

## Relationship-Specific Closeness of Intergenerational Family Ties: Findings from Evolutionary Psychology and Implications for Models of Cultural Transmission

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Cross-generational cultural transmission is facilitated by affectional ties between cultural model and recipient. A theory of cultural transmission must therefore account for how and why affectional ties vary between different dyadic relationships. Findings on the tie strengths of several intergenerational kin dyads (grandparent-grandchild, grandparent-parent, aunt/uncle-niece/nephew) as rated by recipients of kin investment (adult grandchildren or nieces/nephews) are presented, based on several studies with altogether more than 3,000 participants between 16 and 80 years old. The relationship structures were dyad specific; asymmetrical with a tilt to the maternal side; robust; and predictable from reproductively relevant variables of the kinpersons involved, namely, sex-specific reproductive strategy, paternity uncertainty, and genetic closeness. Implications for the study of intrafamilial cultural transmission are discussed, with an emphasis on the importance of evolutionary theory for this research field.

**RELATIONSHIP-SPECIFIC CLOSENESS  
OF INTERGENERATIONAL FAMILY TIES  
Findings From Evolutionary Psychology and  
Implications for Models of Cultural Transmission**

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**In their book** *Culture and the Evolutionary Process*, Boyd and Richerson (1985) set the ambitious aim “to account for all the processes by which the distribution of beliefs, attitudes, and values in a population are transmitted and modified” (p. 12). To approach this goal, it is “not sufficient to know how the existing structures of human cultural transmission give rise to cultural change; we must also understand *why* human cultural transmission has these structures.” Evolutionary theories of human behavior are indispensable for finding satisfactory answers to this “why” question. They guide us to see the relevant structures, that is, to “carve nature at its joints” (Gangestad & Snyder, 1985, p. 317), so as not to get lost in an oversupply of unconnected middle-level theories. The newly emerging science of evolutionary psychology (Buss, 1999; Tooby & Cosmides, 1992) integrates concepts and findings from diverse disciplines such as behavioral ecology, genetics, cognitive sciences, and sociology.

A variety of a person’s features can be transmitted socially from one generation to the next within the family. In this article, we address two interrelated aspects of between-generation dyads that can be considered as conducive to all or most social (nongenetic) vertical transmissions: investment in progeny and emotional closeness of between-generation dyads. Investment in progeny can express itself in a variety of aspects, like expenditure of time,

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acceptance of risks, emotional and material costs, feelings of obligations, and grief intensity upon death of a descendant. In noneconomic terms, it is the extent of solicitude. We will show that investment in progeny and emotional closeness of between-generation dyads is highly and robustly structured and that this structure is parsimoniously and to a considerable extent accounted for by a few basic reproductively relevant variables that in principle apply to all species with biparental care. Because investment and emotional closeness are a conducive, albeit not a sufficient, condition for social transmission, we will argue that intergenerational social transmission in families is similarly structured.

Researchers from various disciplines have repeatedly noted that our kinship systems have an obvious tilt to the maternal side of the family. This asymmetry is reflected in a variety of measures, be it social interactions, feelings of closeness and obligations (Rossi & Rossi, 1990), or salience of kin (Salmon & Daly, 1996). Women, in short, are the kin keepers. Most obvious is the asymmetry in parental care: Mothers care more for their offspring than fathers do (reviewed in Geary, 1998), and it is even not always clear how much of the fathering is paternal effort and how much is mating effort (Marlowe, 1999).

The proximate causes for lower paternal than maternal investment in humans do not seem to reside in men's lower ability to care for infants nor in father absence (Geary, 1998) but rather in a lower threshold of mothers to respond to the infant's needs and the ensuing development of the infant's preference for the breast-feeding caretaker (Hrdy, 1999). Minor initial sex differences thus develop into marked gender differences, exaggerated and rigidified by social norms and customs. The ultimate causes for the lower maternal than paternal threshold to respond to the infant's needs are found in sex differences in relative costs and benefits of parental investment (Trivers, 1972). The minimum investment required for producing offspring is higher for mammalian females than for males, mainly due to gestation and lactation. The potential reproductive rate thus is lower for females than for males (Clutton-Brock & Vincent, 1991). During our ancestral past, human females had to find an optimal mate and invest in offspring to reproduce successfully. Men could do the same, but, in contrast to women, they could also improve their reproductive outcome by maximizing the number of mates. The mating costs of parenting (Alcock, 1998) are therefore larger for males than for females because time and energy spent in parenting cannot be invested in finding additional mates. These sex-specific reproductive strategies led to corresponding sex-dimorphic psychological adaptations such as preferences, desires, and motivations, which are still present today, despite the introduction of contraceptives, baby bottles, supermarkets, pediatricians, and maternity leave (Geary, 1998).

A second possible ultimate cause of the greater paternal than maternal unwillingness to invest in offspring is paternity uncertainty. Because women sometimes engage in extrapair copulations (Baker & Bellis, 1995), ancestral men recurrently encountered the risk of investing in another male's offspring, which led to male adaptations such as partner surveillance, male forms of jealousy, and the sexual double standard across cultures (Buss, 1999). Accordingly, paternal investment has been shown to vary with paternity confidence between cultures (Gaulin & Schlegel, 1980).

