

The Misremembrance of Wines Past: Verbal and Perceptual Expertise Differentially Mediate Verbal Overshadowing of Taste Memory

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When participants generate a detailed, memory-based description of complex nonverbal stimuli (e.g., faces) their recognition performance can be worse than nondescribing controls. This effect, termed *verbal overshadowing*, has been hypothesized to occur in situations in which domain-specific perceptual expertise exceeds verbal expertise. The present study explored this hypothesis by examining the impact of verbalization on the wine recognition of individuals of three categories of wine tasting expertise: Non-wine drinkers, untrained wine drinkers, and trained wine experts. Participants tasted a red wine, engaged in either verbalization or an unrelated verbal activity, and then attempted to identify the target wine from among three foils. As predicted, only the untrained wine drinkers showed impaired wine recognition following verbalization. The results are explained in terms of the differential development of perceptual and verbal skills in the course of becoming an expert. © 1996 Academic Press, Inc.

Of all the sources of memory illusions, our own language may be the most insidious. We depend on language to represent our experiences faithfully so that we can communicate them to others and so that we can remember them ourselves. Generally, language serves memory well. Verbal rehearsal and elaboration are among the most established techniques for enhancing memory (e.g., Darley & Glass, 1975; Maki & Schuler, 1980). Verbal discussion is known to be a critical ingredient for integrating experiences into one's life narrative (Nelson, 1993a). Indeed, the absence of language is often considered a primary source of infantile amnesia (Nelson, 1993b). It is perhaps the very effectiveness of language as a

memory enhancer that enables it to be such a potent source of memory illusions, luring us to rely on it even in situations for which it may not be well suited.

Perceptual memories are one domain where language often falls short. Despite their rich evocative quality, most of us experience a dearth of language when trying to describe memorable perceptions. We might say: "He was *very handsome*"; "The soup was *delicious*"; "The wine tasted *exotic*, but *bitter*." However, such recountings seem merely impressionistic dabs that capture only the coarsest details of our perceptual memories. Because language is usually so effective for characterizing our memories, its paucity in the case of perceptual memories is not always recognized. This sets the stage for a memory illusion, termed verbal overshadowing, in which a recently generated verbal representation is emphasized at the expense of the perceptual memory itself. Of course, the impact of relying on a verbal representation of a perceptual memory will depend on the relative quality of the two representations (verbal versus nonverbal). Such a reliance may be inconsequential when either the perceptual memory is quite scant or the verbal representation quite exten-

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sive. However, memory impairment may result when a perceptual memory greatly exceeds one's ability to communicate that memory. Indeed, a number of recent studies have illustrated the memory disruption that can result when, as a result of memory verbalization, individuals rely on verbal representations of difficult-to-describe perceptual memories for stimuli such as faces and colors (Schooler & Engstler-Schooler, 1990), visual forms (Brandimonte, Schooler, & Gabbino, 1995), and music (Houser, Fiore, & Schooler, 1995).

A central implication of the verbal overshadowing approach is that the impact of verbalization on memory will critically depend on individuals' relative levels of verbal and perceptual expertise in a domain. When the two types of expertise are relatively commensurate, either both strong or both weak, shifting between the two should be inconsequential. When, however, there is a distinct disparity between the two, that is, when perceptual expertise markedly exceeds verbal expertise, then a reliance on the verbal characteristics of a memory may be disadvantageous. The present study examines this hypothesized relationship between verbal overshadowing and expertise. To address this issue, we first review recent research on the disruptive effects of verbalization on perceptual memory and then consider its implications for the impact of verbalization on the memory performance of individuals of varying degrees of domain-specific perceptual and verbal expertise.

VERBAL OVERSHADOWING: BASIC FINDINGS

Although verbal rehearsal typically enhances memory performance, Schooler and Engstler-Schooler (1990) reported a situation in which the standard memory facilitation from verbal rehearsal breaks down—namely, when participants describe complex stimuli—that is, things that are difficult to capture in words. Specifically, they found that postencoding verbalization of difficult-to-describe visual stimuli, such as faces, impaired participants' ability to subsequently distinguish the targets from verbally similar distractors, an effect that they termed verbal overshadowing.

Additional studies suggested that these disruptive effects were the result of attempting to verbalize nonverbalizable stimuli. Consistent with this view, postencoding visualization of a face did not impair recognition, whereas verbalization impaired recognition, not only of faces, but also of other nonverbal stimuli, such as colors. In contrast, verbalization modestly improved recognition of verbal stimuli (e.g., spoken statements). More recent studies have observed verbal overshadowing effects for a variety of other tasks for which relying on a purely verbal representation could be disruptive, including memory for various perceptual stimuli such as music (Houser et al., 1995), maps (Fiore, 1994), and visual forms (Brandimonte et al., 1995). Collectively, these studies suggest that following verbalization, individuals increasingly rely on verbalizable memory attributes at the expense of the nonverbalizable attributes. For memories that are readily verbalized, such a shift is nonproblematic and may even be helpful. For nonverbal memories, however, an emphasis on the verbal aspects of the memory, may be quite detrimental, as most individuals possess only rather meager linguistic skills for communicating complex perceptual experiences.

However, what about individuals who, through extensive training and experience, learn a vocabulary that enables them to communicate perceptual experience in a domain with seemingly greater precision? Consider, for instance, a wine expert's description (from memory) of a red wine, as "earthy on the nose; exhibiting a woody taste in the mouth with hints of cherries and tobacco; the tannins could be called round [while] . . . the fruit has a very short finish." Might this expert's ability to describe the wine so precisely *enhance* his or her memory wines, or at least, to overcome the memory impairment that have been shown to arise when complex perceptual memories are committed to words? To address this issue, we next consider evidence that verbal overshadowing may be caused by differences between verbal and perceptual expertises in a domain.

