Chapter 3
The Evolution of Moral Development

Mark Sheskin

The Evolution of Moral Development

Fairness is a central part of both moral judgment and moral behavior. In moral judgment, people are so committed to fairness that they often prefer situations with *lower* overall welfare but a *higher* degree of fairness. For example, people typically judge that a new medicine should not be introduced if it will decrease cure rates for a small group of people, even if it also increases cure rates for a large group of people, and therefore causes an overall increase in cure rates (Baron, 1994). In moral behavior, fairness motivates people to sacrifice their own welfare. For example, in many settings, people will share resources they could instead choose to keep (e.g., in the dictator game; Kahneman, Knetsch, & Thaler, 1986), and will reject unfair behavior from others, even when doing so is costly (e.g., in the ultimatum game; Güth, Schmittberger, & Schwarze, 1982).

The goal of this chapter is to explore the developmental origins of adult fairness. In doing so, I will situate the development of fairness within a larger framework of the evolution of moral development. Thus, I will begin by characterizing human moral psychology and the role of fairness within it (section "Human Moral Psychology"). I will then argue for a particular view of the evolution of morality that places fairness in the center (section "The Evolution of Morality, Especially Fairness"). This view accounts for the peculiar features of how fairness emerges over development, most notably a "knowledge-behavior gap" in which children understand many features of fairness before they are motivated to behave in compliance with those features (section "The Development of Morality, Especially Fairness"). Finally, I will discuss implications for other areas of research and future directions based on this account (section "Implications and Future Directions").

M. Sheskin (✉)
Cognitive Science Program, Yale University, New Haven, CT, USA
e-mail: msheskin@gmail.com

M. Li, D.P. Tracer (eds.), *Interdisciplinary Perspectives on Fairness, Equity, and Justice*, DOI 10.1007/978-3-319-58993-0_3

Human Moral Psychology

There is controversy over the structure of human moral psychology. One set of approaches suggests that all moral concerns fall into a discrete number of foundations, and that people around the world show moral concerns in each of the foundations (Haidt, 2012; Haidt & Joseph, 2004; Shweder, Much, Mahapatra, & Park, 1997). Early work suggested the three foundations of "Community," "Autonomy," and "Divinity" (Shweder et al., 1997), with violations of fairness being part of the "Autonomy" foundation. More recent expansions have separated out a distinct "fairness" foundation from either four (e.g., Haidt & Joseph, 2004) or five (e.g., Haidt, 2012) others: harm, hierarchy, in-group, purity, and liberty.

Other approaches to morality do not divide it among discrete foundations. For example, one approach suggests that all moral judgments are about harm (e.g., Gray & Schein, 2016) and that our moral judgments follow a "template" that includes (1) a moral agent (2) causing harm to (3) a moral patient (Gray, Schein, & Ward, 2014). Of particular interest for the current chapter, some approaches place fairness (rather than harm) at the center (e.g., Baumard, Boyer, & Sperber, 2010), and others argue for the presence of both harm and fairness, but identify fairness as a particularly important and defining feature of human morality (compared to social behavior in other species; Tomasello, 2016).

The ongoing debate about the structure of morality, and the role of fairness in it, may be due to morality being an "artificial kind" rather than a "natural kind." This distinction comes from philosophy (Bird & Tobin, 2016), and separates out groupings that reflect the true nature of reality, versus groupings that represent human interests. For example, "hydrogen" is a natural kind that picks out all atoms of a particular set, whereas "pets that are good choices for a small apartment" is an artificial kind that picks out individuals for a particular human purpose. An example of applying this distinction to morality comes from Greene (2015), who argues that morality is not natural kind in human cognition, but is instead unified at the functional level. He provides an analogy with the concept of "vehicle" and explains that:

> At a mechanical level, vehicles are extremely variable and not at all distinct from other things. A motorcycle, for example, has more in common with a lawn mower than a with a sailboat, and a sailboat has more in common with a kite than with a motor cycle. One might conclude from this that the concept VEHICLE is therefore meaningless, but that would be mistaken. Vehicles are bound together, not at the mechanical level, but at the functional level. I believe that the same is true of morality.

This way of thinking about morality, as a concept that is useful for picking out a collection of aspects of human cognition, suggests that we might benefit from abandoning the idea that "morality" is a unified phenomenon that will have a systematic structure, underlain by a bounded set of proximate mechanisms and with a unified evolutionary explanation. Instead, depending on specific research goals, morality must be "fractionated into a set of biologically and psychologically cogent traits" (McKay & Whitehouse, 2015).

Applying this analysis of morality in general to fairness in particular, we might conclude that fairness itself is an artificial rather than a natural kind. That is, although fairness judgments and behaviors may have natural foundations, there may be multiple distinct capacities that we artificially group together when we speak as though there is just one capacity called "fairness." To the extent that there is a unified domain of fairness, it will be a *functional* unity—a set of judgments and behaviors that are directed towards a particular human goal. Thus, in this chapter, I will discuss the development of multiple types of fairness judgments and behaviors, as well as the development of several proximate mechanisms related to these judgments and behaviors.

The Evolution of Morality, Especially Fairness

Within the set of topics that people study when they refer to "morality" (a term for which there are very many definitions), certain elements of human moral behavior are well understood, especially when they are continuous with behaviors found across a wide variety of species. For example, mothers typically provide high levels of benefits for their offspring, fitting the textbook definition of altruism: an individual acts in a way that makes herself worse off and another better off. The explanation of such "kin altruism" is in the logic of "Hamilton's Rule," which states that kin selection will lead to the increase of genes that conform to "C < Br," meaning that the costs to the acting individual are less than the benefits to the recipient of the action, discounted by the relatedness between the actor and recipient (Hamilton, 1964). Although it is possible to find debate on the technical details (e.g., Nowak, Tarnita, & Wilson, 2010; reply by Abbot et al., 2011), this well-established feature of evolution applies broadly, and the kin selection paradigm has been used to investigate a wide range of phenomena (West, Griffin, & Gardner, 2008).

On the other hand, many aspects of human morality may require human-specific explanations. This is clearly apparent for many of the specifics of our moral lives—there are no other animals that have a moral judgment regarding the outcome of US presidential elections—but it may also be true of many features of human morality that could plausibly apply to nonhuman animals. Specifically, there is mounting evidence that fairness may be both a unique feature of humans compared to other species (Sheskin & Santos, 2012) and a core part of human morality (Baumard & Sheskin 2015).

