# THE IMPACT OF ATTACHMENT ON PRESCHOOL CHILDREN'S PREFERENCE FOR PARENT-RESEMBLING FACES – A POSSIBLE LINK TO SEXUAL IMPRINTING

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**Abstract.** One possible form of how children use parental models in their social relations would be if children showed more willingness to make friends with peers resembling their parents. To test this possibility, composite faces created from 3 to 6 year old children's photos were transformed to resemble facial images of their parents. The children were asked to show which one of the two same-sex transforms they find more appealing: the familial or the control face. Children who lived in emotional proximity to their parents, and in particular to their mothers, were attracted more to father-resembling faces than to unfamiliar ones. These results suggest that childhood experiences influence face preferences. This bias may affect social decisions later in adulthood, and could help to explain preferences for parent-resembling mates.

**Keywords:** children's face perception, face preferences, family environment, sexual imprinting

## INTRODUCTION

In the last few years, several studies investigating parental influence on adults' social attraction have been published. For example, PERRETT et al. (2002) revealed that adults with older parents find older-looking mates more attractive than those with younger parents. In another experiment, subjects found opposite sex faces more attractive when they were preceded by a subliminal stimulus of the opposite sex parent's face (FRALEY and MARKS 2010).

The aim of previous research was mainly to reveal adult's bias towards unknown individuals who resemble family members and used a wide range of methods, including ratings of photographs by independent judges (BERECZKEI, GYURIS, KOVES and BERNATH 2002; BERECZKEI, GYURIS and WEISFELD 2004), facialmetrics (NOJO, IHARA, FURUSAWA, AKAMATSU and ISHIDA 2011; WISZEWSKA, PAWLOWSKI and BOOTHROYD 2007), and face manipulation software (KOCSOR and BERECZKEI, submitted). Most of these studies were inspired by the theory of sexual imprinting (e.g., BERECZKEI et al. 2002; BERECZKEI, GYURIS and WEISFELD 2004). However, no attention has yet been paid to the developmental processes leading to the preference for parent-resembling mates. It would be important and relevant to

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know whether children subjects are biased towards unknown peers of theirs who resemble the subjects themselves or their parents, and whether this latter bias is influenced by the children's relationship with their parents.

Based on results of psychological research on socialization within the family (BANDURA 1977; PATTERSON 1975), the answer to these questions is probably positive. As children are extraordinarily sensitive to stimuli from the family environment and spend most of their time – especially before attending school – among family members, one may well expect that parental faces are favored stimuli. Former research indicated that infants as young as 3 months old were able to differentiate between their mothers' face and unknown individuals' faces (BARRERA and MAURER 1981; DE SCHONEN and MATHIVET 1990). The father's face was preferred to unknown male faces from about 4 months after birth (WARD 1998). After the consolidation of attachment to parents (after the $7^{th}$ month) infants were able to make distinctions between strangers and family members with certainty (AVERETT, GENNETIAN and PETERS 2000; EIBL-EIBESFELDT 1989).

The connection between childhood experience and social decisions is explained by some authors in terms of sexual imprinting theory (BERECZKEI et al. 2002; BERECZKEI, GYURIS and WEISFELD 2004; MARCINKOWSKA and RANTALA 2012; WISZEWSKA, PAWLOWSKI and BOOTHROYD 2007). This model proposes that children internalize phenotypic characteristics of their parents to rely on these during mate choice in adulthood. People tend to choose mates who are similar to their parents – and, because of genetic relatedness, to themselves – as long term partners. Advantages of physical similarity and optimal genetic distance (THIESSEN and GREGG 1980) can lead to more stable marriages and to a higher number of children (BERECZKEI and CSANAKY 1996; GODOY et al. 2008; HELGASON et al. 2008; MASCIE-TAYLOR 1988; RUSHTON 1988), and thus greater reproductive success. Sexual imprinting theory tries to explain an aspect of mate choice which could be adaptive during the evolution of humans (and probably other animals), and seems to be adaptive in contemporary industrial societies as well. Nevertheless in our interpretation, the psychological basis which promotes this phenomenon is not an adaptation in the strict sense as used by most evolutionary psychologists (e.g. BARKOW, COSMIDES, and TOOBY 1991), but it is a specific pattern of mate choice driven by more general cognitive mechanisms (such as associative learning).

