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## Some qualitative mathematics in China

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### ABSTRACT

In this article, inspired by Lévi-Strauss's comments on "qualitative mathematics", I outline some features of Chinese cultural practices related to number and quantification. More specifically, I note that Chinese numerological practices are embedded in a more generally "structuralist" and mathematical way of conceiving experience; that taken together they comprise a loose, and even "creative" (rather than precise/rationalistic) type of life-accounting; and that number use in China is often emotionally loaded.

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In an article entitled ‘The mathematics of man’, written in 1954, Lévi-Strauss suggests that

We can be sure, even now, that in future young social scientists will need a sound, modern training in mathematics, without which they will be swept from the scientific scene (1954, p.589).

The key word in this – perhaps surprising – sentence is “modern”. Lévi-Strauss does not, after all, think that we need more number-crunching social scientists. On the contrary, the mistake, he says, is for social scientists to have borrowed quantitative methods

... which, even in mathematics itself, are [now] regarded as traditional and largely outmoded, [without realizing] that a new school of mathematics is coming into being and is indeed expanding enormously at the present time – a school of what might almost be called *qualitative mathematics*, paradoxical as the term may seem, because a rigorous treatment no longer necessarily means recourse to measurement. This new mathematics (which incidentally simply gives backing to, and expands on, earlier speculative thought) teaches us that the domain of necessity is not necessarily the same as that of quantity (1954, p.585, emphasis added).

He has in mind mathematicians such as André Weil (who wrote an appendix to the *Elementary structures*) and early game theoretic writings.<sup>i</sup> The approach embodied in work of this kind – which Lévi-Strauss links to developments in structural linguistics – presages for him a mathematics (and a social science) focused on “small numbers”, concerned with illuminating the relations between elements found in sets/structures rather than with quantification, as such. (If this seems wishful thinking on the part of a structuralist, by the way, note that one of the most influential approaches in contemporary philosophy of mathematics is called ... “structuralism”.<sup>ii</sup>)

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Of course, Lévi-Strauss would be the first to say that a *folk* version of “qualitative mathematics” – that is, a folk philosophy of structure – will be found in all human societies. In the remainder of this article I want to reflect on the Chinese version of this.

Chinese society is famously number-oriented, i.e. numbers and numerology are pervasive aspects of many Chinese social/cultural practices. Indeed, about ten years ago I decided to conduct a research project on popular numerical culture in rural China and Taiwan for the simple reason that my informants there seemed, so much of the time, to speak amongst themselves in numbers (Stafford 2003, 2004, 2007, 2008, 2009). They talked endlessly about the lottery, about the prices of goods (achieved through haggling), about the examination results and class rankings of their children. They used numbers to describe and evaluate public events such as banquets and rituals: how many guests, sitting at how many tables, eating how many different types of food? What quantity of offerings should be given to the gods, how many times should we bow before them, holding how many sticks of incense? Their fortune-telling practices were also explicitly quantitative: a matter of literally “calculating fate” (*suan ming*) and sometimes even modifying it by conspiring to change the relevant numbers (e.g. altering a character in a child’s name so that the brushstroke count for the name as a whole would become more auspicious).

Of course, many if not most cultures have the idea that *some* numbers (such as “unlucky 13”) carry a weight of meaning. But in China the case can be made that *all* numbers are important/meaningful. I even conducted a pilot project, at one point, to test the hypothesis that people in China simply find numerical information *intrinsically* interesting – and more specifically that if numerical information of any kind is placed in their cognitive environments they will spontaneously notice and recall it (Stafford 2008). In general, then, it struck me that the Chinese and Taiwanese people I met were keen counters and quantifiers. And I think they *are* interested in number/quantity for its own sake. It is even tempting to say that they take an accountant’s view of life (which, from a Western point of view, may sound a bit of a putdown), placing their faith in numbers rather than words.

However I’d like to make three points about this – seemingly quantitative – outlook.

The first is that numerological practices in China are embedded in a more general framework that could be called structuralist (again, in the Lévi-Straussian sense). This framework seeks to explain patterns/structures (such as the patterns of the universe, including cycles of time), and the relations between elements in these patterns/structures, in largely qualitative terms. Of course, numbers can help with this. For example, Chinese fengshui (geomancy) has many numerological practices linked to it. But as Feuchtwang notes, fengshui should be seen as a distillation of a general Chinese “calendrical and natural philosophy” which

... assumes that the universe is in flux, in continuous change, but that there are patterns of change discernible to experts in fengshui. By observing these patterns and by understanding the natural laws which they manifest, experts can diagnose the prevalence of good and bad influences at any spot of the ground (Feuchtwang 2002, p.4).

We might say, then, that the Chinese interest in numbers and quantity emerges from an interest in pattern and in the *qualities* of patterns, not the other way around. It is arguably more mathematical than arithmetical in spirit.

The second point is that quantifications of the kind I observed in China and Taiwan (e.g. those related to haggling, or embedded in folk accounting) are often imprecise, even “creative”. One might think that a number-oriented culture would produce agents skilled at arithmetic, and keen on accounting precision, even tending (as Weber might have it) towards a rationalising/bureaucratising world view. But many of the people I met in rural China and Taiwan (such as small traders) seemed, on the contrary, almost wilfully loose in their accounting practices. They often seemed as interested in the qualitative meanings of numbers words (e.g. arriving at “good-sounding numbers” when haggling over prices) as they were in doing proper sums. To put this differently: they were as keen on the poetry as the prose of numbers.

