Eyewitness memory of a real-life event: Recognition accuracy of young children for a disguised face and a bystander

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幼児における現実場面の目撃記憶――変装した人物と周辺人物に対する再認の正確性――

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要約

本研究は、3 ～ 6 歳児が現実の出来事を目撃した際に、変装した登場人物の顔や、出来事の中では中心的な役割をもたない人物（周辺人物）の存在や顔について、どの程度正確に再認できるかを検討した。実験参加者の幼児は、女性の話し手（ターゲット）が紙芝居を読み、男性のお手伝い（周辺人物）が読み終わった紙芝居を持つ等の補助をしているという出来事を、変装条件もしくは統制条件のどちらかで目撃した。変装条件では、ターゲットは紙芝居をする際に、再認テストにおける写真とは異なる髪型で眼鏡を着用していたが、統制条件では、再認テスト時の写真と同様に眼鏡は着用せず髪型も同じであった。出来事を目撃してからおよそ 24 時間後に、ターゲットの顔再認課題と、周辺人物の存在についての再認課題と顔再認課題を行った。その結果、周辺人物の存在を尋ねる質問に対して、“いなかった”もしくは“わからない”と答える幼児がみられた。また、変装条件のターゲットに対する顔再認率は著しく低く、変装条件のみにおいて、ターゲットよりも周辺人物の顔再認が正確であった。これらの結果が、幼児の顔認識能力や注意能力、インタビュー時の質問方法等の観点から考察された。

Key words

young children, eyewitness memory, facial identification, disguised face, omission error

1. Introduction

Most previous eyewitness studies of children have used live or videotaped events in which a non-disguised person performs a target event. A facial identification test is then conducted. However, in real-life scenes of crime, criminals often change their hairstyles and wear caps, wigs or masks before or after they commit a crime. Furthermore, it is not unusual for two or more people to commit a crime (e.g., a main performer carries a weapon, and a bystander assists). The aim of this study was to examine how accurately 3- to 6-year-olds can identity a disguised face and remember a bystander in addition to a main performer in a real-life event.

Traditional experimental studies exploring facial information processing (e.g., Diamond & Carey, 1977) have shown that disguises, such as eyeglasses, hairstyles, beards, and caps, impair performance on face identification tasks. In particular, young children had a strong tendency to rely on changeable and uncertain cues such as hairstyle (Campbell, et al., 1999; Campbell, Walker, & Baron-Cohen, 1995; Diamond & Carey, 1977). For example, Diamond and Carey (1977) asked 6- to 16-year-olds to identify the same person as a target from two alternatives, one identical to the target and the other a distracter. When identical stimuli had different hairstyles, and the distracter had the same hairstyle as the target, 6-year-olds' decisions were extremely inaccurate even though the target and alternatives were presented simultaneously.

The findings of studies on visual-perceptual development have implied that hairstyle is likely to be accessible information for young children, although these studies did not directly examine facial processing using facial stimuli. A series of studies by Odom and his colleagues (e.g., Cook & Odom, 1992; Odom & Guzman, 1972; Odom & Cook, 1984) demonstrated by means of similarity-classification tasks that there are developmental differences in perceptual sensitivity to multidimensional geometric stimuli. Young children have a higher sensitivity to size or color than to orientation or texture, in contrast with older children whose sensitivity is highest for orientation. As a result, young children might have difficulty attending to inner facial features because they do not adequately perceive differences in configuration or orientation of facial parts or skin texture.

Although the above-mentioned studies of cognitive development have pointed out the negative effects of facial transformation on identification accuracy in young children, a few studies have focused on this issue from the perspective of development of eyewitness memories. Pozzulo and Balfour (2006) examined how a change in the culprit's appearance, from the time of the crime to lineup identification, influences children's identification accuracy. In their study, participants were shown a videotape of

a staged theft and then were tested using either a hair-changed lineup including the culprit with a different hairstyle from in the video or an unchanged lineup. As a result, the identification accuracy of the changed condition (21 %) was lower than that of the unchanged condition (50 %) when using a target-present and simultaneous lineup. However, it is unclear whether low performance on a transformed lineup is observed even when the target event is a real-life event and not a video-taped event.

Accordingly, the chief aim of this study was to reexamine the negative effect of facial transformation under more naturalistic conditions in which the participants saw a real-life event. Studies using a video-taped event generally adopt a short exposure time for the target event and a short interval to the identification test. For example, in Pozzulo and Balfour (2006), participants watched a video for 90 seconds and then were given identification tests after a 25 minute delay. However, practical research using real-life events tend to adopt a longer exposure time and duration because forensic interviews are usually conducted one day or more after seeing a criminal event. For example, Memon and Rose (2002) used an 8 minute duration and a one day interval. In Goodman and Read (1996), a 5 minute duration and 5 day interval were employed. In this study, children witnessed a live event for 8 minutes in their classroom, and after a 24-hour delay they were given an identification test, similar to the procedure used by Memon and Rose.

