ELSEVIER

Evolution and Human Behavior 24 (2003) 81–87

Evolution and Human Behavior

How much paternal resemblance is enough? Sex differences in hypothetical investment decisions but not in the detection of resemblance

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Received 25 April 2002; accepted 16 July 2002

Abstract

Subjects presented with an array of children's faces, which had been morphed to resemble the subject to varying degrees, were asked to make hypothetical investment decisions. Although females were relatively indifferent to resemblance, males reacted favorably towards children's faces that contained 25% or more of their characteristics. This difference was not a byproduct of differences in the detection of resemblance since males were no better than females at matching child faces with adult faces.

Keywords: Parental investment; Paternal resemblance; Cuckoldry; Paternal uncertainty; Social mirror; Sex differences

1. Introduction

Because of female infidelity males can never be certain of paternity. This asymmetry in parental certainty produces an asymmetry in parental investment, i.e., when males question paternity they are less likely to invest in the child and mother. This is most evident in stepfather-stepchild dyads (Burch & Gallup, 2000; Daly & Wilson, 1996). To test for a

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1090-5138/03/$ – see front matter
PII: S1090-5138(02)00117-4

paternal resemblance bias, Platek, Burch, Panyavin, Wasserman, & Gallup (2002) morphed participant faces with toddlers and asked hypothetical investment questions. Males were more likely than females to select children whose faces they had been morphed with.

Two questions raised by Platek et al. (2002) were addressed in the present experiments: How much physical resemblance is necessary to affect a male's reaction, and are males better at assessing resemblance or is it the evolutionarily significant context of making investment decisions that causes them to react differentially towards children's faces based on resemblance?

1.1. Experiment 1

Forty (20 males, 20 females, mean age = 19.2) students from the State University of New York at Albany served as subjects. The study was approved by the local institutional review board and subjects gave written informed consent.

Pictures were taken using equipment described in Platek et al. (2002). Each subject's picture was used to create two morphs. One combined 50% of the subject's face with a 2-year-old female's face and the other combined 50% of the subject's face with a 2-year-old male's face (Ulead Morph Editor version 1.0; see Platek et al., 2002 for details).

To make varying percentage morphs that did not deviate in appearance from the other images, self-morphs were subjected to a serial binary dilution. Each 50% self-morph was morphed with another randomly selected 50% child morph of a stranger of the same sex. A new stranger–same child morph was used in each dilution step to preclude the image from appearing too much like any one stranger face. Each newly created morph was morphed with another randomly selected 50% same sex stranger–same child face morph up to four times to produce self-morphs of 50%, 25%, 12.5%, 6.25% and 3.125%.

The experiment was computerized using SuperLab (Cedrus, version 2.01). Each trial consisted of showing the subject five faces in a semicircular array with a question (see Table 1) embedded in the center. The experimental arrays were compared to a control array that did not show any face that shared facial characteristics with the subject. Five arrays consisted of showing the subject morph (at varying percentages of morph) and four images of other people morphed with the same child. Each percentage of self-morph (50%, 25%, 12.5%, 6.25% and 3.125%) was shown with each of the ten questions. In the final condition, the subject was shown an array of all five of the varying degrees of self-morphs for each of the questions.

The 7 face arrays were paired with each of 10 questions (see Table 1) for a total of 70 stimulus trials. For any trial, whether the subject saw the faces morphed with the girl or boy was randomized across subjects, conditions and questions. The coordinates in which a face was presented and the order in which the arrays appeared were randomized. Subjects responded by selecting letters on the computer keyboard that corresponded to letters presented under the faces on the screen. Each new array represented a random combination of face coordinate positions, question to be asked and condition. At the end of the experiment, subjects were asked how difficult it was to choose among the faces.

Table 1
Percentage of subjects who picked their self-morph in response to the hypothetical investment questions

	50% morph		25% morph	
	Males	Female	Males	Females
Positive questions				
Which one of these children would you be most likely to adopt?	80%*	45%	75%*	35%
Which one of these children do you find to be the most attractive?	70%*	25%	45%	35%
Which one of these children would you be comfortable pending the MOST time with?	65%*	35%	70%*	65%*
Which one of these children would you spend US$50 on if you could only spend it on one child?	70%*	30%	65%*	30%
If one of these children damaged something valuable of yours, which one would you punish LEAST?	20%	10%	20%	15%
Which one would you LEAST resent having to pay child support for?	40%	25%	40%	25%
Negative questions				
Which one of these children would you spend the LEAST time with?	20%	15%	10%	10%
Which one would you spend US$50 on last?	45%	30%	15%	30%
If one of these children damaged something valuable of yours, which one would you punish MOST?	10%	20%	0%	15%
If you were forced to pay child support to these children, which one would you MOST resent having to pay child support for?	20%	25%	10%	5%

* $P < .005$.

