

previous behaviour; children have been shown to avoid helping individuals who have demonstrated negative intentions, across a variety of contexts (Dunfield & Kuhlmeier 2010; Vaish et al. 2010). Taken together, recent research supports the idea that, under certain circumstances (e.g., instrumental need as opposed to material desire), early prosocial behaviours conform to the predictions of the presented mutualistic approach to morality. Moreover, it suggests an important role for future research in clarifying the particular task demands that affect the production of nuanced moral acts in early development.

In sum, the target article presents an exciting new approach to understanding the proximate and ultimate explanations for human morality. We believe that an integration of recent research in the area of social cognitive development both supports and enriches the understanding of “morality as an adaptation to an environment in which individuals were in competition to be chosen and recruited in mutually advantageous cooperative interactions” (target article, Abstract). Indeed, by considering the full breadth of human other-oriented behaviours, we can find support for the proposed mechanisms in the earliest instances of children’s moral behaviour and gain better insight into the evolution, maintenance, and production of these unique human tendencies.

Baumard et al.’s moral markets lack market dynamics

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Abstract: Market models are indeed indispensable to understanding the evolution of cooperation and its emotional substrates. Unfortunately, Baumard et al. eschew market thinking in stressing the supposed invariance of moral/cooperative behavior across circumstances. To the contrary, humans display contingent morality/cooperation, and these shifts are best accounted for by market models of partner choice for mutually beneficial collaboration.

We applaud the conceptual clarity that Baumard et al. bring to the subject of cooperation, and endorse their focus on mutualism – as opposed to both true altruism and reciprocity – as a form of cooperation likely favored under a wide range of evolutionary scenarios. Moreover, the authors’ model of a market for mutualistic cooperators driven by partner choice provides a plausible account of the evolution of mental mechanisms that generate, and act on, concepts of fairness. However, they do not carry the premises of their market model to their logical conclusions. Baumard et al. endorse and build on prior positions that hold that selection has favored a moral compass that leads individuals to “do the right thing” in a relatively invariant fashion. Such invariance was ostensibly selected for because an inflexible moral compass is thought to preclude both erroneously trading the larger long-term gains of mutualism for the smaller short-term gains of defection, and erroneously underestimating the likelihood of getting caught in the act. Baumard et al. bolster prior arguments to this effect by stating that people are fairly accurate when inferring others’ intentions in situations involving such temptations, and hence that the odds are stacked against cost-free defection. While we share with Baumard et al. a market model of mutualism, we challenge the notion of an invariant moral compass on both empirical and theoretical grounds.

Empirically, we submit that, with the exception of the (infrequent) types occupying the respective tails of the moral

distribution (psychopaths and saints, respectively), most people appear somewhat flexible in their moral behavior in general, and in their mutualistic behavior in particular. True, many people behave in what is locally construed as a moral manner much of the time, but this is not the same as being invariantly moral or invariantly fair. Moreover, it is not simply the case that people engage in some fixed level of moral behavior most of the time, and occasionally fall below this level, as might be expected if an evolved moral compass were merely imperfect due to constraints on optimality. Rather, most people are plastic in both directions. Inspired by others’ virtuous acts, people episodically rise above their baseline levels of prosociality (Haidt 2000; 2003; Schnall et al. 2010). Likewise, rendered cynical by others’ self-interested behavior, people episodically fall below their baseline levels of prosociality (see Keizer et al. 2008; Raihani & Hart 2010).

