

## *Chapter 6*

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# **Intuition and Deliberation in Morality and Cooperation: An Overview of the Literature**

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Behavioral sciences often rely on a dual-process model of the mind to describe human decision-making processes (Evans, 2008). Underlying this model is the evolutionary view of a “cognitive miser,” of a mind constantly trying to save energy by reacting automatically to environmental cues (Fiske & Taylor, 2013). A long-standing debate revolves around the question of whether these intuitive reactions can

be beneficial or whether we need effortful deliberation for achieving our goals (Kahneman & Klein, 2009). Here we first summarize this dual-process model of the mind and the arguments made on both sides of this debate. We then focus on a question that remains in relative neglect in the management literature—whether intuitions support ethical and cooperative behavior. As a provisional answer, we provide an overview of the literature and discuss the emerging picture on dual-process accounts of morality and cooperation.

## **The Dual-Process Model of the Mind**

The model posits two distinct systems of cognitive processes. System 1 refers to the automatic, intuitive, and low-effort processes of the mind (Kahneman, 2011). Having emerged much earlier in our evolutionary history, we share this capacity for automatic thinking with many other animals. System 2 processes, on the other hand, are to a large extent what makes us distinctively human (Sapolsky, 2017). Directly related to the relatively recent evolution of the neocortex, System 2 corresponds to more deliberated, analytical, high-effort, and controlled processes (Kahneman, 2011; Tversky & Kahneman, 1974). While novel nontrivial decisions (e.g., multiplying two large numbers) often require System 2 thinking, we naturally rely on System 1 to conduct routinized behavior (e.g., driving our car, walking our dog, brushing our teeth). For example, try to answer as fast as you can, what is 2 times 2? And, what would be your ranking in a race, if you run past the person in the second position? Given that our intuitions often provide the correct answer to the first but not the second question (Thomson & Oppenheimer, 2016), research on the dual-process decision-making has sought to answer a third question.

## **Can We Rely on Our Intuitions?**

System 1 processes, reflecting adaptations to our ancestral environment, have the evolutionary advantage of minimizing cognitive effort. Yet the environments we now inhabit and the problems we currently face are usually quite different than back in our days in the savannah. A prominent approach, the heuristics-and-biases (HB) view, emphasizes how this mismatch between our intuitions and our environments result in systematic cognitive biases (Kahneman, 2011). In contrast, the simple-heuristics (SH) and the naturalistic decision-making (NDM) views emphasize how intuitions can be reliable when they fit well with the environment (Gigerenzer, Hertwig, & Pachur, 2011; Klein, 2008).

According to HB, systematic errors in judgment are a natural by-product of our System 1 processes that have largely failed to catch up with our rapidly changing worlds. Take the conjunction fallacy, which demonstrates how our intuitions can systematically fail when making the probabilistic inferences that we regularly rely

on in organizational settings. Linda, for example, is someone concerned with issues of social justice. Which do you think is more probable, that (A) Linda is a bank teller, or that (B) Linda is a bank teller and a feminist? While most people (over 80 percent) tend to answer B, deliberating on the correct answer makes it clear that B must be a subset of A and that it is hence less probable to occur (Tversky & Kahneman, 1983). A long list of other cognitive biases have been identified by research on the HB view (e.g., Tversky & Kahneman, 1974), which shows how human beings frequently and systematically fail the normative benchmarks of procedural rationality.

In contrast, the NDM and SH views emphasize the practical successes of automatic thought. The NDM view seeks to explain the efficiency of expert intuition in natural environments. For example, fireground commanders are often able to successfully make life-saving decisions (e.g., regarding how the flames will spread, whether a house will collapse) under acute time pressure (Klein, Calderwood, & Clinton-Cirocco, 1986). NDM explains such impressive intuitive judgments as the result of becoming skilled in the unconscious recognition of relevant cues in a complex environment (Klein, 1993). Rather than the instantaneous recognition of complex patterns, the SH view instead posits that “simple heuristics can make us smart” by providing practical and less error-prone results in a complex and uncertain world (Gigerenzer, Todd, & ABC Research Group, 1999). Accordingly, System 1 processes can become well-adapted to our current natural and social environments through the development of a repertoire of simple rules called heuristics. Take, for example, the equality heuristic, the simple rule of “allocating resources equally to each of N alternatives” (Gigerenzer, 2008). In the unpredictable world of financial investments, none of the sophisticated optimizing algorithms, including Markowitz’s Nobel-winning mean-variance portfolio model, were found to outperform this simple rule (DeMiguel, Garlappi, & Uppal, 2007).

