

INHIBITORY EFFECTS 1

Inhibitory Effects of Context on

Recall of Ambiguous Words

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Lexical ambiguity is a term which is used to describe words that can have two or more possible meanings. For example, **CURRENT** can be used to describe the strength of a river, electricity, or it can be used as an adjective meaning up to date. Lexical ambiguity has been studied in order to understand how words are organized and represented in the mental lexicon (Hogaboam & Perfetti, 1975). The research in this area has contributed significantly to the spreading activation model of word recognition (Neely, 1976, Swinney, 1979, Holley-Wilcox & Blank, 1980 & Simpson and Burgess, 1985). The spreading activation model of word recognition suggests that many interconnections exist between words related on a number of dimensions (semantic, morphological, and phonological) and activation of one word involves many pathways (Collins and Luftus, 1975). In experiments of lexical ambiguity, it has been shown that both meanings of a word are activated in isolation (Holley-Wilcox and

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Blank, 1980) and some have shown activation even when the word is embedded in a biasing sentence context (Swinney, 1979). This offers support for a context independent model in which all meanings are accessed despite the context.

Another model of processing words in context is the context-dependent model in which context dictates the meaning to be accessed. A third model, the ordered access model suggests that words are accessed according to frequency of representation in memory and less frequent meanings are accessed only after dominant meanings are deemed inappropriate.

It is difficult to find consistent evidence of the initial activation due to the speed of the stages and the sensitivity of different tests. However, the context independent model allows for a stage following the initial activation, an attentional phase in which only one meaning of the word, the most appropriate is made available (Tweedy, Lapinski, & Schvaneveldt, 1977). This is in agreement with Posner and Synder's proposed two-stage model of automatic processing of word meanings followed by attentional processing of the

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meaning most congruent to the context (Posner & Synder, 1975).

Lexical ambiguity has been studied in experimental conditions using techniques such as semantic priming, lexical decision tasks and ambiguity detection tasks. Semantic priming involves presenting a prime (a word related to a target word) followed by a target word. Generally findings indicate that reaction time to naming the target word is quicker when the target is related to the prime than when it is unrelated (Meyer & Schvaneveldt, 1971) and it is quicker when it is related to the word through the more common or dominant meaning (Simpson & Burgess, 1985). In lexical decision tasks a decision is made as to whether or not a target word is a word or non word. Reaction times to decisions of word/nonword are slower when the target resembles either orthographically or phonetically a word related to the prime (Neely, 1976). In an ambiguity detection task, subjects must decide whether or not the last word in the sentence is ambiguous. In experiments of this nature, subjects recognized ambiguity more quickly when the sentence was related to the less common, subordinate meaning of the word than

when it was related to the more common, dominant meaning (Neill, Hilliard, & Cooper, 1988).

The difficulty with using priming techniques to assess lexical access is that what occurs in a priming task could be influenced by a post-access decision process rather than a pre-lexical decision process (Seidenberg, Waters, Sanders & Langer, 1984). The nature of priming techniques is such that it can prime subjects to look for ambiguity that they may not consciously detect otherwise. Priming is also subject to backward priming effects (Koriat, 1977) in which the target word activates the prime instead of the prime activating the target. In addition, the experimental procedures generally involve recognition of ambiguous meanings but do not address what occurs in a recall situation. It is hypothesized that a word definition task would be more sensitive to recall processes than naming or lexical decision tasks.

Lexical ambiguity experiments have yielded conflicting results with regards to the effect of context on lexical access. It has been found that both meanings are accessed in presence of sentence context (Onifer and Swinney, 1981) however, when there were

strongly associated words within the sentence which biased one of the meanings, selective access of only one meaning was observed (Seidenberg, Tanenhaus, Leiman, Bienkowski as cited in Carroll, 1986). This could be attributed to the fact that context aids in a post-lexical decision process which directs attention to the appropriate meaning of a word after all meanings of the word have been accessed as suggested by the Posner and Synder model. Glucksberg, Kreuz, & Rho (1986) found evidence that associative or semantic primes served as inhibitors for the expression of the inappropriate meaning.

The present experiment hopes to find evidence of an inhibitory process in which recall of one meaning (which may be accessed) is suppressed in the presence of an opposite biasing context. The experimental procedure will involve presentation of priming words followed by a ambiguous word definition tasks. If strong contextual factors inhibit the expression of other meanings of a word, then when a subject is asked to define an ambiguous target word after the presentation of related primes, only the meaning associated with the priming word should be expressed.

Method

Subjects

Eighty-three introductory psychology students from three classes at Algoma University College volunteered or participated as part of in-class instruction. They were divided into three groups corresponding to the three classes.

