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BRIEF REPORTS

The effects of conceptual salience and perceptual distinctiveness on conscious recollection

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Two experiments were conducted to examine the hypothesis that recollective experience is influenced by the manipulation of salient or distinctive dimensions of the encoded stimuli (Rajaram, 1996). In Experiment 1, the conceptual dimension of the to-be-remembered homographs (*bank*) was manipulated by requiring subjects to encode the dominant (*money*–BANK) or the nondominant (*river*–BANK) meanings. In Experiment 2, the perceptual dimension was manipulated by presenting orthographically distinctive (*subpoena*) or orthographically common (*sailboat*) words. An advantage for conceptually salient (dominant meaning) items and perceptually distinctive (orthographically distinctive) items was selectively observed in *remember* responses. These results support the hypothesis that processing of distinctive or salient attributes boosts the recollective component of explicit memory.

Recent research on the retrieval experience has shown that subjects can reliably distinguish between at least two types of experience that accompany explicit memory performance: *remembering* and *knowing*. This distinction was originally introduced by Tulving (1985) and later elaborated upon, both empirically and theoretically, by Gardiner (1988, 1996; Gardiner & Java, 1990, 1993). In a typical recognition memory experiment, subjects assign *remember* judgments if they have a conscious and vivid recollection of the earlier presentation of those items during the study phase. Subjects assign *know* judgments to items if they are certain the item appeared earlier in the study phase, but for which they do not have a conscious recollective experience. The elaborate instructions and various examples of this experiential distinction have been described in detail in a number of published studies (Gardiner, 1988; Rajaram, 1993, 1996; Rajaram & Roediger, 1997; Tulving, 1985). The present article focuses on the experience of *remembering*. The aim was to identify a priori the experimental variables that influence remembering to gain theoretical understanding about the nature of recollective experience.

The *remember–know* distinction in explicit memory has received intense experimental scrutiny in recent years owing to the systematic dissociations observed between these two judgments as a function of various theoretically motivated manipulations (see Gardiner & Java, 1993, and Rajaram & Roediger, 1997, for reviews). In a series of studies, Gardiner and colleagues (Gardiner, 1988; Gardiner & Java, 1990; Gardiner, Gawlik, & Richardson-Klavehn, 1994; Gregg & Gardiner, 1994) demonstrated that *remember* judgments are sensitive to conceptual manipulations and *know* judgments are sensitive to perceptual manipulations.

For example, Gardiner (1988) reported that the generation effect (better memory for items generated in response to conceptual cues than for items that are simply read; Jacoby, 1978; Slamecka & Graf, 1978) is found only for *remember* responses and not for *know* responses. With respect to perceptual variables, Gregg and Gardiner (1994) showed that manipulations of surface features such as modality (auditory vs. visual presentation of items across study and test in a recognition memory task) affect *know* judgments, not *remember* judgments. Working from these and other similar patterns of results, Gardiner (1988) hypothesized that *remember* judgments are based on conceptual processing arising from the episodic memory system and *know* judgments are based on perceptual processes carried out by the procedural memory system.

In another series of experiments, Rajaram (1993) reached similar conclusions with respect to the nature of processes that give rise to different types of conscious experience during retrieval. Rajaram (1993) reported that the levels-of-processing effect (better memory for items encoded for meaning than for surface features; see Gardiner, 1988) obtained in recognition memory was amplified in *remember* judgments. In contrast, the manipulation of perceptual fluency, induced by preceding the presentation of an item by a masked presentation of itself, increased the proportion of *know* responses, not *remember* responses. On the basis of these findings, Rajaram (1993) proposed a processing account (Roediger, 1990; Roediger, Weldon, & Challis, 1989) in which *remember* re-

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sponses were presumed to be sensitive to conceptual manipulations and *know* responses were presumed to be sensitive to perceptual manipulations.

