Kin investment of aunts and uncles: Why is the matrilateral bias stronger in women?

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Abstract
398 participants rated on a 7-point scale how much their aunts and uncles had been concerned about their welfare and whether the matrilateral or patrilateral aunt and uncle was the more concerned. The matrilateral aunt was more often chosen as the more concerned one than the patrilateral aunt, and the same for uncles. The ANCOVA of the kin investment ratings, adjusted for difference in age and residential distance of aunts and uncles, showed a sizable sex effect (aunts more concerned than uncles), a small but significant laterality effect (matrilateral aunts/uncles more concerned) and a significant interaction (matrilateral bias stronger in aunts than in uncles). These German results are comparable to those of Gaulin et al. (1997) from the US. The participants were also asked by which name they addressed their grandparents and aunts/uncles. Independent observers rated the emotional proximity of the various address forms. Whereas the discriminative solicitude of the four grandparents is reflected both in the number of address forms given as well as in rated emotional proximity of address forms (most for maternal grandmother, least for paternal grandfather), the same did not apply to aunts and uncles. Various studies have consistently found the matrilateral investment bias to be stronger in female than in male relatives. Possible explanations for this sex difference are discussed.

Three years ago at our meeting in Cambridge (Euler & Weitzel, 1995) we talked about grandparents and showed how reproductive strategy and paternity confidence explained discriminative grandparental caregiving, i.e. the fact that grandmothers care more for grandchildren than grandfathers do, and maternal grandparents more than paternal ones. So the grandparent most concerned about grandchildren is the mother of the mother, and she is also the grandparent most of us like best. The grandparent least concerned is the father of the father. Almost thirty percent of the variance in discriminative grandparental solicitude could be accounted for by the sex-specific reproductive strategy and paternity confidence.

Last year at Ghent we talked about grandparent-parent relationships, especially about relationships to in-law daughters and sons (Euler, Hoier & Weitzel, 1997). We showed how these relationships are clearly structured along evolutionary factors. We tried to explain, for example, why the sons-in-law have a relatively good standing for in-laws, whereas the daughters-in-law often get a rough deal. We pointed to a possible ultimate explanation: The son-in-law is the husband of a daughter, and to support her in her time-consuming reproductive strategy is in the best reproductive interest of the grandparents themselves. A welcome-strategy towards the son-in-law is a good adaptation here. The daughter-in-law,
however, is the wife of a son, and insofar as the son is inclined towards a strategy of maximizing mates, it is a good adaptation for his parents to interact with the daughter-in-law in terms of a good-bye strategy (and not in terms of a good-buy strategy), as if they wanted to communicate unconsciously to their son to try another mate. The mother-in-law/daughter-in-law is the most conflict-prone of the parent-grandparent relationships. Very often she is just not good enough. The father-in-law/daughter-in-law relationship fares a little better, for a particular reproductive reason, that is, the daughter-in-law is a potential mate for the father-in-law.

We seem to have touched quite relevant questions here because we received a lot of popular resonance to this research in Germany, especially from the yellow press. If the yellow press is interested, it’s safe to assume evolutionary relevance. Today we want to complete our tiny trilogy with a talk about aunts and uncles, and what their contribution is to the wider family, which we may consider as joint venture for reproductive profit. When talking about aunts and uncles we mean the sisters and brothers of mom and dad, and not their spouses.

The role of paternity uncertainty is well known to you, so there is no need to explicate this factor. We are all familiar with the phenomenon of the avunculate, the particular rights and obligations (e.g. inheritance; Flinn, 1981) of the mother’s brother, particularly in those societies with a high incidence of extra-pair copulations and a consequent low paternity certainty (Gaulin & Schlegel, 1980). If paternity certainty drops too low it is adaptive for a male to divert paternal investment away from the progeny of his sexual partner to the progeny of his sister. Remnants of this fact can still be found in different role names in traditional German for the maternal and paternal brother. Only the paternal brother was called "Onkel" (like the English 'uncle') in past times, and today this word still has connotations of unfamiliarity and distance. For example, a potentially mean strange man is called a "böser Onkel" in Germany. I also learned that in some languages (e.g. Serbo-Croatian) this name distinction between these two kinds of uncles is made. The maternal brother, however, used to be called "Oheim" in Germany, and he played particular roles in the family not bestowed on an uncle. So we predict that kin investment in nephews and nieces is higher for maternal uncles and aunts than for paternal ones.

