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22 The Verbal Overshadowing Effect in Memory for Pictures

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I. Introduction

The verbal overshadowing effect is a phenomenon in which the use of language interferes with some nonverbal cognitive tasks. Since Schooler and Engstler-Schooler (1990) reported that verbally describing a target face from memory impairs subsequent recognition, many studies have reported that verbalization interferes with face recognition (Fallshore & Schooler, 1995; MacLin, 2002; Ryan & Schooler, 1998; Schooler, Ryan, & Reder, 1996), recognition of other memory materials (Finger, 2002; Melcher & Schooler, 1996; Schooler & Engstler-Schooler, 1990; Westerman & Larsen, 1997), and other nonverbal cognitive tasks (Brandimonte & Bishop, 1992; Schooler, Ohlsson, & Brooks, 1993; Wilson et al., 1993; Wilson & Schooler, 1991).

Schooler and his colleagues proposed an explanation called transfer inappropriate processing shift (TIPS) for the verbal overshadowing effect in face recognition (Schooler, 2002; Schooler, Fiore, & Brandimonte, 1997). In this explanation, they argued that (a) verbal, local aspects and nonverbal, global aspects are involved in face encoding and recognition processes, (b) nonverbal and global aspects are usually dominant in both face encoding and recognition, (c) verbalization induces a processing shift from global to local aspects, and (d) this processing inclination is carried over to the subsequent recognition task and interferes with recognition.

Itoh (2005) proposed a balance of effects by the attention shift model (the BEAS model), which is an expansion of the TIPS explanation, to explain the results of some researches in which verbalization did not interfere with, or even improve, face recognition (e.g. Chance & Goldstein, 1976; Itoh, 2005; Yu & Geiselman, 1993). In the BEAS model, it is postulated that the relative strength of local aspects is higher than global aspects in conditions where memory for the target face is weak compared to conditions where memory is strong. When local aspects of memory for the target face are strong enough relative to global aspects, the processing shift from global to local aspects by verbalization might improve recognition.

If these explanations are correct, it is predicted that a manipulation of the processing inclination, i.e. global or local, at the time of material encoding, modulates the effect of verbalization on subsequent recognition. If global processing is dominant at the time of encoding, verbalization might interfere with recognition. Whereas verbalization might improve recognition if local processing is dominant. The main purpose of this research was to examine this prediction. We manipulated the processing inclination at the time of encoding with a task that uses Navon figures: small letters were arranged so that they make a large letter (see Figure 1(a)). Being engaged in a task where one is required to respond based on large letters may make global processing dominant. Whereas being engaged in a task where one is required to respond based on small letters may make local processing dominant.

In this research, we did not use photographs of faces as materials but photographs of clouds and fingerprints. This is partly because we were planning to conduct a cross-cultural comparison and we wanted to use materials that were similarly familiar for participants from two different cultures. Furthermore, we were able to compare the effects of the Navon figures tasks on verbalization in recognition for the two memory materials, the cloud and fingerprint photographs.

II. Method

Each participant went through two consecutive experimental sessions. Each session consisted of a task with Navon figures to induce the processing inclination (the Navon task, hereafter), a memory task with photographs of either clouds or fingerprints as materials (the cloud task and the fingerprint task, respectively), and a task to check the processing inclination (the Clare task).

1. Participants

Ninety-seven undergraduate and graduate students individually participated in the experiment. They were randomly assigned to one of the eight conditions. None of them had participated in similar experiments.

2. Materials

2.1. The Navon task

For the Navon task, we prepared 100 Navon figures. In each figure, 11 to 18 small letters were arranged to form a large letter (Figure 1(a)). Two test figures were made to accompany each Navon figure. The two figures contained three letters: the small letter and the large letter of the Navon figure, and another letter in the English alphabet. The size of the letters in Figure 1(b) were almost same as the large letters of the Navon figures and the smaller letters in Figure 1(c) were almost same size as the small letter in the Navon figure. The positions of the letters were counterbalanced. In all the figures, letters were black and the background was gray.

