REFORMULATING (YET AGAIN) THE INCEST AVOIDANCE PROBLEM

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"...most of us know that it is a difficult task to formulate our problems clearly, and that we often fail in this task. Problems are not easily identified or described...Thus there is only too often the problem of formulating the problem—and the problem of whether this was really the problem to be formulated." (Popper 1976:134-135)

Until the mid-twentieth century, custom in most of China (as well, I might add, as in most of Korea) gave families a choice of how to acquire wives for their sons. One way was to wait until the son was fully grown and then arrange a marriage with a young adult who would come to live with her husband and his parents. In this case, which I call "major marriage," the young couple did not ordinarily meet until the day of their wedding. The alternative was what I call "minor marriage." In this case the family adopted (or bought) a girl and raised her as a daughter-in-law. Many of these girls were taken in as infants and nursed by their future mothers-in-law. It was common practice for a woman who bore a son and then a daughter to give her daughter away and raise her son's wife in her daughter's place. (Wolf & Huang 1980)

Although the great majority of girls adopted as "little daughters-in-law" were taken by couples who already had a son for the girl to marry, there were exceptions. Prompted by the belief that adopting a girl would enhance the wife's chances of bearing a son—or by anxiety about finding a girl to adopt in a tight adoption market—some couples adopted a little daughter-in-law before producing a son. (Wolf & Huang 1980: 242-250) The result was that about 5 percent of the women in minor marriages were present at their husband's birth. We will see later that this 5 percent is the key to answering an important question about human sexuality.

When I began field research in northern Taiwan in the late 1950s, I found that nearly half of the women over thirty years age had been married in the minor fashion. It was what I saw of their lives that alerted me to the significance of this form of marriage, but the evidence I present in this paper is largely drawn from household registers compiled in Taiwan by the Japanese colonial government. In 1905 the Japanese police interviewed every adult on the island and recorded, among other things, their birth date, their adoption date if adopted, and the form and date of their current marriage. After that, household and village heads were required to report to the police all vital events—births, deaths, marriages, divorces, etc.—within ten days of their occurrence. (Wolf & Huang 1980: 16-33) My previ-

ous work shows that the great majority of this information is highly reliable. The only exceptions are events in the lives of people who were already elderly when the police interviewed them in 1905. In this paper I will avoid the problems this creates by confining my analysis to the marriages of women born after 1890.

My work to date—which now spans more than forty years—has established three points relevant to the incest avoidance problem. The first two are based on the reconstruction of upwards of 20,000 marriages. The first point is that when women in minor marriages were adopted at an early age, their fertility was 40 percent lower than that of women in major marriages. (Wolf 1995: 115-134, 198-213) The second point is that when women in minor marriages were adopted early, their chances of experiencing divorce were three times *higher* than that of women in major marriages. (Wolf 1995: 98-114, 181-197) My third point is based on interviews concerning extra-marital sexual relations among 551 women. My finding is that according to their relatives and neighbors, women who married a childhood associate were more than twice as likely to seek sexual satisfaction outside of marriage than women who married a stranger. (Wolf 1995: 79-97, 166-180)

When I began publishing this evidence in the early 1960s, the great majority of anthropologists—and some biologists as well—were convinced that Sigmund Freud was entirely right in insisting that "an *incestuous love-choice* is in fact the first and regular one, and that it is only later that any opposition is manifested towards it, which is not to be sought in the psychology of the individual." (Freud 1953: 220-221) That is no longer the case. The evidence from Taiwan, together with Joseph Shepher's evidence from Israel, forced a reformulation of the incest avoidance problem. (Shepher 1971: 293-307; Shepher 1983) It was finally accepted that Edward Westermarck had been right all along in arguing that "there is a remarkable absence of erotic feelings between people living closely together from childhood." (Westermarck 1926: 80)

