THE EFFECT OF PROPORTION OF REPETITION

PRIMING ON A LEXICAL-DECISION TASK:

EVIDENCE FOR STRATEGIC FACTORS

DURING VISUAL WORD RECOGNITION

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Factors During Visual Word Recognition

Since Posner and Snyder (1975a, 1975b) proposed a

dual-process (automatic vs. attentional) theory of

information processing, cognitive psychologists have

been interested in how human subjects utilize

attentional processes in addition to automatic

processes in the recognition of words. Several studies

have been conducted which are supportive of the

dual-process theory of information processing (Fischler

& Bloom, 1979; Fischler & Goodman, 1978; Foss, Corilo,

& Blank, 1979; Neely, 1976, 1977; Stanovich & West,

1979, 1981; Tweedy, Lapinski, & Schvaneveldt, 1977). A

popular research paradigm used to investigate the

dual-process theory is the lexical-decision task; a

subject's response time (RT) is recorded as he or she

decides whether a string of letters is a word or a

nonword.

It has generally been found that if a target word

is preceded by a word in the same context, e.g., DOCTOR

preceding NURSE, the "yes" decision to the target word

is facilitated. That is, shorter RTs are measured than

when a word such as NURSE is not preceded by a related

word. This effect is usually explained in terms of automatic, spreading activation (Collins & Loftus, 1975). The prime word activates semantically related representations in memory which facilitate the recognition of the target word. This explanation does not account for any attentional processes which may play a role in the lexical decision.

One way to reveal time components related to automatic and attentional processes is to manipulate variables which affect the attentional process and not the automatic. Tweedy, Lapinski, and Schvaneveldt (1977) and Tweedy and Lapinski (1981) have shown that the amount of facilitation recorded for target responses increases as the proportion of related pairs presented to subjects increases. Ken den Heyer, Briand, and Dannenbring (1983) and de Groot (1984) studied the effects of proportion over various stimulus onset asynchronies (SOAs) and found that the effect of proportion was not significant until sufficient processing time is used (SOA is the time interval between prime onset and target onset). At very short SOAs, e.g., 75 msec, the effect of prime type was significant, but the effect of proportion did not reveal itself until more processing time (240 msec in

de Groot, 1984) had elapsed. Therefore, these studies support the notion that at least two processes can show their effects when subjects are asked to make lexical decisions: One which is activated very quickly, with its effect attributed to automatic spreading activation and one which takes more processing time to become active, which has been attributed to one or more attentional processes being utilized by subjects.

Attentional processing, which takes advantage of information concerning the proportion of related-word pairs, has been explained in terms of subjects focusing attention onto certain memory locations and not others. This process, based on the Posner and Snyder dual-process model, has been called prime-induced attentional processing (den Heyer, 1984, de Groot, 1984). The proportion effect can be explained as the tendency for subjects to increasingly expect the target word to be related to the prime word as the proportion of related pairs increases. Therefore, subjects focus attention on words which are related to the prime, and are more likely to do so as the proportion of related pairs increases. When the target word in the lexical decision is related to the prime, facilitation of response time to the target takes place due to

attention having already been partially focused onto the target word's memory representation.

An important aspect of the Posner and Snyder dual-process theory is that strategic or attentional processing, unlike automatic processing, can result in the response to an unrelated target being inhibited, resulting in a greater response time. For example, if the duration of an SOA between a prime word and a target word is sufficiently long, attention can be focused on words related to the prime. If a target word unrelated to the prime is then presented, additional attention, and subseqeent processing time, is required to re-direct attention away from the attended memory representations and to the memory representation of the target word. If the SOA between prime and target is very brief, no attentional processing develops, and therefore, no inhibition or costs can occur.

Previous researchers, e.g., den Heyer, 1983; de Groot, 1984; and, Neely, 1978, have pointed out that facilitation and inhibition cannot be appropriately analyzed without comparison to a baseline measure. Such a baseline can be obtained by priming word and nonword targets with a neutral prime, e.g., the word

NEUTRAL, the word BLANK, or simply XXXXX. Such a prime does not provide information which can be used to direct attention to expected words. Therefore, RTs to word targets preceded by a neutral-prime are not influenced by proportion effects.

Neely (1976, 1977) found that RTs to nonwords following word primes were facilitated in comparison to nonwords following neutral primes. This is contrary to what would be predicted from Posner and Snyder's dual-process model (prime-induced attentional processing). As noted above, neutral primes require little attention. Therefore, more attention should be available for processing the target, facilitating RTs to nonwords following neutral primes. To account for the facilitation found for the word-nonword condition Neely elaborated Posner and Snyder's dual-process model and proposed that subjects were utilizing a "predict-and-match strategy".

