

## SHORT REPORTS

### MEMORY FOR TACIT IMPLICATIONS OF SENTENCES<sup>1</sup>

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The present study investigated the nature of the information that is available to Ss when they have comprehended linguistic materials. The Ss were read a set of acquisition stories and later asked to recognize which of a set of test sentences they had actually heard in the stories. The Ss were likely to "recognize" novel sentences which expressed information consonant with implications of the material presented during acquisition.

The present experiment was based on the assumption that comprehension involves inferential thinking. For example, a study by Bransford, Barclay, and Franks (1971) indicated that information about spatial relationships implied but not explicitly stated in linguistic inputs is available to Ss on a later recognition task. However, comprehending many types of information may include more than knowledge about the spatial relations among objects. For example, Ss may also make inferences about the objects which might be involved in certain relations, and about the consequences suggested by certain relations. The present study asked whether Ss were likely to think they heard information based on such inferences.

Two classes of items were investigated. Type A items were like those previously studied by Kintsch (1972). Kintsch presented Ss with sentences like *THE MAN WAS SHOT* and asked them to specify additional information that seemed to be true about the sentences. His Ss indicated that the man must be shot by something (i.e., there must be some *instrument* for carrying out the action, to use Fillmore's, 1968, term), and most assumed that "something" would be a gun. Type B items each suggested some consequence of the action described, e.g., *THE BOY HIT THE BASEBALL AND WATCHED AS IT FLEW INTO THE PICTURE WINDOW IN THE HOUSE*. One probable consequence is that the window shattered. The Ss heard stories of both types and were then presented with a recognition test where some items contained information that was only true by implication (e.g., that a gun was used to shoot the man in Type A situations, that the window shattered in Type B situations).

**Method.** The experiment consisted of an acquisition phase and a recognition phase. Experimental and control groups received the same recognition list and differed with respect to the acquisition list.

For both groups, the acquisition list consisted of 20 short (two or three sentences) descriptive

stories. Eight of these were identical in both experimental and control lists and were filler items which were of no interest in the analysis. For the experimental group, the remaining 12 stories were inference stories. There were 6 Type A stories in which an object was implied and 6 Type B stories, each of which suggested some probable consequence. For the control group, the same 12 inference story frames were used, but in each case either a prepositional phrase or a verb phrase was changed. Thus, for the control group no object was implied or the implied object was different in Type A stories, and the probable consequence of the action was changed in Type B stories.

The recognition list consisted of 38 sentences. The first 2 sentences were filler sentences included to give Ss an opportunity to adjust to the recognition task and to get used to the pacing. The remaining 36 sentences included three categories—old, unrelated, and inference. Old sentences were identical to those used in the stories of both groups. Unrelated sentences involved elements from the acquisition stories, but were inconsistent with the information conveyed by the stories. Inference sentences were not identical to the acquisition sentences for either experimental or control groups, but were potentially true by implication for experimental Ss.

Three examples of each type of acquisition story are given below, with the changes made for the control group given in parentheses and the corresponding inference recognition item given in italics.

Type A: (a) JOHN WAS TRYING TO FIX THE BIRD HOUSE. HE WAS POUNDING (LOOKING FOR) THE NAIL WHEN HIS FATHER CAME OUT TO WATCH HIM AND TO HELP HIM DO THE WORK. *John was using the hammer to fix the bird house when his father came out to watch him and to help him do the work.* (b) THE FARMERS MUST BE WARNED OF THE ONCOMING FLOOD, THE SHERIFF CRIED. HE MOUNTED (PHONED) AS QUICKLY AS POSSIBLE SINCE HE KNEW THAT IT WOULD TAKE QUITE A WHILE TO SPREAD ALL THE NEWS. *The sheriff mounted his horse as quickly as possible since he knew that it would take quite a while to spread all the news.* (c) IT WAS 7:00 ON MONDAY MORNING AND THE MAN DROVE (WALKED) TO WORK. IT WAS A BEAUTIFUL DAY, AND HE REALLY ENJOYED THE TRIP. *It was 7:00 on Monday morning and the man took his car to work.*

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TABLE 1  
MEAN NUMBER OF YES RESPONSES DURING RECOGNITION

Group	Recognition Item	
	Old (10 sentences)	Inference (12 sentences)
Experimental	6.65	7.65
Control	6.95	2.60

