

Substitute Parenting

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Substitute parenting presents a puzzle for evolutionists

Evolutionary theory has straightforward relevance to parental behavior. The behavioral inclinations that natural selection favors are those that contribute to Darwinian fitness, that is, to one's expected genetic posterity (in the statistical, not the psychological, sense of "expected"). The primary avenue by which people and other creatures promote their fitness is by producing viable young who will eventually reproduce. Parental motives, emotions, and actions are therefore prime targets of selection.

"Parental investment" (Trivers, 1972) is a limited resource that parents have evolved to allocate in ways that can be expected to maximize the eventual reproductive success of one's total progeny (Clutton-Brock, 1991; Royle, Smiseth & Kolliker, 2012). This means investing preferentially in young whose individual attributes predict that the investment will be most helpful, but above all, it means investing preferentially in one's *own* young (Daly & Wilson, 1980). Why a Darwinian would predict that parents will avoid squandering their limited resources on unrelated young should be obvious: Selection favors those genes and traits that enhance their carriers' fitness relative to the fitness of conspecific rivals.

As theory would lead us to expect, parents of many animal species indeed care discriminatively for their own young, while spurning others, using a variety of complex psychophysiological adaptations to make the distinction (Daly & Wilson, 1988, 1995). And yet, despite abundant evidence that animal parents indeed care selectively for their own offspring, our own species is one in which non-parents often serve as children's primary caregivers, sometimes temporarily ("fosterage"), and sometimes indefinitely or permanently ("adoption"). When and why this occurs is the focus of this chapter.

The initially puzzling phenomenon of substitute parenting in *Homo sapiens* falls into three broad categories that require distinct treatments. One major subtype of substitute parenting entails genetic relatives, especially grandparents, stepping up to replace parents who cannot or will not care for their children, and promoting their own inclusive fitness by so doing. A second subtype is stepparenthood, which is most persuasively interpreted as a component of "mating effort". Both stepparenting and replacement care by genetic relatives are cross-culturally ubiquitous and almost certainly ancient, and the behavior of substitute parents in these contexts is therefore likely to exhibit evolutionary adaptation to the characteristic opportunities and pitfalls associated with these recurrent social dilemmas. The same cannot be said, however, for the third major subtype of substitute parenting, namely adoption by non-relatives. Families sometimes adopt children to fill otherwise vacant social and familial roles or niches, and they foster or adopt children as a component of reciprocity and citizenship within close-knit communities. It is the modern practice of "adoption by stranger" that presents the greatest

challenge to a simple conception of human beings as evolved fitness maximizers, by necessitating that we ask why large numbers of people elect to treat unrelated children as if they were their own.

Each of these three broad categories of substitute parenting and their possible explanations will be discussed in a subsequent section of this chapter.

Nepotistic alloparenting and "the grandmother hypothesis"

In the non-state societies that provide our best models of the social circumstances in which humans evolved, babies are typically born into groups that consist largely of close relatives (Hrdy 1999, 2009; Huber & Breedlove, 2007). The most assiduous parental helpers tend to be the children's grandparents, followed by aunts and older siblings (Hrdy, 2009; Kramer 2005, 2010; Sear & Mace, 2008; Tanskanen & Danielsbacka, 2018).

In hunting and gathering societies, grandmothers are often more efficient food producers than their adult daughters, and are committed, competent providers of direct childcare (Hawkes *et al.*, 1997). Indeed, a case can be made that natural selection has "designed" human grandmothers to be specialized alloparents. Why, after all, should women cease to be potential reproducers when they can still function effectively in other domains? Women's reproductive capability comes to an end at about the same age as is the case in our nearest relatives, the great apes, but unlike female apes, women continue to be robust net economic producers for many years after their last child has been weaned. Furthermore, humans reproduce at shorter intervals than apes in spite of the burden imposed by our species' prolonged childhood dependency. How do women manage this feat? Hawkes (2003) has proposed that the contributions of grandmothers provide the answer, and that the inclusive fitness gains from grandmaternal investment explain the evolution of our species' exceptional postmenopausal life span.

Hawkes's "grandmother hypothesis" remains controversial for various reasons, the most important of which is that demographic data from natural-fertility populations, including some hunter-gatherers, indicate that grandmothing may not yield sufficient gains in inclusive fitness, on average, to offset the costs of ceasing to reproduce. However, age-specific mortality and grandmaternal impacts in past environments may have differed from what we see in any contemporary population. For the arguments and counter-arguments, see the commentaries and reply following Hawkes *et al.* (1997). In any event, regardless of whether menopause itself or postmenopausal longevity are properly interpreted as adaptations "for" alloparenting, there is no question that grandmothers indeed provide a lot of help to their adult daughters, help that often has substantial positive effects on child survival and functioning (Hrdy, 2009; Scelza, 2011; Sear & Mace, 2008, 2009).

Given their prominence among alloparental helpers, it is no surprise that grandmothers are also the relatives who are most likely to take over as primary caregivers when children cannot be cared for by their parents. One context in which grandmothers are prominent as primary caregivers is when official agencies in the developed world remove children from parents who have been abusive, neglectful, or dysfunctional. The preferred solution in such cases used to be placing the child with unrelated foster parents, but for a combination of reasons, preferential placement with kin is now widely favored (Daly & Perry, 2011), and it turns out that "kin" mostly means grandmothers. For example, Perry, Daly & Macfarlan (2014) analyzed kin placements at a Canadian child protection agency over a 3-year period, and reported that in 318

placements with the focal child's genealogical relatives, a grandmother was the primary caregiver in 199 (63%). Such a predominance of grandmothers among non-parental caregivers is not exceptional (e.g. Coall & Hertwig 2010; Hrdy 2009; Zinn 2010).

