

2005). Laboratory rats even hoard blocks of wood. That is, adaptive behaviour is not always functional. Indeed, evolution could hardly work without useless activities becoming functional in new ecologies. A hoard of flints knapped by hominids (Wynn 2002) need not be evidence of an instinct for armouries among survivors of battles between groups; the collecting instinct could have run free in makers of axes for butchering or hunting.

Thus, adaptive capacities for hoarding could account for accumulation of coins. The gold or silver need not be felt to be beautiful to look at or delightful to touch (as reductionism disposes L&W to suggest). The miser may simply be scrabbling through his hoard. The cop-out of invoking play is unnecessary, gambling is not analogous and it is unhelpful to relate drug addiction to obsessive-compulsive disorder (Grisham & Barlow 2005).

Hoarding needs no coins (nor money-processing chips, as L&W revealingly invoke twice), nor marks on a screen or in a ledger; the miser can go through his fortune in his head. Some people find entertainment in mining caches of data. Selfishness or incompetence about potential for knowledge from one's own database is a serious problem in the information industry (Lai et al. 2005).

Just credit information can be "a functionless motivator," although the strength of a delight in money as such is likely to come from its use to acquire immediate or delayed access to goods and services. It adds nothing to claim that money activates the brain's bump for collecting (or the cultural role of a collector). Like any mental processes, thoughts and feelings about money activate neural pathways and also pathways through the economy when overt in social activity. Hence, locating critical brain areas for people's normal or abnormal collecting of useless objects (Anderson et al. 2005) in no way substantiates the "metaphor" of a drug; it merely provides a starting point for characterizing the cellular expression of genes for the instinctual capacities that develop into accumulation of resources – or of junk. The irreducibly social system of an economy is also necessary for the hoarded resource to be the tool for collecting any purchasable resource.

So why do L&W start with the idea of a psychoactive drug's mimicry of neurotransmitters at receptors in the brain and then stepwise empty it of all content, even metaphorical? The only necessity is if money's power has to be physical, in cause and in effect. Psychoactive drugs are substances that alter ion movements at synapses. What L&W call "sensory drugs" are material stimuli to sensory receptors of the rare sort that elicit greater and greater reactions as the stimulation becomes extremely strong. This monotonic relationship is peculiar to unlearned reflexes however; liking for sweetness becomes contextualised socially or nutritiously to the particular level familiar in a food or drink, for rats (Booth et al. 1972) as well as for people (Booth et al. 1983; Conner et al. 1988). Furthermore, this may be the only piece of appetitive behaviour that is innate in human beings. (The baby-like rounded profile does not elicit particular movements.) The game is up when the only example of a "cognitive drug" (the metaphor for money) is pornographic pictures and text. Contrary to L&W, there is little or no evidence in human beings for innate sexual arousal at the sight of the real thing: the power of pictorial erotica results from acculturation, not genetically programmed wiring between inferotemporal cortex and autonomic efferents to the genitalia. The clincher is textual erotica, and indeed spoken words: linguistic capacities may be instinctive but not English or French verbiage, about sex or food.

Sexy sights or sounds are not "illusory" either. What's missing when they are bought rather than freely offered, in the flesh or just by photo or phone, is the other person. Even intense sweeteners are not illusions: their sweetness conveys what the consumer wants them for (Freeman et al. 1993). Similarly, it is not an illusory quality of money that makes monetary gifts "socially awkward," nor is it a trade instinct somehow separate from reciprocal altruism. A gift is expected to be attractive to the particular

recipient: resorting to money instead of a personally appropriate object shows lack of empathy, which is poor acculturation of the biological capacity for altruism.

In summary, the capacity to develop the cooperative or individual activity of collecting items for their own sake is likely to have selective advantage in ecologies where resources are much more limited at some times than at others. In a species with much nonmaterial culture and activity, resources hoarded to no extrinsic purpose can include artefacts of society that are also nonmaterial, such as a balance at the bank that others only dream of. Money may derive all its attractions from services and goods it buys. Then (contrary to L&W) money can fulfill the hoarding instinct in biosocial cognitive actuality – no illusion and not dependent on brains that can use coins as neurotransmitters.

