violations. For moral violations involving the infringement of other persons' rights (e.g., a person stealing a purse from a blind person or a drunk man beating his wife), anger was the most associated emotion. In line with these results, studies with economic games reveal anger and irritation to be the most reported emotions when a cooperation norm is broken (Reuben & van Winden 2008).

These observations spell trouble for mutualistic anthropology, for it is hard to understand why breaches of morality and cooperation tend mainly to elicit a punitive emotion if morality evolved mainly through partner choice and not through partner control and the enforcement of social norms by punishment. Nevertheless, Baumard et al. succeeded in making room for punishment in their mutualistic anthropology: punishment, they say, is about restoring fairness. Thus, mutualistic anthropology can explain the role of anger in our moral life by making the hypothesis that anger, in its moral manifestations, has evolved to motivate us to restore fairness.

This hypothesis also leads to precise predictions: If anger is really about motivating us to restore fairness, then anger should be more concerned with the consequences of an action (i.e., whether someone's rights were infringed), than about the mental states of the agent (i.e., whether he wronged his victim accidentally or on purpose). But, once again, this prediction is at odds with empirical results. First, punishment does not vary uniquely according to the consequences of one's action and the magnitude of the wrong: though it is sensitive to consequences, it is also sensible to the agent's intentions (Cushman 2008; Cushman et al. 2009; Falk et al. 2003). This is consistent with most legal systems, in which punishment varies not only according to the *actus reus* (what the agent did), but also according to the *mens rea* (what the agent's intentions were). If punishment is driven by anger-related emotion, then it is plausible that anger is sensible not only to consequences, but also to the agent's intention.

Additional support for this inference can be found in Darley and Pittman (2003): while keeping consequences constant, they varied the agent's intentions and found that the sentiment of "moral outrage" varied with the agent's intention. Finally, using a similar method (Cova 2012), we gave participants scenarios that vary along two factors: intention (the agent had the intention to harm someone or not) and consequences (the action had bad consequences or not). We found that the agent's intention, but not consequences, had a significant impact on the anger people felt towards the agent. In fact, participants reported more anger (and desire to punish) about an ill-intentioned agent whose action had no consequences than about a well-intentioned agent whose action had terrible consequences. This strongly suggests that anger is more concerned with the agent's mental states than with the wrong he actually inflicted, whereas the mutualistic view of anger should predict the contrary.

To sum up, anger and anger-related emotions play a crucial role in our moral lives. The fact that these emotions are about retaliation and inflicting punishment suggests that punishment might have played a greater role in our evolutionary past than the one suggested by mutualistic anthropology.

Does market competition explain fairness?

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Abstract: The target article by Baumard et al. uses their previous model of bargaining with outside options to explain fairness and other features of human sociality. This theory implies that fairness judgments are determined by supply and demand but humans often perceive prices (divisions of surplus) in competitive markets to be unfair.

The target article's core argument (sect. 2.1.4) reiterates the basic economic principle that an individual's bargaining power is improved by outside options. Baumard et al. rely on their previous bargaining model (André & Baumard 2011a) in which simulated agents played a modified Ultimatum Game. When responders rejected an offer, they did not get zero, as usual, but instead interacted with a new partner. Further, they had a 50% chance of being the proposer in the new interaction. Offers depended on the costs of switching partners and approached 50% as the costs approached zero. The authors concluded that this finding explains the evolution of fairness. The most straightforward prediction of this model is that people's offers (and fairness judgments) will be sensitive to the costs of switching but the authors did not offer evidence about this prediction.

The importance of outside options is well known from previous research in economics, game theory, biology, political science, and social psychology. This research includes classic economic models of monopoly, duopoly, oligopoly, and competition (Holt 2007); market experiments (Smith 1962; 1982); and multi-player bargaining models and experiments (Mesterton-Gibbons et al. 2011; Murnighan 1978; Von Neumann & Morgenstern 1944). Particularly relevant to the authors' model, previous experiments showed that proposer competition increases offers in ultimatum games, but also, importantly, responder competition *decreases* offers (Fischbacher et al. 2009).