In recent years, the body of evidence supporting the predictions of this theory – with respect to preferences, actual mate choice, and role of attachment – began to grow. Independent judges successfully matched photographs of the mother and wife of adult males, indicating actual resemblance between them (BERECZKEI et al. 2002; MARCINKOWSKA and RANTALA 2012). Similarly, the stepfather and husband of adult females were also more likely to be matched if a positive emotional relationship had developed between stepfather and his adopted daughter during her childhood (BERECZKEI, GYURIS and WEISFELD 2004). Wiszewska and her colleagues (2007) analyzed facialmetric characteristics of faces and found that women with good childhood attachment to their father rated those men as the most attrac-

tive who were similar to their fathers in appearance, especially in the middle region of the face. A more recent facialmetric study showed that wives and mother-in-laws, and husbands and father-in-laws were similar (NOJO et al. 2011). Kocsor and Bereczkei (submitted) using methods similar to those described here demonstrated additional evidence for the connection between childhood attachment and attraction to opposite sex parent-resembling faces. In their study, males giving low rejection and high emotional warmth scores for their mothers on the EMBU-scale (ARRIN-DELL et al. 1999), and females with low paternal rejection scores chose transforms resembling their opposite sex parents significantly more often than controls.

The role of learning processes and childhood socialization seems to be crucial in adults' mate preferences. However, how children use parental models in their social relations has not been studied. One possible manifestation of this would be if children showed more willingness to make friendships among children who resemble their parents. Another question is whether this assumed bias depends on attachment to parents.

We conducted a study with preschool children between 3 and 6 years of age. Composite faces of children were transformed in shape to resemble subjects' parents or unknown adults (for control faces). Children were asked to make a sympathy choice (which of the two individuals they prefer to play with). Attachment to parents was measured as well (Düss-tale test), defining groups of children who are attached more to their mother, father, or neither.

Our hypotheses were as follows:

1. Children prefer faces resembling their parents, compared to those resembling unknown adults, in their social relationships.

2. Children's attachment to parents influence their face preferences; those who show stronger attachment are more likely to choose parent-resembling child faces than controls.

## METHODS

### Participants

In our study, 87 children between 3 and 6 years old (M = 5.40, SD = 1.03) participated with 47 boys (M = 5.47, SD = 1.01) and 40 girls (M = 5.32, SD = 1.06) *(Table 1).*

*Table 1.* Age distribution of the participants

| Group | N | Minimum age (years/months) | Maximum age (years/months) | Mean age (years) | SD |
|-------|---|----------------------------|----------------------------|------------------|------|
| boys | 47 | 3 | 6 / 11 | 5.47 | 1.01 |
| girls | 40 | 3 / 5 | 6 / 10 | 5.32 | 1.06 |
| total | 87 | 3 | 6 / 11 | 5.40 | 1.03 |

## Stimuli

Digital photos were taken of subjects' parents at their homes. Because of the transformation procedure (see below) lighting condition was not a relevant factor; satisfactory image quality could be ensured by using a tripod and standard distances.

