

“I Can’t Read, but I Can Reckon”: Work, Emotion, and Calculation among Early Twentieth-Century Sichuan Girls

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In interviews with elderly Sichuan women, their girlhood experiences with work and footbinding showed a strong connection between the relative immobility of the footbound and skills in counting and simple calculation beyond what might have been expected of village illiterates. Those who performed repetitive work such as cotton yarn spinning from about age 7 to marriage at about age 18 were important contributors to their family’s cash flow and were also protected by footbinding from the hardest and most demeaning forms of labor. The paper addresses the likely psychological impact of the resulting narrowing of girls’ horizons during a period when children’s growth and curiosity are vigorous. I suggest that frustration of physical and intellectual urges, combined with the pain and helplessness caused by footbinding created circumstances well suited to concentration on number play and the untaught development of numeracy. Human biological universals should be investigated along with cultural practices in reaching an understanding of the outcomes of such practices.

Keywords: numeracy, work, girls, footbinding, biocultural

Introduction

This essay begins with a set of vignettes about girlhood from interviews with elderly Chinese women. Together, I hope, they economically illustrate the work context within which even the footbound and illiterate could acquire simple numeracy and reveal the nature of girls' work and girls' attitudes toward it. After comparing Chinese to other cultural traditions of numeracy and discussing the differences between literacy and numeracy in the Chinese case, I describe forms of labor in which Chinese girls were once heavily engaged and in which considerable numeracy was readily acquired. I then examine the implications of my Sichuan informants' sharply constrained childhoods from the perspective of recent developments in the human biology of emotion.

For decades, anthropologists have criticized explanations of behavior that depended on biology or human nature. We have been right to do so for two reasons. Historical materialist analyses have always insisted on the plasticity of human behavior in response to ecological constraints and the accretions of ideation and symbolism. In his analysis of commodity fetishism, Marx fathered twentieth-century constructionism. Only the analytically naive (of whom plenty flourish in academic biology) ignore the substantial degree to which even genetically motivated human behavior is inflected by local culture. We have been right to criticize easy biological arguments, infected as they have been by the folklore of the "biologizers."

This situation, however, has recently changed. For the first time in history, we have the research techniques to begin studying our own behavior from a body-knowing as well as a culture-knowing point of view. Genetics, neuroscience, and properly controlled comparisons now give us the beginnings of cumulative rather than folkloric knowledge of our species nature. Still, what we know is far less than what we do not know, and immense possibilities exist for the biases of social politics and petty career enhancement to distort both. Nevertheless, the excitement among anthropologists at these new developments is palpable. We can begin to build on, rather than endlessly reiterate our alertness to culture's effects. This essay is certainly propelled by this excitement, urging readers to take full advantage both of new scientific findings and of the intuitions we bring from our common humanity.

Five Old Memories and One New One

My feet were bound when I was 4 *sui* 歲 [less than 4 full years old] and were

finished [*baoduan le* 包斷了] by the time I was 20. At 8 *sui*, I started to spin, and soon could spin two [big] *liang* 兩 [Chinese ounces] a day. The market was every three days, so I could spin almost a *gong jin* 公斤 [kilo] for every market. *Saosao* 嫂嫂 [sister-in-law] did the outside work while *Jiejie* 姊姊 [elder sister] and I spun. Our family grew some raw cotton, spun yarn for sale, and bought *tubu* 土布 [homespun, homewoven cotton cloth] for clothes and bedding. Nobody wove around here, not even hiring in a weaver for their own yarn. When I got a bit older, I learned to embroider and sew for the family and for sale. I wasn't married out until I was 26 because the family needed the money I earned at spinning.

Dad did all the marketing, of course, and Mother wouldn't let us talk in front of elders, only listen. I didn't know anything about the outside world except what I could overhear from others. [Wu Shi, born 1887 in a village near Suining City, Sichuan (Gates 1992 manuscript fieldnotes:90)]

My natal family harvested about 1,000 *gong jin* of cotton a year along with wheat, rape, and sorghum to eat—all on rented land. We'd store the raw cotton until the price was high, and the profit paid the rent. I was the only daughter, and we were prosperous, so the money I earned picking, drying, ginning, and packing was my *sifang qian* 私房錢 [money owned individually by brides]. I gave it to my mother to keep for me. She gave me a really good dowry with three cabinets, four quilts, and both a white hemp and a colored hemp mosquito net. Very expensive. After I married at 19 *sui*, I had four children who died and then four more. None of the women in that family spun or wove; it was a good family. In that family, women's feet were bound very small. They could not criticize my feet, even though I had had many infections as a child that kept me from cotton picking. [Ke Xiao Yuqin, born 1906 in hills outside Suining City (ibid.:85)]