Both these ultimate causes, sex-specific reproductive strategy and paternity uncertainty, contribute to the obvious tilt to the maternal side in human family structures. Here we will show how the asymmetry between the sexes also is evident in human intergenerational investment other than parental investment, namely, in grandparental investment (Euler & Weitzel, 1996) and in grandparent-parent relations (original data).

## GRANDPARENTAL SOLICITUDE

In eusocial species, reproductive effort is not restricted to mating and parenting. Alexander (1987) regards lifetimes as composed of effort (caloric expenditure and risk taking) that can be divided into somatic effort and reproductive effort. Somatic effort (e.g., eating, health care, growing, learning, cultivating relations with nonkin) amasses resources, while reproductive effort reduces them. Aside from mating and parenting, reproductive effort can be carried on as extraparental nepotistic effort, the investment in descendants with whom one shares a high proportion of alleles. These are mainly the young kinfolk that in Italy are called *nipote*, namely, grandchildren, nephews, and nieces.

By assisting their adult daughter or son in her or his parental effort, grandparents can continue to contribute to their own genetic inclusive fitness. Because the average amount of parental care differs between the sexes (Geary, 1998), it makes a difference to grandparents whether a daughter's or a son's parental effort is assisted. At the proximate level and viewed from the recipient of grandparental help, a mother needs more help in direct child care than a father does. Therefore, Euler and Weitzel (1996) predicted that maternal grandparents care more for their grandchildren than paternal grandparents do.

A second factor that may account for discriminative grandparental care is paternity uncertainty. Because two generations of descendants are involved in grandparental solicitude, grandparents have a double possible parental uncertainty. The most uncertain grandparent is the paternal grandfather, who can be certain neither of his own nor of his son's paternity. The most certain grandparent is the maternal grandmother, being certain of her as well as of her daughter's maternity. In comparison, the paternal grandmother and the maternal grandfather have intermediate levels of uncertainty of grandparenthood.

If both factors, assistance in sex-specific reproductive strategy and paternity uncertainty, are combined, we obtain an ordered prediction about discriminative grandparental investment. From the grandchild's perspective, the mother of the mother is expected to invest the most and the father of the father the least. The maternal grandfather is expected to invest more than the paternal grandmother because the former helps a daughter and the latter helps a son, and both have one link of uncertain paternity.

Euler and Weitzel (1996) examined grandparental solicitude as rated retrospectively by adult grandchildren, assuming that ratings by the recipients of care are a better indicator of grandparental solicitude than ratings given by grandparents themselves, because equity norms level grandparents' self-descriptive statements about favored grandchildren. Participants (720 male, 1,125 female, 12 unspecified; ages 16 to 80 years) were asked on a 7-point rating scale how much each grandparent had cared for them (*gekümmert*) up to the age of 7 years, from 1 (*not at all*) to 7 (*very much*). The German verb *kümmern* has both a behavioral and a cognitive-emotional meaning, namely, (a) to care for, to look after; and (b) to be emotionally and/or cognitively concerned about. From the total sample of 1,857 respondents, those 603 cases were selected for the analysis whose four (putative) genetic grandparents were all still alive when the participant was 7 years old.

The results confirmed the prediction about the discriminativeness of grandparental solicitude. Most care was rated for the maternal grandmother ( $M = 5.16$ ), followed by the maternal grandfather ( $M = 4.52$ ), the paternal grandmother ( $M = 4.09$ ), and the paternal grandfather ( $M = 3.70$ ). Maternal grandparents cared significantly more than paternal grandparents, and grandmothers cared significantly more than grandfathers. The effect sizes, given as the

partial  $\eta^2$  (Tabachnik & Fidell, 1996), which denotes the variance attributable to the effect of interest divided by this variance plus error variance, were .11 for the lineage effect (maternal vs. paternal) and .17 for the effect of sex of grandparent. Both effects together account for a sizable proportion of the variance.

Of special interest is the finding that the maternal grandfather cared more than the paternal grandmother. If grandparental caregiving were solely determined by a social role and child care traditionally ascribed to women, then grandmothers should provide more care than grandfathers. This argument should apply particularly to the older grandchildren in the sample, whose grandparents can be assumed to be more influenced by traditional gender roles than the grandparents of the younger participants. However, the difference was in the opposite direction, significantly so, and even more pronounced for the older (40 years or more) than the younger participants.

The sex of the grandchild mattered little. Female grandchildren rated just slightly higher grandparental solicitude than male grandchildren (partial  $\eta^2 = .01$ ,  $p = .046$ ). As expected, residential proximity had a large influence on grandparental care, but the four grandparents did not differ in residential distance. Unexpectedly, age of the grandparent had no significant effect on care, and neither did the availability of other grandparents. In the total sample, grandparental care was unaffected by whether one, two, or three other grandparents were alive. Discriminative grandparental solicitude was a robust phenomenon under various conditions, with one exception: Comparing separated with nonseparated grandparents, separated grandfathers showed significantly less solicitude than nonseparated grandfathers. Most drastic was this reduction in separated paternal grandfathers, whose solicitude dropped to a low mean of 1.77. The same drop was not observed in widowed grandfathers. The low level of care provided by separated grandfathers may be taken as evidence that male grandparental care, like male parental care, is to a considerable extent postmating effort directed at their spouses.