From an evolutionary perspective, this is unsurprising. The inclusive fitness returns from child care depend on relatedness, and in an outbred population, grandparents are closer relatives of a focal child ($r = 0.25$) than anyone other than its full siblings and the parents themselves. Moreover, regardless of whether the trajectory of human female fertility is correctly interpreted as reflecting adaptation "for" grandmothering, that fertility trajectory has the effect that senior women typically lack options for promoting their fitness other than indirectly. Aunts and uncles who are full siblings of a focal child's parent are also relatives of degree 0.25, and they are in fact the next most common substitute caregivers in the child protection context after grandparents (e.g. Perry *et al.*, 2014; Zinn, 2010). But the aunts and uncles of a child in need of care are usually of reproductive age themselves, and are therefore likely to have more competing demands than is the case for the child's grandparents. And whereas the child's siblings are even closer kin, they are often too young to take over as primary caregivers, and if old enough, they are likely to have their own romantic and family lives to attend to. Even so, older siblings *are* extremely important alloparental helpers (Kramer, 2005, 2010), and in dire circumstances such as in HIV/AIDS-decimated populations, even young children are likely to become the primary caregivers of their younger siblings (e.g. Mturi, 2012).

In the Perry *et al.* study, maternal grandmothers outnumbered paternal grandmothers as emergency caregivers of children removed from their parents by almost 2 to 1 (130 maternal *versus* 69 paternal). This difference could derive from the specific circumstances of the child protection context, in which children's fathers may be unusually often absent or even unknown. However, the predominance of the maternal side was especially striking among grandmothers with major health problems and/or a lack of social support, and despite these challenges, placements with maternal kin were substantially more stable than those with paternal kin, with the latter twice as likely to "break down" such that the child moved on to another temporary home. These facts suggest that maternal grandparents were simply more committed, on average, than their paternal counterparts, an interpretation that gibes with considerable evidence that children's relationships with their mothers' mothers in the modern west are generally stronger and warmer than those with their fathers' mothers (P.K. Smith, 1991; Daly & Perry, 2017).

Why should this be so? Chapais (2008) has proposed that female solidarity within matrilineal is an ancient primate adaptation that has been overlaid, rather than fundamentally revised, by the occasional advent of pair bonds and paternal investment. Alexander (1974) was perhaps the first to explicitly argue that the uncertainty of paternity makes the progeny of one's daughters more reliable fitness vehicles than the progeny of one's sons. Following this line of thought, M.S. Smith (1981, 1988) proposed that maternal grandmothers should be the most solicitous grandparents, followed by maternal grandfathers and paternal grandmothers, each of whose putative genetic connection to the child has one uncertain paternal link, and then by paternal grandfathers whose connection includes two uncertain links. Results of Smith's interview study indicated that retrospective recall of one's relationship with one's grandparents upheld the predicted ordering, as have several subsequent studies of differential closeness and investment (Chrastil *et al.*, 2006; Danielsbacka *et al.*, 2011; Euler & Weitzel, 1996). Whether uncertain paternity can really be implicated as a source of these rankings remains questionable, however, since the combination of strong mother-daughter ties and a sex difference in the

inclination to nurture children could generate the same rank ordering even if paternity were as certain as maternity. Moreover, even if misattributed paternity were vanishingly rare, investing preferentially in a daughter's children might still be adaptive by virtue of helping maintain the daughter's capacity for further reproduction and nepotistic investment in her natal kin, in which grandmothers have a greater stake than in the corresponding capacities of their daughters-in-law (Perry & Daly, 2017).

In many human societies, newlyweds are expected to reside with the groom's family. Such "patrilocal" norms are typically associated with a cultural emphasis on kinship ties through fathers, while matrilineal links are downplayed. (Our modern western society's normative use of patronyms is a vestige of this sort of patrilineal kinship system.) But even in patrilineal, patrilocal societies, women continue to play a role in the lives of their adult daughters' children. Rural Bangladesh provides an example. Patrilocality, purdah (the normative seclusion of women), poverty, and seasonal flooding all make it difficult for married women to maintain contact with their natal families, but virtually every young mother nevertheless visits her own mother regularly (Perry, 2017). Young children usually coreside in the same family compound as the paternal grandmother and often in the same household, and yet the maternal grandmother is more likely to take over as primary caregiver in the event of a divorce or the death of either parent (Perry, under review). In intact families, the relatively accessible paternal grandmothers do provide more child-care assistance than maternal grandmothers, but the former help less than would be predicted on the basis of co-residence and proximity, and the latter help more (Perry, 2016). Similarly, social bonds with and through the mother's mother remain surprisingly strong in some other patrilineal, patrilocal societies, too (review by Daly & Perry, 2017).