Minding six younger ones kept me busy as a girl, but I spun too. In an evening I could spin one big *liang*, and you could trade five *liang* of thread for seven of rice in the putting-out [*jia gong* 加工] system. After I married, I sewed layettes. Our custom here was that a woman's mother would commission all the clothing a child would need until it was 6 years old and send them to her in the three days after the birth. That was 20 to 30 pieces at least, and could be a lot more; the pregnant woman's mother specified the qualities and numbers of things. It took me several months to prepare a really big set. I'd get one *dayang* 大洋 [silver dollar] each month, and eat with the employer's household. People often remade old clothes into baby clothes, but a big set could cost 60 yuan in new cloth, too. As I got old, my eyes failed, so I spun for a living again, this time on a big wheel. I learned in 14 days, and could produce

two *gong jin* or more in a day and an evening. [Xu Shi, born 1915, Suining City (ibid.:107)]

I was married out as a *tongyangxi* 童養媳 [little daughter-in-law] at 10 *sui*, so I'm illiterate, but I can recognize the numbers on money, not just the colors. Every family around here had spinners—daughters, daughters-in-law. If there were no girls, boys might spin. Some used the big wheel, and some the small. On our street there were about 20 families, and only five had the big wheel. Only a few wouldn't spin. Nobody wove—we all bought cloth, and there was no putting-out of yarn or raw cotton.

On the big wheel I could spin two *gong jin* for each two-day market if I worked from dawn to deep into the night. You stuck a lit incense stick into your footbindings or leg ties to see by. The family had hired a man to make us a wheel. It took him six or seven days, and cost 30 *tong yuan* 銅元—that was Sun Zhongshan's money. For a *gong jin* of spun cotton yarn you got a *sheng* 升—five *gong jin*—of hulled rice. [He Cefang, born 1921 in Nanjiang Qu, Suining City (ibid.:57)]

My family bound my feet when I was four or five, but I made a big fuss. Father said it would be all right to let me out because I could work better in the fields and on the road, and, of course, natural feet are better for paper-making, too, and we made paper every year.

How did we make fine paper when I was a girl? I know all about it; my family taught me carefully so I would always have a bowl to eat from.

The bamboo must be cut when it's as tall as it will grow before the leaves come out, then soaked for a month in plain water until it stinks. You beat this to a pulp, wash it till it's very clean, stamp it with your feet until it's dry, then wash it some more and boil it for three or four days. Then put it into bamboo tubes with holes drilled at the bottom, so it will drain. Next, you leave it in clean running water for 10 days, so you have to carry it back and forth to the stream every day. This is all preparation. For really fine paper, put this pulp into a big stone mortar with a foot-lever pestle, and beat it 3,500 blows—"keng, keng." It's in pretty small bits by then, and well mixed with water. Dip a fine sieve into it—it has to be one big, smooth action. Peel off the piece—it'll be about two feet square—and hang it on a rack to drip. Then you smooth it on a wall with a stiff brush. That was my work. In a day, we made a thousand sheets. We started at *Duanwu jie* 端午節—the fifth day of the fifth month—and it took about a month from cutting to dried paper. You could only do it once a year. We sold it out to Leshan, a center of all kinds of paper-making, to be primed for calligraphy with white wax by experts. It was sold by the *dan* 石—30,000 sheets—at 10,000 *gong jin* of rice for each *dan*. That was husked, not

unhusked rice. My family used to make 1,200 *gong jin* worth in a season. [Li Suo, born in 1925 near Da Cu Xiang, E Mei Shan Xian, Sichuan (ibid.:25)]

We're storing this tobacco from last year until the prices go up; last year's crop was just too big. My husband and I didn't do all the work ourselves. We hired a few young women at busy times, and it's a really complicated job. From seed to dry leaf bundles like these, we perform 79 operations. [Wang Mei, born 1955 in Shifang Xian, Sichuan (Gates 2000 manuscript fieldnotes:37)]

Almost certainly, 105-year-old Wu Shi would not have seen anything unusual about the numerical specificity of 67-year-old Li Suo or 47-year-old Wang Mei as they described the characteristic work of Chinese girls and women in still not-very-industrial Sichuan. Like many of the women I interviewed there in the 1990s, they could not read, but they could reckon; they were certainly numerate by the definition of numeracy as "an efficient system of spoken numbers founded on the idea of a base to enable numbers to be arranged into convenient groups" (Joseph 2000:41). Although I did not focus in these interviews on the topic of numeracy, one of the principal links between "learning" and "the Chinese economy," Charles Stafford's invitation to find such links turns up an abundance of provocative information in my fieldnotes. Although it is not as systematic as I would like, this information supports an initially unexamined assumption that levels of simple numeracy were (and are) very high among Chinese women. These women, even as young girls, were fluent in counting, simple arithmetic, keeping mental accounts of money earned and products made, and making long-term calculations about their possible future dowries.