The claim that fairness is unique to humans is controversial. Starting with a seminal 2003 paper by Sarah Brosnan and Frans de Waal, one line of research has highlighted potential continuities between human fairness and precursors in nonhuman primates, especially regarding the potential that individuals may react negatively to receiving less than a conspecific (e.g., Brosnan, Talbot, Ahlgren, Lambeth, & Schapiro, 2010; Fletcher, 2008). Other researchers have even added non-primates to the list of species that might react negatively to unfairness, including dogs (Range, Horn, Viranyi, & Huber, 2009) and corvids (Wascher & Bugnyar, 2013).

On the other hand, many labs have failed to replicate these results (e.g., Sheskin, Ashayeri, Skerry, & Santos, 2014; Silberberg, Crescimbene, Addessi, Anderson, & Visalberghi, 2009).

A reasonable consensus position is that nonhuman animals show *at most* limited concerns about fairness. For example, a recent review that was generally sympathetic to nonhuman fairness concerns nonetheless concluded that "inequity responses are not developed to the same degree in other species as in humans" (Talbot, Price, & Brosnan, 2016). This experimentally derived conclusion that nonhumans show limited concerns about fairness (or maybe no concerns with fairness) is corroborated by theoretical arguments about *why* humans are concerned with fairness. As we will see, the likely evolutionary account of human fairness predicts that it will be characteristic of humans, but not of other species.

Why is fairness so important to humans? Humans cooperate with each other in a wide variety of contexts, and have a high degree of freedom to choose partners for mutually beneficial tasks. This creates a "biological market" in which people who have a reputation for being good collaborators gain benefits by being preferred as partners, while those with lesser reputations are not selected for group tasks and miss out on the benefits of collaboration (e.g., Noë & Hammerstein, 1994). The competition for a good moral reputation might lead to "competitive altruism," in which each person takes very high costs to establish the best possible reputation (e.g., Barclay & Willer, 2007), but it will often lead to fairness instead (Debove, André, & Baumard, 2015). Specifically, people benefit from having a reputation for putting in at least their fair share of effort (and taking no more than their fair share of the rewards), but the symmetry of many situations (i.e., each person can be in both the position of choosing a partner and the position of being chosen as a partner) leads to "meeting in the middle" exactly at fairness.

Importantly, this explanation is specific to humans. As argued by Tomasello (2016), "early humans were forced into a niche of obligate collaborative foraging" in which they "knew that they were being evaluated by others." Although there is collaboration in nonhuman species, "humans' last common ancestor with other apes…did not create enough of the right kind of interdependence (individuals could opt out and still do fine)." Thus, due to the extreme importance of being selected for joint tasks and of judiciously selecting others for joint tasks, humans (and not other animals) have a strong interest in being known as a trustworthy cooperator rather than as a cheat, and for tracking the reputations of others as trustworthy cooperators or as cheats.

Recently, this partner-choice framework has been applied to moral development (Sheskin, Chevallier, Lambert, & Baumard, 2014). If one of the major benefits of costly prosocial behavior is establishing a good reputation to be included in mutually beneficial joint tasks, then such behavior should be less common at younger ages. Specifically, very young children are provisioned by adult caregivers (e.g., Meehan, Quinlan, & Malcom, 2013), reducing the marginal utility of additional benefits gained by collaboration with others. Furthermore, even if the additional benefits from collaboration were worthwhile, very young children are not skilled at most collaborative tasks (e.g., hunting; Gurven, Kaplan, & Gutierrez, 2006),

reducing the chances that a good reputation could lead to being selected for a task. These doubly decreased benefits of a good moral reputation mean that, for young children, costly prosocial behavior will often not be paid back by benefits from collaboration. Thus, natural selection may have produced a default developmental timeline for fair behavior that tracks the typical importance of a good moral reputation at different ages (i.e., low when young, but increasing with age).

Although this framework is focused on the species-typical developmental timeline for fairness, it also accounts for certain systematic individual and situational differences. This is because the claim that a system is the product of natural selection is *not* the claim that it develops identically in each individual or that it is insensitive to environmental variation. To the contrary, "plasticity in developmental systems that interact with more changing or variable aspects of the environment (e.g., social status, predatory threats) should be favored by selection" (Bjorklund & Ellis, 2014).

For example, the current framework suggests that a collaborative context might be especially conducive to fair behavior, even in young children. Consistent with this, Hamann, Warneken, Greenberg, and Tomasello (2011) found that 3-year-old children (but not adult chimpanzees) share more equally with each other when the resources are the result of collaborating on a joint task, compared to when the resources are either "free" or the result of working in parallel.

The Development of Morality, Especially Fairness

Infant Social Evaluation

The developmental origins of human fairness begin in early infancy. Although infants are unable to engage in most moral actions, research over the last decade has revealed that infants do engage in sophisticated social evaluation of interactions between third parties. Building off of classic work by Heider and Simmel (1944), which found that adults will interpret motives and social roles when watching animated geometric shapes (e.g., a bully chasing a victim), Kuhlmeier, Wynn, and Bloom (2003) found that 12-month-old infants prefer to see an animated triangle approach a shape that has previously helped it climb a hill, rather than one that has hindered that goal. Extending this result to the infants' own preferences, Hamlin, Wynn, and Bloom (2007) found that 6-month-olds will reach for a helper over a hinderer. These evaluations can be stunningly complex: 10-month-olds discriminate between a helper who is aware of an agent's preferences and knowingly helps to fulfill them, and a helper who is unaware of an agent's preferences and accidentally helps to fulfill them (Hamlin, Ullman, Tenebaum, Goodman, & Baker, 2013).

Infants react to more than just helping and hindering—they show a sophisticated understanding of fairness. Infants prefer agents who distribute fairly (Geraci & Surian, 2011; see also Meristo & Surian, 2013). They also expect that agents will typically provide equal numbers of resources to recipients: For example, Sloane,

Baillargeon, and Premack (2012) found that infants will look longer (indicating surprise) at a "2 and 0" distribution compared to a "1 and 1" distribution. Furthermore, this is a specifically social effect, rather than (e.g.,) a symmetry preference, as the infants show no difference in looking time when the distributions are to inanimate recipients. Even more impressively, infants expect that unequal effort merits unequal reward, expecting that a recipient who has worked harder on a task deserves more reward (see also Schmidt & Sommerville, 2011; Sommerville, Schmidt, Yun, & Burns, 2013).

