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Verbal Overshadowing Effect: How Temporal Perspective may Exacerbate or Alleviate the Processing Shift

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SUMMARY

Generating a detailed, memory-based description of a non-verbal perceptual stimulus can impair later recognition of that stimulus—an effect termed verbal overshadowing (VO). After viewing a face for 10 seconds, half the participants wrote a description of it; the others completed an unrelated task. Participants then either imagined their proximal or distant future, or completed an unrelated task. Following a recognition test for the face previously presented, all the 75 participants attempted to solve three insight problems. A robust VO effect was observed for participants who imagined their proximal future; that is, providing a description of the face impaired their later recognition of that face. In contrast, those who imagined their distal future showed no such impairment. Furthermore, distal imagining participants solved more insight problems compared to proximal, and control condition participants. The results of this study provide support for a processing shift interpretation of VO. Copyright © 2007 John Wiley & Sons, Ltd.

Verbally describing one's memory for a face impedes later recognition of that face (Schooler & Engstler-Schooler, 1990), a phenomenon termed 'verbal overshadowing' (VO). Since Schooler and Engstler-Schooler's initial experiments, a growing body of research has focused on two competing explanations of VO: (1) the recoding interference hypothesis (Meissner, 2002; Meissner, Brigham, & Kelley, 2001; Schooler & Engstler-Schooler, 1990) and (2) the processing shift account (Dodson, Johnson, & Schooler, 1997; Fallshore & Schooler, 1995; Schooler, 2002; Schooler, Fiore, & Brandimonte, 1997; Schooler, Ryan, & Reder, 1996; Westerman, 1997; Vanags, Carroll, & Perfect, 2006).

According to a recoding interference view, the verbalisation of a non-verbal stimulus gives rise to a verbal memory representation of that stimulus, which at test, interferes with or overshadows the original perceptual memory representation (formed from seeing the stimulus) that accurate recognition performance depends upon.

On the other hand, a processing shift account proposes that VO stems not from conflicting representations, but from the effect that verbal description has in leading participants to switch from an appropriate to an inappropriate mode of processing, which then carries over to the recognition test. Faces, for instance, are predominantly processed in a holistic or configural manner, (Tanaka & Farah, 1993; Tanaka & Sengco, 1997); however, in the VO paradigm the requirement to verbalise one's memory for a face elicits a featural or analytic strategy (Fallshore & Schooler, 1995). When this featural processing mode is

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applied at test, the inability to access the necessary configural information about the face leads to impaired recognition performance (Schooler et al., 1997). Conversely, in circumstances where face encoding entails a proportionately greater reliance on featural information (i.e. the recognition of other-race faces for which they lack expertise), or recognition calls for a featural strategy (i.e. when the test faces are inverted), the featural processing induced by verbalisation is no longer inappropriate and therefore no VO results (Fallshore & Schooler, 1995).

The processing shift theory of VO satisfies a number of findings that cannot be explained by a recoding interference view. These include the findings that: (1) there is very little relationship between the quality of verbal description and recognition performance (e.g. Brown & Lloyd-Jones, 2002; Fallshore & Schooler, 1995; Schooler & Engstler-Schooler, 1990), but see for a different outcome (Finger & Pezdek, 1999; Meissner et al., 2001); (2) describing one stimulus can disrupt memory for a stimulus that was not described (e.g. Dodson et al., 1997; Westerman & Larsen, 1997); (3) the negative effects of verbalisation are alleviated by having participants perform a holistic, perceptually oriented task prior to the final recognition test (e.g. Brandimonte, Schooler, & Gabbino, 1997; Finger, 2002; Schooler et al., 1996) and (4) simply engaging participants in a featural versus configural task (Navon letters) between encoding and test produces effects similar to those of VO (Macrae & Lewis, 2002).

Macrae and Lewis interpreted these latter results as evidence that recognition accuracy is not hindered by the act of verbalisation *per se*, but by the shift to an unsuitable featural processing style, which is associated with this activity. This suggestion may help to account for the disconcerting number of times that VO has failed to be replicated (e.g. Meissner et al., 2001; Memon & Bartlett, 2002; Memon & Rose, 2002; Yu & Geiselman, 1993). That is, it is possible that the requirement to produce a verbal description of a previously seen perceptual stimulus, such as a face, does not always trigger enough featural processing, or does not de-emphasise critical configural processing to the extent needed, to impair recognition. As such, other manipulations known to elicit featural processing may need to be used in the standard VO paradigm to cumulatively increase the emphasis on inappropriate processing, and thereby strengthen this sometimes fragile and inconsistent effect. Quite recently, the adoption of a proximal or near future time perspective has come to light as one such manipulation that induces concrete or featural thought.