Baumard et al. further argue that outside options are *necessary* for even splits: "Quite generally, in the absence of outside options, there is no particular reason why an interaction should be governed by fairness considerations" (sect. 2.1.4, para. 2). Contradicting this claim, Nash showed for a two-player game (no outside option) that "the solution has each bargainer getting the same money profit" (Nash 1950, p. 162). Schelling (1960) showed how conspicuous division points, including (but not limited to) equality, can be stable solutions. Also, offers of half (and even more) can be promoted by additional bargaining stages (Goeree & Holt 2000) and reputation (Nowak et al. 2000).

Does market competition explain fairness? It might help to examine a classic model of outside options. Consider the following scenario. Annie, Betty, and Cathy (A, B, and C) find a cave full of treasure. It takes exactly two people to carry a treasure chest. Annie is stronger than Betty, and Cathy is the weakest. Together, Annie and Betty can carry \$8 million (M) of treasure, Annie and Cathy can carry \$6M, and Betty and Cathy can carry only \$4M. Any two individuals can agree to any possible division of cash, but the third individual receives \$0. Which pairs might work together to carry treasure, and how might each pair divide the cash?

Von Neumann and Morgenstern (1944, p. 227) found that the division of surplus depends on outside options – the surplus each individual could generate with the third player. They showed that all pairings are equally likely, including the least productive pair (so much for the invisible hand). Each pair has a unique stable division: Annie \$5M and Betty \$3M, Annie \$5M and Cathy \$1M, and Betty \$3M and Cathy \$1M. More generally, for pairs AB, AC, and BC with group payoffs x, y, and z, respectively, each individual's payoffs are $A = (x + y - z)/2$, $B = (x - y + z)/2$, and $C = (-x + y + z)/2$, for both groups each person could join. This implies that if Betty were stronger, then Cathy would get a better deal from Annie. For example, if AB generated \$10M, AC generated \$6M (same as before), and BC generated \$6M, then Annie and Cathy would split more evenly: \$4M and \$2M rather than \$5M and \$1M. Also, the Annie-Betty split would now be equal: \$5M and \$5M.

Outside options influence bargaining but it is not clear that they explain people's fairness judgments. Was Annie's original 5:1 division with Cathy "fair"? Is it "fair" that Cathy's split with Annie depends not only on their respective talents, but also on Betty's talents?

Humans do not seem to equate fairness with market price. For example, people think it is unfair to raise the price of snow shovels when demand increases after a snow storm (Kahneman et al. 1986b). People were outraged when hotels increased prices after the 9/11 attacks (New York State Attorney General, 2001). The idea that prices – divisions of surplus – depend on supply and demand is notoriously difficult for people to accept. That's why humans experience the diamond–water paradox, confusion about why luxuries can be priced higher than necessities (Smith 1776/1904). People represent goods as having intrinsic prices, and they expect current prices to match previous prices – precedents. This fits with Schelling's (1960) focal point model of bargaining because precedents can increase the conspicuousness of division points, independent of supply and demand.

The target article's model seems to predict that humans will perceive free-market capitalism as maximally fair. Instead, popular culture includes anti-globalization, the "99 percent," opposition to organ markets, and complaints about the earnings of CEOs, actors, and athletes – despite their rare talents. This might be because partner competition can increase wealth disparities. Consider a simple market with three buyers who value a good X at $9, $6, and $3, respectively, and three sellers whose costs for producing X are $7, $4, and $1, respectively. It is possible for the higher-value buyers to trade with higher-cost sellers, generating $2 surplus per buyer-seller pair to yield $1 per player. But, the competitive equilibrium price is $5, yielding the unequal payoffs of $4, $1, and $0, symmetrically to buyers and sellers, in order of descending values and ascending costs (with a greater total surplus of $10). Competitive markets can exacerbate inequality and people often perceive this as unfair.

Market competition is a critical feature of human social life and much remains to be learned about the underlying cognitive systems. However, the target article seems to be overextending its bargaining model by applying it to fairness, impartiality, cooperation, mutualism, and morality. Future work should develop more specific models of strategic behavior to provide closer fits with the nuanced structure of human social computations.

