequencies (taken from the norms of Kučera & Francis, 1967) for adjectives in each adjectival category were approximately equal (see Appendix E for the final sentences).

Of the final 16 sentence frames, the relatedness ratings for the U condition ranged from 1.48 to 2.90 with a mean of 2.15; the relatedness ratings for the RV condition ranged from 3.05 to 4.95 with a mean of 3.71; and the relatedness ratings for R ranged from 5.47 to 6.71

with a mean of 5.92. The mean sentence imagery, adjective imagery and adjective frequency rating for the U sentences were 4.35, 4.44 and 30.31 respectively; for the RV the mean ratings were 4.50, 4.22 and 28.56; and for the R condition the mean ratings were 4.47, 3.87 and 35.44. A t-test revealed that there were no significant differences between the sentence imagery ratings of the adjectival categories ($p > .30$ for the largest difference between RV and U). At a subsequent time, 14 native English speakers from the same population as was used before - many of them the same raters even - rated the final 16 sentences without any adjectives (as Bs) together with a small random collection of adjectival sentences for sentence imagery. (see Appendix F). The mean sentence imagery for B was found to be 3.97. t-tests showed that the difference in sentence imagery between B and RV, and between B and R was significant ($p < .05$), while that between B and U was not significant ($p > .30$).

Procedure.

Each S was tested individually, as each list and/or random sentence presentation order was different for each S. The S was told he would be reading some sentences, each of which were typed on a separate index card. He would have only 3 sec. to read each sentence before E would flip it over. He was instructed to read each sentence carefully, because he would be tested on them later. E set the electronic recycling timer at 3 sec, and flipped over each card of the acquisition list at the sound of the faint click emitted by the timer.

After presenting the acquisition set of sentences, E presented orally to each S five two-digit subtraction problems to serve as a distractor task. Then E gave the answer sheet to the S, at the top of which the instructions were typed (see Appendix G). Thus, while E read these instructions aloud to S, the S read them along with E. The S was instructed to decide whether or not the sentences he would be reading were identical to the ones he had read previously. The S was to circle any number from +5 to +1 depending on his degree of certainty that the sentence was the same; and any number from -5 to -1 depending on his degree of certainty that the sentence was different. He was told he would have five sec to read each sentence and to make his rating of confidence.

E then set the recycling timer at five sec, and gave S a blue computer card, with which to help him to keep track of the particular scale he was rating. At each signal from the timer, E flipped over theach cards of the test list, keeping an eye at the same time on the S to make sure he did not make two ratings on the same scale. If S did so, E promptly reminded him of it, so that he could correct it quickly before the next sentence was shown.

After the S had rated all of the cards, E marked beside each rating scale the particular sentence frame the S had rated and also noted the particular A/T list the S had been tested on. E reshuffled, in turn, the acquisition and test cards, and changed the buffer cards

which appeared, two at the beginning and two at the end of each acquisition list and two at the beginning of the test list. The buffers heading the test list were never identical to either the buffers that headed or tailed the acquisition list. The buffer cards were rotated among the A/T lists in a manner similar to that used for the main list, except that since the buffers were fewer in number, every four Ss received the same buffers in the same adjectival conditions.

CHAPTER III

RESULTS

The proportion of sentences that were judged to have been seen before was computed for each S. The mean of these proportions yielded an average response bias of .47, indicating that Ss, on the whole, were almost equally likely to say they had seen the sentences before as to say that they had not. So no statistical adjustment was necessary.

The proportion of Ss who gave incorrect judgments (including false recognitions and false rejections) under each A/T condition was also computed, and may be seen in Table 1. The proportion of Ss who falsely recognized new B sentences (.33) was about the same as the proportion of Ss who falsely recognized new Rs (.32), but the proportion is considerably less for RVs (.21) and even less yet for Us (.15). A chi-square revealed that these differences were not significant ($X^2=4.63$, $p > .05$).

The -5 to +5 rating scale was transformed into a scale ranging from 1 to 10, henceforth to be referred to as the response confidence scale. The only difference between this scale and the one that Ss used is that the negative signs were dropped. Thus, a score of 1 on the response confidence scale means that Ss were very confident that they had not seen a particular sentence before, irrespective of whether they were right or wrong; and a 10 means that Ss were very confident that they had seen a particular sentence before, irrespective of whether they were right or wrong.

TABLE 1

Proportion of Subjects giving Incorrect Judgments as a function of Acquisition and Test Adjective Type

Test Adjective Type	Acquisition Adjective Type: B	R	RV	U	$\bar{X}$	$\bar{X}_{(3)}$*
B	.34	.34	.34	.31	.33	.33
R	.22	.31	.44	.31	.32	.32
RV	.19	.25	.31	.19	.24	.21
U	.16	.13	.16	.28	.18	.15
$\bar{X}$	.23	.26	.31	.27	$\bar{X}$ = .31	

*Mean of the three new test adjective types

The mean response confidence ratings as a function of the 16 A/T conditions are tabulated in Table 2 and illustrated in Fig. 1. A treatment X treatment X subjects analysis of variance on the response confidence ratings as a function of acquisition and test adjective types showed that the main effect of acquisition adjective type was not significant [$F(3,93) = 1.75$, $p > .05$]; but that the main effect of test adjective type [$F(3,93) = 4.31$, $p < .005$] and the acquisition X test interaction [$F(9,279) = 13.86$, $p < .001$] were significant (see Table 3).

The Newman Keuls procedure for individual comparisons of means as a function of test adjective type showed that mean response confidence in B and in R were each significantly greater than in U ($p < .01$ and $p < .05$, respectively). There were no other significant differences.

The Newman Keuls procedure for selected individual comparisons of means as a function of acquisition and test adjective types showed there were no significant differences in response confidence among the old adjective types (i.e., B/B, R/R, RV/RV, U/U). A glance at Fig. 1 suggests that the interaction was primarily due to the old sentences being identified as old more often than the new sentences, which is to be expected. Accordingly, a Scheffé test showed that this was the case [$F(1, 279) = 119.06$, $p < .001$].

The -5 to +5 rating scale was transformed into a scale ranging from 1 to 10, henceforth to be referred to as the accuracy confidence scale. A score on this transformed scale represents both correctness

of the

TABLE 2

Mean Response Confidence Ratings as a function of

Acquisition and Test Adjective Type

Test Adjective Type	Acquisition Adjective Type: Blank (B)	Related (R)	Relevant (RV)	Unrelated (U)	$\bar{X}$
Blank (B)	6.97	4.47	4.25	4.22	4.98
Related (R)	3.25	7.25	4.78	3.69	4.74
Relevant (RV)	3.03	3.13	7.16	3.09	4.10
Unrelated (U)	2.41	2.38	2.41	7.25	3.61
$\bar{X}$	3.92	4.31	4.65	4.56	