From a theoretical perspective, the situational plasticity of individual moral behavior is not surprising – indeed, we contend that it is *exactly* what is predicted by market models of partner choice for mutualism. As Baumard et al.’s own analogies with biological markets indicate, the behavior of individual actors in a market reflects the effects of supply and demand on pricing. Consider first the simplest case, in which all mutualism is dyadic, and cooperativeness is a binary trait. Here, market dynamics do not operate, as all (or virtually all) prospective cooperators eventually find partners. However, if prospective partners vary in quality, then market dynamics arise: Vying to pair with the best partners, prospective cooperators will escalate their prosociality in order to compete with their rivals for limited slots. This situation is exacerbated if some or all of the most profitable mutualisms involve groups of actors rather than dyads, as this means that large numbers of unattached actors can accumulate (rather than simply pairing off, as occurs under dyadic scenarios). When the supply of prospective cooperators is greater than the number of open slots in cooperative ventures, the prospective cooperators can be expected to advertise that they have lowered their expected wages by displaying a willingness to engage in more costly prosocial behavior. Conversely, when the supply of prospective cooperators is lower than the number of open slots in cooperative ventures, the prospective cooperators can be expected to display a reduced willingness to engage in costly prosociality. Following Fessler and Haley (2003), we argue that such facultative adjustment of prosocial inclinations is mediated by genuine moral emotions, themselves the products of adaptations that evolved to regulate behavior in exactly this market context. When individuals are surrounded by prosocial actors, they are genuinely motivated to “match others’ bids,” while the converse is true when they find themselves surrounded by self-interested others. The result is that there are multiple stable equilibria with regard to prevailing levels of cooperation, a pattern evident even on relatively small geographical scales (e.g., Wilson et al. 2009). While some such heterogeneity is undoubtedly due to self-selection of the type described by Baumard et al. in their discussion of mobility in small-scale societies, we argue that much of this heterogeneity reflects the fundamental plasticity of people’s moral inclinations – the same actor will feel and behave differently in different social contexts.

In keeping with the above perspective, we also take issue with Baumard et al.’s position that there has been little selection for psychological mechanisms that motivate altruistic punishment aimed at deterrence. Because it is impossible to forecast others’ behavior with complete accuracy, and because the moral compass is not invariant, cooperative groups benefit from policing both in the short term and over the long term as deterrent effects accrue. As punishment constitutes a public good for such groups, advertising one’s willingness to punish norm violators makes the actor more attractive as a prospective partner (Fessler & Haley 2003). As in the case of escalating feedback loops of prosociality motivated by genuine emotions, this can lead to bid-matching behavior wherein one actor expresses moral outrage at a norm

violation, leading other actors to express similar – or higher – levels of outrage.

In sum, market models of morality are indeed powerful – more powerful even than Baumard et al. recognize, for such models can not only explain the evolution of mutualistic cooperation and the emotions that support it, but, importantly, they can also explain the vicissitudes of morality both within and between individuals, groups, and societies.

More to morality than mutualism: Consistent contributors exist and they can inspire costly generosity in others

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Abstract: Studies of economic decision-making have revealed the existence of consistent contributors, who always make contributions to the collective good. It is difficult to understand such behavior in terms of mutualistic motives. Furthermore, consistent contributors can elicit apparently altruistic behavior from others. Therefore, although mutualistic motives are likely an important contributor to moral action, there is more to morality than mutualism.

We applaud the effort of Baumard et al. to move beyond the question of *whether* people cooperate (they do, often) to examine *why* people cooperate. We do not dispute their arguments that cooperation sometimes stems from either selfish or fairness motives. Nevertheless, studies of economic decision-making reveal phenomena that are not easily understood in terms of the mutualism framework's notion that interactants aim to "share the costs and benefits of cooperation equally" (target article, Abstract), behaving "*as if* they had passed a contract" (sect. 3.2.2, para. 1, italics in original).

Particularly problematic is the existence of *consistent contributors* (CCs; Weber & Murnighan 2008). CCs are individuals who *always* contribute to the group in the context of a Public Goods Game (PGG), regardless of others' behavior. CCs have been shown to emerge in non-trivial numbers in economic games. Because their generosity is not dependent on cooperation by others, they place themselves at great of risk incurring more costs and deriving fewer benefits than others in their group. If CCs were motivated by fairness, one would expect that over time they would reduce their contributions to match those of others. Yet, they do not. Thus, their existence poses a problem for Baumard et al.'s argument that fairness considerations dominate in environments that afford cooperative opportunities. CCs do not give the impression that they have passed a contract with the other parties. It would be a strange contract indeed that stipulates: "I will contribute to the group regardless of what you do."

