



their own homes. This may have more to do with the scarcity of good, affordable nursing homes or insurance than with the sentiments of dutiful daughters-in-law. Similarly, the statistics that prove that daughter adoption was frequent do not get translated into the actual sentiments of mothers. Without the ethnocentric assumption that mothers must be sentimentally attached to their babies, the reading of these statistics as an absence of maternal sentiments is impossible. I find this the decisive weakness of Wolf's article.

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Different cultures constitute natural experiments about what outputs an evolved, species-typical psychological mechanism produces under various conditions. Alternative models provide contrasting predictions of how various inputs generate outputs, which can then be compared with ethnographically observed variation. Wolf has elegantly employ this approach to explore anti-incest mechanisms (see also Lieberman, Tooby, and Cosmides 2003). He now uses his data to question whether maternal sentiments are "a major component of human nature."

Exploring Wolf's question can be aided by introducing a richer, more computationally specified set of alternative models than those evoked by the folk psychological and ethological concepts commonly used (sentiment, the contrasted category of "calculation," imprinting, unconditional love). The behavior to be explained can also be widened: Theory predicts, and observation confirms, that maternal behavior may range from total self-sacrifice at one extreme to the intentional killing of the child at the other (see Daly and Wilson 1988 for a brilliant dissection of discriminative parental solicitude).

The maternal motivational system was designed by natural selection to assign value to and regulate behavior towards offspring in a way that promoted maternal fitness under ancestral conditions. "Calculation," rather than being only a deliberative, extrinsic process acting in opposition to "sentiment," is expected to be embodied in the design of the neural programs generating sentiments. From an evolutionary psychological perspective, sentiments are generated by neurocomputational programs whose structure was designed to take ancestrally valid cues relevant to evaluating the fitness payoffs to alternative courses of action and perform operations on them to produce adaptively calibrated motivational output.

Here are design criteria for the maternal motivational system:

*Kin recognition:* Under ancestral demographic conditions, having an infant born out of one's body functioned as a reliable signal to the maternal motivational system that a new genetic offspring existed. Subsequent contact

induces the formation of a recognition template. This cues relatedness reliably because in a band-sized social environment synchronized births and neonate mixing were almost nonexistent.

*Valuation from infancy through adulthood:* The existence of an offspring creates a rare, potentially valuable opportunity for substantial maternal fitness increase. However, actual fitness increase and hence the optimal valuation of the child depend on both costs and benefits. Hence, valuation at a given time depends on integrating evolved cues that ancestrally predicted costs and benefits. Valuation should change dynamically as these variables change (e.g., with opportunity costs for investing in existing or future children and alternative mateships, with changes in child health, with increases or decreases in expected resources, maternal health, or caretaking by others). Valuation (love) is commonly high but can be low or negative depending on how much benefits exceed costs.

*Labor shifting:* Raising a child is effortful and subtracts from the free energy available for other activities, including other children. Ancestrally, fathers, grandparents, older siblings, other kin, and band-mates would have been potential caretakers to which some (or, rarely, all) of the burden of child care could have been transferred. The downside was the risk that others' caretaking was of lower quality. The intensity of motivated proximity should track the expected difference between the quality of maternal care (minus its opportunity cost) and other care. In Wolf's data, children are not being infanticidally abandoned but relocated to another caretaker. Hence, an appreciation of effort liberated for other children should offset (to some degree) the urge to maintain proximity.

*Components of child value:* Evolutionarily, the primary fitness value of children to a parent is their expected future offspring. Other components include their net productivity as it accrues to parents, siblings, and other kin, their exchange value in marriage (which selected for paternal sexual proprietariness towards daughters), and their potential value as long-term deep-engagement partners (Tooby and Cosmides 1996).

*Deep engagement and parenting:* Deep engagements are dyadic relationships of reciprocal valuation that are stabilized by the mutual recognition of mutual irreplacability (as in friendships, romantic love, and family love triggered by the mutuality of affection rather than unidirectional investment). Marked by psychological intimacy, they are designed to be long-term and to provide insurance to a participant that critical social support from at least one person will weather lapses in the utilitarian reasons that induce social support from others. Knowledge by parents that a child will leave by adulthood (as by marrying out) may make them unrewarding as candidates for deep engagement, thereby lowering the motivation to cultivate intimacy and maintain proximity. This factor may explain some cross-cultural variation in parent-offspring intimacy (such as Wolf's findings) and some preference in sex of offspring.

