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Verbal facilitation effects instead of verbal overshadowing in face memory of 4- to 6-year olds

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ABSTRACT
Research on eye witness memory in older children and adults revealed that verbally describing unfamiliar faces impairs later recognition of these faces, known as the “verbal overshadowing effect.” The aim of this study was to investigate whether a verbal overshadowing effect occurs in 4- to 6-year olds, too, and whether visualization (i.e., drawing the seen face) might elicit a visual overshadowing effect. Instead of a verbal overshadowing effect, a verbal facilitation effect was revealed with verbal intelligence being a significant predictor for recognition accuracy in the verbalization group but not in the control group. No effect of visualization was observed on recognition accuracy. Potential explanations for the results are discussed.

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KEYWORDS Face memory; verbal overshadowing; visual overshadowing

Introduction
Research on eye witness memory in adults identified plenty of factors impairing the accuracy of face recognition (e.g., Sporer, Malpass, & Koehnken, 1996). A well-known phenomenon is, for instance, the “verbal overshadowing effect.” Witnesses who verbally described a face and then have to identify it in a recognition task are more prone to make errors than witnesses who did not make a verbal description in advance. This phenomenon was initially reported by Schooler and Engstler-Schooler (1990). In the study, adults were presented with a video of a bank robbery, followed by an unrelated filler task. After 20 min, subjects of the experimental group were asked to give a detailed description of the robber’s face, while the control group continued with another filler task. All subjects were then presented with photographs of eight similar faces including the robber’s face and were asked to identify the latter. In fact, the experimental group was found to be less able to recognize the robber compared to the control...
group. Over the years, a vast number of studies have been conducted to further examine this phenomenon. For example, a recent study by Alogna et al. (2014) consisting of a large-scale, multiple-laboratory replication of the original experiments of Schooler and Engstler-Schooler (1990, Experiment 1 and 4) revealed a robust verbal overshadowing effect in adults, whereas Brown and Lloyd-Jones (2005) reported a verbal facilitation effect (i.e., higher recognition accuracy after verbalization) rather than a verbal overshadowing effect. A meta-analysis by Meissner and Brigham (2001) indicated a small, but reliable negative effect of verbalization on face memory, which was, however, questioned by Francis (2012), who suggested that this effect was still overestimated due to a potential publication bias. Thus, the verbal overshadowing effect—and in particular its underlying mechanisms—remains subject of controversial debate.

Currently, three explanatory approaches for this effect are discussed (Chin & Schooler, 2008). The processing account (Schooler, 2002) refers to a shift in processing caused by verbalization; that is, verbalization triggers the use of feature-based strategy instead of holistic processing, which impedes face recognition. The criterion account (Clare & Lewandowsky, 2004) suggests that verbalization causes a conservative response bias, making the witness less likely to believe that the target is present in the line-up. Finally, the content account (Schooler & Engstler-Schooler, 1990) proposes that individuals whose level of perception exceeds their level of verbal abilities should be especially prone to verbal overshadowing. These individuals would be able to perceive various aspects of a face, but unable to appropriately put these perceptions into words. Accordingly, the detrimental effect of verbalization occurs because people rely on the impoverished verbal details of their memory at the expense of their superior perceptual memories. It is noteworthy that there is evidence for all three approaches (Chin & Schooler, 2008). This study concentrates on the content account, as it holds the most interesting implications for pre-school children due to their still limited level of verbal abilities.

