SEX, BIRTH ORDER, AND THE NATURE OF KIN RELATIONS: AN EVOLUTIONARY ANALYSIS

By

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ABSTRACT

This thesis presents research on the nature of human kin relations, with an emphasis on the impact of sex and birth order on familial sentiment. This aspect of human kinship is viewed from the perspective of evolutionary psychology and a brief explanation of what this entails is given in Chapter 1. Chapter 2 examines sex differences in the salience and meaning of kin relations for contemporary Canadians. The studies here demonstrate greater kin knowledge on the part of sisters, a greater inclination on the part of women to place value on their kinship roles in self-characterizations, and a greater inclination to be emotionally attached to kin. Chapter 3 focuses specifically on the unique nature of middleborns, especially with regard to familial relations, illustrating that they tend to be less close to parents, less inclined to turn to them in need, and less likely than first and lastborns to engage in genealogical research. Chapter 4 presents work on the evocative nature of kin terms when used in political rhetoric, indicating that such terms are effective in eliciting support but also that they are more effective with first and lastborn audiences than middleborn ones, another reflection of the impact of birth order on aspects of kin relations. Chapter 5 examines the relationships between sex, birth order, and contact with kin, particularly grandparents. These two studies demonstrate the strength of maternal kin ties and the intergenerational impact of birth order. The results of all these studies suggest that sex and birth order play major roles in shaping the interactions between an individual and his, or her, kin.

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This thesis is dedicated to my parents, who always supported me and believed in my ability to do whatever I wanted to do. If I could have one wish, it would be that you were still with me, to see that I finally made it.

"It seems to me you lived your life like a candle in the wind;
Never fading with the sunset when the rain set in..."

Elton John

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Introduction

The focus of this dissertation was to investigate the psychology of familial affiliation from an evolutionary perspective. The first goal was to examine the influence of sex on family ties. In particular, to look at whether males or females know more about their family histories and whether there are corresponding sex differences with regard to the role of family in self-identity, a sense of closeness to kin, and actual frequency of contact with kin. The second goal was to examine the role of birth order in shaping relations with kin. Much of the birth order literature fails to make distinctions between middleborns and lastborns and this may, in part, be the source of the inconsistent results that are so often criticised (for critiques see Ernst & Angst, 1983 and Steelman & Powell, 1985). Sulloway (1995) has argued that birth order effects are indeed substantial, particularly in terms of personality traits. The latter part of my research explores the impact of birth order on familial sentiment and relations, particularly closeness to others, interest in genealogy, reliance on kin, susceptibility to the use of kin terms in political rhetoric, and contact with kin.

I begin with a brief overview of what evolutionary psychology entails, followed by the general theory on which this work is based. Chapter 2 presents a study on sex differences in kinship knowledge. Chapter 3 contains three studies on the impact of birth order on family ties. My work on the influence of kin terminology on political speech is in Chapter 4, while Chapter 5 contains two studies on frequency of contact with kin.

What is evolutionary psychology?

Evolutionary psychology can be described as the pursuit of psychological science in the shadow of evolutionary theory and knowledge. While those who work in this area come from such disciplines as anthropology, psychology, biology, they are all united by the basic premise that the mechanisms that generate behavior have evolved by natural selection. This does not mean that all of an individual's actions have been selected for. Neither does it mean that a particular trait that has been selected for in the past necessarily confers a current advantage to the individual expressing it. The fact that deer tend to freeze when they scent a predator, in order to conceal themselves, is clearly not adaptive in a modern environment containing motor vehicles and roads. What the process of natural selection does imply is that the behaviors expressed by individuals are the result of interactions between their evolved natures and the environments in which they live. Environments may change but, for the most part, mental mechanisms seem to be species typical. To explore these mechanisms, or underlying psychologies, evolutionary psychologists study universals of behavior across environments as well as the way some behaviors vary across environments.

If we consider human nature as the product of natural selection, we can generate predictions about the nature of human psychology. To the extent that we have some notion about the probable selective forces that shaped our species, we can make predictions about how those forces shaped our psychology. Productive applications of this can be found in the areas of cognition (Cosmides & Tooby, 1992), mate choice (Buss, 1989), language (Pinker, 1994) and criminology (Daly & Wilson, 1988).

My thesis focuses on the nature of kin relations and the ways in which evolutionary theory can inform our view of family relations. In light of this, a brief summary of current theory concerning kinship and family relations follows.

Kinship and Nepotism

According to Hamilton (1964), the litmus test of the fate of a potentially heritable novel trait is its impact on the inclusive fitness of individuals possessing the trait. This inclusive fitness effect is the sum of the trait's effects on the survival and reproduction of a particular individual plus whatever effects it may have on the survival and reproduction of that individual's relatives (who have a specific probability of carrying the gene for that trait), weighted by the closeness of relationship. Thus, altruistic behavior is predicted to be selected for as long as the cost (in terms of his own reproduction) to the altruist is less than the reproductive benefit to the individual being helped times the altruist's genetic relatedness to the individual he is helping. The total benefit to an individual, or his lifetime fitness, can be measured in terms of number of own offspring produced, plus the number of offspring he helps his relatives to rear. This sum is called inclusive fitness.

Thus, individuals can increase their fitness by assisting kin, even at some cost. This theory has opened the way to studies of the underlying psychology (motives, emotions, and inclinations) behind behavior that would have been adaptive in ancestral environments. Some of this work is reviewed in Chapters 2-5. The research reported in this dissertation has focused on how certain variables (mainly sex and birth order) produce patterns in such behavior.

Parental Investment and the impact of sex and birth order

Chapter 2 concerns sex-based differences in the area of genealogical knowledge. In all societies, certain people make it their business to know genealogies and to educate others, particularly close kin, about how they are related to one another. Such knowledge serves both our interests and those of our kin, providing information about sources of assistance and alliance. The questionnaire study reported here examines the nature of this difference among Canadian men and women, demonstrating that Canadian women have greater kin knowledge than their brothers, and discussing this in relation to findings in other cultures.

Trivers (1974) was the first to focus attention on the basic Darwinian conflict between parents and offspring in any sexually reproducing species. As parents are only 50% related to their offspring, there will be conflict over the magnitude of parental investment in individual offspring, especially when there is more than one offspring present or potentially to be born; conflict over the timing of weaning is one dramatic example. Implicit in this conflict is another, sibling-sibling conflict. As siblings share only half their genes, they will sometimes differ from parents in their preferences for how resources should be allocated between themselves and their siblings.

Sibling conflict is also driven by another Darwinian consideration. In high childhood mortality ancestral environments, older children would have had greater reproductive value to parents than younger children (Alexander, 1979). As Daly and Wilson (1984) have pointed out, parental psyches are therefore likely to have evolved to value older children more than younger ones. Perhaps counterbalancing this are two other factors. Lastborn children have an advantage in that they have no younger sibling demanding extra time and care, allowing them to monopolize parental attention. In addition,

young mothers (with high residual reproductive value) would be expected to invest less in current reproduction than an older mother with a statistically smaller prospect of producing any future offspring (Clutton-Brock, 1984). The older mother may invest highly as it is her last opportunity to do so. The question of what this means for middleborns is considered in Chapters 3, 4, and 5, using questionnaire, experimental, and archival sources of data. The general answer is that middleborns are less familially oriented than first or lastborns (less close to parents, less inclined to participate in genealogical research, less likely to turn to parents in need).

Chapter 4 reports an experimental study of the influence of kin terminology in political rhetoric. Kin terms proved more effective in eliciting support for the views of the speechmaker. This effect was not seen, however, in middleborns. In fact, middleborns were more likely to respond to terms of friendship than of family.

The social issues and problems facing men and women in our ancestral past have been quite different. One major difference concerns paternity uncertainty. A mother can be certain that the child she gives birth to is her own. Her mate does not that have that certainty (unless she never leaves his sight and he never sleeps). Thus, one might expect the bonds that lead to investment may be stronger when maternally based (such as investment by maternal grandparents versus paternal grandparents). This prediction is examined in Chapter 5 and subjects did, indeed, have more frequent contact with maternal relatives than with paternal ones, despite living closer, on average, to paternal kin.

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Original Articles

On the Importance of Kin Relations to Canadian Women and Men

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Sex differences in the salience and meaning of kin relations for contemporary Canadians were examined in two studies. In study 1, 24 opposite-sex adult sibling pairs were asked to reconstruct their kindreds as fully as possible, following a computerized menu. Sisters almost invariably recalled more relatives than did their brothers, especially living and matrilateral relatives. In study 2, a questionnaire administered to 150 female and 150 male undergraduates explored the relevance of kinship to characterizations of the self ("Who are you?") and to nominations of one's closest social relationships. Women were much more likely than men to refer to their kinship statuses in characterizing themselves (I am a daughter, a sister, etc.), whereas 28% of men and only 8% of women mentioned their surnames (I am a Smith, Jones, etc.). Women and men were about equally likely to name a relative, as opposed to a mate or friend, as the person to whom they feel closest, but women more often nominated a parent (especially mother) and men a sibling (especially an older sister). These sex differences are discussed in relation to possible differences in how women and men make use of family ties. © Elsevier Science Inc., 1996

KEY WORDS: Close relationships; Family relations; Genealogical knowledge; Kinship; Self-concept; Sex differences; Sibling relations.

> For there is no friend like a sister
> In calm or stormy weather.
> —Christina Rossetti, 1991

Ever since Hamilton (1964), kinship has been of central importance to evolutionary thinking about social perceptions, motives, and action. Inclusive fitness theory implies that relatedness imparts a commonality of interests that is likely to be manifested in solidarity of feeling and behavior. In

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Alexander's (1979, p. 46) words, "we should have evolved to be exceedingly effective nepotists, and we should have *evolved* to be nothing else at all."

The expectation of a close connection between kinship and solidarity gains credence from the prominence of kinship in human affairs. Anthropologists find that ties of kinship exert a dominant influence on all social phenomena in relatively unstratified, face-to-face societies, and that they remain extremely salient in more complex societies despite the emergence of social structures that are ostensibly independent of kinship (Brown 1991; Fox 1967). According to Leach (1966), "Human beings, wherever we meet them, display an almost obsessional interest in matters of sex and kinship."

It is often maintained that the relevance of kinship to social life and personal identity has been greatly diminished in modern western society (e.g., Leibowitz 1978; Cousins 1989). However, rumors of the demise of familial ties are premature. The notion that one attains immortality through one's descendants remains potent (e.g., Timberlake and Chipungu 1992), and the thousands of daily visitors to the Mormon Genealogical Library in Salt Lake City attest to the continuing appeal of tracing one's ancestry (Shoumatoff 1985). Family reunions and genealogical reconstruction "open the flood gates of time gone by, reminding us who we are and where we have been . . . establishing pride in self and kin and transmitting a family's awareness of self from the youngest to the oldest" (Taylor 1986, p. 31). And family ties are not just sentimental, but practical. Adult Americans still turn to blood relatives for help, and as the required assistance increases in magnitude, they rely on kin more and on unrelated friends less (e.g., Essock-Vitale and McGuire 1985; Hogan and Eggebeen 1995; Stack 1974).

Granting that kinship networks are of psychological and behavioral significance, even in the modern west, there are several reasons for suggesting that the salience and meaning of kinship may differ for women vs. men. Although ours is a society with bilateral descent reckoning, it derives from a European tradition of named patriclans, and a biased emphasis on patrilineage persists in our surnaming practices. Moreover, the contemporary United States retains a degree of virilocality: as in most human populations, women disperse greater distances between birth and first reproduction than do men (Koenig 1989). Nevertheless, American women see their relatives more often than men and exchange more help with them, apparently investing more effort in the maintenance of kin ties (Brody 1965; Hogan and Eggebeen 1995; Oliveri and Reiss 1987; Schneider and Cottrell 1975; Troll 1987). Similarly, Smith (1988) found that Canadian couples with young children saw more of the wife's parents (the children's maternal grandparents) than of the father's parents, despite the fact that the wife's parents tended to live farther away.

To compare the subjective kinship universes of American women vs. men, Schneider and Cottrell (1975) interviewed married couples and found that the wives both enumerated more relatives and professed to keep in touch with more relatives than did their husbands. Of course, spouses may differ in their actual numbers of relatives of any given degree, so that if a particular wife is cognizant of third cousins whereas her husband is not, we cannot be certain that the difference is one of genealogical awareness. However, we can probably assume that the average woman and

man have comparable kindreds and hence that Schneider and Cottrell's method would reveal average sex differences. What it cannot reveal is how consistent those differences might be. A more precise way to assess any such sex differences is to ask full siblings, whose genealogies are identical except for descendants, to reconstruct their shared kindreds as best they can. This is the approach taken in study 1.

In study 2, we investigated the salience of kinship by means of a questionnaire. In addition to questions about the respondent's familial and other relationships, we elicited a series of self-characterizations in response to the question "Who are you?" This technique, adapted from Hartley (1970), has been widely used to study aspects of the self, such as the salience of ethnic identity and sex roles, but the many studies using it have paid scant attention to responses indicative of one's place in a kinship system. [A partial exception is McGuire and Padawer-Singer (1986), who at least distinguished familial from other responses in tabulating young children's answers to this question.]

METHOD

Study 1

Subjects were 24 Canadian opposite-sex sibling pairs. In 12 pairs, the brother was older, and in 12, the sister. All were native speakers of English, of predominantly European descent, with 73% having some level of university education. This availability sample, recruited through links of acquaintanceship, had a mean age of 32.6 (±18.5, SD), with a range of 15 to 91.

Each of the 48 subjects completed a structured computer menu–driven interview concerning their known relatives, without consulting the paired sibling or anyone else. The path that subjects were instructed to take through their genealogy was by generation. Parents were considered first, followed by parents' siblings and their children (i.e., the subject's cousins); the next step was grandparents and their siblings, etc. A relative was counted as having been recalled if the subject could provide a personal name other than the surname, and for each such relative, subjects were asked to provide the first and last (natal) name, relationship to the subject, parents' names, number of siblings, spouse's names, and children's names, if known.

Data from all subjects' self-reported genealogies were summarized to allow between-sex comparisons of genealogical knowledge. Differences between sibling pairs in the numbers of relatives reported in various categories, such as living vs. deceased relatives and matrilineal vs. patrilineal, were subjected to two-tailed, pairwise Wilcoxon signed rank tests, with an absence of sex differences as the null hypothesis.

Study 2

Three hundred McMaster University undergraduate students (150 female, 150 male) were asked to complete a questionnaire concerning "identity and family relationships" as partial fulfillment of a requirement (participation as a research subject or a library research paper) for an introductory course in psychology. Ages ranged from

18 to 30 with most subjects under 21 years of age. Subjects were drawn from two predominantly freshman cohorts in successive years. The questionnaire completed by the second set of 160 subjects (80 female, 80 male) included several new questions in addition to those completed by the first set of 140 subjects (70 female, 70 male), but this report concerns only items that were common to both questionnaires.

In addition to such demographic information as the subject's age, birthplace, and number and ages of siblings, subjects were asked to identify the person to whom they felt closest, how far away that individual lived, and how often they saw him/her. Subjects were also asked the following question:

> *In the 10 blanks below, please make 10 different statements in response to the question "Who are you?" Write your answers in the order that they occur to you. Go fairly quickly.*

The questionnaire took between 30 minutes and 1 hour to complete.