For perspective, set the number-consciousness so frequently expressed in the above quotations against the astonishingly low arithmetic skills of children in U.S. public schools, or the recent report of a contemporary Indian bond-slave whose "employers took thumb impressions on papers against any amount of money, which he could never read and understand, pushing him [and his family—added by author] into perpetual slavery" (Satyarthi 2002:15). Anumeracy has long been taken by anthropologists as a characteristic problem of peasant and small-scale societies in their dealings with the capitalist world. Certainly, Westerners do not imagine shy, illiterate village girls to be clever calculators.

Wu Shi and the others are more functionally numerate than we might expect, though few have mastered any written characters beyond the utterly transparent graphs for "one," "two," and "three." They are typical of Chinese

peasants as we know them from many sources: Consider the famous “Rent Collection Courtyard” sculpture installation that depicts the wicked landlord using nonstandard measures to extort rents beyond the contractual amount because his tenants were perfectly capable of reckoning the numbers of *gong jin* owed (*Rent Collection Courtyard* 1968).

A Sample of Chinese Women

How might Chinese girls and women—poorly positioned in domestic hierarchies and often stereotyped as none too bright—have acquired such skills, and why would they want to do so? I have at hand materials that seem peculiarly appropriate for answering these questions: personal interviews with about 300 of the 5,000 elderly Sichuan women whom I team-surveyed in the early 1990s about their work as girls and young women. About 90 percent identified themselves as illiterate. Before my research team and I¹ asked about literacy, I had not thought to ask about numeracy. We were put right by the women themselves who volunteered that they “could reckon” (*hui suan shuzi* 會算數計), stressing this skill as easier to attain and extremely useful. Survey work is excellent for certain purposes, but it is hopelessly inflexible, and I did not follow up on this insight with systematic questions about numeracy.

Fortunately, I had other sources of insight into female calculation of precise quantities in Chinese settings. In the late 1980s, I gathered work histories for women entrepreneurs, women who, alone or in partnership with their husbands or another person, had started and were operating small businesses in Taipei and in Chengdu. About half of these two hundred women were old enough to overlap in historical time with those in the five-thousand-woman study. They taught me much about how they had obtained the capital, the skills, and the family cooperation necessary to initiate enterprises. Some of the results of this research are available in print (Gates 1991, 1995). In the early 1990s, I joined two collaborative projects that have brought me evidence for about 4,000 elderly Fujianese women and a few hundred more from Jiangnan,² materials that parallel those collected in Sichuan.

¹ Research teams were assembled from rural members of the All-China Women's Federation, Sichuan Provincial Branch with the supervision of provincial-level cadres, especially Director Lo Dong and researchers Jiang Yinghong and Hua Xinghui, with funding provided by the Harry Frank Guggenheim Foundation. Site visits took about a week; I was able to participate in interviewing in four of the ten counties.

² Fieldwork in Fujian and Jiangnan with regional academic colleagues was supported by the Luce Foundation and the Chiang Ching-kuo Foundation, respectively.

Numeracy across the Ethnographic Record

Why were so many of the women I interviewed so business-ready with oral numeracy and a generally cost-benefit approach to problem-solving? An answer requires that we first sketch a comparative framework and then delve deeper into their lives and work. Much recent literature reveals that numeracy may be a more common cognitive capacity than many anthropologists (including myself) have assumed. Only oral and mental counting and calculation are in play here. This essay speaks solely to these phenomena, and not to written forms. Animal behaviorists allow for a consciously inaccessible, but still effective low-number counting capacity—"numerosity" (Butterworth 1999) or "subitizing"—even in birds and mammals: they have an evolutionary interest in keeping track of current offspring (Budiansky 1998). Some subsistence-level societies may have got along well enough with very simple numeracy—"one, two, three, many"—but careful fieldwork has sometimes revealed surprising tendencies toward greater numerical skills (Joseph 2000; Zaslavsky 1999). Simply knowing one's cows or sheep by name or by subitizing, as the Nuer and my mother-in-law do, is insufficiently precise for most pastoralists, as Campbell found among the Sarakatsan (Campbell 1964) and Beck among the Qashq'ai (Beck 1991).

Purely oral numeracy is probably more easily attained in a verbally transparent base-ten system such as the Chinese use than in those with more cryptic bases. In Chinese, one says "ten one" and "ten nine" for 11 and 19, and "two tens" and "eight tens" for 20 and 80, unlike irregular systems that employ locutions such as *quatre-vingt* (80, French) or that use "quincuagesimal" systems (based on five and 20), in which five is the primary base (many West African systems) or, in the nineteenth-century Hausa case, five- and twenty-based, but having 12 as the base for the formation of the words for 13 through 18. While computation is easily picked up by African women known for high engagement in trading, mental arithmetic is sometimes taught directly by skilled seniors (Clark 1994:191). My Chinese informants rarely mentioned direct instruction, nor were they as likely as African trader-apprentices to attend markets and learn by observation.