The same pattern of discriminative grandparental solicitude has been found in comparable studies in various countries, namely, in the United States (DeKay, 1995), France and Germany (Steinbach & Henke, 1998), Greece and Germany (Pashos, 2000). Among urban Greeks, the pattern of grandparental solicitude was essentially the same as in the other studies cited, but among rural Greeks it differed, especially for male respondents, which rated the care given by paternal grandparents higher than by maternal grandparents. This paternal bias is only partially explained by prevailing patrilocality in rural Greece and a possible reduced paternity discrepancy. Rather, patrilinearity with preferred investment in paternal grandchildren, especially paternal grandsons, is the explanation that best fits Pashos's (2000) data from rural Greek grandparents.

Various studies in which aspects of grandparental investment other than grandchild-rated solicitude were investigated have confirmed the general pattern of discriminative grandparental investment: perception of closeness to (Fischer, 1983) and time spent with grandchildren (Smith, 1988), interaction frequencies (Eisenberg, 1988; Hartshorne & Manaster, 1982; Hoffman, 1978-1979; Salmon, 1999), perceived emotional closeness to grandparents (Eisenberg, 1988; Hoffman, 1978-1979; Kennedy, 1990; Matthews & Sprey, 1985; Rossi & Rossi, 1990; Russell & Wells, 1987), naming favorite grandparents (Kahana & Kahana, 1970; Steinbach & Henke, 1998), gifts received from grandparents (DeKay, 1995), grandparental mourning after a grandchild's death (Littlefield & Rushton, 1986), and adoption of grandchildren (Daly & Wilson, 1980).

Above we have argued that sex-specific reproductive strategy and paternity uncertainty explain discriminative grandparental caregiving. Rossi and Rossi (1990) give another reason

for the grandparents' preference to invest in their daughters' children over the investment in their sons' children. With the sharp rise in divorce rate and custody typically being vested in the hands of mothers, investment in daughters' children ensures steadier and less-risky relations than investment in sons' children. If this risk difference were operating, then the solicitude difference between maternal and paternal grandparents should vary with divorce rates between countries and between cohorts, that is, it should be larger in the American sample (DeKay, 1995) than in the German (Euler & Weitzel, 1996) or French (Steinbach & Henke, 1998) sample, and larger among the younger grandparents in the German sample than among the older grandparents. None of these predictions is supported.

Another variable that influences grandparental caregiving aside from the two main reproductive variables considered so far was detected by Salmon (1999). The birth order of the parent explains a sizable portion of the remaining unexplained variance of grandparental solicitude. Grandparents have significantly less contact with grandchildren of their middle-born daughters or sons than with grandchildren of firstborn and last-born daughters or sons, a finding explained by the fact that middle-borns show less attachment to their parents than do firstborns or last-borns (Salmon & Daly, 1998).

Effective investment in progeny requires an ability to recognize kin in paternal descendants. Therefore, it can be predicted that fathers rely more on child resemblance for their investment than mothers (Porter, 1987). Indeed, mothers and their relatives seem to comment, even insist, on resemblance to the father more often than to the mother, seemingly so as to ascertain his paternity and thus promote his willingness to invest in the infant (McLain, Setters, Moulton, & Pratt, 2000; Regalski & Gaulin, 1993). Results on whether infants actually resemble more the father or more the mother are conflicting (Brédart & French, 1999; Christenfeld & Hill, 1995; McLain et al., 2000). Euler and Weitzel (1996) found that the participants rated their physical and behavioral resemblance to their father during childhood higher than to their mother. However, resemblance to paternal grandparents was not rated higher than to maternal grandparents, nor to grandfathers higher than to grandmothers. What was found, however, was a correlation between resemblance and grandparental solicitude, which tended to systematically vary with the number of links of paternity uncertainty. For the maternal grandmother (no link of paternity uncertainty), the correlation was  $r = .37$ ; for the maternal grandfather and the paternal grandmother (one link each),  $r = .39$  and  $r = .42$ ; and for the paternal grandfather (two links),  $r = .47$  ( $N = 458$  for each coefficient). It seems that the higher the paternity uncertainty, the more grandparental solicitude is being made dependent on resemblance to the grandchild.

## RELATIONSHIPS BETWEEN GRANDPARENTS AND PARENTS

Euler and Weitzel (1996) have shown that the relationships between grandparents and grandchildren are systematically structured by a few reproductively relevant variables. A comparable structure can be expected to reveal itself in the relationships between grandparents and parents. If grandparental investment is to be transmitted to grandchildren, parents will frequently function as mediators. Grandparental investment is thus facilitated by good relationships between parents and grandparents and obstructed by poor ones.

