The effects of verbal instructions on the accuracy of gender discriminations of disguised faces by young children

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幼児による変装した顔の性別判断に及ぼす言語教示の効果

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要約

従来の研究から、幼児は、顔の内部特徴ではなくて髪型を手がかりにして顔の性別判断を行うために、成人よりも性別判断課題の成績が悪いことが明らかになっている。本研究は、顔の内部に注目させるような言語的教示により、幼児の性別判断課題の成績が向上するかどうかを検討した。5、6 歳児を対象として、髪の手がかりを消した顔写真と 2 種類の髪型で変装をした顔写真を用いた性別判断課題の成績を、2 つの条件で比較した。課題で用いた写真は、髪の手がかりを消した男性、短い髪の男性、長い髪の男性、髪の手がかりを消した女性、短い髪の女性、長い髪の女性、それぞれ 3 枚ずつ、計 18 枚であった。条件は、性別判断課題の前に、髪型ではなくて顔の内部で性別を判断するように教示を行う教示条件と、性別判断課題のみを行う統制条件であった。結果は、両条件ともに、長い髪の男性、髪の手がかりを消した女性、短い髪の女性の成績が悪く、男性の顔よりも女性の顔の成績が悪かった。また、長い髪の男性においてのみ統制条件より教示条件のほうが成績がよく、他の刺激では 2 条件間の差はなかった。これらの結果から、幼児期の子どもは、顔の内部の質感の違いに敏感ではないこと、また、顔の内部に注目するという教示を保持しながら同時に髪の情報を無視するというような抑制機能が劣る可能性などが考察された。

Key words

facial perception, gender-discrimination, young children

1. Introduction

Developmental studies have demonstrated that young children inaccurately discriminate the gender of facial stimuli because they attend to possibly misleading outer cues such as hairstyle (e.g., Sugimura, 2006). Although we have to use a cue of inner facial features to make correct gender-discriminations, young children are inability to spontaneously attend to the relevant cue. What factors, then, improve children's accurate discriminations by using a cue of inner facial features? The present study addressed this question.

Facial information processing studies (e.g., Diamond & Carey, 1977) and eyewitness testimony studies (e.g., Patterson & Baddeley, 1977) have shown that disguises by, eyeglasses, hairstyles, beards, caps, etc. impair performances on both face identification and recognition tasks. In particular, young children had a strong tendency to rely on changeable and uncertain cues such as hairstyle (Campbell, Coleman, Walker, Benson, Wallace, Michelotti, & Baron-Cohen, 1999; Campbell, Walker, & Baron-Cohen 1995; Diamond & Carey; 1977). However, these studies paid little attention to the children's ability in discrimination of the gender of facial stimuli transformed by hairstyles.

On the other hand, several studies examining the conceptual changes of gender knowledge (e.g., Bem, 1989; Intons-Perterson, 1988) have indicated that young children often depend on hairstyle cues to discriminate gender. For example, Intons-Perterson (1988) demonstrated that hair length is the most important cue for young children when assigning gender of the drawings of human figures. Children labeled 94% of the figures "girl" when the hair was longer than chin-length and 74% of the figures "boy" when the hair was shorter.

However, the results of these concept developmental studies do not sufficiently clarify the issue of children's ability to discriminate the gender of facial stimuli because the studies used only one or two unsystematic and unrealistic stimuli that were selected arbitrarily. For example, Intons-Perterson (1988) used unrealistic paintings from children's picture books.

Sugimura (2006) investigated how accurately young children and adults discriminate the gender of male and female realistic facial photographs disguised by a variety of hairstyles. The results showed that the young children inaccurately discriminated the gender, in particular for faces altered by a hairstyle to the opposite gender (e.g., a male with long hair). Namely, hairstyles carrying masculinity or femininity information affected considerably the children's ability to discrimination of gender. In contrast to the children, the adults' discriminations, however, were accurate and

based on information from the inner facial features not from the hairstyles.

The fact that young children have difficulty in not only face identifications but also in gender discriminations toward disguised natural faces is a serious problem with respect to obtaining accurate eyewitness testimony. Criminals often change their hairstyles by wearing caps, wigs, masks, etc., before or after they commit a crime. Furthermore, adults, who realize that hairstyle is an unreliable cue for discriminating gender, might believe that children can discriminate in the same way that they do themselves. Consequently, adults might accept the false judgments of children that is based on hairstyle cues.