People who meet Joseph's standard of numeracy—those fluent in an oral tradition of numbers on an efficient base—often make their oral practices material. When spoken numbers are represented by marks or objects—pebbles in heaps, for example—even quite complex operations, addition, subtraction, multiplication, and division, become feasible. The abacus that came into common use in Ming China (1368–1644) derives directly from such a system—bun-

dles of rods (Needham 1959:74-80). Simple oral numeracy as a part of daily life and work has been familiar to Chinese commoners since time out of mind, as it has been widely familiar in most societies. The base-ten set of Chinese numerals, among the simplest in the tens of thousands of ideograms available to the highly literate, appear in many daily contexts. James Wilkerson (this issue) points out the ubiquity of numbers and arithmetic in important commoner institutions such as temples and lineages.

Where do we historically find traditions of numeracy that led to elite forms of mathematics? Sticking to the Old World, for we know so little of the New in this regard, numeracy was particularly well developed in the major Afro-Eurasian agrarian empires around the Mediterranean, in southwest Asia, and in China's cultural sphere. These regions together constitute what Judith K. Brown has labeled "The Mother-in-Law Belt" (Brown 1997). Brown's reason for lumping these classical tributary societies together is to emphasize their commonality in treatment of young women, especially brides, who typically fall under the discipline of the oldest woman in their virilocal household, their mother-in-law. Managing (and benefiting from) the labor of daughters-in-law (and daughters, servants, and bond-slaves) in these androcentric societies necessarily devolves on a senior woman who has become invested in the interests of the patriline to which she has borne children. Closely supervised female work teams not only did the work of social and family reproduction, they produced as well for state and market, especially in the form of textiles and light handicrafts.

As inhabitants of preindustrial empires, people in the Mother-in-Law Belt paid tribute, the quantities of which were vitally important to both rulers and ruled. Tribute in spun and woven fabric was a common requirement; even where the weaving of luxurious goods was male work, spinning was characteristically gendered as female. These populations produced not only for subsistence and taxes, but also for domestic and international markets. Our field has recently seen a flood of publications on the priority, sophistication, and significance of this commerce (e.g., Abu-Lughod 1989; Goody 1996; Liu 1998). Commodity production, notably of light-labor handicraft manufactures that were often sharply gendered was massively important in the region's history. It is over-generalizing, but still clarifying, to say that control of both women's labor and the products of women's hands were essential elements of the Mother-in-Law Belt, the global economy centered on it, and its cultures, high and low.

The bureaucratization and commoditization of economies infiltrate all aspects of life through pervasive and expanding quantification. While the development of a capitalist world system has increased the speed and scope of

this process—dramatically so after the emergence of fossil fuelled industrialization, even in the preindustrial great civilizations, commerce and numeracy tended to cluster. Processes sometimes seen as capitalism (e.g., Susanne Brandtstädter, this issue) are far older and more culturally pervasive than capitalism as it emerged in Europe. The sophistication of indigenous Chinese mathematical knowledge is increasingly recognized, and that of Islamic and South Asian peoples provided accounting practices in the precapitalist trading spheres that linked the old world from East Africa to Japan (e.g., Rudner 1994). Later, Western European colonialists would notoriously employ the managerial and accountancy skills learned from the Middle East, India, and China to control production and population in those very empires.

Were preindustrial Chinese exceptionally numerate? Four circumstances certainly fostered, and continue to foster, numeracy. An obvious one is the ubiquitous use of numbers in the daily life of ordinary folk. People often refer to their children as “Old Three” or “Old Seven” instead of using given names; visible phases of the moon are converted readily into lunar dates such as “Five Fifteen”—the fifteenth day of the fifth lunar month; family food habits are structured around the small feasts for gods, ghosts, and ancestors prescribed for particular days; women making spirit money offerings count out the bundles with practiced precision. Private menstrual calculations are of significance to women and their husbands, for intercourse (and ritual) are forbidden at certain times. Written numbers are everywhere, especially at rituals, when lists of contributions are posted in temples and at festivals. Even modest households keep records of each member’s astrological “eight characters” (a series of numbers), of ancestors’ death dates, and of quantities of money given in gift exchanges (Yan 1996 and this issue). In premodern times florid ritual practices would have influenced children’s acquisition of numeracy and maintained it throughout adult life.

The second nourisher of numeracy is, paradoxically, the difficulty of China’s written tradition; a third is the large suite of production activities thought to be particularly appropriate for girls and women; and the fourth is a possible biological consequence of the very widespread custom of binding little girls’ feet. Each of these is examined below.

