



Original Article

Eye spots do not increase altruism in children[☆]Sonja Vogt^{a,b,*}, Charles Efferson^{a,b,*}, Joël Berger^c, Ernst Fehr^{a,b,*}^a Department of Economics, University of Zurich^b Laboratory for Social and Neural Systems Research, University of Zurich^c Department of Humanities, Social and Political Sciences, Swiss Federal Institute of Technology, Zurich

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ABSTRACT

The evolutionary legacy hypothesis proposes that an evolved reciprocity-based psychology affects human behavior in anonymous one-shot interactions when reciprocity is not explicitly possible. Empirical support rests on experiments showing that altruism among adults increases in the presence of stylized eye spots or faces. Such stimuli do not affect material payoffs, but they are assumed to activate a person's reciprocity-based psychology. We identify two versions of the evolutionary legacy hypothesis. The weak hypothesis posits that reputational concerns can generate altruism in the absence of opportunities for a good reputation. The strong hypothesis posits that reputational concerns alone can explain anonymous one-shot altruism, and they can do so specifically in lieu of explanations based on group selection. A number of experimental studies support the weak hypothesis but are merely consistent with the strong hypothesis. To address both the weak and strong hypotheses, we conducted an eye spot experiment with children. Altruism can vary by age or sex in childhood, and under the strong hypothesis this kind of variation should reveal associated variation in sensitivity to eye spots. Although we found significant variation in altruism among children, we found no corresponding variation in sensitivity to eye spots. More generally, we found no eye spot effects of any kind. We discuss the possibility that eye spots might only affect altruism under specific conditions. We further argue that conditional effects do not refute the weak hypothesis in any way, but they do suggest potential limitations on the explanatory scope of the strong hypothesis.

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1. Introduction

Altruistic cooperation and the prosocial preferences on which it depends play a crucial role in human societies (Bowles & Gintis, 2011). When social interactions take place in their usual setting, a setting characterized by incomplete contracts, social norms, and informal institutions, prosocial behavior can dramatically attenuate the inefficiencies that follow from strictly self-regarding behavior (Bowles, 2004). Nonetheless, in spite of the crucial role prosocial behavior has in human societies, the evolutionary mechanisms responsible for such behavior remain a highly contentious matter. This is especially true in the special and important case of altruism in anonymous one-shot interactions with genetically unrelated partners (Burnham, 2013; Burnham & Johnson, 2005; Hagen & Hammerstein, 2006; Haley & Fessler, 2005; Henrich, 2004).

Anonymous one-shot interactions are special because ethnographic data suggest that people rarely had anonymous interactions in ancestral societies (Fehr & Henrich, 2003). Moreover, some researchers additionally argue that ancestral social interactions were typically repeated. If so,

one-shot interactions were probably also quite rare (Burnham & Johnson, 2005; Hagen & Hammerstein, 2006; Haley & Fessler, 2005). Although the nature of social life in the distant past will always involve some speculation, the evidence overall suggests that anonymous one-shot interactions constitute a special class of evolutionarily recent phenomena.

Anonymous one-shot interactions are additionally important for the following reasons. First, much of the experimental research documenting human altruism is based on interactions of this sort (Camerer, 2003; Henrich et al., 2006, 2004; Henrich et al., 2010; Kagel & Roth, 1995). Second, even if nameless and ephemeral interactions were rare in the past, they are presumably quite common now, and for this reason they matter in contemporary human societies. Finally, the evolutionary basis for anonymous one-shot altruism among unrelated strangers is especially hard to identify and explain. In particular, the only evolutionary explanations for prosocial behavior that are widely regarded as unproblematic are kin-based altruism and the enlightened material self-interest of reciprocity in its various forms (Axelrod & Hamilton, 1981; Bowles & Gintis, 2011; Hamilton, 1964; Henrich, 2004; Nowak & Sigmund, 1998; Panchanathan & Boyd, 2004; Trivers, 1971). With respect to anonymous one-shot altruism, however, neither kinship nor reciprocity provides an obvious explanation. The apparent alternative is group selection, especially selection between groups with different culturally transmitted social norms (Bowles & Gintis, 2011; Fehr & Fischbacher, 2004; Henrich, 2004; Richerson & Boyd, 2005). An active and persistent debate, however, has surrounded the