The second relevant factor is the sex-specific reproductive strategy. Mothers and grandmothers invest more in their descendents than fathers and grandfathers. Females are 'kin
keepers’, as sociological family researchers sometimes say. Does this sex effect also apply to collateral kins? Do aunts care more for nephews and nieces than uncles do?

**Method**

To investigate these two hypotheses we applied our useful method of asking adult recipients how much kin investment they received. We had 398 student participants in our study, between the ages of 18 and 62 years, but most in their twenties, 133 males and 263 females. In certain relevant aspects we employed the same method of data collection and analysis as had been done by Gaulin, McBurney and Brakeman-Wartell (1997) in a similar study. These scientists from Pittsburgh had used a method similar to the one we had used in our previous grandparent study, so we gladly stuck to it, and now we can compare the results of these three studies.

First, we included the data only from those participants who reported that both of their biological parents were still alive and living together. These were 302 cases, 109 males and 193 females. Because people have four different categories of aunts/uncles (namely maternal and paternal aunts and uncles) and differing numbers of relatives in each of these four categories, we asked only for the amount of investment of the oldest relative in each category. On a 7-point scale the participants thus had to rate the following: "How much concern does the maternal (or paternal) uncle (or aunt) show about your welfare?". We also asked about the age of uncle (aunt) and the residential distance between the relative and the participant. If the participant had both maternal and paternal aunts, or both maternal and paternal uncles, we also asked who of both showed more concern about the participant's welfare.

**Results**

**Forced-Choice Data**

*Participants who had all four relatives.* Fifty-seven participants (18 males, 39 females) had both kinds of aunts as well as both kinds of uncles. These participants could make either none, one or two matrilateral choices. If there were no laterality bias, the expected proportion of choices (0, 1, 2) should be 1:2:1. The observed distribution was 23:17:12 (see Table 1; five participants did not respond completely to both forced-choice questions). The matrilateral bias, that is the excess of matrilateral choices, was significant ($\chi^2=10.88$, df=2, p<.01).
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Tab. 1. Frequencies of matrilateral choices of aunts/uncles.

Participants who had only aunts or only uncles. Seventy-one participants had only both kinds of aunts but not both kinds of uncles and answered the questions as to which one was more concerned about their welfare. If there were no laterality bias, there should be a 50% split on the question which relative showed more concern. However, 45 of them (63%) chose the matrilateral aunt as more concerned (χ²=5.16, df=1, p<.05). Forty-nine participants had both kinds of uncles but not both kinds of aunts and answered the forced-choice question. Thirty-one (65%) chose the maternal uncles as more concerned (χ²=4.08, df=1, p<.05).

To control for the possibility that residential distance and age of relative may account for this matrilateral bias, the influence of both variables was eliminated by a multiple regression (see Gaulin et al., 1997). Thus we obtained a Y intercept which yields the level of matrilateral bias that would be present if age and distance differences were zero, and the Y intercept could be parametrically tested. The bias was still significant after this correction, and even highly significant for aunts (aunts: T=3.74, df=121, p<.005; uncles: t=1.676, df=92, p<.05).

Rating Scale Data

Participants who had all four relatives. A within-subjects ANCOVA was calculated, with distance and age as covariates. Figure 1 shows the results in terms of means. After controlling for age and distance differences, we found a laterality effect: Matrilateral relatives were more concerned than patrilateral ones (F=4.93, df=1.50, p=.031). We found a sizable sex effect: Aunts were more concerned than uncles (F=32.65, df=1.50, p=.000). Finally, there was a considerable statistical interaction between laterality and sex of relative: The matrilateral bias was considerably stronger for aunts than for uncles (F=5.39, df=1.50, p=.024). As to effect sizes, the sex effect was by far the biggest with an η² (alt)= .40, followed
by the laterality-by-sex interaction ($\eta^2_{(alt)} = .10$) and then by the laterality effect ($\eta^2_{(alt)} = .09$).