Another interest of this study was to examine how accurately young children remember a bystander who is not the main performer in a target event. Most previous eyewitness studies of children have used live events or video-taped events in which only one main person performed the target event, afterward conducting a facial identification test for the one target person (e.g., Leichtman & Ceci, 1995; Bruck, Melnyk, & Ceci, 2000). Although a few early eyewitness studies in which a medical procedure was used as a target event (Goodman, Aman, & Hirschman, 1987; Peters, 1987) examined facial-identification accuracy for two people (i.e., a doctor and an assistant), they did not focus on recognition errors such as omitting the existence of the bystander (i.e., the assistant).

Ross et al. (2006) examined children's unconscious transference and implied a lower ability among younger children compared to older children in remembering peripheral aspects of an event such as bystanders. They examined whether children from 5 to 12 years of age misidentified a bystander as a perpetrator in line-up testing after seeing a video-taped criminal event in which two or three people appeared (i.e., a thief, victim, and bystander similar in appearance to the thief in the bystander condition, and only a thief and victim in the control condition). Results showed that 11- and 12-year-olds in the bystander condition were significantly more likely than children in the control condition to misidentify the bystander (i.e., 64 % in the bystander condition and 40% in the control condition). However, 5- and 6-year-olds were less likely to select the bystander in both conditions, and the proportions were almost chance level (bystander condition: 18 %, control condition: 16 %). In addition, 45 % of the younger children correctly selected the thief, that is, they could identify the main performer in the event. These results suggest that young children are less likely to remember those who are not directly involved in the central aspect of the event.

Recent studies of children's eyewitness memory using a real-life event have indicated that young children have a tendency to make omission errors regarding the presence of bystanders. In a study by Sugimura (in press), young children and adults watched a live show performed by main performers and bystanders. Approximately one month after seeing the event, the participants were given a recognition/recall test and facial identification test regarding the main performers and bystanders. Results showed that half of the children failed to remember the presence of bystanders who were not centrally involved in the event. All of the adults remember such bystanders.

In this study, we reexamined whether young children make omission errors regarding the presence of a bystander who did not have a main roll in an event under conditions different from those in Sugimura (in press). In their experiment, all 59 participants watched a show together in a kindergarten playroom and were then tested one month after seeing the event. It is possible that some children did not fully attend to the show and accurately encoded peripheral aspects of the event. In addition, their memory of the bystanders was likely to have deteriorated during the four-week interval. Therefore, we presented a target event to small subgroups comprising approximately 10 participants each and adopted a short interval (i.e., testing 24 hours after the event was seen).

The aim of the present study was to assess the ability of young children to identify disguised faces and to remember a bystander in addition to a main target. We used a picture-card story presented by a storyteller (main target) and an assistant (bystander) as a target event. We chose such a scenario because a show depicting a criminal event in which, for example, the main performers carry weapons and bystanders assist them would be unethical. Although several studies (e.g., Ross et al., 2006) have adopted video-taped criminal events such as theft, most researchers using real-life events select entertaining events such as a magic show (e.g., Bruck, Melnyk, & Ceci, 2000). As pointed out by Davies, Smith, and Blincoe (2008), only a few studies have investigated the impact of the presence of weapons on children's memory because of ethical concerns related to what children may be exposed to in the interest of science. Instructions for the facial identification tests were in accordance with recommended non-biased methods in eyewitness studies of children (e.g., Memon & Rose, 2002). The participants were informed that the target person may or may not have been present in the lineup and were then asked whether the target was present in the lineup. They were permitted an "I don't know" option for all questions.

2. Methods

2.1 Participants

Twenty-three 4-year-olds (ages 3:10–4:9, *M* = 4:3), 30 5-year-olds (ages 4:11–5:10, *M* = 5:4) and 23 6-year-olds (ages 5:11–6:10, *M* = 6:4) participated in this experiment. We assigned them to a disguised face (DF) or normal face (NF) condition, matching for mean age and gender.

2.2 Materials

2.2.1 Features of the target persons

The target was a 20-year-old female with black eyes and black shoulder-length hair. In the DF condition, she wore black-framed glasses, had a band-aid on her cheek, and had her hair pulled back. The bystander was a 20-year-old male with black eyes and black short hair. He was undisguised in both conditions.