The contrasting views of HB on the one hand and NDM and SH on the other are mainly a matter of emphasis on the negative versus positive consequences of relying on intuitions. Despite the various differences in viewpoints (Gigerenzer, 2008), scholars tend to agree that intuitive performance can be improved by gaining experience through regular feedback, especially when the environment is conducive to such learning, and by relying on the right expertise in the right context (Kahneman & Klein, 2009).

These insights have gained increased attention in the management literature (Artinger, Petersen, Gigerenzer, & Weibler, 2015; Basel & Brühl, 2013). It is now widely reported that managers (Khatri & Ng, 2000; Parikh, Neubauer, & Lank, 1994) and entrepreneurs (Koudstaal, Sloof, & van Praag, 2018) routinely rely on intuitions and that reliance on intuition is positively associated with managerial seniority (Sadler-Smith & Shefy, 2004). In sum, the emerging picture indicates that although intuitive managerial decisions are often successful and although there is room for significant improvement (Loock & Hinnen, 2015), integration of individual deliberation as well as external analytical and empirical aids to managerial

decision-making should be encouraged (Hodgkinson, Bown, Maule, Glaister, & Pearman, 1999), since reliance on intuitions in business settings have also been shown to result in systematic failures (Li & Tang, 2010; Rosenzweig, 2007; Simon, Houghton, & Aquino, 2000).

Despite the growing scholarship on the pros and cons of intuitive managerial decision-making, the literature understandably prioritizes the aspects of strategic business decisions and consequent corporate financial performance. However, dual-process theories in behavioral sciences have over the past 30 years been extended to decisions regarding morality and cooperation, which remain neglected in the management literature. As these findings may provide additional insights into managerial decisions (e.g., corruption, collusion, and social responsibility), we now review and summarize this relatively more recent literature.

## Moral Intuitions

The origins and substance of moral judgments have been extensively examined for the last 50 years (Haidt, 2001, 2007; Kohlberg & Kohlberg, 1969; Piaget, 1965; Shweder, Much, Mahapatra, & Park, 1997). An early account, Kohlberg's *rationalistic theory*, which was for a long time the paradigmatic approach, posits that moral judgments are a result of advanced cognitive processes. According to this approach, even though emotional and intuitive processes may play a role, the necessary condition for arriving at moral judgments is to rely on reflective and analytic processes. Kohlberg defines moral judgments in hierarchical stages of universal applicability and consequently identifies three stages of moral development that proceed from pre-conventional to conventional and from conventional to post-conventional periods. Based on the justifications they provide when facing moral dilemmas, Kohlberg's method classifies those who refer to universal principles of justice (e.g., human rights) as having achieved the post-conventional stage of moral judgments. Kohlberg's implicit assumption here is that moral and cognitive development are intertwined, where reflective thought processes correspond to higher order moral judgments (i.e., post-conventional morality). Although Kohlberg's theory has been severely criticized as showing an essentialist bias toward Western liberalism (e.g., Haidt, 2007), more recent studies show that endorsement of the principles of universal justice (e.g., equality) indeed often requires more sophisticated, reflective processes (Napier & Luguri, 2013; Van Berkel, Crandall, Eidelman, & Blanchar, 2015; Yilmaz & Saribay, 2017a, 2017b).

A more recent approach that also assigns a pivotal role to cognitive processes in moral judgments is Greene's *dual-process model* (2007). The model predicts that moral judgments tend to be consistent with either utilitarian or deontological ethics depending on whether judgments are made deliberately or intuitively. While utilitarianism prioritizes maximizing the aggregate social welfare (Mill, 1863), deontological judgments are guided by moral principles with simple rules of application

(“you shall not kill”). Think of the classical trolley dilemma, for example: a runaway trolley is on the path to kill five people and you have the chance to save these lives by sacrificing the life of one other person. What would you do? Greene finds that people tend to approve of using a switch that diverts the trolley to a side track, where it will instead kill one person, while they tend to disapprove of making a similar sacrifice by pushing someone on the tracks to stop the trolley. Greene suggests that the idea of actively pushing someone to his or her death triggers a visceral reaction that results in an intuitive deontological response (i.e., it is wrong to kill), whereas lack of such emotions when using the switch engages utilitarian reasoning (i.e., it is right to save as many lives as possible).

Consistent with Greene’s dual-process account, utilitarian judgments have been shown to correlate with activity in brain regions responsible for analytic thinking, whereas deontological judgments have been shown to coexist with emotional arousal (Greene, 2007; Koenigs et al., 2007). Greene’s account finds further support in behavioral experiments. For example, it takes more time to make utilitarian judgments than to make deontological judgments about moral dilemmas (Greene, Sommerville, Nystrom, Darley, & Cohen, 2001). Similarly, activating analytic thinking increases (Paxton, Ungar, & Greene, 2012), whereas activating intuitive thinking decreases (Trémolière, De Neys, & Bonnefon, 2012), the endorsement of utilitarian moral judgments. More recently, Greene’s account has been criticized by the fact that approval of sacrificial killing of one person (with the consequence of saving many others) does not necessarily require reliance on utilitarian ethics or analytical thinking (Kahane, Everett, Earp, Farias, & Savulescu, 2015). In particular, it has been shown that psychopathic tendencies may result in behavior similar to utilitarian moral judgments (Aktas, Yilmaz, & Bahçekapili, 2017).