With four grandparents and two parents, there are eight different grandparent-parent dyads, four of them in-law dyads. Among the in-laws, the mother-in-law seems to play a salient role. In many cultures, she is the target of scorn and derision in jokes and songs. The relation between the mother-in-law and the daughter-in-law is a source of particularly

intense conflict (Duvall, 1954). Why is the image of the mother-in-law so negative? The most popular explanation, nourished by psychoanalytic theory, is rivalry between the two over the son's or husband's love and attention. But why is there no equal rivalry between the father-in-law and son-in-law over the daughter or wife?

Evolutionary psychological theory might give a more satisfying answer. First, a key reproductive variable that differentiates the eight grandparent-parent dyads is consanguinity. The son or daughter is genetically closer than his or her spouse, and therefore the four parent-child dyads are expected to be more positive relationships than the four in-law dyads. Second, there is the factor of parental support of the adult child's reproductive strategy. It is in the reproductive interest of grandparents to support their adult child in his or her sex-specific reproductive strategy. An adult daughter, more restricted than a son to the reproductive strategy of parental care, is best aided by her parents within the context of a good parent-daughter relationship. A poor parent-son relationship is comparatively less detrimental for a son's opportunistic reproductive strategy of maximizing mates. Therefore, grandparents can be expected to have generally better relationships with daughters than with sons. Third, due to uncertainty of paternity, a better relationship is predicted between mother and children than between father and children. These last two factors, daughter support and paternity uncertainty, yield predictions about the differential quality of the four relationships between grandparents and their adult children. The best relationship is expected to exist between the grandmother and her daughter, the worst of these four between the grandfather and his son. Depending on the relative strengths of the two factors of daughter support and paternity uncertainty, the grandfather-daughter or the grandmother-son relationships are expected to be second-best.

Now to the in-law relationships. How do evolutionary considerations differentiate these four dyads? The factor of daughter support is again playing a role here. A daughter needs more stable partner support in her child care than a son needs it in his strategy of maximizing mates. A daughter is best aided by her parents if they welcome and relate well to her husband. A son, insofar as he is inclined toward polygyny, is comparatively less impeded by poor relations between his wife and his parents. Rejection of his partner by his parents may even be strategically appropriate and unconsciously in the grandparents' own reproductive interest. Therefore, the relations to the son-in-law are expected to be better than relations to the daughter-in-law. Again, considering paternity uncertainty as a factor, the mother-in-law is expected to have a better relationship to the spouse of the adult child than the father-in-law.

Taken together, these considerations predict a relatively good relationship between the mother-in-law and the son-in-law and a relatively poor one between the father-in-law and the daughter-in-law, with the other dyads—again depending on the relative strengths of both factors—somewhere in-between. However, folklore, and perhaps our own experiences object. Is not the relationship between the mother-in-law and the daughter-in-law said to be the most problematic of the eight relationships?

From 2,319 persons, we obtained a rating on a 7-point scale of how good each one of their eight grandparent-parent relationships was when the participants were children (1 = *very bad relationship*, 7 = *very good relationship*). The participants (888 male, 1,426 female, 11 unspecified) were between 12 and 67 years old, with a median of 21 years and 11 months. Of these participants, 962 gave us complete ratings (337 males, 619 females, 6 unspecified; age 16 to 62 years, median 21 years and 7 months), that is, a rating for all eight grandparent-parent dyads.

Table 1 shows the predictions on the basis of consanguinity, daughter support, and paternity uncertainty, as well as the means and standard deviations of the relationship ratings. The

**TABLE 1**  
**Predictions About Grandparent-Parent Relationships and Results ( $N = 962$ )**

<i>Grandparent- Parent Dyad</i>	<i>Predictions on the Basis of</i>			<i>Relationship Rating</i>	
	<i>Consanguinity</i>	<i>Daughter Support</i>	<i>Paternity Uncertainty</i>	<i>M</i>	<i>SD</i>
Mother-daughter	+	+	+	5.49	1.56
Father-daughter	+	+	-	5.16	1.67
Mother-son	+	-	+	5.03	1.56
Father-son	+	-	-	4.71	1.64
Mother-in-law/son-in-law	-	+	+	4.45	1.61
Father-in-law/son-in-law	-	+	-	4.35	1.65
Mother-in-law/daughter-in-law	-	-	+	3.75	1.76
Father-in-law/daughter-in-law	-	-	-	4.03	1.71

NOTE: Plus or minus sign denotes better or worse relationship predicted.

plus or minus sign denotes whether the column condition leads to a prediction of a better or worse relationship for that particular grandparent-parent dyad relative to the other dyads. A MANOVA showed a large significant main effect for consanguinity,  $F(1, 961) = 788.55, p = .000$ , partial  $\eta^2 = .45$ . Relationships between grandparents and their own sons or daughters were rated as better than relationships with spouses of sons or daughters. Sex of parent yielded a significant main effect,  $F(1, 961) = 99.12, p = .000$ , partial  $\eta^2 = .09$ . Relationships with daughters and their husbands were better than with sons and their wives. Sex of grandparent yielded a significant main effect,  $F(1, 961) = 15.32, p = .000$ , partial  $\eta^2 = .02$ . Relationships between grandmothers and parents were better than between grandfathers and parents. Same-sex grandparent-parent dyads were rated as having had slightly better relationships than cross-sex dyads, as shown by the interaction between Sex of Parent and Sex of Grandparent,  $F(1, 961) = 9.12, p = .003$ , partial  $\eta^2 = .01$ . Sex of participant (grandchild) showed no effect.