The sophistication of infant social evaluation is consistent with the evolutionary account detailed in the previous section. Unlike costly prosocial behavior, merely observing and judging others is nearly costless, and it can have important benefits. This is because, from early in infancy, humans observe and learn from others. The same can be said of many species, and there is some overlap between the ways humans learn from each other and the ways animals learn from each other, but it remains the case that some features of social learning are specific to humans (for a recent review, see Heyes, 2016). As described by Csibra and Gergely (2009), "human communication is specifically adapted to allow the transmission of generic knowledge between individuals. Such a communication system, which we call 'natural pedagogy', enables fast and efficient social learning of cognitively opaque cultural knowledge that would be hard to acquire relying on purely observational learning mechanisms alone."

The strong effects of pedagogy can be seen clearly in situations where it leads to "poor" performance by children trusting adults who are giving them incorrect or incomplete information. For example, children assume that an adult demonstrating how to use an object demonstrates all relevant functions, and so are less likely to explore and discover novel features (Bonawitz et al., 2011). Likewise, human children engage in "overimitation" (Lyons, Young, & Keil, 2007): when shown how to open a puzzle box to retrieve a reward inside, children faithfully copy all demonstrated actions, even ones that seem unrelated to opening the box. Other species do not overimitate, including our closest evolutionary relatives (chimpanzees; Horner & Whiten, 2005) and species that have been bred to work closely with us (domesticated dogs; Johnston, Holden, & Santos, 2016).

The standard explanations for phenomena like those above (not exploring actions that are left out of instruction, but overimitating unnecessary steps when they are included in instruction) are that they are crucial for the cumulative learning of human culture (Legare & Nielsen, 2015). For example, a child will benefit from trusting adults that we should wash our hands before we eat, even if the reasons are not completely clear.

Given that adults sometimes disagree, and some may have malevolent intentions, it would be bad to learn equally from everyone. Fortunately, infants and children do not learn indiscriminately from all sources (for a review, see Poulin-Dubois & Brosseau-Liard, 2016). They learn selectively based on information ranging from previous accuracy (Koenig, Clément, & Harris, 2004) to features of the informant such as likely group membership (e.g., language; Liberman, Woodward, & Kinzler, 2016) and overall benevolence (Johnston, Mills, & Landrum, 2015).

In sum, even very young infants show sophisticated social evaluation. This is likely because the costs are lower than the benefits: such capacities are relatively cheap to implement (i.e., although it requires that attention to be paid to adult behavior, and the cognitive abilities to evaluate and remember these behaviors, it requires no overt behavior), and social evaluation is important for determining which adults to affiliate with and learn from.

The Emergence of Costly Fairness Behavior

In contrast with the presence of social evaluation even in infancy, costly fairness behavior—along with costly prosocial behavior in general—emerges slowly over development. This does not mean that young children never show prosocial behavior; it is possible to design tasks on which even the youngest children will take costs to help others (e.g., Warneken, Hare, Melis, Hanus, & Tomasello, 2007; Warneken & Tomasello, 2006), and it is possible to design tasks on which even older children will show some limitations on their prosocial behavior (e.g., Sheskin et al., 2016). And, of course, adults do not always show perfectly moral behavior; indeed, we are struck by the oddness of people who commit themselves fully to moral causes with no privileging of their own welfare (MacFarquhar, 2015).

However, when a task does show strong differences across ages, it is typically in the direction of showing more willingness to take costs with increasing age (e.g., Fehr, Bernhard, & Rockenbach, 2008; but see also House et al., 2013). For example, Benenson, Pascoe, and Radmore (2007) implemented a "Dictator Game" with 4- and 9-year-old children, in which one child decided how to divide ten stickers between self and other. Whereas 4-year-olds allocated the majority of stickers to themselves, and nearly half took all of the stickers, 9-year-olds were significantly fairer on both of these dependent measures. Similar results showing increasingly fair splits of resources with increasing age are well established in the literature, going back at least to a 1952 study in which Uğurel-Semin asked 4- to 16-year-olds in Istanbul to divide odd numbers of nuts between self and other.

This slow emergence of moral behavior, compared to the relatively earlier emergence of social evaluation in infants, has been called the "knowledge-behavior gap" (Blake, McAuliffe, & Warneken, 2014). A particularly striking demonstration of the gap comes from the work of Smith, Blake, and Harris (2013), in which 3-year-olds report that they *should* act fairly but decline to follow through and act fairly. Most strikingly, this is not a case of planning to be fair and then lacking the inhibitory control to give resources to another, as the 3-year-olds in this study predicted that they would behave selfishly.

Whereas the previous section explored the "ultimate" evolutionary explanation (based on costs and benefits) for this gap, in this section we will further explore the specific developmental timeline of fairness behavior, and the development of the proximate mechanisms that underlie it (Tinbergen, 1963). By what age do children act fairly, and when are they willing to take costs to avoid unfairness? The answer is

very different depending on whether the potential unfairness puts the child at a disadvantage or an advantage.

Disadvantageous inequality aversion (DIA), consisting of negative reactions to receiving relatively less than someone else, emerges quite early in childhood. For example, children as young as 3 years old will react negatively to receiving a lesser number of stickers compared to another child (LoBue, Nishida, Chiong, DeLouache, & Haidt, 2011). When they are allowed to decide whether to accept or reject an experimenter-provided distribution, children between the ages of 3 and 7 years old will typically reject receiving one candy while another child will receive four candies, preferring that both children receive nothing (Blake & McAuliffe, 2011).

On the other hand, advantageous inequality aversion (AIA), consisting of negative reactions to receiving relatively *more* than someone else, emerges later. In the study by LoBue et al. (2011), the children who received unfairly more rarely complained. In the study by Blake and McAuliffe (2011), children below the age of 8 typically accepted receiving four while another child receives one (though 8-year-olds did sometimes reject these advantageous distributions).

The exact age at which each of these behaviors is seen varies depending on the exact method. For example, Shaw and Olson (2012) found advantageous inequality aversion in 6-year-olds, 2 years younger than the result from Blake and McAuliffe (2011). In the study by Shaw and Olson, the experimenter distributed four erasers evenly, and then observed "Uh oh! We have one left over" and asked "Should I give this eraser to you, or should I throw it away?" It could be that, by asking what the experimenter should do (as opposed to, e.g., what the child wanted), 6-year-olds were more likely to select the fair option than they might be otherwise. Indeed, other research has found that asking children "should" vs. "want" questions leads to differences in fairness behavior (e.g., Sheskin et al., 2016).