Evidence for partner choice in toddlers: Considering the breadth of other-oriented behaviours

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Abstract: When do humans become moral beings? This commentary draws on developmental psychology theory to expand the understanding of early moral behaviours. We argue that by looking at a broader range of other-oriented acts than what has been considered by Baumard et al., we can find support for the mutualistic approach to morality even in early instances of other-oriented behaviours.

As Baumard et al. state in the target article, humans "don't just cooperate but cooperate in quite specific ways" (sect. 3.5, para. 2). The observation that humans appear uniquely motivated to act on behalf of others, in a variety of contexts, in response to a diversity of needs, and very early in development (e.g., Dunfield et al. 2010; Svetlova et al. 2010; Warneken & Tomasello 2006; Zahn-Waxler et al. 1992), has motivated much interest in explaining this distinctive human tendency (e.g., the target article; see also Tomasello 2009). To this end, there have been a number of attempts to categorize and clarify the varieties of other-oriented behaviours that children engage in (e.g., Dunfield et al. 2010; Hay & Cook 2007; Warneken & Tomasello 2009), with the goal of providing a more comprehensive, unified account of early other-oriented behaviours. Importantly, in light of recent advances in understanding the many ways in which humans act on behalf of others, any comprehensive account of the origins of the human moral sense must consider all varieties of other-oriented behaviours, not simply a select few.

Although the target article presents a cogent, mutualistic theory of morality, we believe that there are two important issues that have not been adequately addressed: (1) The present proposal is almost exclusively based on economic behaviour (specifically sharing), despite the fact that humans engage in a wide variety of other-oriented behaviours; and, relatedly, (2) by limiting the examination of morality to economic behaviour, the target article has failed to address a growing body of supportive literature from developmental psychology. In this commentary, we briefly present some insights from the field of developmental psychology that we feel broaden and enrich the authors' present argument.

It is rather indisputable that human adults readily track and evaluate others based on their previous behaviour and modify interactions based on these evaluations. Moreover, as the authors note, economic games are a particularly good measure of human prosocial tendencies because the individual's moral motivation is clearly quantifiable (in regard to the amount of money given), allowing for fine-grained analysis of the effects of various manipulations on other-oriented motivations. Yet, giving up a desired resource (such as money) is only one of the forms that other-oriented behaviour can take.

Humans are thought to respond to at least three negative states (material desire, instrumental need, and emotional distress) with three varieties of prosocial behaviours: sharing, helping, and comforting, respectively (Dunfield et al. 2010). Each of these various prosocial behaviours are hypothesized to rely on a unique suite of social cognitive skills (Dunfield & Kuhlmeier, in press). Importantly, unlike sharing, the unique characteristics of responding to instrumental need and emotional distress can make it difficult to determine the "value" of helping and comforting acts, making it harder to determine if an act has been fairly reciprocated. Indeed, no model can claim to truly account for the breadth of human morality without consideration of all the other-oriented behaviours that humans engage in.

Baumard et al. discuss children's failures to show selective sharing (e.g., Bernhard et al. 2006; Blake & Rand 2010); however, it is necessary to consider that sharing is one of the last prosocial behaviours to develop (e.g., Dunfield & Kuhlmeier, in press). Moreover, early sharing behaviours are often less spontaneous than other prosocial measures, relying heavily on the recipient's vocalization of their desire (Brownell et al. 2009), suggesting that they may not be the best measure to assess children's moral motivations. Indeed, if we look at earlier emerging prosocial behaviours, such as helping or comforting, we can observe nuanced interactions earlier in development, which suggests that Baumard et al.'s proposed proximate mechanisms for a mutualistic morality may motivate some of the earliest examples of other-oriented behaviour.

Support for the existence of proximal mechanisms necessary to engage in mutualistic morality can be found when looking at children's helping behaviour. Children begin to reliably help others in response to the observation of need early in the second year of life (e.g., 18 months; Warneken & Tomasello 2006). Yet, prior to the ability to produce helping behaviours, children are already able to differentiate between helpers and hinderers (Hamlin et al. 2007) and make predictions about future interactions based on their observations of previous helping and hindering acts (Kuhlmeier et al. 2003). Thus, even before children are actively helping, they are already tracking the quality of others' moral acts. Further, very shortly after children start helping others, their helpful acts are produced selectively based on the recipient's