Materials

The test materials consisted of a series of to-be spelling and definition words. There were 21 sets of words. In each set there were four words, three of which were to be spelled and the fourth word which was to be defined. The second spelling word in each set was either a dominant, subordinate or ~~did not~~ prime the ambiguous word. Eighteen sets contained ambiguous words and the remaining 3 sets were used as practice trials at the beginning of the experiment. The ambiguous target words ^{were} taken from homograph norms of Nelson, McEvoy, Walling and Wheeler (1981) and had distinct dominant ($n > 30$) and subordinate ($n < 11$) meanings. The experimenter generated the primes and other spelling words and a separate population of 16

undergraduate students verified the primes as associates of ambiguous words and ranked the best and next best associates. There was high agreement amongst raters as to what meanings were associates, and furthermore, the rank of associates corresponded to dominant and subordinate meanings. The spelling words and primes were matched on either letter length or on the number of syllables.

Each of the 21 word sets appeared in all three lists. Every ambiguous target word was preceded by either a dominant, subordinate or no prime spelling word. There were equal numbers of ambiguous words primed by dominant, subordinate and no prime spelling words on all three lists. The order of prime presentation was pseudorandom with the stipulation that no experimental condition would appear more than twice consecutively. Each class received a different list.

Procedure

The subjects were told that the experiment was a spelling/vocabulary test in which they would be asked to spell some words (cue words) and give a definition for others (ambiguous words). They were instructed that there may be more than one spelling or meaning to

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a word and they were to write down all spellings and meanings if they were aware of this. In addition they were told to write information on all definitions. The experimenter then read the words to the class.

The experiment was analyzed as a repeated-measures design in which all subjects serving under all cue conditions with the different lists as a between-subjects factor. The number of definitions given which reflect only the dominant meaning, only the subordinate meaning and those which reflect both meanings were recorded as a dependent measure and the type of cue given as the independent measure.

Results

The type of cue presented did not interact with the type of definition given by Ss $F(2,2)=1.12, p.>.05$, and this indicates that there was no inhibition of inappropriate meanings as a result of prime presentation. However, there was a significant difference in the type of answers given in all cue conditions $F(2,2)=61.50, p.<.001$. Ss gave more dominant-only and both dominant and subordinate answers more than subordinate only answers as is shown in

Figure 1. Comparison of the dominant-only answers ($\bar{M}=3.15$) and both meaning answers ($\bar{M}=2.16$) indicate significant differences between the two in the no-cue condition ($t(82)=3.50$, $p. <.05$) In the dominant-cue condition dominant-only answers ($\bar{M}=3.24$) were given more often than both definitions ($\bar{M}=2.18$, $t(82)=6.23$, $p.<.05$).

Discussion

The results offer no support for the experimental hypothesis. When no cue and the dominant cue were presented the dominant-only definition was given more often than subordinate only and both meaning definitions. However, this difference cannot be attributed to the type of cue given for there was no difference between the type of cue presented and the definition given. In the subordinate cue condition, there was no difference between the number of dominant only and both definitions given. These two results suggest one of two possible explanations.

It is possible that retrieval of ambiguous words follows an ordered access model. The results obtained in the no-cue condition and the dominant-cue condition are explainable in this way. If access is ordered when

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no cue is presented, there is no purpose to further search, and the search is therefore terminated. In the dominant-cue condition, the context is congruent and there is no need for further processing. The results in the subordinate cue condition are more problematic to explain. The ordered access model would predict more both-definitions in comparison to dominant-only definitions. The failure to find a difference suggests that there was some slight effect of priming not observed in the other cue conditions or that Ss used backward priming in the definition task.

Backward priming involves using the prime to facilitate an answer. In the subordinate-cue condition, Ss could have been using the prime, to match the definitions given with the prime as a verification of their answer. Post hoc analysis of the both definition of subordinate-cue condition indicate that subjects gave dominant meanings first, followed by subordinate meanings.

The possibility exists that priming was ineffective. This could be due to the fact that the strength of associates was not equal. The verification of primes involved ranking two associates as best and

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second best and these corresponded with dominant and subordinate meanings. However, there was no measure of the strength of association. Perhaps if the associations had been equal, there would have been inhibition of context-inappropriate meanings and independent¹⁰ of dominance and subordination.

There may have been other methodological difficulties which reduced the effectiveness of the prime. An inconsistent time delay between the presentation of the prime and the presentation of the ambiguous word could have resulted in the decay of the prime. As well, the difficulty of the spelling words following the prime could have contributed to the prime's decay. The instructions to indicate awareness of ambiguous words coupled with the fact that there were no unambiguous words interspersed with the experimental words could have confounded the results.