The predict-and-match strategy is an expectancy-based strategy in which subjects utilize information gained from the prime to focus attention on words which are related to it. If the target is one of the predicted (related) words, then the subject is biased toward a 'yes' decision because the outcome of

the predict-and-match strategy ("yes, it is related")
and the correct required lexical-decision ("yes, it is
a word") are congruent. In the case of the nonword
targets, the outcome of the predict-and-match strategy
is "no, it is not related" (to the word prime). This
'no' outcome is congruent with the correct
lexical-decision ("no, it is not a word"), thereby
facilitating RT.

Inhibition on unrelated-word trials is expected if
subjects are utilizing the predict-and-match strategy.
In this case when a word unrelated to the prime is
presented as a target, the outcome of the
predict-and-match strategy ("no, it is not related")
biases the subject toward a "no" response, which is
incongruent with the correct response ("yes, it is a
word") for the lexical decision. Additional processing
time is required to overcome this incongruency, and
there is a greater RT to the target word.

Studies utilizing a neutral-prime in order to
examine facilitation and inhibition across related-word
proportions have failed to produce proportion effects
consistent with hypotheses based on the both
prime-induced attentional processing and its
elaboration (predict-and-match strategy) outlined above

(den Heyer, 1984; de Groot, 1984). Facilitation to related pairs associated with increasing proportion of related words was replicated in both de Groot (1984) and den Heyer (1984). Neither study, however, confirmed changes in inhibition occuring for unrelated word-pairs as the proportion of related pairs increased. Since inhibition to urnrelated-pair targets is expected to change as the proportion of related pairs changes if subjects are utilizing prime-induced attentioanl processing or the prodict-and-match strategy, neither is supported. The results associated with the nonword data are also inconsistent between these studies. Whereas de Groot (1984) reported a significant proportion effect on nonword data, den Heyer (1984) reported no significant proportion effect for the nonword conditions.

It should be noted that in both studies RTs to nonwords primed with words were shorter than those preceded by a neutral prime, as would be predicted if subjects were using predict-and-match, but RTs did not decrease with increasing related-pair proportion. It is obvious that the predict-and-match strategy and prime-induced attentional processing, alone or

together, do not adequately account for proportion effects.

Further explanation of the effect of proportion has been offered by de Groot (1984) and den Heyer (1984). They agree that a 'post-lexical coherence checking mechanism' also accounts for at least a portion of the proportion effect. This mechanism was first proposed by West and Stanovich (1982) to explain why RTs in word-naming tasks are consitently shorter than RTs in lexical-decision tasks. They used a paradigm in which subjects made lexical decisions or named words which were presented at the end of a phrase. The phrase preceding the word was either contextually congruent or not congruent with the target word. While context incongruence had little effect on naming, it inhibited lexical decisions. West and Stanovich (1982) based their explanation of this effect on the assumption that the lexical-decision task requires more post-lexical information translation to arrive at a response than the word-naming task (see also Forster, 1979). In other words, they concluded that the lexical-decisions were being inhibited by additional information not dealt with in the word naming task.

Since lexical-decision times are longer than word-naming times (West & Stanovich, 1982), the additional time allows other information to influence decision making. They proposed that a coherance checking mechanism, based on Forster's (1979) analysis of language processing, checks for coherance between a word and those that precede it. Inhibition is caused by the incongruence between the output of the post-lexical coherance checker, namely "no coherance", and the correct "yes" response required by the lexical decision; the result of this incongruity is longer decision times. To expand this explanation of the proportion effect, de Groot (1984) concluded that "post-lexical coherance checking" primarily accounted for the effect of increasing related pair proportion.

The post-lexical coherance checker is hypothesized to show its effect(s) in much the same way as the predict-and-match strategy; facilitation occurs on related-word trials and inhibition on nonrelated-word trials as proportion increases. Facilitation occurs as subjects are biased to a 'yes' response when coherance is detected between the prime and target. Inhibition occurs on unrelated-word pairs because the 'no coherance' outcome from the coherance checker, which

biases the subject in the direction of a "no" decision, must be overcome prior to providing the correct "yes" response for the lexical decision.

The primary difference between predict-and-match and post-lexical coherance checking is that both the prime and the target must be processed before coherence can be checked, while only the prime needs to be processed for the predict-and-match strategy to be invoked. This distinction is important because it has implications for how nonword results are interpreted (den Heyer, 1984).