RESULTS

Study 1

Although sister-brother pairs have identical kindreds, sisters recalled more relatives (mean ± SE: 31.9 ± 2.8) than their brothers (27.5 ± 2.5) (see Table 1). This difference was highly consistent, with 20 women and only two men enumerating more relatives than did the opposite-sex sibling (Wilcoxon test: $p < .001$); in two pairs, sister and brother reported identical numbers of kin. Women performed significantly better than their brothers in recall of both ascendant and collateral kin. The female advantage was almost unanimous with respect to the naming of living relatives and was less consistent but still significant with respect to deceased kin. (Only two subjects named more deceased relatives than living ones, and these two were the oldest sibling pair in the study.) Sisters recalled maternal relatives significantly better than brothers, and also tended to recall more paternal relatives although the difference on this side was not significant. Fourteen sisters knew more natal ("maiden") surnames of their female ascendant kin than did their brothers, whereas no brother knew more than his sister ($p < .001$); 10 sibling pairs tied on this measure. Sisters' superior knowledge of these maiden names was concentrated on maternal relatives.

Table 1. Sex Differences in 24 Opposite-Sex Sibling Pairs' Recall of Their Shared Kindreds in Study 1

	Number of Sibships in Which Sisters Named . . .			Difference: # Named by Sister Minus # by Brother (Mean ± SE)
	More kin than Brothers	Same Number as Brothers	Fewer kin than Brothers	
All named kin	20	2	2	4.33 ± 1.38
Matrilateral	17	5	2	2.83 ± 0.70
Patrilateral	12	8	4	1.17 ± 1.01
Living	20	3	1	3.38 ± 1.13
Dead	13	9	2	0.96 ± 0.67

Female superiority of performance with respect to one kinship category was not strongly predictive of superiority with respect to another. For example, the sister-minus-brother difference in recall of maternal kin was not significantly correlated with the difference in recall of paternal kin across sibling pairs ($r = 0.243, p = .275$), and neither was the greater female recall of living relatives significantly correlated with the degree of greater female recall of deceased relatives ($r = 0.368, p = .092$).

There were no apparent influences of being the elder (29.6 ± 2.3 relatives recalled) vs. the younger (29.8 ± 2.9) sibling.

Study 2

Women and men were equally likely to make some sort of reference to familial or kinship status in answering the "Who are you?" question: 53% of women and 51% of men mentioned a family role (mother, brother, etc.), a family name, or both. However, the sexes differed significantly in the particular aspects of kinship status mentioned (Table 2), with women more likely to mention family roles and men more likely to mention their surnames as aspects of their identity ($\chi^2_{2df} = 14.4, p < .001$). In addition, considering only those who labeled themselves with a relationship term, 44% of women characterized themselves as a "daughter," whereas just 12.5% of men mentioned being a "son" ($\chi^2_{1df} = 7.2, p < .01$).

When subjects were asked which individual they felt closest to, 83 (27.7%) nominated an unrelated friend, with mothers and mates each nominated by an additional 77 (25.7% of respondents in each case), and only 21 (7%) nominating father (Table 3). Women and men distributed their responses similarly among the three categories of relatives, mates, and unrelated friends; among those who nominated relatives, however, women were significantly likelier to nominate their mothers and men their siblings ($\chi^2_{1df} = 15.3, p < .001$). Both women and men were more likely to nominate a sister than a brother. And when sisters were nominated as the respondent's closest intimates, it was overwhelmingly older sisters: this was the case for 14 of the 15 men and eight of the 10 women who nominated sisters.

DISCUSSION

Genealogical Recall (Study 1)

Contemporary North Americans, like other people, continue to rely on relatives, feeling both some entitlement to ask kin for help and some expectation that it will be willingly provided. Women tend to keep in touch with more relatives than do men,

Table 2. Numbers of Respondents Who Mentioned Familial Roles (e.g., "I Am a Daughter") and Surnames (e.g., "I Am a Smith") When Asked to "Make 10 Different Statements in Response to the Question "Who Are You?" in Study 2

	Family Role	Family Name	Both	Neither
Women	67	0	12	71
Men	35	28	14	73

especially maternal relatives (e.g., Schneider and Cottrell 1975), and they apparently rely on kin somewhat more than men, who are relatively likely to turn to unrelated friends instead (e.g., Hogan and Eggebeen 1995). In particular, matrilateral kin are a woman's primary social resources, providing child care, economic assistance, and emotional support (e.g., Stack 1974; Essock-Vitale and McGuire 1985), so it is not surprising that women are highly knowledgeable about them. In this study, women exhibited greater interest in and/or recall of kin than their brothers, especially matrilateral kin. One interpretation is that people who rely heavily on relatives invest the most cognitive resources in keeping track of relatives, and especially relatives in those lineages and subfamilies most relied upon.

Alternatively, the women's superior performance in study 1 might be one manifestation of a sex difference in processing or retrieving social information, rather than being specific to kin. One way to address this hypothesis would be to assess whether sisters can name more unrelated family friends, neighbours, or public figures in various categories than their brothers, perhaps restricting the study to coresiding siblings. It is unlikely that the differential performance reflects an even more domain-general female advantage in this sort of task, since the evidence on sex differences in episodic (as opposed to semantic) memory is mixed, with men doing better on some tasks (e.g., Clifford and Scott 1978), women on others (e.g., Ellis, Shephard, and Bruce 1973), and the sexes performing equally well on still others (e.g., Cunningham and Bringmann 1986). But although there is no general superiority of women in memory tasks, sex differences may emerge when the content to be recalled is of sex-differential salience. Geer and McGlone (1990) investigated sex differences in memory for elements of sexual stories containing romantic, erotic, and neutral elements, for example, finding that whereas the sexes did not differ in responding to the "neutral" sentences, women were quicker and more accurate on romantic elements, whereas men were quicker and more accurate on erotic ones.

If kinship is cognitively distinct, one might hypothesize that women's and men's minds are fundamentally different in this domain. Just as there appear to be distinct female and male sexualities as a result of the different selective pressures faced by women vs. men during human evolution, there could be evolved sex differences in human kinship cognition, as a result of the different social ecologies en-

Table 3. Numbers of Respondents Who Nominated Relatives, Mates, or Friends in Response to the Question "Of All the People You Know Who Do You Feel Closest to?" in Study 2

Responses	Female Respondents	Male Respondents
Parent	58	40
Mother	49	28
Father	9	12
Sibling	12	22
Sister	10	15
Brother	2	7
Other genetic relative	4	4
Mate	37	40
Unrelated friend	39	44

countered by the sexes. However, female superiority in genealogical recall is not necessarily cross-culturally universal or even usual. Chagnon (1988) has reported that among the Y±nomamö Indians of Venezuela, men, for whom the reconstruction of lineages is crucial for negotiating both marital entitlement and alliance in warfare, are apparently more adept at classifying kin than are women. In a modern nation state like Canada, men are presumably much less dependent on kinsmen, and they may rely more on non-kin reciprocal relationships than women largely because local sex roles afford them more opportunities for interaction with non-relatives. To the extent that sexually differentiated benefits of kinship ties and knowledge vary in relation to locale-specific sex roles and practices in domains such as marriage and intergroup conflict, it appears from the Canada-Y±nomamö contrast that sex differences in genealogical abilities and interest vary in parallel. Nevertheless, cross-culturally general evolved sex differences in aspects of interests or abilities remain a possibility worthy of investigation, and more detailed comparison of genealogical recall by women and men in societies with different patterns of kin association could be enlightening.

Identity and Closeness (Study 2).

In responding to the question "Who are you?", many subjects did not refer to their kinship statuses at all, lending some support to claims (e.g., Cousins 1989) that the modern American sense of identity is more concerned with personal physical or attributive traits than with social roles. however, it should be noted that these young adults, 96% single and 99% childless, may represent a life stage in which sociality has an especially strong extrafamilial focus. Testing a wider age range could be of interest, as it is certainly possible that salient aspects of identity change in systematic ways over the lifecourse. For example, the presence of children who could benefit from collateral kin investment may make family especially salient to parents. But be that as it may, just over half of the present respondents of both sexes did mention family roles or surnames in answering "Who are you?" (Table 2), and almost half nominated a genetic relative when asked to name the one person to whom they felt closest (Table 3).

Women were more likely than men to mention their family role(s), such as daughter or sister, whereas men were more likely to mention their surnames (Table 2). Most strikingly, in response to "Who are you?", 28 men but not a single woman provided a "clan" name without any additional reference to the respondent's individual familial relationship status(es). It is perhaps unsurprising that patrilineally derived surnames should be of little salience to female identity, both because women derive so much of their social support from maternal relatives and because most still relinquish their natal surnames at marriage (although it should again be noted that these women were almost all single). It may be somewhat more surprising that a named patrilineage is still a significant element in the identity of Canadian males.

Differential emphasis on one's place within a kinship structure was particularly evident in the relative importance attached to being a daughter vs. a son. Thirty-five women used the word "daughter" in responding to "Who are you?", whereas only

six men used the word "son," a much larger sex difference than the 58 women vs. 40 men who nominated a parent as the one person to whom they felt "closest." It has been suggested that mothers actively influence and shape the relationships of all family members with extended kin and that this may be based on an enduring, intimate tie between mother and daughter (Oliveri and Reiss 1987). Under such circumstances, a woman's role in her family may be particularly salient.

If young men tend to break away from family ties and invest themselves in male-male alliances, we might expect them to emphasize friendships, whereas women, who value family responsibility and relationships more highly, would place greater emphasis on closeness to parents, particularly their mothers (Char and McDermott 1987). Women in our study 2 were indeed more likely than men to name parents (especially mothers) as their closest interactants, but men were only slightly more likely than women to nominate unrelated friends. A larger difference was in the frequency of nominating siblings (Table 3). One might propose that fraternal solidarity derives from the fact that brothers have long been a man's most valuable allies, but the men in this study nominated sisters as their closest interactants ($n = 15$) substantially more often than brothers ($n = 7$). This perception of cross-sex sibling closeness is apparently not reciprocated, since only two women nominated a brother as their closest interactant, whereas 10 nominated a sister. Without responses from both members of sibling pairs, it remains unclear to what extent these professions of closeness may be systematically asymmetrical, but some light may be shed by the fact that 88% of respondents who named sisters as their closest interactants named older sisters. The question apparently evoked thoughts of asymmetrical relationships, perhaps with more experienced persons in whom the respondents feel able to confide. Asking respondents from broods of three or more to nominate the sibling to whom they feel closest might further clarify these sibling attachments.

In sum, sisters recalled more relatives than their brothers; men stressed patrilineal surnames as identity features more than women; women stressed specific kin roles more than men; and although respondents of both sexes nominated mother above all other relatives in naming their closest interactants, men were more likely than women to name a sibling instead. These results may be interpreted as reflecting a female kinship psychology that is relatively focused on specific genealogical links between generations and a male psychology that is somewhat more concerned with patrilineal group identity and same-generation alliances. Such sex differences in the meaning or salience of various aspects of kinship could reflect naturally selected responses to consistent differences in the ways in which women and men have made use of their kin, but the contrast between these Canadian results and Chagnon's (1988) Y±nomamö data indicates that sex differences in genealogical interest and expertise are labile. Only further study can clarify whether the phenomena reported here are in any way reflections of a sexually differentiated kinship cognition as a result of a history of selection, or are instead the manifestations of a sexually monomorphic psychology responding to the somewhat different social demands and opportunities facing contemporary Canadian women and men.

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Birth Order and Familial Sentiment:

Middleborns are Different

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Abstract

Effects of birth order on several aspects of family relations and self-identity were examined in three studies. In Study 1, first and lastborn undergraduates were more likely than middleborns to refer to kinship in characterizing themselves. In Study 2, subjects were asked to whom they would turn under two scenarios of duress. First and lastborns were more likely to nominate parents, whereas middleborns were much more likely than other respondents to nominate siblings. In Study 3, analyses of historical archives and of an Internet questionnaire indicated that genealogical research attracts many more firstborns and many fewer middleborns than expected by chance. In all three studies, first and lastborns were much more likely than middleborns to nominate their mothers as the person to whom they felt closest. These substantial effects support Sulloway's (1996) claim that birth orders constitute significant family "niches", which differ with respect to the perceived dependability of parental investment and therefore also differ in the social orientations that they engender.

Introduction

Theoretical models of the evolution of parental inclinations predict that parents will often treat their offspring differentially. There are grounds for predicting discriminative parental solicitude in relation to a number of variables including offspring age, parental age, birth order, offspring sex, cues of phenotypic quality, and cues of parentage (Clutton-Brock, 1991; Daly & Wilson, 1987, 1995; Trivers, 1974; Trivers & Willard, 1973; Wilson & Daly, 1994). The unifying notion behind these theories is that natural selection has shaped parental psychologies to function as if they "value" individual offspring and investments in their development in proportion to the expected impacts of such investments on parental fitness (genetic posterity) in ancestral environments.

The anticipated relevance of birth order is a corollary of the relevance of offspring age. One's expected contribution to parental fitness resides mainly in one's "reproductive value" (expected future reproduction; Fisher, 1930), and this quantity increases with age until at least puberty, making an older immature offspring more valuable from the parental perspective than a younger one (see, e.g., Montgomerie & Weatherhead, 1988). In the human case, parental favoring of older offspring can be masked by changing parental response to children with changing needs and abilities, but it becomes apparent in tough choices: When one child must be sacrificed so others can be saved, it is apparently a cross-cultural universal that the youngest is the likeliest victim (Daly & Wilson, 1984). For these reasons, Sulloway (1995, 1996) argues that it is ultimately their security in the expectation of parental favoritism that makes firstborn children defenders of parental values and the status quo, while laterborns are relatively inclined to be "rebels".

Besides enjoying the relative security of parental preference in a pinch, firstborn children have always benefited from an early absence of sibling contenders for a share of parental investment. Even in the modern West, where parental resources are presumably less stretched than in noncontracepting, premodern societies, firstborn children still receive more parental caretaking and attention in infancy than laterborns (e.g. Jacobs & Moss, 1976), and they grow faster, such that despite being smaller at birth they are larger by one year of age (Meredith, 1950; Wingerd, 1970).

There is, however, a countervailing effect: As parents themselves grow older, the fitness value of an offspring of any given age and phenotype increases relative to the parent's residual reproductive value. Thus, in any species in which expected future reproduction is a declining function of parental age, older parents will have been selected to invest more in offspring, all else equal, than younger parents (e.g. Pugesek, 1995). Thanks to menopause, this argument certainly applies to the human female, and dramatic decreases in rates of maternally perpetrated infanticide as a function of maternal age appear to be one reflection of age-related changes in the relative weights that the maternal psyche places on one's infant versus one's future (Bugos & McCarthy, 1984; Daly & Wilson, 1984, 1995).

Thus, although their initial uncontested status and their greater fitness value gives firstborns what Sulloway (1996: 305) calls "an edge in courting parental investment", this advantage may be offset by a growing willingness of aging parents to sacrifice themselves to benefit needy young. Moreover, as Sulloway (1996: 305) goes on to note, a lastborn child has the advantage of being "the only member of the family to receive parental investment undiluted by the needs of a younger rival", with the upshot being that "the losers in this Darwinian calculus are often middle children". Nevertheless,

with few exceptions (Kennedy, 1989; Kidwell, 1982), analyses of the possible effects of birth order have contrasted firstborns with laterborns and ignored the middleborn- lastborn distinction.