For all age groups and sexes (boys and girls *[Figure 1],* male and female adults) composite faces were created from 8 age-matched individual facial images. To this end, about 150 points around the characteristic facial features (e.g., around the nose, eyes, mouth, etc.) were designated with the image manipulation software Psychomorph (TIDDEMAN, BURT and PERRETT 2001; TIDDEMAN, STIRRAT and PERRETT 2005); these were used as reference points during the averaging of faces. Stimuli were made by transforming same-sex preschool composites 50% in shape in order to resemble either the subject's parents or an unknown individual. Transforms did not differ in color or skin texture. To avoid perceived "aging" of the base images during transformation to parental faces, adult composite images were used as reference endpoints (see DEBRUINE et al. 2007, for a more detailed overview of the method).
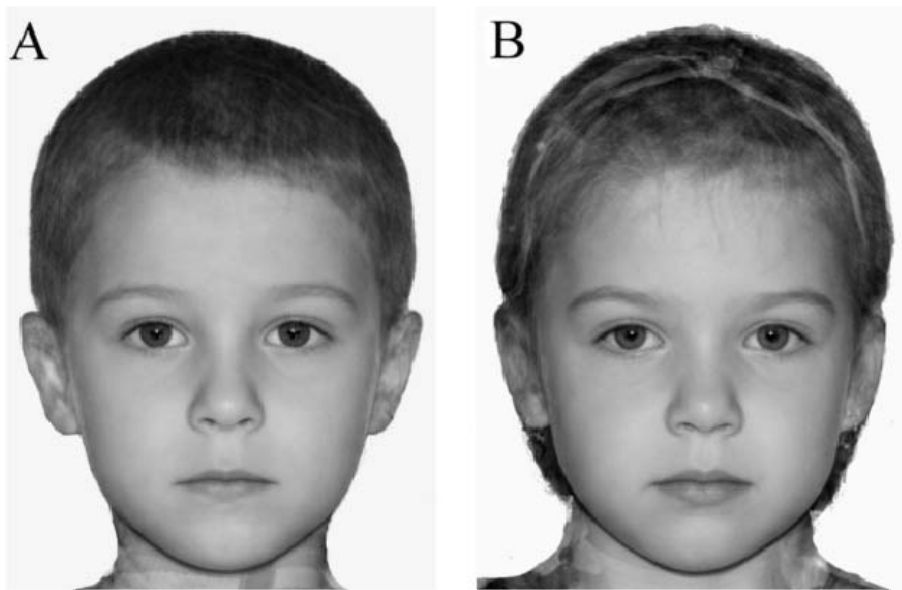


*Figure 1.Composite preschool faces.* Both images were constructed from 8 individual faces
(A. boys; B. girls).

Transformed images were arranged into pairs with Gimp 2.6 software *(Figure 2).* The size of each pair was 950×600 pixels and the images appeared in the original size on the computer screen. All subjects were exposed to two image pairs: 1.

mother – unknown adult female 2. father – unknown adult male. Occurrence of familial and control faces on the left or right side was counterbalanced manually. Control faces were chosen randomly from the same image pool as the stimuli. Stimuli were presented and the order of image pairs was randomized with DMDX (University of Arizona).
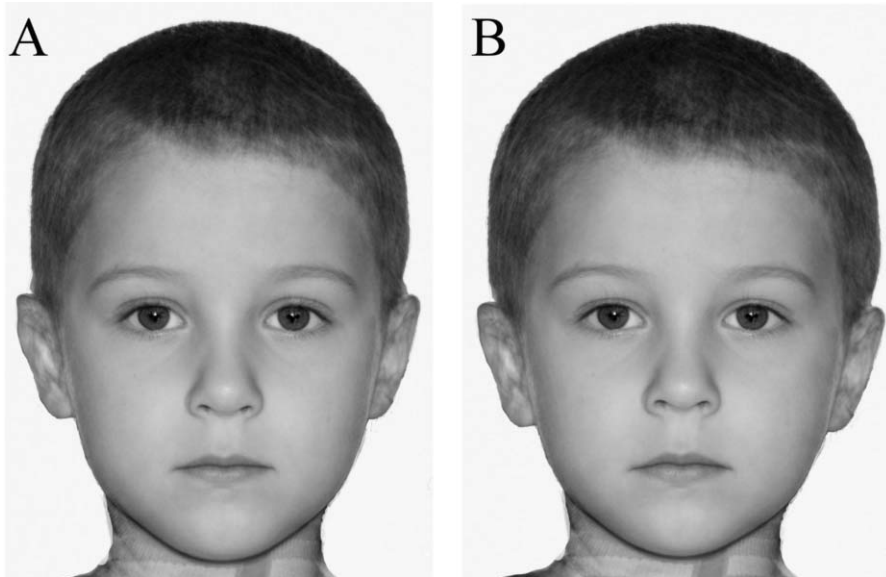


*Figure 2. Arrangement of the stimuli.* This example shows an image pair presented to preschool boys. Shape of the composite image was transformed 50% to resemble the mother of the subject (A), and an unknown adult woman (B), respectively.