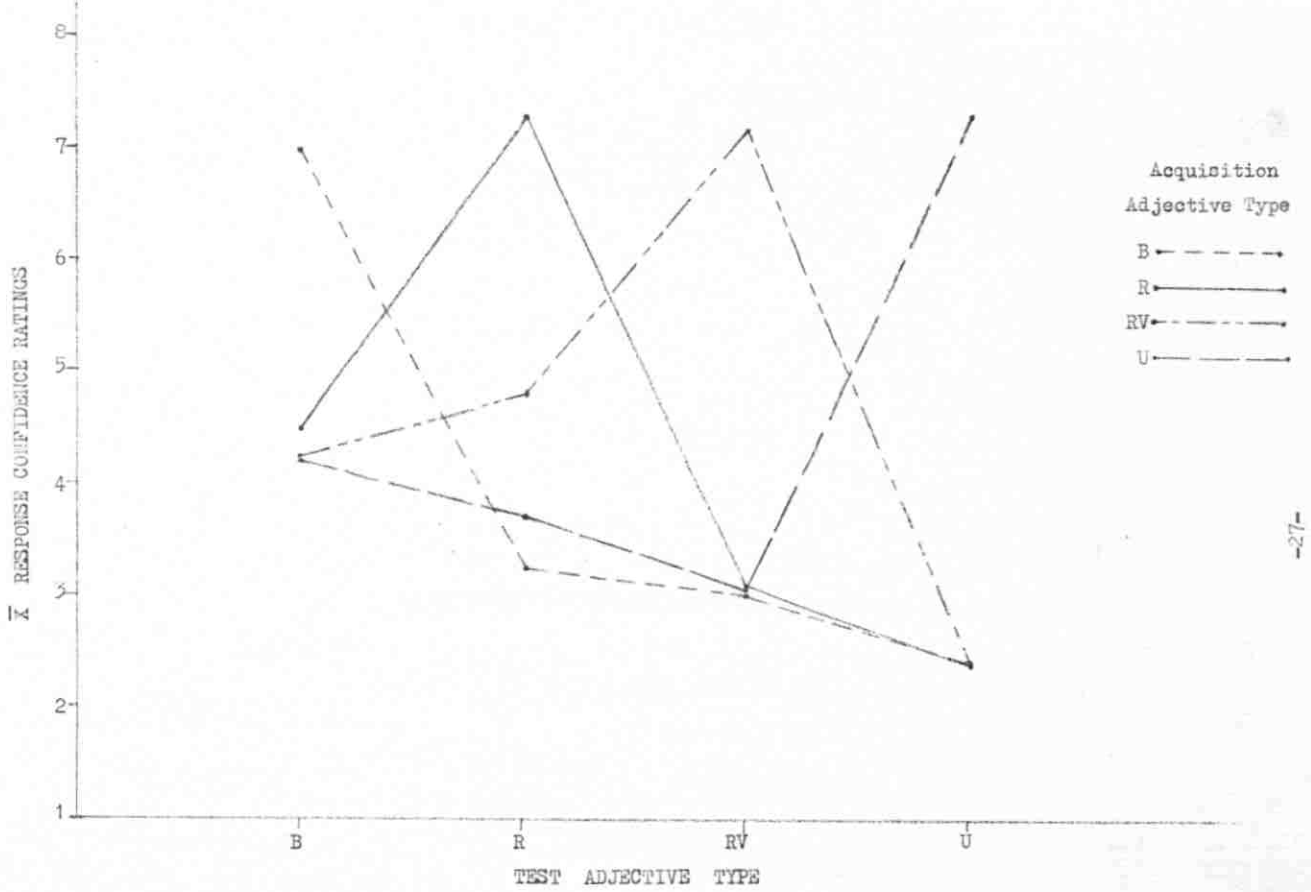

Fig. 1. Mean response confidence ratings as a function of acquisition and test adjective type.

TABLE 3

Treatment X Treatment X Subjects Analysis of Variance of the Response Confidence Ratings as a function of Acquisition and Test Adjective Type

Source	SS	df	ms	F	p
Total	7221.59	511	---	---	---
Subjects	691.65	31	---	---	---
Acq	41.74	3	13.91	1.75	NS
Test	148.02	3	49.34	4.31	.005
A X T	1400.74	9	155.64	13.86	.001
Error A	741.45	93	7.97	---	---
Error T	1065.17	93	11.45	---	---
Error A X T	3132.83	279	11.23	---	---

of the S's response and his confidence therein. If the S gave a correct response, he received a score between 6 and 10, irrespective of whether he responded on the same or different end of the scale. If he was very sure of his response, he got a 10, and if he was least sure he got a 6. However, if the S gave an incorrect response, he received a score between 1 and 5. If he was very confident of his response, he go a 1; and if he was not at all sure of his response, he got a 5. Thus, the scale ranged from the S's being most confident when he was incorrect to his being most confident when he was correct.

The mean accuracy confidence ratings as a function of the 16 A/T conditions are tabulated in Table 4 and illustrated in Fig. 2. A treatment X treatment X subjects analysis of variance on the accuracy confidence ratings as a function of acquisition and test adjective type showed that the main effect of test adjective type was significant [F (3,93) = 3.40, $p < .025$]; and that neither the main effect of acquisition adjective type [F (3,93) = .67, $p > .05$], nor the acquisition X test interaction [F (9, 279) = .84, $p > .05$] were significant. (see Table 5).

A Newman Keuls procedure was carried out for individual comparisons of means as a function of test adjective type. It showed that the mean confidence in U was significantly greater than in B ($p < .05$). There were no other significant differences.

TABLE 4

Mean Accuracy Confidence Ratings as a function of Acquisition and Test Adjective Type

Test Adjective Type	Acquisition Adjective Type: Blank (B)	Related (R)	Relevant (RV)	Unrelated (U)	$\bar{X}$
Blank (B)	6.97	6.53	6.75	6.78	6.76
Related (R)	7.75	7.25	6.22	7.31	7.13
Relevant (RV)	7.97	7.87	7.16	7.91	7.73
Unrelated (U)	8.59	8.63	8.59	7.25	8.27
$\bar{X}$	7.82	7.57	7.18	7.31	