2. Results

There were no main effects for sex of the toddler face. Since multiple comparisons were made, statistical significance was set using the Bonferroni adjustment method (α/number of comparisons: .05/10 = .005). Males selected faces they had been morphed 50% with more often than chance (binomial test) in response to four questions (see Table 1). Fisher's exact probability tests showed that males were more likely than females to select a face they had been morphed with in response to the same four questions ($P < .05$). Females were never more likely than males to select a face they had been morphed with. In the control array, neither males nor females selected any face more often than chance.

Composite scores were created by subtracting the number of times a subject selected a self-morph to a negative question from the number of times they selected a self-morph to a positive question. A Mann–Whitney U test applied to these scores showed that males (mean rank = 25.88) reacted more positively to faces they had been morphed 50% with than females (mean rank = 15.13), $U = 92.5$, $P < .01$.

Neither males nor females selected any face (morph or control) more often than chance when the target face contained only 3.125%, 6.25% or 12.5% of their characteristics. However, when the target face contained 25% of their characteristics, males were more likely to select a face they had been morphed with to three questions and females were more likely to choose the face they had been morphed with to one question (see Table 1 and Fig. 1). For arrays that contained all self-morphs (i.e., 3.125%, 6.25%, 12.5%, 25% and 50%), males

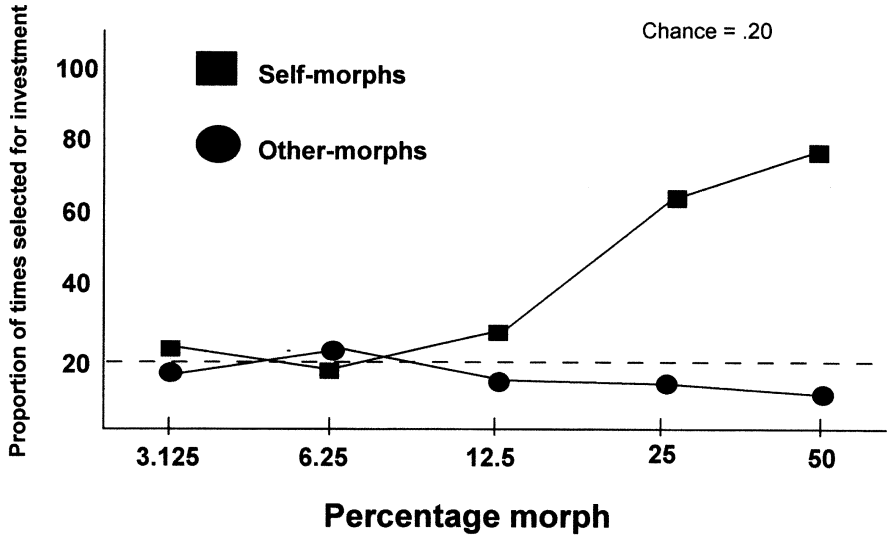

Fig. 1. Composite male investment scores as a function of percent self-morphs for positive questions (see Table 1).

were more likely than females to select a face that they shared more characteristics with in response to five questions (see Table 2).

On a scale of 1 (*very easy*) to 5 (*very difficult*), females ($M = 3.62$, S.E.M. $= \pm 0.24$) found it more difficult to select faces than males ($M = 1.80$, S.E.M. $= \pm 0.24$), $F(1,38) = 27.73$, $P < .001$. Males ($M = 9.25$ s, S.E.M. $= \pm 1.59$ s) responded faster than females ($M = 13.05$ s, S.E.M. $= \pm 1.25$ s) when the five stimulus faces represented all self-morphs of varying percentages, $F(1,38) = 5.38$, $P < .05$.

2.1. Experiment 2

Forty (20 females, 20 males, mean age = 18.5) additional students from the State University of New York at Albany served as subjects.