Psychologists have been skeptical about the reality of birth order effects, especially since Ernst & Angst (1983) reviewed the literature and concluded that most are artifacts of poor research design and vanish when appropriate controls for such factors as family size and social class are incorporated. This conclusion was not based on a formal meta-analysis, however, and when Sulloway (1995) conducted one, he found that it was unwarranted. In fact, the literature demonstrates many highly significant differences between firstborns and laterborns on such personality traits as extroversion, agreeableness, neuroticism, openness, and conscientiousness, differences that cannot be attributed to the confounding factors implicated by Ernst & Angst.

According to Sulloway (1996), some birth order effects are modulated by sibship sex combinations, birth intervals, and other variables, and these complications have made them seem unreliable and perhaps artifactual. If the arguments presented above are sound, then the failure to distinguish the lastborn status from that of other "laterborns" is a second likely source of failures to detect genuine effects, and the failure to consider the countervailing effects of maternal age at the child's birth is a third. Finally, we would suggest that few studies have focused on the domain in which birth order effects are most strongly to be expected, namely familial sentiments.

Theory suggests that first and lastborns will see their parents and familial resources as dependable sources of support to a greater degree than will middleborns, and some evidence supports this expectation. Kidwell

(1981) analyzed survey responses of 10th-grade boys in U.S. public schools and concluded that "the middleborn male respondent reports that his parents are considerably more punitive and less reasonable and supportive towards him than do either the firstborn or lastborn respondents" (p. 330). Kennedy (1989) analyzed questionnaire responses of U.S. college students, and found that middleborns reported lower levels of parental support with their tuition than either firstborn or lastborn respondents, and that middleborns professed to phone home relatively infrequently and to feel less close to their parents, We predicted that birth order effects would be conspicuous in such domains as one's reliance on parents as social supports, the relevance of one's family to one's self- concept, and one's interest in family as manifested in genealogical research.

STUDY 1

Who do people consider to be their closest interactants or confidants? On the basis of the above arguments, we would expect firstborns and lastborns to be relatively likely to nominate parents, and middleborns to be relatively likely to nominate an unrelated friend or partner. We would also expect that with birth order held constant, respondents with older mothers will have experienced those mothers as more investing and will be relatively likely to nominate them as the individual to whom they feel closest. This latter prediction contrasts with what one might predict from the notion of a "generation gap" whereby the older the mother, the more likely it is that she will be out of touch with her child's interests and concerns.

Familial sentiment and solidarity may also be reflected in people's open-ended self-characterizations. Hartley's (1970) "Who am I?" test (sometimes called the "Twenty Statements Test" or TST) is a technique for

investigating personal identity by the elicitation of multiple responses to the single item "Who are you? I am ...". Responses are usually coded as "physical", "social", "attributive" or "global" (Hartley, 1970), but our interest is in partitioning responses in the social realm, and specifically in family roles and names. (We have reduced the twenty response items to ten, because twenty proves tedious for many subjects and begins to elicit formulaic answers.) This method has been widely used, but the majority of previous studies have focused on race, ethnicity or personality traits, and not on family relationships. Some authors have made some distinctions among "social" responses in their analyses (e.g. McGuire & Padawer-Singer, 1976), but no one has tabulated or presented results with respect to the issues of concern to us here.

Methods

Three hundred McMaster University undergraduate students (150 female, 150 male), all of whom had at least one sibling, completed a questionnaire concerning "identity and family relationships" as partial fulfillment of a requirement (participation as a research subject or a library research paper) for an introductory course in Psychology. Ages ranged from 18 to 30 with most subjects under 21 years of age.

In addition to such demographic information as age, birthplace, and number and ages of siblings, subjects were asked, "Whom of all the people you know, are you closest to?".

The salience of family in self-identity was assessed with the following question (adapted from Hartley, 1970): "In the ten blanks below, please make ten different statements in response to the question Who are you?' Write

your answers in the order that they occur to you. Go fairly quickly." Responses were categorized as (1) indicating a role within the family (brother, sister, mother, etc.); (2) invoking a family name (Smith, Johnson, etc.); or (3) not family-related.

The questionnaire completed by a second set of 120 subjects (60 female, 60 male) included several new questions in addition to those completed by the initial 180 subjects (90 female, 90 male). For present purposes, the only noteworthy addition was mother's age at the time of the respondent's birth.

Results

Thirty-two subjects (17 females and 15 males) were "only children" (had no siblings). Their responses are excluded from the following analyses.

Figure 1 portrays the distributions of responses to the question "Whom of all the people you know, are you closest to?" Birth order effects were large: 64% of firstborns named a parent (mother 52 %, father 12%), compared to 39 % of lastborns (mother 31%, father 8%), and just 10% of middleborns (mother 7%, father 3%). This birth position effect was not an artifact of sibship size: Firstborns were relatively likely to nominate mother, and middleborns were relatively unlikely to do so, more or less regardless of the number of siblings. Differential nomination of parents in relation to birth order was significant within both female (chi-square 2df = 31.8, $p < .001$)
and male (chi-square 2df = 23.2, $p < .001$)) respondents. (Females were more likely than males to nominate parents -- 44% versus 28% in total -- whereas 36% of males but only 12% of females nominated their mates (Figure 1). These sex differences were orthogonal to birth order differences.)

Figure 2 presents the incidences of nominating mother in relation to birth order and mother's age at the time of the respondent's birth. For

analysis, mothers were divided at the median age into those 27 and younger versus those 28 and older at the subject's birth. Those in the older mother group were four times as likely as subjects in the younger mother group to name mother as the individual they were closest to (chi-square 1df = 31.1, $p<.001$). This effect was distinct from the birth order effect in that it held up within firstborns (chi-square 1df = 23.8, $p<.001$) and lastborns (chi-square 1df = 21.5, $p<.001$). No such effect was evident within middleborns.

One hundred and fifty-six of the 268 subjects mentioned either a family role (mother, brother, etc.), or a family name, or both, among their ten responses to the question "Who are you?" Sixty-eight percent of firstborns mentioned such terms, compared to 57 % of lastborns, and just 38 % of middleborns (chi- square 2df = 15.52, $p<.001$). When males and females were considered separately, this birth order difference was significant only for males (chi-square 2df = 23.79, $p<.001$), while a slight trend in the same direction existed for women (Table 1).

STUDY 2

The Study 1 results indicate that birth order is a powerful determinant of familial sentiment. But family ties are not just sentimental. Although modern industrialized society is often contrasted with traditional kin-based societies, adult Americans still turn to blood relatives for help, and as the required assistance increases in magnitude, they rely on kin more and on unrelated friends less (Essock-Vitale & McGuire, 1985; Hogan & Eggebeen, 1995). Middleborns seldom name their parents as their closest interactants, but do they turn to them for support nonetheless? In an early study of fear's effects on the "need for affiliation", Schachter (1959) found that firstborns

expressed a stronger desire to affiliate with others when frightened than did laterborns, but Schachter's and subsequent studies neither distinguished between middleborns and lastborns, nor addressed the question "desire to affiliate with whom". Thus, we asked to whom respondents would turn when faced with emotional or financial distress.

Methods

One hundred and forty McMaster University undergraduate students (70 female, 70 male), all of whom had at least one sibling and none of whom had participated in Study 1, completed a questionnaire on "family relationships and helping behavior". Participation in this study partially fulfilled a research participation requirement for either an introductory or second year course in Psychology. The subjects were all between the ages of seventeen and thirty-five.

Subjects were asked questions about themselves, including age, birthplace, whom they most closely resemble, and the number and ages of any siblings. They were asked to name the person to whom they felt closest, as in Study 1, and also to name the sibling to whom they felt closest, if they had more than one. Participants were also given two scenarios to read, each of which was followed by questions about the scenario and what the subject would do in such a situation, including to whom they would turn for emotional (Scenario 1) and financial (Scenario 2) help. Scenario 1 read as follows: "Imagine that you are in the following situation. Last night, you were on your way home and you saw several people killed in a fiery car crash on the highway. It upset you a great deal." Scenario 2 read as follows: "Imagine that you are in the following situation. You had what you thought was a secure job and took on a mortgage for quite an expensive home. Now you

have lost that job and are in serious financial trouble. A bank won't give you a loan because you have no job."

Results

Responses to the question "Whom, of all the people you know, are you closest to?" replicated the results of Study 1, with 36 % of firstborns naming a parent (mother 31%, father 5%), compared to 29% of lastborns (mother 29%, father 0%), and just 7% of middleborns (mother 7 %, father 0%) with a chi-square $2df = 9.94$, $p < .01$).

When asked to whom they would turn for emotional support in Scenario 1, 42% of firstborns named a parent (parents 15%, mother 21%, father 6%), compared to 44% of lastborns (parents 13%, mother 25%, father 6%), and just 21% of middleborns (parents 3%, mother 17%, father 0%). Instead of naming parents, the middleborns were more than five times as likely to name a sibling than were firstborn or lastborn respondents.

When asked to whom they would turn for financial support in Scenario 2, 87% of firstborns named a parent (parents 60%, mother 0%, father 27%), compared to 81% of lastborns (parents 50%, mother 6%, father 25%), and just 63% of middleborns (parents 44%, mother 4%, father 15%).

The three tasks (closest person, scenario 1, scenario 2) were not simply redundant: Only 12 subjects (8.6%) named the same individual in response to all three. Moreover, every subject without exception named a relative in response to at least one of the three.

STUDY 3

It is often maintained that the relevance of kinship to social life has been greatly diminished in modern Western society. However, the thousands of daily visitors to the Mormon Genealogical Library in Salt Lake City (Shoumatoff, 1985) attest to the continuing appeal of tracing one's ancestry. Canadian women exhibit more extensive knowledge of their family trees than their brothers (Salmon & Daly, 1996), but is there also differential interest in family connections in relation to birth order? The arguments and findings above suggest that middleborns may focus their social attentions elsewhere, while firstborns and lastborns are familially oriented.

This is one domain within which one might expect lastborns to be rather less like firstborns and more like middleborns than was the case for closeness of ties to parents as measured in Studies 1 and 2. The greater reproductive value of older children affects their fitness value to other family members in the same way that it affects their fitness value to parents, but the rationale for prolonged "indulgent" investment in lastborns applies only to the parents. In stratified societies, firstborn advantage is often apparent in the forms of primogeniture for firstborn sons and superior dowries for firstborn daughters, and historically, reproductive performance decreased with increasing birth order in such societies (Boone, 1988). Under the practice of primogeniture, it is especially in the interests of firstborns to be interested in family status within the community and the maintenance of the status quo within their own family (Sulloway, 1996).

So who invests discretionary time and effort in the study of their family connections? Is the pursuit of genealogical research practiced differentially in relation to birth order? Jacobson (1986) suggested tersely that it is not, but this conclusion was based only on a failure to find a significant

firstborn-laterborn difference between members of a genealogical society and a control group of "hobbyists"; no details were presented. We investigated the question using both historical archives and field research methods.

Methods

Study 3a used archival materials, namely two collections of "family histories" from the rural communities of Binbrook, Ontario (Binbrook Historical Society, 1979) and Antler, Saskatchewan (Antler & District History Committee, 1983). These compendia included histories of families owning property in the township of Binbrook between 1792 and 1973, and histories of families living in the district of Antler between 1892 and 1982.

For analysis of differential participation in this work in relation to birth order, the birth position of each of the individuals who played the role of family genealogist within their own natal sibships was noted, and the observed frequencies of firstborns, middleborns, and lastborns were compared to "expected values" computed in the following way. It was taken as a given that each family history had been compiled by some member of the sibship to which the actual compiler belonged, and the null hypothesis for computing expected values was that each member of the sibship who lived to adulthood was equally likely to have played that role. (Thus, for example, a genealogist with two siblings would have contributed 0.33 to the expected numbers of firstborn, middleborn and lastborn genealogists; one with three siblings would have contributed 0.25 to the expected number of firstborns, 0.50 to the expected number of middleborns, and 0.25 to the expected number of lastborns; and so forth.) Actual numbers were then compared to the expected ones via chi-square analysis. Every one of the 136 genealogists of their natal families in these two compendia had at least one sibling.

Study 3b used a questionnaire filled out by volunteer respondents who frequented genealogical newsgroups on the Internet. The questionnaire contained demographic questions including questions indicating the respondent's birth order and sibship size; questions about the respondent's rationale for doing genealogical research; the "Whom, of all the people you know, are you closest to?" question used in the previous studies; and a question addressing "radicalness" which was based on Sulloway's findings (1996). Participation was, of course, entirely voluntary. Those who elected to respond e-mailed their questionnaires to an account created for that purpose. Participation in relation to birth order was compared to expected values by the same method as was applied to the archival data in Study 3a, and responses to other questions were compared by birth order.

Results

Figure 3 portrays the relationship between birth order and genealogical research participation in the various groups (Figure 3). In Binbrook, firstborns were 4.6 times more likely than middleborns to submit a family history, and the difference between observed and expected birth orders of the submitting genealogists was highly significant (chi-square 2df = 19.5, $p<0.001$). When the 28 male and the 37 female genealogists are considered separately, the same pattern of underparticipation by middleborns is significant ($p < 0.05$) in both.

The results for Antler replicate those for Binbrook. Again, fewer middleborns than expected submitted family histories (chi- square 2df = 14.5, $p<0.001$), with firstborns being 3.6 times more likely than middleborns to submit a family history. And again, the same pattern held when the 31 male and the 40 female genealogists were considered separately ($p < 0.01$ in both cases).

One hundred Internet genealogy newsgroup respondents (56 women and 44 men) returned the electronic questionnaire. Differential participation by birth order was again highly significant (chi-square 2df = 33.03, $p<0.001$), with firstborns 2.7 times more likely to submit a questionnaire than middleborns, but in this instance lastborns were also underrepresented. Moreover, even within this sample of volunteer respondents self-selected for an interest in genealogy, birth order effects on family sentiment were replicated: Echoing the undergraduate respondents in Studies 1 and 2, 41% of the 59 firstborn Internet genealogists nominated mother as the person to whom they felt closest, as did 52% of the 19 lastborn respondents, compared to just 14% of the 22 middleborns (chi-square 2df = 10.44, $p<0.01$).

The effects of mother's age at the respondent's birth on her chance of being nominated as the respondent's closest interactant were assessed within firstborns and lastborns considered separately. The average age of mother at the birth of the 24 firstborn genealogists who nominated her was 25.9 years, whereas the 35 firstborns who nominated someone else were born to women whose mean age was 25.1. This difference was in the predicted direction, but was not significant (t 39df = 0.5). For lastborns, the average age was 33.8 for those nominated and 31.3 for those who were not nominated (t 13df = 0.65), which was again in the predicted direction, though not significant. There were not sufficient mothers nominated by middleborns to make this comparison.

There was no apparent effect of birth order on professed rationales for conducting genealogical research, but there was a significant sex difference, with women more likely to articulate family as a motivation for research while men (particularly firstborn ones) were more likely to explain their interest in terms of a general interest in history. As for the question

addressing the issue of "radicalness" ("Do you think that you are open to new and radical ideas?), firstborns were the least open to radical views (chi-square 2df = 17.09) with 47% of firstborns saying "yes", while 86% of middleborns and 89% of lastborns said "yes". There were no apparent sex differences.