Literacy vs. Numeracy in China

Anthropology has explored the sociocultural implications of literacy much more extensively than those of numeracy. Jack Goody’s 1968 volume on the subject stimulated considerable interest in written *words*; but most of us are professionally a-numerate, people who assume that math is harder to master

than storytelling. This bias is especially inappropriate for anthropologists interested in the Chinese case because most of our assumptions about literacy are drawn from experience with alphabetic and syllabic writing systems. Alphabetic and syllabic systems require little development of memory skills and virtually no spatial thinking. Written Chinese demands both, differing from the linear systems in the operations and locations it stimulates in our brains (William S. Y. Wang 1991). Written Chinese is almost certainly harder to master and maintain at functional levels than more linear scripts according to John de Francis (1984) and many scholars of the May Fourth Movement (e.g., Lu Xun's 1934 essay on language reform [1974]).

"Arabic" numerals, however, do not share the advantage of graphic linearity; like Chinese written numerals, they are ideographic. For the average mind trying to master both literacy and numeracy, literacy is easier in an alphabetic tradition, but numeracy is no more difficult in an ideographic tradition. Indeed, a learning culture that emphasizes memorization of basics might speed the process of mastering such handy devices as "times tables" and thus broaden the base of simple numerates in society.

People living in a society as commoditized as China, and under the influence of a great tradition of esteem for the written have strong motivations for becoming both literate and numerate. Historically, and even in the present, they appear to be more successful with numeracy because of the nature of the Chinese writing system. This material difference has probably had considerable influence in Chinese social processes, limiting literacy to far fewer people than numeracy, and offering different opportunities to those with both capabilities and those with only number skills.

Footbinding, Girls' Light Labor, and Numeracy

Examining the kind of work done by women in our sample immediately brings footbinding into focus. Because binding a daughter's feet gave her slightly improved status chances, footbinding was the norm for most late imperial/early Republican Chinese families. It was far from being the universal practice, however. In 10 Sichuan counties, the average county-level percentage of women over 65 in 1991 and 1992 who had ever been bound (some bound and later let out) to never-bound ranged from 35 percent in Ming Shan to 85 percent in Suining (Gates 1997, 2001). Throughout China, ratios range from virtually none to the 85 percent found in the Taipei Basin (Wolf and Huang 1980: 265). Exceptional communities such as non-Han Manchus, local indigenes, and the Han Hakka never bound their girls' feet, but most Han households were obliged to either follow the general preference for footbinding or ignore it.

The principal reason for following the norm and actually binding a child's feet appears to have been the availability of commodity production suitable for very young, weak, housebound girls. Such light labor covers a great range of activities, many of them familiar but largely unstudied. Where raw materials or other resources necessary for such work was not available, village girls did heavier jobs: digging, foraging for fuel, portering, and the like.

In surveying elderly Chinese women, my team and I asked about many kinds of girls' products, distinguishing among those made mostly for home use, for wages in a putting-out system, or for direct sale to market. We specified spinning (in the case of silk, reeling; in the case of bast fibers, twisting) cotton, silk, or hemp thread; weaving cotton, silk, or hemp thread; dyeing cotton, silk, or hemp yarn or fabric; embroidering; plain sewing; picking tea; processing tea; picking opium; and a wide range of simple servant activities. Less systematically, when we encountered them, we documented the light but labor-intensive work of producing white wax from insects and oil from tea and tallow-tree seed, family paper manufacturing, processing paper into spirit money, and a long list of other activities by which our informants had contributed to family welfare during their girlhoods. In addition to work easily done by footbound girls, we collected data on jobs unsuitable for the footbound, such as heavy agricultural labor, combing mud flats for shellfish, collecting fodder from mountain slopes to feed pigs, and portering goods between navigable stretches of rivers. Even for strenuous tasks, girls as young as 10 joined the workforce if their family needed their earnings.

In most rural, small town, and urban working-class families, such earnings are always needed, either to meet present requirements or to save for sons' weddings, daughters' dowries, the purchase of more land, and dignified funerals. The vast majority of Chinese households in the recent past have counted on the labor even of small girls to maintain or improve their livelihoods. Until the 1930s and 1940s footbinding was practiced most extensively where families could employ their daughters in light indoor labor. Non-footbound girls worked hard, but often under conditions of greater autonomy. Informants from regions with little spinning sometimes commented on the "bitter lives" of girls who worked out of doors; a few of their outdoor opposites offered the contrasting opinion that sitting inside spinning all day would have been a dreadful fate. Their descriptions of roaming the hills in search of firewood or pigfood sounded like those of a little African maiden:

One thing I remember about my childhood with a lot of nostalgia is the freedom. If you are told to collect firewood, it is not a bad thing. When you go to the forest there are so many things you want to do. There is wild fruit you can pick. You

have a rope to tie firewood. Before you collect firewood, you make a swing with the rope and swing for a long time, eat wild fruits and have a lot of fun. [Isabel Mbugua, now living in Nairobi, told Helena F. Halperin (1999:6)]