If subjects use the predict-and-match strategy, their responses should be facilitated on word-nonword trials as related-word proportion increases. This would occur because of the negative ("no") bias caused by the "no match" output from the predict-and-match strategy to the nonword target. In contrast, the post-lexical coherence checking mechanism would not show its effect in nonword data because the nonword would not be processed as a word. Therefore, the post-lexical coherance checker, which requires both prime and target be processed prior to being activated, would not be activated because the nonword item carries no semantic referrent. As noted earlier, nonword data

from de Groot (1984) showed significant differences produced by the manipulation of proportion of semantically related word pairs, while den Heyer (1984) did not find any proportion effect for nonword data. These results, along with inconsistencies found for inhibition on unrelated-word trials indicate there is a question as to whether the post-lexical coherence checking mechanism, the predict-and-match strategy, or a combination of the two account for the effect of proportion.

Because both predict-and-match and post-lexical coherance checking are attention driven processes they should be subject to interference from other attentional processing. If manipulations which affect these strategies are introduced, the strategies may be defeated. In this regard the present study is primarily concerned with further investigation of post-lexical coherence checking. In order to experimentally control the use of this post-lexical processor while still employing a lexical-decision task paradigm, another lexical priming effect will be utilized.

Forbach, Stanners, and Hochhaus (1974) found that a very large facilitation effect can be induced if a

target is primed with itself, an effect they termed repetition priming. To date no studies have been conducted which have investigated the effect of increasing the proportion of repeated-word pairs (repetition priming) within a list of prime-target word pairs. As with increasing the proportion of related pairs, subjects should be able to utilize a post-lexical strategy to facilitate word recognition as proportion increases, which will be termed the post-lexical repetition checker. If the repetition checker works in the same way as the coherance checker, then a proportion effect should result when the proportion of repeated pairs is increased across groups. That is, facilitation on repeated-word trials and inhibition on unrepeated-word trials is expected. Finally, as predicted for the coherence checker, there should be no proportion effect for the repetition checker on nonword data.

Given that subjects are shown to take advantage of increasing proportion of repeated words to facilitate word recognition, then aspects of the repetition priming task could be used in another experiment to defeat the post-lexical repetition checker strategy. This could be accomplished by increasing the proportion

of repeated nonwords at the same rate the proportion of
repeated words are increased. Under these conditions
proportion information should not indicate to subjects
that the use of a strategic process will aid the
recognition of words or nonwords, since the same
information (proportion of repetition) would pertain to
both word and nonword responses.

As noted, previous researchers (e.g., den Heyer,
1983; de Groot, 1984) have pointed out that
facilitation and inhibition cannot be appropriately
analyzed without comparison to a baseline measure.
This baseline can be achieved by including neutral
prime conditions with word and nonword targets.
Therefore, the paradigm used in the following
experiments included trials in which the prime NEUTRAL
preceded equal proportions of word and nonword targets.

Experiment 1

Experiment 1 was designed to verify a post-lexical
repetition checking strategy. If it operates as the
proposed post-lexical coherance checker, a proportion
effect should occur as the proportion of repeated-word
trials is increased. Facilitation for repeated-word
trials and inhibition for unrepeated-word trials was
expected when compared to neutral-prime word trials.

In addition, no significant proportion effect was expected for the nonword data.

Method

Subjects. Sixty students were recruited from undergraduate psychology courses. The subjects were given extra credit for their participation. Subjects were screened so that no subject had previously participated in a visual-word priming experiment.

Materials. Three-hundred thirty high frequency words were chosen from Kucera and Francis (1967). One-hundred sixty-five nonwords were created by replacing the first letter of each syllable within a word with another, randomly selected letter. One-hundred twenty of the words were randomly paired to create 60 WORD-WORD pairs. Within these 60 pairs repetition pairs were randomly created by changing a proportion of the targets of these pairs to match the corresponding prime. High, medium, and low repeated-word proportion conditions contained 45 repeated and 15 unrepeated, 30 repeated and 30 unrepeated, and 15 repeated and 45 unrepeated pairs, respectively. The remaining words and nonwords were randomly combined with the neutral prime (NEUTRAL) or together to create 15 neutral-prime/word, 15

neutral-prime/nonword, 15 nonword-word, and 15 word-nonword pairs. The remaining 120 nonwords were randomly paired together to create 60 nonword-nonword pairs. Thus there were 180 prime-target pairs with different pairings (unique randomizations) for each subject.

An Apple IIc computer with monitor was used to control presentation of instructions, randomization, pairing of words, and visual-word presentation. The computer also recorded response times and calculated percent accuracy. Stimuli were presented in uppercase letters.

Procedure. Individuals were instructed to decide if the bottom letter string of two letter strings presented on the computer monitor was a word or not a word and to indicate their response by pressing one of two keys on the computer keyboard. Subjects used the index finger of their preferred hand to indicate 'word' and the index finger of the opposite hand to indicate 'nonword.' At no time during the instructions or during the experiment were the subjects given information about any pairs being repeated.

