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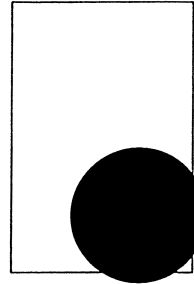
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# Finger counting money

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## Abstract

Through a discussion of a novel design concept for an embodied currency, this paper inquires into gesture and number. In so doing, it underscores the importance of attending to the phenomenological character of number and money. It speculates on the creation of an embodied currency lived in and through community.

## Key Words

design • embodiment • gesture • money • number

Now you shall believe what you would deny could be done;  
In your hands you hold eight, as my teacher once taught;  
Take away seven, and six still remain.  
– a Roman riddle (from Menninger, 1969: 201)

In the fall and winter of 2008, I participated remotely in a tutorial at the Royal College of Art titled ‘The Future of Money’. Interaction and user interface designers and engineers were charged with redesigning money. I was their anthropological interlocutor, commenting on their projects as they developed and offering suggestions for reading and discussion. Several of the projects explored the possibilities of designing technologies around gestures in order to recreate currency and solve particular problems that physical currency can pose – not just the cost of producing currency objects, the clumsiness of coin and cash, or the possibility of loss or theft, but also the issues raised by illiteracy and innumeracy, as well as issues of access to one’s money in social contexts rife with crime, fear, violence, or physical or social distance from reliable banking institutions. I focus here on one of these projects, a proposal for a gestural currency by the designer Will Carey. Will and I were in conversation over a period of about a year, off and on, about his project. We are each trying to work out separate, though related, issues in each of our projects. This short essay asks what Will’s project can offer anthropologists interested in new ways of thinking about numbers.<sup>1</sup>

Will’s proposal re-imagines the relationship between numbers, money and embodiment. This process, I believe:

- (1) brings to the fore the difference between the abstract numbers of mathematics and *counting* numbers; this difference is captured in the distinction in German between *zahl* and *anzahl* or English approximations *number* and *count* or *tally*.

- (2) highlights the embodiment of number through gestural language; this embodiment does not so much ‘re-ground’ numbers in the materiality of human bodies but rather helps reveal what was always there: the finite limits of number as embodied (Rotman, 1993), or number as always tally or *anzahl*, and never purely *zahl*.
- (3) brings us to a phenomenology of number, its iconicity and indexicality rather than its symbolic referentiality, which
- (4) suggests the possibility of a reimagined ‘embedded’ economy in the embodied community of traders/transactors, etc. This can take the form of either or both the free market imagined by exponents of Adam Smith, who forget his moral argument, and the market as a human institution insisted upon by Keith Hart (on Smith’s moral arguments see Elyachar, 2006; Hart, 2000).

Will’s project helps me to sort through some of the assumptions embedded in claims about number’s transcendence, or the Platonic conception of number as abstract and universal, as discussed in the introductory essay of this collection. This essay takes up Will’s project in order to speculate about what kinds of numbers – and currencies, and economies – it might help to inaugurate, or at least place on the drawing board.

### MODERN DAY DACTYLONOMY

Will’s proposal is to adapt the existing finger counting system common across China to serve as a form of currency. Will imagines a system capable of recognizing the numbers represented by fingers, connecting the person doing the counting with his or her money – dematerialized in the ‘electronic ether’, not necessarily held in a bank account but perhaps in a non-bank institution or entity to which everyone would have access – and allowing exchanges between users of the system. Noting that China has relatively low rates of wallet and purse usage – as low as 35 percent in some cities, compared with 90 percent in Seoul and 98 percent in Tokyo – Will is seeking a way into China’s urban ‘cash culture’ that will serve the same purpose as wallets do in so many other places but without increasing the potential for pickpocketing.

Will also explicitly frames the project in terms of providing access to financial services to the world’s unbanked and, in particular, overcoming the problems inherent in many technological fixes which assume a relatively high degree of literacy as well as connectivity. The proposal has a range of goals, including simplicity, access, and security. It is also utopian in that it imagines ‘everyone an ATM’ and that productive, individual and communal power might be unleashed in such a world.