## Projective test

To assess attachment, the first tale of the Düss-tale test, the so called "bird tale" was used (Appendix). The set of Düss-tales is an effective diagnostic and therapeutic tool for children. It utilizes children's propensity of identification with animals for revealing unconscious desires, anxiety, and conflicts (KŐVÁRI and LÁTOS 2010). The task of the experiment leader or psychologist is only to start telling the story, then it is completed by the child. She or he enters into the spirit of the situation, revealing the developmental state of her or his unconscious, which is reflected by the option she or he chooses to complete the story (REYNOLDS and KAMPHAUS 2003). From these inferences, numerous psychological characteristics can be implied. In the case of the bird tale, in this instance, the quality of attachment to parents can be discerned (MAZZESCHI et al. 2001). If the tale was finished by the child in a way that the nestling flies on the tree where the daddy bird or the mommy bird is sitting, it can be interpreted that the child is securely attached to the father or the mother,

respectively. Any other option could be a sign of a weak relationship, or an insecure or avoidant attachment style. The original set of tales does not contain pictures, but to facilitate involvement, the story was supplemented with different drawings for boys and girls *(Figure 3, Appendix)*

## Procedure

The experiment was conducted in each case at the child's home in a calm, quiet environment, without the parents being present. After a spontaneous friendly talk, the experiment leader sat down near the child whose gaze was focused on the computer screen. Stimuli were presented in a randomized order. Children were asked the following question: *"You will see images of children. Imagine that they arrive at your nursery school. Which one would you prefer to play with? Show me the one!"* Responses were recorded by the experiment leader. Subsequently, the bird tale of the Düss-tales was told and completed.

## Data analysis

To test the effect of attachment, subjects were divided into three groups based on how they completed the bird tale: a. attached more to mother (n = 24); b. attached more to father (n = 12); c. without obvious attachment pattern (n = 51). It turned out that most of the children in the sample did not show signs of secure attachment to either parent, several are attached more to mother and only a few of them showed attachment to father. Therefore, to create subgroups with similar sample sizes, the subgroups a. and b. were merged to create a fourth category: d. attached to parents (36 individuals).

All analyzes were carried out with SPSS 17.0.

## Testing attractiveness as a possible confounding variable

Because the faces were manipulated along the dimension of physical resemblance to fathers, it is possible that the resulting facial images resemble the original faces not only in individual characteristics, such as the shape of the face, lips, nose, or face proportions, but reflect general attractiveness of the original images as well. This may cause that the children's choice is not based on their preference for parent-resembling faces, but the overall attractiveness of their parents. Therefore, we conducted another test in order to rule out the possibility that the chosen faces are different in their attractiveness, friendliness, trustworthiness and masculinity. Because the main results were significant only with respect to male faces (see *Results*), only male faces were tested.

Two subsets, each consisting of seven good quality images, were selected for testing: 1. fathers whose facial transforms were preferred by their children in contrast to controls; 2. fathers whose facial transforms were not preferred by their children in contrast to controls.

For the first category, we did not select images of fathers who have more children and their choice differed, because it meant that the father is not more attractive than at least one of the controls which was shown in a pair. Furthermore, we did not select paternal images which were used as controls for other children, in case this child did not prefer him. In sum, all tested faces in the preferred category could be potentially more attractive than controls.

The images were converted to grayscale, the contrast and the background were standardized. They were presented in random order to 18 adult independent judges (6 males) between 20 and 34 years (M = 29.78, SD = 3.98) who were asked to rate the faces on a 1 to 9 Likert-scale along four dimensions: friendly looking, attractive, trustworthy, and masculine.

## RESULTS

One sample Chi-square test was used to analyze whether children prefer parent-resembling faces to unknown individuals of their age group. Significant differences were found neither in the whole group (mother vs. control $\chi^2 = 0.00$, $P = 1.000$; father vs. control $\chi^2 = 1.16$, $P = 0.281$), nor in the subgroups of boys (mother vs. control $\chi^2 = 0.19$, $P = 0.662$; father vs. control $\chi^2 = 0.19$, $P = 0.662$) and girls (mother vs. control $\chi^2 = 0.23$, $P = 0.631$; father vs. control $\chi^2 = 1.26$, $P = 0.262$).