$\eta^2_{(alt)}$ denotes the variance attributable to the effect of interest divided by this variance plus error variance (Tabachnik & Fidell, 1989, p. 55). Thus, over half of the total variance

![Bar chart showing mean ratings of kin investment for aunts and uncles]

Fig. 1. Mean ratings of kin investment for aunts and uncles

**Participants who had only aunts or only uncles.** The difference in the concern ratings for matrilateral vs. patrilateral aunts was regressed on the difference in residential distance and age for the 125 participants who had both kinds of aunts and had given complete data. The matrilateral bias after regression was .863 ($t=3.93$, df=124, $p<.0005$). Neither the difference in residential distance nor the difference in age had an effect on the difference in concern of the aunts.

The matrilateral bias after regression for the 95 participants who had both kinds of uncles and complete data was .311 ($t=1.428$, df=94, $p<.10$). Unlike in the Pittsburgh study by Gaulin et al. (1997) the matrilateral bias for uncles did not reach significance in this Kassel study. Also the effect of difference in age on difference in concern had been significant for the Pittsburgh uncles, but neither residential distance nor age had a significant corrective regression effect for the Kassel uncles. Otherwise, the data of Pittsburgh and Kassel were
comparable with the additional exception that the concern ratings were generally lower in the German data than in the U.S. data, especially for the uncles.

**Number and intimacy of names for aunts and uncles.**

We asked our participants which names they used to address their grandparents and their aunts and uncles. First we counted how many different address forms appeared for the various relatives (e.g. "grandmother", "grandmother plus first name", "grammy", "the Kassel grandmother"). With respect to grandparents we found the biggest number of different address forms for the maternal grandmother (41 different forms for N=283, or 14.5%), followed by the paternal grandmother (35 different forms for N=240, 12.9%), then the maternal grandfather (29 forms, N=240, 12.1%) and finally the paternal grandfather (23 forms, N=221, 10.4%). This is the same hierarchy as the solicitude ratings for widowed and separated grandparents, i.e. those without a contaminating coresidence effect (Euler & Weitzel, 1996). Thus, there are more idiosyncratic names for significant other persons in the family and more general address forms for less significant relatives. This phenomenon might be comparable to the existence of a multitude of vernacular words for very important things in life, like eating, money, and sexual intercourse.

For aunts and uncles, the number of name categories did not vary significantly with kind of relative. For the maternal aunt 20 different names were given (N=207), for the maternal uncle 20 (N=193), for the paternal aunt 17 (N=200), and for the paternal uncle 16 (N=186). The variety of name categories for aunts and uncles was smaller than for grandparents which reflects the lower kin investment of aunts and uncles as compared to grandparents. These differences between aunts/uncles and grandparents can also be seen in the size differences of concern ratings as shown in the bottom and top graph of Fig. 2.

Therefore it comes as no surprise that the emotional closeness, which is reflected in the various names for the relatives, showed a matrilateral bias for grandparents but not for different aunts/uncles. To investigate this aspect, all those cases where the matrilateral relative (grandmother, grandfather, aunt, uncle) was addressed with a different name category than the respective patrilateral relative, were selected and rated by 22 independent raters, as to which of the pair element reflected more emotional closeness.

**Comparison of studies**
The study by Gaulin et al. (1997) and the current one agree in the following: Irrespective of whether we look at forced-choice or rating data, there is a clear matrilateral bias in kin investment. Aunts and uncles prefer their sisters' children over their brothers' children for their kin investment. This matrilateral bias is stronger in females than in males. In Germany and in the United States it is especially the aunt who prefers her sisters' children over her brothers' children, and rarely the uncle. The finding that the stronger matrilateral bias in female relatives might possibly be a general phenomenon, was first indicated by Gaulin et al. (1997) when they noticed that both in the Euler & Weitzel study on grandparental investment (1996) and in theirs, the matrilateral bias was stronger in female relatives (see Fig. 2). Gaulin et al. (1997) came to notice it when they took the matrilateral bias to calculate paternity certainty. They arrived at an estimate of 13% (estimate derived from the uncles' matrilateral bias) and 20% (estimate from aunts) paternity discrepancy. The German grandparent study gave estimate of 9% (estimate derived from the matrilateral bias of grandfathers) and of 17% (derived from grandmothers). The current study gives estimates of 4% (from uncles) and 23% (from aunts). The mean of all estimates is 14%. Thus, with some liberal scaling assumptions and not taking these estimates too seriously, people in the U.S. and Germany behave as if about 14% of the putative fathers were not the biological ones. The estimates in these studies here all lie within the range given by Macintyre and Sooman (1991) after review of several studies which tried to assess paternity discrepancy more directly. The sizeable indices of paternity discrepancies are one of the pillars of the sperm competition theory of Baker and Bellis (1995). Another indirect paternity estimate, derived with a slightly different technique but from the same matrilateral bias, has been reported by Russell & Wells (1987), who estimated a paternity discrepancy of 13% from the matrilateral biases in feeling emotionally close to various kin.