2.2.2 Event recognition test

Eight 8 × 6 cm picture cards with scenes of eight typical activities in kindergarten were used. One of the eight depicted the event that had actually occurred (i.e., picture-card story). Seven were distractors, including a paper folding show and a soap bubbles show.

2.2.3 Face identification test

For the target identification test, six 15 × 10 cm color facial photographs of Japanese females taken from the shoulders up were used. All photographs were front views with neutral facial expressions, and each person wore identical gray clothes. One of these six females was the main target, and five were distractors whose facial features were similar to those of the main target. The five distractors were selected from 20 female photographs given similarity ratings by 30 undergraduate students. The students were asked to rate the similarity of facial features between a target female and the 20 females in the photographs using a 5-point scale of similarity-dissimilarity: 1 = *completely dissimilar*, 2 = *dissimilar*, 3 = *neutral*, 4 = *similar*, and 5 = *very similar*. The average rating value of each distractor was 2.83, 2.53, 2.50, 2.47, and 2.43. For the bystander test, five male photographs of distractors were selected using the above-mentioned procedure. The average rating value of each distractor was 2.43, 2.40, 2.40, 2.30, and 2.20.

2.3 Procedure

2.3.1 Watching an event

The participants, divided into subgroups of approximately 10 children, watched a picture-card story presented for about 8 minutes in the playroom of their kindergarten. The target female was sitting in a chair with a set of picture cards in her hands. The children were sitting in chairs facing the female at a distance of approximately 2.5 meters. The male helper (bystander) was sitting in a chair on the left side at a distance of 2 meters from the target female. He held another set of picture cards in his hands. These were two persons unfamiliar to the children. As the children entered the room and sat down, the target female greeted them, introduced herself, and presented the first picture-card story for about 4 minutes. She did not mention anything about the bystander. When the female finished the first story, the bystander approached her and gave her the second set of picture-story cards. He then took the first cards, moved to the right side, and sat on another chair placed on the right side. The female presented the second picture-card story for about 4 minutes. When she finished the second story and informed the children that this was the end of the picture story, the children left the room. The bystander was seated in silence and without expression during the event.

2.3.2 Twenty-four-hour delayed test

2.3.2.1 Event recall and recognition test

Approximately 24 hours after watching the event, the children were asked individually to recall and/or recognize what happened in the playroom. An experimenter sitting across the table from a participant first established rapport and then stated the following: “I’d like you to tell me everything that you remember about what happened in the playroom yesterday. I wasn’t there yesterday, so I don’t know what happened” (recall test). Participants who mentioned the picture-card story were then given the following instructions: “Please tell me more about watching the picture-card story”. For the children who failed to recall the event, a recognition test was given with these instructions: “Now I’m going to show you some picture cards depicting a variety of activities in kindergarten”. The experimenter then put the eight picture cards on the table, one by one, while describing each picture (e.g., “This shows a person making soap bubbles”). After arranging the eight cards in a 4 × 2 array, the experimenter said “Please choose all the cards depicting the event that you saw in the playroom yesterday”. The children were permitted to respond “I don’t know” to every question.

2.3.2.2 Target identification test

The experimenter arranged the 6 facial photographs in a 3 × 3 array and gave the following instructions: “Here we have 6 photos on the table. The person who read the picture stories may or may not be shown. Can you tell me whether the person who read the picture stories is in the photo array or not?” For the children who responded “No” or “I don’t know” to this question, the target identification test was finished. For the children who responded “Yes”, a further question was asked: “Can you tell me who among these photos read the picture stories?” The children were permitted to respond “I don’t know” to every question.

2.3.2.3 Bystander recognition and identification test

Following the target identification test, the experimenter asked

the children “Were there other people besides the person who read the picture stories in the playroom?” (i.e., recognition question) For the children who responded “Yes” to this question, a bystander identification test was given with the same instructions as for the target identification test. The bystander identification test was not given to children who responded “No” or “I don’t know” to the recognition question.

3. Results

3.1 Event recall/recognition

Seventy children (92.1 %) succeeded in recalling the event, for example, “watched some picture stories”, “two picture stories”, “had some stories”. Five children (6.6 %) who failed to recall the event recognized the picture-story activity with the assistance of the picture cards. Only one child (1.3 %) failed to make correct recognition. Although most of the children recalled the event (i.e., picture stories), only three children (3.9 %) reported the target person and bystander, indicated by responses such as “A woman named Nozomi read picture stories”, “A woman and a man showed picture stories”, and “Someone read picture stories”.