The emergence of AIA and DIA at different times, and the variability depending on study design, suggests that our concern with fairness may not be a unified phenomenon that emerges at a single precise time. Certainly, even if we do have cognitive mechanisms specialized for fairness (e.g., Baumard, André, & Sperber, 2013), our behavior is multiply determined. When faced with a potential payoff of (e.g.,) "2 for self and 3 for other" our motivations can be quite wide-ranging, including (1) selfishly maximizing our absolute welfare with no reference to the other person's welfare, (2) generously maximizing the other person's welfare with no reference to our own welfare, (3) an "efficiency" preference to maximize the total welfare, with no reference to the specific amounts received by either person, (4) a "fairness" preference to minimize the difference between people's welfare, and (5) a "social comparison" preference to maximize our own welfare compared to other people.

It could be, for example, that even very young children have a general motivation to behave fairly, but that the strength of this preference is relatively weaker than other preferences. Thus, a 5-year-old might reject disadvantageous inequality due to a fairness preference that is buttressed by a social comparison motivation that is likewise against being at a relative disadvantage, but the same 5-year-old might accept advantageous inequality because that same fairness preference is undermined by the social comparison motivation seeking a relative advantage. Indeed,

given a strong enough social comparison motivation, a child might act spitefully: Sheskin, Bloom, and Wynn (2014) found that 5-year-olds will often choose a low-but-advantageous payoff of "1 for self and 0 for other" over a higher-and-fair payoff of "2 each."

Proximate Mechanisms

Reflecting the multitude of motivations involved in developing fairness behavior, there are likewise many potential proximate mechanisms. Some of these proximate mechanisms may appear in a person's awareness as motivations towards particular goals (e.g., empathy towards those who are treated unfairly leading to actions that reduce unfairness), whereas other proximate mechanisms may be unrelated to motivations. For example, numerical ability is important for many areas of human life, only one of which is supporting fair division of discrete, sharable resources. However, given that the motivation to share resources equally is impotent without the ability to match equal numbers, it is reasonable to assume that children's fairness behavior would increase with increasing numerical abilities. Recent research reveals exactly this connection (Chernyak, Sandham, Harris, & Cordes, 2016).

Likewise, understanding others' mental states is important for far more than fairness (e.g., it is important when trying to strategize against an opponent), but many researchers have suggested that theory-of-mind (ToM) may be important for prosocial behavior, and that increases in the former allow increases in the latter. For example, in adults, activity in a region of the brain associated with ToM (the dorsomedial prefrontal cortex) predicts prosocial behavior amount of money shared and amount of time spent helping another person (Waytz, Zaki, & Mitchell, 2012). Developmentally, 3- to 5-year-olds who pass a common test of ToM ability (the "Sally-Anne task") provide fairer divisions than children who do not (Takagishi, Kameshima, Schug, Koizumi, & Yamagishi, 2010; but see contrary results in Cowell, Samek, List, & Decety, 2015). Thus, many of the proximate mechanisms involved in fairness may be general cognitive capacities that are not specific to fairness.

Other proximate mechanisms are more specifically tied to fairness. For example, many researchers have highlighted the importance of reputational benefits for prosocial behavior, and some approaches (e.g., the partner-choice framework described in the previous section) build their entire view of morality around it. Thus, a developing sensitivity to reputation may be linked to the development of fairness behavior. Importantly, several research designs have provided converging evidence that young children are sensitive to cues to being watched (e.g., Piazza, Bering, & Ingram, 2011). With particular relevance to the claim that moral behavior is important for one's reputation with potential collaborators, "young children care more about their reputation with ingroup members and potential reciprocators" (Engelmann, Over, Herrmann, & Tomasello, 2013).

Likewise, empathy may be involved in increasing motivations for fairness. There is a long tradition of research on the "empathy-altruism" link (e.g., Batson, Duncan, Ackerman, Buckley, & Birch, 1981), and recognizing and then empathizing with people's distress at being treated unfairly may motivate fairness. In line with this prediction, empathy is associated with fairness at many ages (e.g., Edele, Dziobek, & Keller, 2013). On the other hand, empathy is a "spotlight" that is typically evoked by specific targets, and is therefore not well suited to governing complicated decisions about how to fairly value multiple targets (Bloom, 2016).

This section on proximate mechanisms is not intended to be a complete list. Indeed, the claim that fairness (and morality) are not unified phenomena implies that a complete list would be impossible. Thus, as a final example, consider how simple reinforcement learning might account for some of the increases in fair behavior. To the extent that children's initially weak motivations towards fairness lead to good outcomes (e.g., praise from adults, being included rather than shunned by peers), this may strengthen the behavior. Importantly, this idea is separate from the idea that the child is explicitly taught that one should act in certain ways, and is instead focused on children's internally motivated behavior becoming associated with positive outcomes. This idea has been explored by multiple researchers (e.g., Chater, Vlaev, & Grinberg, 2008), and, despite the simplicity of the learning mechanisms involved, it may lead to context-sensitive behavior in which people are intuitively fair in cooperative environments but intuitively selfish in noncooperative environments (Nishi, Christakis, Evans, O'Malley, & Rand, 2016; Rand, Greene, & Nowak, 2012).

Implications and Future Directions

This chapter has argued for an approach to fairness as a complicated phenomenon composed of many contributing mechanisms, but unified by the function of gaining a reputation as a valuable collaborator who will put in an appropriate proportion of effort on a joint task, and take an appropriate proportion of the resultant rewards. Given that increasing age is associated with increases in the importance of benefits from joint tasks, and with increases in the ability to contribute to joint tasks, fairness increases over development. This may be due to a default timeline for development determined by the average features of our ancestral environment, as well as individual learning over each person's lifespan. Even if there is an independent preference for fairness, our actual behavior (fair or not) is determined by a wide range of factors. This final section explores implications of this account for cross-cultural research, comparative research, and developmental research.

Implications for Cross-Cultural Research

Several studies have explored the extent to which fairness concerns are cross-culturally universal (Henrich et al., 2006; Hsu, Anen, & Quartz, 2008; Wright et al., 2012; though see criticisms of some methods in Dana, Cain, & Dawes, 2006; List,

2007; Winking & Mizer, 2013), and the extent to which they vary. For example, Henrich et al. (2010) studied dictator game behavior across 15 diverse populations, from the nomadic and foraging Hadza in Tanzania, to wageworkers in Missouri. They found that the degree to which a population engaged in an economic market (as measured by the percent of calories an average individual purchased) was correlated with offers in the dictator game. It is not possible to determine causation from their data (Delton, Krasnow, Cosmides, & Tooby, 2010), and one salient alternative is that participants use their experience in daily life to interpret the unusual situation presented to them in the economic game (Baumard et al., 2010).

