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The effect of verbalisation on repetition priming for faces

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Verbally describing a previously seen face can impair subsequent recognition of the described face. Although this phenomenon, known as the verbal overshadowing effect, has been found in the context of recognition memory, Lloyd-Jones, Brown, and Clarke found that it does not reduce the amount of priming (one type of implicit memory) but influences the reaction times (RTs) for a perceptual task. Here, we re-examined the effect of verbalisation on implicit memory by manipulating the processing mode for both description and perceptual tasks. With this experimental design, we found that verbalisation influenced implicit memory consistent with the explanation of the processing shift account. Verbalisation can leave the priming effect intact but lengthens the RTs when the processing mode involved in verbalisation is inappropriate for the perceptual task. Also, we found that the face inversion effect was modulated by the processing mode involved in verbalisation. We suggest, therefore, that implicit memory is not different from explicit memory in the way that it is affected by verbalisation. We propose that the mode of processing is critical for both types of visual memory.

Keywords: Face; Implicit memory; Processing mode; Verbal overshadowing.

Suppose that one day you come across the person of your dreams on the street. You may be eager to describe the person to your friends, as though painting a picture for them, including details such as height, eye colour and clothing. In this situation, does describing the person help you to form a more vivid and accurate mental image of him or her? According to previous studies (Brown & Lloyd-Jones, 2002; Schooler & Engstler-Schooler, 1990; but see also Brown & Lloyd-Jones, 2005), this is not the case; verbally describing a face that one has seen makes it less likely that one will recognise the person later compared to someone who has not made any verbal description. This phenomenon is called the verbal overshadowing effect.

Researchers have found that diverse factors mediate the relationship between verbalisation and visual memory (Brandimonte, Hitch, & Bishop, 1992; Nakabayashi, Burton, Brandimonte, & Lloyd-Jones, 2012). For example, the amount of verbal influence is small if one has weak perceptual skill with high verbal skill (Ryan & Schooler, 1998). In addition, the instructions of the description task (Brown & Lloyd-Jones, 2002; Kerr & Winograd, 1982), the number of items being described (Brown & Lloyd-Jones, 2005) and the timing of verbalisation (Nakabayashi & Burton,

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2008) are critical factors in terms of the effect of verbalisation on memory. Whereas verbalisation can exert negative impacts on memory, it can also facilitate the subsequent recognition task in some circumstances. For example, Brown and Lloyd-Jones (2005) showed that if participants described each face they observed they were more likely to recognise the described faces later; this is called the verbal facilitation effect. Therefore, the mechanism by which verbalisation influences, either positively or negatively, a stored visual representation remains a controversial issue.

For the verbal overshadowing effect, several accounts have been proposed. First, the retrieval-based interference hypothesis suggests that the misinformation one may generate during verbalisation impairs one's memory (Melcher & Schooler, 1996; Schooler & Engstler-Schooler, 1990). Supporting this hypothesis, researchers found that people who were forced to generate a large number of descriptions made more errors, as verbalisation rendered them more likely to add misinformation (Meissner, Brigham, & Kelley, 2001). On the other hand, Clare and Lewandowsky (2004) proposed that verbalisation does not impair memory itself but causes a conservative shift in the criterion of face recognition. This is called the criterion-shift account. They reasoned that, when making a verbal description, people are likely to become less confident in their memory and therefore reject more faces in a line-up even when the target face is present. In their experiment, they added target-absent line-ups and showed that verbalisation increased correct rejections. Although these accounts suggest interesting views on the verbal overshadowing effect, each, in itself, provides a limited explanation of verbal overshadowing. For example, the retrieval-based interference account cannot explain the findings that verbalisation influences the recognition of faces that were not described and thus should not be influenced by misinformation from verbalisation (Brown & Lloyd-Jones, 2002, 2003). In the case of the criterion-shift account, although Clare and Lewandowsky (2004) failed to find verbal overshadowing with a forced-choice procedure, earlier studies had found verbal overshadowing with such a procedure (Fallshore & Schooler, 1995; Ryan & Schooler, 1998).