3.2 Target identification

Table 1 shows the number and percentage of all types of responses for the facial identification questions. As shown in Table 1, only two children (5.1 %) in the DF condition succeeded in selecting the target. Fisher’s exact test revealed that the number of children who made a correct identification was significantly higher in the NF condition (21.6 %) than in the DF condition ($p < .044$). In addition, a χ^2 test showed that the number of children who reported the presence of the target in the lineup was significantly greater in the control condition than in the DF condition ($\chi^2 = 5.253$, $df = 1$, $p < .022$).

3.3 Bystander recognition/recall and identification

Table 2 shows the number and percentage of all types of responses for the recognition and facial identification questions. Ten children (27.0 %) in the NF condition and 14 children (35.9 %) in the DF condition failed to recognize the presence of the bystander. A χ^2 test showed that there was no significant difference in the number of children who failed to recognize the presence of the bystander between the two conditions. Regarding the children who recognized the bystander, there was no significant difference in the number of children who succeeded in correct identification and who reported the presence of the bystander in the lineup between the two conditions.

3.4 Comparison of identification accuracy between target and bystander

McNemar tests showed that the number of correct identifications of the bystander was greater than that of the target in the DF condition ($p < .001$), whereas there was no significant difference between them in the NF condition.

4. Discussion

The results of the target identification test showed that the children’s performance with respect to the disguised target was lower than that related to the non-disguised target. The correct identification rate was only 5.1 %, or below chance level. This result suggests that young children have no credibility when identifying faces if a culprit’s appearance has changed from the time of the crime to lineup identification. However, the low performance of the children in the DF condition was mainly due to their false rejections, that is, their “No” or “I don’t know” responses to the question asking whether the target was presented in the lineup. In particular, a higher percentage of “I don’t know” responses was observed. The higher rate of false rejections in the DF condition was consistent with the results of Pozzulo and Balfour (2006). These results indicate that young children made less false positives (i.e., selecting distractors) even when identifying disguised persons, although a correct identification rate was low. As shown by Scoboria, Mazzoni, &

Table 1: Number and proportion of all types of responses for target-identification test

The target is in the lineup / Photo identification		Response				subtotal	total
		No	I don't know	Yes			
				incorrect	correct		
NF condition							
	n (%)	2 (5.4)	15 (40.5)			17 (45.9)	37 (100.0)
	n (%)			12 (32.4)	8 (21.6)	20 (54.1)	
DF condition							
	n (%)	8 (20.5)	20 (51.3)			28 (71.8)	39 (100.0)
	n (%)			9 (23.1)	2 (5.1)	11 (28.2)	
total	*n* (%)	10 (13.2)	35 (46.0)	21 (27.6)	10 (13.2)		76 (100.0)

Table 2: Number and proportion of all types of responses for bystander-recognition and dentification test

Bystander recognition	Response						subtotal	total
	No	I don't know	Yes					
The bystander is in the lineup			No	I don't know	Yes			
Photo identification					incorrect	correct		
NF condition								
n (%)	4 (10.8)	6 (16.2)					10 (27.0)	
n (%)			2 (5.4)	10 (27.0)			12 (32.4)	37 (100.0)
n (%)					4 (10.8)	11 (29.7)	15 (40.5)	
DF condition								
n (%)	6 (15.4)	8 (20.5)					14 (35.9)	
n (%)			0 (0.0)	7 (17.9)			7 (17.9)	39 (100.0)
n (%)					0 (0.0)	18 (46.2)	18 (46.2)	
total	10 (13.2)	14 (18.4)	2 (2.6)	17 (22.4)	4 (5.3)	29 (38.2)		76 (100.0)

Kirsch (2008), "I don't know" responses are likely to reflect the outcome of meta-cognitive monitoring of the content of memory. The children might be able to monitor their low confidence in their memory for the disguised person.

The low identification accuracy also implies that once children perceived that all the faces presented in the lineup were different in overall appearance from the target face (i.e., no glasses and changed hairstyle), they would not make further comparisons of the subtle differences in inner facial features (i.e., eyes, mouth, or nose). In this study, however, participants were not informed of the possibility of a transformation of the actual faces seen in the event to those in the lineup photographs. If instructions for observing the transformation had been given, participants might have been able to disregard the changeable and unreliable cues of eyeglasses and hairstyles. For example, it is possible that instructions such as "The person you saw in the event may or may not have changed their appearance in the lineup, so please look carefully at the inner facial features and not just the hairstyle" might have reduced the rate of false rejections. Many eyewitness studies (e.g., Dale, Loftus, & Rathbun, 1978; Goodman & Reed, 1986; Leichtman & Ceci, 1995) have demonstrated that inappropriate forms of interviewing can mislead children's testimonies. However, even young children might give accurate testimony if they are asked in an appropriate way. Further studies are needed to develop practical methods of facial identification for when culprits change their appearance.