Subjects were first presented 12 practice trials before the 180 test trials. Each trial consisted of

the following sequence: 1) a row of asterisks appeared
in the center of the monitor; 2) approximately 1 s
later the prime appeared in the same screen location;
3) after a 1000 ms delay the target string appeared.
The subject indicated 'word' by pressing the '/' key
for right hand preferred (or the 'Z' key for left hand
preferred) with their index finger. Nonword responses
were indicated using the opposite index finger and
remaining / or Z key. After a delay of 3 s the next
trial began. A mandatory 5 min rest break occurred
after 90 trials.

Results

For each subject the standard deviation of
response times (RTs) to targets was calculated. To
eliminate trials in which subjects were distracted from
the task RTs more than 1.96 standard deviations away
from the mean RT for an individual subject were
deleted. Mean RTs and error rates for all of the
prime-target conditions are shown in Table 1. The mean
correct RTs corresponding to the overall (costs +
benefits) facilitation effect, benefits, costs, and
nonword data were analyzed using separate 3 X 2
analysis of variance routines for each of the four
dependent varibles. Each analysis was based on 3

levels of proportion by 2 levels of prime type;
proportion was a between-subjects factor and prime type
was a within-subjects factor.

Insert Table 1 about here

The comparison of the repeated-word and
unrepeated-word RTs yeilded a significant main effect
for prime type, $F(1,57) = 40.87$, $p < .001$, and a
significant prime type by proportion interaction,
$F(2,57) = 8.21$, $p < .001$. While this analysis shows
that increasing the proportion of repeated words
significantly decreased decision times to repeated-word
targets compared to unrepeated-word targets, this
evaluation includes both facilitation and inhibition.
Therefore, in the remaining analyses RTs from word
trials primed with NEUTRAL were used as a baseline for
analyzing facilitation and inhibition. Figure 1 shows
that when repeated-word and unreapted-word RTs are
compared to the neutral-word baseline, it appears that
the effect is primarliy due to increasing facilitation
to repeated-word targets.

Insert Figure 1 about here

The analysis of facilitation for the WORD data
(repeated word vs neutral-word) yielded a significant
main effect for prime type, $F(1,57) = 55.33$, $p < .0001$,
and a significant prime type by proportion interaction,
$F(2,57) = 3.93$, $p < .05$. In contrast, there were no
main effects or interactions for inhibition
(unrepeated-word vs neutral-word). The analysis of
nonword data (word-nonword vs neutral-word) also
yeilded no main effects or significant interactions.

Error rates were analyzed utilizing the above
statistical designs. Error rates were low, and there
were no significant differences in any of the analyses.

Discussion

The results of Experiment 1 show that the effect
of increasing the proportion of repetition pairs is
much the same as increasing the proportion of
semantically related pairs: Response times to
repeated-pair targets significantly decrease as
proportion increases (see Figure 1). The results also
show no significant inhibition to unrepeated-word

targets occured as proportion of repeated pairs were increased, replicating the results of den Heyer (1984) and de Groot (1984) for unrelated-pair data. In addition, no significant effects for nonword data were found in the present study, replicating den Heyer (1984). As noted earlier, prior evidence presented by den Heyer (1984) and de Groot (1984) on increasing proportion of related pairs showed increasing facilitation as proportion of related pairs were increased. The expected inhibititon to unrelated-word pairs was not verified in either study. In addition, de Groot reports a significant nonword effect while den Heyer reports nonsignificance.

The lack of significant results for the nonword data is indicative of subjects utilizing a repetition checker. As den Heyer (1984) points out for related word data, if a nonword is present in the prime-target pair, then the post-lexical coherance checker would not be activated. It can be assumed that the same is true in regard to post-lexical repetition checking, since again, nonwords, which have no semantic representation, would not activate this post-lexical processor. Therefore, no inhibition would be associated with word-nonword trials. If subjects were utilizing a

predict-and-match strategy, inhibition to word-nonword targets would be expected. In this case inhibition is expected because of the congruence between the result of the strategy's outcome ("no match") and the correct "no" decision to the nonword.

The lack of findings concerning an inhibition effect for unrepeated-word data is not consistent with any of the attention-based processes presented in the introduction. As noted, lack of inhibition to unrelated words is indicative of automatic rather than attentional processing (Posner and Snyder, 1975a, 1975b). It may be the case that the attentional process that is triggered by increasing the proportion of related words may be less demanding on attention than previously hypothesized, causing researchers such as de Groot and den Heyer to fail to replicate inhibition to unrelated words. As de Groot (1984) pointed out in discussing post-lexical coherance checking, it may be a over-learned mechanism which people of average reading ability readily utilize. Since the present results show facilitation associated with increasing repeated-word proportion to be very similar to that found with related words, it may be that the proposed post-lexical repetition checking

mechanism may demand little attentional processing.
What is quite obvious from these and previous results
is that an experiment which more clearly indicates the
use of a strategic process is needed.