VERBAL AND PERCEPTUAL EXPERTISE AND
SUSCEPTIBILITY TO VERBAL
OVERSHADOWING

A central implication of the above characterization of the verbal overshadowing effect is that verbal disruption should occur under situations in which individuals possess *relatively greater perceptual than verbal* expertise in a domain (cf. Schooler, Ryan, Fallshore, & Melcher, in press). In support of this claim, Fallshore and Schooler (1996) found that in the case of own-race faces, verbalization impaired recognition. However, for other-race faces there was no effect of verbalization on recognition. Fallshore and Schooler suggested that with increasing expertise, individuals acquire the ability to represent the configural relationships between features (Diamond & Carey, 1986; Rhodes, Tan, Brake, & Taylor, 1989). Because such configural relationships are less readily described than individual features (Wells & Turtle, 1988) this form of expertise may increase the disparity between individuals' verbalizable versus nonverbalizable face expertise. Consistent with this view, Fallshore and Schooler found that while the overall recognition performance of participants was better for own-race versus other-race faces, participants' description quality, as indicated by the performance of yoked participant-judges who identified faces based on verbalization participants' written descriptions, was actually numerically superior for other-race faces. Moreover, participant-judges identification performance was significantly correlated with verbalization participants' recognition accuracy for African-American faces, but *not* for Caucasian faces. These results suggest that other-race face recognition relies more on verbalizable knowledge than does own-race recognition, and suggest that own-race face recognition is uniquely vulnerable to verbalization because the disparity between verbal and nonverbal expertise is greater for own-race as compared to other-race faces.

In sum, prior research suggests that verbal overshadowing effects occur when perceptual expertise is high and verbal expertise is mod-

est, whereas it does not occur when both verbal and perceptual expertise are modest. However, what happens when individuals possess both perceptual and verbal expertise? If verbal overshadowing happens because everyday language is inadequate to the demands of describing complex perceptual or cognitive memory traces, then persons who have a specialized verbal expertise should not be subject to verbal overshadowing. A language or vocabulary dedicated to a specific domain may provide a precision and depth lacking in ordinary language, thereby facilitating the recall of both nonverbal and verbal information. Thus, in order to fully examine the manner in which verbal and nonverbal expertise mediate verbal overshadowing, we need to identify a domain that not only varies with respect to nonverbal expertise (as in the case of own versus other-race faces) but also with respect to verbal expertise. Wine tasting seems an ideal candidate for two reasons. First, it is associated with individuals who vary both with respect to their perceptual expertise (wine drinkers versus nondrinkers) as well as with respect to the verbal expertise (individuals with and without extensive formal training). Second, memory for wine taste corresponds to a domain (taste/olfaction) which, although never previously examined in this context, in principle offers conditions that seem likely to be conducive to verbal overshadowing.

Why taste should be susceptible to verbal overshadowing. Several characteristics of odor (and by extension, taste¹) sensation and memory suggest that they are likely domains for the observation of verbal overshadowing. Engen and Ross (1973) have suggested that odors are encoded and remembered as "unitary perceptual events"; they are not readily decomposed into constituent features. In this respect, olfactory memories share the aforementioned configural properties associated with memories for faces (Rhodes et al., 1989).

¹ We consider taste and olfaction memory together because olfaction is a fundamental component of taste experiences.

Thus, to the degree that perceptual memories that are not easily analyzed according to their constituent features are particularly vulnerable to verbalization, then memory for smells/tastes should be similarly at risk.

Although no prior research has specifically examined the effect of *self-generated* verbalization on smell/taste memory, several studies have investigated the effects of experimenter-provided verbal labels. Not surprisingly odor recognition is enhanced by the provision of veridical labels at acquisition (Engen & Ross, 1973; Lyman & McDaniel, 1990; Walk & Johns, 1984). On the other hand, being given incorrect labels impairs recognition (Engen & Ross, 1973). It thus seems likely that the impact of verbalization on scent memory would depend on the overall accuracy of subjects' descriptions. However, given the common difficulty of naming even familiar odors (Lawless & Engen, 1977), it seems quite probable that verbalization can, at least under some circumstances, impair scent/taste recognition.

Expertise and the communication of perceptual experience. If the impact of verbalization on scent/taste recognition depends on the ability to categorize correctly or describe the stimulus, then given research on the greater precision of wine experts' descriptions, we might reasonably expect that experts' wine recognition would be less impaired by verbalization. Recent research on the effectiveness of wine experts' verbal descriptions suggests that they can indeed describe wines more precisely than nonexperts. Lehrer (1983) investigated the validity of "wine talk" by trying to determine if wine experts "constitute a separate linguistic community." Though she found that experts evidenced wide variability in their use of wine terminology and ability to communicate effectively about wines, compared to novices they were more accurate and more consistent in using a list of 145 wine terms to describe sample wines. Lehrer's work suggests that although wine-related verbal expertise is difficult to acquire, there are delineable levels of such expertise. Likewise, Lawless (1985) found that experts were significantly more

accurate than novices in matching white wines to descriptions written by other experts. Lawless also found that novices and experts differed significantly in their use of concrete and abstract wine descriptors. Experts used more concrete (e.g., yeasty) and fewer abstract (e.g., full) terms than did novices. Solomon (1990) found similar linguistic differences between experts and novices and further provided evidence suggesting that experts' greater precision in describing wines "is associated with their more precise [taste] discrimination performance" (p. 495). Overall, the perceptual communication data strongly suggest that wine experts learn to pay selective attention to describable features of wines, whereas nonexperts are less able to do so.