2.2. The memory task

For the memory task, two photographs were prepared as targets. One was a color photograph of clouds and the other was a monochrome photograph of a fingerprint. Five photographs were prepared as the distracters for each target. The photographs of clouds including the target and the distracters were of the same part of the sky and were taken successively with few

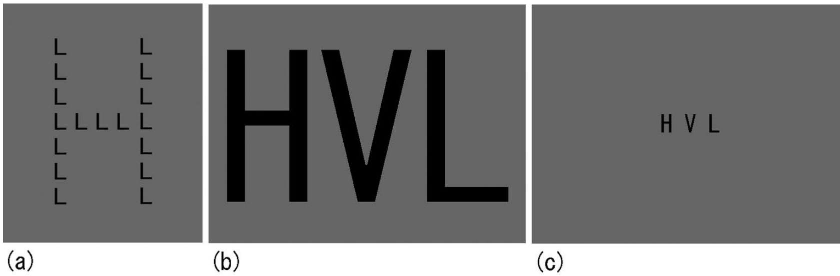

Figure 1. Sample materials for the Navon task.
(a) A Navon figure, (b) A test stimulus for the global condition, (c) A test stimulus for the local condition.

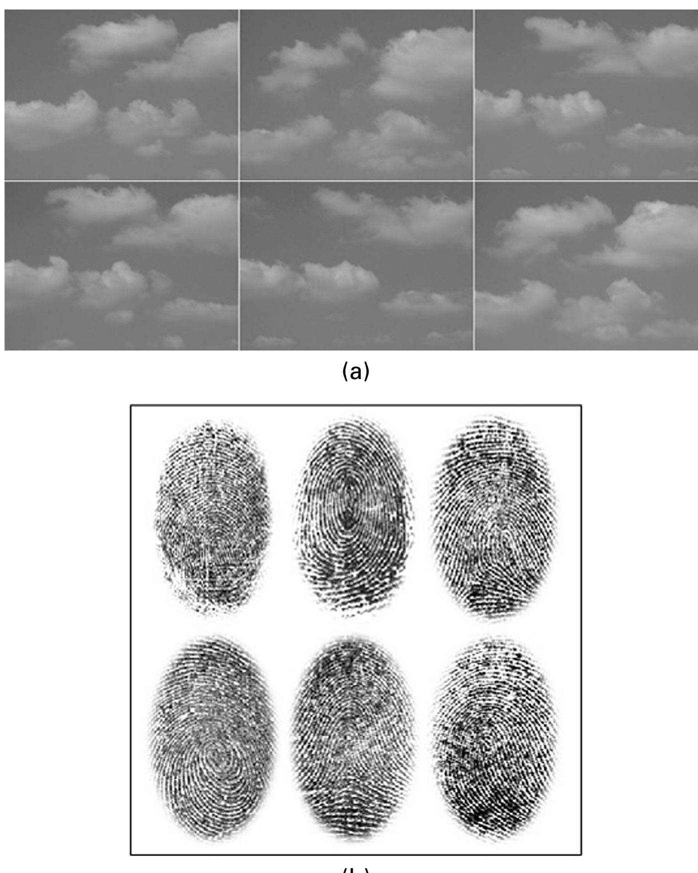

Figure 2. Test sets for the memory tasks.
(a) A set for the cloud task. The lower left photo is the target. (b) A set for the fingerprint task. The upper right photo is the target. The photographs of clouds were actually presented in full color in the experiment.

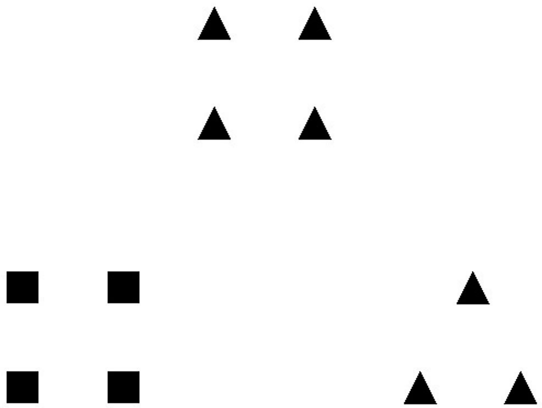

Figure 3. Sample material for the Clare task.

second intervals. This procedure produced a set of photographs that were similar but not identical to one another. In summary, two test sets were constructed with one target and five distracters for each target (Figure 2).

2.3. The Clare task

For the Clare task, 24 stimulus sets were used. Three patterns were included in a stimulus set: one was placed in the upper half and two were placed in the lower half of the set (Figure 3). Each set consisted of three patterns, each of which consisted of three to nine squares or triangles that were arranged to form a square or a triangle. One of the patterns in the lower half had the same element shapes as the upper pattern but its global configuration was different from the upper pattern. The other pattern in the lower half had different element shapes from the upper pattern but its global configuration was same as the upper pattern. All patterns were black and the backgrounds were white.

3. Procedure

Participants were instructed that they would be engaged in several tasks in which they were required to make responses to their observation of images on a computer screen. Then they went through two sessions consecutively.