The independent samples Chi-square test revealed significant differences between choices of children with and without obvious attachment patterns. Children with good parental attachment chose father-resembling faces more often than those with weak attachment measured with the Düss-tale ($\chi^2 = 8.34$, $P = 0.004$). Separate analysis of the two sexes showed that this result was mainly caused by the choices of boys; those boys who were attached to either the mother or the father found the face of the father-resembling children more attractive than control faces ($\chi^2 = 5.98$, $P = 0.014$). There was no significant difference in the subgroup of girls ($\chi^2 = 2.60$, $P = 0.107$), though the pattern tended in the same direction as was observed in the boys; this explains why the significance was stronger in the whole group. With respect to mother-resembling faces, differences were found neither in the whole group ($\chi^2 = 1.20$, $P = 0.272$), nor in the subgroups of boys ($\chi^2 = 0.43$, $P = 0.510$) and girls ($\chi^2 = 0.82$, $P = 0.366$).

The paired samples $t$-test of the ratings on the second test (assessing facial characteristics of the fathers) revealed that the paternal faces which were chosen by their children do not differ significantly in their friendliness (the standard error of the difference was 0, exact match), attractiveness ($t = 1.76$; $P = 0.096$), or trustworthiness ($t = -0.82$; $P = 0.422$). The only difference was found in the masculinity

($t = 4.75$; $P < 0.001$) with the preferred faces being more masculine (M = 5.20) than the others (M = 4.64). There was no difference between the ratings of males and females (independent samples $t$-test; $P > 0.1$ for all traits in both categories).

## DISCUSSION

In our experiment, we tried to develop a link between face preferences and relation to parents in childhood, and adult mate preferences focusing on a potential early manifestation of sexual imprinting. The children in our sample did not prefer manipulated composite faces of their own age resembling their parents more than facial images resembling unknown individuals. However, significant differences were found between the choices of boys with different parental attachment. Those who were better attached to their parents, particularly to their mothers (measured with the Düss-tale projective test), were more likely to choose father-resembling faces.

We could not find evidence for the first hypothesis; children between 3 and 6 years of age did not prefer child faces similar to their parents compared to unknown child faces in a forced choice test. This result is quite surprising because almost every psychological study and textbook highlights that this age is crucial with respect to children's identification with their parents.

Nevertheless, results of the test for the second hypothesis indicate that the quality of attachment to parents can influence the development of face preferences. We found that children who were better attached to their parents (either to mother or father) are more likely to choose those child faces which were transformed to resemble their fathers, compared to children with less pronounced attachment. The latter showed an opposite preference pattern: they were more likely to choose control faces as friends to play with. It is possible, though, that fathers who are better able to promote father-child attachment also look, on average, more friendly, attractive, or trustworthy, and these particular traits enhance their children's attraction towards the transformed composites, rather than increased similarity to individual facial cues of the fathers. Besides, male facial masculinity–which is associated with negative social attributions (Perrett et al. 1998)–is linked to decreased family investment (Mazur & Michalek 1998), which can result in insecure attachment (e.g. Belsky, Steinberg, and Draper 1991; Belsky 1997). However, the results of the second test, evaluating the fathers' faces, ruled out these possibilities; there was no difference between the attractiveness, friendliness, or trustworthiness of those male faces which were preferred or not by the subjects. Moreover, the former images were significantly more masculine than the others, which is quite opposite from what could be expected if masculinity was a crucial factor in the children's choice in this particular experiment. Hence, these results suggest that it is the physical and emotional proximity and the intense positive relation with parents which enhanced preference for and recognition of parents' facial characteristics in manipulated composite faces. Being aware that the data are significant with respect to

boys' preference for the father's face only, it is still possible that children, in general, may use parental faces as models in their social relationships.