Another account of verbal overshadowing is the processing shift account (Schooler, 2002). According to this perspective, when people describe the details of faces they have seen, they are more likely to focus on facial features, thereby forcing them to rely on a feature-focused processing mode. This featural mode of processing, however, hinders facial recognition. It is widely acknowledged that holistic processing is important for face perception (Young, Hellawell, & Hay, 1987). In other words, the mode of processing induced by verbalisation may not be appropriate for facial recognition. Supporting this hypothesis, Brown and Lloyd-Jones (2002) showed that the verbal overshadowing effect is evident only when people describe previously seen faces by focusing on certain features; when not forced to describe specific features, the verbal overshadowing effect disappears. This finding suggests that the processing mode involved in verbalisation plays a pivotal role in inducing the verbal overshadowing effect. These authors also found that the verbal overshadowing effect can be transferred to faces that were not described (Brown & Lloyd-Jones, 2002). That is, the detrimental effect of verbalisation is not specifically content-dependent but rather is related to the act of verbalisation itself, again consistent with the processing shift account.

Whereas most research on the verbal overshadowing effect has examined the processing shift account in relation to explicit memory, Lloyd-Jones, Brown, and Clarke (2006) investigated how this account can be applied to another type of memory: implicit memory. Implicit memory is marked by the absence of conscious recollection but improved performance on tasks involving pre-exposed stimuli. This form of memory is largely based on the perceptual system rather than on conscious or intentional recollections of previous experiences (Schacter, 1992). Lloyd-Jones et al. (2006) conducted an experiment using a face/non-face discrimination task and investigated how verbalisation affected the amount of repetition priming. They had participants who observe several faces and then asked them to describe a face. After describing the last face presented, participants completed a perceptual task that required them to judge whether a stimulus presented on the screen was a face or a non-face. In this task, half of the faces were old and the other half were new. If participants' implicit memory of old faces was intact, then it was expected that their reaction times (RTs) for old faces would be faster than those for new faces. This was what researchers found in the description condition. Although verbalisation lengthened the RTs for both old and new faces, the effects of priming were not diminished. Based on these results, the authors concluded that verbalisation shifts the processing mode for perceptual encoding of both primed and unprimed faces and therefore does not necessarily reduce the effects of priming.

Although Lloyd-Jones et al. (2006) showed that implicit memory is influenced by the effect of verbalisation, as the processing shift account predicts, there are still several issues to be clarified to support this account. First, the task adopted by the authors insufficiently reflected the consequences of shifting processing modes. According to the processing shift account, the verbal overshadowing effect is generated because facial perception is aided by the global mode of processing, which is in direct contrast to the mode that verbalisation induces. To investigate whether a similar phenomenon occurs in implicit memory, it is necessary to devise a task that is sensitive to the mode of processing. Otherwise, even if verbalisation does affect implicit memory, the observation of such an effect is unlikely. In the experiment by Lloyd-Jones et al. (2006), it is not clear which of the two processing modes was required to perform the perceptual task. Their study utilised a face/non-face discrimination task that presented a normal face or a face with scrambled features as stimuli. Observers in this experiment could have relied on either global or featural processing; in other words, they could have detected faces among the stimuli either holistically or by relying on salient features, such as an eye at the bottom of a face. Without clarifying this issue, it is difficult to conclude which processing mode is inappropriate for the perceptual task. Second, the study had only one type of description task, which focused on the features of a target face. To examine whether a shift in the processing mode is responsible for the verbal overshadowing of memory, it is necessary to manipulate both the holistic and featural modes of processing (Brown & Lloyd-Jones, 2002, 2003).

In the present study, we aimed to re-examine the effect of verbalisation on implicit memory using a gender discrimination task. As in typical verbal overshadowing studies (Brown & Lloyd-Jones, 2002; Lloyd-Jones et al., 2006), participants learned faces that were presented upright (the learning phase) and then gave a verbal description of the face they had seen last (the description phase). Finally, they performed a gender discrimination task with the faces they had seen in the learning phase (the test phase). According to the processing shift account, verbalisation impairs face recognition because it involves an inappropriate processing mode, regardless of the pre-exposure to faces. Therefore, this account predicts that a priming effect will be preserved because verbalisation influences both primed and unprimed faces, whereas the RTs will be lengthened when the processing mode is inappropriate for processing the visual stimuli.