Experiment 2

Experiment 1 showed that increasing the proportion
of repeated-word pairs did result in increases in
facilitation of RTs to repeated-word targets. No
statistical evidence was found for the hypothesized
inhibition effect for the unrepeated-word targets.
Experiment 2 is designed to indicate whether or not the
proportion effect in Experiment 1 is due to an
attention-based strategy.

The use of repeated rather than related words in
Experiment 1 allows for the design of Experiment 2 to
include identical proportions of repeated nonwords and
words. Because increasing repetition will be
associated with both word and nonword decisions, the
use of a strategy to facilitate either word or nonword
decisions should be nullified. Therefore, unlike
Experiment 1, a significant increase in facilitation
effect with greater proportion of repetition is not
expected. Because attentional processing is expected
to be defeated, no significant inhibition is expected

for the unrepeated-word targets or the word-nonword targets. These results, if obtained, will indicate that an attentional, rather than automatic, process caused the proportion effect in Experiment 1.

Method

Subjects. Sixty students were recruited from undergraduate psychology courses. The subjects were given extra credit for their participation. Subjects were screened so that no subject had previously participated in a visual-word priming experiment.

Procedure. The procedures, apparatus, and word and nonword materials for Experiment 2 were the same as in Experiment 1, except that for each subject repeated nonword-nonword pairs were created to match the proportion of repeated-word pairs. This was accomplished by creating primes identical to targets in the appropriate proportion of nonword-nonword pairs from Experiment 1.

Results

Mean RTs were calculated and extreme response times were deleted as in Experiment 1. Mean RTs and error rates are shown in Table 2. As in Experiment 1 separate analyses for the overall (repeated word vs unrepeated word), facilitation (repeated word vs

neutral-prime word), inhibition (unrepeated word vs neutral-prime word), and nonword (word-nonword vs neutral-prime word) data were conducted using a 3 (proportion) X 2 (prime-type) analyses of varience.

Insert Table 2 about here

Significant results were obtained for the overall (repeated-word vs unrepeated-word) prime type effect $F(1,57) = 58.88$, $p < .001$ and its proportion by prime type interaction $F(2,57) = 3.68$, $p < .05$. Figure 2 shows that this overall proportion effect is due to both increasing facilitation for repeated-word trials and increasing inhibition for unrepeated-word trials.

Insert Figure 2 about here

The facilitation analysis yeilded a significant effect due to prime type $F(1,57) = 42.58$, $p < .001$ but no proportion by prime type interaction. No significant differences were obtained for the inhibition or nonword

data. Error rates were analyzed and there were no
significant effects associated with the error data.

Discussion

The lack of a proportion by prime type interaction
for the facilitation analysis supports the hypothesis
that a strategy related to the proportion of repeated
words was defeated. In the discussion of Experiment 1
it was argued that a post-lexical repetition checking
strategy best accounted for the significant
facilitation in the interaction of repetition priming
and proportion of repeated words, and the lack of
inhibition in the nonsignificant prime type by
proportion analyses for unrepeated word and nonword
data. Therefore, the results of Experiment 2 indicate
that the repetition of nonwords at the same rate as
words were repeated affected the post-lexical
repetition checker. I feel this is the case although
the proportion by prime type interaction was
significant in the overall (unrepeated-word vs
repeated-word) analysis. As shown in Figure 2, there
appears to be some facilitation to repeated words and
inhibition to unrepeated words occuring in relation to
increasing repeated-word proportion, but clearly this
is not to the extent shown in Experiment 1.

The lack of inhibition associated with unrepeated-word pairs reported in Experiment 1 indicated that a post-lexical repetition checker, like the coherance checker, is a readily activated mechanism of information processing. This would account for the significant overall (facilitation + inhibition) proportion effect found for the repeated-word data in Experiment 2. That is, it may be the case that the detection of repeated nonwords interfered with a post-lexical repetition checking strategy, but because subjects are not accustomed to dealing with the processing of nonwords, the attentional process was not completely defeated.