According to one version of the "grandmother hypothesis", the psychology of grandmotherhood evolved to redirect older women's reproductive efforts toward support of their daughters' children, and the findings above suggest that senior women may feel a deeper emotional commitment to their daughters' children than to those of their sons. Could it be that it is only maternal grandmothers who are genuinely helpful? Some studies (e.g. Sheppard & Sear, 2016) suggest that the answer is yes. Two cross-cultural reviews (Huber & Breedlove, 2007; Strassmann & Garrard, 2011) have concluded that maternal grandparents have a beneficial effect on grandchild survival, whereas paternal grandparents have no demonstrable impact. Strassmann & Garrard's (2011) meta-analytic study focused on patrilineal and patrilocal societies, and its results suggest that even where paternal grandparents are more accessible than maternal grandparents, they are less beneficial to a grandchild's survival. Some results from European history (Volland & Beise, 2002) seem to have the same implication.

Fox *et al.* (2010) have proposed that our genetic sex-determination system may have had some surprising evolutionary effects on grandparenting. XX individuals develop as female, and XY individuals as male; when a woman reproduces, she transmits either X, with equal likelihood, regardless of the child's sex, but a father necessarily transmits his only X to each daughter and his only Y to each son. A result is that the chances that a given grandmaternal X chromosome has a descendant copy in a grandchild vary: it has a 25% probability of appearing in any child of her daughter (just like a typical nuclear gene), but it has a 50% chance of being transmitted to a son's daughter and is never transmitted to a son's son. Suppose, then, that a mutation that affects how a woman responds to her grandchildren were to arise on the X. Such a mutation could be favored by selection if its effect were to make the grandmother invest in her son's daughters at the expense of their brothers. Indeed, such a mutation could, in principle,

increase in prevalence all the way to universality, even if it yielded only a small gain in the fitness of one's granddaughters through sons at the expense of destroying their brothers! This specific sort of "selfish gene" effect is called "sexually antagonistic zygotic drive", and there are a number of phenomena that suggest that it really does operate in some nonhuman animals (Rice *et al.*, 2008).

At first glance, the theory sounds preposterous. Wouldn't other interested parties keep paternal grandmothers away from their grandsons if their impacts were predictably harmful? And because nuclear genes have an equal fitness stake in all grandchildren and are vastly more numerous than X-chromosome genes, wouldn't the whole grandmaternal genome have evolved to suppress these renegade X effects? Those are indeed reasonable expectations, and yet there is some intriguing evidence that grandmothers "play favorites" in ways that match the theory: Fox *et al.* (2010) analyzed the association between grandmaternal presence and child survival in seven disparate data sets, and found that the apparent impact of a grandmother was almost always positive *except* for the case of sons' sons, who survived less well in the grandmother's presence than in her absence in every society! These ostensible effects may yet be explained by unobserved variables - perhaps children who live near their paternal versus maternal grandmothers differ systematically in other ways, for example - but in light of present knowledge, this initially far-fetched theory certainly deserves further testing.

Stepparenthood

A lone parent is often in a difficult situation. Whether never-married, widowed, divorced, or abandoned, mothers who find themselves without a supportive spouse commonly seek help from their natal families or even turn their children over to the care of their own mothers. The single mother who perseveres as her children's primary caregiver and also wishes to find a new partner will be disadvantaged in the mating market. From a suitor's perspective, the prospect of becoming a stepparent to a predecessor's child is treated as a cost, not a benefit, in remarriage negotiations, and stepchildren are sources of marital instability, conflict, and violence (Becker *et al.*, 1978; White & Booth, 1985; Daly, Singh & Wilson, 1993; Daly & Wilson, 1996; Campbell *et al.*, 2003).

Stepparental investment has to be understood as a form of mating effort, not parental effort (Rohwer, Herron & Daly, 1999). The obligations of co-parenting are undertaken as part of the give-and-take of establishing a sexual partnership, and it is the partnership, not the parental role, that the stepparent seeks. It follows that we should not expect the average stepparent to be as selfless and devoted as the average genetic parent, and indeed, although most stepparents provide adequate care and some go far beyond mere adequacy, there is abundant evidence that their contributions to children's well-being fall short, on average, of what genetic parents provide.

The most dramatic such evidence is the much greater rates of abuse and death at the hands of stepparents than of genetic parents, hazards that apparently arise because some stepparents resent their obligations and are actively hostile to their stepchildren (Daly & Wilson, 1998, 2008). In the case of non-fatal child abuse, the over-representation of stepchildren as victims might, in principle, have been due to biases in detecting or recording abuse, rather than to real differences in incidence. If such biases were the whole story, however, they should be reduced or abolished in the most extreme and unequivocal cases such as fatal batterings, when in fact, those are precisely the cases in which excess risk to stepchildren is maximal. The most thorough analyses are for Canada, where children under 5 years of age were beaten to death by stepfathers

at a rate of 321.6 deaths per million child-years at risk (i.e. residing with stepfathers) in 1977-1990, compared to a death rate at the hands of birth fathers of 2.6 per million child-years at risk (Daly & Wilson, 2001). Data from Great Britain are similar in that they, too, indicate that the risk of fatal battering by a father figure is elevated more than 100-fold in stepfather households; Australian data indicate an even larger differential (Daly & Wilson, 2008).