SUMMARY AND PREDICTIONS

Previous research suggests that verbalization of a perceptual memory can be disruptive when perceptual expertise exceeds verbal expertise. Although evidence for this relationship has been revealed in the domain of face recognition, it has not been demonstrated for other domains. Moreover, prior evidence for this relationship has come from the observation of verbal overshadowing when perceptual expertise is high and verbal expertise is low (own-race face recognition) but not when both forms of expertise are low (other-race face recognition). Prior studies have not examined situations in which both perceptual and verbal expertise are high.

The present study sought to examine the relationship between verbal overshadowing and expertise in wine tasting because it represents an area of expertise within which individuals can vary with respect to perceptual and verbal expertise. Our subjects included *non-red wine drinkers*, who have virtually no experience with the stimulus, and thus provide a baseline of individuals with minimal perceptual and verbal expertise; *wine drinkers*, who have developed a palate for red wine (they have moderate perceptual expertise), yet do not know how to describe wines with much precision (they lack verbal expertise); and fi-

nally, *wine experts*, who have developed an extensive vocabulary dedicated to taste and odor detection and classification that enables them to significantly exceed novices in describing wines (Lehrer, 1986; Solomon, 1990). If verbal overshadowing of perceptual memory occurs when there is a marked discrepancy between individuals' verbal versus perceptual expertise, then these three types of participants should show the following pattern of verbalization effect. Persons who do not drink red wine (like persons describing other-race faces) should show no effect of verbalization because their minimal verbal expertise matches their limited or nonexistent perceptual experience. In contrast, regular red wine drinkers with little or no formal wine training (like persons recognizing own-race faces) should show a substantial effect of verbalization because they have developed a relatively high degree of perceptual expertise (a "palate") but not the verbal tools to express it. Finally, wine experts possess both perceptual and verbal skills that are highly integrated, and perhaps even interchangeable, and should therefore perform well regardless of verbalization. The above predictions were tested in a wine memory study in which participants of varying levels of expertise tasted a target wine, verbalized it or engaged in an unrelated activity, and then attempted to discriminate it from three similar distractors.

METHOD

Participants

The participants were 107 adults between the ages of 21 and 78. Ninety-one were from Pittsburgh, Pennsylvania, and 16 were from Washington, DC. At the start of the session they completed a questionnaire which included a three-item wine knowledge quiz (see Appendix A). Based on the questionnaire, participants were categorized according to red wine consumption frequency, amount of formal wine training, and professional involvement in wine, as follows:

Novices. Participants who indicated that they drank red wine less than once per month

(i.e., little or no perceptual experience) were classified as Novices ($n = 39$). Most Novices were University of Pittsburgh students and staff who responded to a campus newspaper advertisement. Fifteen were paid \$5 for their participation. The other 22 volunteered (as did all other participants).

Intermediates. Participants were classified as Intermediates ($n = 43$) if they drank red wine at least once per month (moderate to high perceptual expertise) and had little or no formal wine training (low verbal expertise). Most were enrolled in community college wine appreciation classes or were members of local wine societies; five responded to an advertisement in a Pittsburgh newspaper. Their mean red wine consumption was 7.0 times per month.

Experts. Participants were classified as Experts ($n = 25$) if they were either wine professionals or had taken multiple wine seminars. Eighteen of them were, or had been, professionally involved with wine (as retailers, brokers, cellar masters, wine-makers, and/or competition judges). Their mean red wine consumption was 10.1 times per month.

Materials and Design

Stimuli. Eight red varieties from five countries were the targets and distractors for two recognition trials. There were two sets. In Set A the target was a Cabernet Sauvignon (California); the distractors were a Gamay Beaujolais (California), a Beaujolais Villages (France), and an Egri Bikaver (Hungary). In Set B the target was a Shiraz (Australia) and the distractors were a Barraida (Portugal), a Merlot (Argentina), and a Pinot Noir (California). The test arrays were presented in each of four Latin squares orders. The target wine appeared equally often in each of the four positions. Stimulus set order (A or B) was counterbalanced within each trial.

This was a 3 (Novice/Intermediate/Expert) \times 2 (Verbal/Nonverbal) \times 2 (Trial) design with expertise and verbalization as between-subjects factors, trial as a within-subjects factor, and target discrimination as the dependent variable. Approximately equal numbers of

Verbal and Nonverbal participants were tested in groups of 4 to 14.

Procedure. After completing the questionnaire participants were told that "this is a wine-tasting and recognition experiment in which you will be asked to taste two red wines. After a short interval during which you will perform a simple task, you will try to recognize the sample from among several wines." For Novices, the experimenter demonstrated how to swirl, smell, and to taste wine. Participants were asked to spit out each sample after tasting it. On each trial the participants received a tray with five opaque plastic cups—the target and the recognition test array—containing approximately one ounce of wine. Cards covered the wine from view prior to tasting. French bread and distilled water were available for participants to clear their palates between samples. Participants tasted the target after having been told to "pay attention to any or all aspects of the sample *except* for its appearance." They were allowed 1 min to taste the target as often as they wished. They then read verbalization or control task instructions in their response booklets.

Nonverbal participants solved a moderately difficult crossword puzzle. Verbalization participants were asked to "describe this wine *as precisely and in as much detail as you can*. Describe it uniquely, so that someone else would match it to your description. Consider all elements of the wine's taste, smell, feel, or related associations . . .". After 4 min the participants were told that the array contained four different wines, including the one previously tasted, that they should taste each in order, and that they were to indicate successively their confidence that each was the target. They used a scale where 7 indicated complete certainty that a wine was the same, 4 mean that they were guessing, and 1 indicated certainty that a wine was not the same.