TEMPORAL CONSTRUAL EFFECTS ON INSIGHT AND CREATIVITY

Construal Level Theory (CLT; Liberman & Trope, 1998; Trope & Liberman, 2003) posits that temporal distance, defined as the perceived proximity of an event in time, shapes an individual's mental representation of that event. 'The greater the temporal distance, the more likely events are to be represented in terms of more abstract, general, and decontextualised features that convey the perceived essence of the events (high-level construals) rather than in terms of the more concrete, contextual, and incidental details of the events (low-level construals)' (Förster, Friedman, & Liberman, 2004, p. 3). In other words, CLT predicts that a distant future time perspective prompts individuals to focus on more global rather than local units of an object or event.

Förster et al. (2004) applied the logic of CLT to insight and creative cognition. Given the body of research (e.g. Finke,1995 as cited in Förster et al., 2004) suggesting that creativity and insight profit from more holistic or abstract construals of problem elements, Förster

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et al. (2004) speculated that thinking about an event from a distant future time perspective as opposed to a near future time perspective, triggers a tendency towards abstract mental representation that could greatly benefit performance on subsequent creativity and insight tasks. Thus participants imagined themselves in the distant or the near future, and then attempted to solve insight problems (Experiments 1–3) and perform creative generation (Experiments 4 and 5) tasks. Participants with a distant future time perspective solved more insight problems and generated a greater number of creative abstract solutions than their near future time perspective counterparts.

The authors interpreted the facilitative influence of distant future time perspective on creativity and insight as the outcome of a transfer-appropriate processing shift. That is, they reasoned that thinking about the distant future activated general processes of representational abstraction that were carried over or transferred to the subsequent tasks, thereby benefiting attempts at insight problem solving and creative generation, which require abstract cognition. A final experiment showed that where analytic reasoning is required for task completion, distant future time perspective does not bolster task performance, but rather, engenders a 'transfer-inappropriate' processing shift, undermining performance.

CURRENT STUDY

Insight problem solving and face recognition are alike in as much as that they are both hypothesised to require non-reportable processing. With respect to faces, Dunning and Stern (1994) found face recognition to be more effective when participants reported using non-reportable automatic processes (e.g. 'I just recognized him, I cannot explain why') than when they reported drawing on more verbalisable and deliberate strategies (e.g. 'I compared the photos to each other in order to narrow the choices'). Similarly, the critical steps leading to the successful solution of insight problems are 'unavailable for conscious inspection' (Schooler, Ohlsson, & Brooks, 1993, p. 22). It is well-documented that solvers of insight problems are rarely able to rate their nearness to insight solutions (e.g. Metcalfe & Wiebe, 1987), and that when a solution is reached, experience a distinctive affective response involving suddenness and surprise—the 'aha' feeling (Schooler et al., 1993).

Indeed, insight problem solving, like face recognition, has been shown to be vulnerable to verbalisation. Schooler et al. (1993), for instance, compared the solving of insight problems with concurrent verbalisation (i.e. think-aloud instructions) to silent insight problem solving and found higher performance in the silent condition (Experiment 3). Importantly, no such disruptive effect of verbalisation was observed for the matched analytic problems, presumably because these problems rely little on non-reportable processes, and instead entail a series of incremental steps, each of which are separately reportable.

Given face recognition's strong resemblance to insight problem solving as a non-verbal, automatic and holistic cognitive activity susceptible to VO, then Förster et al.'s (2004) finding of temporal construal effects on insight and creativity may generalise to the recognition of faces. Yet no published study to date has explored this intriguing possibility. The objectives of the present study, therefore, were to (1) replicate Förster et al.'s (2004) finding that near and distant future time perspectives elicit processing styles that differentially affect the solving of insight problems, with the former diminishing and the latter enhancing performance; and (2) determine whether imagining one's life in the distant future would reinstate the holistic processing mode that was disrupted as a consequence of describing the face and thus result in a release of VO; and conversely, whether imagining

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the near future, subsequent to describing the face, would induce further emphasis on inappropriate processing, and thus support or even strengthen VO.