Type B: (a) WHEN THE MAN ENTERED THE KITCHEN HE SLIPPED ON A WET SPOT AND DROPPED (JUST MISSED) THE DELICATE GLASS PITCHER ON THE FLOOR. THE PITCHER WAS VERY EXPENSIVE, AND EVERYONE WATCHED THE EVENT WITH HORROR. *When the man entered the kitchen he slipped on a wet spot and broke the delicate glass pitcher when it fell on the floor.* (b) IT WAS LATE AT NIGHT WHEN THE PHONE RANG AND A VOICE GAVE A FRANTIC CRY. THE SPY THREW (PULLED) THE SECRET DOCUMENT INTO (FROM) THE FIREPLACE JUST IN TIME, SINCE 30 SECONDS LONGER WOULD HAVE BEEN TOO LATE. *The spy burned the secret document just in time since 30 seconds longer would have been too late.* (c) THE RIVER WAS NARROW. A BEAVER HIT THE LOG THAT A TURTLE WAS SITTING ON (BESIDE) AND THE LOG FLIPPED OVER FROM THE SOCK. THE TURTLE WAS VERY SURPRISED BY THE EVENT. *A beaver hit the log and knocked the turtle into the water.*

For both experimental and control Ss the same ordering of the 20 acquisition stories was used. The order was random with the restriction that the acquisition list begin and end with a filler story. The recognition sentences were randomized in blocks of the three categories (old, unrelated, and inference). Due to an error in making up the control acquisition list, two recognition sentences which should have been old for these Ss were not (one each from Type A and Type B stories). Therefore, the corresponding recognition sentences in the experimental group were ignored when the data were scored. Consequently, for both experimental and control groups, the analysis of the recognition performance was based on 10 old sentences, 12 unrelated sentences, and 12 inference sentences.

Experimental Ss were tested in two group sessions, as were control Ss. The Ss were told to listen carefully to the descriptive stories and that they would be asked questions about them later. The acquisition list was read once by E at a normal reading rate. There were approximately 2 sec. between stories, during which E announced "next story." The retention interval was 3 min. During this time, paper was distributed, Ss numbered the page 1-38, and the following recognition instructions were read:

Now I'm going to read you some sentences. For each one, please indicate whether or not it is an actual sentence from one of the stories you heard. If you think the sentence was exactly as you heard it in one of the stories write yes; if you think the sentence was not from one of the stories, or is not exactly in the same words as you heard it in one of the stories,

write no. Please give a yes or no answer for each sentence, even if you feel you have to guess. There will not be much time between sentences, so please make your judgments quickly.

The test sentences were read at a 10-sec. rate.

The experiment was initially conducted with high school student volunteers and was later replicated with introductory psychology students at the State University of New York at Stony Brook. Protocols from 10 Ss in each of the four testing sessions were randomly selected to equalize ss.

*Results.* In a preliminary analysis of the data, type of S (high school or college student) was not a significant variable in any comparison. In addition, the results reported below held for both S populations independently. Therefore, the data from both populations were combined in the following analyses.

Experimental and control Ss did not differ in mean number of yes responses to unrelated items; the means were .70 and .45, respectively ( $F < 1$ ). Table 1 shows the mean number of yes responses for old and inference recognition items. The Condition  $\times$  Type of Item interaction was significant,  $F(1, 38) = 27.36, p < .001$ . This interaction reflects the fact that the experimental and control Ss did not differ on old items ( $F < 1$ ), whereas the experimental Ss were much more likely than the control Ss to say yes to the inference items,  $F(1, 38) = 49.73, p < .001$ . The absolute number of Ss responding yes was higher in the experimental than control condition for all 12 inference recognition items.

*Discussion.* These results are consistent with the notion that an S's understanding depends not only on what he hears, but on the implications of this information in light of relevant knowledge he already possesses. The Ss were likely to think that information available only by implication was actually given during the acquisition task. On the basis of the present procedures one cannot determine whether such implications were actually realized at acquisition or whether they were determined at recognition. The general conditions under which inferences are made is a question for future research. Also of interest are the processes by which Ss reject information; these may involve acts of inference as well. Consider, for example, the inference test sentence WHEN THE MAN ENTERED THE KITCHEN HE SLIPPED ON A WET SPOT AND BROKE THE DELICATE GLASS PITCHER WHEN IT FELL ON THE FLOOR. Control Ss could have rejected this sentence because their understanding of the situation included an intact rather than broken pitcher, or because they remembered that the pitcher was on the floor, whereas the verb TO FALL implied that it was initially above the floor. Perhaps the ease (e.g., in a reaction time task) with which an S can accept and reject information would provide more precise information about the state of his knowledge following comprehension. The major point of the present article is that slight changes in inputs can result in large differences in the ideas communicated, including the implications that may be derived.

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