Although elevated risk to stepchildren is the most extensively documented fact in the family violence literature, efforts to cast doubt on the phenomenon have been oddly persistent and vehement. Gelles & Harrop (1991) claimed to have debunked all prior evidence on the basis of a telephone survey in which interviewees were no more likely to admit assaulting their stepchildren in anger than their genetic children; this would hardly warrant mention were it not for the fact that the American Medical Association has notified clinicians that steprelationship is not, after all, a genuine risk factor for child maltreatment on the sole basis of this survey (Daly & Wilson, 1998)! Other writers have tried to explain away even the data on lethal abuse as reflecting nothing more than biased detection, a claim that is easily shown to be absurd: *Child Fatality Review Panels* have indeed uncovered large numbers of child maltreatment deaths that were initially miscategorized, but stepparents are massively overrepresented as perpetrators in those cases, too, and even if *every* "accidental" infant death were really a successfully concealed paternally perpetrated murder, there aren't enough such accidental deaths to raise the rate of fatal batterings by fathers enough to match the rate by stepfathers (Daly & Wilson, 2008).

The most concerted efforts to discredit the evidence that stepparents are more dangerous than birth parents have been those of a Swedish zoologist, Hans Temrin, and his collaborators. Temrin, Buchmayer & Enquist (2000) initially claimed to have demonstrated that Swedish stepfathers are no more likely to kill children than birth fathers, but they had simply done the calculations wrong and their own data in fact showed a substantial differential in the usual direction (Daly & Wilson, 2001). Grudgingly conceding the error, Temrin, Nordlund & Sterner (2004) then presented new data indicating that although stepchildren incur excess risk when very young, that differential disappears, and furthermore that Swedish parents with both stepchildren and genetic offspring were actually slightly more likely to kill the latter. What this interesting result appears to reflect is the fact that hostile, assaultive child murders are extremely rare in Sweden and are overwhelmed numerically by a very different sort of case, namely murder-suicides by depressed parents who imagine themselves to be taking their loved ones with them (Somander & Rammer, 1991). This is certainly not the case elsewhere, and it raises the interesting question of whether stepparental antipathy and resentment are less severe in Sweden than in other developed countries, perhaps because the Swedish welfare state reduces their obligations and hence their resentment. Finally, Temrin *et al.* (2011) purport to have demonstrated that the excess risk of death at the hands of stepparents can be entirely accounted for by the correlated attributes of becoming a stepparent. Hilton *et al.* (2015) have made the most direct attempt to see if this interpretation can be upheld elsewhere, and conclude that it cannot, at least in Canada. More generally, in all of the above work, Temrin and his collaborators have persisted in lumping together angry assaults and acts of suicidal depression, which are crucially different (Daly & Wilson, 1994; Weekes-Shackelford & Shackelford, 2004; Harris *et al.*, 2007), and they have ignored the fact that in every analysis except their own, parents who have both stepchildren and birth children in the same household have been found to be selectively violent toward the stepchildren, not the birth children (Daly & Wilson, 1985, 2008; Hilton *et al.*, 2015).

It is important to note that although children are much more likely to be assaulted or killed by a stepparent than by a birth parent, such violence is nevertheless rare. Nonviolent manifestations of discrimination against stepchildren, by contrast, are not at all rare. Stepchildren routinely receive less financial assistance and other support, net of effects of the family's wealth, than children living with both birth parents (e.g., Anderson *et al.*, 1999; Case, Lin & McLanahan, 2000; Case & Paxson, 2001; Emmott & Mace, 2015; Sundström, 2013; Zvoch, 1999); suffer excess morbidity and mortality (e.g. Fergusson, Fleming & O'Neill, 1972; Wadsworth *et al.*, 1985; Tooley *et al.*, 2006; but see Malvaso *et al.*, 2015); and have poorer adult outcomes in many ways, not just in comparison to children living with two genetic parents but even in comparison to those living with single mothers (e.g. Biblarz & Raftery, 1999; McLanahan & Sandefur, 1994). The examples cited above are from modern nation states (including Sweden), but the available evidence (reviewed by Daly & Wilson, 2008) indicates that stepchildren often incurred even greater disadvantages in small-scale, non-state societies, and in the past. A telling indicator of the precarious nature of their experience is that stepchildren's levels of the stress hormone cortisol were chronically elevated, relative to other children in similar material circumstances, in a study of Dominican villagers (Flinn & England, 1995).

Hundreds of popular books offer advice on how to navigate the characteristic conflicts of stepfamily life, but their empirical content seldom if ever goes beyond anecdotes. Family counsellors appear to be unanimous in cautioning against efforts to minimize or ignore the differences between stepfamily relationships and genetic family relationships, but there is no consensus on the essential nature of those differences. Most stepfamily research has been carried out in a single country, and explicit cross-national comparison of stepfamily functioning and stepchildren's disadvantages is needed. It seems, for example, that Swedish stepchildren suffer an elevated risk of violence to a lesser degree than is the case in several other countries, but no efforts have yet been made to compare the magnitude of this "Cinderella effect" cross-nationally or to seek its determinants. Such research may be especially likely to have policy implications.

Adoption

From an evolutionary perspective, cases in which substitute parents are not related to their wards are particularly puzzling. The idea that stepparenting is an investment in the mating relationship, not the child, provides a partial answer, but what about other cases of adoption. If natural selection favors investing one's efforts and resources in projects that are likely to result in the replication of one's own genes, not those of one's rivals, why does adoptive parenthood even exist?