This analysis suggests that the cross-cultural differences may reflect *not* the extent to which fairness norms are present in a culture, but the extent to which they are applied to an economic game played with a stranger: people who engage in frequent mutually beneficial economic exchanges with strangers (i.e., in societies with high market integration) import these interaction norms into the game, whereas people who do not engage in as much market activity with strangers do not import their (potentially equally strong) fairness norms into the game.

Future cross-cultural research might investigate how people apply fairness norms in economic games played against a wider range of individuals, ranging from anonymous strangers (as in Henrich et al., 2010) to face-to-face interactions with close friends. It could be that people in societies with low market integration show just as strong fairness norms with close friends as people in societies with high market integration. In fact, given the importance of collaborating with these known others, it is possible that the correlation between market integration and fairness would reverse. Indeed, such results would be consistent with research showing surprisingly high levels of egalitarianism in hunter-gatherer societies (Pennisi, 2014). Once more is known about adult patterns of behavior, it will be important to investigate how the common initial state in infancy diverges across cultures into the adult patterns. There are already interesting cross-cultural studies of the development of fairness (e.g., Blake et al., 2015; House et al., 2013), but (as with adults) we know little about how children apply fairness differentially with wide ranges of individuals.

Implications for Nonhuman Research

Currently, much of the literature on nonhuman behaviors related to morality are focused on identifying whether or not individuals show a nonzero level of behavior that seems related to a human capacity (e.g., the debate over nonhuman fairness described earlier in this chapter). However, if moral behavior is (largely) for gaining reputational benefits so that one is chosen as a participant in cooperative activities with others, then nonhuman species should be expected to show quite limited "moral" behavior. It is useful to be clear about how this claim is different from the previous section's analysis of cross-cultural variation. That claim was about how individual humans flexibly apply characteristically human fairness concerns depending on their environment; this section is about why nonhuman species *as a group* might be expected not to show much "moral" behavior.

One approach for moving the discussion forward comes from recent work comparing multiple species within a single paradigm (e.g., Claidière et al., 2015). For example, Burkart et al. (2014) tested prosocial behavior across 15 primate species, and found that prosocial motivation was associated with cooperative breeding. Similarly, it could be that fairness is only present to the extent that there is partner choice for collaborative tasks. More generally, hypotheses about the likely distribution of behavior across species, and then unified experimental designs applied across a wide range of species within a single paper, allows for more systematic testing than piecemeal results about whether ("$p < 0.05$") each particular species shows nonzero evidence of a behavior. This is especially true since, as is common throughout psychology, positive results are more likely to be reported than negative results (see Bones, 2012).

Future Directions for the Development of Fairness

Building off of the discussion on cross-cultural differences, a major question for future research on the development of fairness is how children come to acquire culturally specific behaviors about the scope of fairness. Progress on this question can build on work in a wide range of disciplines, from evolutionary developmental biology (e.g., adaptive developmental plasticity; Nettle & Bateson, 2015) to research on adults' valuation of others' welfare (e.g., "welfare tradeoff ratios," Tooby, Cosmides, Sell, Lieberman, & Sznycer, 2008). Most notably, the partner-choice framework (in accordance with common moral intuitions) suggests that it is appropriate for me to treat friends differently than strangers, but there is individual variation in judgments of how much more people should weigh the welfare of socially close versus socially distant others.

Reflecting the complexity of fairness judgments, future developmental research should also proceed with greater attention paid to the specific capacities being tested with various methods. When multiple approaches are included in one study (e.g., predictions vs. behaviors in Smith et al., 2013; "should" vs. "want" in Sheskin et al., 2016), it can reveal large differences in fairness behavior. This is likely true for a wide range of additional factors (whether the recipient is present or absent, whether the study is in a public park with onlookers or in a private testing room in a lab, etc.). Individual studies that explore a specific set of features can certainly be informative, but larger-scale studies that systematically test the impact of such features can be additionally informative (compare with the similar point made about animal research in the previous subsection).

In sum, much is known about the emergence of fairness behavior over childhood development. There is strong evidence for evaluation of others' fairness behavior even by young infants (e.g., Sloane et al., 2012), but there is an initially weak willingness to take costs to behave fairly (e.g., Smith et al., 2013), with the motivation increasing over time (e.g., Benenson et al., 2007). This "knowledge-behavior gap" (Blake et al., 2014) may be explained by an analysis of the typical costs and benefits

of moral judgment and behavior at different ages (Sheskin, Chevallier, Lambert, & Baumard, 2014), and this framework may be useful for future work looking at the development not just of our general capacity for fairness, but also for individual and cross-cultural differences in how this capacity is *applied* across ecologies and to different people.

References

Abbot, P., Abe, J., Alcock, J., Alizon, S., Alpedrinha, J. A., Andersson, M., … Zink, A. (2011). Inclusive fitness theory and eusociality. *Nature, 471*(7339), E1–E4; author reply E9–E10. doi:10.1038/nature09831

Barclay, P., & Willer, R. (2007). Partner choice creates competitive altruism in humans. *Proceedings of the Royal Society B: Biological Sciences, 274*(1610), 749–753. doi:10.1098/rspb.2006.0209.

Baron, J. (1994). Nonconsequentialist decisions. *Behavioral and Brain Sciences, 17*(01), 1–10.

Batson, C. D., Duncan, B. D., Ackerman, P., Buckley, T., & Birch, K. (1981). Is empathic emotion a source of altruistic motivation? *Journal of Personality and Social Psychology, 40*(2), 290–302.

Baumard, N., André, J. B., & Sperber, D. (2013). A mutualistic approach to morality: The evolution of fairness by partner choice. *The Behavioral and Brain Sciences, 36*(1), 59–78. doi:10.1017/S0140525X11002202.

Baumard, N., Boyer, P., & Sperber, D. (2010). Evolution of fairness: Cultural variability. *Science, 329*(5990), 388–389.

Baumard, N., & Sheskin, M. (2015). Partner choice and the evolution of a contractualist morality. In J. Decety & T. Wheatley (Eds.), *The moral brain* (pp. 35–48). Cambridge, MA: MIT Press.

Benenson, J. F., Pascoe, J., & Radmore, N. (2007). Children's altruistic behavior in the dictator game. *Evolution and Human Behavior, 28*(3), 168–175. doi:10.1016/j.evolhumbehav.2006.10.003.

Bird, A., & Tobin, E. (2016). Natural kinds. In E. N. Zalta (Ed.), *The Stanford encyclopedia of philosophy* (Spring 2016 ed.). Stanford, CA: Stanford University. http://plato.stanford.edu/archives/spr2016/entries/natural-kinds/.

Bjorklund, D. F., & Ellis, B. J. (2014). Children, childhood, and development in evolutionary perspective. *Developmental Review, 34*(3), 225–264. doi:10.1016/j.dr.2014.05.005.