Discussion

Sulloway (1996) argued that birth order is the key determinant of innovativeness and additional aspects of scientific and other careers, ultimately because firstborns are the beneficiaries of parental favoritism and have the most to gain from upholding the status quo. Although most of his analyses contrasted only firstborns versus "laterborns", Sulloway also noted that whereas firstborns "have an edge in courting parental investment", the "losers" are "often middle children", because the lastborn has the advantage of being "the only member of the family to receive parental investment undiluted by the needs of a younger rival" (p. 305).

In the studies reported here, birth order was found to have a large impact on self-concepts, on nominations of one's closest social ties, on claims about who one would turn to for help, and on self-selected participation in genealogical research. As predicted from an evolutionary psychological analysis of discriminative parental solicitude (Wilson and Daly, 1994; Daly and Wilson, 1995) and from Sulloway's (1995, 1996) analysis of intrafamilial niche differentiation, firstborns were consistently found to be the most parentally and familially oriented, and middleborns the least.

Kidwell (1982) called middleborns "the neglected birth order," suggesting that the prevalent practice of comparing firstborns to laterborns has masked the effect of being a middleborn. Arnstein (1978) proposed that the condition that distinguishes the middleborn position is its lack of perceived distinction and attention in the family, and suggested that this lack of uniqueness may result in a tendency for the middleborn to be overlooked by parents and to receive less special attention. Most research on birth order has either contrasted firstborns versus laterborns or analyzed in terms of each serial position (first versus second versus third, etc.). The categorization first versus middle versus last has been employed only rarely, but as we noted in the introduction, the few previous results are consistent with the present analysis in indicating that middleborns can rely on parental support less than either first or lastborn children, and that they respond accordingly (Kidwell, 1981, 1982: Kennedy, 1989).

Some critiques of the birth-order literature have suggested that family size is confounded with birth order and that this makes apparent birth-order effects spurious. Middleborns necessarily come from sibships of three or more, whereas firstborn and lastborn groups could include many subjects from two-child families. However, Figure 2b illustrates that these birth order effects are not artifacts of family size: Looking at firstborns versus middleborns versus lastborns within a given sibship size, effects of birth order on nominations of one's closest interactants remain large.

As the recipients of less (or less dependable) parental attention and investment, middleborns are apt to invest their social efforts in reciprocity-based extrafamilial friendships and mateships. And it was indeed the case that middleborns named unrelated persons as their closest interactants and as the people to whom they would turn for

emotional and even financial support very much more often than did first and lastborns. They were also relatively unlikely to think of their status as a family member in answering "Who are you?" (Study 1) and relatively unlikely to take an interest in family history (Study 3). In Studies 1 and 2, firstborns were over five times more likely than middleborns, and lastborns about four times more likely than middleborns, to nominate a parent (usually mother) as closest interactant. Most striking, perhaps, is the fact that even among the Study 3 Internet respondents, a group self-selected for genealogical interests, first and lastborns were still far more likely than middleborns to nominate mother.

The chroniclers of Binbrook and Antler family histories represent traditions of rural landholding in which farms were usually inherited by the eldest son. It is hardly surprising that middleborns in such a situation should be relatively disinclined to take an active interest in family history. But it is perhaps less obvious why birth order effects were as striking among women as among men, and why lastborns are keener genealogists than middleborns (Figure 3). Not only does primogeniture in inheritance seem to dictate a firstborn-laterborn contrast, but one might also note that the greater reproductive value of firstborns affords them a greater "fitness value" to other family members in much the same way as to parents, whereas the evolutionary psychological rationale for "indulging" lastborns applies only to parents. Results for the web genealogists would appear to jibe with these arguments for a firstborn-laterborn contrast, since both middleborns and lastborns were underrepresented. However, it should be noted that firstborns are generally overrepresented on the Internet, as they are in college (www.cc.gatech.edu/gvu/user_surveys).

In Study 3, the middleborn Internet respondents were the least likely (though the difference was not significant) to claim family as the main rationale for conducting their research, in some cases even stating that friends provided the main encouragement. An interesting additional point is that female respondents actually outnumbered males, despite a predominance of males on the Internet and on newsgroups in particular (Clerc, personal communication). Thisresult echoes Salmon and Daly's (1996) finding that Canadian women have more extensive (or more accessible) genealogical knowledge than their brothers, presumably reflecting the fact that family "kinkeeper" is predominantly a female role.

It is not our claim that lastborns are more like firstborns than like middleborns in all domains. Self-professed openness to "new and radical ideas", for example, differentiated firstborn vs laterborn Internet respondents in Study 3, in exactly the way that Sulloway's (1996) discussion would predict. Both first and lastborns may enjoy relatively high and dependable levels of parental investment, but with qualitative differences. Kidwell (1982) argued that parents invest heavily in firstborns because of high achievement goals, whereas "for the lastborn, the standards and expectations are relaxed, and parental attentions are directed toward the greater enjoyment of the last child - the baby of the family" (p. 226).

Increasing "indulgence" as birth order rises is also to be expected on the basis of increasing maternal age (Wilson and Daly, 1994). In Study 1, such an age effect was demonstrably distinct from the birth order effect since mothers who were older when the respondent was born were substantially more likely to be nominated as "closest" within both the firstborn and lastborn groups. No such effect was

apparent in middleborns, perhaps because of a "floor effect": only 7% nominated mother at all.

In sum, these results support Sulloway's claims concerning the powerful impact of birth position on family relations. The combination of firstborn favoritism, lastborn freedom from competition from successors, and maternal age effects, appears to result in greater family interest and reliance on the part of first and lastborns, while middleborns apparently invest more of their efforts in non-kin reciprocal relationships.

Both self-report and archival measures show middleborns to be significantly different from first and lastborns in some aspects of family relations, and these differences are sometimes large. As middleborns are distinct from lastborns in these matters, they should not be grouped with lastborns as "laterborns." Such a grouping masks the distinct effects of being a middleborn versus a lastborn.

Notes

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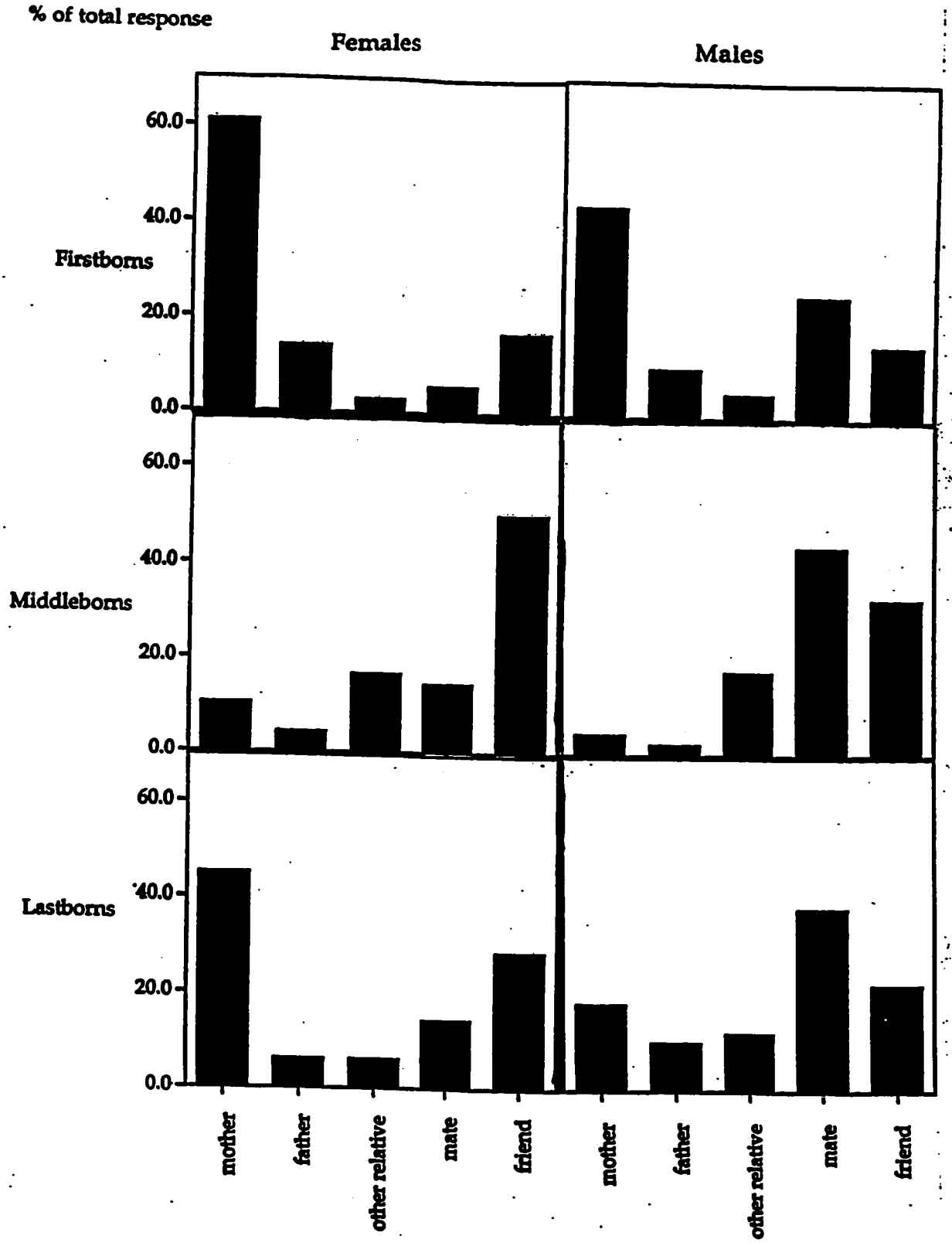

Figure 1: Percentage of respondents of a particular birth order and sex who nominate a certain individual as the person they feel closest to.

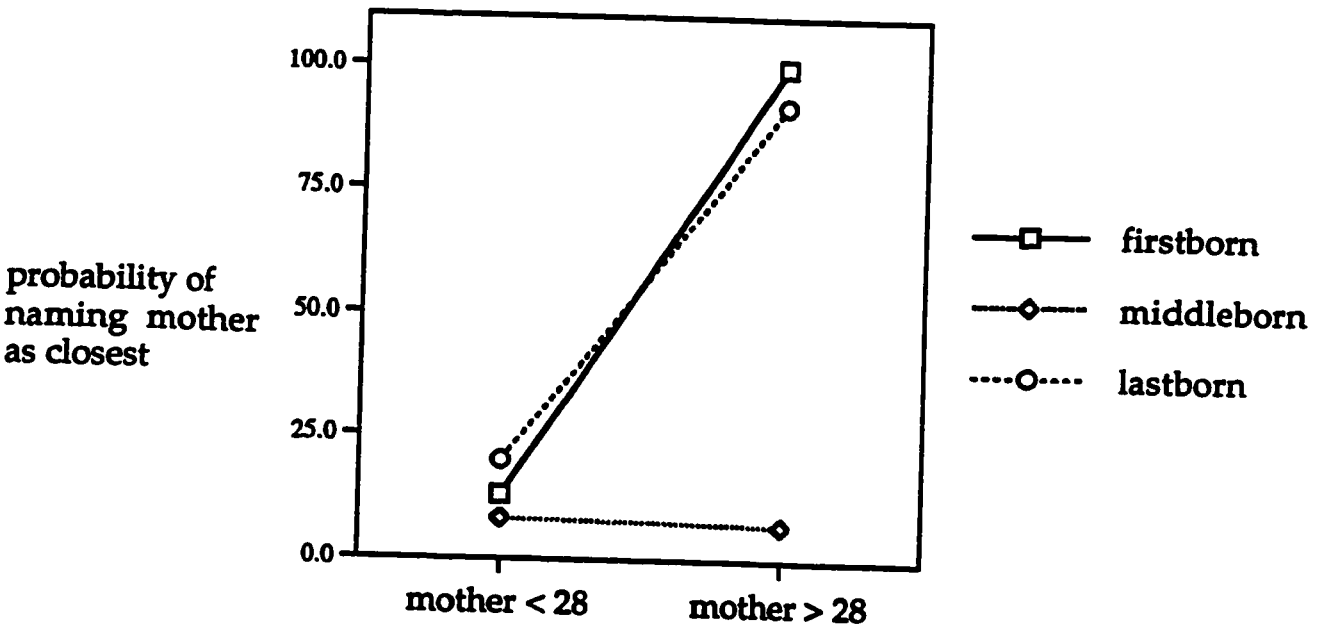

Figure 2: The probability of subjects naming mother as their closest intimate in relation to age of mother at subjects birth.

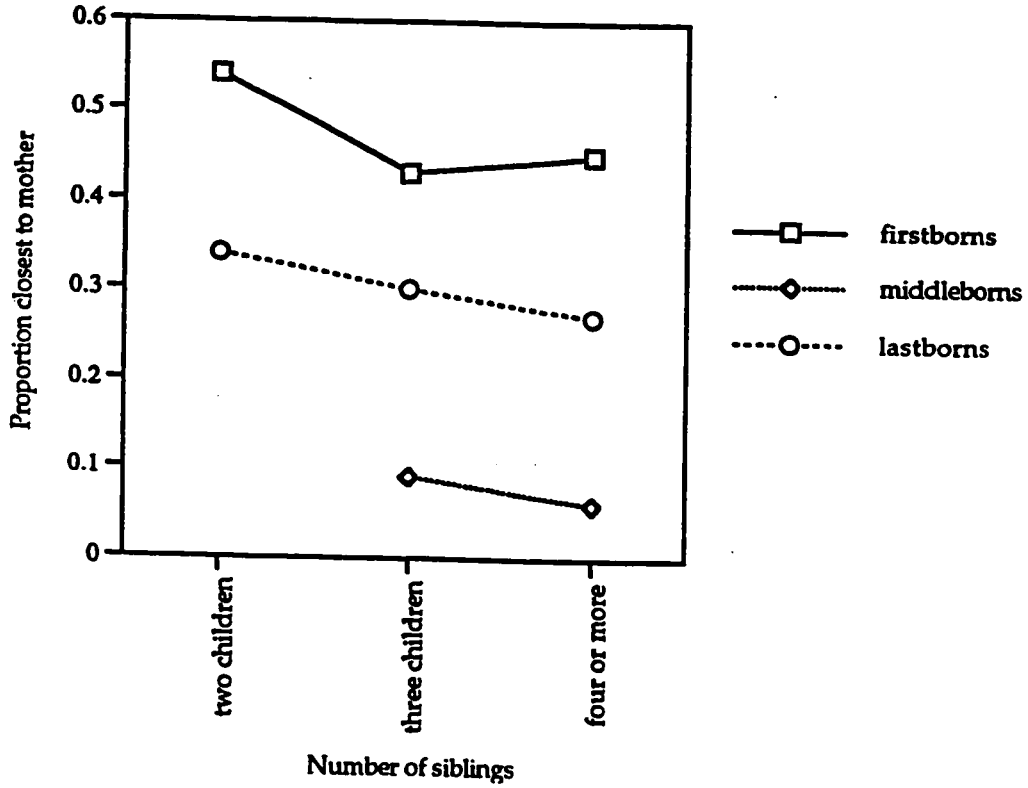

Figure 2b: Proportions of undergraduate subjects of a particular birth order naming their mother as their closest intimate in relation to family size in Study 1.