However, recently published evidence is troublesome for the conceptual/perceptual processing account as a framework for understanding retrieval experience (see Conway & Dewhurst, 1995; Dewhurst & Conway, 1994; Gardiner & Java, 1990, Experiment 1; Rajaram, 1996). For example, Rajaram (1996) reported effects of perceptual manipulations on *remembering* in a series of three experiments. In one experiment, subjects were presented with pictures and words at study. In a later recognition task in which all the studied and nonstudied items were presented in pictorial form, a picture superiority effect (better performance for studied pictures than for studied words; see Weldon & Roediger, 1987) was obtained not only in recognition but also selectively in *remember* judgments. Thus, the physical overlap between studied and tested pictures boosted the experience of *remembering*, not *knowing*.

In two other experiments, Rajaram (1996) manipulated the size and left–right orientation of line drawings (see Cooper, Schacter, Ballesteros, & Moore, 1992; Srinivas, 1996) across study and test in a recognition paradigm. Varying size (Experiment 2) or left–right orientation (Experiment 3) across study and test had deleterious effects on *remembering* despite the strong possibility that such manipulations bring about only perceptual changes in the stimuli. In order to reconcile these and other findings that are problematic for the distinction between conceptual and perceptual processing (Conway & Dewhurst, 1995; Dewhurst & Conway, 1994; Gardiner & Java, 1990, Experiment 1) with the earlier body of evidence that supported it, Rajaram (1996) proposed a different framework. Specifically, Rajaram proposed that "a distinction between factors that induce fluency of processing and factors that provide salient or distinctive information provides a better account of most of the extant data" (p. 374).

The distinctiveness–fluency framework is drawn from previous accounts of memory performance (see Hunt & McDaniel, 1993; Hunt & Mitchell, 1982; Jacoby & Dallas, 1981; Luo, 1993) and is applied here to account for the retrieval experience. In other words, this framework is designed to predict and explain why different experimental manipulations produce different states of subjective experience at retrieval. Within this framework, processing of salient or distinctive attributes of the stimuli, which may be conceptual or perceptual in nature, leads to the experience of *remembering* at retrieval. In contrast, the retrieval experience of *knowing* is influenced by the fluency with which perceptual or conceptual information is processed.

The experiments reported in this paper directly examine the hypothesis that processing the salient or distinctive attributes of stimuli leads to the experience of *remembering*. The constructs of salience and distinctiveness have often been used interchangeably in the memory literature (see Schmidt, 1996) and the extant studies do not explicitly differentiate between them. Distinctiveness has been variously defined as the property that (1) separates items or events that share few rather than many features with other items in memory (Nelson, 1979), (2) emerges due to differences rather than similarities among items (Hunt & McDaniel, 1993; Schmidt, 1996), (3) arises from presentation of isolated items in the context of background items (Hunt & Mitchell, 1982), or (4) characterizes "events ... that are incongruent with active conceptual frameworks, or that contain salient features not present in active memory" (Schmidt, 1991, p. 537). Thus, a common thread among these definitions is the differences among items that presumably uniquely specify some items, or the salience of items that make them stand out from among the background items.

Notably, the distinctive items in such empirical investigations are typically the isolated, or *less frequently* presented, items either within the experiment or in the natural distribution of real-life events. As a result, distinctiveness is often confused with low-frequency occurrence of items or events. Because of such propensity in defining low-frequency events as distinctive events, it is important to preserve the importance of context (Murphy & Medin, 1985) and of the conceptual framework (Schmidt, 1991) in defining distinctiveness. Thus in certain contexts a frequently occurring item such as *table* can also become unique or distinctive. For example, although a high-frequency word and therefore a common event, the word *table* stands out or becomes salient, in the context of famous names. Such considerations have led to the use of the terms *distinctiveness* and *salience* interchangeably. Although distinctiveness may well refer to salient events such as the example just described, these terms will be treated as two separate constructs in the present study for reasons explained in the introduction to Experiment 1. Specifically, it is assumed here that unique or uncommon events are distinctive as well as salient in that they will stand out (as in the case of low-frequency words). It is further assumed that cognitive events that are not necessarily unique or uncommon (such as the high-frequency word *table* in the above example) will also produce the experience of remembering if such events become salient relative to the background items.