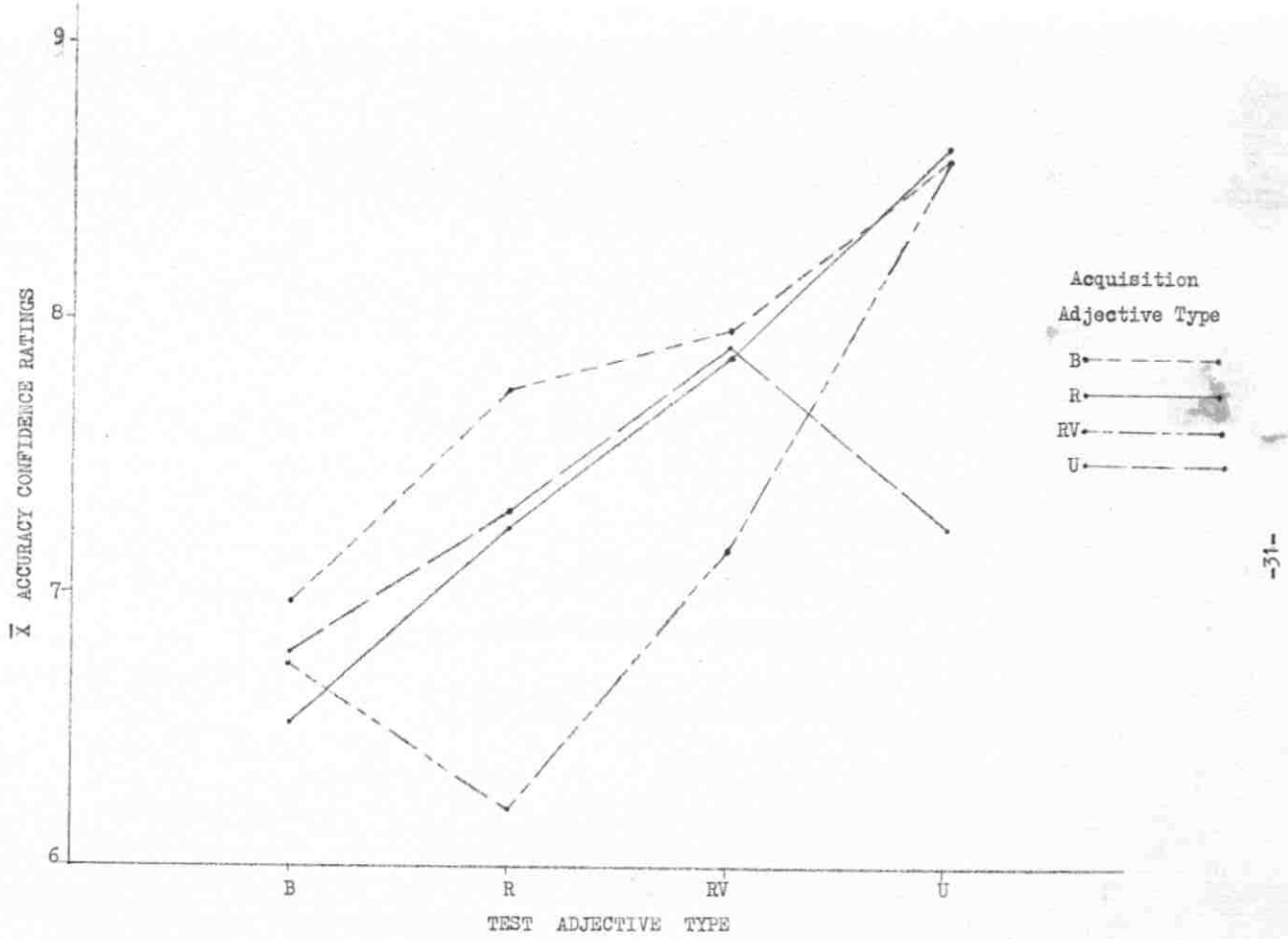

Fig. 2. Mean accuracy confidence ratings as a function of acquisition and test adjective type.

TABLE 5

Treatment X Treatment X Subjects Analysis of Variance of the Accuracy Confidence Ratings as a function of Acquisition and Test Adjective Type

Source	SS	df	ms	F	p
Total	5901.56	511	---	--	--
Subjects	67.12	31	---	--	--
Acq	30.96	3	10.32	.67	NS
Test	168.93	3	56.31	3.40	.025
A X T	70.58	9	7.84	1.12	NS
Error A	1430.23	93	---	--	--
Error T	1542.26	93	---	--	--
Error A X T	2591.48	279	---	--	--

CHAPTER IV

DISCUSSION

Since there was no yes/no response bias, this may be disregarded in the discussion of the results.

Although the trend in proportions of Ss who incorrectly identified, or complementally correctly identified,the verious adjectival categories was as expected, the differences were not statistically significant.

The response confidence scale was used to evaluate E's original prediction based on the idea of Bransford, Barclay and Franks (1972), concerning the ordering of the test sentence types in terms of confidence in false recognitions. The response confidence scale reflects Ss' confidence in both their correct recognitions and false recognitions (recorded at the upper end of the scale) versus both their false rejections and correct rejections (recorded at the lower, opposite, end of the scale).

Bransford et al. (1972) proposed that Ss integrate the information in sentences with their prior knowledge of the world in order to construct WSDs of situations. According to this view, when Ss are asked to decide whether they have seen a particular sentence before, they will extract the information from it and compare it to the originally formed WSD in memory. It seemed reasonable to assume that the more closely sentences match old WSDs, the more they will be identified as the same, and the more confident Ss will be in their

answers. E hypothesized that sentences containing the least novel information, i.e., B, R, RV, U, from least to most, would be the least discrepant from the original WSD, and so match it best.

Although the mean response confidence ratings of sentence types conformed to the pattern predicted, namely, B, R, RV, U, not every difference between two successive adjectival categories were significant. It was found that Bs and Rs were each correctly rejected with significantly less confidence ('falsely recognized' with more confidence) than Us. In contrast to the findings with potentially inferrable sentences of Bransford et al. (1972), there were few false recognitions. Nevertheless, the data appear to support the idea of WSD formation advanced by Bransford et al.(1972). The obtained results seem to indicate that B and R were almost equally consonant with the original WSD, so it seems likely that the amount of information communicated in R was not much different than that communicated in B. B represented the 'least common denominator' so to speak. Being the sentence frame common to all the other types of adjectival sentences, B was a part of the structure of any WSD formed for that particular sentence frame with all its adjectival variations. R would probably have provided no information that Ss would not already have built into their WSDs with help from their knowledge of the world. Us were less confidently recognized than B or R, which was expected. Us were the least likely to match in any way the original WSD, as Us provided

novel information which could neither be deduced from knowledge of the world, nor fit into the context of the verb. The RV mean response confidence fell nearly midway between the Us and the Rs, and did not differ from either of them significantly. Its medial position may be due to the fact that it combines the characteristic features of both the Rs and the Us. It provides new information like the Us, which, however, fits into the context of the verb like the Rs.

The accuracy confidence scale was used to determine which hypotheses - Ehri and Muzio's, Brewer and Harris's, or E's - concerning the ordering of the sentence types in terms of confidence in correct identification was supported by the data. This scale reflects confidence in correct responses, the upper end of the scale representing confidence in both correct recognition and correct rejection, while the lower end represents confidence in false recognition and false rejections.

The hypothesis based on Ehri and Muzio (1974) was that the greater the extent to which adjectives provide information independent of the verb, the greater the confidence in correct recognition. The expected ordering, therefore, was R, RV, U, from least to most confidence. The hypothesis based on Brewer and Harris (1974) was that the greater the extent to which adjectives fit into the context set by the verb, the greater the confidence in correct recognition. The expected ordering was just the opposite of that based on Ehri and

Muzio (1974), namely U, RV, R, from least to most confidence. Finally, E's combination of both these factors, i.e., information and context, yielded the following expected ordering from least to most confidence: R, U, RV.

When correctly identifying sentences, Ss tended to be most confident when they judged a U sentence, next most confident when they judged a RV, then a R and finally, least confident when they judged a B. Therefore, the expected ordering based on Ehri and Muzio (1974), rather than on Brewer and Harris (1974) or E, was supported by the data. (It is interesting to note where the B sentences fall, as all three hypotheses are silent on this point). However, this observed trend must be qualified considerably, for there were no significant differences between any of the adjectival conditions for which a prediction was made, namely among the test Us, RVs and Rs. So the ordering is only a tantalizing trend.

On this accuracy confidence scale, the only comparison which was statistically significant was the Us which were identified with greater confidence than the Bs. Ehri and Muzio's expected ordering was made on the basis of increasing information. Taking this factor into consideration, B would be expected to be least confidently identified as it represents only that information which is common to all the other adjectival conditions, namely, the basic sentence frame (the minimum information possible). Since the differences between the adjectival conditions failed to reach significance, although

they represented increasing degrees of information, it may be that the mere presence of an adjective constitutes sufficient information to override the distinctions among the various adjectival conditions (R, RV, U). In this case, the difference between B and the three adjectival forms would be expected. But if Ehri and Muzio's reasoning can be extended to the B condition, their position is only partially supported by the data, since only the B versus U comparison was significant.

There may be yet an even more fundamental explanation of why the trend predicted on the basis of Ehri and Muzio was not significant. Their incidental learning task consisted of having Ss rate the ease of imaging the 16 subject and 16 object modified sentences. They found that there was no significant difference in sentence imagery between R and U adjectives that modified the subject nouns, but that U adjectival sentences were significantly harder to image than R adjectival sentences, when these adjectives modified the object nouns. In addition, they found that there were no significant differences between the recall of U amd R subject modifiers, but that the recall of U object modifiers was significantly greater than that of R object modifiers. Thus, it appears that amount of recall varied with sentence imagery. It may be the case that it is sentence imagery, rather than the degree to which adjectives carry information independent of the verbs (the novelty of information), which accounted for their results. The difficulty with the sentence

imagery explanation is that, contrary to expectation, it varied inversely, rather than directly, with amount of recall. A similar relationship could easily have been obtained in this experiment if sentence imagery and adjective imagery had not been controlled for initially, because most of the original pool of 41 U sentences were given very low sentence imagery ratings. It is true that, in the present study, the imagery of B sentences (post-experimentally determined) was lower than that of R or RV sentences. However, the only significant difference that was obtained in terms of confidence ratings of correct identification was that between the B and U test sentences, which were equal in imagery. Thus, it would appear that imagery may not be a relevant factor in the present experiment.

