spontaneity of the heart's atrioventricular node, which ordinarily, but not always, remains subordinate to the sinus node, as a model instance of the much more general phenomenon of subsystem spontaneity and semi-autonomy (Lorenz 1966, p. 86). These ideas about subsystem spontaneity also seem related to William James's argument that "Man has more instincts than any other mammal" (James 1890, pp. iv–v, 383–441).

Whether the spontaneous "motion" of a subsystem is generated internally or by the "chaos" of its surroundings, the principle of natural selection implies that when the subsystem encounters an opportunity in its environment, it may exploit that opportunity, and will then persist in its new form or behavior, so long as any costs or risks of its new functionality provide a net increase in its "inclusive fitness," or longer-term probability of survival in itself or the copies it generates. Taking a few steps back from such individual cases to better conceptualize "the forest" over and beyond its individual swaying "trees," we can envision the larger ecology of a living environment comprising autonomously "entified" loosely coupled components and features of components. All of these are engaged in the same general game of seeking new opportunities for exploitation of each other or for mutualism. In human social systems such ferment is extremely rich because our exquisitely developed abilities to learn, remember, and imitate make it particularly easy for a feature to decouple from its host entity and jump to a new vector. In other cases, instead of such decomposition and recomposition, an entity or feature of an entity simply accumulates additional functions, thereby achieving greater and greater robustness. In much of their argument for "money as a drug" I think this is what L&W are getting at.

NOTE

1. I thank the fourteen undergraduates in my Psychology 325 class ("Persuasion and truth in sales communications") for their enlivening discussion of the L&W target article during our September 26, 2005 evening meeting.

Keeping up with the Joneses: The Desire of the Desire for money

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Abstract: The biological basis of money lies in a three-term relationship between one subject and some others, with money acting as a mediator. The drive to acquire money is a special case of a desire for recognition. What is aimed at by subjects is their desire for the desire of some others: the former derive satisfaction from representing to themselves the admiration, or envy, of these others. This raises reproductive advantage.

The object of Lea & Webley's (L&W's) inquiry is to find a "biological basis" for money, meaning a basis reducible to a Darwinian trait such as reproductive advantage. Both their "tool" and "drug" approaches refer to a two-term relationship where a subject experiences cognitive and emotional states linked to a representation centred on money. The most obvious instance of this, which the authors unfortunately fail to mention, is sustenance. For anyone below the poverty level, cash remains foremost the means to the essential end of subsistence. The "biological basis" of money needs therefore to be understood in the authors' analysis as meaning "when cash as a tool for straightforward biological survival has been discounted." Examples of such a two-term relationship would then be those of Harpagon, Molière's *Miser*, clinging to his cherished casket, or Uncle Scrooge, diving and tunnelling through gold coins and hundred-dollar bills in his pool-designed vault. In such cases, cash has been "fetishized," adulated as such, as a symbol of wealth.

One can talk of a "biological" response to gold because of its shininess and hue, and its feature of being rust-proof, leading to its universally evidenced function as a symbol for immortality. Paper banknotes and coins of vile metal are of a different nature and their link to riches is conventional; in financial parlance, their nature is "fiduciary," requiring an act of trust that a central bank will honour cash of this sort, guaranteeing it will maintain it in its role of a universal equivalent of worth. L&W mention times (such as in the aftermath of the American Civil War) when convertibility of cash into precious metal gets suspended. When this happens, precious metal is restored in its role of a depository of value, confirming that money as such might very well be – as the authors hint – an entirely cultural phenomenon, impossible to analyze profitably within any alternative framework.

Analyzing money as a cultural phenomenon, beyond immediate survival concerns, does not preclude tracing it back to its "biological basis." It requires, however, an extension from a two-term relationship between a subject and money to a three-term relationship between one subject and at least one other, with money acting as a mediator between the two. In the two-term model, a subject holds a representation of money (as with cash as a "fetish"); in the three-term model, a subject owning money holds a representation of another subject's representation of him/herself owning that cash.