Given that Chinese (and other East Asian) students tend to perform well at arithmetic/mathematics in international comparisons, the idea that they are uninterested in precision may seem far-fetched. Note, however, the argument by the cultural psychologist Richard Nisbett that enculturation into “holistic” Chinese thought tends to produce agents who – results at maths notwithstanding – are broadly “non-logical” by comparison with Westerners (of course, this claim depends on a particular definition of logical). He suggests that the Chinese performance advantage in mathematics is best seen as a recent historical artefact (Nisbett 2003, pp.188-190). In any case, here I am simply suggesting that the Chinese interest in numbers/numerology should not automatically be equated with an interest in developing a precise/rationalistic view of the world.

The third point, which follows on from this, is that while in the Western folk view numbers are typically associated with a kind of cold logicity – the point of numbers is that they give us a means of saying exactly how things are, devoid of subjectivity and bias – in everyday usage in China and Taiwan they are often emotionally loaded, and frequently tied to the intimate domain of kinship and family life.<sup>iii</sup>

In recent publications I’ve provided two illustrations of this. First, I’ve discussed the case of Mrs Chen, a businesswoman from rural Taiwan, suggesting that Mrs Chen’s “narrative of self” is importantly constructed around numbers (Stafford 2009). More specifically, her emotional relationships with the three most important men in her life – her father (a spirit medium, now deceased), her husband (currently also her business partner), and her son (a star pupil) – are significantly narrated via the medium of numbers. For instance, the sacrifices she and her husband have made to support her son’s education are numericised, as is his ongoing success in school and university (which is taken as a kind of return gift from him), as well as his exceptional frugality while living away from home. As I note:

... although social scientists may think of numbers primarily as a way of aggregating the (otherwise unmanageably diverse) experiences of individuals, for

Mrs Chen numbers are one way of differentiating *her* story from everybody else's. Virtually all Taiwanese parents spend money educating their children, of course, but the amount she has spent is possibly more than anybody she knows, and her son's results have generally been as good as (and for the most part better than) those of any other young person from South Bridge. When Mr and Mrs Chen organise an event at her father's altar [before his death her father was a prominent spirit medium, and the Chens continue to be responsible for organising ritual events there], the numbers (of participants, of 'visiting dieties', of offerings, of cash contributions) are part of the story – making *her* religious practice distinguishable, in quantity if not in quality, from that of her neighbours (Stafford 2009, p.9).

A second illustration is seen in the case of Mr Zhang, a farmer in northeast China who is notably anxious about the risks he and his loved ones face, not least because his own life has been marked by tragedy (Stafford 2007). In thinking/worrying about what may happen next, Mr Zhang draws on two Chinese cultural frameworks related to patterns of human experience. The first, already outlined above, is numerological/cosmological in orientation. By situating one's own life trajectory within the mathematical structure of the universe, people like Mr Zhang (who is deeply interested in fortune-telling) can "calculate" what is likely to happen and try to avoid disaster. The second framework focuses on patterns in interpersonal relationships, and more specifically on the processes of "separation" and "reunion" which frame both public rituals (including weddings, funerals, and most of the rites for dealing with ancestors and gods) and private emotional experience.

Both of these cultural frameworks – the numerological one and the separation/reunion one – have a predictive power, and through them individuals can exercise some degree of agency vis-a-vis the future. The "separation and reunion schema" (as I call it) is obviously emotionally loaded, i.e. it is explicitly tied to feelings of attachment, separation and loss. However, what I want to stress here is that the numerological framework is equally likely to be used to understand and/or control matters of the heart. For example, Mr Zhang and his wife were made very anxious, during my fieldwork, by the fact that a nephew of theirs was not rushing to marry during a window of opportunity (a two-year period) which had been revealed through divination as the only time when he could secure a happy marriage. Numerology not only helps determine when a wedding should take place, it also helps determine whether the personalities and life trajectories of the prospective spouses will really "cooperate" in the required way. But here there's a paradox. Numerology-linked fortune telling is one way of trying to dampen down the *anxiety* that might otherwise overwhelm someone like Mr Zhang when he reflects on the circumstances of his loved ones and himself. And yet, as the example involving Mr Zhang's nephew suggests, numerical practices can themselves induce anxiety: making us almost paranoid about what numbers and number sequences may foretell.

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Obviously, much more could be said about each of these three points, but here I end my brief consideration of Chinese qualitative mathematics on the question of attention. In what I take to be the Euro-American folk view, both number in particular and mathematical outlooks in general (the latter arguably misperceived as being primarily to do with number/arithmetic/quantification) are taken as almost prototypically boring. This contrasts with the generally positive Chinese folk view of number and quantification, which on closer inspection is seen to relate to the wider “qualitative mathematics” of experience embodied in traditional practices such as fengshui. As I’ve tried to suggest, this Chinese folk mathematics, and the “structuralist” numerology that goes with it, emerges from an interest in pattern rather than an interest in quantity, as such; it is surprisingly creative, even artistic/poetic, in its “accounting” for the world; and it is sometimes linked to, and even directly inspires, strong emotions. For the ordinary people I met in rural China and Taiwan, this makes numbers worth paying attention to.

## FOOTNOTES

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<sup>i</sup> See Almeida (1990) for an overview and discussion of some of Lévi-Strauss’s mathematical influences.

<sup>ii</sup> For a useful overview which situates structuralism within the history of the philosophy of mathematics, see Shapiro 2000.

<sup>iii</sup> Obviously, in any culture numbers can become emotionally-laden through their association with important things like falling house prices or the margin of victory in sporting events. My sense, however, is that in the Chinese case the numbers themselves, as numbers, and as instigators of emotionally-laden outcomes, are more likely to be focused on by individual agents.

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