In this study, the role of salience or distinctiveness in producing the experience of *remembering* was tested with variables that can a priori be designated as generating conceptual salience (Experiment 1) or perceptual distinctiveness (Experiment 2).

EXPERIMENT 1

The aim of this experiment was to examine the effects of semantic or conceptual salience on *remembering*. As noted, facilitatory effects of conceptual manipulations on remembering have been documented in a number of studies (e.g., Gardiner, 1988; Rajaram, 1993). Note that in most of the previous experiments, semantic or conceptual encoding was contrasted with nonsemantic encoding. For example, encoding of meaning was compared with encoding of phonemic features (Gardiner, 1988; Rajaram, 1993). To understand the nature of conceptual attributes that would specifically influence *remembering*, the present experiment contrasted two types of conceptual encoding. This manipulation was achieved by using homographs (e.g., *chest*); subjects focused on the salient conceptual attribute of the stimulus in one condition (the dominant meaning, e.g., *body part*–CHEST) and on the nonsalient conceptual attribute in another condition (the nondominant meaning, e.g., *cabinet*–CHEST).

The a priori designation of salient and nonsalient conceptual attributes of homographs is based on findings from a large body of published evidence. A number of studies have shown that in the processing of homographs (e.g., *chest*), access to the dominant meaning takes precedence over access to the nondominant meaning (Forster & Bednall, 1976; Pacht & Rayner, 1993; Rayner, Pacht, & Duffy, 1994). Furthermore, the dominant meaning stays activated longer than the nondominant meaning (Simpson & Krueger, 1991); in fact, the facilitation for dominant meaning of the homographs does not reverse even when subjects are informed that the word list consists largely of nondominant interpretations (Simpson, 1981; Simpson & Burgess, 1985). Studies have also shown that even when the first presentation of the homograph requires access to the nondominant meaning, subjects show a strong bias for accessing the dominant meaning in the subsequent processing of the homograph (Gee, 1997; Winograd & Geis, 1974). Finally, explicit memory performance for homographs is superior in recognition memory and cued recall if the dominant meaning context rather than the nondominant meaning context is provided at test (Gee, 1997; Winograd & Conn, 1971), or when dominant meaning is encoded relative to nondominant meaning in word-fragment cued recall (Rajaram, Srinivas, & Roediger, in press). All these studies clearly demonstrate that the dominant meaning of homographs is more salient than the nondominant meaning. On the basis of such evidence from studies on lexical access and explicit memory performance, it is hypothesized that encoding of the dominant meaning of homographs will lead to preferential processing of salient conceptual attributes relative to the processing of the nondominant meaning. If the experience of *remembering* is more sensitive to salient and distinctive properties of the encoded stimuli, a dominance advantage should be obtained for *remember* responses.

One issue regarding this predicted effect of conceptual salience on *remembering* requires further explication. Note that the semantic interpretation of a homograph that is assumed to enhance conscious recollection is the more frequent rather than the less frequent meaning of the homograph. At first glance, this prediction appears to be the opposite of that obtained with *lexical* frequency of items. Specifically, low-frequency words give rise to the experience of *remembering* more than do high-frequency words (Gardiner & Java, 1990). To resolve this apparent contradiction, it is important to identify the sources of distinctiveness or salience for both lexical frequency and semantic frequency.