Another explanation for the low accuracy in identifying a disguised face is failure of the encoding process. Although a large number of eyewitness studies have demonstrated the high recognition ability of young children provided they are not given suggestive questions or misleading information during the retention process (e.g., Goodman & Reed, 1986; Leichtman & Ceci, 1995), regarding memorization of disguised faces, children may have difficulty encoding inner facial features while disregarding eyeglasses. In other words, they might not be able to succeed in the dual task of disregarding eyeglasses and processing the internal facial features. Although it is premature to conclude from this study, the development of executive function such as inhibitory control (e.g., Carlson, 2005; Welsh, Pennington, & Groisser, 1991) is likely to relate to the ability to encode disguised faces and not attend to paraphernalia such as eyeglasses. Several eyewitness studies (Robert & Powell, 2005; Scullin & Bonner, 2006) examining children's suggestibility have indicated that the ability of inhibitory control is related to tolerance to suggestive questions. For example, Robert and Powell (2005) showed that children with higher inhibitory skills were more resistant to suggestions than children with poor inhibitory control. Further research can identify the exact relationship between executive function and the accuracy of eyewitness memory.

The results of the bystander recognition test demonstrated that approximately 30 % of the children were not able to remember the presence of the bystander regardless of the conditions. Although the conditions of time interval and observation distance in this experiment were improved compared with that in Sugimura (in press), children who failed to remember the bystander were observed. This result suggests that young children show a marked tendency to make an omission error regarding the person who is not mainly involved in an event.

One practical reason for this omission error is that young children might have difficulty attending to peripheral aspects of an event. Several studies examining the effect of arousal events on eyewitness memory have demonstrated that even adults have difficulty memorizing background peripheral information when selectively concentrating attention on the central aspects of an event (e.g., Christianson, 1992; Brown, 2003). Given that the divided attention ability of children (e.g., Donnelly, et al., 2007;

Karatekin, 2004; Irwin-Chase & Burns, 2000) and their level of attentional control, or orienting (e.g., Kramer, Gonzalez de Sather & Cassavaug, 2005; Schul, Townsend, & Stiles, 2003) are inferior to those of adults, young children are likely to have limited attentional resources available for encoding peripheral aspects of an event compared with adults.

Another possible explanation is based on children's misinterpretation of the question asking about a bystander. The instructions asking children about the presence of a bystander (i.e., "Were there other people besides the person who read the picture stories?") were ambiguous in Japanese. In English, "the person" clearly refers to one person who read the picture story. However, "kamisibai o yonda (who read the picture stories) hito (the person)" in Japanese does not define whether one person or more than one person read the picture stories because Japanese does not have plural or singular forms of nouns. Therefore, it is possible that the children interpreted "kamisibai o yonda hito" as indicating two people (i.e., the storyteller and the bystander who helped the storyteller). As a result, they responded "No" or "I don't know" to the question about the presence of other people.

Interestingly, the rate of participants in the DF condition who correctly identified the bystander (46.2 %) was higher than the rate who accurately identified the target person (5.1 %). In addition, the rate of those who correctly identified the bystander in the NF condition (29.7 %) was higher than the rate of those who correctly identified the target (21.6 %), though not statistically different. These results indicate that the participants who remembered the presence of the bystander were highly accurate in identifying his face. Why was the bystander's face more memorable than the target's face? This can be explained by the difficulty in matching an expressive face in a real-life event and the identical face with no expression presented in a photo lineup. Diamond and Carey (1977) demonstrated that facial expression affects the accuracy of facial identifications of young children. In their facial identification tasks, 6-year-olds, compared with older children and young adults, had a greater tendency to select a distractor whose expressions were the same as that of the target. In this experiment, the target person smiled while interacting with the participants throughout the event. The bystander was seated in silence and without expression. Therefore, the children might not have had difficulty matching the facial image of the bystander seen in the event with his expressionless facial photo in the lineup.

However, it is unclear why the participants who had seen the disguised target person showed high accuracy in identifying the bystander. Although previous studies on adults have shown that the accuracy of identification tends to decrease as a function of the increase in the number of perpetrators seen (Clifford & Hollin, 1981; Fahsing, Ask, & Granhag, 2004), there have been no studies examining whether the faces of non-disguised persons are likely to be attended to or are memorable when other persons seen in the event are disguised. Further studies are needed to clarify the factors affecting identification accuracies when a number of people appear in an event.

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