We used a gender discrimination task to measure implicit memory because it is known to be effective in producing repetition priming. Goshen-Gottstein and Ganel (2000) showed that repetition priming occurs strongly with a gender discrimination task for either familiar or unfamiliar faces, even when the experimenters used different exemplars from the same faces for the test. Another advantage of using a gender discrimination task is that gender judgements are known to be based on configural information (Ganel & Goshen-Gottstein, 2002) and draw, therefore, on the global mode of processing rather than the featural mode. Thus, this task was expected to clarify the unclear mode of processing involved in the face discrimination task in the study by Lloyd-Jones et al. (2006).

We used the faces of celebrities as stimuli because it has been shown that familiar faces are more likely to induce repetition priming (Goshen-Gottstein & Ganel, 2000). It should be noted, however, that the memory of familiar faces is less likely to be influenced by verbalisation compared to unfamiliar faces (Brown, Gehrke, & Lloyd-Jones, 2010; Nakabayashi, Burton et al., 2012). Because people already have abundant information about familiar faces, memories of them are robust against verbally generated representations. Nevertheless, we believed that the employment of familiar faces would be more appropriate for the following reasons. First, producing a sufficient amount of priming was critical to our purpose of examining how verbalisation influences implicit memory; this may not be achievable with unfamiliar faces. Furthermore, unlike previous studies that used a recognition task, we used a perceptual task, which may be less related to semantic information.

Based on a factorial design, two types of instruction and two types of face stimuli were used for the verbalisation and perceptual tasks, respectively. The instructions for the description task emphasised either the features or the global shape of the faces to be described; this encouraged participants to employ featural and holistic modes of processing, respectively. For the gender discrimination task, we used both upright and inverted faces. It has been shown that, because configural information is critical for the perception of upright faces, people depend on the global mode of processing in this situation (Young et al., 1987). When a face is inverted, however, this reliance disappears and people fail to recognise it due to the face inversion effect (Farah, Tanaka, & Drain, 1995). Therefore, using two different face orientations enables us to examine the employment of global or featural modes during perceptual tasks. It should be noted that performance is expected to be much worse for inverted faces compared to upright faces, given that a holistic representation of faces is critical for judgements of gender (Ganel & Goshen-Gottstein, 2002; Goshen-Gottstein & Ganel, 2000). If the type of processing mode affects implicit memory, however, then the deteriorative effect from face inversion is expected to be diminished when the mode induced by verbalisation is appropriate for the processing of inverted faces.

The entire experiment consisted of three phases: learning, description and task. During the learning phase, participants observed 25 upright faces that were presented for five seconds each. They were then required to provide a verbal description of the face that was presented last, focusing on either the individual features or the global configuration of the face. It should be noted that participants studied and described upright faces only, which may have led to a lower level of priming when they were tested with inverted faces. Finally, the participants performed a gender discrimination task, which included both primed and unprimed faces. In order to examine the effect of changes in the processing mode, one half of the primed and unprimed faces were presented upright, and the other half were presented inverted. We expected that when the processing mode was inappropriate for processing faces, the RTs would be lengthened whereas the priming effect would be preserved.

METHODS

Participants

Fifty students from Yonsei University, all native Korean speakers with normal or corrected-to-normal vision, participated in the experiment for course credit or monetary compensation. The Institutional Review Committee of Yonsei University approved the experimental protocol, and written informed-consent forms were obtained from all participants.

Materials and apparatus

The stimuli consisted of 27 male and 27 female faces belonging to Korean celebrities that had been downloaded from various websites. For gender discrimination in the test phase, 48 faces (24 males and 24 females) were presented, half of which (12 males and 12 females) were previously presented in the learning phase. The remaining six faces were used for the description task. Among them, one face was randomly chosen and presented as the last face of the learning phase. We used the faces of Korean celebrities as our stimuli because familiar faces induce a larger repetition priming effect during gender discrimination tasks than do unfamiliar faces (Goshen-Gottstein & Ganel, 2000). All of the participants were familiar with the faces that we used. All faces were shown from a front view and edited to fit into a 3.34-degree circle using Adobe Photoshop SC5 (version 5.0 Adobe Inc., Mountain View, CA, USA). Thus, the hair and any other distinctive features, including clothes, were excluded from the images. We tried to leave only the internal features of the face because it has been found that repetition priming for famous faces occurs based on the internal features but not on the complete face (Goshen-Gottstein & Ganel, 2000).