General Discussion

The strongest finding of the present experiments is that increasing the proportion of repeated-word pairs, like related words, resulted in increases in facilitation on repeated-word trials. This extends previous findings from semantic priming (related-word) paradigms to the present repeated-word results. The significant interaction due to facilitation repeated-word data and lack of facilitation on nonword data in Experiment 1 indicate that a process like the post-lexical coherance checker, termed the post-lexical

repetition checker, may have caused the effect of proportion in that experiment. In addition, the lack of significance for the facilitation analysis in Experiment 2 shows that subjects in Experiment 1 were utilizing an attentionally-based strategic process to facilitate the recognition of words.

Because Experiment 1 and 2 were designed specifically to examine an attentional process similar to the post-lexical coherance checking mechanism, the present set of results do not provide information pertaining to prime-induced attentional processing or the predict-and-match strategy (an elaboration of prime-induced attentional processing). Therefore, even though the evidence from the two experiments is indicative of a post-lexical repetition checking strategy being used by subjects, it is quite possible that an additional attentional processing mechanism was responsible for the proportion effect.

Of particular interest in this regard is the significant difference found between proportions for the repeated-word vs unrepeated-word (overall) analysis in Experiment 2. The repetition of equal proportions of nonwords was intended to cancel any effect due to the action of the post-lexical repetition checking

process, consequently the data of Experiment 2 suggest the predict-and-match strategy may have been operating. A significant nonword effect, which would provide evidence that the predict-and-match strategy was being utilized, may not have become evident because the present design lacked sufficient power to show its effect.

Another possibility which can account for the significant overall priming effect in Experiment 2 is that the repetition of nonwords is fundamentally different than the repetition of words. Since nonwords have no semantic representation they may be processed at a completely different level of processing than words, and therefore, the information utilized to detect the repetition of nonwords is fundamentally different than information used to detect repetition of words. Evidence that supports this argument has been presented by Rugg and Nagy (1987). These researchers utilized Event Related Potentials (ERPs) to investigate how nonwords repetitions are detected. Their evidence indicates that the recognition of nonword repetition is quite different than for words (see Rugg & Nagy, 1987).

One important qualification to the present results stems from a possible artifact of the experimental

design. The design used 180 trials which consisted of
60 word-word, 60 nonword-nonword, 15 neutral
prime-word, 15 neutral prime-nonword, 15 word-nonword,
and 15 nonword-word trials. This design was utilized
in Experiment 1 to allow for the matching of densities
for repeated words and nonwords in Experiment 2. Sixty
trials seemed to be a minimum number to use for the
proportion factor to allow for a sufficient number of
trials for each proportion. At the same time the total
number of trials (180) was kept low because of the
tedious nature of the task, and the fear that subjects
would stop attending to it if more trials were
required. At 180 trials it was estimated that a
sufficient number of trials for each condition would be
obtained.

By using this design however, the possibility
rises that some subjects may have taken advantage of
the fact that in eighty percent of the word-prime
trials the prime was followed by a word. In addition,
trials in which nonwords were used as the prime were
followed by word targets only twenty percent of the
time. Therefore, a good heuristic would have been to
respond to all word primes with "word" and all nonword
primes with "nonword", guaranteeing an eighty percent

success rate. If such a strategy was being employed by a few of the subjects, the results of the present studies may have been invalidated. However, if any subject had utilized such a strategy, error rates approaching twenty percent for the word-word condition in Experiment 1, and for both the word-word and nonword-nonword conditions in Experiment 2 would be evident. No such error rates were observed. Therefore, I feel the present data do provide implications concerning the operation of specific strategy mechanisms in repetition priming, and it is felt that the present conclusions deserve a high degree of confidence.

To account for the questions raised by the results of Experiments 1 and 2, future research might employ a similar, but modified paradigm. One possibility is to conduct a study with a very large number of subjects, so that sufficient statistical power would pick up any unrepeated-word inhibition effect which may not have become evident with the present paradigm. In addition, by changing to a much higher number of trials, sufficient numbers of word-nonword and nonword-word trials could be added so that utilizing the prime alone

is not a viable heuristic for correctly responding to the target.

At this point it is appropriate to say something about the nature of the paradigms utilized to study information processing. In some ways the present investigations represent a study of tasks as much as of reading processes. The two experiments in the present study were an attempt to extend the lexical-decision paradigm so that it can be used to gain additional information about automatic and attentional processing. Some researchers (e.g., de Groot, 1984, and Seidenberg, Waters, Sanders, & Langer, 1984) have concluded that naming, rather than lexical-decision tasks, are more appropriate for studying reading processes. They argued that naming is more closely related to reading than the cumbersome and problematic lexical-decision task. This is probably true, but it does not mean that the lexical-decision task can not provide valuable information toward a complete understanding of how humans process information.