The confidence ratings were converted to a *discrimination score* for each trial. This value was the difference between the confidence rating for the target wine minus the mean of the ratings for the three distractors. A score of 6 indicated perfect discrimination (i.e., rating

the target a 7 and each distractor a 1); a score of 0 indicated no discrimination, and negative scores indicated false alarms (i.e., ranking one or more distractors higher than the target). Where participants changed any ratings, the final ratings were used to calculate the discrimination score.

RESULTS

The relationship between verbalization and expertise was mediated by a significant three-way interaction between Verbalization, Expertise, and Trial $F(2,196) = 7.52$, $MSE = 44.14$. (Alpha for all statistics was set at .05). This three-way interaction was the result of a sizeable first trial interaction between verbalization and expertise ($F(2,106) = 4.30$, $MSE = 40.95$) which became insignificant on trial 2, $F(2,103) = 1.16$, $MSE = 11.28$. This attenuation of the verbal overshadowing effect across trials has been observed in a number of recent studies (Fallshore & Schooler, 1996; Houser et al., 1995; Schooler, Ryan, & Reder, in press). These carry-over effects could be due to a number of factors (see Discussion). For the present purposes we focus our analyses on trial 1, for which performance was uncontaminated by previous exposure to the paradigm.

Figure 1 illustrates first trial performance. The Expertise \times Verbalization interaction was driven by a significant verbal overshadowing effect among the Intermediates, $t(41) = 2.49$. The Novices showed a trend toward verbal enhancement, though it only approached significance, $t(37) = 1.88$, $p < .07$, while the Experts showed virtually no effect of verbalization.

Recognition results from the control (non-verbalization) condition indicated that the Intermediates and Experts had greater perceptual expertise than Novices. (Tukey's HSD post hoc tests indicated that the Intermediates and Experts constituted a group that was significantly more accurate than the Novices. From the standpoint of the observed verbal overshadowing effect, it is noteworthy that although Nonverbal Experts scored numerically

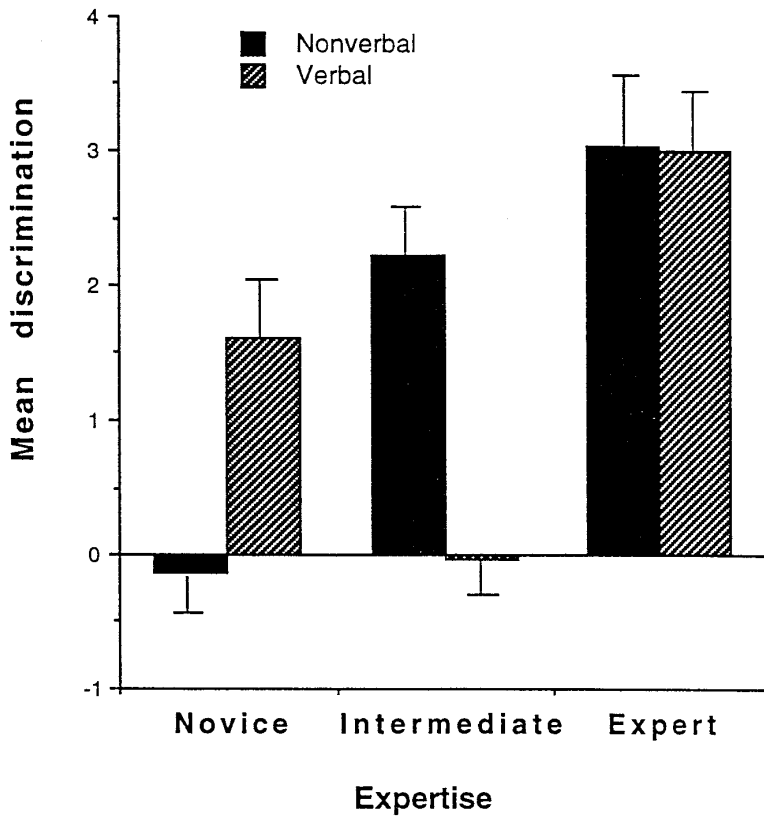


FIG. 1. Trial 1 mean discrimination as a function of expertise and verbalization.

higher than Intermediates, this difference was not significant.)

Participants' mean scores on the three-item, four-point general wine knowledge test indicated that the Experts had markedly greater verbal expertise than either the Intermediates or Novices. There was a significant effect of expertise on wine knowledge performance, $F(2,104) = 48.58$, $MSE = 59.10$, with mean scores of 1.1, 1.9, and 3.8 for Novices, Intermediates, and Experts, respectively. Tukey's HSD post hoc test indicated that all three means differed significantly from one another, although it should be noted that the magnitude of the difference between Novices and Intermediates (.8) was markedly less than that between Intermediates and Experts (1.9).

One interpretation of the verbal overshadowing effect is that verbalization increases individuals' reliance on verbal expertise and de-

creases reliance on their perceptual expertise. In order to test this hypothesis, all potentially relevant variables (e.g., age, gender, consumption frequency, wine quiz score, expertise category, and stimulus blocking variables) were

TABLE 1
PARTIAL CORRELATIONS OF VERBAL SCORE AND CONSUMPTION FREQUENCY WITH TRIAL 1 DISCRIMINATION

	Type of expertise	
	Verbal (controlled for perceptual measure)	Perceptual (controlled for verbal measure)
Verbalizers	.30*	-.02
Nonverbalizers	.17	.24**

* $p < .05$.

