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ABSTRACT

Using computer controlled text presentation that permitted the measurement of reading time for individual sentences, a study tested two hypotheses concerning how schemata guide reading comprehension. The focusing hypothesis suggested that the schemata activated by the reader's perspective might identify relevant information to which additional processing would then be directed. The slot-filling hypothesis suggested that the schemata would provide a structure to which relevant information could be readily assimilated with no additional processing. The 106 subjects read and recalled a passage from one of three assigned perspectives (burglar, homebuyer, control). The effect of "naturally occurring" perspective was tested by recruiting subjects from a real estate class, an educational psychology class, and a police training institute. The results confirmed the powerful role of perspective in determining perceived importance and likelihood of recall. Consistent with the focusing hypothesis, readers spent more time on sentences containing information important to their perspective. (Author/RL)

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The Effect of Reader Knowledge on Text Comprehension:

What Real Cops and Pretend Burglars Look for in a Story

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Recent research has demonstrated that text comprehention is an interactive process in which the reader utilizes the text as a source of raw materials from which to construct meaning. The plans or blue prints which guide construction have been variously called schemata, scripts, and frames. The common core of these constructs (which we will call schemata) is that they provide an organized structure by which information can be assimilated. A schema represents a prototypical model of an object or event based on prior experience and specifies the component parameters and relations between parameters which constitute the model. Thus, the schema for tree might include roots, trunk, limbs, and leaves as parameters and specify their various spatial and biological interrelationships. Information about a new instance of tree is acquired by instantiating the schema, that is, by binding the proper values to the variables specified, such as the size and shape of the trunk and leaves.

The powerful role of schemata in text comprehension and memory has been demonstrated by Anderson, Reynolds, Shallert, and Goetz (1977) who showed that when reading an ambiguous text, for instance one which could be interpreted as being about a card game or musical quartet practice, readers constructed a particular interpretation based on their prior knowledge and interests (i.e. whether they were physical education or music education students) and that they were most often unaware of the ambiguities.

Pichert and Anderson (1977) have shown that schemata are powerful determinants of the relative importance of text elements. They presented college students with a text that contained information that would be of

special interest to a burglar (e.g. the location of booty, information useful in gaining entry and avioding detection) and other information that would be of greatest value to a prospective homebuyer (e.g. information about the structural condition and remodeling of the house). When asked to assume the homebuyer or burglar perspective, students assigned greater importance, as measured by ratings, and were more likely to recall information appropriate to their own perspective. In discussing their research, Pichert and Anderson suggested that during comprehension schemata might facilitate the learning of perspective relevant information either by determining which information is important and will be selected for further processing (the focussing hypothesis) or by providing a ready slot into which the information could be readily assimilated with perhaps a reduction in the amount of processing required (the slot-filling hypothesis).

The purpose of the present study was to test these two hypotheses about how schemata guide comprehension. If the attention allocation hypothesis is correct and if the additional processing requires extra time, then readers should spend more time reading those sections of the text which contain information relevant to their operative perspective. If the slot-filling hypothesis is correct, no additional (and perhaps less) time should be required. In the present study, the text was presented by computer and reading times recorded. In addition, the readers' background knowledge and interests were varied by recruiting subjects from police, real estate, and education courses in order to provide a test of the function of "natural" as well as assigned perspectives.

Method

Design

The study entailed a 3X3X2 factorial design with reader background (police, real estate, education) and assigned perspective (burglar, homebuyer, control) as between-subjects variables and item type (burglar vs homebuyer) as a within-subjects variable.

Subjects

The subjects were 37 policemen enrolled in a summer training institute at the University of Illinois, 35 students in a course in real estate at Parkland Junior college, and 34 undergraduates enrolled in an introductory educational psychology course at the University of Illinois. Subjects were paid $3.00 for participation in the study.

Materials and Apparatus

The passage was an expanded adaptation of a story of Pichert and Anderson (1977) which relates the exploits of two schoolboys who play hooky and spend the day "messing around" in the otherwise unoccupied home of one of the boys. The passage contains information that would be of special interest to a burglar (e.g. the location of jewelry and furs, that fact that the side door was usually unlocked) or a prospective homebuyer (e.g. the panelled and carpeted den, the damp and musty basement). The passage was modified so that individual sentences contained information important to only one of the perspectives or to neither perspective (i.e. filler sentences). The passage was 66 sentences and nearly 900 words in length.

The passage was presented one sentence at a time on a cathode ray screen via the PLATO IV interactive CAI system. Presentation was subject-paced: when the reader pressed a key on the console, the currently displayed sentence was erased and the next sentence presented. The PLATO system automatically stored the exposure time for each sentence.

Procedure

Subjcest were run in groups of six or fewer. As subjects arrived, the experimenters logged them on to PLATO, which assigned them to conditions according to a predetermined, counterbalanced order, and presented instructions. Prior to the experimental passage, subjects read an unrelated 500 word story to familiarize the subjects with PLATO text presentation. Following the practice passage, subjects were informed that the most important story would follow, One-third of the subjects were instructed to take the burglar perspective, one-third the homebuyer perspective, and one-third received instructions that did not specify a perspective.