3.1. The Navon task

The first task in each session was the Navon task. After a 1000 ms (one second) presentation of a fixation point, a Navon figure was presented on the screen for 250 ms. The Navon figure was followed by a test figure that consisted of three letters. For half of the participants (global condition), the letters in the test figure were large, whereas the letters in the test figure were small for the other half of the participants (local condition). They were required to judge which one of the three letters was same as the large letter in the Navon figure (for the global condition) or the small letter in the Navon figure (for the local condition). The participants responded by choosing one of three keys on a keyboard (1 for left, 2 for center, and 3 for right) each of which corresponded to the position of a letter in the test figure. Participants' response removed the test figure from the screen and a blank screen, or a large red "x" if the response was incorrect, was presented for 200 ms. Then after a one second inter-trial interval, a fixation point for the next trial was presented. In some cases a message that informed the participants to make haste was presented for 500 ms if the response latency was longer than 900 ms. Participants were engaged in the Navon task for 10 min. The numbers of the trials depended on latencies and were not constant among participants.

3.2. The memory task

Immediately after the Navon task, the memory task began. A target photograph was presented for five seconds after an intentional learning instruction. Half of the participants (verbalization condition) were required to verbally describe the photograph presented to them and then write down the description on a sheet of paper. The other half of the participants (control condition) were required to verbally list as many as possible the names of countries and their capital cities for the first session or to list names of Japanese prefectures and their seats of the prefectural governments for the second session. Participants were told to continue the verbal description or verbal listing tasks for five minutes.

Participants then took a recognition test. They were told to observe a test set of the target and five distracter photographs and identify the target photograph that they had seen before. They were required to answer with the position of the target photograph in the test set or they could choose a "no target in the test set" option.

3.3. The Clare task

The final task in the session was the Clare task. In a stimulus set, the participants were presented with a set of three patterns and were required to choose the pattern that they felt was most similar to the sample pattern in the upper half of a stimulus set from the two alternative patterns that were in the lower half of the set. They were required to press either one of two keys: 1 for the pattern on the left side or 2 for the pattern on the right side in the lower half of the set. A stimulus set stayed on the screen until a participant made a response. The screen was then replaced with a new set. No feedback was given to the participants. Twenty-four stimulus sets were presented once in a single session.

3.4. Second session

In the second session, participants did the Navon task and the memory task in the same conditions they had for the first session. Half of the participants who did the cloud task for the memory task in the first session did the fingerprint task in the second session; the other half who did the fingerprint task in the first session did the cloud task in the second session. The Clare task was common to both sessions. After the second session, participants were asked to describe how they had chosen a photograph in each session. Then they were debriefed and thanked.

4. Design

The design of the experiment was two by two by two, factorial. The first factor was the Navon task (global vs. local), the second was the verbalization task (verbalization vs. control), and the third was order of the memory task (cloud-first vs. fingerprint-first). All the factors were between participants. Each participant did the Navon task and the memory task in the same conditions for the first and second sessions. For the Clare task, participants did the task twice. The session (first vs. second) was treated as the fourth, within-participant factor in the analysis of the Clare task results.

III. Result

1. The Navon task

Accuracy and mean latency of the responses in the Navon task were not our main interest, although they were important because they could show us if the participants carried out the task as we expected. Here we will just report the overall result. Overall proportion of correct responses was 0.96 and the mean latency was 481 ms. Proportion correct seems high enough and mean latency was short enough to say that the participants did the task appropriately.

2. The memory task

Each participant went through two memory tasks: the cloud task and the fingerprint task. The results of these two tasks were analyzed separately.

Figure 4 shows proportion correct in the cloud task for each condition. A two (the Navon task) by two (verbalization) by two (order of the memory task) analysis of variance (ANOVA) was applied to the accuracy data. A significant effect on recognition performance was seen with the order of the memory tasks ($F(1,89) = 5.43$, $p < 0.05$). Percent correct for the cloud-first condition (0.30) was lower than the fingerprint-first condition (0.53). An interaction between the Navon task and the order of the memory tasks was also significant ($F(1,89) = 5.55$, $p < 0.05$). When participants experienced the fingerprint task first, the recognition performance for the cloud task was better for the local condition than for the global condition ($F(1,89) = 4.00$, $p < 0.05$). In the local condition, performance was better for the fingerprint-first condition than the cloud-first condition ($F(1,89) = 10.98$, $p < 0.001$). Other main effects and interactions were not significant ($p > 0.10$). Thus, verbal description of the cloud from memory had no effect on recognition performance.