Another potentially pertinent explanatory variable is the frequency-recognition effect, which describes the finding that whereas low frequency words are better recognized than high frequency words, high frequency words are better recalled than low frequency words. Kinsbourne and George (1974) showed that this effect is unrelated to differences in association value, imagery, concreteness, or changes in situational frequency, as manipulated by immediately prior exposure. Although all the adjectival type sentences were equated for the frequency of their adjectives, if we may draw the analogy between the fact that low frequency words carry more information than high frequency words, and the fact that U sentences carry more information than any of the other adjectival type sentences, then the frequency-

recognition effect might be generalized to the present study. In that event, U sentences would be expected to be recognized better than the least information-carrying sentences, the Bs, as was found to be the case here. But U sentences should not have been recalled better than R sentences as was observed in both Ehri amd Muzio's study and a pilot study by E (to be mentioned in more detail below); so the utility of this explanation is compromised.

A speculative consideration of the experiment of Olson (1971), reveals a tentative approximation to an explanation of the accuracy confidence data. Olson found that in a forced-choice recognition test, more false recognitions were made to adjectives belonging to the same predicative class as the correct answer, than to adjectives of another predicative class. This supported his view that Ss remember what aspect is predicated (e.g., color) should they forget the particular value predicated (e.g., red). He concluded that the nature of an adjectival predication is stored independently of the particular predication itself. This could have been true of the present experiment. As none of the adjectives in one condition belonged to the same predicative class as adjectives in another condition, and if Ss remember the nature of what was predicated should they forget the particular value predicated, then they would easily reject the distractors. Thus, none of the adjectival conditions conditions should be correctly identified with more confidence than any other. And, indeed, no differences were found among the sentences that contained

the various types of adjectives. But it the nature of a predication is remembered, then one would expect that the presence or absence of a predication should be remembered also. This would not account for the difference that was found between the U and B test conditions. However, the idea of WSDs may be reconciled with Olson's idea. If Bs were the most consonant with the original WSD, they would have been less often correctly identified and that with the least confidence. When Ss encountered one of the other adjectival sentences, remembering the nature of what was predicated deterred them from relying solely on the degree of consonance with the WSD. Thus, the trend predicted on the basis of Ehri and Muzio (1974) was obtained, but failed to reach significance. Memory for the nature of the adjectival predication might be possible through the construction of several WSDs at different levels of specificity, in order to guarantee some (minimal) retention of the general content of a sentence.

It could also be the case that once a S correctly identifies a sentence, his confidence in it remains the same regardless of the adjectival conditions. But then, Bs should not have been identified with less confidence than Us.

The fact that old adjectival sentences were identified as old with the same degree of confidence (response confidence scale) and that they were correctly identified with the same degree of confidence (accuracy confidence scale) constitutes clear evidence that

the type of adjectival sentence seen during acquisition is not important (the main effect of acquisition was not significant on either scale), which in turn points to the typical difference between recall and recognition. In recognition, Ss find it sufficient for the task to respond by comparing the test sentence information with their original WSD. Thus, test adjective type is the important variable, while acquisition adjective type is not. In recall, the Ss must retrieve the original sentence (and verbalize their WSD), and therefore, acquisition adjective type becomes important (as in Ehri and Muzio, 1974). Additional evidence for this difference in strategy Ss adopt comes from a pilor study conducted earlier by E, in which Ss were asked after each recognition trial, to recall what the sentence was if they thought it was different. It was found that Ss recalled correctly more U adjectives (19) than R adjectives (10), while recall of RVs (15) and of Bs (13) foll in between the two. This gives support to the idea that Us are given a distinct representation in the WSD, while Rs are simply assimilated to the structure of the WSD.

The interpretive approach involves memory for what was explicitly stated in a sentence; so it would have predicted no difference in identification of sentences. The contructive approach, however, involves memory for what was also implied by the sentence; and therefore the data, by and large, lend support to it. The concept of S-formed WSDs (put forth by Bransford et al., 1972) proved to be a fairly

effective explanatory tool to account for the obtained pattern of confidence ratings on both scales. The possibility was raised that Ss construct WSDs at several levels of specificity, thereby preventing total loss of sentence memory, should the WSD at the most specific level be forgotten.

APPENDIX A

List of Sentences and 7-point scales submitted to Subjects for Adjective Relatedness-to-verb and for

Sentence Imagery Ratings

	low						high
The sailor fastened the aluminum bolt.	1	2	3	4	5	6	7
The teacher rewarded the fat student.	1	2	3	4	5	6	7
The gunman assasinated the political figure.	1	2	3	4	5	6	7
The judge tried the crazy man.	1	2	3	4	5	6	7
The artist poured the clear glue.	1	2	3	4	5	6	7
The diner flavored the bland food.	1	2	3	4	5	6	7
The manager trusted the witty foreman.	1	2	3	4	5	6	7
The judge tried the young man.	1	2	3	4	5	6	7
The man forced the stuck lock.	1	2	3	4	5	6	7
The captain fought the blond soldier.	1	2	3	4	5	6	7
The pioneer caught the running deer.	1	2	3	4	5	6	7
The charwoman polished the tile floor.	1	2	3	4	5	6	7
The sailor fastened the vital bolt.	1	2	3	4	5	6	7
The neighbor calmed the sobbing woman.	1	2	3	4	5	6	7
The mechanic replaced the ineffective part.	1	2	3	4	5	6	7
The farmer watered the planted soil.	1	2	3	4	5	6	7
The artist poured the liquid glue.	1	2	3	4	5	6	7
The teacher rewarded the intelligent student.	1	2	3	4	5	6	7
The manager trusted the loyal foreman.	1	2	3	4	5	6	7
The handyman repaired the bedroom furniture.	1	2	3	4	5	6	7
The neighbor calmed the frightened lady.	1	2	3	4	5	6	7
The collector restored the old vase.	1	2	3	4	5	6	7
The judge tried the accused man.	1	2	3	4	5	6	7
The sailor fastened the loose bolt.	1	2	3	4	5	6	7
The swimmer righted the painted canoe.	1	2	3	4	5	6	7
The pioneer caught the brave deer.	1	2	3	4	5	6	7
The thief dragged the round case.	1	2	3	4	5	6	7
The woman filled the small jar.	1	2	3	4	5	6	7
The swimmer righted the tiny canoe.	1	2	3	4	5	6	7
The passerby rescued the drowning girl.	1	2	3	4	5	6	7
The counselor awakened the handsome boy.	1	2	3	4	5	6	7
The sailor fastened the stove bolt.	1	2	3	4	5	6	7
The neighbor calmed the drunken lady.	1	2	3	4	5	6	7
The trainer tamed the majestic lion.	1	2	3	4	5	6	7
The drummer quickened the slow beat.	1	2	3	4	5	6	7
The salesman sharpened the old knife.	1	2	3	4	5	6	7
The neighbor calmed the excited woman.	1	2	3	4	5	6	7
The housewife cleaned the square window.	1	2	3	4	5	6	7
The drummer quickened the complex beat.	1	2	3	4	5	6	7
The artist poured the thick glue.	1	2	3	4	5	6	7
The diner flavored the cafeteria food.	1	2	3	4	5	6	7
The pioneer caught the trapped deer.	1	2	3	4	5	6	7