The problem then became why? Why did the early association entailed by minor marriages inhibit sexual attraction? From an evolutionary perspective, the most likely answer is that the dangers of close inbreeding selected for something that causes us to respond to early association with an enduring sexual aversion. But what is this something? What did natural selection select for? I am convinced that this is right question, but the formulation is too general. What is needed now is to specify more clearly what it is about minor marriages that produces "the Westermarck effect." My strategy for doing this is to try to answer three questions that Westermarck neglected. The first is: what does "childhood" mean in his famous hypothesis? How early do males and females have to meet to qualify as "living closely together from childhood"? The second is: what does "closely" mean in the phrase "living closely together"? What kind of association is necessary to produce sexual aversion? And the third is: are males and females equally sensitive to the effects of early association? In a review of the fifth edition of Westermarck's *The History of Human Marriage,* the famous sexologist, Havelock Ellis, suggested that the inhibition is "probably

more clearly marked in the female [than in the male]." (Ellis 1932: 168) Westermarck's only response was to note that "Dr. Ellis may be right." (Westermarck 1934: 36) But was he?

In this paper I will pursue these questions by examining more closely than I have previously variation in sexual attraction *among* minor marriages. My measures of sexual attraction are general marital fertility and an especially constructed index I call the fertility/divorce index. General marital fertility is calculated by dividing the number of births among married women aged 15-45 by the number of years they were married during these ages. My fertility/divorce index is general marital fertility adjusted to take account of the number of divorces experienced by the women in question. The adjustment consists of subtracting from the numerator of the marital fertility rate five births for every divorce. I have chosen the number five as a rough estimate of the number of children women who were divorced would have borne if they had not been divorced.

The fertility/divorce index is intended to capture in one number the two clearest, quantifiable manifestations of the sexual aversion aroused by early association. Divorce alone is an unreliable measure because it was stigmatized—to the point of being regarded as polluting—and therefore infrequent. We have to assume that the great majority of the couples affected by early association never considered divorce as the solution to an unhappy relationship. My reason for creating an index that takes it into account is the possibility that the few couples who did risk divorce were those who were the most sensitive to the inhibiting effects of early association. The fertility/divorce index is best considered an attempt to estimate what the fertility rate would have been if there were no divorce.

The marriages from which my tables and graphs were constructed include all the minor marriages contracted by women born in the years 1890-1920 in sixty-five villages and two small towns. Twenty-eight of these communities were included in the analyses presented in my 1995 book and are located in northwestern Taiwan (in the southwestern corner of the Taipei Basin and in the hills overlooking Hsin-chu City). The remainder are additions to my database and are located in northeastern Taiwan (largely on the Ilan Plain) and in the Pescaderes Islands.

I will begin with what "childhood" means—or should mean—in the Westermarck hypothesis. This is not simply a question of when childhood ends. It is also a question about the relative impact of the ages included. One possibility is that the Westermarck effect is primarily a product of association during a particular developmental phase. The other is that it is largely a function of the number of years of association prior to puberty. To address the matter I have plotted my two indices of sexual attraction against the age at which women in minor marriages first met their future husband. The plotted points include all the data available except for marriages in which the wife was adopted before the husband's birth and marriages in which the husband was eight or more years older than the wife. We will see later why these two were excluded.

Table 1 and Figure 1 display in numerical and visual form the relationship between

the fertility of minor marriages and the wife's age at adoption. It is important to note that the data are heavily concentrated at age zero and diminish steadily as age rises. This is because Taiwanese women preferred to adopt their son's wife as early as possible. The result for us is that above age four the plotted relationship is irregular. The trend is upwards for any two-year period, but there are two marked reversals. I believe the relationship displayed in Figure 1 is best interpreted by taking age ten as the end of Westermarck's "childhood." The data then say that while association before age three is particularly inhibiting, association beginning at any age before ten has a substantial impact.