As noted in the introduction, in the current theories of memory performance, the effect of distinctiveness is assumed to arise from differences among items (Hunt & McDaniel, 1993; Hunt & Mitchell, 1982; Schmidt, 1996). Thus, in a background of similar items, any item that is different will stand out and be more memorable. In the case of lexical frequency, the differences among words arise because some words occur less frequently in the English language, and therefore become isolated (or differentiated) by virtue of their infrequent occurrence in the midst of frequently occurring counterparts. However, in the case of multiple semantic interpretations of homographs, the distribution of different meanings is not similar to the lexical frequency distribution just described. Specifically, most homographs do not have only two meanings, one dominant and one nondominant, thereby causing the nondominant (or lower frequency) meaning to stand out. A large proportion of homographs have more than two meanings, and sometimes up to five meanings.[1] Of these meanings, only one meaning is dominant while the rest are nondominant. Thus, in this distribution, the multiple nondominant meanings form the background of similar semantic frequency and therefore cannot be considered distinctive. Instead, the dominant meaning becomes differentiated by virtue of its higher semantic frequency. Although differences of this sort may or may not make the dominant meaning of a homograph distinctive, they certainly do not cause the dominant meaning to be less distinctive than the nondominant meaning. Furthermore, by virtue of its higher semantic frequency, the dominant meaning of a homograph becomes *more salient*, as evidenced by a number of studies cited earlier. As a result, the potential effects of processing the dominant meaning on conscious recollection can firmly be attributed to its salience relative to the nondominant meaning.

Method

Subjects. Thirty-six undergraduates from the State University of New York at Stony Brook participated for credit in partial fulfillment of course requirements.

Design and materials. At study, subjects encoded the dominant or the nondominant meanings of homographs in a within-subjects design. Accuracy data for explicit memory and retrieval experience of *remembering* were measured using a recognition memory paradigm. Altogether, 60 homographs served as critical items in this experiment. This set of 60 homographs was selected from the Nelson, McEvoy, Walling, and Wheeler (1980) norms (see also Rajaram et al., in press). According to the Nelson et al. norms, in this item set the average frequency with which the dominant meaning was produced by subjects (35) differed reliably from frequency for the nondominant meaning [6.4; $t(59) = 26.46$, $SE = 1.08$, $p < .05$]. The dominant and nondominant meanings of the homographs were biased with phrases constructed and reported by Rajaram et al. (in press). In addition to the 60 homographs, one additional set of 40 words was used as fillers in the study lists and a second additional set of 40 words was used as fillers in the construction of the recognition test.

Three study lists were constructed for purposes of counterbalancing in such a way that, across lists, each homograph served as a studied dominant target, a studied nondominant target, or a nonstudied item. Within each study list, 20 homographs were preceded by phrases that biased their dominant meaning (e.g., *yellow–name of a color*), 20 homographs were preceded by phrases that biased their nondominant meaning (e.g., *yellow–cowardly or chicken*). In addition, 40 phrase–word fillers (e.g., *sadness: an emotion*) were included to conceal the experimental manipulation from subjects. The 80 phrase–word pairs were arranged randomly with respect to the study conditions in the study booklets. In addition, a scale displaying numbers from 1 to 5 was placed in front of each phrase–word pair to enable subjects to rate the pairs (to be described shortly).

The test list consisted of 40 studied homographs (20 studied for their dominant meaning and 20 for their nondominant meaning), 20 nonstudied homographs, and 20 filler words to maintain a 1:1 study–test ratio from the subjects' point of view. Two test lists were constructed to create two random orders of stimuli with respect to the conditions. In the test booklet, each word was followed by two blank lines in that row. The first line was provided to indicate whether or not the word had been studied earlier. The second line was provided to indicate whether the subject *remembered* or *knew* the item from the study list. In addition to the study and test lists, a cover sheet was constructed with a window that exposed one row at a time. Study exposure was controlled through a tape on which a female voice prompted with "next" every 5 sec.

Procedure. Subjects were tested in small groups of 1–3. At study, subjects were given the study booklets and the cover sheet and were asked to expose one row at a time. They were asked to determine on the rating scale how well each phrase and word related to each other (1 = *not related*, 5 = *highly related*), and were also informed about a later (unspecified) memory task. Subjects kept pace with the tape by moving the cover sheet every 5 sec. The study phase was followed by a 12-min retention interval in which subjects wrote down the names of the U.S. presidents for 6 min and the names of the U.S. capital cities for an additional 6 min.