	low						high
The orator silenced the assembled figure.	1	2	3	4	5	6	7
The assistant cooked the raw vegetables.	1	2	3	4	5	6	7
The policeman lowered the freckled arm.	1	2	3	4	5	6	7
The collector restored the ruined vase.	1	2	3	4	5	6	7
The counselor awakened the dozing boy.	1	2	3	4	5	6	7
The woman filled the narrow jar.	1	2	3	4	5	6	7
The policeman lowered the raised arm.	1	2	3	4	5	6	7
The salesman sharpened the butcher knife.	1	2	3	4	5	6	7
The hiker cooled the warm watermelon.	1	2	3	4	5	6	7
The boss retired the tough worker.	1	2	3	4	5	6	7
The man forced the thick lock.	1	2	3	4	5	6	7
The neighbor calmed the angry lady.	1	2	3	4	5	6	7
The collector restored the broken vase.	1	2	3	4	5	6	7
The charwoman polished the dull floor.	1	2	3	4	5	6	7
The man forced the shiny lock.	1	2	3	4	5	6	7
The father punished the bad boy.	1	2	3	4	5	6	7
The mechanic replaced the spare part.	1	2	3	4	5	6	7
The orator silenced the noisy crowd.	1	2	3	4	5	6	7
The child wore out the turtleneck sweater.	1	2	3	4	5	6	7
The hiker cooled the sliced watermelon.	1	2	3	4	5	6	7
The mother ironed the printed skirt.	1	2	3	4	5	6	7
The diner flavored the tasteless food.	1	2	3	4	5	6	7
The mechanic replaced the missing part.	1	2	3	4	5	6	7
The assistant cooked the frozen vegetables.	1	2	3	4	5	6	7
The hunter chased the lame fox.	1	2	3	4	5	6	7
The housewife cleaned the dirty window.	1	2	3	4	5	6	7
The child wore out the threadbare sweater.	1	2	3	4	5	6	7
The father punished the stubborn boy.	1	2	3	4	5	6	7
The collector restored the ancient vase.	1	2	3	4	5	6	7
The athlete climbed the rugged terrain.	1	2	3	4	5	6	7
The educator reconciled the doubtful views.	1	2	3	4	5	6	7
The man forced the light lock.	1	2	3	4	5	6	7
The hunter chased the fleeing fox.	1	2	3	4	5	6	7
The passerby rescued the ugly girl.	1	2	3	4	5	6	7
The maid fed the sick child.	1	2	3	4	5	6	7
The athlete climbed the steep terrain.	1	2	3	4	5	6	7
The salesman sharpened the old knife.	1	2	3	4	5	6	7
The teacher rewarded the deserving student.	1	2	3	4	5	6	7
The collector restored the delicate vase.	1	2	3	4	5	6	7
The farmer watered the red soil.	1	2	3	4	5	6	7
The woman filled the glass jar.	1	2	3	4	5	6	7
The captain fought the enemy soldier.	1	2	3	4	5	6	7

	low						high
The athlete climbed the rocky terrain.	1	2	3	4	5	6	7
The judge tried the innocent man.	1	2	3	4	5	6	7
The servant opened the swinging door.	1	2	3	4	5	6	7
The policeman lowered the tired arm.	1	2	3	4	5	6	7
The mechanic replaced the lost part.	1	2	3	4	5	6	7
The farmer watered the cracked soil.	1	2	3	4	5	6	7
The servant opened the front door.	1	2	3	4	5	6	7
The teacher rewarded the good student.	1	2	3	4	5	6	7
The gunman assasinated the quiet figure.	1	2	3	4	5	6	7
The orator silenced the angry crowd.	1	2	3	4	5	6	7
The mother ironed the pleated skirt.	1	2	3	4	5	6	7
The hunter chased the stealthy fox.	1	2	3	4	5	6	7
The manager trusted the honest foreman.	1	2	3	4	5	6	7
The handyman repaired the antique furniture.	1	2	3	4	5	6	7
The father punished the tall boy.	1	2	3	4	5	6	7
The mechanic replaced the used part.	1	2	3	4	5	6	7
The athlete climbed the beautiful terrain.	1	2	3	4	5	6	7
The servant opened the closed door.	1	2	3	4	5	6	7
The hiker cooled the stolen watermelon.	1	2	3	4	5	6	7
The aunt protected the moody children.	1	2	3	4	5	6	7
The counselor awakened the snoring boy.	1	2	3	4	5	6	7
The woman filled the cookie jar.	1	2	3	4	5	6	7
The fire warmed the carpetted room.	1	2	3	4	5	6	7
The manager trusted the smart foreman.	1	2	3	4	5	6	7
The sailor fastened the rusty bolt.	1	2	3	4	5	6	7
The neighbor calmed the slender lady.	1	2	3	4	5	6	7
The drummer quickened the pleasing beat.	1	2	3	4	5	6	7
The salesman sharpened the dull knife.	1	2	3	4	5	6	7
The father punished the naughty boy.	1	2	3	4	5	6	7
The trainer tamed the mean lion.	1	2	3	4	5	6	7
The counselor awakened the sleeping boy.	1	2	3	4	5	6	7
The handyman repaired the broken furniture.	1	2	3	4	5	6	7
The teacher rewarded the industrious student.	1	2	3	4	5	6	7
The gunman assasinated the hated figure.	1	2	3	4	5	6	7
The drummer quickened the familiar beat.	1	2	3	4	5	6	7
The child wore out the rayon sweater.	1	2	3	4	5	6	7
The father punished the crying boy.	1	2	3	4	5	6	7
The trainer tamed the wild lion.	1	2	3	4	5	6	7
The farmer watered the dry soil.	1	2	3	4	5	6	7
The assistant cooked the cheap vegetables.	1	2	3	4	5	6	7
The diner flavored the ordered food.	1	2	3	4	5	6	7
The gunman assasinated the important figure.	1	2	3	4	5	6	7

	low						high
The passerby rescued the injured girl.	1	2	3	4	5	6	7
The thief dragged the bulky case.	1	2	3	4	5	6	7
The woman filled the empty jar.	1	2	3	4	5	6	7
The teacher rewarded the considerate student.	1	2	3	4	5	6	7
The aunt protected the helpless children.	1	2	3	4	5	6	7
The mother ironed the wrinkled skirt.	1	2	3	4	5	6	7
The captain fought the quiet soldier.	1	2	3	4	5	6	7
The guard defended the grassy wall.	1	2	3	4	5	6	7
The educator reconciled the philosophical views.	1	2	3	4	5	6	7
The swimmer righted the slippery canoe.	1	2	3	4	5	66	7
The thief dragged the bound case.	1	2	3	4	5	6	7
The fire warmed the furnished room.	1	2	3	4	5	6	7
The passerby rescued the needy girl.	1	2	3	4	5	6	7
The educator reconciled the contradictory views.	1	2	3	4	5	6	7
The captain fought the armed soldier.	1	2	3	4	5	6	7
The guard defended the attacked wall.	1	2	3	4	5	6	7
The charwoman polished the wooden floor.	1	2	3	4	5	6	7
The swimmer righted the capsized canoe.	1	2	3	4	5	6	7
The mechanic replaced the imported part.	1	2	3	4	5	6	7
The maid fed the active child.	1	2	3	4	5	6	7
The fire warmed the cold room.	1	2	3	4	5	6	7
The passerby rescued the paralyzed girl.	1	2	3	4	5	6	7
The housewife cleaned the dusty window.	1	2	33	4	5	6	7
The charwoman polished the office floor.	1	2	3	4	5	6	7
The diner flavored the packaged food.	1	2	3	4	5	6	7
The boss retired the handicapped worker.	1	2	3	4	5	6	7
The maid fed the hungry child.	1	2	3	4	5	6	7
The guard defended the exposed wall.	1	2	3	4	5	6	7
The collector restored the crumbled vase.	1	2	3	4	5	6	7
The thief dragged the bulky case.	1	2	3	4	5	6	7
The educator reconciled the opposite views.	1	2	3	4	5	6	7
The aunt protected the frightened children.	1	2	3	4	5	6	7
The diner flavored the steening food.	1	2	3	4	5	6	7
The thief dragged the striped case.	1	2	3	4	5	6	7
The collector restored the lovely vase.	1	2	3	4	5	6	7
The housewife cleaned the streaked window.	1	2	3	4	5	6	7
The thief dragged the heavy case.	1	2	3	4	5	6	7
The athlete climbed the rugged terrain.	1	2	3	4	5	6	7
The fire warmed the damp room.	1	2	3	4	5	6	7
The boss retired the aged worker.	1	2	3	4	5	6	7
The educator reconciled the hellistic views.	1	2	3	4	5	6	7
The aunt protected the vulnerable children.	1	2	3	4	5	6	7