Blake, P. R., & McAuliffe, K. (2011). "I had so much it didn't seem fair": Eight-year-olds reject two forms of inequity. *Cognition, 120*(2), 215–224.

Blake, P. R., McAuliffe, K., Corbit, J., Callaghan, T. C., Barry, O., Bowie, A., … Warneken, F. (2015). The ontogeny of fairness in seven societies. *Nature, 528*(7581), 258–261. doi:10.1038/nature15703

Blake, P. R., McAuliffe, K., & Warneken, F. (2014). The developmental origins of fairness: The knowledge-behavior gap. *Trends in Cognitive Sciences, 18*(11), 559–561. doi:10.1016/j.tics.2014.08.00.

Bloom, P. (2016). *Against empathy: The case for rational compassion*. New York, NY: Ecco Press.

Bonawitz, E., Shafto, P., Gweon, H., Goodman, N. D., Spelke, E., & Schulz, L. (2011). The double-edged sword of pedagogy: Instruction limits spontaneous exploration and discovery. *Cognition, 120*(3), 322–330. doi:10.1016/j.cognition.2010.10.001.

Bones, A. K. (2012). We knew the future all along: Scientific hypothesizing is much more accurate than other forms of precognition—A satire in one part. *Perspectives on Psychological Science, 7*(3), 307–309. doi:10.1177/1745691612441216.

Brosnan, S. F., & de Waal, F. B. (2003). Monkeys reject unequal pay. *Nature, 425*(6955), 297–299. doi:10.1038/nature01963.

Brosnan, S. F., Talbot, C., Ahlgren, M., Lambeth, S. P., & Schapiro, S. J. (2010). Mechanisms underlying responses to inequitable outcomes in chimpanzees, pan troglodytes. *Animal Behaviour, 79*(6), 1229–1237. doi:10.1016/j.anbehav.2010.02.019.

Burkart, J. M., Allon, O., Amici, F., Fichtel, C., Finkenwirth, C., Heschl, A., … van Schaik, C. P. (2014). The evolutionary origin of human hyper-cooperation. *Nature Communications, 5*, 4747. doi:10.1038/ncomms574

Chater, N., Vlaev, I., & Grinberg, M. (2008). A new consequence of simpson's paradox: Stable cooperation in one-shot prisoner's dilemma from populations of individualistic learners. *Journal of Experimental Psychology: General, 137*(3), 403–421. doi:10.1037/0096-3445.137.3.403.

Chernyak, N., Sandham, B., Harris, P. L., & Cordes, S. (2016). Numerical cognition explains age-related changes in third-party fairness. *Developmental Psychology, 52*(10), 1555–1562.

Claidière, N., Whiten, A., Mareno, M. C., Messer, E. J., Brosnan, S. F., Hopper, L. M., … McGuigan, N. (2015). Selective and contagious prosocial resource donation in capuchin monkeys, chimpanzees and humans. *Scientific Reports, 5*, 7631. doi:10.1038/srep07631

Cowell, J. M., Samek, A., List, J., & Decety, J. (2015). The curious relation between theory of mind and sharing in preschool age children. *PloS One, 10*(2), e0117947. doi:10.1371/journal.pone.0117947.

Csibra, G., & Gergely, G. (2009). Natural pedagogy. *Trends in Cognitive Sciences, 13*(4), 148–153. doi:10.1016/j.tics.2009.01.005.

Dana, J., Cain, D. M., & Dawes, R. M. (2006). What you don't know won't hurt me: Costly (but quiet) exit in dictator games. *Organizational Behavior and Human Decision Processes, 100*(2), 193–201. doi:10.1016/j.obhdp.2005.10.001.

Debove, S., André, J. B., & Baumard, N. (2015). Partner choice creates fairness in humans. *Proceedings of the Royal Society B: Biological Sciences, 282*(1808), 20150392. doi:10.1098/rspb.2015.0392.

Delton, A. W., Krasnow, M. M., Cosmides, L., & Tooby, J. (2010). Evolution of fairness: Rereading the data. *Science, 329*(5990), 389–389.

Edele, A., Dziobek, I., & Keller, M. (2013). Explaining altruistic sharing in the dictator game: The role of affective empathy, cognitive empathy, and justice sensitivity. *Learning and Individual Differences, 24*, 96–102.

Engelmann, J. M., Over, H., Herrmann, E., & Tomasello, M. (2013). Young children care more about their reputation with ingroup members and potential reciprocators. *Developmental Science, 16*(6), 952–958. doi:10.1111/desc.12086.

Fehr, E., Bernhard, H., & Rockenbach, B. (2008). Egalitarianism in young children. *Nature, 454*(7208), 1079–1083. doi:10.1038/nature07155.

Fletcher, G. E. (2008). Attending to the outcome of others: Disadvantageous inequity aversion in male capuchin monkeys (cebus apella). *American Journal of Primatology, 70*(9), 901–905. doi:10.1002/ajp.20576.

Geraci, A., & Surian, L. (2011). The developmental roots of fairness: Infants' reactions to equal and unequal distributions of resources. *Developmental Science, 14*(5), 1012–1020. doi:10.1111/j.1467-7687.2011.01048.x.

Gray, K., & Schein, C. (2016). No absolutism here: Harm predicts moral judgment 30× better than disgust-commentary on Scott, Inbar, & Rozin (2016). *Perspectives on Psychological Science: A Journal of the Association for Psychological Science, 11*(3), 325–329. doi:10.1177/1745691616635598.

Gray, K., Schein, C., & Ward, A. F. (2014). The myth of harmless wrongs in moral cognition: Automatic dyadic completion from sin to suffering. *Journal of Experimental Psychology: General, 143*(4), 1600.

Greene, J. D. (2015). The rise of moral cognition. *Cognition, 135*, 39–42. doi:10.1016/j.cognition.2014.11.018.

Gurven, M., Kaplan, H., & Gutierrez, M. (2006). How long does it take to become a proficient hunter? Implications for the evolution of extended development and long life span. *Journal of Human Evolution, 51*(5), 454–470. doi:10.1016/j.jhevol.2006.05.003.