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plausibility of cultural group selection since the idea was first proposed as part of the more general research program on gene–culture coevolution (Bell, Richerson, & McElreath, 2009; Bowles & Gintis, 2011; Boyd & Richerson, 1985, 2005; Boyd, Richerson, & Henrich, 2011; Burnham & Johnson, 2005; Haley & Fessler, 2005; Richerson & Boyd, 2005).

A clever and influential approach to this seeming impasse is to transfer unproblematic explanations based on reciprocity to situations in which the explicit material structure of a social interaction does not allow for reciprocity. Doing so is feasible insofar as the implicit structure of the interaction does allow for reciprocity. This is the evolutionary legacy hypothesis for the evolution of human altruism (Burnham, 2013; Burnham & Hare, 2007; Burnham & Johnson, 2005; Hagen & Hammerstein, 2006; Haley & Fessler, 2005). The hypothesis posits that human psychology reflects ancestral conditions that differed radically from the anonymous one-shot conditions implemented in many contemporary behavioral experiments.

Specifically, the hypothesis proposes that for much of our evolutionary past human social groups were small and cohesive, social contact was intense, interactions were repeated, and one's reputation as a more or less cooperative individual was always at stake. Life was effectively like a "camping trip that lasted a lifetime" (Cosmides & Tooby, 2013, p. 203). Under circumstances of this sort, a person would have cooperated in accord with reciprocal strategies that protected her reputation as a prosocial individual, and she would have done so to gain the benefits that followed when members of her group reciprocated in the future. Contemporary behavior stems from a psychology adapted to these ancestral conditions. Consequently, the behavior observed in contemporary anonymous one-shot interactions does not respond fully to the anonymity and transience of the setting. Put differently, even if the explicit structure of the interaction is anonymous and one-shot, the implicit structure in the mind of the actor is such that she will behave in a way that bolsters her good reputation. In this sense, the evolutionary legacy hypothesis is fully consistent with evolutionary psychology more generally and its key principle that human cognition consists of modular adaptations to life as hunter-gatherers under ancestral conditions (Burnham, 2013; Cosmides & Tooby, 2013; Haley & Fessler, 2005; Kurzban, 2010; Smith, 2000).

The empirical evidence for a reputational psychology in anonymous one-shot interactions is typically experimental. In particular, a number of studies have shown that exposure to face-like stimuli increases altruistic choices in incentivized economic games (reviewed in Nettle et al., 2013; Sparks & Barclay, 2013). Crucially, this outcome occurs even though the face-like stimuli are sometimes quite abstract and do not affect material payoffs. The resulting conclusion is that face-like stimuli, relative to control stimuli, activate the ancestral, reputation-based psychology of participants, and this leads to the observed increase in altruism. Simply put, if people feel they are being watched, they will behave themselves because future benefits from others depend on it.

These experimental findings are consistent with two basic versions of the evolutionary legacy hypothesis. The weak hypothesis is simply that reputational concerns can affect behavior in anonymous one-shot settings. We call this version "weak" because it does not exclude the possibility that other forces, even a group-selected psychology, are also at work. The "strong" hypothesis, however, does exclude other forces. It specifically posits that every anonymous one-shot interaction involves a variety of uncontrolled cues (e.g. other people in the room) that imply one's reputation is at stake, and these cues produce *all* of the ostensibly other-regarding behavior observed in anonymous one-shot interactions. This possibility is especially important in terms of drawing inferences about evolutionary mechanisms from anonymous one-shot behavioral experiments among genetically unrelated strangers (Camerer, 2003; Henrich, Heine, & Norenzayan, 2010).