Sichuan girls growing up in small towns and villages in what was then preindustrial but highly commercialized region had economic motivation and frequent opportunity to become fluently numerate through work.³ They, and especially the footbound among them, were unschooled, secluded, and discouraged from displaying curiosity. Almost automatically, however, they kept quantitative tabs on home production/distribution processes even when no one intentionally taught them numbers. Numeracy enabled girls to apprehend abstraction, to calculate returns on labor, to compete with others for distinction in industriousness. It engaged them in planning and in assessing their self-worth, using a conceptual hierarchy very different from those of gender and relative age. Play with numbers—cheap, portable, invisible, and likely to be useful in future—was almost the only form of mental exercise some of the women I interviewed had access to as children. Such play may well have had consequences for Chinese economic culture.

As their memories of their young lives repeatedly revealed, however, they found the tedium of their tasks almost unbearable.

Life was nothing but spinning! The only time you stopped was to eat or go to the toilet!

Pushing a millstone was the worst thing; it was so boring and exhausting. You just walked round and round like an ox. I asked to have my feet bound so I wouldn't have to push the mill.

At least when you hung the bundles of white wax insect eggs to hatch, or climbed the bushes to collect the white stuff, you could go out of the courtyard and see things. But wrapping the eggs [in leaf bundles] for hanging was an endless job.

Carrying firewood down from the mountain was hard, but I liked it better than pounding bamboo for paper. When I was little, it was just pound, pound, pound.

Work is an emotional matter for Chinese (Potter and Potter 1990:190-195), a realm of experience in which it is culturally appropriate to energetically express feelings. When women we interviewed described work, gestural imitation of production processes, facial and verbal staginess, boasting of having

³ Damasio's work, largely based on humans, is supported and complemented by a large and growing literature on a variety of mammals, notably the research of Joseph LeDoux in *The Emotional Brain* (1996) and *The Synaptic Self: How Our Brains Become Who We Are* (2002).

accomplished new or difficult tasks, and obvious frustration (Sichuanese have a stereotyped gesture for this) spilled out at a volume that would be inappropriate for discussing marriage or domestic relationships. Several essays in this issue repeatedly remind us how salient simple numeracy can be in the construction of personal identity. For Mr. Wang, Dewas and Dabas, and Little Yang and Teacher Ho (described by Yunxiang Yan, Scott Simon, and Charles Stafford, respectively, in this issue), business skills gave them a public face. One's relationship to valued kin and community institutions are also feelingly described, as when Aihua boasted of past collective projects: "Look at these fields, they're all level now, our production team did that, an individual family couldn't have done that." "Without the production teams," A Hong inserted, "we would have been" as poor as Indian villagers (Ellen Oxfeld, this issue).

Footbinding, Emotion, and Human Biology

How might the feelings and developmental trajectories of my informants have affected their understandings of themselves? Such a question cannot be answered only from informants' memories of their conscious perceptions. Additionally, we may turn to the findings and insights of researchers in fields beyond ethnography. We are learning increasingly how much of human behavior precedes its conscious processing. Emotions especially are a form of intelligent awareness "just as cognitive as other percepts" (Damasio 1994:xv), but less responsive to learning than more conscious forms of awareness.

In *Descartes' Error: Emotion, Reason, and the Human Brain* (1994) and *The Feeling of What Happens: Body and Emotion in the Making of Consciousness* (1999), the neurologist Antonio Damasio synthesizes new research that demonstrates the dependence of conscious cognition on an evolutionarily older brain substrate. The homeostasis necessary for life is maintained by richly complex body-sensing mechanisms operating together with the evaluation of somatic inputs that he specifies as emotion. Emotion can and does exist prior to and, pathologically, in the absence of conscious cognition; the reverse is true as well. Persons with damage to the sharply delimited brain regions responsible for evaluation of well-being-emotion—can have unimpaired cognitive capacities but be unable to exercise them productively.

Emotions and feelings may not be intruders in the bastion of reason at all. . . . The strategies of human reason probably did not develop, either in evolution or in any single individual, without the guiding force of the mechanisms of biological regulation, of which emotion and feelings are notable expressions. . . . [C]ertain aspects of the process of emotion and feeling are indispensable for rationality. . . . The lower levels in the neural edifice of reason are the same ones that regulate the

processing of emotions and feelings, along with the body functions necessary for an organism's survival. In turn, these lower levels maintain direct and mutual relationships with virtually every bodily organ, thus placing the body directly within the chain of operations that generate the highest reaches of reasoning, decision making, and, by extension, social behavior and creativity. [Damasio 1994:xii-xiii]

Damasio does not ignore the fact, long obvious in cross-cultural studies, that the expression of emotion is inflected to some degree by social learning. His emphasis, however, is on the universal substrate of emotion known to exist from experimentation on animals and from experience with neurological damage and disease in humans. Against this perspective, Cartesian mind/body dualism dissolves, honoring instead that other Enlightenment thinker, David Hume, who argued for the necessity, not the opposition, of "passion" to "reason." It is impossible to do justice here to this rich, evolving, and necessarily still partly speculative line of inquiry, but its implications for cognitive anthropology and for various forms of constructionism are immense.