How well do siblings agree in their retrospective ratings of their grandparent-parent relationships during their childhood? We obtained ratings from the siblings of the participants and calculated for the families with two children ( $N = 87$ ) the intraclass correlations within sibling pairs. The average correlation across all eight grandparent-parent dyads was  $r = .64$ . This correlation varied negatively with the age difference of the sibling pair, which can be expected because the quality of relationships can vary with time and because the age gap between siblings is one determinant of a child's family niche (Sulloway, 1996). There is considerable agreement between siblings about the quality of grandparent-parent relations.

Two other studies that investigated the various parent-child relationships delivered comparable results. Rossi and Rossi (1990) found that affinal kin, those acquired through marriage or remarriage, evoke lower feelings of obligation than do consanguineal kin in comparable positions, and sons-in-law evoke higher feelings of obligation than do daughters-in-law. The bond between mother and children was stronger than the bond between father and children, strongest between mothers and daughters and weakest between fathers and sons. Szydlik (1995) obtained results that at one point differed from the ones presented above. When adults were asked how close their relationship was to their various relatives, including their parents and their children, but not their in-laws, he found that mothers and daughters had the closest of the four parent-child relationships (percentage of persons answering "close" or "very close") and fathers and sons the least close relationship, as did the



**TABLE 2**  
**Correlations Between Relationship Quality of**  
**Grandparent-Parent Dyad and Age and Mate Value of Parent**

Relationship of Daughter or Son With Her or His	Correlations Between Relationship Quality			
	Daughter's		Son's	
	Age	Mate Value	Age	Mate Value
Mother	.11	.26**	.01	.15**
Father	.07	.32**	-.15*	.20**
Mother-in-law	-.13	.28**	.11	.24**
Father-in-law	-.14	.33**	.10	.20**

\* $p < .05$ . \*\* $p < .01$ .

authors and Rossi and Rossi (1990). However, the relationship between mother and son was, on average, somewhat better than the one between father and daughter. Whether this difference is due to differences in the samples, in survey questions, or in data presentation cannot be answered here.

The three reproductive determinants listed in Table 1 predicted the poorest relationship for the father-in-law/daughter-in-law dyad and the second poorest for the mother-in-law/daughter-in-law dyad. However, it is the latter relationship that is the poorest. The mean difference between the two dyads is significant,  $t(1, 961) = 4.772$ ,  $p = .000$ , as are all adjacent mean differences in Table 1, with the exception of the one between father and daughter and between mother and son,  $t(1, 961) = 1.850$ ,  $p = .065$ . This reversal of the bottom two dyads, unpredicted by our reproductive conditions, but suggested by folklore, is also reflected in a significant interaction between Consanguinity and Sex of Grandparent, MANOVA,  $F(1, 961) = 124.98$ ,  $p = .000$ , partial  $\eta^2 = .12$ . In-law female spouses are obviously less of a problem for grandfathers than for grandmothers. Can this be explained, at least post hoc?

The father-in-law/daughter-in-law relationship is, in one respect, a special relationship. This dyad has a direct reproductive potential, which no other grandparent-parent dyad has; that is, it involves two unrelated reproductive individuals of both sexes with the man usually being older than the woman. The other seven dyads are mismatches with respect to direct reproduction because of incest barrier, same sex, or age relation in the case of mother-in-law and son-in-law. We hypothesize post hoc that the reproductive potential of the father-in-law/daughter-in-law dyad contributes to a positive relationship. If this hypothesis was valid, the goodness (quality) of this relationship should covary with the mate value of the daughter-in-law.

The hypothesis was tested in a subsample of 370 participants (232 female, 138 male), where the mate value was a composite score of the  $z$ -transformed 7-point ratings of mother's and father's physical attractiveness, intelligence, chances to find another mate, prudence, job prospects, agreeableness/warmth, and self-confidence (the latter for father only) during the participant's childhood. Because mate value also depends on age, especially for women (Symons, 1979), the age of each parent at birth of participant also was collected. The results are presented in Table 2, which shows the correlation coefficients between the quality of the relationship of each grandparent-parent dyad and the parent's age and mate value. Our hypothesis requires that the correlations for the father-in-law/daughter-in-law dyad be the highest of the eight dyads. However, the correlation between age of daughter-in-law and quality of relationship to her father-in-law ( $r = -.14$ ) is only the second highest. With respect

to mate value, the correlation is numerically the highest with  $r = .33$ , but not significantly higher than the other correlations. In fact, all correlations between the quality of parent/grandparent relationship and parent's mate value are positive in slightly varying sizes. The hypothesis that the reproductive potential of the father-in-law/daughter-in-law dyad is the cause of the better relationship of the daughter-in-law to her father-in-law than to her mother-in-law was thus not supported. The data show that grandparents cherish high mate value in both their descendants and their descendants' mates. This makes evolutionary sense because the affiliate kin will become part of the parents' genetic lineage.