Figure 5 shows the proportion correct in the fingerprint task. An ANOVA was calculated similarly to the cloud task and revealed a

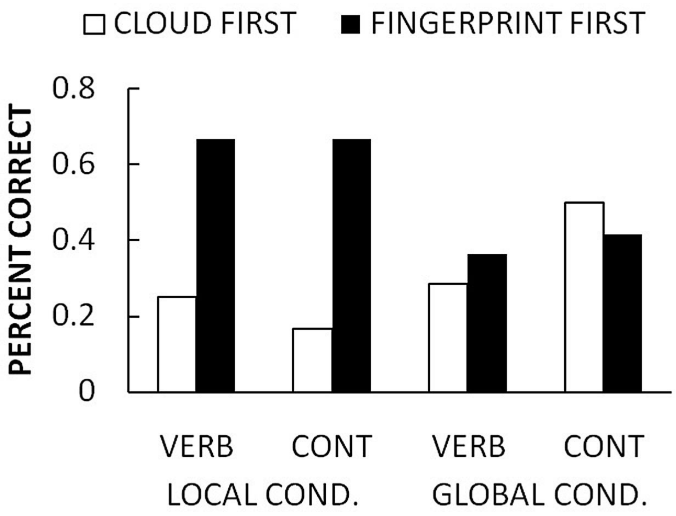

Figure 4. Percent correct in the cloud task for each condition.

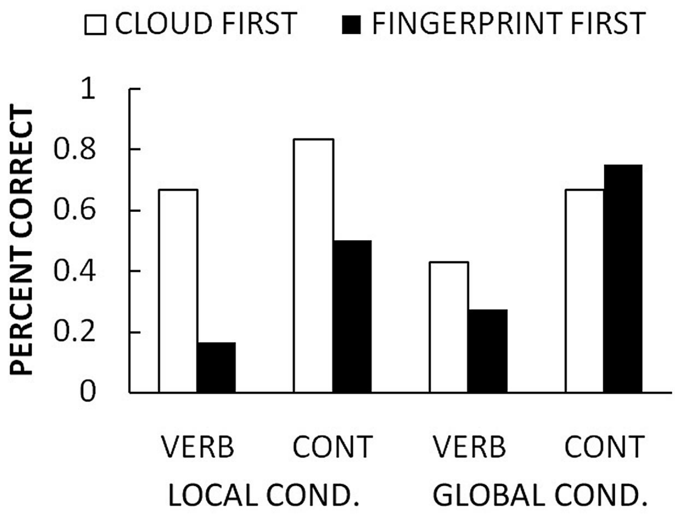

Figure 5. Percent correct in the fingerprint task for each condition.

significant effect on recognition performance with the order of the tasks ($F(1,89) = 5.65$, $p < 0.05$), and an interaction between the Navon task and the order of memory tasks ($F(1,89) = 3.98$, $p < 0.05$). The percent correct for the cloud-first condition (0.64) was higher than one for the fingerprint-first condition (0.43). This difference was limited to the local condition: only a significant effect due to task ordering was seen for the local condition ($F(1,89) = 9.56$, $p < 0.001$).

A significant effect from verbalization was seen for the fingerprint task ($F(1,89) = 10.17$, $p < 0.001$). Percent correct for the verbalization condition (0.39) was significantly lower than the control condition (0.69). Thus, when the memory materials were fingerprints, a verbal overshadowing effect was observed. However, there were no interactions between verbalization and other factors. The effect of the Navon task and other interactions other than the one described above on recognition performances were not significant ($p > 0.10$).

3. The Clare task

In the Clare task, each response was based on either the global configuration or the local feature of the patterns. To analyze the results of the Clare task, we calculated a proportion of the responses based on the global configuration (P(G), hereafter) for each session for each participant. Table 1 shows mean P(G)s for each condition. A two (the Navon task) by two (verbalization) by two (order of the memory task) by two (the session: first vs. second) ANOVA was applied to this data. The effect of the Navon task on the Clare task was significant ($F(1,87) = 16.76$, $p < 0.0001$) and the effect of the memory task ordering on the Clare task was also significant ($F(1,87) = 9.06$, $p < 0.005$). When participants were required to respond based on global configuration in the Navon task, and when they experienced the cloud task first, they tended to give more global responses

Table 1. Proportions of the responses based on the global configuration (P(G)) in the Clare task.