So far, research on the influence of verbal face description on face memory has focused mainly on adults. Among the few studies that examined children, Memon and Rose (2002) found no verbal overshadowing effect in 8- and 9-year olds. Children witnessed a live event in their classroom: A stranger entered the room, presented a picture of a dog, asked the children whether they had seen this dog, and left. Twenty-four hours later, children were assigned to a verbalization and non-verbalization group and afterwards had to complete a face recognition task in order to identify the man. No significant difference in accuracy was revealed between children in the verbalization and non-verbalization group. However, this study contains some methodological shortcomings, that is a 24-h delay between the event and verbalization, which might have been too long to elicit a verbal overshadowing effect (cf. Meissner & Brigham, 2001). Moreover, some children might have been more interested in the picture of
the dog rather than the stranger’s face which might have caused individual differences in the time attending and processing the stranger’s face. Dehon, Vanootighem, and Brédart (2013) conducted another study, not only covering different age groups (7- to 8-year olds, 9- to 10-year olds, 13- to 14-year olds), but also taking the shortcomings of Memon and Roses’ study (2002) into account. By presenting a video of a person located in the centre of the screen without any other interfering characters, such as another person or a dog, a verbal overshadowing effect was revealed for all age groups, irrespectively of whether children verbalized immediately after the presentation or delayed by 24 h, and also irrespectively of whether or not the recognition task was performed immediately after the verbalization or 24 h later. These results indicate that the verbal overshadowing effect is not restricted to adults, but occurs in children, too. However, no research on verbal overshadowing of face memory has been conducted so far with children younger than seven years old. Given that also preschool children become witnesses of criminal events, the question arises whether their memory is affected by verbalization, too. The aim of this study was to investigate (a) whether the verbal overshadowing effect also occurs in 4- to 6-year olds, (b) whether the content account (Schooler & Engstler-Schooler, 1990) can make an explanatory contribution of this effect in young children and (c) whether visualization (i.e., drawing the seen face before recognizing it) affects their face memory.

First, we expected in line with the content account (Schooler & Engstler-Schooler, 1990) that young children should be especially prone to verbal overshadowing: After verbalization, children should be less accurate in face recognition than children in the non-verbalization group as young children’s vocabulary is still limited compared to that of older children and adults (cf. Brandone, Salkind, Golinkoff, & Hirsh-Pasek, 2006). Presented with a face, 4- to 6-year olds should be able to perceive various aspects visually, but might have difficulties putting all these aspects into appropriate words. Thus, subsequent verbalization would not fully match the perceptual experience and result in poor verbal representations which overshadow the original visual representations (Schooler & Engstler-Schooler, 1990). Hence, children would judge based on the impoverished details of the verbal representations which should impair face recognition.

Second, we accessed individual differences in verbal abilities. According to the content account, subjects with poorer verbal abilities should suffer more from verbalization (i.e., exhibit lower accuracy in face recognition) than subjects with higher verbal abilities (Ryan & Schooler, 1998). Moreover, if there was a relationship between verbal abilities and accuracy in the non-verbalizing control group, too, one might assume that it is not verbal intelligence in particular but rather general intelligence (often correlated with verbal abilities), which contributes to better recognition performance.
Third, we examined whether face memory of 4- to 6-year olds might be affected not only by verbalization but also by visualization, that is drawing the face from memory prior to the recognition phase. Analogously to the content account focusing on verbal abilities, it might be possible that the perceptual abilities of children also exceed their drawing abilities, and thus give rise to a “visual overshadowing effect.”

**Method**

**Sample**

Participants were 56 preschool children aged 4–6 years, recruited from local day-care centres after their parents signed a consent form. Children were randomly assigned to one of the three experimental conditions: the verbalization group (18 children, mean age: $M = 5.1$ years, SD = .8; 7 males, 11 females), visualization group (18 children, mean age: $M = 5.0$ years, SD = .8; 9 males, 9 females), and control group (20 children, mean age: $M = 5.3$ years, SD = .7; 11 males, 9 females). All children were native speakers, had normal or corrected-to normal vision and took part voluntarily.

**Stimuli and procedure**

There were four tasks, always presented in the same order. Each task included the presentation of a video of a robbery on a laptop (screen size 15.6 inch) by means of headphones, which was followed by the experimental intervention and then by a recognition test, in which the face of the robber had to be identified out of five photographs of faces, each measuring $16 \times 12$ cm, including the target and four distractors. To ensure similarity between target faces and distractor faces, the photographs were rated in advance by ten students and the four most similar faces to the target were chosen.

Children were tested individually in a separate room of their institutions. The experiment was introduced as a game in which children would play the role of a detective who has to hunt robbers. Each task started with a scene showing a person who presented her favourite object (e.g., a teddy bear). The person told that her favourite object had been stolen, and even though the object was back, unfortunately the robber has not been caught yet. Children were asked for help by memorizing the face of the robber in the upcoming scene. The next scene showed a person in neutral black clothing, taking away the favourite object from a table. At the end of the robbery scene, the camera focused on the still face of the robber for 5 s. Subsequently, children completed a filler task to generate a

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1. Except for the control group which was presented with tasks in random order, however, this did not influence performance as proactive interference could be ruled out in all experimental groups (see results).
delay of 3.5 min that included doing handicrafts by richly decorating a certificate with stickers and paintings.