Therefore, interview techniques that weaken the children's tendency too much rely on hairstyle cues need to be developed. Although many eyewitness studies have demonstrated that inappropriate forms of adult questioning can mislead child testimonies (e.g., Dale, Loftus, & Rathbun, 1978; Goodman & Reed, 1986; Leichtman & Ceci, 1995), they have also suggested that even young children might give accurate testimony if they are asked in an appropriate way, taking consideration of the children's cognitive characteristics. As Sugimura (2006) has shown, young children attend mostly to the hairstyles of the facial stimuli because they believe that hairstyles are useful cues. However, if children are instructed beforehand not to use hairstyle cues when making gender discriminations, they may be able to discriminate faces more accurately.

Accordingly, the present study was designed to examine the effects of verbal instructions that disregard hairstyle cues in gender discriminations. In Sugimura (2006), the instruction for asking children to make gender discriminations (i.e., "Is this a man's face or a woman's face?") was ambiguous because children could interpret the word "face" as either "inner facial features" or "overall impression including hairstyle". Therefore, in the experimental condition in this study, the instructions not to be misled by hairstyles were added to the original instruction. Furthermore, as Sugimura (2006) showed that children had considerable difficulty in discriminating the facial stimuli altered to hairstyle to opposite gender (e.g., a male face with feminine long hair), this study focused on the effects of instructions for discriminating these kinds of facial stimuli.

2. Method

2.1 Subjects

Sixty 5- and 6-year-olds (5:0-6:8, mean age=5:10) participated in this experiment with the permission of the principal of the kindergarten and the children's parents. They were assigned into two conditions, matching for the mean ages and sex: the experimental condition and the control condition.

2.2 Materials

Sixty color photographs from the shoulders up were taken of 30 male and 30 female Japanese undergraduate students (18-24 years old). All students were asked to remove their glasses and heavy make-up before their pictures were taken. Hair and shoulders were concealed with black headbands and white cloths, respectively. All males had neither beards nor mustaches. All photographs were front views with neutral facial expressions.

Each photograph was rated by 51 undergraduate students on a masculinity-femininity 5-point scale: 1-very feminine, 2-feminine, 3-neutral, 4-masculine, and 5-very masculine. On the basis of these rating averages, 18 photographs (9 masculine-males and 9 feminine-females) were selected as the test stimuli. The rating averages of the two groups were 4.79 (SD=.09) and 1.73 (SD=.12). Photographs of rated feminine-males and masculine-females were omitted because even adults could not discriminate perfectly these ambiguous stimuli (Sugimura, 2006).

The nine faces in each group were divided into three subgroups, thus comprising three faces for each subgroup. The mean of the rating averages for each of the three subgroups was manipulated to have an even score for each other. The first subgroup had masculine short hair, the second had feminine long hair, and the third had the hair completely concealed. The alteration of the hairstyles in the pictures was carried out using a computer application, I-Style, that allows faces with various facial parts (hair, beards, and mustaches, etc.) to be created.

The stimuli for the training session consisted of three different faces with different hairstyles, i.e., a female with masculine short hair, a male with feminine long hair, and a female with her hair concealed. The support material for the instructions in the experimental condition consisted of two faces with different hairstyle of the identical male (i.e., a male face with feminine long hair and the identical male face with hair-concealed) and two faces with different hairstyle of the identical female (i.e., a female face with masculine short hair and the identical female face with hair-concealed). The faces for the training session and the support material were selected from the faces that had not been chosen as the test stimuli. All stimuli were printed on 13cm × 10cm sheets for color photographs.

2.3 Experimental design

A factorial design was used with the independent variables of condition, hairstyle, and gender of stimuli. The condition variable was between subjects while the others were repeated measures.

2.4 Procedure

The subjects were tested individually by a female experimenter. The experimenter gave the following instructions to both conditions. "Let's play a game of guessing whether someone is a man or woman. I'm going to show you some pictures of faces. Please tell me whether the faces are male or female. When you can't decide whether the face is male or female, don't be afraid to say 'I don't know.' Now let's practice (presenting one of the stimuli for the training session). Is this a man's face or a woman's face?"

After three training trials, the subjects were given 18 experimental trials. The subjects were permitted to take as much time as they wished to make a choice.

For the subjects under the experimental condition, the following instructions were added before the training session. "Please take a look this picture (pointing the picture of a male face with hair-concealed). He is a man, isn't he? But look (putting another picture of the same person with feminine, long hair up next to the first picture)! He has a different hairstyle in this picture. He looks like a woman with long hair, doesn't he?" The experimenter also demonstrated how a female with short hair can look like a male by using a similar pair of female stimuli pictures. Following these demonstrations, the experimenter then continued following instructions: "Womanlike long hair often makes a man look like a woman, and manlike short hair often makes a woman look like a man. So please be careful not to be misled by hairstyles when deciding whether the pictures you see are of men or women. Please look carefully at the face but not at the hairstyle."