Verbalization condition	Order of the session	Navon task condition			
		Global		Local	
		Session 1	Session 2	Session 1	Session 2
Verbalize	Cloud first	0.76	0.72	0.53	0.6
	Fingerprint first	0.65	0.68	0.31	0.34
Control	Cloud first	0.6	0.59	0.55	0.51
	Fingerprint first	0.56	0.51	0.26	0.26

in the Clare task. The effect of verbalization was marginally significant ($F(1,87) = 3.18$, $p < 0.10$). P(G) was higher in the verbalization condition than in the control condition. There was no significant effect seen regarding the session ($p > 0.10$).

An interaction between the Navon task and the memory task order was marginally significant ($F(1,87) = 3.19$, $p < 0.10$). No other interactions were significant ($p > 0.10$).

IV. Discussion

In this experiment, we expected that being engaged in the Navon task would induce global or local processing inclination, which would be carried over to the target encoding phase of the memory task. Verbalization between encoding and recognition was expected to induce local processing inclination. Verbalization would result in the discrepancy in the processing inclination at encoding and recognition and hence deteriorate recognition performance when the Navon task condition is global. However, in the local Navon task condition, we expected that verbalization would not cause the discrepancy in the processing inclination and would not interfere with recognition. Hence, an interaction between the factors of the Navon task and verbalization was expected to be seen in recognition performance.

We could see if processing inclination would be induced by the Navon task and verbalization looking at the proportion of the global and local responses in the Clare task. If the Navon task could cause the processing inclination, the proportion of global responses (P(G)) may be higher in the global condition than in the local condition, at least when verbalization was not required (i.e. in the control condition). If verbalization could cause the processing inclination, P(G) may be lower in the verbalization condition than in the control condition, at least in the global condition.

The result shows that P(G) was higher in the global than in the local condition and suggests that the Navon task induced the processing inclination as we expected. However, P(G) was higher in the verbalization than in the control condition, although the difference was only marginally significant. This difference is opposite to our prediction. This may be because verbalization did not induce the local processing inclination, or, if it did, the inclination could not be detected by the Clare task after recognition. One of the possible reasons of the latter possibility may be that the effect of verbalization could be tentative and not be carried over to the Clare task phase. Another reason might be that the nature of the induced inclination may be different from the one induced by the Navon task and what could be detected by the Clare task.

As for the performances in two memory tasks, verbalization did not affect the performance of the cloud task and it did not interact with the Navon task. Our prediction that there is an interaction between the factors of the Navon task and verbalization was not supported. However, looking at the results in detail, verbalization numerically deteriorated recognition performance in the global condition, while it improved performance slightly in the local condition. This pattern of interaction is what we predicted. We think that the number of participants is not enough and we need more data. We should refrain from concluding until more data can be collected. It may be better to analyze only the data from the first session and discard the data of the second session because it has been shown that experiencing a sequence of encoding, verbalization of the target from memory and recognition can alter the effect of verbalization on recognition performance (Fallshore and Schooler, 1995). For this reason, we think that we should collect much more data.

On the other hand, verbalization consistently deteriorated recognition performance in the fingerprint task. However, an interaction between the Navon task and verbalization was not observed. This result is obviously inconsistent with our prediction. There might be some explanation for this inconsistency. First, verbalization may not cause a shift of processing and some other mechanisms may produce the verbal overshadowing effect, at least in the fingerprint task. The verbal recoding hypothesis (Meissner, Brigham, & Kelley, 2001; Schooler & Engstler-Schooler, 1990), in which inappropriate verbal descriptions are generated during verbalization and these descriptions interfere with recognition, is one of the possible explanations for the verbal overshadowing effect here. Analysis of the relation between the appropriateness of description generated by the participants and recognition accuracy might be useful to examine this possibility.

The second possible explanation of the inconsistency is that both the

Navon task and verbalization might affect the processing inclination, but dimensions of the shifts might be different. For example, the Navon task might induce global or local processing inclination, whereas verbalization might shift the processing inclination from nonverbal to verbal. The global-local dimension of the processing inclination and the nonverbal-verbal dimension may be independent.

For the fingerprint task, verbalization deteriorated recognition performance. This result may imply the possibility of a shift in the processing inclination, which may be carried over to the recognition phase. However, P(G) in the Clare task that was given to the participant just after the recognition phase was not affected by verbalization. This finding in the experiment would be consistent with the explanation above.

On the other hand, Macrae and Lewis (2002) found that a task using Navon figures given just before a recognition test had an influence on the performance of face recognition. This would suggest that the dimensions of the Navon task and verbalization are the same or, at least, correlate with each other. This would be inconsistent with the second explanation above.