** $p = .08$.

TABLE 2
CHANGE IN MEAN DISCRIMINATION IN TRIAL 2

	Nonverbal	Verbal
Novices	+2.35*	-0.51
Intermediates	-0.14	+2.81*
Experts	+0.37	-1.00

* Difference significant at $p < .01$ (paired t test).

entered into stepwise regressions of discrimination in the verbal and nonverbal conditions. The results are consistent with the following interpretation: The *Nonverbal* participants' discrimination was significantly predicted only by the measure of *perceptual* expertise (consumption frequency) ($r = .40$) whereas *Verbalizers*' discrimination was only significantly predicted by the measure of *verbal* expertise (quiz score) ($r = .39$). None of the other variables tested entered significantly into the stepwise regression model. A complementary pattern was revealed by partial correlation analysis examining the effects of partialling out the effects of verbal and perceptual expertise in the two conditions. As can be seen in Table 1, when consumption frequency was partialled out, wine knowledge was significantly correlated with performance in the verbal condition but not the nonverbal condition. In contrast, when wine knowledge was partialled out, consumption frequency had a modest correlation with discrimination among the nonverbalizers (though significant at only the .08 level), whereas consumption had no correlation with the verbalizers' performance.

Trial 2 results. Table 2 shows how discrimination changed between the two trials. As can be seen in Table 2, the Expertise x Verbal Condition x Trial interaction was driven by significantly improved performances among the nonverbal Novices and verbal Intermediates, $t(21) = 4.38$ and $t(17) = 3.4$, respectively. The changes in Experts' discrimination were insignificant.

Wine Description Analyses

Each wine description was coded for frequencies of the following categories of attri-

butes²: (1) general featural descriptors such as "sour," "sweet," "fruity," etc.³; (2) specific flavor associations, that is, references to specific flavors and/or odors detected in the targets, for example "oak," "ashes," "tobacco," various specific fruits and berries, etc.; (3) wine terminology, that is, specialized evaluative and categorical terms often used by wine Experts⁴; (see Appendix B for the exhaustive list of terms comprising the categories); (4) negative, feature-absent descriptors (whether objective or affective) such as "it is not sweet"; "not bitter," etc.⁵; (5) affective judgments such as, "I did not like this wine," "It's drinkable," "It's okay, but nothing special"⁶; and (6) description length (number of words in the description). The words were counted exactly as written, whether in complete sentences, telegraphically, or list-style. The results, shown in Fig. 2, were summed over both trials because there were no significant differences between trials on any of the measures, except that Experts made more flavor associations on Trial 2 than on Trial 1 (1.9 versus 1.2, respectively, $t(15) = 2.55$).

DISCUSSION

The results of this experiment reveal that memory for taste can, at least under some circumstances, be disrupted by attempts at committing it to words. The verbal overshadowing

² All descriptors were counted uniquely, that is, once per description even if repeated.

³ Quantifying adjectives such as "slightly," "little," "barely," "strong," etc., were not counted when used in conjunction with another descriptor—for example, "a slight burning." They were counted if used alone, as in "a slight/strong," etc., wine.

⁴ Following Lehrer (1990) "dry" was not counted as a wine term. Technically, what novices typically perceive as one dimension of "dryness" is a two-dimensional, independent combination of sweetness (sugar) and astringency (tannic acid). "Aroma" counted as wine term only if the subject had correctly defined it on the quiz. It was not counted if used as synonym for "odor" or "smell."

⁵ When subjects used negative terminology combined with a feature or flavor, both categories were counted. For example, "it was not sweet" would be counted once as a feature and once as a negative.

⁶ "No" and "not" were not counted as negatives if they were part of an affective judgment.

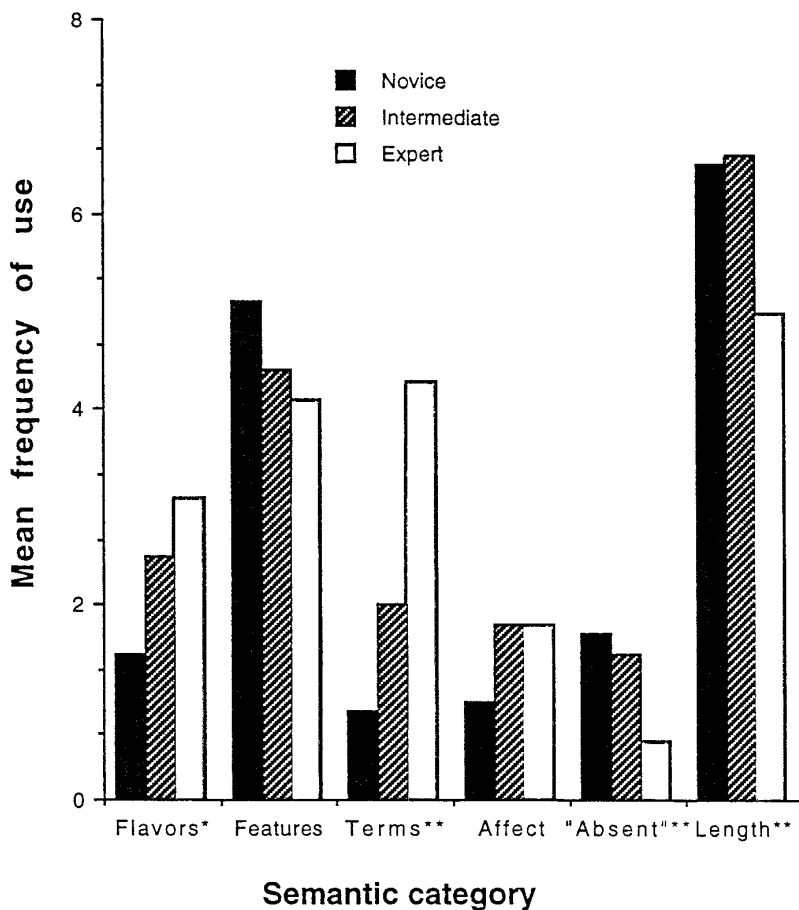


FIG. 2. Wine description contents by level of expertise. The description lengths were scaled to fit the ordinate. *The prediction of flavor terms increasing with expertise approached, but did not reach, significance, $F(2,48) = 2.63$, $p < .09$. **Novices and intermediates differed significantly from experts (by a Tukey's HSD post hoc test) following a significant ANOVA.