3. Results

3.1 Effects of instructions

The correct response was defined as identifying the male faces as either "male," "a male," "a man," or "a boy," and the female faces as either "female," "a female," "a woman," or "a girl." For all responses, 1 point was assigned to each correct response and 0 points to incorrect or "I don't know" responses. The summed score for all stimuli for each subject was the basic unit for further analyses. Figure 1 shows the mean scores of the summed scores as a function of the condition, the hairstyle and the stimuli gender.

A three-way (2 conditions × 3 hairstyles × 2 stimuli genders) ANOVA was performed on the mean scores. The main effect of stimuli gender was significant ($F(1,58) = 15.48$, $p < .01$), indicating that the mean score of the male stimuli was significantly higher than that of female stimuli. The main effects of condition and hairstyle were not significant.

The interaction effect of hairstyle × stimuli gender was significant ($F(2,116) = 38.72$, $p < .01$). The results of the simple effects and the multiple comparisons were as follows. For male stimuli, the score of long hair was lower than that of both short hair ($t=7.42$, $P<.01$) and hair-concealed ($t=7.10$, $P<.01$), while for female stimuli, the scores of short hair and hair-concealed were lower than that of long hair ($t=5.75$, 4.28, $Ps<.01$). Furthermore, the score of male face was higher than that of female face for hair-concealed ($F(1,174) = 25.79$, $p < .01$), and for short hair ($F(1,174) = 44.00$, $p < .01$), while it was the opposite for long hair ($F(1,174) = 20.79$, $p < .01$).

The interaction effect of condition × hairstyle × facial features was significant ($F(2,116) = 5.09$, $p < .01$). The results from the simple interactions, the simple simple main effects, and the multiple comparisons revealed that the scores of the experimental condition were higher than those of the control condition for only males with long hair ($F(1,348) = 12.35$, $p < .01$).

3.2 Gender-of-observer effect

While an investigation of the effects of the gender of observer on gender-discrimination was not primary interest of this study, gender of observer is possibly an important performance variable in many gender-discrimination studies. Therefore, a two-way (2 observer genders × 2 stimuli genders) ANOVA was added to test whether young children have a observer -gender-related tendency for the discrimination task. Figure 2 shows the mean scores as a function of the observer gender and the stimuli gender.

The main effect of stimuli gender was significant ($F(1,58) = 16.57$, $p < .01$), while the main effect of observer gender was not significant. The interaction effect of observer gender and stimuli gender was significant ($F(1,58) = 4.20$, $p < .05$). The test of the simple main effects indicated that the female subjects had higher score than the male subjects for male stimuli ($F(1,116) = 5.43$, $p < .05$), on the other hand, there was no difference between the female subjects' and the male subjects' score for female stimuli.

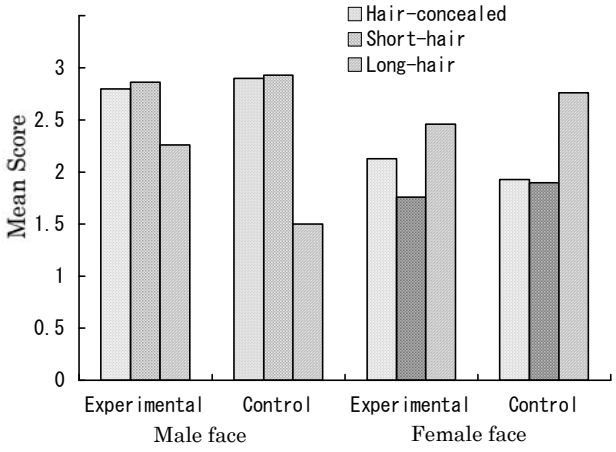

Figure 1: Mean scores as a function of condition, hairstyle and stimuli gender

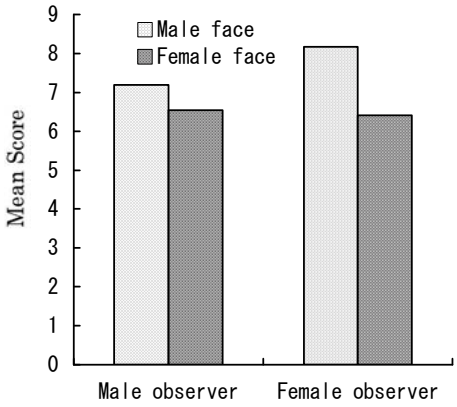

Figure 2: Mean scores as a function of observer gender and stimuli gender

4. Discussion

The present study showed that attentive instructions were effective in making accurate discriminations for only male faces with long hair. Namely, some children could attend to the cues of internal facial features in accordance with the given instructions, not use hairstyle cues. However, the score for male faces with long hair under the attentive condition was not as high as the full score.