Table 1

General Fertility by Wife's Age at First Association

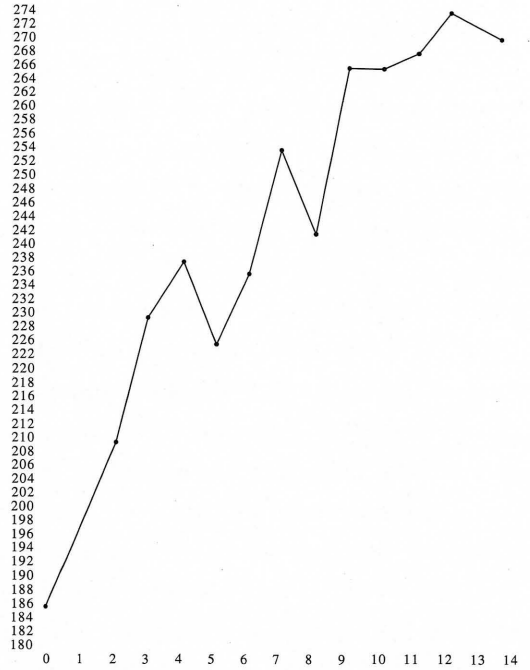| Wife's age at first association	Years of marriage	General fertility rate
0	23,284	185
1	4,966	197
2	3,524	210
3	2,590	229
4	1,852	238
5	2,471	225
6	1,851	235
7	1,441	253
8	1,764	242
9	1,729	266
10	1,671	265
11	1,648	267
12	1,607	274
13	1,260	250 }
14	913	290 } 270

Figure 1 General Fertility by Wife's Age at First Association. General Fertility Rate/ Wife's Age at First Association.

Table 2 and Figure 2 report the relationship between the fertility/divorce index and the wife's age at adoption. The data displayed there surprised me. I did not expect adjusting for divorce to make such a large difference. Not only is the distance between the lowest and highest points in Figure 2 nearly twice as great as in Figure 1, the relationship between the plotted variables is more regular. There is now only one reversal and it occurs at a late age where the data are thin and vulnerable to the depredations of chance.

How one interprets the data displayed in Table 2 and Figure 2 depends very much on what age is taken as marking the end of childhood. My inclination is to ignore the reversal at age eleven and again opt for age ten. On this interpretation the data say that association during the early years of childhood is more inhibiting than association during the later years

Table 2

Fertility/Divorce Index by Wife's Age at First Assocation

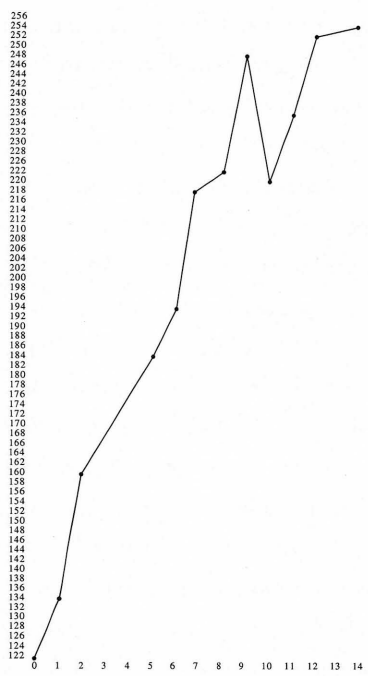| Wife's age at first association	Years of marriage	Fertility divorce index
0	3,284	122
1	4,966	134
2	3,524	159
3	2,590	167
4	1,852	176
5	2,471	184
6	1,851	194
7	1,441	218
8	1,764	222
9	1,729	248
10	1,671	220
11	1,648	236
12	1,607	251
13	1,260	242 }
14	913	268 } 250

Figure 2 Fertility/Divorce Index by Wife's Age at First Association. Fertility/ Divorce Index/ Wife's Age at First Association

of childhood, but now the critical years are the first two years of life rather than the first three. It it is again clear, however, that association beginning at any age before ten has a substantial impact, every additional year of association adding to the sum of the aversion.

