

Opinion piece

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Pro-sociality without empathy

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Empathy, the capacity to recognize and share feelings experienced by another individual, is an important trait in humans, but is not the same as pro-sociality, the tendency to behave so as to benefit another individual. Given the importance of understanding empathy's evolutionary emergence, it is unsurprising that many studies attempt to find evidence for it in other species. To address the question of what should constitute evidence for empathy, we offer a critical comparison of two recent studies of rescuing behaviour that report similar phenomena but are interpreted very differently by their authors. In one of the studies, rescue behaviour in rats was interpreted as providing evidence for empathy, whereas in the other, rescue behaviour in ants was interpreted without reference to sharing of emotions. Evidence for empathy requires showing that actor individuals possess a representation of the receiver's emotional state and are driven by the psychological goal of improving its wellbeing. Proving psychological goal-directedness by current standards involves goal-devaluation and causal sensitivity protocols, which, in our view, have not been implemented in available publications. Empathy has profound significance not only for cognitive and behavioural sciences but also for philosophy and ethics and, in our view, remains unproven outside humans.

Keywords: empathy; pro-social behaviour; intentionality; goal-directedness

1. INTRODUCTION

The evidence for empathy in animals has been equivocal despite repeated attempts to investigate this topic in several species [1–4]. The issue is interesting, because while pro-social behaviour is widespread and uncontroversial as a phenomenon (emphatically so in eusocial organisms), empathy as a proximate mechanism requires that the agent relies on a cognitive or emotional representation of someone else's internal state, similar to several assumptions required to ascribe

theory of mind, and positive evidence in non-humans would be a remarkable breakthrough both for our understanding of animal cognition and of empathy's evolutionary emergence.

Two recent papers [5,6] report similar demonstrations of pro-social behaviour in non-humans, but the claims for their value as evidence for empathy are profoundly different and can serve to scaffold the debate. Our reflections are meant to go beyond the analysis of these papers to touch on matters that are at the core of current debates in the field and should be of interest to students of behaviour and cognition from multiple disciplines.

2. RECENT CLAIMS

In both papers, one animal, the victim, is forcefully restrained by the experimenters, leading one or more other conspecifics to perform behaviour apparently designed to release it. This pro-social behaviour is sensitive to circumstances such as the bond between agent and victim, and probably the presence of stress in the latter. Inspired by previous observations of rescue behaviour in ants [7], Nowbahari *et al.* [5] tested whether such pro-social behaviour was preferentially directed to kin. They found that *Cataglyphis cursor* ants will release active (non-anaesthetized) nest-mates restrained by a nylon snare in a sand field, but not (i) anaesthetized nest-mates, (ii) *C. cursor* ants from different colonies, (iii) sympatric unrelated species, or (iv) prey items. Importantly, these authors refrained from speculating about the psychological motivation of their subjects, focusing instead on the functional significance of such kin-favouring behaviour.

In the second study, Bartal *et al.* [6] used a preparation conceptually similar to that of Nowbahari *et al.* [5] to study pro-social behaviour in rats. They report that rats will open a restrainer to free an apparently distressed cagemate, but will not open either empty or neutral object-containing restrainers. This behaviour was interpreted as 'providing strong evidence for biological roots of empathically motivated helping behavior' [6, p. 1427] similar, or even homologous, to that of humans.

In spite of the obvious species differences, the behavioural patterns exhibited by the ants and rats in these two studies—i.e. initial frenzy of the actor(s) followed by pulling on the legs/tail of the victim and directed biting at the restraint—are very similar, but nonetheless led to quite different interpretations (links to video footage of these behaviours are available in the electronic supplementary material). These contrasting approaches to similar findings in two distant taxa reflect an ongoing tension in the field of comparative cognition that may reflect different standards in the interpretation of evidence: under what conditions should we postulate unobservable mental states as causes of behaviour? Bartal *et al.* [6] argue that the most parsimonious interpretation for the rescue behaviour observed in rats is that they possess 'the ability to understand and actively respond to the affective state of a conspecific' [6, p. 1430]. This second set of authors is accompanied by many others in their readiness to make claims about animals' mental states (cf. [8,9]). The ability to actively respond to a conspecific's state is uncontroversial, and clearly shared with the

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ants, but both the idea that it is the other's affective state that acts as causal factor and that this involves the actor's understanding of affective state are a different matter. In fact, the extent to which the observations provide evidence of 'actions that are intended to benefit another' [6, p. 1427] requires some unpacking. The word *intended* could be read functionally, as *being designed by natural selection to benefit another*, or psychologically, as *being goal-directed towards acting on the actor's internal representation of the receiver's wellbeing*. In the former, adaptive design, interpretation is justified because both ants and rats can obtain reproductive benefits by helping group mates who, in nature, are likely to be genetically related. Even if rats in a group were not genetically closer than random, survival of group mates must bring evolutionary benefits; why live in a group otherwise? However, the claim that individuals are driven by the psychological goal of improving a groupmate's wellbeing is unjustified in both species. Proving that any behaviour is psychologically goal-directed requires more stringent tests.