Hoarding behavior: A better evolutionary account of money psychology?

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Abstract: The target article authors have been drawn into two metaphoric models of attitudes toward money that have prevented them from developing a convincing evolutionary theory able to account for the various behaviors they list and categorize as either tool-type or drug-type. Instead, hoarding could provide an evolutionary model that is better supported by behavioral and neurological evidence and could account for the whole range of behaviors they review. Moreover, the authors' focus on money as the common denominator of these behaviors brings an ideological bias to their inquiry.

Metaphors play an important role in scientific heuristics. The spontaneous or systematic identification of common properties across distinct categories of objects and the transfer of models across phenomenal modalities may indeed reveal essential similarities that were not obvious in the first place. This is often the first step toward the construction of a hypothesis which may eventually lead to a scientific theory that explains a set of previously unrelated observations as resulting from the same general laws. Metaphors are nevertheless double-edged because there is always a risk that they trap the imagination of scientists and preclude further advances. Niels Bohr's planetary model of the atom provides an example of this phenomenon. Lea & Webley (L&W) select two metaphors among the many that may bear upon money in contemporary Western cultures. Mindful of the limits involved in the heuristic use of metaphors, they nevertheless embrace drug and tool as the most likely to provide insights into the biological significance of the behavior of contemporary humans toward money. The case they make is persuasive, but in the rhetorical rather than scientific sense, as it is difficult to see how their dual theory could be falsified. Of course, as topologist René Thom used to say, a metaphor cannot be false. But the point is: how much trust can we place in such intuitions and for which purpose? All that glitters is not gold. At best, the authors' two root metaphors can help classify the other metaphors which have been propounded in the past to explain money-oriented behaviors.

It is surprising that L&W have not taken into consideration hoarding behavior, also called collecting behavior, as a possible evolutionary ground to account for the various forms of attitudes toward money that they review. From the beginning of modern psychology, hoarding has been considered a human "instinct" (e.g., James 1890, Ch. 24); and the continuum between this self-preservation strategy and the behavior of many animals (mammals, birds, and insects) that hoard food or collect

nonfood items that may be displayed in courtship is well documented (e.g., male bower birds). The adaptive value of storing nonperishable food in caches when seasonal variations bring scarcity is obvious (e.g., Sherry 1985; Smith & Reichman 1984). Likewise, the adaptive value of demonstrating fitness by flaunting collections of nonfood items can be construed as a behavioral “handicap,” in the evolutionary sense of the term (Zahavi & Zahavi 1997), similar to phenotypic features such as oversized feathers or other conspicuous and costly ornamental appendages. In archaeology, hoarding is also considered to be an expected behavior in past cultures at least from the Neolithic on (Hamon & Quilliec 2005). However, hoarding behavior appears in L&W’s article only marginally in association with the term “miser,” perhaps because it has come to designate in contemporary psychology a behavioral dysfunction, usually associated with cluttering, and often connected with senescence. But this is a recent semantic change particular to clinical psychology. As noted above, it has kept its functional value as an adaptive strategy in other fields of inquiry.

Anderson et al. (2005) offer a neurologically based model of hoarding behavior that could explain more economically within a single evolutionary theory the two types of behaviors toward money contrastively described by L&W in the target article. Anderson et al.’s investigation of patients with mesial prefrontal lesions who show compulsive collecting behavior suggests that the drive to collect and hoard, which “primarily originates from subcortical bioregulatory nuclei” (p. 208) (i.e., limbic subcortical and mesolimbic cortical structures), is modulated by self-regulatory functions associated with mesial prefrontal regions. Anderson et al. tentatively submit that “the drive to collect would be assisted in part by a weighting system, whereby the neural representation of a stimulus item would be associated with a particular signal value, which would serve as an index of the relative worth of the stimulus” (p. 208). This is all the more relevant to the case of money attitudes in that it does not appear that “the targets of acquisition behavior are specified at a genomic level” (p. 207).