The one undeniable conclusion to be drawn from the data presented above is that the earlier a girl destined to marry in the minor fashion was adopted, the less satisfied she was with the relationship created by her marriage. But we must ask: what about her husband? Wasn't his age when he first met his future wife a factor? Girls adopted as infants were most often matched with a boy born two or three years previously, but many were matched with boys born six or seven years previously and others with boys born after their arrival. Might it be, then, that we need to attend to the husband's age at first association as well as the wife's? It could be argued that it all depends on whether or not Dr. Ellis was right. If the "instinct" was really "more marked in the female [than in the male]," it might not matter how old a man was when his future wife was adopted.

One of my reasons for expanding my database beyond that employed in my 1995 book was to be able to address this question. A large database is required because to examine the effect of the husband's age at first association, one has to control on the wife's age. Even with the incremental data I must confine my analysis to marriages in which the wife was adopted as as an infant. These data include all minor marriages in which the wife was adopted before age one except those cases in which she was adopted before her husband was

born. Again I leave these special cases until later.

The relationships between my two indices and the husband's age at his wife's adoption are shown in Tables 3 and 4 and Figures 3 and 4. In this case the results obtained with the two indices are very much the same. Both indices remain flat and regular until age eight, rise sharply at age eight, and then fall abruptly at age eleven. I will ignore the abrupt fall at the end because the figures are not well-grounded. Thus what the evidence says is that so long as the husband is not eight or more years older than his wife, his age when he first meets her does not matter. The rise in both indices if he is eight or more years older is most likely due to the couple's not "living closely together from childhood." In this case the husband would already be in school when his wife, a nursing infant, joined the family.

Must we conclude, then, that Dr. Ellis was indeed right? It is certainly the case that when the wife is the younger partner in a minor marriage, the trajectory of my indices is largely controlled by her age at first association. The husband's age does not matter as long as he is still a small child. But what if the wife were the older partner? It is this question that makes important those marriages in which the wife was adopted before the husband's birth. They allow us to see what happened when the husband was a nursing infant at first association and the wife a small child.

The relevant data are displayed in Tables 5 and 6. The figures shown there are irregular because their base is small, but they all support the same conclusion. They say that when the husband is the infant at first association the aversion is almost as strong as when the wife is the infant. The critical comparison is between the data for ages 0-4 in Tables 3 and 4 (where the wife is an infant and the husband is a small child) and that in Tables 5 and 6 (where the husband is an infant and the wife is a small child). To make the comparison clear I have summed the original data across the five age classes and calculated new rates and indices. The new general fertility rates for Tables 3 and 5 are 180 when the wife is an infant and 193 when the husband is an infant. The new fertility/divorce indices for Tables 4 and 6 are 120 when the wife is an infant and 133 when the husband is an infant.

Suppose for a moment that the figures in Tables 5 and 6 rose steadily with age, as is the case with the figures in Tables 1 and 2. One could then argue that these figures are only low because females are sensitive to early association with a younger male as well as early association with an older male. In other words, one could argue that Dr. Ellis was right. But in fact there is no significant trend among the figures in either table. The reason can only be because the source of the problem in these marriages is the male. His age does not vary and so the indices do not vary. Consequently, I conclude that Dr. Ellis was wrong. Males and females are equally sensitive to the sexually inhibiting effects of early association. What really matters is whether the male or the female is the younger partner.

I skipped the second of the questions raised above in order to pursue the implications of Tables 3 and 4 for the question of a sex difference. The question skipped was: What does "closely" mean in the phrase "living closely together"? All I have to contribute to the answer

Table 3

General Fertility by Husband's Age at First Association When Wife's Age at First Association is 0