The experiment was performed in a dark room using a programme written in Matlab and Psychophysics Toolbox (Brainard, 1997; Pelli, 1997). During the task phase, however, the dark room was dimly illuminated so that participants could perform the description task. All stimuli were presented on a linearised Samsung 21-in. monitor driven by a Pentium IV computer. The frame-rate of the monitor was 85 Hz. The participants were seated approximately 90 cm from the screen with their heads fixed on a chin and forehead rest.

Design and procedure

A 2 × 2 × 2 mixed factorial design was employed in this experiment. The type of verbalisation was a between-subjects factor (featural description vs. global description). The 50 participants were randomly assigned to one of the conditions (25 per condition). The orientation of the faces (upright vs. inverted) in the test phase and the presence of priming effects (primed vs. unprimed) were two within-subjects factors.

The experiment consisted of three phases: the learning phase, the task phase and the memory test phase. First, in the learning phase, among the 54 faces, 25 (12 males and 12 females, with the 25th face capable of being either male or female) were randomly chosen and presented for five seconds in the centre of the screen, one by one, in random order. The participants were asked to observe these faces attentively. After all faces to be primed were presented, the 25th face was presented in the same way for the description task. The participants were told before the learning phase that they would be asked to perform a certain task with the last face.

Following the learning phase, participants performed a description task for five minutes. In the featural description condition, participants described the facial elements of the face seen last (the 25th face), with one minute allotted to each facial element; they described the eyebrows, eyes, nose and mouth separately, and the cheeks and chin together. The feature to be described was presented on the screen for one minute, followed by a beep sound to inform participants that it was time to describe the next feature. In contrast, in the global description condition, participants were asked to describe the global structure, such as head shape or their overall impression of the face. They were given a full five minutes to make all of these descriptions. In both conditions, the participants were encouraged to describe the faces in as much detail as possible so that other people seeing only their description could identify the described face when placed amongst other faces. These instructions were written on the screen and on the paper on which they wrote their descriptions.

Finally, in the test phase, participants performed a gender discrimination task. Forty-eight faces (24 males and 24 females), including 24 primed faces (12 males and 12 females), which had been presented in the learning phase, were used for the task. Half of the primed faces and half of the unprimed faces were randomly selected and appeared upside down. Therefore, the faces were either primed or unprimed and, at the same time, either upright or inverted (primed upright, unprimed upright, primed inverted and unprimed inverted). Primed inverted faces, however, were learned in the opposite orientation to the test orientation because all of the learned faces were upright. The faces were presented in the centre of the screen in random order. The participants pressed the “1” key in response to a male face and the “2” key for a female face. They were instructed to respond as accurately and as quickly as they could. For incorrect responses, a beep was sounded as feedback. Faces remained on the screen until the participants provided a response.

RESULTS

We first examined the quality of the descriptions to assess the effectiveness of our manipulation of the types of verbalisation. Specifically, we tested whether there were more featural descriptors in the featural description condition than in the global description condition, and vice versa. We had two independent raters to count the number of featural/global descriptors. They classified the descriptors using the category adapted from Brown and Lloyd-Jones (2002). The numbers of descriptors from the two raters were significantly correlated to each other (for the featural descriptors, [$r(25) = .764$, $p < .001$], and for the global descriptors, [$r(25) = .779$, $p < .001$]), suggesting that the raters employed similar criteria to determine the featural/global descriptors. We found that there were significantly more featural descriptors in the featural description condition (13.9) than in the global condition (5.34) [$t(24) = 10.187$, $p < .001$], as well as more global descriptors in the global description condition (4.88) than in the featural description condition (2.92), $t(24) = -3.329$, $p = .003$. Therefore, participants in the two different description conditions engaged in two different modes of processing, as we had intended. One may argue that the global description condition failed to elicit the global processing mode because there were equivalent numbers of featural and global descriptors in this condition. However, we believe that this is because people are more likely to generate featural descriptors when they are instructed to give a verbal description (Nakabayashi, Lloyd-Jones, Butcher, & Liu, 2012).

We then analysed the accuracy of the gender discrimination task, finding that the overall average correct response rate was 97.47%. To rule out the possibility of a trade-off between accuracy and RTs, we conducted a three-way analysis of variance (ANOVA) on mean accuracy, with priming and faces as within-subjects variables and group as a between-subjects variable. None of the independent variables was significant (all ps > .1). Therefore, the following analysis of RTs was not the result of a trade-off between RT and accuracy. Before analysing the RTs, we discarded the trials that produced incorrect responses and responses that took longer than 2.5 standard deviations from the overall sample average. Trials with RTs of less than 200 ms or slower than 2000 ms were also excluded from the analysis (Greene & Wolfe, 2011). Three participants had more than 20% of their total trials rejected and were thus omitted from the analysis (all three participants were involved in the featural description condition). For the remaining 47 participants, 6% of the total trials were rejected.