Will’s project is part of a family of innovations in money and payment systems that I do not have space to explore in this essay. Money, not capital, has become the focus. For some, this is because of a sense that the limits of microfinance have been reached, or that problems with the ‘bank model’ for microfinance are becoming more and more apparent. There is also an emerging focus on currency and not capital because of the regulatory roadblocks that have faced money transfers and microsavings, but not micro-credit. Those developing such systems thus downplay the potential for their new means of exchange to serve all of the classic functions of money.

Will described his project to me thus:

As you know China already has a one handed counting method, so I imagined that this could be the building block for a gestural payment. Payments would be initiated using the relevant hand-gestures, and scanned either via a camera or other device (existing technology and not a specifically designed device). For street transactions mobile phone cameras could be used, and as you know there is tracking software available that can track faces, or parts of the body, so hand gestures could feasibly be recognized. Tracking hand gesture is the idea, and using this as a means of initiating transactions in a cashless economy is what I began to question.

I started to imagine that people would have tattoos . . . so this would be scanned to open a transaction. The tattoo could be invisible or visible, but rather than carrying a physical object I felt that some type of RFID equivalent that was embedded into the body would be one method of authentication.

### **FINGER COUNTING, COMMERCE AND COSMOLOGY**

In Will's proposal, hands were being drawn into a relationship with numbers, which were being drawn into another relationship with money. While this appears to be a relationship of equivalence and straightforward representation, the situation is considerably more complicated. It also unwittingly echoes a long and potentially worldwide history of counting, commerce and cosmology. To the inheritors of the intellectual legacy of Marcel Mauss, it also may hold some potential for a 'radical phenomenology in which a performance of acquired social practices – involving kinesthetic feedback – creates forms of resistance that no inscription entirely can fix' (Noland, 2008: 22).

In English and several other European languages, digit means both finger and a number in a place-value system. While many peoples count numbers on their fingers, they do so in strikingly different ways. The Chinese finger counting system was utterly alien to me; when I asked a Chinese colleague about it, she was absolutely flummoxed that I did not count on my fingers that way. There is a tiny ethnographic literature on finger counting, mainly in Melanesia (Biersack, 1982; Mimica, 1988; see also Lancy, 1981). There is a somewhat more substantial literature on gestures and gestural language, some of which touches on numbers and counting (such as Goodwin, 2000; on gestures more generally, see McNeill, 2000; Murphy, 2003; Taub, 2005).

Finger counting has long been associated with commerce, from the pearl traders of the Indian Ocean and the Arabian Gulf, to the Chicago pit, where futures traders devised an elaborate gestural language of number and trade (on the former, Menninger, 1969: 213 and Bloom, 2002; on the latter, Zaloom, 2006 and Davidson, 1950: 5). The primary sources on dactylonomy lead to the Venerable Bede (d. 735), the English Benedictine, whose finger counting system was adopted and slightly modified by none other than Luca Pacioli, the so-called father of double-entry bookkeeping, in 1494 (see Menninger, 1969: 201–3). Bede's and Pacioli's finger counting served the purposes of calculating for and during commerce.

Finger counting has also been connected to religion and cosmology. George Collier's unpublished 'Aboriginal Sin in the Garden of Eden' shows how the digits of the hand were used as mnemonic devices for imparting Scripture to the Indians of the New World. There remain in the Mission San Antonio de Padua, located in a remote part of central California, wall paintings documenting the practice (on tracing the origins of finger

counting using ecclesiastical materials, see Marrou, 1958). Some of the cosmological principles embodied in the counting fingers in Christian Europe include the ascription of spiritual importance to the number 6 and the ring finger. Six is a so-called 'perfect' number because the sum of its divisors is equal to six (the divisors of 6 are 1, 2 and 3). The ring finger, named the *medicus* in medieval Europe because its vein was thought to run directly from the heart, was 'deemed worthy above all the others to bear the ring' and to represent the number six (Menninger, 1969: 203).

Outside Europe, finger counting appears in texts of Islamic jurisprudence having to do with the status of explanation and exposition. Dactylonomy is accorded a place among the five modes of *bayan* or 'manifestation of meaning and its elucidation' (Bernard, 1985: 629): speech, writing, gesticulation, 'the knuckles', or finger counting, and demonstrative proposition through logical proof or expression of learned interpretation (see Shehaby, 1975: 65). The delineation of modes of bayan was important in discussions over the sources of jurisprudential authority and the degree of divinity they could claim. As God is without body, and a transcendent unity, gestures and finger counting could not be divinely authored as could speech and writing. Number in this context, as always-already embodied, thus by definition could not be transcendent or abstract. Since God does not have knuckles, he cannot count (aside from his own eternal oneness, presumably).