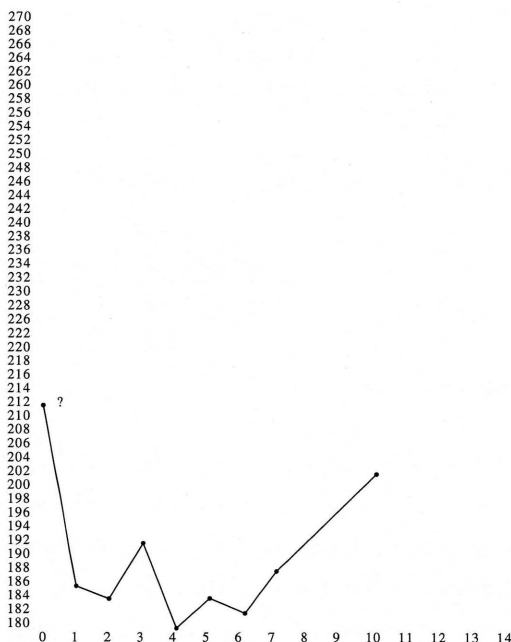| Husband's age at first association	Years of marriage	General fertility rate
0	471	212
1	1,700	185
2	5,240	183
3	5,128	191
4	4,324	179
5	2,855	184
6	1,852	179
7	1,627	187
8	1,140	238 }
9	353	201 }
10	487	207 } 200
11	242	169 }
12	317	151 }
13	---	---
14	---	---

Figure 3 General Fertility by Husband's Age at First Association When Wife's Age at First Association is 0. General Fertility Rate/ Husband's Age at First Association.

Table 4

Fertility/Divorce Index by Husband's Age at First Association When Wife's Age at First Association is 0

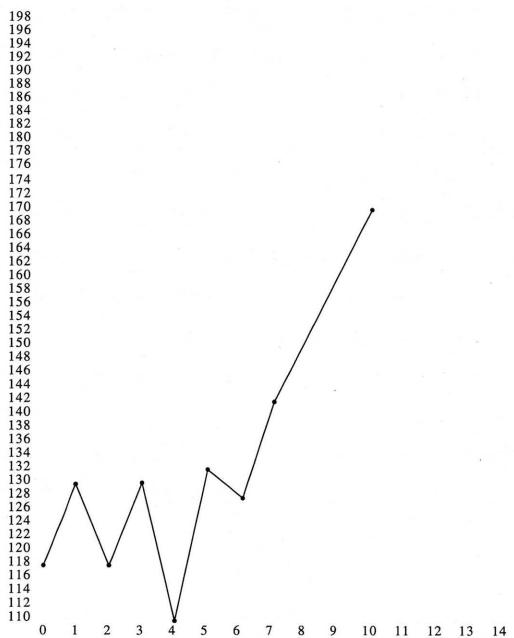| Husband's age at first association	Years of marriage	Fertility divorce index
0	471	117
1	1,700	130
2	5,240	118
3	5,128	129
4	4,324	109
5	2,855	131
6	1,852	128
7	1,627	141
8	1,140	194 }
9	353	162 }
10	487	197 } 160
11	242	149 }
12	317	120 }
13	---	---
14	---	---

Figure 4 Fertility/Divorce Index by Husband's Age at First Association When Wife's Age at First Association is 0. Fertility/ Divorce Index/ Wife's Age at First Association.

Table 5		
General Fertility by Wife's Age at First Association When Wife Is Adopted Before Husband's Birth		
Wife's age at first association	Years of marriage	General fertility rate
0	151	212
1	704	201
2	1,722	206
3	1,222	160
4	678	207
5	269	178

Table 6		
Fertility/Divorce Index by Wife's Age at First Association When Wife Is Adopted Before Husband's Birth		
Wife's age at first association	Years of marriage	Fertility divorce index
0	151	178
1	704	124
2	1,722	147
3	1,222	85
4	678	170
5	269	134

at this point is the data reported in Tables 3 and 4. The indices in both tables indicate that a minor marriage is less likely to manifest sexual aversion if the husband is eight or more years older than the wife. This suggests that "closely" means intense interaction of the kind commonly found among children who are near in age and who regularly play together. Close examination of the composition of the sibling sets in which the parties to minor marriages were reared might prove the point. The problem is that it would require a database several times the size of the one on which this paper rests.