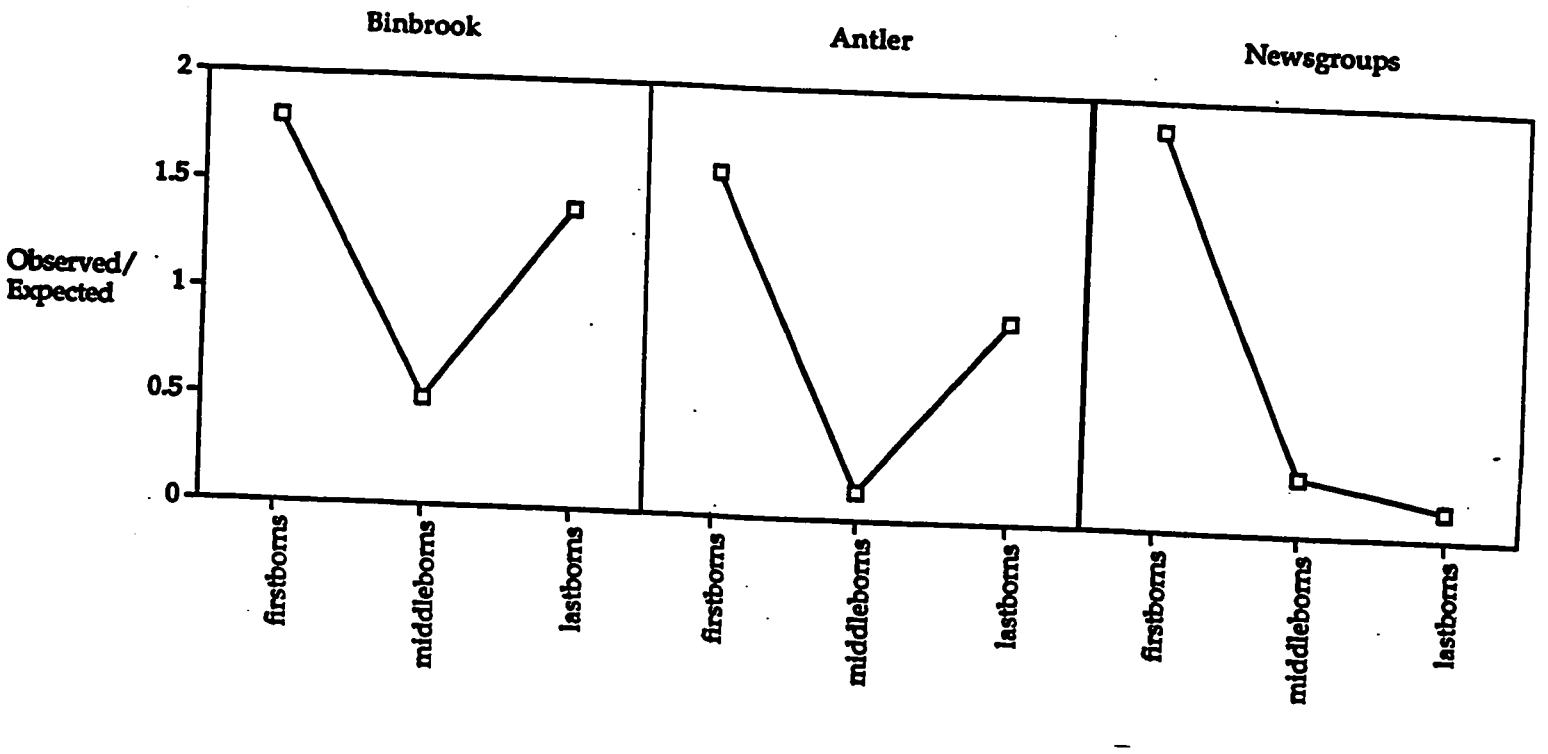

Figure 3: The ratio of observed to expected numbers of each birth order submitting family histories or responding to the email questionnaire.

	females	males
firstborns	61.0 %	74.0 %
middleborns	52.0 %	31.0 %
lastborns	53.0 %	60.0%

Table 1: Percent of subjects in each birth order, by sex, who list either a family name or role in their answer to the question "Who are you?"

The Evocative Nature of Kin Terminology in Political Rhetoric

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Abstract

Kin terms such as 'brothers, sisters, motherland' are frequently used in both political and patriotic speech. Johnson (1986, 1987) has argued that this use of kin terms in patriotic, or rhetorical, speech can be predicted on the basis of evolutionary psychology. He has suggested that the human inclination toward nepotistic behavior can be called forth by the successful manipulation of kin terminology. In this study, two hypotheses were examined concerning the evocativeness of kin terminology in political speech and the influence of birth order on the effectiveness of such terminology. The first hypothesis was that kin terms would be more effective than more distant relationship terms (like friend) in evoking a positive response. Kin terms elevated agreement with the views expressed in the speech that the subjects heard. The second hypothesis, that middleborns would be less likely to respond to such kin term usage than first or lastborns was based on previous work on birth order and family relations (Salmon & Daly, in prep.). And in fact, middleborns were less likely to be influenced by the use of kin terms than first or lastborns in this study.

"For he today that sheds his blood with me shall be my brother. "

Shakespeare

Introduction

"Brother can you spare a dime?" How often have we heard speakers who wish to emphasize or promote beneficence address nonrelatives with kin terminology? Perhaps even more common is the metaphorical brothering of a potential ally in a joint venture, where the speaker wishes to focus attention on a (possibly?) shared interest and promote kin-like solidarity (Johnson, 1986). This behaviour raises several questions: Why use such terms? Does it work? And does it work better on certain individuals? Evolutionary psychology and kin selection may provide the answers.

Based on the concept that evolved motivational mechanisms have been designed to expend an organism's life in the pursuit of genetic posterity, one might expect nepotistic strategies of investment and a natural solidarity between kin. Such behaviours have been well-documented in many species (for an overview, see Daly & Wilson, ch.3, 1978), leading toward a general expectation of benevolence, or emotional attachment to close kin. This type of bond is rooted early in the human life cycle. Children experience kinship ties first, long before those of friendship or reciprocal alliance. As children, their closest associates and caregivers are relatives and it is not surprising that the first words they learn are often those terms for family members, like mommy and daddy.

Such kinship bonds are powerful in their influence. Even the terms used to describe them convey images with emotional effects. And this is

where the power of such terminology may lie. Our social life is based upon family relations. Kin recognition by association, one of the most likely mechanisms of recognition (Holmes & Sherman, 1982; Alexander, 1979; Johnson, 1989), depends upon familiarity. If living and rearing arrangements are such that those who interact most frequently and intimately with each other are typically kin, familiarity would be a reliable indicator of kinship. The artificial, or metaphorical, use of kin terms is designed to exploit the natural solidarity of kin or to tap into the emotions/bonds/obligations of kinship. We address non-relatives by kin terms when we are attempting to promote solidarity or to solicit aid. In such a situation, the term is used to elicit the emotions associated with kin, as opposed to situations in which the emotional state/relationship arises and is then affirmed by the bestowing of a kin term (Stack, 1974). In such a situation, a capacity produced by kin selection is called forth by successful manipulation of the cues which evolution has produced for eliciting altruism. After all, what evokes altruistic behaviour on behalf of kin is not kinship itself but environmental cues that have typically been highly correlated with kinship. If one of the functions of political speech is the fostering of bonds of association and loyalty among a group of individuals, we might therefore expect kin terms to play an important role in the efficacy of political speech.

One study that attempted to address the issue of the effectiveness of kin terminology in patriotic speech was that of Johnson et al. (1987). Their hypothesis was that kin terms used in the context of patriotic speech are more evocative than other terms of association. The hypothesis was evaluated via attitudinal questions and physiological measures. Neither yielded significant results, although the trends found were in the direction predicted by the hypothesis. But the fact that politicians and union leaders persist in using kin

terminology suggests that it is an effective strategy for arousing the emotions of an audience. And yet, it also seems likely that natural selection should have equipped us with psychological defenses against being manipulated by easily faked words from the mouths of persons whose self-interests are not necessarily compatible with our own. Perhaps saying "brother" achieves little more than to signal to the listener that a claim of common cause is about to follow, a claim that the listener may still reject but that he has at least been prepared to consider.

This study attempts to deal with the same general hypothesis as Johnson et al.'s (1987) but with a few changes. At the time of the previous study, an attempt to have subjects listen to speeches was abandoned, as it was too difficult to produce three speeches identical in all but their use of kin terms. Subjects read the speeches, not the typical way they would experience patriotic speech, which would be as listeners. More recent advances in computer and audio equipment have made simple word substitution possible. Another change from the Johnson et al. (1987) study is that these Canadian subjects listened to a political, as opposed to patriotic, speech on the belief that political issues hold more relevance/significance than patriotic ones to students who have never seen a war fought on their own land and who may be quite unfamiliar with such events in the past.

There is an additional hypothesis that I wished to address with my study. The sibships into which we are born are crucial social environments with associated opportunities, costs, and "niches", and it would be remarkable if our evolved social psyches did not contain features adapted to the peculiarities of sibling relationships. Sulloway (1995, 1996) has developed the idea of niche differentiation, an evolutionary psychological perspective, with principal reference to the ways in which one deals with one's ordinal position

in a sibship. Evolutionary considerations suggest that parents would favour their eldest offspring (Alexander, 1979) and when tough choices are required, there is evidence that they do just that (Daly & Wilson, 1984). Therefore, Sulloway (1995, 1996) argues that it is ultimately their security in the expectation of parental favoritism that makes firstborn children defenders of parental values and the status quo, while laterborns are relatively inclined to be "rebels."

There is, however, some theoretical and empirical support for the notion of parental indulgence of lastborns as well. An organism with a high residual reproductive value (at the beginning of its reproductive phase, for example) will invest less in current reproduction than an organism that is older (low residual reproductive value) and that has a statistically smaller prospect of producing and future offspring (Clutton-Brock, 1984). Thus, one might expect greater investment in a lastborn child (whose status may even be known before its birth, particularly if the mother is older) in a sort of "it's the last one so give it all you've got" fashion. Perhaps this is the source of the image of the "indulged" lastborn. This emphasis on first and lastborns suggests that it may be the middle birth positions that derive the least benefit from nepotistic solidarity (Kennedy, 1989; Kidwell, 1982; Salmon & Daly, in prep). In support, Salmon & Daly (in prep) have found middleborns to be less interested than first and lastborns in learning about their family history and in keeping in contact with their kin, and I would also expect them to be less influenced by the rhetoric of kinship and family solidarity when used in evocative political speech.

Thus, this study addressed the issues of the use of kin terminology and the evocativeness of political speech and its influence relative to birth order. First, the question of whether kin terms actually do evoke a greater response

(based on the human inclination toward nepotistic behaviour) was addressed. Secondly, the issue of whether middleborns are as susceptible as first or lastborns to such kin term manipulation was examined.

Methods

Speech

A political speech (election campaign speech) with three levels of association terms was employed for the purpose of examining the two hypotheses. As in Johnson et al (1987), level-one terms were kin terms (e.g. mother, father, brother, sister). Level-two terms reflected a lower level of association (e.g. friend, neighbour). Level-three terms reflected a still lower or abstract level of association (e.g. fellow citizen, associate). The use of these different levels of association terms produced three speeches identical except for the terms of association. The three speeches (and their terms) will be referred to as 'kin', 'friend', and 'citizen'.

The speech itself, as previously mentioned, was political in nature, partially inspired by a campaign statement by Ontario Premier Mike Harris. Subjects listened to an audio recording of the speech and each subject heard only one version of the speech. The audio recording was read by a naive graduate student at McMaster University. He read the speech through once, followed by a list of words and phrases. The audio material was then digitized via "Cesar" and then manipulated via "SoundBlaster" so that individual words and phrases could be replaced with precision. The speech was approximately four minutes long and there were four places where substitutions (i.e. 'friends' for 'brothers and sisters') were used.

Subjects and Procedures

The subjects consisted of 112 McMaster University undergraduate students (46 male, 66 female) who were asked to complete a questionnaire concerning political views as partial fulfillment of a requirement for an introductory course in Psychology. Ages ranged from 18 to 52 with most subjects under 21 years of age. Subjects were given a questionnaire which instructed them to complete Section 1 (personal information and questions designed to assess attitudinal change as a function of the experimental manipulation). Some examples of the attitudinal questions include:

"On the scale below, indicate your level of agreement or disagreement with the following statement: The Canada Pension Plan is not working and needs to be changed, perhaps transferred so that it is under private control."

"On the scale below, indicate your level of agreement or disagreement with the following statement: The Canadian school system has failed to live up to expectations and must be improved before we fall far behind the performance of other western countries."

They then heard one of the three versions of the speech and after that, completed Section 2 which asked subjects to help evaluate the effectiveness of the speech by answering questions relating to it directly. Section 3 asked for additional background information (and reworded versions of the Section 1 questions were embedded among the others in this section). Examples of these reworded questions include:

"On the scale below, indicate your level of agreement or disagreement with the following statement: The Canada Pension Plan is in serious trouble with the only viable solution being private sector pension plans."

"On the scale below, indicate your level of agreement or disagreement with the following statement: The Canadian education system is in need of reform."

All the attitudinal questions asked for ratings on a 7-point Likert-type scale.

Results

The post-speech questions were examined and found to be all weakly correlated (correlations from .121 to .488), suggesting their use in the creation of a single "scale" score. As a result, scores on post-speech questions were summed for each subject into a single post-speech score which was used as the dependent variable in the following ANCOVA analyses. There were ten post-test questions used in this score (as well as ten pre-test questions that went into the pre-test covariate score).

These post-speech scores were analyzed with a 3 X 3 X 2 ANCOVA. Speech (kin, friend, citizen), birth order (firstborn, middleborn, lastborn) and sex (male, female) were between subject variables. Pre-speech scores (created the same way as the post-speech scores, summing the pre-test questions) were treated as a covariate in order to control for the political views of the subjects before they heard the speeches.

The analysis revealed that there was a reliable main effect of speech, $F(2,102)=7.50$, $MS_e=29.07$, $p<0.01$. Higher post-speech values (i.e. more supportive of the politician making the speech and his views) were found in those subjects that heard the kin speech. Post-speech scores were found to be lower with the friend speech and even lower with the citizen speech (Figure 1). Sex appeared to have no effect on post-speech scores and neither did birth order.

However, the main effect of speech should be interpreted in light of the significant interaction that was found between birth order and speech, $F(4,102)=5.98$, $MS_e=29.07$, $p<0.01$ (Figure 2). To analyze this interaction,

subsequent ANCOVAs were conducted separately on the three speeches to look at the influence of birth order.

For the kin speech, there was a reliable main effect of birth order, $F(2,34)=11.42$, $MS_e=35.24$, $p<0.01$. Both first and lastborns produced significantly higher post-speech scores than middleborns. For the friend speech, there was also a reliable main effect of birth order, $F(2,33)=6.42$, $MS_e=31.69$, $p<0.01$. In this case, middleborns produced significantly higher post-speech scores than first and lastborns. For the citizen speech, there was no reliable main effect of birth order. Middleborns produced significantly higher post-speech scores than lastborns but they were not significantly higher than those of firstborns. However, the general trend was similar to that of the friend speech.

It should also be noted that there were 48 firstborns (includes 6 "only" children), 30 middleborns, and 34 lastborns among the subjects in this study. The majority came from two and three children sibships with a couple from sibships of four. This suggests that any effects of being a middleborn are not confounded with large sibship size.