The claim is that humans in all cultures reliably de-

velop a dimorphic parental motivation system designed by evolution to use circumstantial cues to up- or down-regulate the intensity of child valuation (love), the urge to maintain proximity, the openness to shifting caretaking, and the degree to which affectionately engaged intimacy is cultivated.

## Reply

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From “historically sedimented sentimental education” to “a dimorphic parental motivation system”—this language alone says that the authors of these comments represent the full range of current anthropological perspectives. Despite this, the comments also suggest a broad band of agreement. Not surprisingly, no one argues for the existence of a maternal instinct—an inborn tendency for women to devote themselves to their children. But, surprisingly, neither does anyone argue that the maternal sentiments are nothing more than ideological artifacts with no real emotional content. By implication if not by declaration, everyone agrees that most women under most circumstances develop strong emotional attachments to their offspring.

The commentators also agree that the maternal sentiments are contingent. Postmodernists and evolutionary psychologists alike argue that, depending on the circumstances, mothers may or may not develop such attachments. They even agree that these contingencies are one or another of three closely related elements of the Chinese kinship system—patriarchal authority, patrilineal descent, and patrilocal residence. Anagnost

points to the “the patrilineal stem family,” Hsu to “Taiwan’s patriarchal and collectivist society,” Li to “son preference in the Chinese culture and family system,” Hrdy to “participation in a patrilocal, patrilineal family system with norms and institutions biased in favor of patrilineal interests,” Ryang to “a systemic effect of a particular form of patriarchy” and “gender ideology,” and Tooby and Cosmides to “knowledge by parents that a child will leave by adulthood (as by marrying out).”

Allow me to sharpen a little the challenge my essay intends. The evidence I present all comes from 11 villages and 2 small towns in northern Taiwan. These are communities I have been studying since the late 1950s. Since then Chuang Ying-chang and I have organized a project to collect and analyze household registers from a number of communities in other parts of the island. This project has recently been institutionalized as the Historical Demography Program of the Academic Sinica’s newly established Ts’ai Yuan-pei Center for the Humanities and Social Sciences. The founding members include Chuang Ying-chang (director), Paul Katz, Pan Ying-hai, James Wilkerson, Yang Wen-shan, and Yu Guang-hong.

The first fruits of this enormous effort are now available. They include the probability of adoption in 13 field sites in Taiwan and the Pescadores Islands. Table 9 shows that this probability varied from .500 and above in northern Taiwan and the Pescadores to less than .100 in southern Taiwan. Part of this variation may be due to the presence of Sinicized aborigines in Ta-ch’ia, Ta-nei, and Chi-pei (Brown 2004:69–88), but there were very few aborigines in any of the other 10 communities. The fact that the probability of a girl’s being given away as an infant varied from .042 in Tung-kang to .682 in Hu-hsi cannot be attributed to non-Han influences. In the years during which these women were born the populations

TABLE 9

*Probability of Adoption among Females Born 1890–1915 in 13 Localities*

Locality	Number of Births	Probability of Adoption				
		By Age 1	By Age 2	By Age 3	By Age 5	By Age 15
Northern Taiwan						
Chu-pei	1,333	.258	.337	.378	.427	.505
T’ai-pei	1,393	.167	.224	.258	.301	.350
E-mei	972	.438	.510	.540	.571	.620
Pei-p’u	288	.276	.345	.373	.401	.480
Wu-chieh	989	.069	.134	.191	.289	.473
Central Taiwan						
Chu-shan	966	.125	.167	.193	.225	.367
Lu-kang	764	.139	.173	.208	.240	.339
Ta-ch’ia	291	.159	.212	.212	.245	.314
Southern Taiwan						
Ta-nei	1,808	.038	.050	.066	.082	.133
Chi-pei	236	.017	.032	.032	.037	.073
Chiu-ju	369	.045	.059	.067	.078	.129
Tung-kang	422	.042	.061	.073	.123	.196
Pescadores						
Hu-hsi	613	.682	.690	.693	.697	.711