Although my answers to the three questions raised above are seriously incomplete, they still demonstrate a need to reformulate the incest avoidance problem. Age at first association—and particularly the age of the younger member of any pair of potential partners—is far more important than previously realized. So we do not forget who first formulated the problem in a useful way, I offer my reformulation as a revised Westermarck hypothesis. My revision reads: "There is a remarkable absence of erotic feelings between people who live together and play together before age ten. The absence is particularly marked among couples brought together before age three, and, for any given couple, largely depends on the age of the younger partner when they first meet."

How, then, are we to explain the reformulated Westermarck effect? Why does association before age ten inhibit sexual attraction? Why is association during the first two or three years of life particularly inhibiting? Why is it that the strength of the inhibition depends on the age of the younger partner rather on the age of both partners? Answering these questions will not be easy because it requires facing up to a dilemma that I have so far avoided mentioning. It stems from the fact that when the husband in a minor marriage is the older partner, his age at first association does not influence the intensity of the aversion. The intensity depends entirely on the age of the wife at first association. This implies that the aversion is largely located on her side of the relationship. But my data comes from China, where, in the words of Friar Domingo Navarette, "the wives are half slaves and their subjection is extraordinary." (Cummins 1960: 161) How could wives who were "half slaves" frustrate their husband's sexual drive and their desire for a houseful of sons and grandsons?

How could women whose subjection was "extraordinary" get a divorce when divorce was regarded as a social disaster?

I think that anyone who knows the traditional Chinese family will agree that they could not. The aversion must have been felt, acutely, by the husband as well as by the wife. But how could this be if the strength of the aversion depends on the wife's age at first assocation and not on the husband's age? This is the dilemma. Solving it is one of the feats the Hercules who tackles incest avoidance must perform. Sadly, the field presently lacks a credible Hercules, but there are three promising candidates.

In a recent book, one of my Stanford colleagues, Eleanor Maccoby, argues that "there is a powerful tendency for children to segregate themselves by gender in childhood and to play more compatibly with same-sex partners." This "drift into same-sex groups" is found in all societies and "begins to show itself in the third year of life...and progressively strengthens until it is strong indeed by middle childhood." (Maccoby 1998: 29-30) "It may be, then," Maccoby suggests, noting the reaction to minor marriages, "that children's spontaneous avoidance of cross-sex others who are not kin serves the biological function of keeping these others within the pool of potential mates." (Maccoby 1998: 94)

The timing Maccoby describes fits neatly with the age-dependent trends displayed in Tables 1 and 2 (and, more dramatically, in Figures 1 and 2). It also fits with the fact that when the wife is the younger partner, the strength of the aversion in minor marriages depends on the age at which she joins her future husband's family. Being the younger of the two, she would be the last to join an exclusive same-sex group. Consequently, her age, but not her husband's age, would influence how frequently the couple interacted as children. The argument does not explain the Westermarck effect, but it does explain why the effect is age-related and why, when the female is younger than the male, her age seems to matter more than his.

The argument suggested by Maccoby is entirely compatible with Westermarck's emphasis on "living closely together from childhood." A more radical approach to the problem of incest avoidance has been suggested to me by another of my Stanford colleagues, Hill Gates, who, as an anthropologist with a special interest in Taiwan, knows minor marriages at firsthand. Gates' argument is radical in suggesting that what produces the Westermarck effect may not be some aspect of playing together, eating together, and sleeping together. It may be something far more easily identified. It may be having been breastfed by the same woman.

Gates's argument begins with the well-known finding that both males and females prefer as sexual partners persons whose major histocompatibility complex (MHC) is different than their own. (Wedekind, Seebeck, Beetens & Paeike 1995: 345-349; Wedekind & Füri 1997: 1471-1479) The reason, it is argued, is that they smell like relatives. Might it not be, then, that the dangers of inbreeding have selected for the ability to identify relatives by their odor and avoid them? The problem with this elegant solution to the problem of

incest avoidance is that it is contradicated by all the evidence presented above. Couples married in the minor fashion were not relatives and therefore should not have been olfactorily obstructed. In a recent article Mark Schneider and Lewellyn Hendrix have tried to salvage the MHC hypothesis by suggesting that we learn the odors of the people with whom we are reared and avoid them because they are probably relatives. (Schneider & Hendrix 2000: 65-91) Gates avoids the complications this introduces by arguing that because the development of MHC is strongly influenced by breastfeeding, children who are breastfed by the same women tend to smell alike even if they are not siblings.