Birth order was also examined in relation to all subjects' answers (Likert scale, 1=extremely low, 7= extremely high) to the question: "On the scale below, rank the extent to which your family life as a child was characterized by love, warmth and support. Circle the number that you think is most appropriate." In this case, there was a reliable main effect of birth order, $F(2,106)=17.36$, $MS_e=0.96$, $p<0.001$. Both first and lastborns were significantly more likely than middleborns to give high scores on this question. In addition, there was also a main effect of sex, $F(1,106)=22.53$, $MS_e=0.96$, $p<0.001$, with females more likely to give high scores. There was also a significant interaction between sex and birth order, $F(2,106)=8.47$,

$\underline{MS}_e$=0.96, $p<.005$, which suggests that the birth-order effect is more pronounced in males than in females.

Discussion

Speech Response and Kin Terminology

Johnson et al's (1987) previous study suggested that kin terminology might be an effective method of evoking patriotism and support among readers. While their results were, in general, not statistically significant, there were trends in the direction predicted. A more recent study, that of Holper (1996) on kin term usage in *The Federalist*, indicated that kin terms were more frequently found in patriotic than in non-patriotic discourse.

In light of such findings, I expected to find the kin speech to be more effective than the other two speeches in eliciting support for the political views expressed by the speaker on the part of listeners. The post-speech scores in this study clearly demonstrate this. As politicians and union leaders, religious figures, and others have recognized, people respond to the use of kin terms. In general, the speech which utilized kinship terminology (brothers and sisters, children, etc.), was the most effective at producing high post-speech scores, indicating the subjects' agreement with the views espoused in the speech. The more distant the terminology (neighbours, fellow citizens, etc.), the less effective in eliciting the desired reaction on the part of the audience. And this is what one would predict from the perspective outlined in the introduction to this paper. If kinship is the primary organizing principle in human relations and the foundation of altruism, and as metaphors are "those explicitly acknowledged but often unconsciously or

tacitly employed conceptual systems of images through which social life is interpreted and around which social life is organized" (Turner, 1987, p. 56), it is not surprising that one should invoke kinship metaphorically in the negotiation of non-nepotistic cooperation. What is interesting, and perhaps surprising from any perspective other than that of evolutionary psychology, is that the effect of such kinship terminology appears to be variable in relation to birth order.

Birth Order and Kinship Terminology

The initial ANCOVA revealed that there was an interaction between the variables of speech and birth order. The kin speech was more effective in evoking political support among first and lastborns than either of the other two speeches. However, middleborns responded much better to the friend speech. The citizen speech was not particularly effective with any birth order, although middleborns responded slightly better to it (not significantly though) than to the kin speech. This suggests that middleborns are not as susceptible to the emotional appeal of kinship ties as first and lastborns, at least in political rhetoric.

Salmon and Daly (in prep) found that in the areas of closeness to kin, importance of kin ties to self-identity, and interest in genealogy, middleborns are quite different from first and lastborns. Middleborns are relatively unlikely, in comparison to other birth orders, to be close to a parent, to make kin ties a part of their self-identity, or to research their family history. In addition, Kennedy (1989) found that parents invest less in middleborns, and Kidwell (1981) also noted that middleborns view their parents as less supportive. Receiving less investment from family, they seek reciprocal ties elsewhere, primarily in the bonds of friendship. And in this study, as in

Salmon and Daly (in prep), middleborn subjects characterized their childhood family life as less secure and comforting than first and lastborns. It is unsurprising then that they respond best to political argument couched in terms of friends and acquaintances, those individuals that they rely on in their own lives.

Interestingly, there were no significant sex differences with regard to post-speech scores. Johnson et al (1987) found some sex differences, most notably with regard to willingness to serve in the armed forces and to die for one's country, roles often taken by men (and questions not asked in my study, which asked questions related to political issues not ones of defense of country). I did not predict any sex differences in my study as the questions did not relate to such areas. While the utility of kinship may differ between the sexes under certain circumstances (Salmon and Daly, 1996), both males and females share close bonds with kin (Salmon and Daly, in prep.) with male alliances (Chagnon, 1981) and female helping networks (Hogan & Eggbeen, 1995; Essock-Vitale & McGuire, 1985) both being relevant. Thus, one would expect both sexes to be subject to the manipulation of kin terminology. Where a sex difference was noted was in the area of characterization of family life, where females tended to respond more positively than males, perhaps due in part to their greater emotional involvement/interest in the family in general (Salmon & Daly, 1996).

While this study addresses my two initial hypotheses, there are additional questions relevant to these issues. One avenue that might address a few more would be further analysis of existing, perhaps historically relevant, political or patriotic speech. For example, are "fringe" political groups more likely to use kin terminology to emphasize the family nature of being a small group united against larger ones in a "common" cause? Unions

certainly use such kin terminology to paint a picture of family support versus the attack of non-familial government.

In addition, are there differences in the kin terms used that correspond to the circumstances of the rhetoric? Metaphors evoking solidarity are most often those of sibship. "The Brotherhood of Free Masonry" or the feminist slogan "Sisterhood is powerful" are declarations of common cause (and implied threat against common foes) by ostensible equals. But asymmetrical kin relationships are also invoked metaphorically, especially in laying claim to authority, as when kings and priests style themselves "fathers." Any implied threats in this case are mainly against the "children" and this style of imposing authority is called paternalism (van den Berghe, 1985, p. 262). Do leaders of state use different kin terms than do members of small, isolated groups?

Conclusions

Two hypotheses based on the evolutionary psychology of kinship were advanced in this paper. The first was that kin terms in political speech are more evocative of support for those political views than other, more distant, terms of association. The second was that birth order would also influence this in that kin terminology would be more evocative for first and lastborns than for middleborns. And indeed, the speech with kin terms was statistically more likely to produce support on the part of listeners. In addition, as predicted, birth order influenced the effectiveness of such terminology, with middleborns being more highly influenced by terms indicating friendship

rather than kinship while first and lastborns were more likely to be swayed by kinship terms.

These results support Johnson's claims about the evocative nature of kin terminology as well as providing more evidence, albeit somewhat indirect, concerning Sulloway's claims about the powerful impact of birth position on intrafamilial relations.

Acknowledgments

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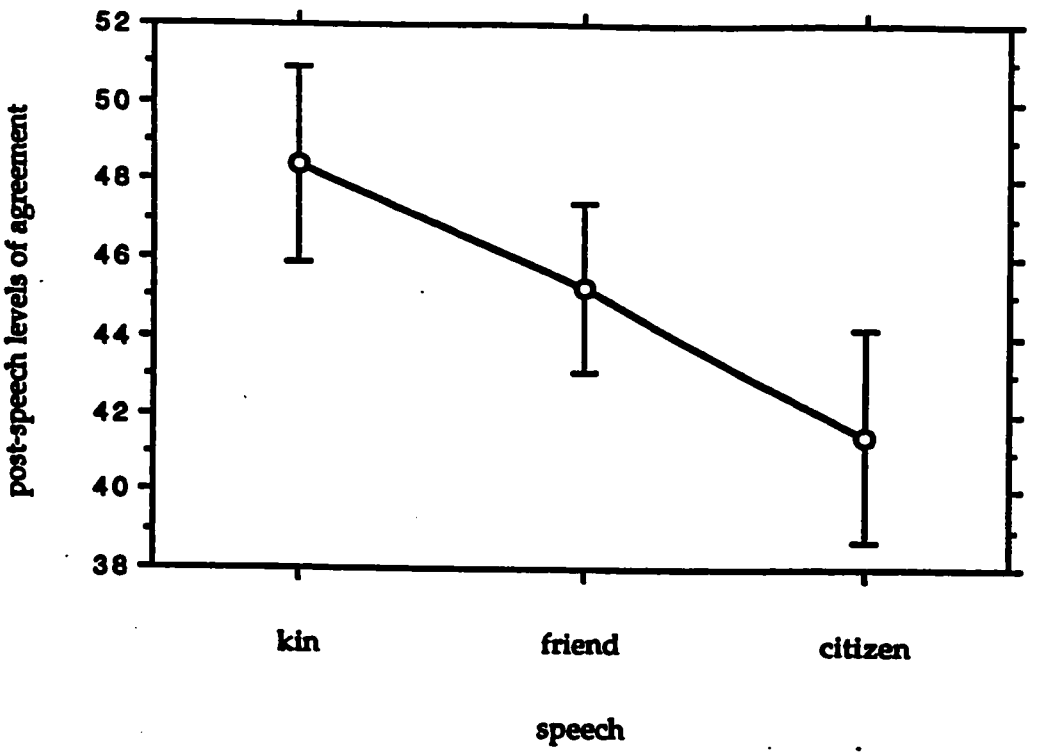

Figure 1: Mean values of post-speech scores (including all three birth orders) by speech, with 95% confidence bars, indictating the declining evocative nature of the speeches from 1 (most effective) to 3 (least effective).

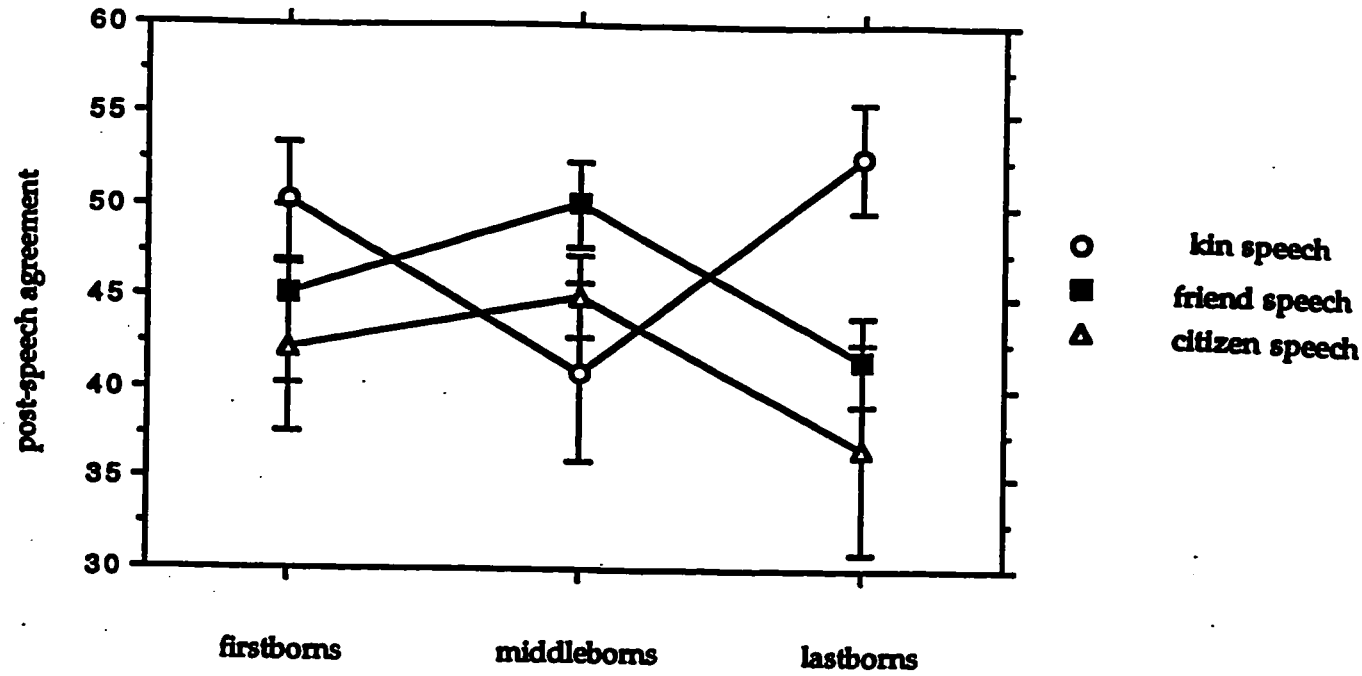

Figure 2: Mean values of post-speech scores for each speech versus birth order, with 95% confidence bars, illustrating the interaction between birth order and speech. Note that the pattern of Speech 1 is quite different from those of Speech 2 and 3.

On the Impact of Sex and Birth Order on Contact with Kin

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Abstract

The effects of sex and birth order on the frequency of contact with maternal and paternal kin were examined in two studies. In Study 1, one hundred and forty undergraduates completed a questionnaire relating to the amount of time they spent in contact with specific relatives, while in Study 2, one hundred and twelve undergraduates completed a questionnaire which addressed the same questions with the addition of two questions relating to the subjects' parents' birth orders. Subjects were more likely to have frequent contact with maternal, as opposed to paternal, kin and women experienced more frequent contact than men with relatives in general. The birth order of subjects did not appear to have a significant influence on contact but the birth order of the subjects' parents did, with the offspring of middleborn mothers having less frequent contact with maternal grandparents and the offspring of middleborn fathers having less frequent contact with paternal grandparents. These sex and birth order differences are discussed in relation to possible differences in how women and men use kinship ties and in terms of how birth order may influence parental solicitude.

Introduction

Like other highly social mammals (Daly & Wilson, 1983; Cronin, 1991), humans evolved to nurture kin, particularly their own offspring. However, recent theories of social evolution suggest that human kin investment psychology is more complex than the general tendency to invest in one's children (Alexander, 1979; Trivers, 1985; Daly & Wilson, 1983,1988; Chagnon, 1981). Contemporary evolutionary psychology suggests that people (like other animals) evolved to discriminate in their solicitude toward kin based on many factors, including degree of relatedness, certainty of relatedness, available resources, and reproductive value (Smith, 1987; Daly & Wilson, 1988; Chagnon, 1981, Burnstein et al., 1994). Factors influencing the degree of solicitude of parents and grandparents have been of particular interest.

It is clear that there are specific adaptations that shape the psychology of motherhood. The most intimate of mammalian social relationships is that between mother and young. However, because offspring are not all equally capable of translating parental nurture into the long-term survival of parental genes, there has been intense selection for subtle discriminations in the allocation of maternal effort (Daly & Wilson, 1995; Haig, 1993; Trivers, 1974).

There are obvious parallels in the case of fatherhood, particularly with regard to discriminative solicitude toward offspring. Yet male certainty of paternity is never as great as that of females (Daly & Wilson, 1982; Davies, 1992; Flinn, 1981) and as a result, male investment in kin may differ. Avuncular inheritance (investing in sisters' children as opposed to own) is but one example (Flinn, 1981; Hartung, 1985). There are no societies where the reverse is true and women invest more in brother's offspring than in their own.

But what of grandparental investment? It is a cross-culturally general fact that postmenopausal women contribute significantly to their grandchildren's welfare (Lancaster & King, 1985), and it is therefore at least plausible that mental processes specific to the task of adaptive allocation of grandparental investment have been targets of natural selection (Euler & Weitzel, 1996; Smith, 1988; Turke, 1997). If paternity uncertainty has been an evolutionary pressure, we might expect closer ties (as reflective of greater investment) between children (or adults for that matter) and their maternal grandparents. And, in fact, Smith (1988) found that Canadian couples with young children saw more of the wife's parents (the children's maternal grandparents) than of the father's parents, despite the fact that the wife's parents tended to live further away. Euler and Weitzel (1996) also found that when adults rated the grandparental solicitude they received as children, maternal grandparents were rated more highly than paternal grandparents.