APPENDIX B

List of Adjectives and 7-point scales submitted to Subjects for Adjective Imagery Ratings

	low						high
excited	1	2	3	4	5	6	7
missing	1	2	3	4	5	6	7
realistic	1	2	3	4	5	6	7
antique	1	2	3	4	5	6	7
deserving	1	2	3	4	5	6	7
running	1	2	3	4	5	6	7
dull	1	2	33	4	5	6	7
pleated	1	2	3	4	5	6	7
stubborn	1	2	3	4	5	6	7
grassy	1	2	3	4	5	6	7
office	1	2	3	4	5	6	7
cookie	1	2	3	4	5	6	7
slippery	1	2	3	4	5	6	7
striped	1	2	3	4	5	6	7
stuck	1	2	3	4	5	6	7
needy	1	2	3	4	5	6	7
bulky	1	2	3	4	5	6	7
butcher	1	2	3	4	5	6	7
furnished	1	2	3	4	5	6	7
lovely	1	2	3	4	5	6	7
beautiful	1	2	3	4	5	6	7
raw	1	2	3	4	5	6	7
cafeteria	1	2	3	4	5	6	7
spare	1	2	3	4	5	6	7
dry	1	2	3	4	5	6	7
opposite	1	2	3	4	5	6	7
enemy	1	2	3	4	5	6	7
political	1	2	3	4	5	6	7
round	1	2	3	4	5	6	7
wrinkled	1	2	3	4	5	6	7
dusty	1	2	3	4	5	6	7
attacked	1	2	3	4	5	6	7
philosophical	1	2	3	4	5	6	7
rusty	1	2	3	4	5	6	7
sliced	1	2	3	4	5	6	7
planted	1	2	3	4	5	6	7
light	1	2	3	4	5	6	7
raised	1	2	3	4	5	6	7
loyal	1	2	3	4	5	6	7

sick	1	2	3	4	5	6	7
cheap	1	2	3	4	5	6	7
warm	1	2	3	4	5	6	7
red	1	2	3	4	5	6	7
broken	1	2	3	4	5	6	7
slender	1	2	3	4	5	6	7
steep	1	2	3	4	5	6	7
printed	1	2	3	4	5	6	7
fat	1	2	3	4	5	6	7
accused	1	2	3	4	5	6	7
empty	1	2	3	4	5	6	7
freckled	1	2	3	4	5	6	7
frightened	1	2	3	4	5	6	7
pleasing	1	2	3	4	5	6	7
shiny	1	2	3	4	5	6	7
lame	1	2	3	4	5	6	7
rocky	1	2	3	4	5	6	7
closed	1	2	3	4	5	6	7
damp	1	2	3	4	5	6	7
drunken	1	22	3	4	5	6	7
familiar	1	2	3	4	5	6	7
old	1	2	3	4	5	6	7
tall	1	2	3	4	5	6	7
angry	1	2	3	4	5	6	7
aluminum	1	2	3	4	5	6	7
painted	1	2	3	4	5	6	7
mean	1	2	3	4	5	6	7
ugly	1	2	3	4	5	6	7
crumbled	1	2	3	4	5	6	7
crazy	1	2	3	4	5	6	7
clear	1	2	3	4	5	6	7
tasteless	1	2	3	4	5	6	7
handicapped	1	2	3	4	5	6	7
smart	1	2	3	4	5	6	7
tile	1	2	3	4	5	6	7
assembled	1	2	3	4	5	6	7
threadbare	1	2	3	4	5	6	7
blond	1	2	3	4	5	6	7
ineffective	1	2	3	4	5	6	7
noisy	1	2	3	4	5	6	7
contradictory	1	2	3	4	5	6	7
dirty	1	2	3	4	5	6	7
brave	1	2	3	4	5	6	7

	low						high
snoring	1	2	3	4	5	6	7
tough	1	2	3	4	5	6	7
cracked	1	2	3	4	5	6	7
tiny	1	2	3	4	5	6	7
stove	1	2	3	4	5	6	7
trapped	1	2	3	4	5	6	7
bound	1	2	3	4	5	6	7
vital	1	2	3	4	5	6	7
fleeing	1	2	3	4	5	6	7
important	1	2	3	4	5	6	7
doubtful	1	2	3	4	5	6	7
opposite	1	2	3	4	5	6	7
ordered	1	2	3	4	5	6	7
hated	1	2	3	4	5	6	7
dozing	1	2	3	4	5	6	7
armed	1	2	3	4	5	6	7
wild	1	2	3	4	5	6	7
small	1	2	3	4	5	6	7
steaming	1	2	3	4	5	6	7
helpless	1	2	3	4	5	6	7
narrow	1	2	3	4	5	6	7
good	1	2	3	4	5	6	7
used	1	2	3	4	5	6	7
cold	1	2	3	4	5	6	7
considerate	1	2	3	4	5	6	7
vulnerable	1	2	3	4	5	6	7
naughty	1	2	3	4	5	6	7
packaged	1	2	3	4	5	6	7
angry	1	2	3	4	5	6	7
industrious	1	2	3	4	5	6	7
paralyzed	1	2	3	4	5	6	7
imported	1	2	3	4	5	6	7
bad	1	2	3	4	5	6	7
streaked	1	2	3	4	5	6	7
witty	1	2	3	4	5	6	7
ruined	1	2	3	4	5	6	7
young	1	2	3	4	5	6	7
liquid	1	2	3	4	5	6	7
square	1	2	3	4	5	6	7

	low						high
rayon	1 w	2	3	4	5	6	7
hungry	1	2	3	4	5	6	7
bedroom	1	2	3	4	5	6	7
stolen	1	2	3	4	5	6	7
innocent	1	2	3	4	5	6	7
glasssss	1	2	3	4	5	6	7
sobbing	1	2	3	4	5	6	7
exposed	1	2	3	4	5	6	7
active	1	2	3	4	5	6	7
thick	1	2	3	4	5	6	7
intelligent	1	2	3	4	5	6	7
moody	1	2	3	4	5	6	7
sleeping	1	2	3	4	5	6	7
swinging	1	2	3	4	5	6	7
tired	1	2	3	4	5	6	7
injured	1	2	3	4	5	6	7
wooden	1	2	3	4	5	6	7
turtleneck	1	2	3	4	5	6	7
stealthy	1	2	3	4	5	6	7
delicate	1	21	3	4	5	6	7
aged	1	2	3	4	5	6	7
honest	1	2	3	4	5	6	7
lost	1	2	3	4	5	6	7
drowning	1	2	3	4	5	6	7
handsome	1	2	3	4	5	6	7
carpetted	1	2	3	4	5	6	7
heavy	1	2	3	4	5	6	7
frozen	1	2	3	4	5	6	7
crying	1	2	3	4	5	6	7
rugged	1	2	3	4	5	6	7
front	1	2	3	4	5	6	7
capsized	1	2	3	4	5	6	7
majestic	1	2	3	4	5	6	7
slow	1	2	3	4	5	6	7
dull	1	2	3	4	5	6	7
bland	1	2	3	4	5	6	7
complex	1	2	3	4	5	6	7
loose	1	2	3	4	5	6	7
quiet	1	2	3	4	5	6	7
ancient	1	2	3	4	5	6	7

APPENDIX C

Instructions for Adjective Relatedness-to-verb scale

INSTRUCTIONS

The purpose of this experiment is to rate the extent to which adjectives are related to verbs in a set of sentences. Your ratings will be made on a seven point scale, where seven is the high relatedness end of the scale and one is the low relatedness end. Your task is to circle the number which best indicates your estimate of the degree to which the adjective is related to the verb in each of the sentences.