If verbalisation influences implicit memory as the processing shift account predicts, the RTs for each type of face would be expected to vary depending on the type of verbalisation, whereas the priming effect remains intact. Specifically, for the featural description group, which is supposed to rely on the featural processing mode, the RTs would be longer for the upright faces than for the inverted ones. For the global description group, on the other hand, the RTs would be lengthened for inverted faces (for which the featural mode is appropriate) but not for upright faces. Figure 1 displays the results. A three-way ANOVA with priming and face orientation as within-subjects variables and group as a between-subjects variable showed a main effect of priming [$F(1,45) = 4.473$, $p = .04$], face [$F(1,45) = 25.503$, $p < .001$] and description group [$F(1,45) = 1641.928$, $p < .001$]. Furthermore, we found a significant interaction between face orientation and description group [$F(1,45) = 5.088$, $p = .029$] and a significant three-way interaction among priming, face orientation and groups [$F(1,45) = 9.157$, $p = .004$]. No other main effect or interaction was significant.

The main effect of priming suggests that using the gender discrimination task to measure implicit memory was successful. Consistent with previous research (Goshen-Gottstein & Ganel, 2000), famous faces produced significant priming. Thus, it is possible for us to investigate how implicit memory is influenced by verbalisation in the following analyses.

The main effect of face orientation showed that the RTs for the inverted faces (722.37 ms) were significantly slower than those (686.04 ms) for the upright faces [$F(1,45) = 25.503$, $p < .001$], consistent with a previous study (Farah et al., 1995). However, we found that this face inversion effect is influenced by the mode of processing; the extent of the face inversion effect was reduced when the mode of processing induced by verbalisation was appropriate for the processing of inverted faces [$F(1,45) = 5.088$, $p = .029$]. When we compared the extent of the face inversion effect within each description group, we found it had less effect in

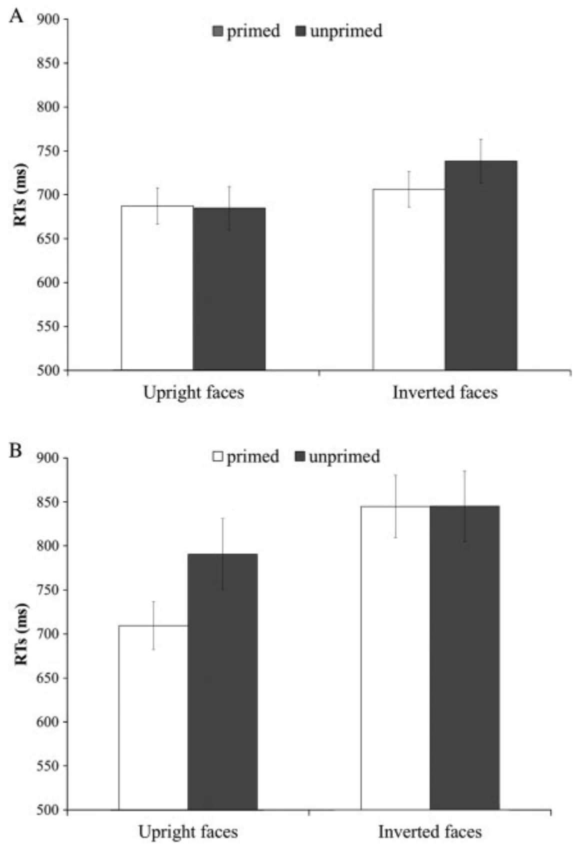

Figure 1. RTs for the gender discrimination task in the featural description condition (A) and in the global description condition (B).

the featural description condition (36.33 ms) than in the global description condition (94.98 ms) [$t(45) = -2.256$, $p = .029$]. These findings are consistent with the processing shift account because the mode of processing elicited by verbalisation was appropriate for inverted faces in the featural description condition.