Not only might we expect differences between maternal and paternal relationships, but there are several reasons for suggesting that the salience and meaning of kinship may differ for women as opposed to men. Although North American society tends to be one with bilateral descent reckoning, it derives from a European tradition of named patriclans, and a biased emphasis on patrilineage persists in our surnaming practices. Moreover, the contemporary United States retains a degree of virilocality: as in most human populations, women disperse greater distances between birth and first reproduction than do men (Koenig, 1989). Nevertheless, American women see their relatives more often than men and exchange more help with them, apparently investing more effort in the maintenance of kin ties (Brody, 1965; Hogan & Eggbeen, 1995; Essock-Vitale & McGuire, 1985; Schneider & Cottrell, 1975; Troll, 1987). Salmon & Daly (1996) found that sisters could name more

relatives (displayed more interest in kin?) than their brothers, especially maternal kin.

But sex (both male/female and maternal/paternal) is not the only influence on kin ties. Sulloway (1996) has argued that birth order is central to human psychological development. Parent-offspring conflict and conflict between siblings make birth order effects seem inevitable (see Trivers, 1974 for parent-offspring and sibling conflict). Sulloway's (1995) meta-analysis of the birth order literature illustrates many highly significant differences between first and laterborns on a number of personality traits (extraversion, agreeableness/antagonism, conscientiousness, neuroticism, and openness to experience).

In addition, Kennedy's (1989) study of middleborns' perceptions of family relationships suggests that middleborns feel less close to, and less supported by, parents than their siblings do, echoing Kidwell's (1981) finding that adolescent middleborns view their parents as less supportive. Salmon & Daly (Chapter 3) also found middleborns to feel less close to parents, and to be less likely to be interested in family history, less likely to turn to parents when in emotional or financial distress, and less likely to include family roles or names in their description of their own self-identity than either first or lastborns. These studies suggest that perceptions of family relationship quality and other aspects of the psychology of kin relations may vary according to birth order.

Based on my previous work on the importance of sex and birth order to kin relations and self-identity, I decided to look at the frequency of phone contact and visits between individuals and their maternal and paternal grandparents, aunts and uncles. If the inclination to maintain contact with

kin can be seen as a measure of closeness (or an indication of solicitation of investment), there are several predictions that can be made.

Prediction 1: Individuals will have more frequent contact with maternal than paternal relatives when availability is controlled, and perhaps even more when paternal relatives actually reside closer.

Prediction 2: Females will have more contact with relatives than males and this will be most pronounced with maternal relatives.

Prediction 3: Birth order will play a significant role in frequency of contact with middleborns having the least contact with relatives.

These predictions were tested as part of two separate studies.

Methods

Study 1: One hundred and forty McMaster University undergraduate students were asked to complete a questionnaire on family relationships and helping behaviour. These were the same subjects as in Study 2 of Chapter 3. Participation in this study partially fulfilled an experimental requirement for an introductory course in Psychology. Seventy subjects were female and the other seventy were male. The questionnaire took approximately one half-hour to complete and the subjects were all between the ages of seventeen and thirty-five.

Subjects were asked numerous questions but the ones of particular relevance here asked for each subject's sex and birth order. They were also asked to list all their grandparents, aunts and uncles and to list for each of those relatives: how far away they lived, how often the subject saw them, and how often they had phone contact with them.

Study 2: One hundred and twelve McMaster University undergraduate students were asked to complete a questionnaire on political views (correspond to study subjects in Salmon, submitted to Politics and the Life Sciences). Participation in this study partially fulfilled an experimental requirement for either an introductory course or a second year course in Psychology. Sixty-six subjects were female and the other forty-six were male. The questionnaire took approximately forty-five minutes to complete and the subjects were between the ages of eighteen and twenty-five.

The questions of present relevance were the same as those listed above for Study 1, with the addition of the subject's parents' birth orders.

Results

Study 1:

While there was usually one living distance from subject given for each pair of grandparents, most subjects had several pairs of aunts and uncles on both paternal and maternal sides. The living distance, frequency of visits, and frequency of telephoning for aunts and uncles were, for the purpose of analyses, taken as the mean distance and frequencies for that category of relative.

When considering all subjects, t-tests showed that subjects lived significantly closer to their paternal relatives, both grandparents, $t(128)=4.33$, $p<0.001$ (Table 1), and aunts and uncles, $t(134)=4.31$, $p<0.001$ (Table 2). Nevertheless, subjects saw both their maternal grandparents, $t(138)=2.70$, $p<0.01$, and their maternal aunts and uncles, $t(134)=1.98$, $p<0.05$, significantly more often than their paternal ones. They also kept in telephone contact more frequently with their maternal grandparents, $t(138)=5.67$, $p<0.001$, and maternal aunts and uncles, $t(139) = 2.41$, $p<0.05$, than with their paternal ones.

These patterns held true for females when males and females were considered separately. However, when males were considered on their own, the differences in visiting or phoning maternal and paternal relatives were not significant. In fact, for frequency of seeing, there was a slight trend in the opposite direction, seeing paternal relatives more, though that trend did not hold for phone contact.

Four separate ANOVAs were used to analyze the frequency of visiting and phoning of maternal and paternal grandparents. Sex (male, female) and birth order (firstborn, middleborn, lastborn) were between subject variables.

The analysis of frequency of seeing maternal grandparents revealed that there was a reliable main effect of sex, $F(1,136)=14.78$, $MS_e=84.62$, $p<0.001$. Females visited their maternal grandparents significantly more frequently than males. There was no significant effect of birth order, although there was a trend in the expected direction with first and lastborns seeing their maternal grandparents more frequently than middleborns.

For the frequency of visiting paternal grandparents, neither sex nor birth order had any effect.

The analysis of frequency of phone contact with maternal grandparents revealed that there was again a reliable main effect of sex, $F(1,136)=48.59$, $MS_e=20.57$, $p<0.001$. Females kept in much more frequent contact with their maternal grandparents than did males. Birth order appeared to have no significant effect on phone contact with maternal grandparents, though lastborns kept in the most frequent contact.

For the frequency of phone contact with paternal grandparents, sex had a reliable main effect, $F(1,135)=9.35$, $MS_e=9.63$, $p<0.01$, with females again keeping in more frequent contact. And again, there was no significant effect of birth order on the frequency of phone contact with paternal grandparents.

It should also be noted that there was no correlation between living distance and either the frequency of visiting or the frequency of phone contact.

In addition, when visiting was examined across all subjects and including both paternal and maternal grandparents, there was a birth order trend in the expected direction with middleborns visiting less frequently, though this difference was not significant.

Study 2:

Subjects again tended to live significantly closer to paternal grandparents, $t(107)=4.52$, $p<0.001$ (Table 3), and paternal aunts and uncles, $t(108)=4.43$, $p<0.001$ (Table 4), as opposed to maternal relatives. Nevertheless, subjects saw maternal grandparents more frequently than paternal, $t(107)=2.78$, $p<0.01$. Subjects also kept in more frequent phone contact with maternal grandparents, $t(107)=5.88$, $p<0.001$, and maternal aunts and uncles, $t(108)=3.04$, $p<0.01$. These patterns held for females when males and females were considered separately. However, when males were considered on their own, the differences in frequency of visiting relatives were not significant. There was no significant correlation between living distance and either frequency of visiting or frequency of phone contact. These results all replicate the results of Study 1 with one exception. In Study 2, there was no significant difference in the frequency of visiting maternal versus paternal aunts and uncles, though the trend was in the same direction as in Study 1.

In this study, there were two additional variables, birth order of the subject's mother and birth order of the subject's father. These variables were introduced after Study 1 when it was suggested that parental birth order could be influencing grandparental relationships, particularly among university

students, some of whom might still be living at home (M. Wilson, personal communication). Four separate ANOVAs were performed to analyze the frequency of visiting and frequency of phone contact with maternal and paternal grandparents. Sex (male, female), birth order (firstborn, middleborn, lastborn), mother's birth order (firstborn, middleborn, lastborn), and father's birth order (firstborn, middleborn, lastborn) were between subject variables.

The analysis of frequency of seeing maternal grandparents revealed a reliable main effect of sex of subject, $F(1,88)=5.19$, $MS_e=109.51$, $p<0.05$. Females were more frequent visitors. There was also a reliable main effect of subject's mother's birth order, $F(2,88)=5.84$, $MS_e=109.51$, $p<0.01$. Subjects with first or lastborn mothers saw their maternal grandparents more frequently than did those with middleborn mothers (Figure 1).

The analysis of frequency of seeing paternal grandparents revealed one demonstrable effect, that of subject's father's birth order, $F(2,88)=3.77$, $MS_e=30.37$, $p<0.05$. Subjects with first or lastborn fathers saw their paternal grandparents more frequently than those with middleborn fathers (Figure 2).

The analysis of frequency of phone contact with maternal grandparents revealed a main effect of sex, $F(1,89)=28.70$, $MS_e=26.78$, $p<0.001$. Females phoned their maternal grandparents more frequently than males.

For frequency of phone contact with paternal grandparents, there was also a reliable main effect of sex, $F(1,88)=15.51$, $MS_e=14.76$, $p<0.001$. Females were phoning their paternal grandparents more often than males.

Discussion

Maternal/Paternal Living Distance and Contact

Evolutionary thinking suggests that much of animal behaviour can best be viewed as having evolved in order to facilitate the reproduction of an individual's genes (Hamilton, 1964). Activities that promote such genetic survival in conspecifics are referred to as kin investment, of which parental investment is the most fundamental. In highly social mammals, such as humans, adult care is necessary for offspring survival. Kin must provide food and protection, and teach survival and social skills. Despite exceptions like inheritance (Smith, Kish & Crawford, 1987; Judge & Hrdy, 1992) human kin investment generally requires expenditures of time to be effective, and therefore the amount of time that grandparents spend with grandchildren is probably a good rough measure of the degree of kin investment.

As predicted, subjects again tended to have more frequent physical and phone contact with maternal relatives. Grandparents' preferences for daughters' children may reflect an evolved inclination to invest more in kin with whom relatedness is more certain. If this bias reflects an evolved pattern of behavior, it may have arisen because paternal uncertainty makes grandparents more likely to share genes with their daughters' children than with their sons' putative offspring. Investment in daughters' children therefore benefits grandparental fitness more. If contact is either the product of investment or an attempt to solicit investment, it is not surprising that the more "sure" maternal kin are the ones with which the most contact is maintained. This result echoes the maternal bias of genealogical knowledge noted by Salmon & Daly (1996) and occurs despite the fact that subjects live closer, on average in both Study 1 and Study 2, to paternal kin. As in many

societies (Clarke & Low, 1992; Koenig, 1989), there was apparently a female bias in dispersing in the parental generation so that subjects were living closer to their father's families than their mother's.

Sex Differences in Contact

Females in both studies had more frequent contact with relatives, in general, than males, as predicted. As in Salmon & Daly (1996) and others (Hogan & Eggebeen, 1995; Troll, 1987), females seem to place a greater importance on maintaining ties to relatives, whether that importance is expressed in terms of genealogical knowledge or frequency of contact with relatives. The fact that the majority of the males in my study were not married corresponds with research (Schneider & Cottrell, 1975) which suggests that married men have more contact with their blood relatives than single men due to the influence of their wives. Clearly, the unmarried state of the majority of the female subjects did not reduce their contact with kin to the same extent that it apparently did for the males.

Similarly to previous findings (Salmon & Daly, 1996; Schneider & Cottrell, 1975), women kept in most frequent touch with maternal relatives. Contemporary North Americans, like other people, continue to rely on relatives, feeling both some entitlement to ask kin for help and some expectation that it will be willingly provided. Women tend to keep in more frequent contact with relatives than do men, particularly maternal ones, and they apparently rely on kin somewhat more than men (Hogan & Eggebeen, 1995). In particular, matrilateral kin are a woman's primary social resources, providing child care, economic assistance, and emotional support (e.g. Stack, 1974; Essock-Vitale & McGuire, 1985), so it is hardly surprising that women spend time on maintaining such ties. Interestingly, males were not more

inclined to keep in frequent contact with paternal kin. In both studies, males on their own did not exhibit the maternal/paternal differences that females did, at least not significantly. Much has been made of the role of male kin alliances in our ancestral past (Chagnon, 1981), but it is possible that such male ties only become evident when the situation demands it (village fissioning or warfare, for example). In a modern western society, males clearly exhibit less interest in kin, as might be expected on the basis of paternity uncertainty.

Birth Order and Familial Contact

While birth order of subjects didn't appear to have a significant effect on contact with grandparents (there was a trend in the expected direction in Study 1 but not in Study 2), there was an effect of parental birth order on visiting grandparents. This suggests that birth order has a greater impact on parent-offspring relations (influencing grandchildren in that manner) than on direct grandparent-grandchild relations. Subjects with first or lastborn mothers saw their maternal grandparents more frequently than those subjects with middleborn mothers. And similarly, those subjects with first and lastborn fathers saw their paternal grandparents more frequently than those with middleborn fathers.

There were no such effects on interaction with aunts and uncles, unsurprising if it is the parent-offspring relationship that is the source of the birth order effect. If parents invest more in their first and lastborn children, as some studies have suggested (Kennedy, 1989; Kidwell, 1982), it seems logical to assume greater contact between them and their favoured children's children. Salmon & Daly (in prep) found first and lastborns more likely to turn to parents than middleborns when in need. Kennedy's (1989) report that

middleborns feel less parental support and that they receive less college tuition support than first or lastborn children, implies that middleborns perceive their parents (perhaps accurately) as less inclined to provide support, whether it be emotional or economic. Those subjects in my study with middleborn mothers and fathers saw their respective grandparents less frequently than those with first and lastborn parents, presumably either because their parents didn't encourage (or experience themselves) close contact with their parents or because grandparents are themselves focused on the children of their own first and lastborns.

Conclusions

As predicted, individuals in these studies experienced more frequent contact with maternal than paternal relatives, despite the fact that they, in general, lived closer to their paternal relatives. Females had more frequent contact with relatives than males, especially with maternal kin. And while the birth order of an individual did not appear to significantly influence contact with grandparents, the birth order of an individual's parents did, with the offspring of middleborn parents seeing their respective grandparents less frequently than those with first or lastborn parents. These results may be interpreted as reflecting that: there is a female kinship psychology that is relatively focused on remaining in close contact with sources of support (i.e. maternal kin); that paternity uncertainty may play a role in investment (or emotional attachment) between grandparents and grandchildren and that parental birth order may influence children's relationship with their

grandparents (either via inclination to provide investment on the part of grandparents or by parental influence on offspring).

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	mean living distance	mean frequency of visits	mean frequency of phone calls
maternal	172.0 ± 279.2	9.9 ± 9.7	6.4 ± 5.3
paternal	64.9 ± 56.5	7.3 ± 5.3	3.9 ± 3.2

Table 1: Living distance from (km), frequency of visiting (per year) and frequency of phone calls (per year), ± the standard deviation, between subjects and their grandparents in Study 1.

	mean living distance	mean frequency of visits	mean frequency of phone calls
maternal	163.5 ± 253.2	6.2 ± 5.0	3.3 ± 2.1
paternal	88.8 ± 179.9	5.3 ± 2.8	2.6 ± 2.5

Table 2: Living distance from (km), frequency of visiting (per year) and frequency of phone calls (per year), ± the standard deviation, between subjects and their aunts and uncles in Study 1.

	mean living distance	mean frequency of visits	mean frequency of phone calls
maternal	180.5 ± 257.2	11.2 ± 11.0	7.6 ± 6.0
paternal	65.2 ± 59.8	8.0 ± 5.8	4.4 ± 4.2

Table 3: Living distance from (km), frequency of visiting (per year) and frequency of phone calls (per year), ± the standard deviation, between subjects and their grandparents in Study 2.

	mean living distance	mean frequency of visits	mean frequency of phone calls
maternal	166.6 ± 249.3	6.0 ± 4.7	3.4 ± 2.2
paternal	92.4 ± 200.0	5.6 ± 2.9	2.4 ± 2.5

Table 4: Living distance from (km), frequency of visiting (per year) and frequency of phone calls (per year), ± the standard deviation, between subjects and their aunts and uncles in Study 2.