This puts an interesting spin on the transcendence of number assumed in some areas of finance, like derivatives, the 'theological unconscious' of which inheres in the patterns of contingency activated in the Black-Scholes-Merton formula and warranted by a statistics of stochastic process suffused with theological concerns (Maurer, 2002).

It also highlights the spatiotemporality of both number and gesture. Gestural numbers do not simply refer to abstract number; and they do not 'represent' countable objects in a signifier/signified sense. Instead, they *point toward* countable objects. They are more like tally marks or tales than abstract numbers. The Chinese example is particularly interesting in that the origin of the finger counting system is not representational in a symbolic sense – each finger standing in for an object counted – but iconic: the hand is made physically to resemble the Chinese characters for the numbers.

### **GESTURE, NUMBER, BODY**

If finger counting is iconic and indexical rather than representational in the Saussurian sense, then how are we to understand its numbers? The literature on gesture languages may provide some guidance. Understanding gesture necessarily entails understanding semiotic processes not limited to Saussurian signification, like deixis and the spatiotemporal materiality of language. Murphy nicely summarizes that 'what matters' is not necessarily the assumption of a symbolic relationship between gesture and talk, but the 'material interactive setting' in which gestures take place (Murphy, 2003: 30). 'What gestures do', he writes, rather than 'what they look like', should be central to an ethnography of gestures and the description of the social and spatiotemporal contexts within which they take place (p. 30).

This seems important for the gestural currency imagined by Will, because it is founded on the principle of not being able to be separated from its intersubjective contexts: unlike a wallet, it cannot be stolen without the active participation of its owner. It can't be pickpocketed; a thief would have to motivate the gestures in his would-be

victim ('put your hands in the air . . . and start signing!'). Yet it is not inalienable, either: it can be given away, but only insofar as gestures take place in a specific sociotechnical context, and the gestures make that context as they proceed. Gestural currency would necessarily always be an intersubjective enterprise. Indeed, it may very well turn out to be the case – were Will's vision actualized – that people would both claim and at the same time resist or at least seek to protect this intersubjective aspect of gestural currency: like the pearl traders of the Indian Ocean, they might seek out ways of concealing or masking their transactions, of limiting the space of intersubjectivity warranting the currency while at the same time displaying to all that trading is going on – under a cloth or covering.

There is a lot more to be said here – on the Peircian model of semiotic processes (via Paul Kockelman's (2006) work on number, unit and utility), as well as on other anthropological efforts to think about the materiality and corporeality of number and counting. In his afterword to Jadran Mimica's study of Iqwaye counting, Roy Wagner writes:

the character of number and numerical relation can be qualitative, rather than a quantitative derivation from number theory . . . the Iqwayan mathematic . . . refers entirely to an imagery of the human body, in its physical and transformative (reproductive) character. Since the human body and its reproductive capabilities constitute the physical realization of the human mind, its *phenomenon*, so to speak, or its *image*, the Iqwayan mathematic is grounded in a concrete (I would way 'macrocosmic') imagery. (in Mimica, 1988: 163)

The numbers in Will's project have a materiality and a phenomenology. Quantities would always be the qualities of specific individuals – not everyone an ATM, but everyone *their own* ATM – connecting identity and money, and also, since gestures are made in social contexts with others, a *community* in relation to value.

Finally, I am interested in thinking about the kinds of things a gestural currency might enable you to do. What games are to be played, what forms of earmarking and sequestering? Finger counting spawned the ancient riddle with which I opened this paper. If there were a finger counting money, would people engage it in this kind of play? And if one of the effects of playing with currency today is a denaturalization of money's mystical qualities – often through a re-enchantment of money's numbers – then what would be the effects of play with finger counting money in the future? Would making money a tale not a number reground markets in a community of regard, a community economy akin to those envisioned by alternative currency proponents and discussed most vividly by Keith Hart (2007)? The equation of money and number mediated through the body, of course, has resonances with Marx on abstract labor; and yet, does 'everyone an ATM' inspire a market commerce beyond alienation?