A participant's face and five stranger faces (two male and two female and one randomly selected face that was female for half the subjects and male for the other) were morphed with the boy and girl face as in Experiment 1 at varying percentages of morph (3.125%, 6.25%, 12.5%, 25% and 50%).

The first condition entailed matching female and male child morphs to the faces of two stranger males and two stranger females (i.e., which [child-morph] face looks most like the adult?). In Condition 2, the adult face to be matched was the subject's face and, in Condition 3, the face to be matched had no corresponding match among the child morph faces. There were 60 trials: matching both female and male child morph faces to stranger male faces and stranger females faces at each of the levels of percentage morph (40 trials), matching a self-image to each child face at each of the levels of percentage morph (10 trials) and attempting to match another stranger's face to the child faces at each of the levels of percentage morphs even though this face had no corresponding morph match (10 trials). All trials and trial types were randomized.

Table 2
Mean percentage self-morph chosen when all faces were self-morphs that varied only in degree to which the face resembled the subject

	Mean (±S.E.M.) % self-characteristics	
Hypothetical investment question	Male	Female
Which one of these children would you be most likely to adopt?	37.99 (±3.94)**	12.58 (±3.37)
Which one of these children would you spend the most time with?	23.09 (±4.02)*	10.26 (±2.58)
Which one of these children do you find to be the most attractive?	30.61 (±4.34)*	15.58 (±3.55)
Which one of these children would you punish least?	29.05 (±3.83)*	13.59 (±3.71)
If you only had US$50, which one of these children would you spend it on first?	22.53 (±3.97)*	11.71 (±2.46)

* $P < .05$.
** $P < .01$.

3. Results

The only condition where participants could accurately match child morphs to adult faces was when 50% of the adult's face (self, strange males or strange females) was morphed with the child's (binomial test, $P < .05$). There were no sex differences in the way participants matched 50% child morphs to adult faces. Likewise, there were no differences in matching as a function of whether the child morph was a boy or girl or whether the adult face was male or female. Whether the adult face was the subject's or a stranger had no effect on matching child morphs to adult faces.

Collapsing across sex of subject, when the subject's face was morphed with the boy they matched their own image 92.5% ($P < .05$) of the time, when morphed with the girl correct matching occurred 70% ($P < .05$) of the time. When asked to match boy face morphs with two strange females, subjects matched the faces 90% ($P < .05$) and 85% ($P < .05$) of the time, and when the girl's face was morphed with the two strange females, subjects were correct 95% ($P < .05$) and 80% ($P < .05$) of the time. When asked to match boy face morphs that included characteristics of two strange males, subjects matched the faces 82.5% ($P < .05$) and 77.5% ($P < .05$) of the time, and when they matched the girl faces that included characteristics of two strange males, they were correct 82.5% ($P < .05$) and 80% ($P < .05$) of the time.

4. Discussion

These data replicate Platek et al. (2002) in showing that males react differentially towards children's faces that resemble them. As in the previous study, subjects were unaware of the effects resemblance had on their investment decisions and the question about adoption produced the greatest male investment bias. Using a dilution technique to manipulate degree of resemblance, only males responded differentially, and only when the stimulus child was a 25% or more morph of the subject. Similarly, when shown five self-morphs that only varied in the degree to which they resembled the subject, males (but not females) were more likely to indicate they would invest in faces they shared more characteristics with (see Fig. 1).

In Experiment 2, males were no better than females at matching child morphs with adult faces regardless of whether they were self- or other morphs. Thus, the sexes exhibit roughly equal ability to detect resemblance, but only males appear to utilize this information when required to make decisions about "parental" resource allocation. It is interesting to note that the only condition that produced an effect for child–adult face matching was when the face was morphed 50%. However, males responded differentially to child-self-morphs as low as 25% when asked to make investment decisions, suggesting that the effect of resemblance does not require a conscious component.

The technique used to create different self-face morph proportions resulted in a 50% reduction of shared characteristics with each successive dilution. Such a reduction matches the proportion of shared genes among kin with each step removed. Thus, the fact that males make investment choices which favored both 25% and 50% self-morphs suggests that in addition to using resemblance to assess paternity for their children, males may use

resemblance to make investment decisions about individuals that ostensibly share 25% of their genes, such as half-sibs, nieces, nephews and grandchildren.

Acknowledgments

The authors thank Todd K. Shackelford, Richard L. Michalski and Lisa DeBruine for comments on an earlier version of this paper.

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