Why did the presence of additional instructions produce slight improvement in the amount of correct responses? One possible reason is that some children that attended to the internal facial feature cues in accordance with the given instructions could not discriminate the gender of the internal facial features. Namely, the ability of preschoolers to attend to subtle facial differences or skin textures is limited. In particular, with regard to skin texture, Cook and Odom (1992) have suggested that younger children's perceptual sensitivity of texture is lower than that of older children and adults. However, this interpretation might be inappropriate for male faces because, as the results of the present study showed, the scores for male faces with hair-concealed (i.e., faces without hair) were almost perfect regardless of the condition.

Another possible explanation is based on the failure to regulate selective attention by means of the given instructions. That is, even if the children understood the meaning of instructions, they might not be able to succeed in the dual task of both disregarding hairstyles and processing the internal facial features. In other words, they might fail to inhibit their strong tendency to rely on external hairstyle cues (Campbell, et al., 1999; Campbell, et al., 1995; Diamond & Carey; 1977) while retaining in their working memory what they had been asked to do (i.e., attending to internal facial features). These dual demands of inhibitory control and working memory, that is, 'executive function,' might be a factor that contributes to children's accurate discriminations of disguised faces. Although it is premature to conclude from this study whether this interpretation is plausible, it can be said that verbal instructions not to use hairstyle cues do not improve the accuracy of young children's gender discriminations so much.

In particular, the instructions had no effect on discrimination of the female faces. Furthermore, although the feminine females were selected as stimuli because of their relatively simple gender information, the children's performance on the hair concealed female stimuli was lower than that for the male stimuli.

The children's inability to discriminate female faces might be due to the relative difficulty in discriminating the internal features of female faces when compared to male faces. The results demonstrated that the instruction was effective in getting the children to discriminate the male faces with a cross-gender hairstyle (i.e., males with long hair) but not the female faces with a cross-gender hairstyle (i.e., females with short hair). That is, even if some children could attend to the internal features of the female faces by means of the instructions, still they might fail to make correct discriminations.

However, this explanation seems to contradict to previous findings in which infants under 12 months could discriminate both male and female faces (e.g., Yamaguchi, 2000). Furthermore, Yamaguchi (2000) showed that even 6 month-old infants could discriminate female faces preceding male faces. Such inconsistent results between studies of infants and young children might be due to differences in the experimental conditions used; the obtained results depended on both whether gender-discriminations were assessed by habituations or by verbal responses and on whether synthesized faces or real faces were used as stimuli. Furthermore, it can be said that the process of gender discrimination for young children is fundamentally different from that of infants. Further studies are necessary to reveal the developmental changes with respect to the cognitive processes of infants and young children.

The children's difficulty in discriminating hair-concealed female faces could be partly explained by the fact that children had a strong tendency to rely on external cues such as hairstyle (Campbell, et al., 1999; Campbell, et al., 1995; Diamond & Carey; 1977). The children might attend only to the external feature of the hair-concealed and associate it with a bald male hairstyle in contrast to adults who may accurately interpret such hair-concealed stimuli as stimuli absent of hairstyle cues.

In relation to the young children's inability to discriminate female faces, an interesting gender-related tendency was demonstrated: while there was no gender-of-observer effect for female faces, the female subjects discriminated male faces more accurately than did the male subjects. This finding is partly consistent with several studies of gender-discriminations by adults (e.g., O'Toole, Peterson, & Deffenbacher, 1996) which revealed the advantage of female over male observer. It could be said that the advantage of female observer for male faces would emerge in preschool age preceding for female faces which are more difficult to categorize than male faces for young children. Although we have no explanation for this gender differences, the data provide some hints about developmental aspects of gender-of-observer effect.

The present study revealed that verbal instructions not use hairstyle cues slightly improved the accuracy of young children's gender discriminations of disguised faces, and, further, it confirmed that young children have more difficulty in discriminating female faces. These results suggest that careful consideration should be given to the effect of altered hairstyles when children are required to identify people. Unlike the process of gender discrimination by adults, young children do not sufficiently inhibit possible misleading hairstyle cues even when explicitly asked not to use such cues.

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（Received May 15, 2006; accepted June 16, 2006）