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## Note

1 Gesture technology is a fast growing area in computing. There are several models driving the development of devices attuned to human movement, including camera-based systems and those that use accelerometers – chips that respond to movement (see Vance, 2010).

## References

- Bernard, Marie (1985) 'Hanafi usul al-fiqh through a Manuscript of al-Gassas', *Journal of the American Oriental Society* 105(4): 623–35.
- Biersack, Aletta (1982) 'The Logic of Mislplaced Concreteness: Paiela Body Counting and the Nature of the Primitive Mind', *American Anthropologist* 84(4): 811–29.
- Bloom, Jonathan M. (2002) 'Hand Sums', *Boston College Magazine*, Spring, available at [http://bcm.bc.edu/issues/spring\\_2002/ll\\_hand.html](http://bcm.bc.edu/issues/spring_2002/ll_hand.html)
- Collier, George A. (n.d.) 'Aboriginal Sin in the Garden of Eden', unpublished manuscript.
- Davidson, Levette J. (1950) 'Some Current Folk Gestures and Sign Languages', *American Speech* 25(1): 3–9.
- Elyachar, Julia (2006) *Markets of Dispossession*. Durham, NC: Duke University Press.
- Goodwin, Charles (2000) 'Gestures, Aphasia, and Interaction', in David McNeill (ed.) *Language and Gesture*, pp. 84–98. Cambridge: Cambridge University Press.
- Hart, Keith (2000) *The Memory Bank: Money in an Unequal World*. London: Profile Books.
- Hart, Keith (2007) 'Money is always Personal and Impersonal', *Anthropology Today* 23(5): 12–16.
- Kockelman, Paul (2006) 'A Semiotic Ontology of the Commodity', *Journal of Linguistic Anthropology* 16(1): 76–102.
- Lancy, David F. (1981) 'The Indigenous Mathematics Project: An Overview', *Educational Studies in Mathematics* 12: 445–53.
- Marrou, H.I. (1958) 'L'Évangile de vérité et la diffusion du comput digital dans l'antiquité', *Vigiliae Christianae* 12(2): 98–103.
- Maurer, Bill (2002) 'Repressed Futures: Financial Derivatives' Theological Unconscious', *Economy and Society* 31(1): 15–36.
- McNeill, David (ed.) (2000) *Language and Gesture*. Cambridge: Cambridge University Press.
- Menninger, Karl (1969[1958]) *Number Words and Number Symbols* (trans. Paul Bonebrake). Cambridge, MA: MIT Press.
- Mimica, Jadran (1988) *Intimations of Infinity: The Mythopoeia of the Iqwaye Counting System and Number*. Oxford: Berg.
- Murphy, Keith M. (2003) 'Building Meaning in Interaction: Rethinking Gesture Classifications', *Crossroads of Language, Interaction, and Culture* 5: 29–47.

- Noland, Carrie (2008) 'The Gesturing Body: Marcel Mauss and Bodily Techniques', unpublished manuscript.
- Rotman, Brian (1993) *Ad Infinitum: The Ghost in Turing's Machine. Taking God Out of Mathematics and Putting the Body Back In*. Stanford: Stanford University Press.
- Shehaby, Nabil (1975) 'The Influence of Stoic Logic on al-Jassas's Legal Theory', in John Emery Murdoch (ed.) *The Cultural Context of Medieval Learning*, pp. 61–86. New York: Kluwer.
- Taub, Sarah F. (2005) *Language from the Body: Iconicity and Metaphor in American Sign Language*. Cambridge: Cambridge University Press.
- Urton, Gary (1997) *The Social Life of Numbers: A Quechua Ontology of Numbers and Philosophy of Arithmetic*. Austin, TX: University of Texas Press.
- Vance, Ashlee (2010) 'Now, Electronics that Obey Hand Gestures', *The New York Times*, 11 January, available at <http://www.nytimes.com/2010/01/12/technology/personaltech/12gesture.html>
- Zaloom, Caitlin (2006) *Out of the Pits: Traders and Technology from Chicago to London*. Chicago: University of Chicago Press.

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