In order for a complete understanding of information processing a thorough knowledge of the strategies subjects might employ is needed. The current study has shown that another way to show the

existence of an attentional, strategic processes is to introduce a variable which would logically defeat that process, thereby providing verification of the existence of the process in question. The ability to cancel the effects of such strategic processes allows researchers to experimentally control these processes, permitting them to focus in on the actual process or processes they want to study. Future research should focus more on similar ways to elicit task specific strategies and then experimentally defeat them.

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Table 1

Average response times and percent error for the various priming and proportion conditions in Experiment 1

| | Group | | |
	1	2	3
W-W, R	674.9[a]	561.1	548.0
	2.5[b]	1.7	0.5
W-W, U	702.0	625.2	695.9
	1.5	0.3	2.0
W-NW	949.8	874.3	896.9
	4.7	2.1	2.4
N-W	728.5	656.5	691.5
	3.4	2.1	0.0
N-NW	888.7	880.0	929.9
	4.1	4.8	4.6
NW-W	847.6	773.2	829.6
	4.5	2.2	4.5
NW-NW	840.3	804.7	802.1
	1.5	4.3	1.6

[a] Response Time;   [b] Percent error.

Note: W-W, R = repeated word-word; W-W, U = unrepeated word-word; N-W = neutral prime-word; W-NW = word-nonword; N-NW = neutral prime-nonword; NW-NW = nonword-nonword;   NW-W = nonword-word.

Table 2

<u>Average response times and percent error for the</u>

<u>various priming and proportion conditions in</u>

<u>Experiment 2</u>

	Group		
	1	2	3
W-W, R	558.7[a]	647.1	588.6
	1.1[b]	2.3	1.7
W-W, U	606.0	736.6	710.2
	0.8	1.2	1.3
W-NW	814.8	946.0	812.6
	4.3	3.2	1.5
N-W	637.6	722.1	682.2
	1.3	1.3	0.6
N-NW	809.4	927.0	832.8
	1.7	4.0	1.8
NW-W	761.4	845.3	771.3
	6.4	2.8	1.9
NW-NW	694.2	810.5	683.0
	2.6	4.1	2.2
NW-NW, R	648.1	764.5	655.6
	1.7	3.6	1.8
NW-NW, U	691.4	871.0	785.4
	2.1	4.4	2.0

[a] Response time;   [b] Percent error

Note: W-W, R = repeated word-word; W-W, U = unrepeated
  word-word; N-W = neutral prime-word; W-NW =
  word-nonword; N-NW = neutral prime-nonword; NW-NW =
  nonword-nonword;   NW-W = nonword-word; NW-NW, R =
  repeated nonword; NW-NW, U = unrepeated nonword.