For example: in the sentence "the assistant cooked the raw vegetables", the adjective raw is strongly related to the verb cook, as the verb cook by itself would imply that the vegetables being cooked were previously uncooked, and probably raw. This verb-adjective pair should therefore be given a rating at the high relatedness end of the scale.

In the sentence "the assistant cooked the cheap vegetables", the relationship of the adjective cheap to the verb cook is quite weak, as the cost of the vegetables has little if anything to do with how one cooks them. So this verb-adjective pair would probably be given a rating at the low relatedness end of the scale.

In the sentence "the assistant cooked the frozen vegetables", the relationship of the adjective frozen to the verb cook might be considered as neither very strong nor very weak, for if vegetables are frozen, then it might make a difference how one goes about cooking them. In this case, the verb-adjective pair would be given a rating somewhere toward the middle of the scale.

Feel free to use the entire range of numbers from one to seven. Don't be concerned either about how often you use a particular number, or about how often you encounter a particular sentence in which only the adjective is changed. Work fairly quickly, but don't be careless in your ratings.

If necessary refer back to these instructions when rating the words on the following pages. If there are any questions, ask them now. Otherwise, turn the page and begin.

APPENDIX D

Instructions for Adjective and for Sentence Imagery Ratings

INSTRUCTIONS

Adjectives differ in their capacity to arouse mental images of things or events. Some adjectives arouse a sensory experience, such as a mental picture or sound, very quickly and easily, whereas others may do so only with difficulty (i.e. after a long delay) or not at al.. The purpose of this experiment is to rate a list of adjectives as to the ease or difficulty with which they arouse mental images. Any adjective which, in your estimation, arouses a mental image (i.e. a mental picture, or sound, or other sensory experience) very quickly and easily should be given a high imagery rating; any adjective that arouses a mental image with difficulty or not at all should be given a low imagery rating. Think of the adjectives "red" or "loyal". Red would probably arouse an image relatively easily and would be rated as high imagery; loyal would probably do so with difficulty and would be rated as low imagery. Since adjectives tend to make you think of other adjectives as associates, e.g. , red-bloody, it is inprotant that you note only the ease of getting a mental image which that particular adjective arouses.

Your ratings will be made on a seven-point scale, where one is the low imagery end of the scale and seven is the high imagery end of the scale. Make your rating by putting a circle around the number from 1 to 7 that best indicates your judgment of the ease or difficulty with which the adjective arouses imagery. The adjectives that arouse mental images most readily for you should be given a rating of 7; adjectives that arouse images with the greatest difficulty or not at all should be rated 1; adjectives that are intermediate in ease or difficulty of imagery, of course, should be rated appropriately between the two extremes. Feel free to use the entire range of numbers, from 1 to 7; at the same time, don't be concerned about how often you use a particular number as long as it is your true judgment. Work fairly quickly but do not be careless in your ratings.

If necessary refer back to these instructions when rating the words on the following pages. If there are any questions, ask then now. Otherwise, turn the page and begin.

INSTRUCTIONS

Sentences differ in their capacity to arouse mental images of things or events. Some sentences arouse a sensory experience, such as a mental picture or sound, very quickly and easily, whereas others may do so only with difficulty (i.e. after a long delay) or not at all. The purpose of this experiment is to rate a list of sentences as to the ease or difficulty with which they arouse mental images. Any sentence which, in your estimation, arouses a mental image (i.e. a mental picture, or sound, or other sensory experience) very quickly and easily should be given a high imagery rating; any sentence that arouses a mental image with difficulty or not at all should be given a low imagery rating.

Think of the sentences "the child looked at the green apple" or "the citizen reflected upon the current issues". The first would probably arouse an image relatively easily and would be rated as high imagery; the second would probably do so with difficulty and would be rated as low imagery.

Your ratings will be made on a seven-point scale, where one is the low imagery end of the scale and seven is the high imagery end of the scale. Make your rating by putting a circle around the number from 1 to 7 that best indicates your judgment of the ease or difficulty with which the sentence arouses imagery. The sentences that arouse mental images most readily for you should be given a rating of &; sentences that arouse images with the greatest difficulty or not at all should be rated 1; sentences that are intermediate in ease or difficulty of imagery, of course, should be rated appropriately between the two extremes. Feel free to use the entire range of numbers, from 1 to 7; at the same time, don't be concerned about how often you use a particular number as long as it is your true judgment. Work fairly quickly but do not be careless in your ratings.

If necessary refer back to these instructions when rating the words on the following pages. If there are any questions, ask then now. Otherwise, turn the page and begin.

APPENDIX E

The 24 sentence frames with their adjectives used in the experiment, and their mean ratings on the adjective relatedness-to-verb scale, the sentence imagery and adjective imagery scales, and their adjective frequency

Sentence Frames		RELATEDNESS-TO-VERB	SENTENCE IMAGERY	ADJECTIVE IMAGERY	ADJECTIVE FREQUENCY
A	The assistant cooked the ( ) vegetables.		3.29		
	(raw)	6.71	5.00	4.31	43
	(frozen)	4.24	5.20	5.08	27
	(cheap)	1.50	4.40	4.54	24
B	The policeman lowered the ( ) arm.		4.00		
	(raised)	5.62	4.21	3.38	101
	(tired)	4.43	4.33	4.08	48
	(freckled)	1.48	3.87	5.23	1
C	The father punished the ( ) boy.		4.93		
	(naughty)	6.52	4.60	3.75	1
	(stubborn)	4.10	4.67	3.54	12
	(tall)	1.86	4.20	5.85	55
D	The passerby rescued the ( ) girl.		4.00		
	(drowning)	5.86	5.40	5.23	4
	(needy)	3.38	3.87	3.23	6
	(ugly)	1.57	4.33	3.77	21
E	The mechanic replaced the ( ) part.		4.36		
	(missing)	5.57	4.27	2.77	33
	(spare)	3.33	4.40	3.77	23
	(imported)	2.48	3.80	3.83	8
F	The aunt protected the ( ) youngster.		4.14		
	(helpless)	5.76	4.47	4.75	21
	(frightened)	4.81	4.53	4.00	26
	(moody)	1.86	4.33	4.17	5
G	The teacher rewarded the ( ) student.		3.21		
	(deserving)	6.10	4.20	2.69	2
	(considerate)	3.05	3.47	3.33	4
	(fat)	2.00	4.40	5.15	60

Sentence Frames		RELATEDNESS-TO-VERB	SENTENCE IMAGERY	ADJECTIVE IMAGERY	ADJECTIVE FREQUENCY
H	The drummer quickened the ( ) beat.		5.79		
	(slow)	6.05	4.53	4.17	60
	(familiar)	3.05	5.00	3.00	72
	(pleasing)	2.90	4.40	3.54	10
I	The judge tried the ( ) man.		3.36		
	(accused)	5.43	4.40	2.54	25
	(crazy)	3.62	4.27	3.92	34
	(youthful)	2.38	4.60	5.08	12
J	The maid fed the ( ) child.		3.93		
	(hungry)	6.14	5.00	4.92	23
	(sick)	3.10	4.73	4.46	51
	(active)	2.43	4.53	3.62	88
K	The woman filled the ( ) jar.		3.50		
	(empty)	6.00	4.20	3.69	64
	(cookie)	3.14	4.87	4.77	1
	(glass)	2.14	4.53	4.77	99
L	The swimmer righted the ( ) canoe.		4.86		
	(capsized)	5.71	5.27	5.62	0
	(slippery)	3.10	4.47	5.38	5
	(painted)	1.48	5.27	4.08	40
M	The charwoman polished the ( ) floor.		4.50		
	(dull)	6.00	3.80	3.45	27
	(wooden)	4.38	4.73	4.54	50
	(rectangular)	2.76	4.73	4.23	5
N	The sailor fastened the ( ) bolt.		3.64		
	(loose)	5.24	4.13	3.46	53
	(rusty)	3.10	5.07	4.92	8
	(shiny)	1.72	4.30	4.85	3
O	The manager trusted the ( ) foreman.		2.36		
	(loyal)	6.05	3.33	3.46	47
	(smart)	3.86	3.60	3.77	21
	(witty)	2.90	3.00	4.00	10