Güth, W., Schmittberger, R., & Schwarze, B. (1982). An experimental analysis of ultimatum bargaining. *Journal of Economic Behavior and Organization, 3*(4), 367–388.
Haidt, J. (2012). *The righteous mind: Why good people are divided by politics and religion*. New York, NY: Penguin.
Haidt, J., & Joseph, C. (2004). Intuitive ethics: How innately prepared intuitions generate culturally variable virtues. *Daedalus, 133*(4), 55–66.
Hamann, K., Warneken, F., Greenberg, J. R., & Tomasello, M. (2011). Collaboration encourages equal sharing in children but not in chimpanzees. *Nature, 476*(7360), 328–331. doi:10.1038/nature10278.
Hamilton, W. D. (1964). The Genetical evolution of social behaviour. *Journal of Theoretical Biology, 7*(1), 1–16.
Hamlin, J. K., Ullman, T., Tenenbaum, J., Goodman, N., & Baker, C. (2013). The mentalistic basis of core social cognition: Experiments in preverbal infants and a computational model. *Developmental Science, 16*(2), 209–226. doi:10.1111/desc.12017.
Hamlin, J. K., Wynn, K., & Bloom, P. (2007). Social evaluation by preverbal infants. *Nature, 450*(7169), 557–559. doi:10.1038/nature06288.
Heider, F., & Simmel, M. (1944). An experimental study of apparent behavior. *The American Journal of Psychology, 57*(2), 243–259.
Henrich, J., Ensminger, J., Mcelreath, R., Barr, A., Barrett, C., Bolyanatz, A., … Ziker, J. (2010). Markets, religion, community size, and the evolution of fairness and punishment. *Science, 1480*(March 2010), 1480–1484. http://doi.org/10.1126/science.1182238
Henrich, J., McElreath, R., Barr, A., Ensminger, J., Barrett, C., Bolyanatz, A., … Ziker, J. (2006). Costly punishment across human societies. *Science (New York, N.Y.), 312*(5781), 1767–1770. doi:10.1126/science.1127333
Heyes, C. (2016). Who knows? Metacognitive social learning strategies. *Trends in Cognitive Sciences, 20*(3), 204–213.
Horner, V., & Whiten, A. (2005). Causal knowledge and imitation/emulation switching in chimpanzees (*Pan troglodytes*) and children (*Homo sapiens*). *Animal Cognition, 8*(3), 164–181. doi:10.1007/s10071-004-0239-6.
House, B. R., Silk, J. B., Henrich, J., Barrett, H. C., Scelza, B. A., Boyette, A. H., … Laurence, S. (2013). Ontogeny of prosocial behavior across diverse societies. *Proceedings of the National Academy of Sciences of the United States of America, 110*(36), 14586–14591. doi:10.1073/pnas.1221217110.
Hsu, M., Anen, C., & Quartz, S. R. (2008). The right and the good: Distributive justice and neural encoding of equity and efficiency. *Science (New York, N.Y.), 320*(5879), 1092–1095. doi:10.1126/science.1153651.
Johnston, A. M., Holden, P. C., & Santos, L. R. (2016). Exploring the evolutionary origins of overimitation: A comparison across domesticated and non-domesticated canids. *Developmental Science, 20*(4). doi:10.1111/desc.12460
Johnston, A. M., Mills, C. M., & Landrum, A. R. (2015). How do children weigh competence and benevolence when deciding whom to trust? *Cognition, 144*, 76–90. doi:10.1016/j.cognition.2015.07.015.
Kahneman, D., Knetsch, J. L., & Thaler, R. (1986). Fairness as a constraint on profit seeking: Entitlements in the market. *The American Economic Review, 76*(4), 728–741.
Koenig, M. A., Clément, F., & Harris, P. L. (2004). Trust in testimony: Children's use of true and false statements. *Psychological Science, 15*(10), 694–698.
Kuhlmeier, V., Wynn, K., & Bloom, P. (2003). Attribution of dispositional states by 12-month-olds. *Psychological Science, 14*(5), 402–408.
Legare, C. H., & Nielsen, M. (2015). Imitation and innovation: The dual engines of cultural learning. *Trends in Cognitive Sciences, 19*(11), 688–699.
Liberman, Z., Woodward, A. L., & Kinzler, K. D. (2016). Preverbal infants infer third-party social relationships based on language. *Cognitive Science, 41*(Suppl 3), 622–634.
List, J. A. (2007). On the interpretation of giving in dictator games. *Journal of Political Economy, 115*(3), 482–493.

LoBue, V., Nishida, T., Chiong, C., DeLoache, J. S., & Haidt, J. (2011). When getting something good is bad: Even three-year-olds react to inequality. *Social Development, 20*(1), 54–170. http://doi.org/10.1111/j.1467-9507.2009.00560.x.

Lyons, D. E., Young, A. G., & Keil, F. C. (2007). The hidden structure of overimitation. *Proceedings of the National Academy of Sciences of the United States of America, 104*(50), 19751–19756. doi:10.1073/pnas.0704452104.

MacFarquhar, L. (2015). *Strangers drowning: Grappling with impossible idealism, drastic choices, and the overpowering urge to help*. New York, NY: Penguin Press HC.

McKay, R., & Whitehouse, H. (2015). Religion and morality. *Psychological Bulletin, 141*(2), 447–473. doi:10.1037/a0038455.

Meehan, C. L., Quinlan, R., & Malcom, C. D. (2013). Cooperative breeding and maternal energy expenditure among aka foragers. *American Journal of Human Biology: The Official Journal of the Human Biology Council, 25*(1), 42–57. doi:10.1002/ajhb.22336.

Meristo, M., & Surian, L. (2013). Do infants detect indirect reciprocity? *Cognition, 129*(1), 102–113. doi:10.1016/j.cognition.2013.06.006.

Nettle, D., & Bateson, M. (2015). Adaptive developmental plasticity: What is it, how can we recognize it and when can it evolve? *Proceedings of the Royal Society B: Biological Sciences, 282*(1812), 20151005. doi:10.1098/rspb.2015.1005.

Nishi, A., Christakis, N. A., Evans, A. M., O'Malley, A. J., & Rand, D. G. (2016). Social environment shapes the speed of cooperation. *Scientific Reports*, 6.

Noë, R., & Hammerstein, P. (1994). Biological markets: Supply and demand determine the effect of partner choice in cooperation, mutualism and mating. *Behavioral Ecology and Sociobiology, 35*(1), 1–11.

Nowak, M. A., Tarnita, C. E., & Wilson, E. O. (2010). The evolution of eusociality. *Nature, 466*(7310), 1057–1062. doi:10.1038/nature09205.

Pennisi, E. (2014). Our egalitarian Eden. *Science, 344*(6186), 824–825.

Piazza, J., Bering, J. M., & Ingram, G. (2011). "Princess Alice is watching you": Children's belief in an invisible person inhibits cheating. *Journal of Experimental Child Psychology, 109*(3), 311–320. doi:10.1016/j.jecp.2011.02.003.