Figure Caption

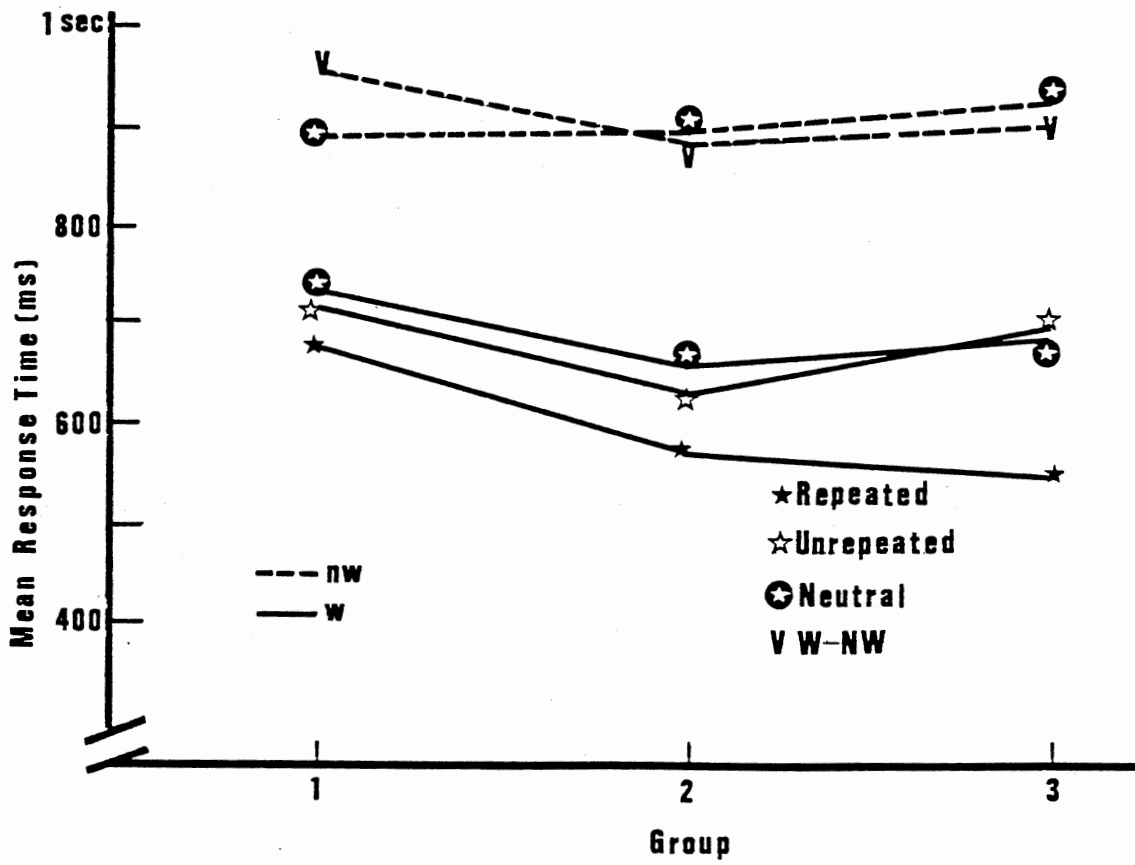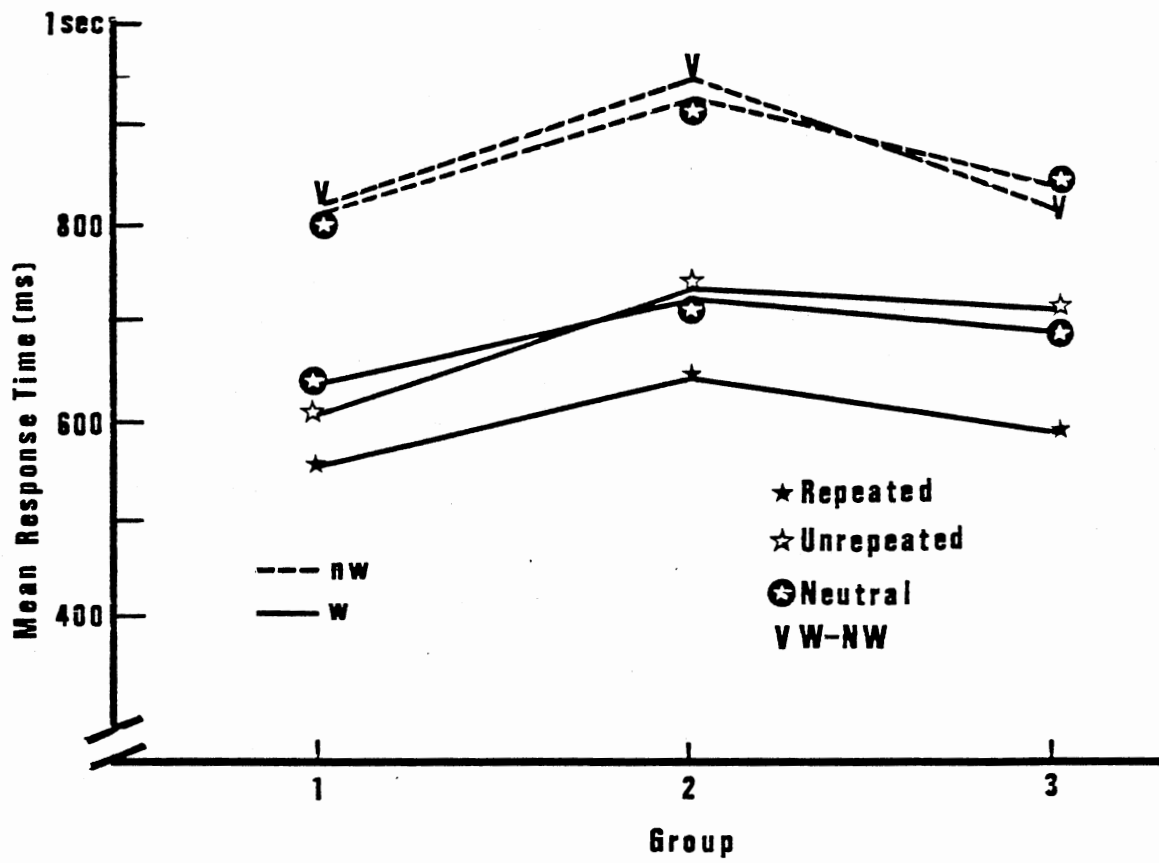Figure 1. The effect c proportion across priming conditions in Experimen 1.

Figure Caption

Figure 2. The effect of proportion across priming

conditions in Experiment 2.

VITA 2

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Doctor of Philosophy

Thesis: THE EFFECT OF PROPORTION OF REPETITION PRIMING ON A
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