The main effect of group showed that gender discrimination was faster in the featural condition (704.21 ms) than in the global condition (797.47 ms), $F(1,45) = 1641.928$, $p < .001$. This could be due to the reduced face inversion effect in the featural description condition, as we discussed earlier. As the mode of processing was appropriate for inverted faces in the featural description condition but not in the global description condition, the featural description group would have less interference from processing inverted faces. However, as the type of description task was examined with a between-subjects design, the main effect of the description group may reflect inherent group differences.

To investigate how the amount of priming varies for each description group, we conducted two-way ANOVAs with priming and face orientation in each description condition. First, in the global description condition, we found that both the main effect of face orientation [$F(1,24) = 18.299$), $p < .001$] and the interaction between face orientation and priming were significant [$F(1,24) = 7.974$, $p = .009$]. Subsequent *t*-tests between the primed and unprimed faces showed that for the upright faces, the RTs in the primed condition (709.39 ms) were significantly faster than those in the unprimed condition (790.58 ms), $t(24) = -4.208$, $p < .001$. However, for the inverted faces, we found that the RTs in the primed condition (844.79 ms) did not differ from those in the unprimed condition (845.14 ms), $t(24) = -.011$, $p = .992$. These results suggest that global description preserved the priming effect for upright faces but not for inverted faces. Whereas the global mode of processing induced by global description preserved priming for upright faces, the effect of face inversion overwhelmed the priming effect for inverted faces.

In the featural description condition, we found that the main effect of face orientation was significant [$F(1,21) = 10.123$, $p = .004$], whereas neither the main effect of priming [$F(1,21) = 1.698$, $p = .207$] nor the interaction between priming and faces [$F(1,21) = 2.007$, $p = .171$] were significant. That is, unlike the global description condition, the priming effect did not occur for either face orientation in the featural description condition. These results suggest that, whereas the featural mode of processing induced by verbalisation facilitated gender discrimination in general, the effect of priming was not preserved even when the mode of processing was appropriate (inverted faces). This could be due to the way in which faces were presented in the learning phase; we presented only upright faces in the learning phase. Because implicit memory heavily relies on the match between the learning and test phases (Weldon & Roediger, 1987), the different way in which faces were presented in the learning and test phases in our study likely reduced the priming effect.

Finally, we examined whether there was a relationship between the effect of priming in the gender discrimination task and the quality of the descriptions made by the participants in the description phase. We found that the number of featural descriptors was positively correlated with the amount of priming in the global description condition [$r(25) = .475$, $p = .016$], whereas this trend was not found in the featural description condition [$r(22) = -.321$, $p = .146$]. This significant correlation between the quantity of featural descriptors and memory is consistent with the prediction of the "more is better" hypothesis, which holds that featural descriptors will increase the accuracy of memory (Bloom & Mudd, 1991). Nevertheless, given that a significant correlation between the number of featural descriptors and the quality of memory was found only in a specific condition (featural descriptors in the global description condition), we believe that the "more is better" hypothesis only partially explains our findings. In addition, this hypothesis cannot explain the reduction of the face inversion effect in the featural description condition. Brown et al. (2010) also showed that the number of descriptors may not be directly related to the performance of a recognition task.

To sum up, we found that the shift in processing mode induced by verbalisation is critical for priming as well as for the face inversion effect. In the global description condition, an appropriate mode of processing elicited by verbalisation preserved priming only for upright faces. Meanwhile, verbalisation did not preserve priming for either inverted or upright faces in the featural description condition. The mode of processing also influenced the face inversion effect. This effect was significantly reduced in the featural condition because featural description produced an appropriate mode of processing for inverted faces.

DISCUSSION

In the present study, we investigated the effect of verbalisation on implicit memory. Based on the processing shift account, providing a verbal description was expected to interfere with the performance of a perceptual task for faces if the processing mode elicited by verbalisation was inappropriate for the task. Using two types of description tasks, the processing mode was manipulated to be either featural or holistic. After the description task, participants performed a gender discrimination task with upright and inverted faces. As predicted by the processing shift account, the mode of processing elicited by verbalisation was critical for both priming and the face inversion effect. For participants who had given a global description, their performance of the perceptual task was worse for inverted faces than for upright ones. This suggests that when the processing mode elicited by verbalisation was not consistent with the demands of the perceptual task, this inappropriate mode interfered with the performance of the task, overwhelming the priming effect. In contrast, participants who had given a feature-focused description exhibited no priming for either upright or inverted faces. This could be due to insufficient priming, given that we used only upright faces in the learning phase. Based on these results, we conclude that verbalisation can influence repetition priming for faces depending on the processing mode induced by verbalisation.