Let us define "adoption" as the act of assuming parental responsibility for a dependent child who is not one's own, with both a presumption of permanence and some broader social recognition of the adopting party's status as the child's *de facto* and *de jure* parent. By this definition, adoption is certainly not peculiar to the modern world. Indeed, the proportion of children who are raised by adoptive parents rather than by birth parents is surprisingly high in many small-scale, traditional societies (e.g. Carroll, 1970; Silk, 1980; Damas, 1983; Reghupathy et al., 2012; Decaluwe et al., 2015). It must be noted, however, that in these face-to-face societies, in which adoptions are arranged privately without the involvement of governments or bureaucracies, adoptive parents are almost always the adoptee's close kin, especially grandmothers and aunts (Silk, 1987, 1990). Thus, despite some assertions to the contrary (e.g.

Palacios & Brodzinsky, 2010), the modern practice of adoption by non-relatives is neither cross-culturally universal nor truly ancient, and is arguably something for which our evolved psychology is not specifically prepared.

In societies like those in which we evolved, people who dwelt in close proximity were apt to be close kin, and even an indiscriminate inclination to nurture children within households, camps, and bands could have been functionally nepotistic. Might these considerations suffice to explain the human animal's willingness to adopt non-relatives, as a sort of "mistake": a byproduct of a generalized beneficence toward children that was fitness-promoting in ancestral social environments? There is surely something to this idea. A great many people find babies appealing regardless of whether they are related to them, so much so that Hrdy (2009) has proposed that babies constitute "sensory traps" for women and perhaps even for men. Preston (2013) has made the case that a generalized positive response to babies was adaptive in ancestral environments and was foundational to the evolution of the human animal's exceptional empathic and altruistic responsiveness. Nevertheless, parental-like solicitude is *not* indiscriminate. Women regularly report that after giving birth, they experience a burgeoning sense that their babies are uniquely wonderful and worthy (Klaus & Kennell, 1976), and as for fathers, paternal affection can be shattered by a revelation of non-paternity (Daly & Wilson, 1988). And of course, there is abundant evidence that stepparents systematically withhold investment relative to birth parents, as we have seen.

So there is clearly more going on in parental responsiveness than mere reflex-like responses to the "sensory trap" of an appealing child, and yet the idea that people possess an evolved preparedness to alloparent may still be valid and of relevance to the puzzle with which we are concerned. Moreover, a strong urge to be a parent may be thwarted by infertility; fifty years ago, this was the prototypical context of non-relative adoptions in the developed world, and adoption is still a frequent "second-best" recourse of infertile couples today (e.g. Kirk, 1964; Hollingsworth, 2000; Bausch, 2006; Park & Hill, 2014).

In the modern west, children who are adopted by non-relatives tend to be well cared for, more or less as if they were their adoptive parents' genetic progeny (e.g. Judge & Hrdy, 1992). Outcome data may sometimes even indicate that unrelated adoptees receive more parental investment than genetic progeny, but adoptive parents are substantially more affluent, on average, than parents in general, and Hamilton, Cheng & Powell (2007) have shown that controlling for parental means eliminates the adoptees' apparent advantage. Unfortunately, these authors portrayed their finding that adoptees are not discriminated against as "inconsistent" with "evolutionary science's kin selection theory", apparently supposing (as is all too common among social scientists) that inclusive fitness theory can be falsified by any demonstrated failure to choose the course of action that maximizes inclusive fitness. This is the same fallacy as supposing that voluntary childlessness falsifies Darwinism.

That said, any instance in which parental discrimination is lacking does indeed present a challenge for evolutionists (Daly & Wilson, 1988). In the case of human adoption, the puzzle is to some degree resolved when we recognize that it is only since the relatively recent introduction of legislated screening of applicants that adoption has ceased to be predominantly exploitative. For centuries, children were adopted to serve as cheap, controllable labor, and were routinely prevented from marrying and obliged to repay their adoptive parents by providing eldercare (e.g. Boswell, 1988; Holt, 1994; Daly & Perry, 2011).

The modern practice of treating unrelated adoptees as if they were one's own children may be best understood as a novelty against which we have evolved no specific "defenses" because such adoptions never presented a recurrent threat to fitness in ancestral environments. Many interesting questions about the psychology of adoptive kinship that might speak to the adequacy of this interpretation remain unexplored. Are there systematic qualitative differences between adoptive and birth parent-child relationships with respect to sentiments and cognitions? Might it be the case that successful adoptive relationships are grounded less in a co-opting of evolved kinship psychology than in psychological processes appropriate to reciprocity and friendship? Are adoptive parents as eager to see their children reproduce, and as smitten with the resultant grandchildren, as genetic parents? These are sensitive issues, which may be difficult to study without giving offense, but the answers could have real value.

Although exploitative adoption is largely a thing of the past, adoptive family relations continue to be fraught with difficulties, not all of which seem to be explicable as results of the challenges that the children confronted before they were adopted (e.g. Barth *et al.*, 1988; Smith *et al.*, 2006). As is the case with grandmothering and stepparenting, so, too, with modern adoption: we believe that there are opportunities for much more evolution-minded research on its psychological underpinnings, and that such research could have applied utility.