of taste memory adds to the growing list of domains that have been shown to be vulnerable to verbalization and thereby further implicates the application of language to perceptual memories as a potentially ubiquitous source of memory illusions. The present study also provides further support for the hypothesis that the nature of one's expertise in a domain is a critical determinant of susceptibility to verbal overshadowing. The negative effects of verbalization on wine recognition were exclusively limited to Intermediates—regular wine drinkers with little or no formal training. The recognition performance of Experts—wine

professionals or individuals with otherwise extensive training—was unaffected by verbalization, and the recognition performance of Novices was, if anything, improved following verbalization.

The present results support the claim that verbal overshadowing occurs when there is a marked discrepancy between perceptual expertise and verbal expertise. In this study, the Novices lacked both perceptual expertise, as indicated by their generally low scores on the wine discrimination test, and verbal expertise, as indicated by their poor performance on the wine knowledge test. Thus, for Novices there

was little cost or risk in attempting to put their memories to words. Experts possessed marked perceptual expertise, as indicated by their superior wine recognition performance, and verbal expertise, as indicated by their near perfect performance on the wine knowledge test. Thus, for Experts, committing wine memories to words was of little consequence because they were well equipped to alternate between their two developed sources of expertise. In contrast to both the Novices and the Experts, the Intermediates revealed a marked disparity between their verbal and perceptual wine expertise. With respect to perceptual expertise, the Intermediates resembled the Experts in several respects. They reported drinking red wine nearly as often as the Experts (7 times per month versus 10 times per month). Moreover, the nonverbal Intermediates' discrimination did not differ significantly from the Experts'. Although the Intermediates' perceptual expertise rivaled the Experts, their verbal expertise was markedly lower (1.9 versus 3.8 points). Similarly, Intermediates described the wines with fewer than half the number of formal wine terms used by the Experts. In short, while the Intermediates resembled the Experts with respect to perceptual expertise, they more closely resembled the Novices with respect to verbal expertise. This discrepancy between verbal and perceptual expertise, not evidenced by either the Novices or the Experts, may thus help to explain why the Intermediates were uniquely vulnerable to verbalization.

The present findings conceptually replicate and extend prior examinations of the relationship between verbal overshadowing and domain-specific expertise. As previously noted, Fallshore and Schooler (1996) observed verbal overshadowing effects for own-race but not other-race face recognition. This differential effect of verbalization was attributed to the unique perceptual expertise associated with same-race recognition, without commensurate verbal expertise. Schooler, Ryan, Fallshore and Melcher (in press) reported a similar finding using individual difference measures: Only participants who performed above the median on an independent face recognition

ability measure showed verbal overshadowing effects. The observation of verbal overshadowing for Intermediates but not Novices thus represents a conceptual replication of these prior demonstrations of the importance of perceptual expertise in eliciting verbal overshadowing effects. The present study extends these findings, however, by illustrating that verbal expertise can insulate perceptual expertise from verbal overshadowing.

In addition to elucidating *when* verbal overshadowing effects occur, the present study also helps to explain *why* they occur. Consideration of the predictors of wine discrimination in the verbal and nonverbal conditions suggests that verbalization may cause a shift in the knowledge base that individuals use in making their recognition judgments. Stepwise regression and partial correlation analyses indicated that nonverbal participants' perceptual expertise (consumption frequency) was the best predictor of their discrimination performance. In contrast, verbal knowledge (wine knowledge quiz score) was the best predictor for verbalizers. This pattern suggests that describing the stimulus encourages the verbalizers to rely more on their verbal recollection and/or knowledge and less on their perceptual recollection. For Novices and Experts, such a shift would be of little consequence given that the two sources of expertise are evenly matched—that is, either equally qualified or equally unqualified. However, for Intermediates, verbalization encourages an inopportune shift from the stronger foundation of their perceptual expertise to the shakier scaffolding of their developing wine vocabulary.

A "*figure/ground*" perspective on verbal overshadowing. The suggestion that describing memories may cause a general shift from reliance on the perceptual to reliance on the verbal aspects of memories suggests that verbal overshadowing effects may be viewed as a memory illusion analog to the perceptual set effects associated with figure ground and other reversible image illusions. In figure/ground illusions, the perception of a stimulus critically depends on what components of the image are viewed as foreground versus those viewed as

background. Figure/ground assignment can determine, for example, whether an image is perceived as a vase or a pair of faces. Figure/ground illusions can be associated with relatively dramatic shifts in interpretation, such that aspects of an image that were previously central become reduced in salience and aspects that were previously background become increased in salience. The present finding that verbalization alters the source of expertise that individuals rely upon in making their taste memory judgments is reminiscent of the shifts that can be associated with figure/ground reversals. Accordingly, under standard conditions, individuals' recollection of perceptual events may foreground perceptual knowledge, with verbal knowledge relegated to the background. However, following verbalization, this relationship may be reversed such that verbal knowledge is now foregrounded, leaving perceptual knowledge overshadowed in the "background." This interpretation also helps to explain the Brandimonte and Gerbino (1993) observation that verbal overshadowing effects can be reversed by reinstating the physical context under which a perceptual stimulus was encoded. By "foregrounding" the perceptual vantage, the verbal code is again shifted to background and its negative impact curtailed.

