Recognition memory for pseudowords[☆]

Robert L. Greene*

Department of Psychology, Case Western Reserve University, 10900 Euclid Avenue, Cleveland, OH 44106-7123, USA

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Abstract

Participants are more likely to give positive responses on a recognition test to pseudowords (pronounceable non-words) than words. A series of experiments suggests that this difference reflects the greater overall familiarity of pseudowords than of words. Pseudowords receive higher ratings of similarity to a studied list than do words. Pseudowords receive more positive recognition responses than words even when pseudowords are remembered at least as well as words. This pseudoword effect is found on forced-choice recognition and on frequency judgments but not in associative recognition.
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The mirror effect (Glanzer & Adams, 1985) is the finding that, in recognition experiments involving two classes of stimuli, the class with the higher hit rate tends to have the lower false-alarm rate. This effect has been most often demonstrated through comparisons of low-frequency and high-frequency words. The mirror effect is commonly portrayed as one of the regularities of recognition memory (Glanzer, Adams, Iverson, & Kim, 1993). Indeed, the mirror effect has been listed (along with the list-strength effect) as one of the two phenomena "that are at the heart of testing and evaluating the models" of recognition memory (Ratcliff & McKoon, 2000, p. 575).

Despite the influence of the mirror effect, it is possible to find exceptions to this pattern. One of the best-documented exceptions involves comparisons of words with pseudowords (pronounceable nonwords). The standard finding here is that pseudowords (or, alternatively, very low-frequency words that can be assumed to be unknown by all participants) tend to have both higher hit rates and higher false-alarm rates than do words (Hintzman & Curran, 1997; Hockley & Niewiadomski, 2001; Whittlesea & Williams, 2000, 2001; Wixted, 1992). This finding, that overall positive-response rates are higher for pseudowords than for words, will be known here as the pseudoword effect.

Several related explanations have been proposed for this pseudoword effect. This class of related explanations will be referred to here as the overcompensation account. According to this class of explanations, participants know that pseudowords may be less memorable than words. On a recognition test, participants try to equate for this memorability difference, either by adopting a lower criterion for pseudowords than for words (Hockley & Niewiadomski, 2001; Stretch & Wixted, 1998) or by rescaling the familiarity values of the pseudowords (Hintzman & Curran, 1997). However, participants systematically overcompensate, so that pseudowords become far more likely to receive positive responses than do words. Experiments 1–3 test this overcompensation explanation, while Experiments 4–8 address an alternative account, namely, that pseudowords receive more positive responses than words because they are higher in familiarity.

Experiment 1

One version (Hockley & Niewiadomski, 2001; Stretch & Wixted, 1998) of the overcompensation approach attributes the pseudoword effect to the use of a lower response criterion for pseudowords than for words. If this version were true, then one may not expect to find the pseudoword effect in forced-choice recognition. It is often assumed that no response criteria are needed on forced-choice tests (e.g., Hicks & Marsh, 1998; Lockhart, 2000; Macmillan, 1993; Murdock, 1982a). However, Wixted (1992, Experiment 1) reported results that suggest that a pseudoword effect may be found in forced-choice recognition; he found a tendency for subjects to select rare words more often on this test than words of higher frequency. Experiment 1 was an attempt to replicate this pattern using words and pseudowords.

Method

Participants

Sixteen students from introductory-psychology classes participated to fulfill a course requirement.

Materials

In the experiments reported here, the materials used were the 60 pseudowords (regular nonwords) and 60 words used by Whittlesea and Williams (listed in Appendix A of their 2000 paper). A different random ordering of stimuli and random assignment of stimuli to experimental conditions was presented to each participant.

Procedure

Participants were tested individually. They were asked to study a list for an unspecified memory test. A list of 30 words and 30 pseudowords intermixed was shown one item at a time on a computer screen at a 1 s rate. Immediately after presentation of the list, a self-paced forced-choice recognition test was administered on the computer. This test consisted of 60 test pairs, each containing one word and one pseudoword. Participants were told that each test pair contained one item that had been presented on the study list and one that had not been. They were asked to select the studied item in each test pair and were informed that words and pseudowords were equally likely to be the correct response.

Results

The overall proportions of items given positive responses are shown in Table 1 for words and pseudowords for all experiments reported here. Unless otherwise noted, a significance level of .05 is used for all statistical tests.

Table 1
Proportions of positive responses given to words and pseudowords

	Experiment	Words	Pseudowords
1	(Forced-Choice)	.38	.62
2	(Repeated pseudowords)	.41	.62
3	(Directed forgetting of words)	.29	.61
5	(1 s Presentation rate)	.36	.61
	(3 s Presentation rate)	.44	.58
6	(Overall recognition)	.38	.60
	(Remember responses)	.21	.19
	(Know responses)	.13	.33
	(Guess responses)	.04	.08
7	(Frequency judgment)	.33	.49
8	(Associative recognition)	.46	.46

A pseudoword effect in forced-choice recognition was found, as all 16 participants selected the pseudoword as the old item more often than the word ($p < .01$ by sign test). As a result of this tendency, participants were more accurate on test pairs when the pseudoword was the correct answer (.85) than when the word was the correct choice (.62), $F(1, 15) = 21.30$, $MSe = 18.40$.

Experiment 2

The standard overcompensation account of the pseudoword effect attributes the lower criterion used for pseudowords to participants' beliefs that words are much more memorable than pseudowords. According to this approach, if participants were put in a situation where they know that words are at least as memorable as pseudowords, no such pseudoword effect should be found. In Experiment 2, this was accomplished by presenting all pseudowords twice and all words once.

Method

Participants

Twenty students from introductory-psychology classes participated to fulfill a class requirement.

Procedure

Participants were told that they would be studying a mixed list of words and pseudowords (pronounceable nonwords) for an unspecified study list. They were told that the experimenter wanted to equate memory for the words and the pseudowords and that all words would be presented once and all pseudowords would be presented twice. They then saw the study list of 90 events (30 words presented once with 30 pseudowords presented twice) at a 1 s rate. The two occurrences of a repeated item were always separated by 10–15 intervening items.