References

- Alexander, R.D. (1974). The evolution of social behavior. *Annual Review of Ecology & Systematics*, **5**, 325-383.
- Anderson, K.G., Kaplan, H. & Lancaster, J.B. (1999). Paternal care by genetic fathers and stepfathers. I: Reports from Albuquerque men. *Evolution & Human Behavior*, **20**, 405-431.
- Barth, R.P., Berry, M., Yoshikami, R., Goodfield, R.K., & Carson, M.L. (1988). Predicting adoption disruption. *Social Work*, **33**, 227-233.
- Bausch, R.S. (2006). Predicting willingness to adopt a child: a consideration of demographic and attitudinal factors. *Sociological Perspectives*, **49**, 47-65.
- Becker G.S., Landes, E.M., & Michael, R.T. (1977). An economic analysis of marital instability. *Journal of Political Economy*, **85**, 1141-1187.
- Biblarz, T.J. & Raftery, A.E. (1999). Family structure, educational attainment, and socioeconomic success: rethinking the 'pathology of matriarchy'. *American Journal of Sociology*, **105**, 321-365.
- Boswell, J. (1988). *The kindness of strangers: the abandonment of children in western Europe from late antiquity to the renaissance*. Chicago IL: University of Chicago Press.
- Campbell, J.C., Webster, D., Koziol-McLain, J., Block, C., Campbell, D., Curry, M.A., Gary, F., Glass, N., McFarlane, J., Sachs, C., Sharps, P., Ulrich, Y., Wilt, S.A., Manganello, J, Xu, X., Schollenberger, J., Frye, V. & Laughton, K. (2003). Risk factors for femicide in abusive relationships: results from a multisite case control study. *American Journal of Public Health*, **93**, 1089-1097.
- Carroll, V., ed. (1970). *Adoption in eastern Oceania*. Honolulu HI: University of Hawaii Press.
- Case, A., Lin, I.-F. & McLanahan, S. (2000). How hungry is the selfish gene? *The Economic Journal*, **110**, 781-804.

- Case, A. & Paxson, C. (2001). Mothers and others: who invests in children's health? *Journal of Health Economics*, **20**, 301-328.
- Chapais, B. (2008). *Primeval kinship: how pair-bonding gave birth to human society*. Cambridge MA: Harvard University Press.
- Chrastil, E.R., Getz, W.M., Euler, H.A. & Starks, P.T. (2006). Paternity uncertainty overrides sex chromosome selection for preferential grandparenting. *Evolution & Human Behavior*, **27**, 206-223.
- Clutton-Brock, T.H. (1991). *The evolution of parental care*. Princeton NJ: Princeton University Press.
- Coall, D.A., & Hertwig, R. (2010). Grandparental investment: past, present and future. *Behavioral & Brain Sciences*, **33**, 1-19
- Daly, M. & Perry, G. (2011). Has the child welfare profession discovered nepotistic biases? *Human Nature* 22: 350-369.
- Daly, M. & Perry, G. (2017). Matrilateral bias in human grandmothering. *Frontiers in Sociology* 2: 11.
- Daly, M., Singh, L.S. & Wilson, M.I. (1993). Children fathered by previous partners: a risk factor for violence against women. *Canadian Journal of Public Health*, **84**, 209-210.
- Daly, M. & Wilson, M.I. (1980). Discriminative parental solicitude: a biological perspective. *Journal of Marriage & the Family*, **42**, 277-288.
- Daly, M. & Wilson, M.I. (1985). Child abuse and other risks of not living with both parents. *Ethology & Sociobiology*, **6**, 197-210.
- Daly, M. & Wilson, M.I. (1988). The Darwinian psychology of discriminative parental solicitude. *Nebraska Symposium on Motivation*, **35**, 91-144.
- Daly, M. & Wilson, M.I. (1994). Some differential attributes of lethal assaults on small children by stepfathers versus genetic fathers. *Ethology & Sociobiology*, **15**, 207-217.
- Daly, M. & Wilson, M.I. (1995). Discriminative parental solicitude and the relevance of evolutionary models to the analysis of motivational systems. Pp. 1269-1286 in M. Gazzaniga, ed., *The cognitive neurosciences*. Cambridge MA: MIT Press.
- Daly, M. & Wilson, M.I. (1996). Evolutionary psychology and marital conflict: the relevance of stepchildren. Pp. 9-28 in D.M. Buss & N. Malamuth, eds., *Sex, power, conflict: feminist and evolutionary perspectives*. New York: Oxford University Press.
- Daly, M. & Wilson, M. (1998). *The truth about Cinderella: a Darwinian view of parental love*. London: Weidenfeld & Nicolson. vii + 68 pp.
- Daly, M. & Wilson, M. (2001). An assessment of some proposed exceptions to the phenomenon of nepotistic discrimination against stepchildren. *Annales Zoologici Fennici*, **38**, 287-296.
- Daly, M. & Wilson, M. (2008). Is the "Cinderella effect" controversial? A case study of evolution-minded research and critiques thereof. Pp. 381-398 in C.B. Crawford & D. Krebs, eds., *Foundations of evolutionary psychology*. Mahwah NJ: Erlbaum.