In view of such evidence and plausible assumptions, it is possible to formulate a hypothesis: Natural selection both favored (1) a drive to collect and hoard a broad range of items, as this behavior enhances self-preservation and reproductive fitness; and (2) an inhibitory system that monitors the process and decides when this drive runs the risk of reaching a maladaptive threshold either by overloading the carrying capacities of the organism at the expense of other vital functions, or by collecting and hoarding indiscriminately. The latter could be explained by the fact that the properties of the stimuli should not be too narrowly specified, since excessive specialization would not be adaptive with respect to changing environments. It can also be expected that, if both behaviors are indeed genetically controlled, it will ensue that there will be variations among individuals in congruence with the emerging structural variation theory of the human genome (Check 2005). Therefore, it is not necessary to hypothesize a maladaptive addictive model (the drug metaphor), but simply natural variations and occasional dysfunctions that cause a more or less drastic disinhibition of the hoarding drive. As frontal cortical functions are associated with cognitive competences, such as the representation of the context and the comparative evaluation of stimuli, it is natural that they would appear to constitute the rational norm that is captured by the tool metaphor. From this point of view, money would not be a specific object but a mere cultural index for resources, and the intellectual conundrum created by the discrepancy of the two attitudes identified by L&W would result from the incompatibility between the two root metaphors rather than from the attitudes to which they refer.

But there is more. By using the abstract notion of money as the common denominator of all the forms of behavior they take into consideration, L&W operate a conceptual reduction by creating a kind of epistemological commodity that tends to erase all

cultural, ideological, and socio-economical differences. Thus, they remain within the universalist discourse of the political economy that regulates contemporary globalization, construing capital as a tool to generate profit but ignoring the immediacy of salaries (or food coupons) as a scarce index of threatened livelihood. Hence, their surprising notion of money as a “functionless motivator” (sect. 2.2.2) that can “mimic... natural incentives” (see Abstract, sects. 2.4, 5.1) – a case that may perhaps apply to Monopoly type of games or extreme financial speculations, but not to everyday experiences in the greater part of the world.

By shifting the focus toward the evolution of the behaviors concerned and their neurological substrates (which could not have evolved with respect to the too-recent institution of money), the hoarding model seems to be more apt for explaining in evolutionary terms, and more economically, the range of behaviors L&W address in their article. Confronted with this somewhat baroque, two-headed theory, one cannot help thinking that the authors could have made a better use of Occam’s razor.

Money, play, and instincts

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Abstract: The metaphor drug model of money slights the possibility that money may literally tap into and exploit brain systems underlying motivational systems, and it also ignores growing evidence on the common neural substrates of behavioral and “physiological” addictions. Additionally, many objects other than money can gain such drug-like properties. The treatment of play in the evolutionary explanation for the unique role of money in people ignores key conceptual and empirical issues.

One of my professors at the University of Chicago back in the 1960s, the brilliant David Bakan, was very pleased with his definition of money as “a medium of exchange accepted by strangers.” Lea & Webley (L&W) realize, however, that money does not just have an instrumental or tool function; there are constraints on its use. They point out that money is not considered an appropriate gift in some contexts (though, of course, that is also true of any other object). L&W invoke money as a drug, mimicking human instincts, to deal with all those aspects of money that their “tool theory” cannot accommodate. They argue that money readily comes to act as a motivator similar to biologically based instinctive drives.

Skinner and his followers viewed money as the ultimate generalized reinforcer developed through instrumental (tool) conditioning. That the ultimate bedrock of even the most artificial and arbitrary training regimes for rats, pigeons, and people was access to primary or secondary reinforcers (or “drives”) was assumed as obvious, though uninteresting and not in need of an evolutionary explanation beyond the connections made in Skinner (1966). Now we find out that the operant approach was based on money (tokens) as drugs. I rather thought that token economies, when instituted in mental hospitals, were means to wean people from unproductive, destructive, incompetent, impulsive, compulsive, or self-injurious (e.g., drug-like) behaviors we now know to be largely due to malfunctioning neurotransmitters resulting from genetic and developmental events. Are we now to consider token economies as just another drug therapy, a trading of one addiction for another?

Although L&W make much of the fact that money developed late in human history, automobiles appeared even more recently. Like David Bakan, my major professor at Chicago, Eckhard Hess, was also very pleased with one of his definitions: an automobile is merely a means to get from point A to point B safely