In the test phase, subjects were presented with the test booklets and the cover sheet to expose the words one at a time. They were asked to write Y (for "yes") on the first blank line if they recognized the word from the earlier study list, and N (for "no") if they did not. Subjects were told that if they recognized the word from the study phase, they should indicate on the second blank line their *remember–know* judgment for that item. The instructions for making *remember–know* judgments were taken from Rajaram (1993, 1996). The experimenter ensured that subjects understood the instructions by requiring them to provide examples (with items other than studied ones). The entire retention interval, including the time taken to communicate the *remember–know* instructions, took an average of 20 min. At test, subjects worked at their own pace and made recognition and *remember– know* judgments on each word before proceeding to the next word in the booklet. The experiment took approximately 45 min.

Results and Discussion

The mean proportions of hits and false alarms for recognition, *remember*, and *know* responses as a function of conditions are displayed in Figure 1. Mean false alarms for *remember* (.02) and *know* (.10) responses fell within the ranges reported in the literature. The significance level in this and the next experiment was set at the conventional level of $p < .05$.

For the overall recognition memory measure, there was a significant advantage for homographs encoded for their dominant meaning (.79) compared with homographs encoded for their nondominant meaning [.66; $t(35) = 5.72$, $SE = .02$]. The critical question posed in this experiment was whether this advantage for the dominant meaning would also appear in the *remember* judgments. The results showed that subjects gave a significantly higher proportion of *remember* judgments to homographs encoded for their dominant meaning (.64) than to homo-

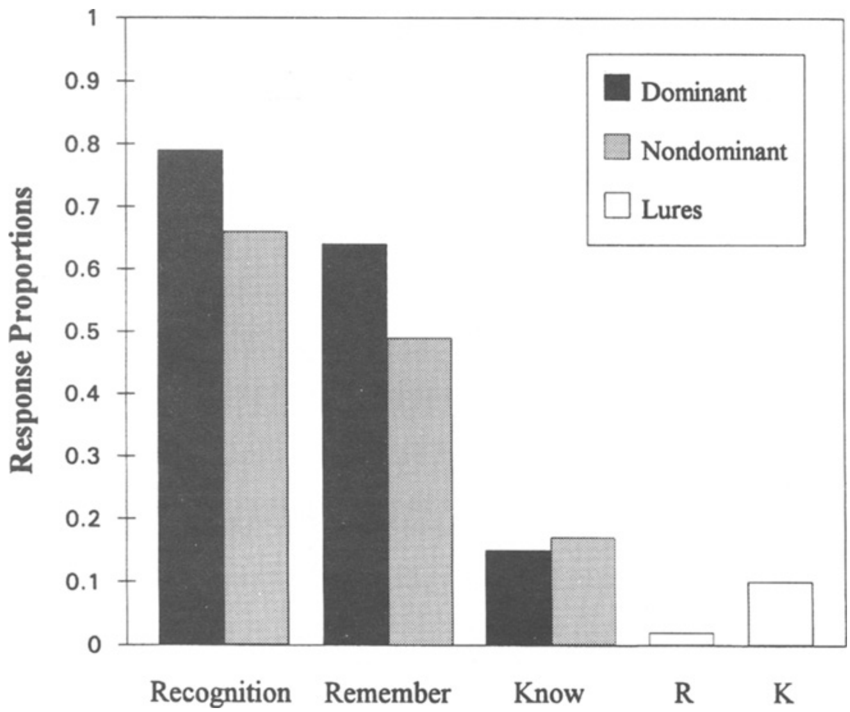

Figure 1. The mean proportions of recognition, *remember*, and *know* judgments as a function of the dominant versus nondominant study conditions in Experiment 1. False alarm data for *remember* (R) and *know* (K) judgments are also shown.

graphs encoded for their nondominant meaning [.49; $t(35) = 6.24$, $SE = .02$]. For *know* responses, the reversed difference (dominant encoding = .15, nondominant encoding = .17) was not statistically significant [$t(35) = -1.67$, $SE = .02$].

These findings from Experiment 1 clearly reveal that processing of salient conceptual attributes leads to a higher proportion of *remember* responses than does processing of nonsalient conceptual attributes. These results will be further discussed in the General Discussion.