Poulin-Dubois, D., & Brosseau-Liard, P. (2016). The developmental origins of selective social learning. *Current Directions in Psychological Science, 25*(1), 60–64.

Rand, D. G., Greene, J. D., & Nowak, M. A. (2012). Spontaneous giving and calculated greed. *Nature, 489*(7416), 427–430. doi:10.1038/nature11467.

Range, F., Horn, L., Viranyi, Z., & Huber, L. (2009). The absence of reward induces inequity aversion in dogs. *Proceedings of the National Academy of Sciences of the United States of America, 106*(1), 340–345.

Schmidt, M. F., & Sommerville, J. A. (2011). Fairness expectations and altruistic sharing in 15-month-old human infants. *PloS One, 6*(10), e23223. doi:10.1371/journal.pone.00232283.

Shaw, A., & Olson, K. R. (2012). Children discard a resource to avoid inequity. *Journal of Experimental Psychology: General, 141*(2), 382–395.

Sheskin, M., & Santos, L. (2012). The evolution of morality: which aspects of human moral concerns are shared with nonhuman primates? In J. Vonk & T. K. Shackelford (Eds.), The Oxford handbook of comparative evolutionary psychology (pp. 434–450). New York, NY: Oxford University Press.

Sheskin, M., Ashayeri, K., Skerry, A., & Santos, L. R. (2014). Capuchin monkeys (Cebus apella) fail to show inequality aversion in a no-cost situation. *Evolution and Human Behavior, 35*(2), 80–88. http://doi.org/10.1016/j.evolhumbehav.2013.10.004.

Sheskin, M., Bloom, P., & Wynn, K. (2014). Anti-equality: Social comparison in young children. *Cognition, 130*(2), 152–156. doi:10.1016/j.cognition.2013.10.008.

Sheskin, M., Chevallier, C., Lambert, S., & Baumard, N. (2014). Life-history theory explains childhood moral development. *Trends in Cognitive Sciences, 18*(12), 613–615. doi:10.1016/j.tics.2014.08.004.

Sheskin, M., Nadal, A., Croom, A., Mayer, T., Nissel, J., & Bloom, P. (2016). Some equalities are more equal than others: Quality equality emerges later than numerical equality. *Child Development, 87*(5), 1520–1528. doi:10.1111/cdev.12544.

Shweder, R. A., Much, N. C., Mahapatra, M., & Park, L. (1997). The "big three" of morality (autonomy, community, divinity) and the "big three" explanations of suffering. In A. Brandt & P. Rozin (Eds.), *Morality and health*. New York, NY: Routledge.

Silberberg, A., Crescimbene, L., Addessi, E., Anderson, J. R., & Visalberghi, E. (2009). Does inequity aversion depend on a frustration effect? A test with capuchin monkeys (cebus apella). *Animal Cognition, 12*(3), 505–509. doi:10.1007/s10071-009-0211-6.

Sloane, S., Baillargeon, R., & Premack, D. (2012). Do infants have a sense of fairness? *Psychological Science, 23*(2), 196–204. doi:10.1177/0956797611422072.

Smith, C. E., Blake, P. R., & Harris, P. L. (2013). I should but I won't: Why young children endorse norms of fair sharing but do not follow them. *PloS One, 8*(3), e59510. http://doi.org/10.1371/journal.pone.0059510.

Sommerville, J. A., Schmidt, M. F. H., Yun, J.-E., & Burns, M. (2013). The development of fairness expectations and prosocial behavior in the second year of life. *Infancy, 18*(1), 40–66. doi:10.1111/j.1532-7078.2012.00129.x.

Takagishi, H., Kameshima, S., Schug, J., Koizumi, M., & Yamagishi, T. (2010). Theory of mind enhances preference for fairness. *Journal of Experimental Child Psychology, 105*, 130–137. doi:10.1016/j.jecp.2009.09.005.

Talbot, C. F., Price, S. A., & Brosnan, S. F. (2016). Inequity responses in nonhuman animals. In C. Sabbagh & M. Schmitt (Eds.), *Handbook of social justice theory and research* (pp. 387–403). New York, NY: Springer.

Tinbergen, N. (1963). On aims and methods of ethology. *Zeitschfrift Fur Tierpsycologie, 20*, 410–433.

Tomasello, M. (2016). *A natural history of human morality*. London: Harvard University Press.

Tooby, J., Cosmides, L., Sell, A., Lieberman, D., & Sznycer, D. (2008). *15 internal regulatory variables and the design of human motivation: A computational and evolutionary approach*, *Handbook of approach and avoidance motivation* (Vol. 251). Mahwah, NJ: Lawrence Erlbaum.

Uğurel-Semin, R. (1952). Moral behavior and moral judgment of children. *The Journal of Abnormal and Social Psychology, 47*, 463–474. doi:10.1037/h0056970.

Warneken, F., Hare, B., Melis, A. P., Hanus, D., & Tomasello, M. (2007). Spontaneous altruism by chimpanzees and young children. *PLoS Biology, 5*(7), 1414–1420. doi:10.1371/journal.pbio.0050184.

Warneken, F., & Tomasello, M. (2006). Altruistic helping in human infants and young chimpanzees. *Science (New York, N.Y.), 311*(5765), 1301–1303. doi:10.1126/science.1121448.

Wascher, C. A., & Bugnyar, T. (2013). Behavioral responses to inequity in reward distribution and working effort in crows and ravens. *PloS One, 8*(2), e56885. doi:10.1371/journal.pone.0056885.

Waytz, A., Zaki, J., & Mitchell, J. P. (2012). Response of dorsomedial prefrontal cortex predicts altruistic behavior. *The Journal of Neuroscience: The Official Journal of the Society for Neuroscience, 32*(22), 7646–7650. doi:10.1523/JNEUROSCI.6193-11.2012.

West, S. A., Griffin, A. S., & Gardner, A. (2008). Social semantics: How useful has group selection been? *Journal of Evolutionary Biology, 21*(1), 374–385. doi:10.1111/j.1420-9101.2007.01458.x.

Winking, J., & Mizer, N. (2013). Natural-field dictator game shows no altruistic giving. *Evolution and Human Behavior, 34*(4), 288–293. doi:10.1016/j.evolhumbehav.2013.04.002.

Wright, N. D., Hodgson, K., Fleming, S. M., Symmonds, M., Guitart-Masip, M., & Dolan, R. J. (2012). Human responses to unfairness with primary rewards and their biological limits. *Scientific Reports, 2*, 593. doi:10.1038/srep00593.