Another characteristic of figure/ground illusions that have an analog in verbal overshadowing effects is the impact of mental "sets" induced by prior experience. In figure/ground illusions prior experience can bias subsequent interpretations. So, for example, encountering prior pictures of lamps tends to bias individuals to interpret the lamp/face figure ground illusion as a lamp and interfere with their ability to see it as a pair of faces. There are a variety of reasons to suspect that verbalization induces a mental set that fixates individuals on particular interpretation, thereby impeding their ability to consider alternative perspectives. For example, several recent studies have found that verbalization specifically interferes with performance on tasks that require individuals to abandon their initial interpretations, such as identifying reversible images (Brandi-

monte & Gerbino, 1993), recognizing out-of-focus pictures (Schooler et al., in press), and solving insight problems (Schooler, Ohlsson, & Brooks, 1992). The mental set associated with verbalization can also result from nonverbalized stimuli. For example, Dodson, Johnson, and Schooler (in press) found that verbalization of a face not only impaired subsequent recognition of the target face, but also reduced participants accuracy in recognizing nonverbalized faces. Apparently, engaging in verbalization can produce a generalized verbal "set" that can systematically bias individuals to foreground verbal knowledge at the expense of perceptual knowledge.

A final implication of considering verbal overshadowing effects in the context of perceptual figure/ground illusions is that the beneficial effects of wine expertise in avoiding the disruptive effects of verbalization may reflect more than simply superior wine vocabulary. It may be that experts have become more proficient in alternating between the vantages of their verbal and perceptual representations. Accordingly, with experience, wine experts may learn the techniques for switching between their perceptual and verbal representations, thereby avoiding becoming fixated on one or the other modality. One implication of the suggestion that wine experts' immunity to verbal overshadowing may reflect, at least in part, their proclivity for alternating between representations is that this skill should be trainable. Although the present study cannot definitively speak to this issue, the attenuation of verbal overshadowing effects that occurs over trials suggests the possibility that the ability to switch between verbal and perceptual representations becomes more flexible with experience.

The Trial Effect

In this study, the negative effects of verbalization on memory performance were limited to the first trial of the experiment. This trial effect has been observed previously in other domains, including faces (Fallshore & Schooler, 1996; Schooler, Ryan, & Reder, in press) and music recognition (Houser et al.,

1995). The fact that the trial effect, like perceptual expertise, mediates verbalization effects across a variety of domains helps to illustrate the generalizability of verbal overshadowing mechanisms. It also, however, begs the question of the source of this effect.

Although a definitive explanation for the trial effect awaits further research, several observations may help to constrain future explanations of it, as well as verbal overshadowing effects more generally. First, it is worth noting that participants' descriptions did not change significantly between the first and subsequent trials (as has also been the case in face-recognition experiments). It is therefore unlikely that the trial effect occurs because participants improve the quality of their descriptions. Second, it is of interest that the significant shifts in performance between trials 1 and 2 were exclusively limited to those participants who performed particularly poorly on Trial 1, namely, the nonverbal Novices and the verbal Intermediates. This improvement suggests that participants may have altered their strategies on Trial 2 in order to compensate for difficulties they perceived on the first trial. For example, following the first trial, participants may have realigned their encoding and recognition strategies to be more commensurate with each other. In addition, participants may have acquired some experience in switching back and forth between their verbal and perceptual representations and as a consequence may have become less inclined to become fixated on the verbal representation following verbalization.

Novices' Verbal Enhancement

In addition to the trial effect, another potentially troubling aspect of the present data deserves discussion, namely the verbal enhancement among Novices. We had predicted that Novices would not show a significant negative effect of verbalization, but did not anticipate that verbalization might improve their performance.

Though the beneficial effect of verbalization was not significant it was sufficiently close ($p < .07$) to suggest that we should

not dismiss it out of hand, particularly since Fallshore and Schooler (1996) observed a similar trend toward beneficial effects of verbalization for novices. We therefore offer the following cautioned account. It seems plausible that Novices, lacking the perceptual and/or verbal expertise necessary to perceive and to describe the full complexity of their perceptual experience, may focus on one or two salient, most easily verbalizable features (cf. Diamond & Carey, 1986; Fallshore & Schooler, 1996). If a novice's discrimination for one or two features among the test samples was accurate, having focused narrowly may increase the probability of correct recognition. Verbalization could have facilitated verbal Novices' performance by enabling them to rehearse and make salient potentially useful features for discrimination. One characteristic of the Novice descriptions is consistent with this strategy: Lacking linguistic and categorical organization to guide their perceptions, Novices were hard-pressed to describe the wines. Their longer mean description length is misleading, for in order to keep writing for 4 min. they often dwelled upon just a few features. For example, they tended to dwell upon the "bitterness" of the Shiraz. For example: "It was definitely bitter . . . kind of dry but not real dry . . . sort of tart . . . definitely was not sweet . . . as I said before, it had a bittery tart taste . . . the taste was more bitter than tart." Another wrote, "This wine was kind of bitter. It tasted almost like olive juice might. . . . It was very thin and this may be due to the bitterness. . . . The bitterness was not tangy like a lemon, it was more like castor oil." And finally, it "tastes a little sour. It burned or stung my mouth. . . . It tasted a little bland and bitter. . . . It smelled a little sour like vinegar. . . ." If memory for specific dimensions, such as bitter or sour, facilitated discriminations, then verbal rehearsal of these basic dimensions may be useful for Novices, who, unlike the Intermediates and Experts, may have been unable to represent the more complex or multidimensional aspects of the wines.