EXPERIMENT 2

The aim of Experiment 2 was to examine the hypothesis that *remember* judgments increase as a function of processing the distinctive attributes of the stimuli even if the processed dimension is perceptual in nature (Rajaram, 1996). As noted in the introduction, evidence from early studies using the *remember–know* paradigm revealed effects of perceptual variables largely for *knowing*, not for *remembering* (Gardiner, 1988; Gregg & Gardiner, 1994; Rajaram, 1993). However, recent studies have documented perceptual effects on *remembering* as well (Dewhurst & Conway, 1994; Rajaram, 1996). In order to understand the effects of perceptual variables on *remembering*, the distinctiveness hypothesis stated earlier was tested by manipulating the perceptual variable of orthography in this experiment.

The a priori designation of perceptual distinctiveness versus nondistinctiveness in the orthographic patterns of stimuli was based on the findings from studies reported by Hunt and colleagues (Hunt & Elliott, 1980; Hunt & Toth, 1990). In a series of experiments, Hunt and Elliott demonstrated that a perceptual variable, orthography of words, possesses variations in distinctiveness. In these experiments, orthographically distinctive words such as *subpoena* and *calypso* were better recalled than orthographically common words such as *sailboat* and *cookie*. The perceptual nature of this variable (distinctive vs. common orthography) was confirmed by findings showing that any manipulation that eliminated the orthographic properties of the words (e.g., capitalization or auditory presentation) also eliminated the advantage for orthographically distinctive words over orthographically common words.

Thus, this predominantly perceptual manipulation, considered a priori to produce distinctiveness effects, was used in the present experiment to examine its effects on the nature of subjective experience that accompanies retrieval. It was predicted that significantly more *remember* responses would be assigned to studied items that are orthographically distinctive than to those that are orthographically common.

Method

Subjects. A new group of 32 undergraduates from the State University of New York at Stony Brook participated for credit in partial fulfillment of course requirements.

Design and materials. Orthography of words was manipulated at two levels, distinctive and common, in a within-subjects design. Accuracy of recognition memory and *remember–know* response frequencies were measured in a recognition memory test.

A total of 64 critical words were used in this experiment. Thirty-two words in this set were orthographically distinctive (e.g., *subpoena, calypso, gnaw, lymph*), and the remaining 32 words were orthographically common (e.g., *sailboat, cookie, grit, loser*). Sixteen orthographically distinctive and 16 orthographically common words were taken from the materials published by Hunt and Toth (1990).

In order to increase the list length, a norming study was conducted to collect an additional set of 16 orthographically distinctive and 16 orthographically common words. In this norming study, 110 words were printed in a booklet. The orthographically distinctive and common words reported in the Hunt and Toth (1990) article were included in this pool in order to validate the ratings given for the remaining words. A new group of 75 subjects who did not participate in the two experiments reported in this article took part in this norming study. Following Hunt and Toth's procedure, subjects in this norming study were instructed to rate on a scale from 1 to 5 the visual "weirdness" of each word (1 = *not weird*, 5 = *very weird*). The set of critical words was selected in this norming study in such a way that the mean weirdness ratings given by subjects for the new set of words differed significantly for orthographically common words (1.67) and orthographically distinctive words [3.37; $t(30) = 11.84$, $SE = .14$]. Furthermore, these respective ratings matched the ratings subjects gave for the Hunt and Toth materials. [For orthographically distinctive words, Hunt & Toth words = 3.47, and the new set of words = 3.37, $t(30) = 0.51$, $SE = .18$; for orthographically common words, Hunt & Toth words = 1.59, and the new set of words = 1.67, $t(30) = 1.09$, $SE = .08$]. Furthermore, the orthographically distinctive and common words in the new set of materials (as in Hunt and Toth) were matched for frequency [mean frequencies for orthographically common words = 2.88; mean frequencies for orthographically distinctive words = 2.69; Kučera & Francis, 1967, $t(30) = 0.30$, $SE = .63$], word length (+1 letter), and the initial letter.