## DISCUSSION

We have shown that investment in progeny and emotional closeness of between-generation dyads is highly structured. This structure is only modestly affected by circumstances that do not tap reproductive conditions (Rossi & Rossi, 1990). The predictor variables addressed in our research account for a sizable share of the variance in the quality of intergenerational relations. Nepotistic investment was sex specific with respect to the investor and the linking kinperson for distant kin, but less so with respect to the sex of the beneficiary.

We looked at intergenerational nepotistic investment and relations from an evolutionary perspective. From this perspective, one asks for what purpose a phenotypic trait, in this case a relationship-specific investment, was designed. The answer to such a question does not conflict with proximate explanations. For example, Rossi and Rossi (1990) note correctly that the pervasive matrilineal bias in kin relations, that is, the fact that women are kin keepers, is due to the close mother-daughter bond. We were not satisfied with this explanation and asked *why* the mother-daughter bond is so close.

If cultural norms and values are familially transmitted, these transmissions should be structured similarly to intergenerational investment patterns, notwithstanding the possibility that social transmission structures also may vary with transmission content. Giving advice, providing financial resources, and teaching technical skills might be contents where male kinpersons are more involved than in emotional investment. But reproductive conditions are nonetheless equally relevant for various transmission contents, as can be seen in the transmission structures of testaments (Judge, 1995; Smith, Kish, & Crawford, 1987).

This study was not designed to illuminate processes of cultural transmission but to empirically demonstrate that, and explain why, the various familial relationships differ in measures of solicitude and closeness. However, we believe that this and other studies of kin relations guided by an evolutionary perspective can contribute to the understanding of the process of cultural transmission within the family. Although it has long been suggested that the affectionate ties between the cultural model and the recipient influence the ease and reliability of transmission, a finely structured theoretical framework to explain *why* some family relations are more affectionate than others is only emerging now with the introduction of evolutionary concepts to social psychology. Daly, Salmon, and Wilson (1997) argued that from an evolutionary perspective, the qualities of the various kin relations are expected to be highly specific. We agree and suggest that this specificity of relationships contributes to the shaping of transmission pathways ("transmission belts") (Schönplflug, 2001 [this issue]).

Theorists seem to agree that cultural transmission, or "cultural adoption" (Tooby & Cosmides, 1992), involves learning by observation. However, observational learning is highly selective, as becomes most apparent in a situation of high cultural variability. It would

indeed be surprising if this selectivity in the choice of models and traits was not influenced by the quality of the relationship between recipient and model.

Cultural transmission becomes an interesting problem only in as much as it implies the possibility of failed transmission. Cultural traits can get lost, either because they are not adopted or because they are actively exchanged for newly introduced ones. Only when there is competition between several cultural traits to be adopted by the next generation will the significance of specific kin relationships and other possible transmission pathways become apparent. The question of intergenerational cultural transmission thus has to be posed this way: What structures and processes determine whether a cultural trait is being conservatively passed along from one generation to the next? What structures and processes, on the other hand, promote cultural change?

There are reasons to question the assumption that familial social transmission of norms and values is the sole or most important process of cultural transmission. On one hand, repeated findings in the field of behavioral genetics (Plomin, DeFries, McClearn, & Rutter, 1997; Rowe, 1994; Tesser, 1993) point to genetic transmission, which, due to conventional genetics-insensitive socialization research designs, has frequently been erroneously interpreted as social transmission. Harris (1995, 1998), on the other hand, points to the peer group, and not the parents, as the main agent of social transmission of norms and values. It makes good evolutionary sense that children should extract as much investment as possible from their family of origin, while at the same time adopt the culture of their own generation within which they will encounter most of their potential competitors, allies, and mates. The empirical evidence for the presumed superior role of peer group influence provided by Harris, however, is largely restricted to language acquisition and is otherwise more anecdotal than systematic.

The transmission pathways between parents and children are the most frequently studied ones, although it has been suggested that the significance of parents as models is being grossly overestimated (Harris, 1995; Knafo & Schwartz, 2001 [this issue]). With respect to our own study, it is interesting to note that the quality of the parent-child relationship is frequently found to be positively correlated with the child's acceptance of the parents as cultural models (e.g., Hood, Spilka, Hunsberger, & Gorsuch, 1996; Schönplflug, 2001 [this issue]). We suggest that our own results on our participants' ranking of their relationships with grandparents and parents-in-law imply that future research will find a similar ranking pattern when the same family members are studied as potential cultural models.