- Damas, D. (1983) Demography and kinship as variables of adoption in the Carolines. *American Ethnologist*, **10**, 328-344.
- Danielsbacka, M., Tanskanen, A.O., Jokela, M. & Rotkirch, A. (2011) Grandparental child care in Europe: evidence for preferential investment in more certain kin. *Evolutionary Psychology*, **9**, 3-24.
- Decaluwe, B., Jacobson, S. W., Poirier, M.-A., Forget-Dubois, N., Jacobson, J. L., & Muckle, G. (2015). Impact of Inuit customary adoption on behavioral problems in school-age Inuit children. *American Journal of Orthopsychiatry* **85**, 250-258.
- Emmott, E.H. & Mace, R. (2015). Direct investment by stepfathers can mitigate effects on educational outcomes but does not improve behavioural difficulties. *Evolution & Human Behavior*, **35**, 438-444.
- Euler, H.A. & Weitzel, B. (1996) Discriminative grandparental solicitude as reproductive strategy. *Human Nature*, **7**, 39-59.
- Fergusson, D.M., Fleming, J. & O'Neill, D.P. (1972). *Child abuse in New Zealand*. Wellington: Government of New Zealand Printer.
- Flinn, M.V. & England, B.G. (1995) Childhood stress and family environment. *Current Anthropology*, **36**, 854-866.
- Fox, M., Sear, R., Beise, J., Ragsdale, G., Volland, E. & Knapp, L.A. (2010). Grandma plays favourites: X-chromosome relatedness and sex-specific childhood mortality. *Proceedings of the Royal Society B*, **277**, 567-573.
- Gelles, R.J. & Harrop, J.W. (1991). The risk of abusive violence among children with nongenetic caretakers. *Family Relations*, **40**, 78-83.
- Hamilton, L., Cheng, S. & Powell, B. (2007). Adoptive parents, adaptive parents: evaluating the importance of biological ties for parental investment. *American Sociological Review*, **72**, 95-116.
- Harris, G.T., Hilton, N.Z., Rice, M.E., & Eke, A.W. (2007). Children killed by genetic versus step-parents. *Evolution and Human Behavior*, **28**, 85-95.
- Hawkes, K. (2003). Grandmothers and the evolution of human longevity. *American Journal of Human Biology*, **15**, 380-400.
- Hawkes, K., O'Connell, J.F. & Blurton Jones, N.G. (1997). Hadza women's time allocation, offspring provisioning, and the evolution of long post-menopausal life spans. *Current Anthropology*, **38**, 551-577.
- Hilton, N.Z., Harris, G.T. & Rice, M.E. (2015). The step-father effect in child abuse: comparing discriminative parental solicitude and antisociality. *Psychology of Violence*, **5**, 8-15.
- Hollingsworth, L.D. (2000). Who seeks to adopt a child? Findings from the National Survey of Family Growth (1995). *Adoption Quarterly*, **3**, 1-23.
- Holt, M.I. (1994). *Orphan trains: placing out in America*. Lincoln NE: University of Nebraska Press.
- Hrdy, S.B. (1999). *Mother nature*. New York: Pantheon.

- Hrdy, S.B. (2009). *Mothers and others*. Cambridge, MA: Harvard University Press.
- Huber, B.R. & Breedlove, W.L. (2007). Evolutionary theory, kinship, and childbirth in cross-cultural perspective. *Cross-Cultural Research*, **41**, 196-219.
- Judge, D.S. & Hrdy, S.B. (1992). Allocation of accumulated resources among close kin: Inheritance in Sacramento, California, 1890–1984. *Ethology & Sociobiology*, **13**, 495–522.
- Kirk, D. (1964). *Shared fate*. New York: Free Press.
- Klaus, M.H. & Kennell, J.H. (1976). *Maternal-infant bonding*. St. Louis MO: C.V. Mosby.
- Kramer, K.L. (2005). Children's help and the pace of reproduction: cooperative breeding in humans. *Evolutionary Anthropology*, **14**, 224-237.
- Kramer, K.L. (2010). Cooperative breeding and its significance to the demographic success of humans. *Annual Review of Anthropology*, **39**, 417-436.
- Malvaso, C., Delfabbro, P., Proeve, M. & Nobes, G. (2015). Predictors of child injury in biological and stepfamilies. *Journal of Child & Adolescent Trauma*, **8**, 149-159.
- McLanahan, S. & Sandefur, G. (1994). *Growing up with a single parent*. Cambridge, MA: Harvard University Press.
- Mturi, A.J. (2012). Child-headed households in South Africa: what we know and what we don't. *Development Southern Africa*, **29**, 506-516.
- Palacios, J. & Brodzinsky, D. (2010). Adoption research: trends, topics, outcomes. *International Journal of Behavioral Development*, **34**, 270-284.
- Park, N.K. & Hill, P.W. (2014). Is adoption an option? The role of importance of motherhood and fertility help-seeking in considering adoption. *Journal of Family Issues*, **35**, 601-626.
- Perry, G. (2016). Alloparental care and assistance in a normatively patrilocal society. *Current Anthropology*, **57**,
- Perry, G. (2017). Going home: how mothers maintain natal family ties in a patrilocal society. *Human Nature*, **28**,
- Perry, G. (under review) Who invests in children in non-intact families in rural Bangladesh?
- Perry, G., Daly, M. & Macfarlan, S. (2014). Maternal foster families provide more stable placements than paternal families. *Children & Youth Services Review*, **46**, 155-159.
- Preston, S. (2013). The origins of altruism in offspring care. *Psychological Bulletin*, **139**, 1305-1341.
- Reghupathy, N., Judge, D.S., Sanders, K.A., Amaral, P.C. & Schmitt, L.H. (2012). Child size and household characteristics in rural Timor-Leste. *American Journal of Human Biology*, **24**, 35-41.
- Rice, W.R., Gavrilets, S. & Friberg, U. (2008). Sexually antagonistic "zygotic drive" of the sex chromosomes. *PLoS Genetics*, 4(12): e1000313. doi:10.1371/journal.pgen.1000313.
- Rohwer, S., Herron, J.C. & Daly, M. (1999). Stepparental behavior as mating effort in birds and other animals. *Evolution & Human Behavior*, **20**, 367-390.