When the TIPS explanation (Schooler, 2002; Schooler, Fiore, & Brandimonte, 1997b) or the BEAS model (Itoh, 2005) was proposed, what the global and local aspects of processing meant was not discussed very much. Research in this area has sometimes supposed that the global-local dimension and the nonverbal-verbal dimensions are the same or highly correlated. Or researchers sometimes argue that the global-local distinction and configural-featural distinction are the same or highly correlated. However, these distinctions or dimensions are not necessarily the same or correlated from the logical viewpoint. The results of this experiment seem to have forced us to consider these distinctions or dimensions seriously.

References

Brandimonte, M. A., and Bishop, D. V. M. (1992). Verbal recoding of visual stimuli impairs mental image transformations. *Memory and Cognition*, *20*, 449-455.

Chance, J., and Goldstein, A. G. (1976). Recognition of faces and verbal labels. *Bulletin of the Psychonomic Society*, *7*, 384-386.

Fallshore, M., and Schooler, J. W. (1995). Verbal vulnerability of perceptual expertise. *Journal of Experimental Psychology: Learning, Memory, and*

Cognition, *21*, 1608-1623.

Finger, K. (2002). Mazes and music: Using perceptual processing to release verbal overshadowing. *Applied Cognitive Psychology*, *16*, 887-896.

Itoh, Y. (2005). The facilitating effect of verbalization on the recognition memory of incidentally learned faces. *Applied Cognitive Psychology*, *19*, 421-433.

MacLin, M. K. (2002). The effects of exemplar and prototype descriptors on verbal overshadowing. *Applied Cognitive Psychology*, *16*, 929-936.

Macrae, C. N., and Lewis, H. L. (2002). Do I know you?: Processing Orientation and Face Recognition. *Psychological Science*, *13*, 194-196.

Meissner, C. A., Brigham, J. C., and Kelley, C. M. (2001). The influence of retrieval processes in verbal overshadowing. *Memory and Cognition*, *29*, 176-186.

Melcher, J. M., and Schooler, J. W. (1996). The misremembrance of wines past: Verbal and perceptual expertise differentially mediate verbal overshadowing of taste memory. *Journal of Memory and Language*, *35*, 231-245.

Ryan, R. S., and Schooler, J. W. (1998). Whom do words hurt?: Individual differences in susceptibility to verbal overshadowing. *Applied Cognitive Psychology*, *12*, S105-S125.

Schooler, J. W. (2002). Verbalization produces a transfer inappropriate processing shift. *Applied Cognitive Psychology*, *16*, 989-997.

Schooler, J. W., and Engstler-Schooler, T. Y. (1990). Verbal overshadowing of visual memories: Some things are better left unsaid. *Cognitive Psychology*, *22*, 36-71.

Schooler, J. W., Fiore, S. M., and Brandimonte, M. A. (1997). At a loss from words: verbal overshadowing of perceptual memories. In D. L. Medin (Ed.), *The psychology of learning and motivation* (pp. 291-340). San Diego, CA: Academic Press.

Schooler, J. W., Ohlsson, S., and Brooks, K. (1993). Thoughts beyond words : When language overshadows insight. *Journal of Experimental Psychology*, *122*, 166-183.

Schooler, J. W., Ryan, R. S., and Reder, L. (1996). The costs and benefits of verbally rehearsing memory for faces. In D. Hermann, C. McEvoy, C. Hertzog, P. Hertel and M. K. Johnson (Eds.), *Basic and applied memory research: practical Apprications* (Vol. 2, pp. 51-65). Mahwah, N.J.: Lawrence Erlbaum Associates.

Westerman, D. L., and Larsen, J. D. (1997). Verbal-overshadowing effect: Evidence for a general shift in processing. *American Journal of Psychology*, *110*(3), 417-428.

Wilson, T. D., Lisle, D. J., Schooler, J. W., Hodges, S. D., Klaaren, K. J., and Lafleur, S. J. (1993). Introspecting about reasons can reduce post-choice satisfaction. *Personality and Social Psychology Bulletin*, *19*, 331-339.

Wilson, T. D., and Schooler, J. W. (1991). Thinking too much: Introspection can reduce the quality of preferences and decisions. *Journal of Personality and Social Psychology*, *60*, 181-192.

Yu, C. J., and Geiselman, R. E. (1993). Effects of constructing identi-kit composites on photospread identification performance. *Criminal Justice and Behavior*, *20*, 280-292.