If so, what is the actual perceptional and cognitive mechanism which explains the bias for faces resembling positively evaluated close relatives? At present, there are only a few studies which investigate how positive or negative experience with certain faces is generalized, but these could contribute to our understanding of the development of face preferences. JONES, DEBRUINE, LITTLE, and FEINBERG (2007), for instance, showed that composites made of individual faces which were associated with an aversive auditory stimuli in a preceding presentation were less preferred in a subsequent test than those associated with neutral stimuli. In an experiment by GAWRONSKY and QUINN (2013), morphed faces elicited the same automatic evaluations as the known faces they resembled. Another study with facial morphs led to a similar result (VEROSKY and TODOROV, 2010). These studies suggest that emotions and learning, even in a short time span of a couple minutes, can have a significant effect on face preferences. During childhood, children are exposed to an enormous number of faces, but the most relevant are the parental faces. It is likely that this long-lasting learning of parental characteristics is the mediator of their preferences. In that sense, though resemblance to father, for instance, may be more easily detected in male faces, it is basically irrelevant whether the seen face is a same-sex or an opposite-sex face; it is only the actual degree of resemblance that matters. This emphasis on learning and simple perceptional processes can give rise to novel accounts of similarity-driven face preferences (such as preference for self-face; see DEBRUINE et al. 2007; KOCSOR et al. 2011).

With the present study, our main aim was to look at a potential manifestation of sexual imprinting in children and see whether they are more willing to make friends with same age peers who resemble their parents. The results are not unambiguous, given that in our study not only paternal but maternal attachment also seemed to play an important role in the preference for fathers' faces. This is an unexpected result from a theoretical view point of sexual imprinting, saying that a specific mechanism of imprinting to the opposite-sex parent is involved in mate choice. Our results suggest that learning mechanisms, and perhaps simple generalization processes, could be important in developing face preferences. Therefore, in contrast to the definition given by several researchers (e.g., BERECZKEI et al. 2002; BERECZKEI GYURIS and WEISFELD 2004, etc.), it is possible that sexual imprinting is not a strictly domain-specific mechanism evolved to promote increased similarity of mates, but is a result of more general processes of face perception. This, of course, does not mean that it could not contribute to the enhancement of reproductive success during human evolution, or it is not adaptive in recent societies. We would like to highlight that we did not look for further evidence supporting the sexual imprinting theory, instead we focused on a possible early manifestation of this phenomenon, assuming that the theory describes a real-world phenomenon. We conclude that it is possible that face preferences depending on attachment are initial manifestations of sexual imprinting in 3 to 6 year old children. In this way, experi-

ence at this age might have influential effects on children's face preferences by enhancing or reducing attraction towards people resembling their parents. However, the exploration of this link and the proximate mechanisms underlying face preferences needs additional research.

## ACKNOWLEDGMENTS

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## APPENDIX

**The Düss-tale about birds.**

Mommy bird and daddy bird and their little nestling were asleep in their nest on a tree. Suddenly a strong storm arrived, the tree joggled and trembled and the nest fell on the ground. Daddy bird quickly flew to a tree nearby, mommy bird flew to another. But what did the little nestling do? She was able to fly a little too…
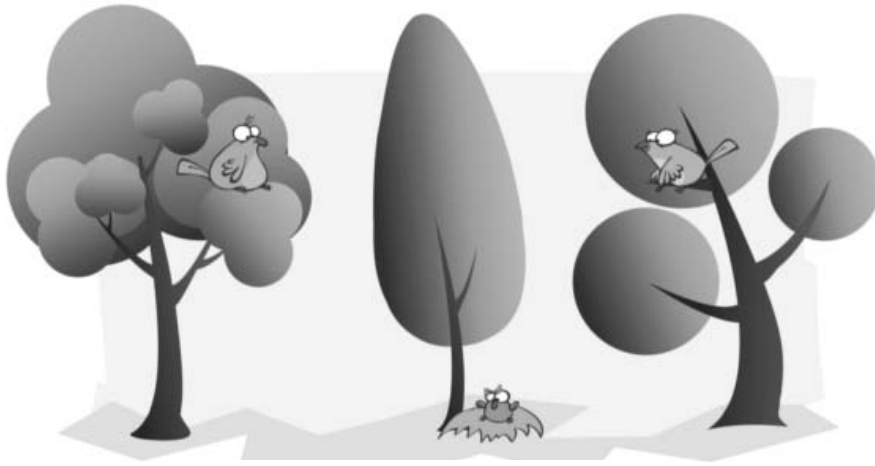


*Figure 3.*Illustration for the Düss Bird Tale.