The three-term nature of money is best illustrated in a "Keeping up with the Joneses" example: Let's buy a 70″ flat screen TV because the Joneses own a 50″! The drive behind the purchase is not improved viewing (only a secondary benefit here) but competition: the satisfaction obtained derives from representing to oneself the Joneses' envious state of mind. By out-competing them we've made ourselves the centre of their own attention: their attention has been captured by us; they are, literally speaking, *captivated*. Money is used as a *tool* to achieve this effect and its *drug*-like quality lies in the altered state of consciousness we reach when subordinating some other subjects' attention to our persons, meaning that we've altered at the same time their own mindsets.

L&W say of their tool/drug dichotomy that "the two theories seem to exhaust the range of possibilities between them" (sect. 2.3, para. 1). This is correct but, as we've just seen, not in the simple "either/or" way they imply: the complexity of the relationship requires a more sophisticated model combining both tool and drug within a three-term model. In that perspective, the drive to acquire money amounts to a special case of a desire for recognition. A psychological theory of recognition has been proposed before; its source lies in philosophy where it was initially formulated by G. W. F. Hegel as the "desire of desire" – that is, my desire for another's desire, either of an object or, in the case of love, of my own person (Hegel 1807/1949, pp. 225–27; Roth 1988, p. 97). The theory was further developed in the twentieth century by Alexandre Kojève (Kojève 1969, pp. 6–7; Roth 1988, pp. 97–99), then given a psychiatric/psychoanalytical formulation by Jacques Lacan (Wilden 1968, pp. 83–85, 192–96). In Lacan's interpretation, the "desire of desire" becomes the linchpin of a theory of the Self where the sole foundation for my own Self – my proper identity – is the attention other subjects are paying to me, that is, it is constituted of my own capacity for captivating others. What constitutes the subjects' Self is therefore not internal to them but distributed among a network of other subjects, although centred on them.

When applied specifically to money, the "desire of desire" model means that what is aimed at by subjects through their possession of money is their desire for the desire of some others: the satisfaction they derive from representing to themselves the admiration or the envy of others. The theory is instrumental (it has a "tool" quality), in that money is in truth sought after to obtain something, but that something is not of a material nature: it is the altered state of consciousness achieved (hence the "drug" quality) through captivating the attention of a number of other subjects. One example presented by the

authors, that of playground exchanges of toys, confirms a desire of desire interpretation much more convincingly than it does a "trading instinct" hypothesis of a drug-like nature, as it is the simple fact that another child holds an object that makes it desirable for a second one.

As for the Darwinian fitness advantage that money confers, subjects who are admired extend the range of their potential partners, gaining access in particular to those who are themselves objects of admiration. The overall benefit of admiration is fitness or reproductive advantage. Cash is a universal tool to this aim. In other words, the psychological function of money turns out to be precisely what the popular press assumes it to be.

Operant contingencies and "near-money"

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Abstract: We make two major comments. First, negative reinforcement contingencies may generate some apparent "drug-like" aspects of money motivation, and the operant account, properly construed, is both a tool and drug theory. Second, according to Lea & Webley (L&W), one might expect that "near-money," such as frequent-flyer miles, should have a stronger drug and a weaker tool aspect than regular money. Available evidence agrees with this prediction.

Lea & Webley (L&W) describe an interesting and provocative framework for the analysis of money-related behaviour. Their goal is to provide a biological account of money motivation, and they claim that, if their attempt fails, the alternative would be a purely cultural explanation. But they overlook the role of conditioning and learning processes that operate within an individual's lifetime. An operant theory of money, properly construed, may be difficult to distinguish from L&W's drug/tool theory, although money-related behaviour is so varied and complex that all three levels – biological, individual learning, and cultural – are probably necessary for a full understanding.

In their discussion of the operant theory, L&W do not mention the role of negative reinforcement or avoidance contingencies. It is well known that avoidance responding is highly resistant to extinction; dogs that learn to jump over a hurdle in a shuttlebox to avoid an electric shock continue to respond vigorously long after the shocks have been discontinued (Solomon et al. 1953). Neo-liberal economic reforms that create "incentives" to work by reducing social welfare expenditure can be viewed, at least in part, as massive avoidance contingencies. Thus, it is possible that some apparent "drug-like" effects of money, such as workaholism, reflect the resistance to extinction of responding maintained by negative reinforcement. Although the aversive event – joblessness, poverty – may never be experienced, the workaholic individual, like the unfortunate dogs in Solomon et al.'s experiment, lives in fear of an unhappy future.