METHOD

Participants

The participants were 75 psychology undergraduate student volunteers, 51 females and 24 males, whose mean age was 21 years. However, because the VO effect is not found when participants describe faces of a race different to their own (Fallshore & Schooler, 1995), only the data from Caucasian participants and those non-Caucasian participants who reported living in Australia for more than 10 years (i.e. assumed to have a reasonable degree of perceptual expertise for Caucasian faces) were analysed.

Materials and design

The experimental design was a 2×3 between-subjects factorial design, with verbalisation (description or no-description) and temporal perspective (distal, proximal or no-imagining) as the two factors. The dependent variable was recognition accuracy.

Target stimuli
The target stimuli for the study phase consisted of two black and white head and neck photographs (which were counterbalanced across participants), each of a different young white male with his head turned at a 45° angle. They were located in the University of Stirling Psychology Department Psychological Image Collection (http://pics.psych.stir.ac.uk) and selected as target stimuli because of their absence of prominent or singularly distinguishable features (e.g. scars, birthmarks, etc.). Each photograph was 11 cm × 10 cm and centred on a white A4 sheet of paper.

Test stimuli
The test stimuli for the recognition memory test was presented on a single sheet of white A4 paper, comprising the target face and five distractor faces (also from the Stirling database) displayed in two horizontal rows of three. The distractor faces were chosen from this larger set according to the experimenter's subjective judgement of their similarity to the target face and each other. Subsequent pilot testing confirmed an optimal degree of similarity between the faces in each of the photographic line-ups, such that the faces were judged neither too similar as to make the task of identification impossible, nor too dissimilar as to make the task too easy. The photographs were also edited to remove hairstyle and clothing cues. The photographs of the target faces in the test sets (presented in the third position for one set, and in the fifth position for the other) were different from the photographs shown in the study phase of the experiment. This was to ensure that the recognition task involved recognising a particular face rather than a particular stimulus photograph (Brown & Lloyd-Jones, 2002).

Classic insight problems
The problems were six classic insight problems selected from the Indiana University's Creative Test. These were divided into various combinations of three (counterbalanced

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across participants) and were issued after the recognition test. Following Schooler et al. (1993), these problems comprised the following three types: (a) well within the capability of the average solver; (b) likely to produce an impasse and (c) likely to reward sustained effort with an 'aha' experience.

Filler tasks

Three spot-the-difference activities constituted the no-description filler task. The no-imagining filler task was a puzzle for which nine tiles had to be arranged in a 3×3 square so that the picture on the edge of each tile matched the picture on the edge of the adjacent tile.

Line-up response sheet

For each of the two stimulus sets, a line-up response sheet presented six face choices (Face 1, Face 2, etc.) that corresponded to the six faces on the test stimuli sheet. A 'not present' alternative was also presented.

Procedure

Participants were tested in groups ranging in size from one to six participants per session. All the participants began by viewing one of the two target faces (counterbalanced) for 10 seconds. They were told to pay close attention to the face and try to remember it for later in the experimental session. All the participants then completed a 5-minute digit calculation filler task, which required them to complete moderately easy arithmetic equations. Following which, control participants worked on a spot-the-difference filler task for the next 5 minutes while participants exposed to the verbalisation manipulation furnished verbal descriptions of the target face. The verbalisation participants were instructed to provide as much detail as they could about the person's face and to continue writing for the entire 5-minute period.

Immediately following the description or filler task, participants were randomly assigned to either the distal, proximal or no-imagining post-task condition, with 25 participants in each condition. While participants in the proximal imagining group were asked to spend 5 minutes imagining in some detail the next day (i.e. their plans and goals for tomorrow), participants in the distal imagining group were directed to conceive a mental picture of their lives a year from now (i.e. the types of activities they foresaw themselves doing or would like to be doing this time next year). Meanwhile, participants in the no-imagining control group worked on an unrelated puzzle filler task for 5 minutes.