Expertise-Linked Changes in Description

The preceding discussion of the Novices' descriptions leads to the question of how descriptions changed with increasing expertise. As previously mentioned, the biggest differences in verbal descriptions occurred between the Experts and the other two groups. Compared to the Intermediates and Novices, the Experts used more formal wine terms (they knew the lingo), were less apt to mention the absence of features (they did not need to compensate for deficient language and/or perception by describing what a taste was *not* like), and wrote shorter descriptions (they communicated succinctly). The greater precision associated with Experts' descriptions allowed them to "unpack" the broader characterizations made by their less well trained counterparts. For example, whereas a Novice described one of the target wines as "very heavy and strong . . . it would overpower the flavor of any food," an Expert described it as "big/robust—not nuanced; alcoholic, grape-y; tannic, with a lot of chew; . . . an end-of-meal wine". Experts also focused on where in the mouth and in what order they noted various taste components. For example one Expert described a wine as "slightly herbal on the front palate; a touch of red cherry fruit in the middle; it seems to have a good bit of volatile acidity and a very sharp acid and tin finish. . . . ; not very pleasant and I feel the burn to the middle of my chest."

Although the Intermediates generally resembled the Novices with respect to their descriptions, there were some respects in which their descriptions implicated the acquisition of more sophisticated wine language: Intermediates used more formal wine terms than Novices; moreover, they were virtually identical to the Experts in the frequency with which they used affective terms, perhaps reflecting their more developed palate and consequent sensitivity to the inexpensive sample wines; finally, the Intermediates' use of flavor associations was more than midway between the Novices and Experts. This trend suggests that the Intermediates were seeking, albeit not en-

tirely successfully, to find ways of evoking complex taste memories that they were otherwise unable to describe (cf. Schooler, et al.).

When Verbal and Perceptual Expertise Clash

One of the central implications of the present study is that verbal overshadowing can result from a clash between incommensurate perceptual and verbal expertise. Although the application of this principle to the verbal overshadowing paradigm is quite recent, evidence for the differential development of perceptual and verbal expertise (with ensuing performance deficits) has been available for some time. For example, Karmiloff-Smith and Inhelder (1974/75) documented temporarily decreased performance caused by increased knowledge (similar to the wine Intermediates in this study). They found that young children rather quickly learned how to balance trick blocks (containing hidden weights that made them balance acentrically) simply by using proprioceptive feedback. Somewhat older children took substantially longer to complete the task, while the oldest children quickly learned how to deal with the misleading blocks, modifying their theory of balance in the process. Karmiloff-Smith and Inhelder hypothesized that the youngest children's success was due to their exclusive reliance on proprioceptive feedback (i.e., through trial and error placement of the blocks on the fulcrum), whereas the oldest children's success was due to the application of more sophisticated and flexible theories of balancing. In contrast, they hypothesized, the middle group's difficulties stemmed from the children's persistent attempts to apply an emerging theory (things always balance at their geometric center) rather than on the proprioceptive feedback that conflicted with the theory. In support of this interpretation, Karmiloff-Smith and Inhelder observed that most children in the intermediate group who initially failed the task succeeded when they closed their eyes and relied once again on proprioceptive feedback. Thus, these children possessed the perceptual knowledge required to solve the task, but it was overshadowed by their attempt to apply their

emerging, conceptual theories. More recently, Goldin-Meadow and colleagues have collected extensive evidence showing that children often possess knowledge (expressed nonverbally) that is not apparent in their verbalizations about, nor in their performance of, various tasks (cf. Goldin-Meadow & Alibali, 1995).

Similar evidence for the potential clash between perceptual and verbal knowledge has been reported for adults. Lesgold, Rubinson, Feltovich, Glaser, Klopfer, and Wang (1988) found that part-way through their residencies, radiologists tend to show *decreased* accuracy and precision in diagnosing lung abnormalities. Lesgold et al. speculated that this drop might reflect differences between a fast “perceptual” learning and a slower “cognitive” learning such that “an emerging cognitive ability will have to contend with a stronger perceptual ability already in place” (p. 337).

The above examples share a fundamental similarity with the present study: When individuals possessing the perceptual skills sufficient to complete a task attempt to rely on verbal/conceptual knowledge, their performance may be impaired during the period in which their verbal expertise, while undeniably high, is still “under construction,” so to speak. Their difficulty may arise, not because they *lack* verbal expertise, but because it is underdeveloped, not fully organized, and not integrated into a complete semantic network. The studies just cited indicate that such conflicts may be a natural consequence of certain learning situations. The present study suggests that even when this clash is not spontaneously observed, it may be initiated by attempts at translating one’s perceptual knowledge to words. In other words, the memory illusion implicated in the verbal overshadowing effect originates in another illusion—namely, that one’s language proficiency is greater than it truly is.

APPENDIX A: GENERAL WINE KNOWLEDGE TEST

General wine knowledge

(1) What color is most German wine?
[White; 1 point]

(2) What is the principal grape in red Bordeaux wine? [Cabernet Sauvignon (then Merlot); 1 point]

(3) What is the difference between aroma and bouquet in wine? [Aroma: Odors from the grape(s); fruit odors; 1 point] [Bouquet: Odors from the wine: Reduction, flavors that develop during fermentation and aging; 1 point]

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