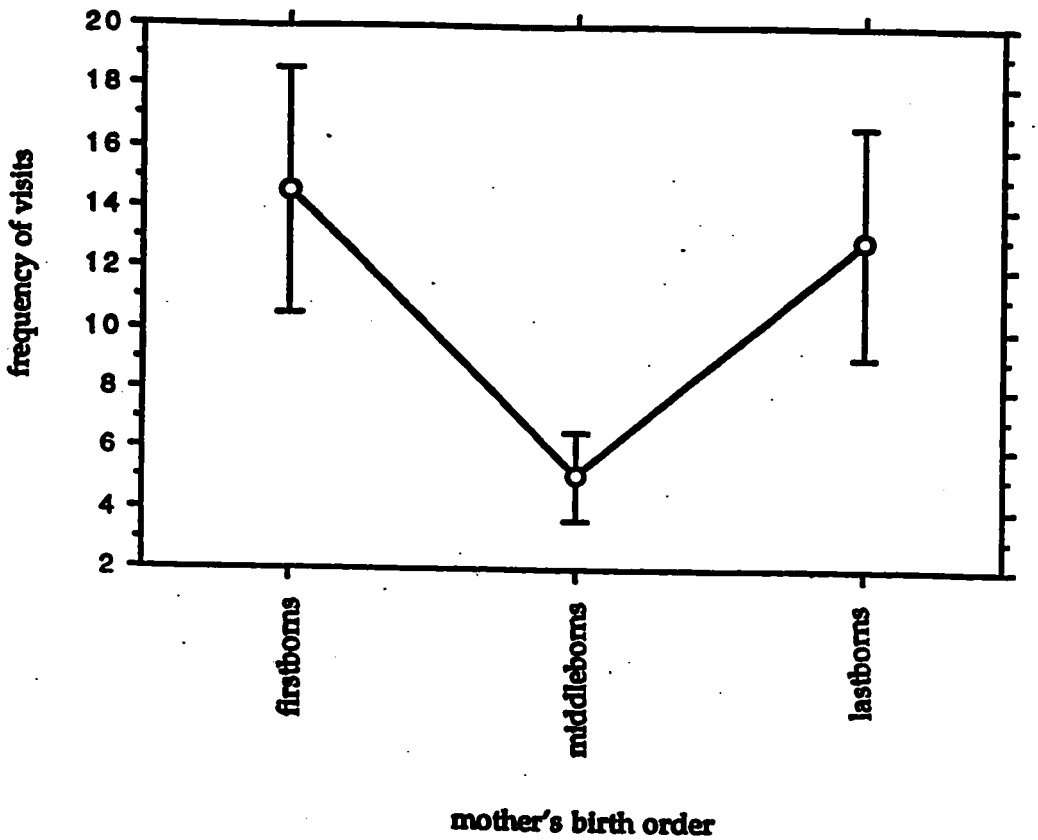

Figure 1: Frequency of visiting maternal grandparents (per year) in relation to subject's mother's birth order, with 95% confidence bars.

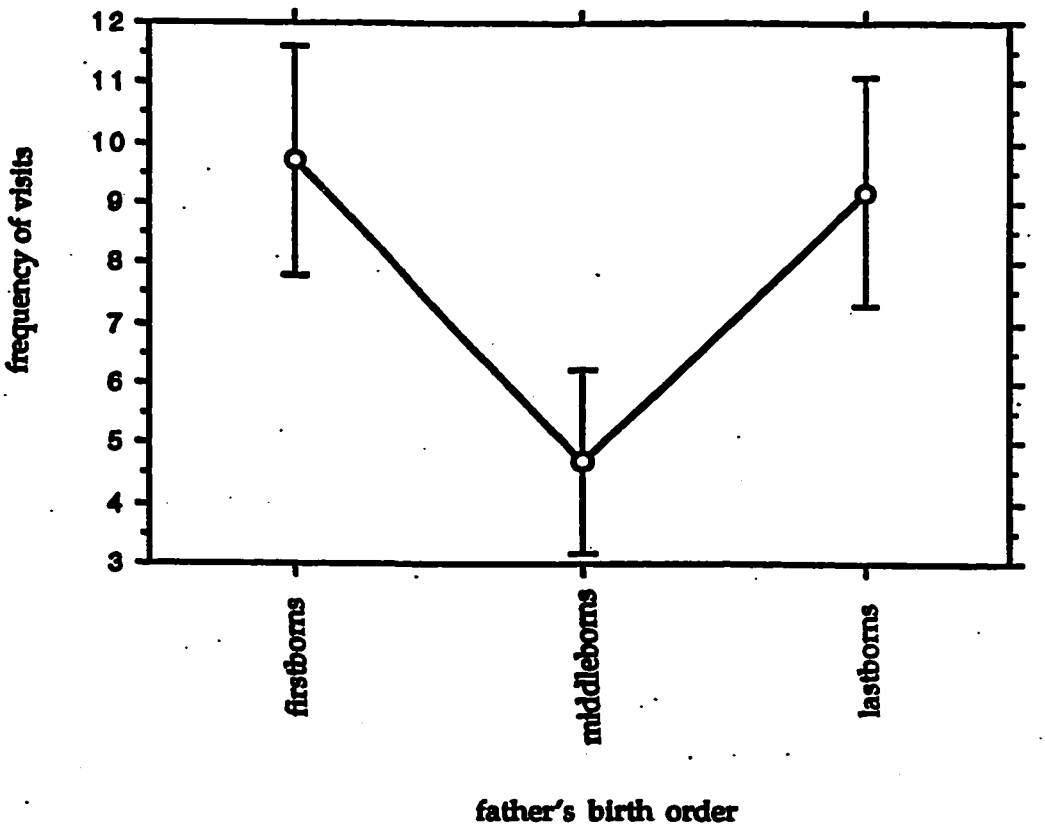

Figure 2: Frequency of visiting paternal grandparents (per year) in relation to subject's father's birth order, with 95% confidence bars.

Final Comments and Future Research

Kinship has been the central construct in evolutionary biological analyses of social phenomena since Hamilton (1964) extended the concept of Darwinian fitness (personal reproductive success) to encompass an individual's effects on the expected reproduction of collateral as well as descendant kin (inclusive fitness). Discriminative parental solicitude and investment in kin other than own offspring are assumed to be part of the psychological adaptations to decisions faced by individuals throughout our evolutionary history. Sex and birth order are factors that are particularly relevant to our psyches, especially in the realm of familial relations, as seen in the work previously presented.

In the first set of studies, Salmon and Daly (Chapter 2) examined sex differences in genealogical knowledge, relevance of kinship to characterizations of the self, and nominations of one's closest social relationship. The results were that sisters recalled more relatives than their brothers, men stressed patrilineal surnames as identity features while women stressed kin roles, and that men were more likely to be close to a sibling than women. These results suggest a female kinship psychology that is relatively focused on specific genealogical links between generations and a male psychology somewhat more concerned with patrilineal group identity and same-generation alliances. These differences could reflect naturally selected responses to consistent differences in how men and women make use of kin, but the contrast with Chagnon's (1988) Yanomamo data indicates that sex differences in genealogical expertise are flexible. Further cross-cultural study would allow for clarification of this issue. The effect of sex on family relations will be returned to in the discussion of Chapter 5.

Birth order differences in closeness (suggested in the results of earlier work) led to the research reported in Chapter 3. The relationship between birth order and familial sentiment was the focus and three studies examined this. Both self-report and archival measures suggest that middleborns are different from first and lastborns in certain aspects of family relations (such as closeness and affiliation) and that middleborns should not be grouped, for analysis of birth order effects, with lastborns as "laterborns." These results also suggest that middleborns express less interest in family, investing more in non-kin reciprocal relationships, presumably as a result of a lack of familial (particularly parental) investment.

Further work needs to be done in this area, particularly in relation to the influence of sibship size on birth order effects, as discussed briefly in the Chapter. But work also needs to be done in terms of examining the production of family histories in other societies, both matrilineal and patrilineal (e.g. Six Nations Indians or Acadians).

The use of kin terms in political speech, the subject of Chapter 4, was also considered a possible source of information about the relationships between sex, birth order, and familial sentiment. Johnson (1986) argued that the human inclination toward nepotistic behavior can be called forth by the successful manipulation of kin terminology. And indeed, the results of this experiment support that argument in that kin terms were more effective in evoking a positive response to the speech. But this effect was not found in middleborns. Middleborns were more supportive when terms like "friend" were used instead of "brother" or "sister", echoing the lack of middleborn enthusiasm for kin seen in Chapter 3.

Additional work needs to be done on the issue of the metaphorical use of kin terminology. A naturalistic approach, similar Holper's (1996)

would be useful. Existing historical speeches could be examined with attention focused on the birth order of the speaker, the nature of the audience (e.g. a union), and the situation (e.g. wartime). Perhaps firstborn politicians are always inclined to use kin terms, as they are the ones they themselves find the most powerful.

The two studies examining frequency of contact with kin served to address both issues of sex differences and birth order. Contact with maternal kin was more frequent than paternal (highlighting the impact of paternity uncertainty) and women kept in more frequent contact in general. The influence of birth order was less straightforward. It was parental birth order that had an impact on grandparental contact, with the offspring of middleborn mothers having less contact with maternal grandparents while those with middleborn fathers has less contact with paternal grandparents. Clearly, birth order influences more kin ties than those between parent and offspring. These studies need to be replicated, perhaps using an appropriate large data set.

One last additional avenue of research into issues of sex, birth order, and familial relations that I believe would prove informative is that of literature and popular culture. Symons, Salmon, and Ellis (1996) have suggested that studies of pornography and erotica constitute unobtrusive measures of human sexuality that can provide new insight into our sexual psyche. In much the same way as the story of Cinderella informs us about the issues of step-parenthood discussed by Daly and Wilson (1988), so feuding brothers, as well as allies, alienated middleborns, and rebellious lastborns in our rich literary and cultural world may provide insight into issues of family relations. Literature is all about human nature and it can provide an alternative window on the issues explored in this dissertation.

There are many factors that influence the nature of kin relations. This thesis examines the impact of two, sex and birth order. The studies reported here represent a launching pad on the way to a fuller understanding of the psychology of familial sentiment and relations.

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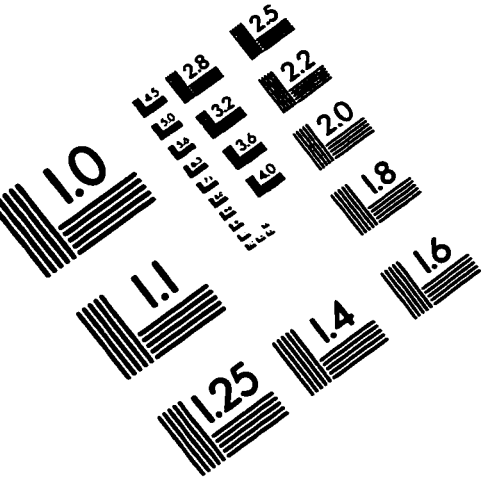
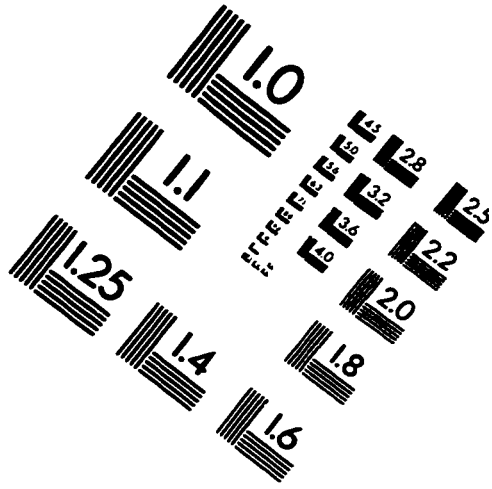
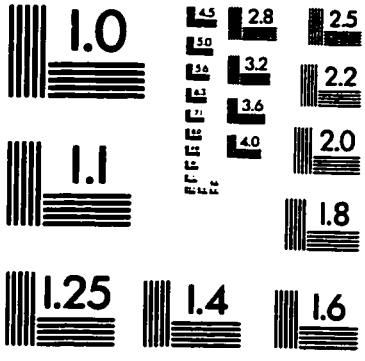
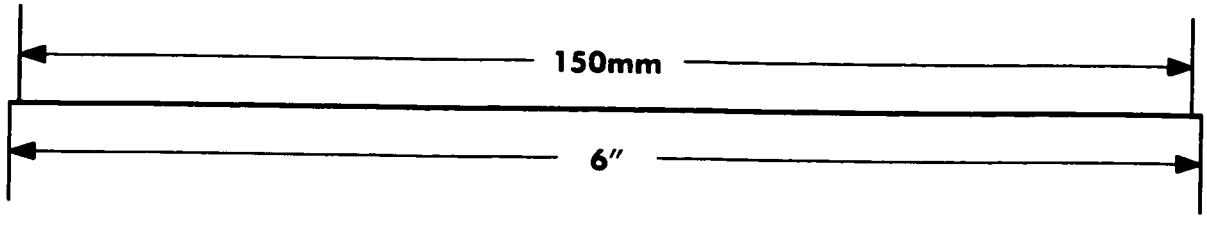
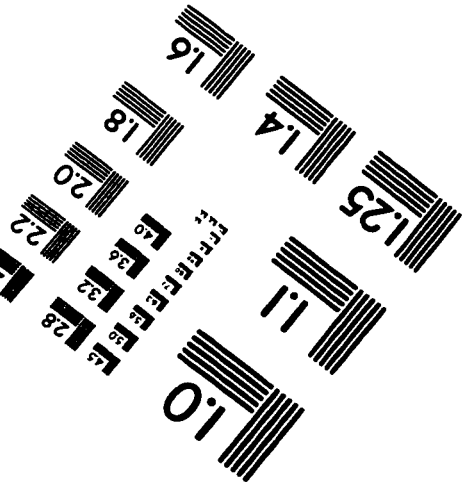
IMAGE EVALUATION TEST TARGET (QA-3)

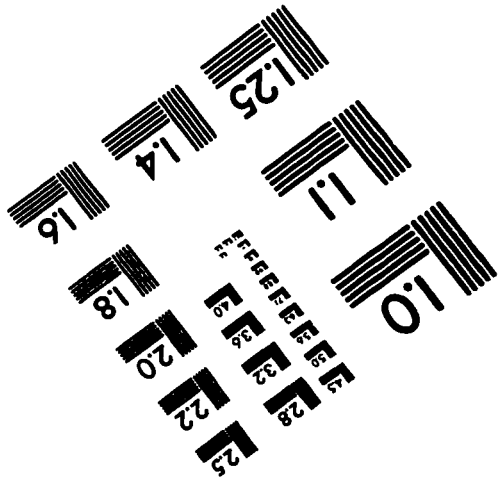












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