Importantly, CCs can increase cooperation by others (Weber & Murnighan 2008). Recent research in our labs supports a dynamic "person X situation" model of how this happens (Packer & Gill 2011). According to our model, individual differences in moral values interact with the situationally triggered salience of moral concerns to guide cognition and behavior. A key facet of our model is the notion that people can approach a decision-making task in distinct mindsets (e.g., Tetlock 2002): For example, a *moral mind-set* in which they focus on *what is the morally correct choice*, or a *pragmatic mind-set* in which they focus on *what are the practical costs and benefits of each choice* (Van

Bavel et al. 2012). We suggest that, perhaps because costly generosity epitomizes lay conceptions of moral action (Olivola & Shafir, in press), CCs activate a moral mind-set in participants. Once this mind-set is activated, cognition and decision-making are guided by the individual's moral values, and thus those with strong altruistic values show a robust pattern of cooperation.

We have tested this model using a PGG in which human participants interact with computer-simulated players. Results support our model, such that the presence of a CC increases cooperation *only* among individuals with preexisting altruistic moral values. Interestingly, such individuals are *not* more cooperative than others in the absence of a CC (despite the fact that overall rates of cooperation are held constant across CC and non-CC conditions). Ongoing work is exploring the motivational basis of the cooperation elicited by CCs. Preliminary evidence suggests that the motives might be altruistic rather than fairness-based. In particular, CCs increase cooperation among those with altruistic values *even when other group members continue to defect with regularity*. Thus, those with altruistic values, like the CCs who activate those values, end up bearing more costs and deriving fewer benefits than those who continue to defect. This raises questions about whether their behavior can be understood in terms of mutualistic concerns.

Consistent contributors and their tendency to elicit cooperation from (at least some) others suggests that a general disposition to cooperate can evolve. Baumard et al. propose a two-step model for the evolution of morality in environments where people can choose their interaction partners: A selfishly motivated and calculative reciprocity first emerges, which is subsequently replaced by a "disposition to be intrinsically motivated to be fair" (sect. 2.2.1, para. 12). Importantly, even if one fully accepts this model, when a sufficient proportion of a population reaches the second step, it may set the stage for a third in which a more general or altruistic disposition to cooperate can evolve. Among a population concerned about fairness, a mutant who consistently cooperates is less likely to be exploited, but instead can trigger increased cooperation. That is, an evolved disposition to cooperate fairly creates an environment within which a more general disposition to cooperate may be adaptive. Indeed, to the extent that consistently contributing individuals are popular choices as interaction partners, a selection pressure in favor of consistent contribution might emerge. Following the authors' reasoning, the more genuine this disposition, the better; hence, we would suggest that a true preference for sharing resources with others is likely to evolve among some members of the population.

Although their motivation is substantially altruistic (i.e., they are willing to bear more costs and derive fewer benefits than others), we suspect that individuals with a general or altruistic disposition to cooperate are likely to exhibit some behaviors that are consistent with the mutualistic framework. First, we hypothesize that although these individuals often tend to cooperate regardless of others' decisions during specific interactions, they are still likely to pay close attention to others' responses and choose to interact with people they trust to respond fairly or altruistically. Second, these individuals are also likely to be sensitive to cooperative environmental affordances; that is, they may tend to cooperate only in contexts where cooperation is possible (e.g., contributions have a reasonable chance of being reciprocated) and likely to increase benefits. Weber and Murnighan (2008) observed this type of strategic cooperation, such that rates of consistent contribution in a PGG increased as the potential payoffs for cooperating increased (although there were still a non-trivial number of consistent contributors when potential payoffs were low).

To sum up, consistent contributors exist, and it is difficult to understand their behavior in terms of mutualistic motives. Further, consistent contributors often elicit cooperation from others, and that elicited cooperation might also have an altruistic basis. We would, therefore, suggest that Baumard et al.'s mutualism framework is a very useful but not complete approach to human morality.