A similar prediction can be made with respect to the specific family niche of the focal child recipient. Salmon and Daly (1998) have shown that Canadian students' closeness to their parents is influenced by birth order, which is considered to be the strongest proxy of a child's family niche (Sulloway, 1996). Firstborns were the birth rank most often naming their parents as the persons to whom they felt closest, followed by last-borns and then middle-borns. Not only does the quality of family relationships determine cultural adoption when we act within these relationships; to some degree, these relationships seem also to mold our personality such that they influence our choice of model outside the family. Sulloway (1996) provides impressive evidence for the paramount importance family relations have played in the history of scientific and other cultural revolutions in Western history. The author interprets his findings within the general evolutionary framework of parent-offspring conflict (Trivers, 1974), which is driven by sibling competition for parental care. Sulloway's (1996, 1999, in press) results can be taken as a warning that it is not appropriate to restrict the study of intrafamilial cultural transmission to different model-recipient dyads. In the long run, we are to identify the individual family niche in a network of relations that seems to shape the

recipient's personality and thereby his or her inclination to adopt, to reject, or to actively exchange a cultural trait for a new one.

## REFERENCES

- Alcock, J. (1998). *Animal behavior: An evolutionary approach* (6th ed.). Sunderland, MA: Sinauer.
- Alexander, R. D. (1987). *The biology of moral systems*. New York: Aldine.
- Baker, R. R., & Bellis, M. A. (1995). *Human sperm competition. Copulation, masturbation and infidelity*. London: Chapman & Hall.
- Boyd, R., & Richerson, P. J. (1985). *Culture and the evolutionary process*. Chicago: University of Chicago Press.
- Brédart, S., & French, R. M. (1999). Do babies resemble their fathers more than their mothers? A failure to replicate Christenfeld and Hill (1995). *Evolution and Human Behavior*, 20, 129-135.
- Buss, D. M. (1999). *Evolutionary psychology. The new science of mind*. Boston: Allyn & Bacon.
- Christenfeld, N.J.S., & Hill, E. A. (1995). Whose baby are you? *Nature*, 378, 669.
- Clutton-Brock, T. H., & Vincent, A.J.C. (1991). Sexual selection and the potential reproductive rates of males and females. *Nature*, 351, 58-60.
- Daly, M., Salmon, C., & Wilson, M. (1997). Kinship: The conceptual hole in psychological studies of social cognition and close relationships. In J. A. Simpson & D. T. Kenrick (Eds.), *Evolutionary social psychology* (pp. 265-296). Mahwah, NJ: Lawrence Erlbaum.
- Daly, M., & Wilson, M. (1980). Discriminative parental solicitude: A biological perspective. *Journal of Marriage and the Family*, 42, 277-288.
- DeKay, W. T. (1995, July). *Grandparent investment and the uncertainty of kinship*. Paper presented at the seventh annual meeting of the Human Behavior and Evolution Society, Santa Barbara, CA.
- Duvall, E. M. (1954). *In-laws: Pro & con*. New York: Association Press.
- Eisenberg, A. R. (1988). Grandchildren's perspectives on relationships with grandparents: The influence of gender across generations. *Sex Roles*, 19, 205-217.
- Euler, H. A., & Weitzel, B. (1996). Discriminative grandparental solicitude as reproductive strategy. *Human Nature*, 7, 39-59.
- Fischer, L. R. (1983). Transition to grandmotherhood. *International Journal of Aging and Human Development*, 16, 67-78.
- Gangestad, S., & Snyder, M. (1985). "To carve nature at it's joints": On the existence of discrete classes in personality. *Psychological Review*, 92, 317-349.
- Gaulin, S.J.C., & Schlegel, A. (1980). Paternal confidence and paternal investment: A cross cultural test of a sociobiological hypothesis. *Ethology and Sociobiology*, 1, 301-309.
- Geary, D. C. (1998). *Male, female: The evolution of human sex differences*. Washington, DC: American Psychological Association.
- Hartshorne, T. S., & Manaster, G. L. (1982). The relationship with grandparents: Contact, importance, role conceptions. *International Journal of Aging and Human Development*, 15, 233-245.
- Harris, J. R. (1995). Where is the child's environment? *Psychological Review*, 102, 458-489.
- Harris, J. R. (1998). *The nurture assumption: Why children turn out the way they do*. New York: Free Press.
- Hoffman, E. (1978-1979). Young adults' relations with their grandparents: An exploratory study. *International Journal of Aging and Human Development*, 10, 299-310.
- Hood, R. W., Jr., Spilka, B., Hunsberger, B., & Gorsuch, R. (1996). *The psychology of religion. An empirical approach* (2nd ed.). New York: Guilford.
- Hrdy, S. B. (1999). *Mother nature: Natural selection and the female of the species*. London: Chatto & Windus.
- Judge, D. S. (1995). American legacies and the variable life histories of women and men. *Human Nature*, 6, 291-323.
- Kahana, B., & Kahana, E. (1970). Grandparenthood from the perspective of the developing grandchild. *Developmental Psychology*, 3, 98-105.
- Kennedy, G. E. (1990). College students' expectations of grandparent and grandchild role behaviors. *The Gerontologist*, 30, 43-48.
- Knafo, A., & Schwartz, S. H. (2001). Value socialization in families of Israeli-born and Soviet-born adolescents in Israel. *Journal of Cross-Cultural Psychology*, 32(2), 229-244.
- Littlefield, C. H., & Rushton, J. P. (1986). When a child dies: The sociobiology of bereavement. *Journal of Personality and Social Psychology*, 51, 797-802.
- Marlowe, F. (1999). Showoffs or providers? The parenting effort of Hadza men. *Evolution and Human Behavior*, 20, 391-404.
- Mathews, S. H., & Sprey, J. (1985). Adolescents' relationships with grandparents: An empirical contribution to conceptual clarification. *Journal of Gerontology*, 40, 621-626.