Finally, inhibition of the context-appropriate meaning might have occurred but was undetected due to the fact that there were no time measures of S's response. For the purposes of this experiment, inhibition of the inappropriate context would be observed if the Ss gave a definition consistent only

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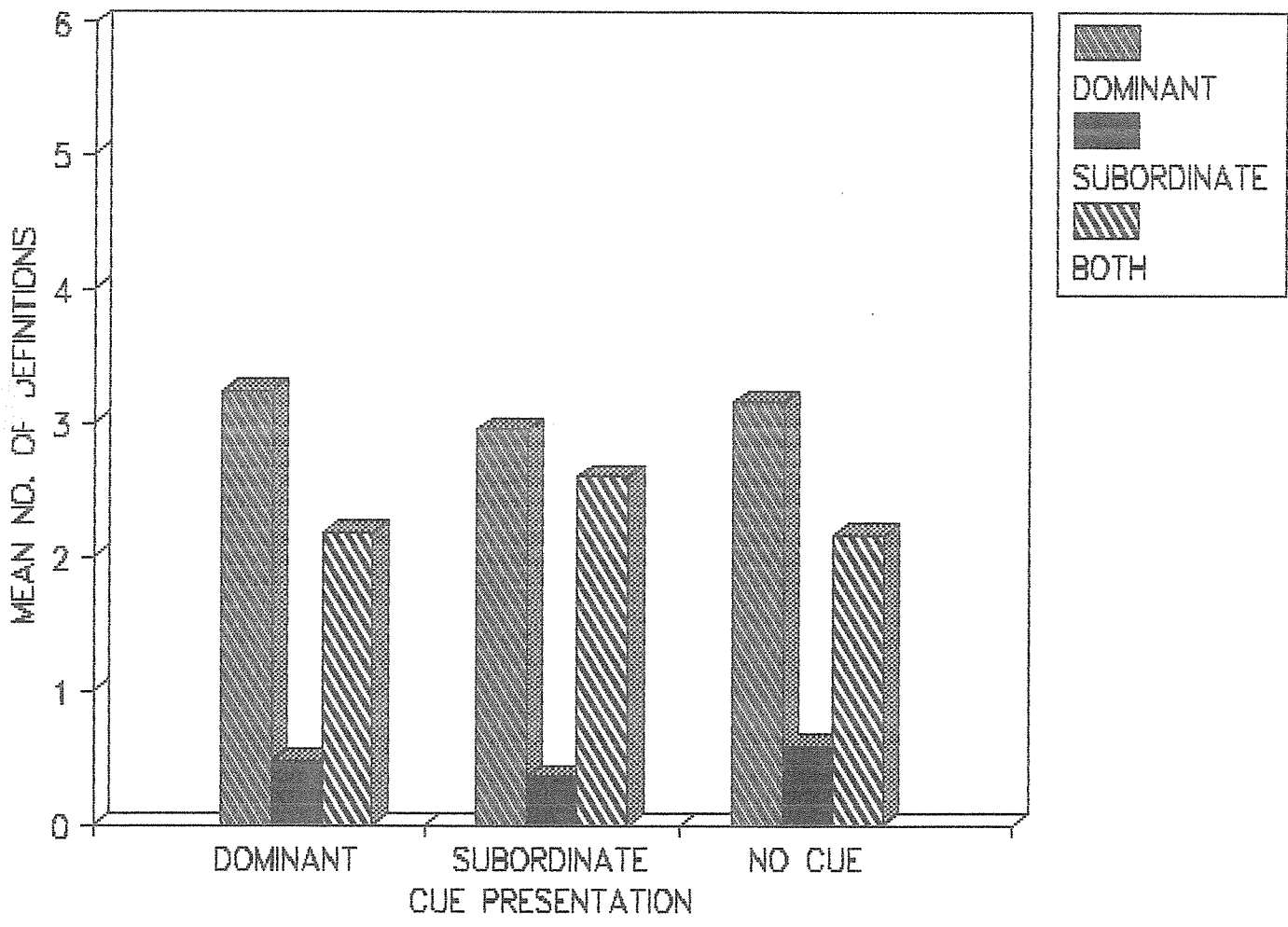
with the meaning of the prime. Inhibition may have occurred but the experimental design was not sensitive to this.

The experimental hypothesis should not be abandoned and the results in this experiment should not be taken as possible support for the ordered access model of processing. Further experimentation which modifies the methodology could yield inhibition of context-inappropriate definitions.

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Figure Caption

Figure 1. Mean no. of definitions given on definition task as a function of prime presentation.



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