Subsequently, all the participants undertook a face-recognition test in which the target face and five similar distractor faces were shown simultaneously. Despite the target face always being present, participants were told that he may or may not be present in the group of faces. They were instructed to choose the face they had seen at the beginning of the experiment, or if none of the faces were recognizable, to select the 'not present' option in the test booklet. Participants then attempted to solve three classic insight problems within 2 minutes for each. The experimental procedure took approximately 40 minutes.

RESULTS

Given the hypothesis that verbalisation would have a differential impact on face recognition accuracy depending on the type of temporal perspective participants

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Table 1. Percentage of participants to accurately identify the face as a function of temporal perspective and verbalisation condition

Verbalisation condition	Proximal (%)	Distal (%)	Control (%)
Description	20.0	69.2	58.3
No-description	80.0	75.0	84.6

employed, a binary logistic regression analysis was performed with the interaction term as the predictor variable. The full model was considered a good fit for the data, −2 Log Likelihood = 94.35; Hosmer and Lemeshow χ^2 (4) = 12.02, $p = 0.017$, with a change in deviance of χ^2 (1) = 4.76, $p = 0.029$. The interaction between verbalisation and temporal perspective accounted for approximately 6.1% (Cox and Snell) to 8.4% (Nagelkerke) of the variance in face recognition accuracy.

In response to the finding of significant interaction between verbalisation and temporal perspective, follow-up logistic regression analyses were performed with verbalisation as the predictor variable for each of the temporal perspective conditions (control, distal and proximal). As can be seen in Table 1, the standard VO effect (i.e. the results for the no-imagining control group) is apparent (description = 58.3%, no-description = 84.6%), but this effect approached, did not reach significance as a predictor of face recognition accuracy with a change in deviance of χ^2 (1) = 2.19, $p = 0.14$.

It was predicted that imagining the distant future subsequent to describing the face but prior to the face recognition test would eliminate the VO effect. Support for this hypothesis was obtained; no VO occurred for the distal imagining group with a change in deviance of χ^2 (1) = 0.10, $p = 0.75$ (description = 69.2% correct, no-description = 75.0%). Indeed, whether or not the face was described accounted for a mere 0.4% (Cox and Snell) to 0.6% (Nagelkerke) of the variance in face recognition accuracy for these participants.

It was further hypothesised that imagining the proximal future subsequent to describing the face but prior to the recognition test, would exacerbate VO. This hypothesis was also confirmed; results indicated a reliable VO effect for the proximal imagining group with a change in deviance of χ^2 (1) = 9.28, $p = 0.002$, such that verbally describing the face led to significantly poorer face-identification performance (20% correct) than not describing the face (80% correct). For these participants, whether or not the face was described accounted for between 31.0% (Cox and Snell) and 41.5% (Nagelkerke) of the variance in face recognition accuracy.

Performance on insight problems

For the three insight problems presented for solution after the face-recognition test, each participant received a total insight problem solving score, which was calculated by summing the number of problems solved. To assess the hypothesis that imagining the distant future enhances insight problem solving relative to imagining the near or proximal future, a one-way ANOVA was conducted, which compared the total number of correct solutions reached in the distal, proximal and no-imagining control conditions. As can be seen in Table 2 and in line with predictions, participants in the distal imagining condition solved more insight problems than did those in both the proximal imagining condition and the no-imagining control condition. This difference was marginally significant, $F(2,72) = 3.04$, $p = 0.054$. Simple contrast analyses revealed that the distal imagining

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Table 2. Mean number of insight problems solved (out of three) as a function of temporal perspective

	Distal	Proximal	Control
Insight problem accuracy	1.48 (0.82)	1.04 (0.68)	1.04 (0.68)

Note: Values enclosed in parentheses represent standard deviations.

group differed from both the proximal imagining condition, $t(72) = -2.14$, $p = 0.036$, and the no-imagining control condition, $t(72) = 2.137$, $p = 0.036$. These latter two conditions did not differ from each other ($t < 1$).

DISCUSSION

The difference in recognition accuracy between the no-imagining control participants who described and did not describe the face trended towards VO (i.e. relatively lower recognition accuracy for those who described the face). Given that VO has never been observed with so few participants in a cell, the fact that the effect approached significance is quite remarkable.