- McLain, D. K., Setters, D., Moulton, M. P., & Pratt, A. E. (2000). Ascription of resemblance of newborns by parents and nonrelatives. *Evolution and Human Behavior*, *21*, 11-23.
- Pashos, A. (2000). Does paternal uncertainty explain discriminative grandparental solicitude? A cross-cultural study in Greece and Germany. *Evolution and Human Behavior*, *21*, 97-109.
- Plomin, R., DeFries, J. C., McClearn, G. E., & Rutter, M. (1997). *Behavioral genetics* (3rd ed.). New York: Freeman.
- Porter, R. (1987). Kin recognition: Functions and mediating mechanisms. In C. B. Crawford, M. S. Smith, & D. Krebs (Eds.), *Sociobiology and psychology: Ideas, issues and applications* (pp. 175-203). Hillsdale, NJ: Lawrence Erlbaum.
- Regalski, J. M., & Gaulin, S.J.C. (1993). Whom are Mexican infants said to resemble? Monitoring and fostering paternal confidence in the Yucatan. *Ethology and Sociobiology*, *14*, 97-113.
- Rossi, A. S., & Rossi, P. H. (1990). *Of human bonding: Parent-child relations across the life course*. New York: Aldine.
- Rowe, D. C. (1994). *The limits of family influence*. New York: Guilford.
- Russell, R.J.H., & Wells, P. A. (1987). Estimating paternity confidence. *Ethology and Sociobiology*, *8*, 215-220.
- Salmon, C. A. (1999). On the impact of sex and birth order on contact with kin. *Human Nature*, *10*, 183-197.
- Salmon, C. A., & Daly, M. (1996). On the importance of kin relations to Canadian women and men. *Ethology and Sociobiology*, *17*, 289-297.
- Salmon, C., & Daly, M. (1998). Birth order and familial sentiment: Middleborns are different. *Evolution and Human Behavior*, *19*, 299-312.
- Schönpflug, U. (2001). Intergenerational transmission of values: The role of transmission belts. *Journal of Cross-Cultural Psychology*, *32*(2), 190-201.
- Smith, M. S. (1988). Research in developmental sociobiology: Parenting and family behavior. In K. B. MacDonald (Ed.), *Sociobiological perspectives on human development* (pp. 271-292). New York: Springer.
- Smith, M. S., Kish, B. J., & Crawford, C. B. (1987). Inheritance of wealth as human kin investment. *Ethology and Sociobiology*, *8*, 171-181.
- Steinbach, I., & Henke, W. (1998). Grosselterninvestment—Eine empirische interkulturelle Vergleichsstudie [Grandparental investment—An empirical cross-cultural comparative study]. *Anthropologie*, *36*, 293-301.
- Sulloway, F. (1996). *Born to rebel: Birth order, family dynamics, and creative lives*. New York: Pantheon.
- Sulloway, F. (1999). Birth order. In M. A. Runco & S. R. Pritzker (Eds.), *Encyclopedia of creativity* (Vol. 1., pp. 189-202). San Diego, CA: Academic Press.
- Sulloway, F. (in press). Birth order, sibling competition, and human behavior. In P. S. Davies & H. R. Holcomb III (Eds.), *The evolution of minds: Psychological and philosophical perspectives*. Boston: Kluwer.
- Symons, D. (1979). *The evolution of human sexuality*. New York: Oxford University Press.
- Szydlak, M. (1995). Die Enge der Beziehung zwischen erwachsenen Kindern und ihren Eltern—und umgekehrt [The closeness of relationship between adult children and their parents—and vice versa]. *Zeitschrift für Soziologie*, *24*, 75-94.
- Tabachnik, B. G., & Fidell, L. S. (1996). *Using multivariate statistics* (3rd ed.). New York: HarperCollins.
- Tesser, A. (1993). The importance of heritability in psychological research: The case of attitudes. *Psychological Review*, *93*, 129-143.
- Tooby, J., & Cosmides, L. (1992). The psychological foundations of culture. In J. H. Barkow, L. Cosmides, & J. Tooby (Eds.), *The adapted mind* (pp. 19-136). New York: Oxford University Press.
- Trivers, R. L. (1972). Parental investment and sexual selection. In B. Campbell (Ed.), *Sexual selection and the descent of man 1871-1971* (pp. 136-179). Chicago: Aldine.
- Trivers, R. L. (1974). Parent-offspring conflict. *American Zoologist*, *14*, 249-264.

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