3. CRITERIA FOR GOAL-DIRECTED BEHAVIOUR

The problem of intentionality in comparative cognition is difficult to tackle and should thus be approached carefully. The issue is isomorphic to that of design in biology: does manifest design require an intentional designer? Or in the case of rescue behaviour: does apparent intention require an intentional agent? The difference between the two questions is that, while manifest biological design definitely does not require a designer, apparent intentionality may, under certain circumstances, result from an intentional agent, an agent that is truly goal-directed in the psychological sense. For this reason, whereas intentionality in the action of evolution is acceptable when used as a communicatory shortcut, behavioural intentionality in the psychological sense should not be invoked in explanatory accounts unless goal-directedness is unambiguously proven. In both cases, purpose is a fair target for explanation, or *explanandum*. As an explanation itself, or *explanans* [10], however, purpose is never justified in evolution and only after careful analysis (and even this is debatable) in psychology.

Dickinson and co-workers [11,12] put forward two criteria for determining whether or not a particular behaviour is psychologically goal-directed. First, the behaviour must be sensitive to the current status of the outcome. If the outcome is no longer a goal (e.g. because it was somehow devalued by a manipulation of the state of the actor or victim), the behaviour should decline. Second, the response must be instrumental in obtaining the goal; that is, a causal relationship between the response and the presupposed goal must be shown.

For purposes of illustration, let us hypothesize that the rescue behaviour of ants and rats is indeed designed to reduce the victim's distress and that this behaviour comes about because the target animals 'understand and actively respond to the affective state of a conspecific' [6, p. 1430]. How can we prove such a claim?

First, we ought to provide an operational definition of 'understanding'. Second, we would need to show that the occurrence of rescue behaviour adapts dynamically to the incentive value of the presupposed goal. If, at some moment, there is no discrepancy between the goal and the current state of affairs, no empathically motivated behaviour should be observed. This means, for instance, showing that rescue attempts do not occur when the victims are trapped, but show no signs of distress.

Third, and crucially, it has to be shown that the rescue behaviour is psychologically directed towards the goal of reducing the victim's distress. In other words, the behaviour shown in the presence of a stressed group mate should be sensitive to the causal relation between the response and the goal. If, for instance, the wellbeing of the victims were to be increased by moving away from them—which is precisely the opposite of what both ants and rats actually do—actors should modify their actions accordingly.

Without such proofs, claims for empathy remain unpersuasive. Finally, in many of the preparations used to study pro-social behaviour, the goal of improving the victims' wellbeing is confounded with the reinforcing effect of terminating stress signals. Acting to make one's own or another subject's stress signals cease can be psychologically selfish and does not require empathic interpretations. For instance, human parents may feed a crying infant because their brains are primed to experience suffering as a response to infants' screaming, regardless of whether they understand or share the feelings of the baby. The debate is still in progress in the field of human psychology [13,14]. Our view is that specially designed protocols are needed to distinguish between the alternative goals, including manipulations in which rescuing releases the victim but does not terminate the stress signals, and vice versa.

Finally, it is worth pointing out that much of the present discussion applies to non-rescuing behaviour, of which a very pertinent example is the existence of pedagogy, namely a tendency to teach. This behaviour, a form of communication that helps receivers to learn, occurs in a variety of species, including humans, apes, meerkats, ants and babblers [15–20]. Nonetheless, it is widely accepted that the connection between the phenomenon and theory of mind is problematic, to say the least, and need not reflect the same (if any) level of empathic experience across taxa. Teaching as a functional category does not require the attribution of mental states and may in fact be sustained by different proximate mechanisms in different species [21]. The available evidence suggests that teaching has evolved independently in many taxa, challenging the hypothesis that it requires elaborate cognitive feats such as the attribution of mental states to others—a very contentious topic by itself [22].

4. CONCLUSIONS

The adaptiveness of pro-social behaviour is relatively well understood in terms of the direct and indirect reproductive benefits that such behaviour brings to the 'benefactor', but pinpointing the proximate mechanisms underlying such behaviour has been a challenging

endeavour. Empathy has been proposed as a candidate motivational mechanism [1,6], but such proposals deserve careful scrutiny because the field of comparative cognition is particularly vulnerable to unwarranted anthropomorphic interpretations. Many human-like complex abilities in animals have been shown to arise from simpler mechanisms than previously hypothesized [23], hence any claims of empathically motivated behaviour should be taken cautiously.

Empathy is an important problem with profound significance for cognitive and behavioural sciences and even for philosophy and ethics. Any solid evidence for empathy in non-humans would be a notable advance but, in our view, it remains unproven outside humans.

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