- Royle, N., Smiseth, P.T. & Kolliker, M., eds. (2012). *The evolution of parental care*. Oxford UK: Oxford University Press.
- Scelza, B. (2011). The place of proximity: social support in mother-adult daughter relationships. *Human Nature*, **22**, 108-127.
- Sear, R. & Mace, R. (2008). Who keeps children alive? A review of the effects of kin on child survival. *Evolution & Human Behavior*, **29**, 1-18.
- Sear, R. & Mace, R. (2009). Family matters: kin, demography and child health in a rural Gambian population. Pp. 50-76 in G.R. Bentley & R. Mace, eds., *Substitute parents: alloparenting in human societies*. Oxford UK: Berghahn Books.
- Sheppard, P. & Sear, R. (2016). Do grandparents compete with or support their grandchildren? In Guatemala, paternal grandmothers may compete, and maternal grandmothers may cooperate. *royal Society Open Science*, **3**: 160069. doi: 10.1098/rsos.160069
- Silk, J.B. (1980). Adoption and kinship in Oceania. *American Anthropologist*, **82**, 799-820.
- Silk, J.B. (1987). Adoption and fosterage in human societies: adaptation or enigma? *Cultural Anthropology*, **2**, 39-49.
- Silk, J.B. (1990). Human adoption in evolutionary perspective. *Human Nature*, **1**, 25-52.
- Smith, M.S. (1981). Kin investment in grandchildren. Unpublished Ph.D. dissertation, York University, Toronto, Canada.
- Smith, M.S. (1988) Research in developmental sociobiology: parenting and family behavior. Pp. 271-292 in K.B. MacDonald, ed., *Sociobiological perspectives on human development*. New York: Springer.
- Smith, P.K. (1991). Introduction. Pp. 1-16 in P.K. Smith, ed., *The psychology of grandparenthood. An international perspective*. London: Routledge.
- Smith, S.L., Howard, J.A., Garnier, P.C. & Ryan, S.D. (2006). Where are we now? A post-ASFA examination of adoption disruption. *Adoption Quarterly*, **9**, 19-44.
- Somander, L.K.H. & Rammer, L.M. (1991). Intra- and extrafamilial child homicide in Sweden 1971-1980. *Child Abuse & Neglect*, **15**, 45-55.
- Strassmann, B.L. & Garrard, W.M. (2011). Alternatives to the grandmother hypothesis: a meta-analysis of the association between grandparental and grandchild survival in patrilineal populations. *Human Nature*, **22**, 201-222.
- Sundström, M. (2013). Growing up in a blended family or a stepfamily: What is the impact on education? Swedish Institute for Social Research (SOFI), Stockholm University, Working Paper 2/2013.
- Tanskanen, A.O. & Danielsbacka, M. (2018). *Intergenerational relations: an evolutionary social science approach*. Abingdon, U.K.: Routledge.
- Temrin, H., Buchmayer, S., & Enquist, M. (2000). Step-parents and infanticide: New data contradict evolutionary predictions. *Proceedings of the Royal Society of London, Series B, Biological Sciences*, **267**, 943-945.

- Temrin, H., Nordlund, J. & Sterner, H. (2004). Are stepchildren overrepresented as victims of lethal parental violence in Sweden? *Proceedings of the Royal Society of London, Series B, Biological Sciences (Suppl.)*, **271**, S120-S124.
- Temrin, H., Nordlund, J., Rying, M., & Tullberg, B.S. (2011). Is the higher rate of parental child homicide in stepfamilies an effect of non-genetic relatedness? *Current Zoology*, **57**, 253–259.
- Tooley, G.A., Karakis, M., Stokes, M. & Ozanne-Smith, J. (2006). Genealising the Cinderella effect to unintentional childhood fatalities. *Evolution & Human Behavior*, **27**, 224-230.
- Trivers, R.L. (1972). Parental investment and sexual selection. Pp. 136–179 in B. Campbell, ed., *Sexual selection and the descent of man, 1871-1971*. Chicago, IL: Aldine
- Voland, E. & Beise, J. (2002). Opposite effects of maternal and paternal grandmothers on infant survival in historical Krummhörn. *Behavioral Ecology & Sociobiology*, **52**, 435-443.
- Wadsworth, J., Burnell, I., Taylor, B. & Butler, N. (1983). Family type and accidents in preschool children. *Journal of Epidemiology & Community Health*, **37**, 100-104.
- Weekes-Shackelford, V.A. & Shackelford, T.K. (2004). Methods of filicide: stepparents and genetic parents kill differently. *Violence & Victims*, **19**, 75-87.
- White, L.K. & Booth, A. (1985). The quality and stability of remarriages: the role of stepchildren. *American Sociological Review*, **50**, 689-698.
- Zinn, A. (2010). A typology of kinship foster families: latent class and exploratory analyses of kinship family structure and household composition. *Children & Youth Services Review*, **32**, 325-337.
- Zvoch, K. (1999) Family type and investment in education: a comparison of genetic and stepparent families. *Evolution & Human Behavior*, **20**, 453–464.