In order to ensure that each of the 64 words served as studied and nonstudied items across subjects, two study lists were prepared. Each study list, presented in booklet form, consisted of 16 orthographically distinctive and 16 orthographically common words. Care was taken to ensure that half of the words in each orthography type were drawn from the Hunt and Toth (1990) materials and the other half from the new set of materials created for this experiment. Study words within each booklet were arranged randomly with respect to orthography. Furthermore, two random orders of each study booklet were prepared and presented equally often across subjects. The test booklet consisted of all 64 words, 16 studied orthographically distinctive words, 16 nonstudied orthographically distinctive words, 16 studied orthographically common words, and 16 nonstudied orthographically common words. Two random orders of the test booklet (with respect to orthography as well as study status of materials) were prepared and presented equally often across subjects. In the test booklets, two blank lines were provided in front of each word. The first line was provided for recognition (Y/N) responses and the second line was provided for *remember–know* responses. Finally, a cover sheet with a window and a tape with 5-sec prompts in a female voice were also used in this experiment.

Procedure. Subjects were tested once again in groups of 1–3. The experiment once again consisted of three phases—study, retention interval, and test. The procedure for this experiment during the retention interval and the test phase was identical to that in Experiment 1. In the study phase, all the details of the procedure were the same as in Experiment 1 except that in the present experiment subjects were asked simply to pay careful attention to each item in the study booklet for a later (unspecified) memory test. The entire experiment took approximately 40 min.

Results and Discussion

The mean proportions of recognition, *remember*, and *know* judgments for studied and nonstudied words are displayed in Figure 2. The proportions of false alarms for orthographically distinctive (*remember* = .04, *know* = .08) and orthographically common (*remember* = .02, *know* = .04) words were quite low and within the range reported in the literature.

In overall recognition, performance was significantly better for orthographically distinctive (.90) than for orthographically common (.78) words [$t(31) = 3.86$, $SE = .03$]. More critically, the effect of this perceptual manipulation was evident only in *remember* responses: Significantly more *remember* responses were made for orthographically distinctive (.61) than for orthographically common (.49) words [$t(31) = 3.49$, $SE = .04$]. The orthography manipulation had no effect on *know* judgments [orthographically distinctive = .29, orthographically common = .29, $t(31) = 0.26$, $SE = .03$].

The results from Experiment 2 confirmed that *remember* responses are influenced by perceptual variables as well. Furthermore, these results demonstrate that *remember* responses increase as a function of processing the distinctive attributes of the encoded stimuli.

GENERAL DISCUSSION

Two experiments were conducted to test the hypothesis that the experience of *remembering* is a function of processing the salient or distinctive attributes of stimuli (Rajaram, 1996). Results of Experiment 1 showed significantly higher proportions of *remember* responses to items encoded for salient meaning (dominant interpretation of homographs) than for nonsalient meaning (nondominant interpretation of homographs). The findings from Experiment 2 showed that a significantly higher proportion of *remember* responses were assigned to studied items that were orthographically distinctive than to items that were orthographically common. These effects of conceptual salience and perceptual distinctiveness were observed only on *remember* responses, not *know* responses. Taken together, these results illustrate two important points. First, *remembering* is influenced by conceptual as well as perceptual variables. Second, the critical factor that accounts for facilitatory effects on *remembering* is the salience or distinctiveness of the encoded material. As noted in the introduction, salience and distinctiveness are not necessarily treated as separate constructs in the literature. Even when we specify them to be separate constructs (as was the case in the present study), the two constructs remain closely related and likely have similar (positive) effects on conscious recollection. Therefore, the distinctiveness–fluency hypothesis predicts that both conceptual and perceptual salience as well as conceptual and perceptual distinctiveness will give rise to the experience of *remembering*.