According to L&W, traditional operant theory, based on the idea that money functions as a conditioned reinforcer, is a "pure Drug Theory" (target article, sect. 3.2.2). But it has long been recognized that stimuli that function as conditioned reinforcers have discriminative as well as reinforcing (i.e., hedonic) properties (Rachlin 1976). For example, a keylight that signals transition from a lower- to a higher-valued situation in terms of reward rate comes to act as a conditioned reinforcer for pigeons (i.e., discriminative function; Baum 1974a). And recent research has found that single dopamine neurons show a spike in activation following the onset of a stimulus that predicts subsequent reward that is similar to the spike following the reward itself. This phenomenon provides neurophysiological support for the traditional view, dating back at least to Pavlov (1927), that conditioned stimuli have hedonic value (Fiorillo et al. 2003; see Schultz [2004] for review). Therefore, the operant account is not easily categorized as either a tool or drug theory, because it combines aspects of both. Moreover, because the tool/drug distinction is closely analogous to that between the discriminative and hedonic properties of conditioned reinforcers, ultimately it may be difficult to distinguish L&W's account from the operant theory.

Nevertheless, we outline one approach to testing L&W's theory, and show that some existing data are consistent with it. We are not attempting to distinguish their account from the operant theory, but rather to test the idea that money has both tool and drug properties.

Money is understood to resemble a drug with "the idea of a drug as a deceiver" (sect. 2.2.4). The implication is that, insofar as money operates as a drug rather than a tool for a particular individual or in a particular situation, it will be overvalued, in the same way that, for example, the taste of saccharin promises a food value that it does not actually have (sects. 2.2.2, 5.2). Misers can be thought to fall victim to this deception (sect. 4.10); however, as a general test of the theory, misers are unsatisfactory since their behaviour is counterbalanced by that of spendthrifts, who, in the eyes of most of us, do not attach sufficient value to money. Is there any phenomenon that suggests that the average person might generally overvalue money?

One approach is to examine the way that people value "near-money" (the phrase is from Lea et al. 1987, p. 328). Near-money, like primitive money, is a currency that can be used to buy a limited variety of services. One prominent example of near-money in Western societies is frequent-flyer miles. Frequent-flyer miles have many of the attributes of money and, indeed, airlines often set up "accounts" for their customers. We suggest that, in terms of L&W's theory, frequent flyer schemes are set up so as to retain as much as possible of the drug nature of money, while having rather little (although still some) of its tool nature. Given this assumption, we would expect to find even more overvaluation of a near-money such as frequent-flyer miles than of regular money. Or, alternatively, because of this greater drug component, near-money should be overvalued relative to regular money.

This possibility has not been rigorously researched, but two recent studies have produced results suggesting it might be true. Liston-Heyes (2002) found that respondents in the United Kingdom were willing to pay more for 100 air miles (about 23 pound sterling) than the air miles were apparently worth (around 7 to 12 pound sterling). Kemp (2005) found New Zealand respondents were willing to pay a median NZ $50 for 1,000 Air New Zealand frequent-flyer points. Estimates of the real cost of these were NZ $12.50 (based on cheap ticket cost) and NZ $3.61 (Air New Zealand company estimate of the marginal cost). Moreover, members of frequent-flyer programs were willing to pay more than non-members (median = $20), as might be predicted from the drug theory.

Thus, at least one independent test of L&W's tool/drug theory seems to support it.

Show me the status: Money as a kind of currency

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Abstract: Currencies that are recognized as money cannot be easily distinguished from alternative currencies such as status. Numerous examples demonstrate the need for status to be recognized as a motivator alongside, at least, money. Lea & Webley (L&W) acknowledge the roles of status; however, a closer focus is warranted.