Why is the matrilateral investment bias stronger in females?

Gaulin et al. (1997) wondered whether the stronger matrilateral bias in female relatives was noteworthy or coincidental, and if not coincidental, whether the effect might be because accurate cues about paternity certainty are more readily available to women than to men. It appears now that it might be an effect worthy of investigation and explanation because the sex-specific matrilateral bias could be replicated again with a comparable magnitude. Gaulin et al.'s assumption, however, that the matrilateral bias might be due to women's better sensitization to paternity discrepancy cues is met with scepticism in our group. There are arguments
and observations which contradict this explanation: Men have to pay quite a reproductive price for paternity discrepancy, namely vain paternal investment. So they are particularly adapted to prevent and detect paternity discrepancy. They have developed and they employ elaborate mate guarding tactics (Buss, 1988; Daly, Wilson, & Weghorst, 1982; Buss & Shackelford, 1997), and they make their paternal investment dependent on phenotypical similarity as signs of paternity (Daly & Wilson, 1982; Regalski & Gaulin, 1993; Euler & Weitzel, 1996). Thus, if there is a sex difference in availability of cues of paternity discrepancy, it should be more readily available to men. Nevertheless, it might be worth the effort to check the more general hypothesis that women’s clearer preference for kin investment in progeny of sisters or daughters is due to sexually dimorphic perceptual-cognitive factors of paternity certainty. That is, women perceive, estimate or calculate matters of paternity certainty different than men.

There is another possible explanation for the fact that the matrilateral bias in kin investment is larger for females than for males. Females invest in descendents of relatives of the same sex, males in descendents of relatives of the opposite sex. If we assume that same-sex kin relations have an advantage over cross-sex kin relations, we have a parsimonious explanation for the bigger matrilateral bias in females, more parsimonious than the assumption of perceptual/cognitive sex differences with respect to paternity. If female relatives get along better with other female relatives than with males, and male relatives better with other males than with females, then his same-sex effects adds to the matrilateral bias in the case of women and not in the case of males. Thus, a small same-sex effect would be sufficient to explain the bigger matrilateral bias in females.

Is there evidence for a same-sex effect in family relationships? If we look at grandparent-parent relationships, we find positive evidence (Euler et al., 1997). We compared comparable same-sex grandparent-parent relationships with the equivalent cross-sex relationships, that is, we excluded from all eight possible grandparent-parent dyads the father-in-law/daughter-in-law dyad as well as its same-sex equivalent, the mother-in-law/daughter-in-law dyad, because the former is a special case being the only one with a direct reproductive potential (see Euler et al., 19977 for more details). In this comparison, the same-sex relationships are small, but significantly better than the comparable cross-sex relationships. So it is well possible, that the greater matrilateral bias in kin investment in females is due to the fact that, among relatives, females get along better with females than males do.

Literature


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(\(\chi^2=10.88, \text{df}=2, p<.01\)).
Fig. 1. Mean concern ratings, adjusted for age and distance differences, for matrilateral (white) and patrilateral (grey) aunts and uncles.
Fig. 2. Matrilateral and sex bias of kin investment from three studies

Data from Euler, Hoier und Pöltz (1998)

Data from Gaulin, McBurney and Brakeman-Wartell (1997)

Data from Euler and Weitzel (1996), widowed or separated grandparents
Desired number (median) of sex partners for male and female college students
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Correlations between desired number of sex partners and paternity estimate for three reference groups, for males (N=56) and females (N=122)