The great advantage of the Gates' hypothesis is that it resolves the minor marriage dilemma. Taiwanese men were always put off by girls their mother nursed for the simple reason that they had been nursed by the same woman. Another advantage of the hypothesis is that it explains why assocation during the first two years of life was so much more potent than association during later years. This is because girls adopted at an early age were often nursed by their future mother-in-law, while those adopted later were not. The one problem with the hypothesis is that it does not explain why association beginning after age three has any impact at all.

The third candidate is the one I nominated in my 1995 book. (Wolf 1995: 463-475; Erickson 1989: 267-291; Erickson 1993: 411-416)) It begins with John Bowlby's account of what he calls "attachment behavior." Bowlby defines this "as any form of behavior that results in a person's attaining proximity to some other differentiated and preferred individual, usually conceived of as stronger and/or wiser." The behavior includes clinging, crying, calling, greeting, and smiling. It is evident from six months onward, "when an infant shows by his behavior that he discriminates sharply between his mother-figure, a few other familiar people, and everyone else." It reaches its "maximum during the second and third year of life and then diminishes slowly." (Bowlby 1975: 292)

Bowlby believes attachment behavior is one of three basic components of human nature. The second is "the urge to explore the environment, to play and to take part in varied activities with peers," and the third is caregiving, which Bowlby characterizes as "the prime role of parents and complementary to attachment." (Bowlby 1988: 163-165) Just as human beings are born with a tendency to seek and maintain contact with persons who are better able to cope, so also they are born with an innate tendency to succor and support other human beings who are not yet able to cope. This is, in Bowlby's view, "readily understood since it serves to promote the survival of offspring and thus the individual's own genes." (Bowlby 1988: 165)

My solution to the dilemma posed by minor marriages is to combine Bowlby's argument with Westermarck's. The selection forces favoring the dispositions underlying attachment and caregiving push us ever closer to our genetic relatives and thus expose us ever more actutely to the dangers of inbreeding, while the selection forces favoring the dispositions underlying incest avoidance push us ever further from our genetic relatives and thus

make us ever more vulnerable to the dangers of isolation. Consequently, if the advantage to be gained by strengthening one set of dispositions is to result in a net genetic gain, the other set must be strengthened at the same time. To evolve at all, the two sets of dispositions had to evolve together. The fact that attachments and sexual aversions both form more readily before age three than after is not coincidental. They are the same thing. (Wolf 1995: 439-475)

What is proposed, then, is that "little daughters-in-law" taken before age three attached themselves to their future husband because he was older and appeared "stronger and/or wiser." This behavior elicited caregiving in return and thereby created an asexual relationship because having evolved together with incest avoidance, attachment, and caregiving are inherently contra-sexual. The reason the fertility of minor marriages varies with the wife's age and not the husband's is simply because the wife is the younger partner and thus the one who does or does not form an attachment. The location of the aversion moves from the female side to the male side when the husband is the younger partner.

These hypotheses need to be tested and can be tested. The Taiwan household registers contain all the information needed to reconstruct the exact composition of households and even neighborhoods. Thus it would be possible to determine the availability of same-sex playmates and the likelihood that couples in minor marriages had grown up separated by membership in same-sex groups. The registers also record the removal of infants by death and adoption—even when the infant is only a few days old. Thus one could determine whether or not a woman was lactating when she adopted a little daughter-in-law and thereby estimate the chances of her having nursed her son's wife. The problem is that analyzing a sufficiently large number of household registers would be huge task. Even Hercules would have hesitated.

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