Thereafter, the experimental intervention followed. Children of the verbalization group had to verbally describe the robber’s face for about 1.5 min. To facilitate this, the experimenter used eight open-ended questions that were posed to the child asking for details and properties of the face (e.g., “Was there something in the robber’s face that you noticed in particular?”, see Appendix A). Children of the visualization group were asked to draw the robber’s face for about 1.5 min, whereas children of the control group continued with the filler task for another 1.5 min.

Thereafter, the face recognition test was conducted. Children saw five monochrome portrait photographs placed on a table in front of them (two at the top and three at the bottom line). The position of the target face was randomized in each task for each child. Each portrait was printed in the centre of a horizontal sheet, showing a frontal face with features like part of the hair and ears. The set of photographs included a picture of the robber as well as distractor faces. Children were asked whether they could recognize the robber and to point on the appropriate picture. After their choice, children were asked once whether this was their final decision, which was confirmed by most of them. Their choice was coded as correct or incorrect. After the face recognition test, children continued with the next task until all four tasks were completed.

In addition, children of the verbalization and control group were tested for their verbal abilities using the subtest “Analogies,” as part of the P-ITPA (Potsdam-Illinois Test for Psycholinguistic Abilities, German version: Esser, Wyschkon, Ballasch, & Hänsch, 2010). Children had to complete given sentences, read by the experimenter, in a logical way (e.g., “A giant is big, a dwarf is … ”). As stated in the manual, the subtest “Analogies” assesses verbal intelligence, which was considered as an indicator for verbal ability as it also taps vocabulary. At the very end, each child was told that all robberies seen in the previous videos were simulated in purpose of the study and that no real person was harmed.

**Results**

The recognition score per child could range between 0 and 4. For the mean number of correctly recognized faces in each experimental condition, see Figure 1. It was first checked whether the mean recognition score was above chance (i.e., 20%). Thus, one-sample t-tests were conducted separately for each experimental condition with an adjusted alpha level set at .016. The recognition score of the verbalization group was significantly above chance level, $p < .001$, which was also the case for the control group, $p = .012$. The children of the visualization group, however, only tended to perform above chance level ($p = .04$, no more significant after correction of the alpha level).
Additionally, a chi-square analysis was conducted for each group separately (adjusted alpha .016) to check for proactive interference (i.e., best performance
in the first task and progressive impairment across the following tasks). As no significant differences were revealed between successive tasks, a proactive interference could be ruled out.

In order to test our main question whether the accuracy in face recognition significantly differed between the experimental conditions and whether a verbal or visual overshadowing effect occurred, the recognition scores were entered into an ANOVA. A main effect of condition was revealed, $F(2, 53) = 4.95$, $MSE = .40$, $p = .011$, $\eta^2 = .16$.

Post hoc tests (Tukey) indicated that the accuracy in face recognition was significantly larger in the verbalization group compared to the visualization group, $p = .014$, and also larger compared to the control group, $p = .042$, suggesting a verbal facilitation effect rather than a verbal overshadowing effect. No significant differences were revealed between the control group and visualization group, $p > .05$, suggesting no visual overshadowing effect.

In order to examine whether children exhibiting a lower level of verbal intelligence performed less accurately in face recognition than children with a higher level, a regression analysis was conducted separately for the verbalization and control group. The regression model in the verbalization group was significant, $F(1, 17) = 6.68$, $MSE = 3.81$, $p = .020$, $R^2 = .30$, with verbal intelligence predicting recognition accuracy, $t = 2.59$, $p = .020$, $\beta = .54$ (see Figure 2). No predictive value of verbal intelligence could be revealed in the control group, $t = 1.67$, $p > .05$, $\beta = .37$.

Discussion

The main questions of this study were (a) whether the verbal overshadowing effect occurs in 4- to 6-year olds, too, (b) whether the content account (Schooler & Engstler-Schooler, 1990) can make an explanatory contribution of this effect in young children and (c) whether visualization affects their face memory in a detrimental way.