It should be noted that, in our manipulation of the processing mode, we employed different types of instruction: in the featural description condition, we listed specific features to describe; in the global description condition, we did not. These two types of instruction may have differing impacts on verbal overshadowing. According to Brown and Lloyd-Jones (2002), there was a larger verbal overshadowing effect when participants described specific features compared to when they were free to recall any information. However, unlike Brown and Lloyd-Jones (2002), we specifically asked participants to describe their overall impression or the global structure in the global description condition. This specific instruction for the global description condition, although not a prompt, produced a larger effect of verbalisation in this condition, unlike the findings of Brown and Lloyd-Jones (2002).

Our findings expand on the results of Lloyd-Jones et al. (2006), who found that having an inappropriate processing mode due to verbalisation lengthens the RTs of a perceptual task but leaves the priming effect intact. Compared to the design of Lloyd-Jones et al. (2006), who employed a single type of description and perceptual task, we manipulated the processing mode for both the description and perceptual tasks. As a result, we found that the processing mode due to verbalisation not only is critical for the perceptual task but also interacts with the face inversion effect. The extent of the face inversion effect decreased when the processing mode from verbalisation was consistent with the demands of the perceptual task. These findings support the processing shift account, showing that the processing mode elicited by verbalisation influences the subsequent task in two different ways.

Although the present study demonstrated that the processing mode plays an important role in the verbal overshadowing effect, alternative explanations have been advanced. Nakabayashi, Burton et al. (2012) suggested a modified version of the processing shift account, as they found that the verbal overshadowing effect occurred only with unfamiliar faces. According to these authors, the processing shift occurs due to the presence of an imbalanced processing mode biased towards semantic processing at the expense of perceptually based processing. The authors further suggested that verbalisation induces the semantic processing of unfamiliar faces, which interferes with perceptual processing. For familiar faces, however, they assumed that people already have a sufficient amount of semantic information and thus do not have to change their processing mode. In contrast to these findings, we found that verbal overshadowing occurred with familiar faces. We think that this discrepancy can be attributed to differences between the tasks used to measure memory. In the present study, semantic processing is not as critical for face recognition as it was in the study of Nakabayashi, Burton et al. (2012) because the nature of the gender discrimination task is perceptual, not largely based on semantic properties (Goshen-Gottstein & Ganel, 2000).

Another possible explanation is provided by the retrieval-based interference hypothesis (Melcher & Schooler, 1996; Schooler & Engstler-Schooler, 1990). This hypothesis suggests that a poor quality of verbalisation hampers the retrieval of an intact memory representation of the described images. As we used face stimuli that were not described in the description task, we cannot determine whether the quality of verbal description is related to implicit memory, as the retrieval-based interference hypothesis suggests. Further studies on this issue will clarify whether this hypothesis can be applied to verbal influence on implicit memory. Finally, the criterion-shift account (Clare & Lewandowsky, 2004) emphasises that the degree of conservativeness in decision-making is influenced by verbalisation. Unfortunately, our paradigm cannot measure this criterion because we measured implicit memory, which does not ask participants to make judgements concerning their recognition.

It has been proposed that both explicit and implicit types of memory possess a shared foundation (Berry, Shanks & Henson, 2008). Consistent with this perspective, our findings suggest that verbalisation influences implicit memory in a manner similar to how it influences explicit memory. Studies concerned with the effect of verbalisation on explicit memory have shown that the relationship between memory and verbalisation is rather fragile and affected by various factors, such as the type of instruction for the description task (Brown & Lloyd-Jones, 2002; Wickham & Lander, 2008), the timing of the description (Jones, Armstrong, Casey, Burson, & Memon, 2013) and perceptual expertise with regard to the described objects (Melcher & Schooler, 1996). Further studies may shed light on whether these characteristics of verbal overshadowing can be applied to implicit memory as well.

In sum, the present study examined the effect of verbalisation on repetition priming for faces. As predicted by the processing shift account, we found that the processing mode elicited by verbalisation interacts with both priming and the face inversion effect. Our findings suggest that a shift in the processing mode is critical for the verbal overshadowing effect and that this mechanism applies to implicit memory as well as to explicit memory.

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