Damasio stresses that cognition—in the present case, children's conscious awareness of their experiences—is not separable from their involuntary (although somewhat culturally constructable) emotions and feelings. Footbound informants frequently described their feelings to me and our research team members. A tiny proportion of women remember having thoroughly internalized a desire for bound feet, perceiving the pain and confinement as tolerable. Others resisted with such energy that their parents eventually gave up. For most, memories of pain and anger were uppermost. They cried and pleaded for release, unwrapped or loosened their bandages, and finally became resigned to obedience and to a more rigorous work regime. My notes record a few who persisted in unbinding their feet despite the vigorous punishment this disobedience drew down. "My mother finally got tired of beating me, so I just stayed big-footed," one commented. Escape from work itself was harder. The most important argument parents brought to bear on a recalcitrant daughter was that if she went natural-footed, she must then take on heavier, outdoor tasks to earn her keep. Non-footbound women and men also remember frustration at tasks that left them little opportunity for physical activity and social contact, but it is the footbound who appear to have suffered most.

Pre-adolescent children, engaged in the most massive physical and mental growth of their lives, have powerful exploratory urges to use these expanding abilities. Frustration, especially among the newly-footbound, was exacerbated by the punishing response of parents to resistance. In experiments on many mammals, including ourselves, frustration of desired behaviors by punishment

has been shown to trigger episodes of aggression, regression to infantile behaviors, and, finally, apathy.

Another response to frustration that many studies document may also bear on the development of work-related numeracy: fixation, or compulsive, stereotyped action. When lab animals are placed in inescapable dilemmas, "[r]esponses formed or expressed during frustration are more rigid than any that can be established through training or learning. They continue to dominate behavior despite their inadequacy at solving the dilemma, and punishment then further increases the fixation" (Maier 1961:78-79). People under "emotional stimuli, such as electric shock or the turning on of a shower" replaced rational choices in favor of "useless and repetitious responses" (ibid.: 84-85). Children's responses to frustration in experiments include "unconstructive play" (ibid.:19).

"[F]rustration induces a kind of behavior which is not reducible to learning and motivation concepts" (ibid.:92). The experimental psychologist, Norman Maier, arguing against a then disciplinarily hegemonic behaviorism, was concerned to describe stereotyped "behavior without a goal" by distinguishing between frustrated and motivated behavior, between that driven by feeling and by reason. "[W]hat if the logical process were a tool of motivation alone, a tool unavailable to the person at time—or in areas—of excessive frustration?" "[F]eeling and thinking, each . . . follows a different kind of logic" (ibid.: i-ii).

Maier's mid-twentieth-century intervention against hyper-rationalism bore little fruit, however. Psychologists continued to discuss emotion as a culturally constructed outcome of cognitive behavior that owed little or nothing to a universal human nature. During much of the twentieth century, anthropological thought paralleled that of learning theorists closely, if usually rather innocently. Working out a politically valuable relativism, many overegged the pudding by insisting that emotions were wholly or almost wholly constructed as individuals learned their way into adulthood, that human behavioral universals were either fantasies or trivialities. While this position is rapidly eroding under the pressure of new findings in human biology, current thinking in cognitive anthropology continues to be extremely chary of "human nature," not yet ready to welcome brain science or recognize Descartes' error.

Arguing that frustrated child workers might turn to repetitious numeracy on the basis of Damasio's elegant synthesis is a stretch. It assumes that children will sometimes find a useful, positive response to limits imposed on their psychosomatic development, an assumption for which I have no psychologist-certified evidence. Yet ethnography of low-tech handicraft-making families in Mexico (Littlefield 1976), India (Nieuwenhuys 1994), and the Philippines

(Rutten 1993) shows that strict discipline and an eager concern for quantity of product and income are common under such regimes, and that children work with a will despite the work's constraints. Not all child labor should be considered forced, as Olga Nieuwenhuys has shown among Kerala coir worker families. Through their work children gain respect, money, the hope of planning their own future and helping those dearest to them; and they internalize the values of interdependence. This was plainly true for many of our Chinese informants.

Where footbinding was a factor, however, such satisfaction may have been less apparent during the pain and immobility of the first few years when the least-skilled parts of light labor were being learned. As well as teaching family economic values, light labor unquestionably generated stupefying boredom.