Following the instructions, subjects read the passage. Each time a subject finished reading a sentence, he or she pushed "Next" to view the next sentence. All sentences were presented at the same location in the center of the screen. The reading times for all sentences were automatically recorded. When subjects finished reading the passage, they spent a 10 minute filled retention interval working on the Miller Analogies Test before attempting recall of the passage. Recall instructions stressed that subjects were to write down everything they could recall about the passage. Subjcest were told to recall the passage as

accurately as possible, but to express in their own words everthing they could recall, even if they had forgotten the exact wording. Finally, subjects were given an eight question debriefing questionnaire adapted from one used by Pichert and Anderson which queried whether they remembered their perspective and the degree to which they had kept it in mind while reading and recalling the story.

Results

Prior to the main study, the passage was presented to other police, real estate, and education students from the same populations. Subjects were asked to assume the burglar or homebuyer perspective, or were assigned no perspective as they read the passage and then rated the importance of each sentence on a five-point scale (1=very unimportant, 5=very important). The correlation between the mean rating (across all three background groups) for each of the sentences from the burglar and homebuyer perspective was r=.02. This result replicates Pichert's and Anderson's finding that assigned perspective is a powerful determinant of rated importance. Within a perspective, agreement was much higher. For example, for the control perspective the correlation between mean ratings for pairs of the background groups ranged from .58 to .63. On the basis of the rating data, ten burglar and ten homebuyer sentences were selected which had the largest difference between mean ratings from the two perspectives. The analyses reported below were based on those 20 sentences.

Reading times of subjects in the main study were calculated in milliseconds per syllable, averaged across the ten sentences for each

perspective, and entered into a 3X3X2 analysis of variance on background, perspective, and item type. The only significant effects were the Background X Item Type interaction, $F(2,97)=5.1$, $p < .01$ and the Perspective X Item Type interaction, $F(2,97)=3.8$, $p < .05$. As shown in Table 1, while police spent slightly longer on burglar than homebuyer items, education students reversed this pattern and real estate students divided their time almost equally. Inspection of the Perspective X Item Type interaction shown in Table 2 reveals that readers in each perspective spent more time on those sentences which contained information important to their perspective.

Recall was scored by dividing the sentences into idea units and applying a gist, or substance, scoring criterion. The proportion recalled was entered into a three-way analysis of variance on the design presented above. The main effects of background, $F(2,89)=10.0$, $p < .01$ and item type, $F(2,89)=20.4$, $p < .01$, reached significance as education students recalled most and real estate students least (police=.349, real estate= .265, education=.452) and burglar items proved more memorable than homebuyer items (.392 vs .319). The Perspective X Item Type interaction, $F(2,89)=16.1$, $p < .01$, was the only other significant effect. As shown in Table 3, readers for each of the perspectives recalled more of those sentences relevant to their perspective. Neither the Backgroung X Item Type nor the Background X Perspective X Item Type interaction approached significance ($p < .20$).

Discussion

The present study, like the earlier research of Pichert and Anderson (1977) demonstrated the powerful role of the readers' perspective. Importance ratings and the likelihood of recall were both affected by instructions to assume a particular perspective. Further, the study suggests that perspective instructions, and the schemata thus activated, act in part to focus attention and direct additional processing to the appropriate portions of the text, as reflected by increased reading times. The present study provides no support for the slot-filling hypothesis. The two hypotheses, however, are not strictly mutually exclusive, and the present study should not be taken as strong disconfirmation of the slot-filling hypothesis. Indeed, in two very recent studies by Reynolds (1981) in which reaction times to a secondary task were recorded as well as reading times, reading time data once again supported the focussing hypothesis, but the secondary task data could be interpreted as consistent with the slot-filling notion.

The present study did not demonstrate a very powerful role for the readers' background knowledge and interests, as neither importance ratings nor recall were significantly influenced. Readers' backgrounds did affect reading times, however, largely because the police spent more time on sentences containing information that would aid a burglar. The failure to demonstrate a stronger effect for reader background may have been due in part to the recruitment of real estate students from an introductory community college course. Perhaps these students were as a group too heterogeneous and as individuals were not sufficiently inculcated

in the field to have the elaborated and specialized knowledge structures needed to provide a strong test. Perhaps too, the use of the powerful assigned perspective manipulation tended to swamp any effects which might have been observed. In any case, the significant effect of reader background on reading time is suggestive and merits further study.

In conclusion, the readers' knowledge structures or schemata play a powerful role in text comprehension and memory, influencing perceived importance, reading times, and recall in the present study. The present study suggests that schemata act in part by serving to focus the readers' attention and direct further processing to appropriate material. Further research is necessary to refine and extend our understanding of the processes involved.

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Table 1

Reading Time (milliseconds per syllable)

	Item Type	
Background	Burglar	Homebuyer
Police	255	245
Real Estate	253	257
Education	240	262

Table 2

Reading Time (milliseconds per syllable)

	Item Type	
Perspective	Burglar	Homebuyer
Burglar	256	246
Homebuyer	258	275
Control	234	243

Table 3

Proportion Recall

	Item Type	
Perspective	Burglar	Homebuyer
Burglar	.492	.307
Homebuyer	.312	.352
Control	.371	.298