Importantly, we do not know of researchers previously using the terms weak and strong to discuss different versions of the evolutionary legacy hypothesis. Nonetheless, the terms capture different themes in the existing literature. The numerous studies showing that payoff-

irrelevant faces increase altruism (reviewed in Nettle et al., 2013; Sparks & Barclay, 2013) support the weak hypothesis. They demonstrate that we cannot categorically ignore reputation and reciprocity simply because the explicit material structure of a game is anonymous and one-shot. Modulating altruism with faces, however, neither implies nor precludes effects associated with other evolutionary forces. For this reason, without additional arguments, existing experimental studies support the weak hypothesis. They are consistent with the strong hypothesis, but they do not provide direct support.

Nonetheless, some researchers have argued that we should grant reputation a kind of privileged explanatory status specifically when considering the evolutionary origins of anonymous one-shot altruism among genetically unrelated strangers (Burnham & Johnson, 2005; Haley & Fessler, 2005). The reason is straightforward. An evoked reputational psychology depends on an evolutionary history involving some kind of repeated interactions and the reciprocal strategies they support. The relevant evolutionary mechanisms operate via the long-term self-interest of individual organisms, and in this sense they are conventional, well understood, and uncontroversial (Burnham, 2013; Burnham & Johnson, 2005). In contrast, group selection, both cultural and genetic (Bowles, 2006, 2009; Henrich, 2004), represents a class of evolutionary mechanisms surrounded by controversy for nearly 50 years (Williams, 1966). Consequently, if we have no conclusive reason to reject reputation as an insufficient explanation, we should favor reputation in lieu of group selection (Burnham & Johnson, 2005; Haley & Fessler, 2005). More to the point, if we know payoff-irrelevant social stimuli matter, and if we know we can never eliminate such stimuli entirely, then reputation is all we need to explain altruism among anonymous unrelated strangers engaged in one-shot exchange. We do not need some form of group selection; nor should we turn to some form of group selection. When taken to its logical extreme, this argument leads to the strong version of the evolutionary legacy hypothesis. To be precise, we see the strong hypothesis as primarily relevant for understanding anonymous one-shot altruism among genetically unrelated strangers. For interactions of this sort, two basic evolutionary mechanisms are on the table: implicit reputation arising from an evolutionary history of repeated interactions and group selection. If genetic and cultural group selection is eliminated, we are left with the strong hypothesis.

The evolutionary legacy hypothesis has inspired a number of studies, and many of them have provided compelling empirical support for the effects of payoff-irrelevant social cues. Importantly, however, previous research leaves us with two challenges. First, as discussed above, existing evidence does not allow us to evaluate the strong hypothesis. Assessing the strong hypothesis requires an approach with predictions that go beyond saying that reputational cues should increase altruism. Second, though many studies have provided evidence for the importance of payoff-irrelevant social cues (Bateson, Nettle, & Roberts, 2006; Burnham & Hare, 2007; Ernest-Jones, Nettle, & Bateson, 2011; Francey & Bergmüller, 2012; Haley & Fessler, 2005; Mifune, Hashimoto, & Yamagishi, 2010; Oda, Niwa, Honma, & Hiraishi, 2011; Rigdon, Ishii, Watabe, & Kitayama, 2009), the evidence overall is mixed. Some studies have also failed to find an effect (Carbon & Hesslinger, 2011; Ekström, 2012; Fehr & Schneider, 2010; Lamba & Mace, 2010; Raihani & Bshary, 2012; Tane & Takezawa, 2011).

To address these challenges, we conducted a dictator game study with payoff-irrelevant stimuli and a distinctive but informative subject pool. Like previous studies, our experimental treatments involved either an asocial control stimulus or a social, face-like stimulus. Unlike previous studies, however, we recruited children of ages five and eight of both sexes to participate in our study. Children represent an informative subject pool because previous research has shown that young children, like adults, care about their reputations (Engelmann, Herrmann, & Tomasello, 2012; Engelmann, Over, Herrmann, & Tomasello, 2013), and thus they have a reputational psychology that can be experimentally manipulated. Moreover, past research also suggests that altruistic behavior changes between the ages of five and eight, and this

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