Sentence Frames		RELATEDNESS-TO-VERB	SENTENCE IMAGERY	ADJECTIVE IMAGERY	ADJECTIVE FREQUENCY
P	The collector restored the ( ) vase.		3.57		
	(broken)	6.00	4.67	3.69	63
	(ancient)	4.76	4.87	5.69	69
	(lovely)	2.90	4.93	4.31	44
Buffer Sentence Frames					
1	The mother ironed the (wrinkled) skirt.		5.50		
	(wrinkled)	6.29	5.60	5.00	12
	(pleated)	4.62	4.53	3.42	0
	(printed)	2.29	5.00	3.77	36
2	The boss retired the ( ) worker.				
	(aged)	6.05	4.31	4.65	18
	(handicapped)	4.86	3.80	3.85	13
	(tough)	2.38	3.13	4.00	36
3	The neighbor calmed the ( ) lady.		4.50		
	(excited)	6.00	5.60	4.69	23
	(drunken)	3.05	4.80	4.77	7
	(slender)	1.48	4.33	4.23	19
4	The thief dragged the ( ) case.				
	(heavy)	5.71	5.00	4.08	110
	(bulky)	4.93	4.97	4.15	9
	striped)	1.38	4.13	4.85	5
5	The artist poured the ( ) glue.				
	(liquid)	5.48	4.13	5.25	48
	(thick)	3.86	5.47	4.69	67
	(clear)	2.14	4.60	4.69	219
6	The athlete climbed the ( ) terrain.		4.79		
	(steep)	5.54	5.77	4.31	19
	(rocky)	4.81	5.93	5.62	10
	(beautiful)	2.19	5.00	4.54	127

Buffer Sentence Frames		RELATEDNESS-TO-VERB	SENTENCE IMAGERY	ADJECTIVE IMAGERY	ADJECTIVE FREQUENCY
7	The farmer watered the ( ) soil.		4.93		
	(dry)	6.48	5.87	4.62	68
	(planted)	4.00	3.07	2.92	11
	(red)	1.81	5.33	5.23	197
8	The pioneer caught the ( ) deer.		4.86		
	(running)	3.19	4.47	4.54	123
	(trapped)	3.90	5.53	3.15	
	(brave)	1.90	3.60	4.46	

APPENDIX F

List of Blank Sentences (and Filler Adjective Sentences)and

7-point scales submitted to Subjects for

Sentence Imagery Ratings

	low						high
The counselor awakened the sleeping boy.	1	2	3	4	5	6	7
The man forced the thick lock.	1	2	3	4	5	66	7
The pioneer caught the deer.	1	2	3	4	5	6	7
The neighbor calmed the lady.	1	2	3	4	5	6	7
The salesman sharpened the old knife.	1	2	3	4	5	6	7
The judge tried the man.	1	2	3	4	5	6	7
The orator silenced the colorful crowd	1	2	3	4	5	6	7
The passerby rescued the girl.	1	2	3	4	5	6	7
The mechanic replaced the part.	1	2	3	4	5	6	7
The boss retired the tough worker.	1	2	3	4	5	6	7
The father punished the boy.	1	2	3	4	5	6	7
The hunter chased the stealthy fox.	1	2	3	4	5	6	7
The policeman lowered the arm.	1	2	3	4	5	6	7
The thief dragged the bulky case.	1	2	3	4	5	6	7
The diner flavored the bland food.	1	2	3	4	5	6	7
The maid fed the child.	1	2	3	4	5	6	77
The artist poured the liquid glue.	1	2	3	4	5	6	7
The charwoman polished the floor.	1	2	3	4	5	6	7
The collector restored the vase.	1	2	3	4	5	6	7
The captain fought the quiet soldier.	1	2	3	4	5	6	7
The drummer quickened the beat.	1	2	3	4	5	6	7
The sailor fastened the bolt.	1	2	3	4	5	6	7
The swimmer righted the canoe.	1	2	3	4	5	6	7
The gunman assassinated the hated figure.	1	2	3	4	5	6	77
The aunt protected the youngster.	1	2	3	4	5	6	77
The teacher rewarded the student.	1	2	3	4	5	66	777
The assistant cooked the vegetables.	1	2	3	4	5	66	77
The woman filled the jar.	1	2	3	4	5	6	6777
The manager trusted the foreman.	1	2	3	4	5	6	6 77
The housewife cleaned the streaked window.	1	2	3	4	5	66	7
The farmer watered the soil.	1	2	3	4	5	6	7
The mother ironed the skirt.	1	2	3	4	5	6	7
The athlete climbed the terrain.	1	2	3	4	5	6	7

APPENDIX G

Instructions and Answer Sheet for the Experiment Proper

INSTRUCTIONS

Now I want you to read the sentences on these index cards. For each sentence you read, I want you to decide whether you have already read the identical sentence before.

If you are very sure that it is identical to one you read before, circle the +5 on the SAME end of the scale on your answer sheet below. Circle the +4, +3 and +2 depending on how much less sure you are that it is the same, but if you are not at all sure, circle the +1. However, if you are very sure that the sentence is **different** in some way from any you read earlier, circle the -5 on the DIFFERENT end of the scale. Circle the -4, -3 and -2 depending on your degree of certainty that it is different. from any of the sentences you read before. Circle the -1 if you are quite uncertain that the sentence is different from any you have seen before. Feel free to use the entire scale from -5 through -1 and +1 to +5; yett don't be concerned about how often you use a particular number as long as it is your true judgment. Work quickly, but do not be careless in your ratings. You will have 5 sec. to read each sentence and to make your rating.

Very sure it's DIFFERENT		Less sure it's different				Less sure it's same			Very sure it's SAME
-5	-4	-3	-2	-1	+1	+2	+3	+4	+5
-5	-4	-3	-2	-1	+1	+2	+3	+4	+5
-5	-4	-3	-2	-1	+1	+2	+3	+4	+5
-5	-4	-3	-2	-1	+1	+2	+3	+4	+5
-5	-4	-3	-2	-1	+1	+2	+3	+4	+5
-5	-4	-3	-2	-1	+1	+2	+3	+4	+5
-5	-4	-3	-2	-1	+1	+2	+3	+4	+5
-5	-4	-3	-2	-1	+1	+2	+3	+4	+5
-5	-4	-3	-2	-1	+1	+2	+3	+4	+5
-5	-4	-3	-2	-1	+1	+2	+3	+4	+5
-5	-4	-3	-2	-1	+1	+2	+3	+4	+5
-5	-4	-3	-2	-1	+1	+2	+3	+4	+5
-5	-4	-3	-2	-1	+1	+2	+3	+4	+5
-5	-4	-3	-2	-1	+1	+2	+3	+4	+5
-5	-4	-3	-2	-1	+1	+2	+3	+4	+5
-5	-4	-3	-2	-1	+1	+2	+3	+4	+5
-5	-4	-3	-2	-1	+1	+2	+3	+4	+5
-5	-4	-3	-2	-1	+1	+2	+3	+4	+5
-5	-4	-3	-2	-1	+1	+2	+3	+4	+5
-5	-4	-3	-2	-1	+1	+2	+3	+4	+5
-5	-4	-3	-2	-1	+1	+2	+3	+4	+5
-5	-4	-3	-2	-1	+1	+2	+3	+4	+5
-5	-4	-3	-2	-1	+1	+2	+3	+4	+5
-5	-4	-3	-2	-1	+1	+2	+3	+4	+5

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