Taken together, these findings provide support for the distinctiveness–fluency hypothesis proposed to understand the nature of subjective experience (Rajaram, 1996). Specifically, the role of salience–distinctiveness on *remembering* has been highlighted in the present findings. Support for the notion that fluency of processing influences the experience of *knowing*, and not *remembering*, comes from a number of studies in the literature. For example, Rajaram (1993, Experiment 3) reported that masked repetition priming of studied and nonstudied items in a recognition memory test led to an increase in *knowing* while leaving *remembering* unaffected. The manipulation of masked repetition priming is considered a priori to increase the perceptual fluency of processing (Jacoby & Whitehouse, 1989). Other experimental manipulations that selectively affect *know* judgments are processing of nonwords (Gardiner & Java, 1990), massed repetition of items (Parkin & Russo, 1993), maintenance rehearsal at study (Gardiner, Gawlik, & Richardson-Klavehn, 1994), and modality match across study and test (Gregg & Gardiner, 1994). Most of these manipulations appear to increase the perceptual component of fluency. Evidence of conceptual fluency effects on *knowing* (but not *remembering*) are also beginning to emerge. Recently, Mäntylä (1997) reported that processing of distinctive facial features led to more *remembering*, whereas global processing that re-

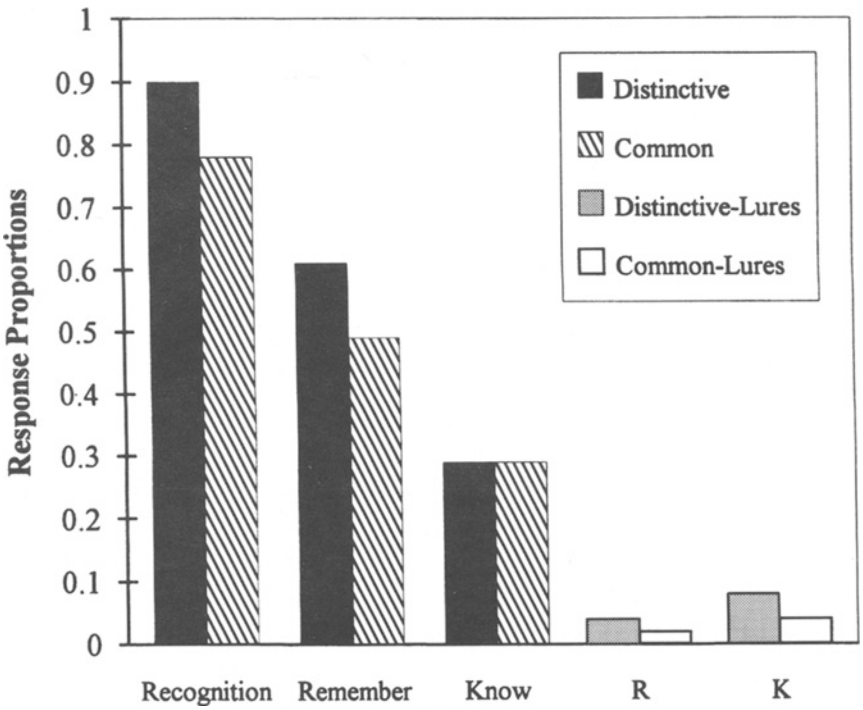

Figure 2. The mean proportions of recognition, *remember*, and *know* judgments as a function of word orthography in Experiment 2. False alarm data for *remember* (R) and *know* (K) judgments are also shown.

quired subjects to categorize faces into different types selectively increased the experience of *knowing*. The latter manipulation likely increased the conceptual fluency with which the item was reprocessed at test. In sum, the strength of the distinctiveness–fluency hypothesis is highlighted by the fact that it allows us to systematically examine the varieties of conscious experience that accompany retrieval.

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NOTE

1. Information compiled from various published norms on homograph meanings (Gawlick-Grendell & Woltz, 1994; Nelson, McEvoy, Walling, & Wheeler, 1980; Twilley, Dixon, Taylor, & Clark, 1994; Wollen, Cox, Coahran, Shea, & Kirby, 1980) shows that the mean number of semantic interpretations for the homographs used in Experiment 1 is 3.0, ranging from 2 to 5. A large proportion of homographs used in this experiment appear to have three, four, or five semantic interpretations.

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