What is more, even with low statistical power, a sizeable VO effect was detected for the proximal imagining condition. That is, participants who described the face and then imagined their life in the near or proximal future were markedly less accurate in their later identification of the face compared to proximal imagining participants who did not describe the face beforehand. As predicted, participants who imagined their proximal future subsequent to describing the face suffered greater impairment to face recognition memory, relative to both those who imagined their distal future and to the no-imagining control group. In contrast, there was no evidence of VO for the distal imagining condition, with those participants who described the face not showing a significantly poorer level of accuracy when compared to those who did not describe the face.

These findings can be explained in terms of a 'transfer-inappropriate' and 'transfer-appropriate' processing shift, respectively. To reiterate, a processing shift account of VO maintains that the verbalisation of a face (or any difficult-to-describe stimulus) causes participants to engage in more featural or analytic processing when examining the faces on the recognition test, at the expense of more beneficial holistic processing (Schooler, 2002).

According to a processing shift account, participants in the proximal imagining condition were most impaired because they first encoded the target face using a holistic, non-verbal and non-analytic process. They then switched to explicit, analytic processing to write their description. This new mode of processing was further enhanced by adopting a proximal time perspective, shown by previous research to elicit a concrete, analytic processing style (Förster et al., 2004). They then failed to revert back to the critical non-verbal, holistic mode, which would be most effective for making a recognition decision. In contrast, participants in the distal imagining condition experienced the least amount of disruption from having described the face because prior to the recognition test, they adopted a distal time perspective, which has been shown to facilitate abstract or holistic thinking (Förster et al., 2004)—the processing style that is most congruent with the demands of face recognition.

The present study's successful replication of Förster et al.'s (2004) findings strengthens the soundness of this processing shift explanation. Specifically, participants who imagined

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their life in the distant future correctly solved more insight problems compared to both those who imagined their life in the proximal future, and the no-imagining control participants. Given that insight problem solving and face recognition are alike in as much as they both benefit from holistic processing, the finding that distal imagining participants were relatively superior on both of these tasks suggests that it was the 'transfer-appropriate' processing shift elicited by this manipulation of time perspective, and not some extraneous variable, that caused a release from VO for these participants. That the VO effect can be reversed by re-emphasising the visual/holistic processing mode prior to test is consistent with previous research (e.g. Brandimonte et al., 1997; Finger, 2002; Schooler et al., 1996).

The present study is also one of a growing number of studies (e.g. Finger & Pezdek, 1999; Meissner, 2002; Meissner et al., 2001) to examine conditions under which VO is exacerbated. That the study failed to observe a significant standard VO but found a robust effect for participants who engaged in an analytic, detail-oriented task (i.e. proximal imagining) subsequent to verbally describing the face has important implications. It suggests that the more extensive the emphasis on the inappropriate analytic processing between encoding and testing, the more likely VO is to occur.

The findings of Meissner et al. (2001) could be interpreted as support for this conclusion. Specifically, they found a robust VO effect when participants were forced to engage in extensive verbalisation elicited by requiring them to fully complete a blank lined page with a description of the previously seen face. In contrast, when participants were not required to engage in such exhaustive verbalisation (i.e. not required to fill in all of the lines), no VO was observed. Although the researchers interpreted this as evidence that VO is due to a self-generated misinformation effect (i.e. recoding interference), an equally tenable explanation given the present findings, is that extensive verbalisation induced stronger analytic or featural processing. This then interfered to a greater extent with the application of non-verbal, holistic processing that is necessary for successful face recognition.

While the results of the present study are impressive, it is important given the numerous failures to replicate effects in the VO literature, that future studies replicate this temporal perspective manipulation across other laboratories, stimulus sets and samples. This would enable the exploration of boundary conditions necessary for obtaining the effect with this manipulation.

Although not previously mentioned, the present study also measured each participant's confidence about their identification decision. Consistent with other studies that have measured confidence (e.g. Schooler & Engstler-Schooler, 1990; Westerman & Larsen, 1997) there was no effect of VO on confidence ratings despite impairment to recognition performance. It may be that the inclusion of an assessment of reaction time latency would provide a more objective measure.

In summary, our findings have further strengthened the credibility of the processing shift account as an explanation of VO. Additionally, prevention of VO in real life situations can be effected through such a simple manipulation as encouraging global thinking.

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