Persistent efforts to overcome boredom even at high physical and emotional cost are extremely hard to extinguish in growing children. They are physiologically driven to play, explore, and experience, and will do so untaught and under disapproval. How much they need to do so is open to debate. WHEN "boredom" sets in is obviously culturally inflected—but only within developmental parameters. Current Western expectations of how much stimulation a child needs—also obviously locally inflected—are surely overblown. Knowledge of electronically jacked-up "modern" children does not supply a useful measure for assessing a supposed under-stimulation among little Chinese spinners. Probably, neither Chinese nor Western tradition was well-attuned to developing healthy children. It seems a worthwhile task to investigate—carefully, systematically, and with great alertness to the possibility of bias—what the biologically optimal degrees of autonomy and interdependence for children might be.

The reintegration of biological elements into our analyses of human behavior is necessarily and uncomfortably controversial. Integrating biology into our work does not mean abandoning the study of what people think about themselves or resurrecting a quaint Boasian four-field anthropology. It means bringing new knowledge from biological studies together with the turbo-charged self-consciousness with which social analysis is now conducted. It means trying to sort fact from folklore by measuring anthropological observations among free-range humans against the findings of scientists whose specializations enable them to control confusing variables with greater precision. And it means defending biologically informed interpretations against both mad scientists and philosophical idealists who imagine that their bodies are all in their heads.

I take this new direction seriously for reasons personal, political, and

intellectual. Absorbing more biology into anthropology requires certain assumptions about humans, assumptions that most of us probably hold. I list them below:

(1) Human beings do not leave the womb as intellectual, emotional, or physiological blank slates, open to any and all kinds of exogenous construction.

(2) Nor do individuals develop from the union of gametes in a genetically pre-determined way.

(3) From before conception through gestation, birth, and the lifecourse, persons exist as processes of interaction between endogenous and exogenous influences. This developmentalism excludes the analytic extremes of social, cultural, or religious constructionism on the one hand, and of much socio-biology/evolutionary psychology on the other.

(4) Shared mammalian heritage AND emergent properties of our particular species contribute to humanness.

(5) Biologists understand a good deal though by no means all of our mammalian heritage, but social analysts understand very little of our species-specific ("human") nature. Most of what philosophers and the intellectually curious of all societies have taught about human nature is folklore: interesting, sometimes insightful, but likely to be largely socially constructed and usually transparently ideological. Understanding a local population requires that we familiarize ourselves with their folklore, but not use it as the sole explanation for the persistence of long-term patterns of behavior.

(6) Cartesian mind/body dualism, the language in which much current debate about human nature is conducted, fails for two reasons. First, as mentioned above, persons are the outcomes of inseparable developmental processes. Second, and almost as importantly, the dichotomy fails because it excludes emotion, a dramatically integrating process.

(7) Emotion is a part of cognition, but one only partially governed by conscious rationality. Behavior, regardless of cultural context, cannot be fully accounted for without its inclusion.

From the details of many Chinese women's girlhood *longueurs* and labors, we can draw some tentative conclusions about Chinese households—even poor and illiterate ones—as promising cradles of numeracy for all members. Boredom is an affective state of particular interest in societies with elaborate division and intensification of labor, like that of China in its household-producer sectors. Children and youths especially experience culturally inflected forms of boredom when disciplined to highly repetitive labor from what I postulate as biologically impelled urges toward physical and mental activity. Those who benefit from intensive work regimes—family seniors and superordinate

classes—must invest heavily in sociocultural means to override boredom. Those who labor in at boring tasks, especially the young, will resist with tenacity and/or suffer the known consequences of frustration. In the case under consideration, intensive and inherently dull work for Chinese children, especially footbound girls, created a context within which abstract, repetitive play with numbers might readily be expected to flourish.

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「我不會讀，但我會算」： 二十世紀初四川女孩的勞動、情緒與算術

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在筆者對四川年長婦女進行關於她們少女時期之勞動與纏足經驗的訪談中，發現了纏足所造成的活動限制與超越一般村莊文盲的算術能力之間的強烈關連。那些從事像紡棉紗這種重複性工作的女性，從七歲一直到十八歲左右結婚的這段期間裡，是其家庭收入的主要貢獻者；而她們也因纏足得以免除了最辛苦和最下賤的勞動工作。這篇文章探討在孩童的成長與好奇心最旺盛的時期，少女因活動範圍受限所可能產生的心理影響。筆者認為生理及心智驅力的受挫與纏足所造成的痛苦和無助，正足以創造出適合專注於數字遊戲與發展無師自通之算術能力的情境。因此我們在探討文化實踐時，不應忽略了人類生理的普同性，如此兩者並進，方能對這些實踐之結果有充分的理解。

關鍵詞：算術，勞動，少女，纏足，生物文化