Contrary to our expectations, no verbal overshadowing effect was revealed. Instead, children seemed to benefit from verbalization compared to performance in the control and visualization group, suggesting a verbal facilitation effect. Verbal intelligence was a significant predictor for recognition accuracy in the verbalization group: Children with better verbal abilities profited more from verbalization than children with verbal poorer abilities, which is in line with the content account, but refers now to a verbal facilitation effect instead of a verbal overshadowing effect. Moreover, verbal intelligence did not predict recognition accuracy in the control group. Thus, we conclude that the beneficial effects of verbalization in part can be explained by the level of verbal intelligence rather than general intelligence (often correlated with verbal abilities). The latter could have been supported, if there had been a relationship between verbal intelligence and accuracy in the control group, too, which was not the case.
At least, three explanatory approaches can account for the absence of verbal overshadowing in 4- to 6-year olds. Previous studies suggest that face encoding strategies of younger children differ from the strategies of older children and adults. Whereas the latter encode faces using a holistic strategy based on the face’s permanent configural information (i.e., the spatial relations among the face’s features), children under 10 years of age use a feature-based strategy, that is, they focus on distinctive features such as the nose rather than spatial configurations (Carey & Diamond, 1977; Meinhardt-Injac et al., 2011; Schwarzer, 2000). For example, Carey and Diamond (1977) demonstrated that children younger than 10 years of age rely more on paraphernalia (i.e., hats and eyeglasses) than older children to distinguish unfamiliar faces, and are easily fooled in recognition by the manipulation of these features (but see Baenninger, 1994). Carey and Diamond (1977) concluded that older children are more able to abstract permanent spatial relations in face (i.e., holistic strategy), and thus perform better in a recognition task when distinctive features are manipulated. Different face encoding strategies might have interesting implications regarding the susceptibility for verbal overshadowing. According to the processing account of verbal overshadowing (Schooler, 2002), verbalization triggers the use of feature-based strategy instead of holistic processing, which in turn impedes face recognition. Given a more feature-based strategy rather than a holistic encoding strategy in young children, it might be possible that the detrimental effects of verbalization do not apply in this age group: Due to a default feature-based encoding strategy, children are less disrupted by verbalization and thus, no verbal overshadowing effect occurs.

Second, it might be possible that young children are less prone to verbal overshadowing than older children and adults due to their lower level of vocabulary. This might be in line with the findings of Meissner and Brigham (2001) and Meissner, Brigham, and Kelley (2001): Experiments that fostered a detailed elaboration were more likely to reveal a verbal overshadowing effect in adults than experiments that only employed a free recall. One explanation is that deeper elaborations also increase the probability of self-generated erroneous details which subsequently impair face recognition (Meissner & Brigham, 2001). With respect to the generally limited vocabulary in 4- to 6-year olds, of course we tried to deepen the verbalization process using a questionnaire, but maybe the degree of verbal elaboration was still not sufficient to trigger the generation of incorrect details that could have elicited a verbal overshadowing effect.

Finally, the comparison of the visualization with the verbalization group yielded significant differences in recognition accuracy, too. In line with that research on sensory dominance in childhood reports an auditory dominance in 4- to 6-year olds rather than a visual dominance (cf. Nava & Pavani, 2012; Sloutsky & Napolitano, 2003). This could be taken as a hint that younger children profit more from language-based processing rather than from visualization, which again would contradict the existence of a verbal overshadowing effect in this age group.
In conclusion, no verbal overshadowing effect could be demonstrated in young children. Rather, a verbal facilitation effect could be revealed. Verbal intelligence, however, was a significant predictor for recognition accuracy in the verbalization group, indicating that the beneficial effects of verbalization are mediated by the level of verbal abilities.

**Disclosure statement**

No potential conflict of interest was reported by the authors.

**References**


**Appendix A. Questions posed to the children in the verbalization group**

Now I will ask you some questions about the robber that you saw in the video. It is important that you concentrate and try to remember the face.

- Was the face familiar to you?
- Was it a friendly or unfriendly face?
- Was there something in the face you noticed in particular?
- Was it a narrow or wide face?
- Can you say something about the eyes?
- Can you say something about the nose?
- Can you say something about the mouth?
- Can you say something about the hair style?