In contrast to Kohlberg’s and Greene’s theories that assign a pivotal role to deliberation in the formation of normative judgments, Haidt’s *social intuitionist model* (2001) predicts that moral judgments are exclusively made by System 1 processes, and that deliberation (i.e., System 2 processes) is merely used to rationalize these intuitively made moral judgments. For example, having read a hypothetical scenario involving an incestual relationship that does not result in any physical or psychological harm to the parties involved, people tend to immediately and strongly judge this relationship as morally wrong while often failing to provide deliberated justifications for their reactions. The natural process of making such moral judgment therefore seems essentially intuitive and not reflective (Haidt, 2001). In short, the social intuitionist model involves a foundational criticism of previous accounts of morality by prioritizing System 1 processes in moral judgments.

Whereas the social intuitionist model (Haidt, 2001) explains the role of cognitive processes in moral judgments, the more recent *moral foundations theory* (Graham et al., 2011; Haidt, 2012) seeks to explain the origin and substance of these moral judgments. The theory posits that moral judgments are evolutionary

adaptions and that all societies rely on five distinct types or foundations of moral judgments in varying degrees. Care/harm relates to the protection of the offspring or the weak. Fairness/cheating relates to the sustenance of group cohesion and detection of those who disrupt it. Loyalty/betrayal is about favoring one's own group. Authority/subversion corresponds to support for hierarchical social structures. Sanctity/degradation emphasizes sacredness as well as physical and spiritual cleansing. The theory has substantial empirical backing and practical relevance. For example, liberals have been shown to embrace the dimensions of care/harm and fairness/cheating, whereas conservatives are found to put equal emphasis on all five dimensions (Graham, Haidt, & Nosek, 2009). Most people are therefore inherently righteous, yet there is significant heterogeneity in their moral compass (Haidt, 2012).

Even though moral foundations theory does not explicitly rely on the dual-process model of the mind, when interpreted through the lens of the social intuitionist model, one might expect evidence for the five evolutionarily acquired moral foundations to be stronger for intuitively made judgments. However, recent evidence draws a more complicated picture. For example, directing conservatives to make intuitive moral judgments either via cognitive-load or ego depletion manipulations resulted in judgments to become more liberal (Wright & Baril, 2011). In addition, activating analytical thinking was found to strengthen some (e.g., care, fairness) but not all (e.g., loyalty, authority, sanctity) of the moral foundations (Yilmaz & Saribay, 2017b). Other studies have found, on the other hand, that priming intuition enhances the value given to the moral foundations of care and authority (Van Berkel et al., 2015).

In short, the emerging picture shows that people tend to rely on their moral intuitions but the specific effect of intuition and deliberation on moral judgments depends on which foundations are relevant in the context of the moral problem. There is consistent evidence that deliberation can strengthen endorsement of fairness and care foundations (Yilmaz & Saribay, 2017b). Nevertheless, a dual-process interpretation that encompasses the whole spectrum of moral judgments is not yet established. In particular, questions remain whether deliberated moral judgments reflect rationalizations of intuitive responses or whether they provide a more accurate account of their personally held moral views. It also remains to be established whether intuitive moral judgments reflect evolutionary visceral reactions or whether they exhibit culturally experienced social heuristics. A likely reason for these mixed results is that moral judgments have so far been mostly studied independently of the context of regular social interactions from which they likely have emerged. Most recently, the theory of *morality as cooperation* (Curry, Mullins, & Whitehouse, 2017) argues just that, predicting moral judgments to reflect cultural or evolutionary “solutions” to recurrent problems of cooperation. Indeed, behavioral research on the dual-process accounts of cooperation have provided significant insights into the role of intuition and deliberation in social life, which we now review.

## Cooperative Intuitions

Cooperation is the act of working with others toward a common goal, such as expending effort to provide a public good (e.g., raising funds for a park in the local community) or curbing excess consumption for maintaining a common environmental resource (e.g., limiting one's CO<sub>2</sub> emissions). Although rightly seen as a defining feature of civilization, cooperation per se is not unique to humans: many other animals, in particular primates, cooperate with genetically unrelated others to gain future benefits and even positive reputation (Hauser, Chen, Chen, & Chuang, 2003). However, the scale of cooperation in human societies is second to none. More importantly, humans are characterized by a particular type of cooperation called *strong reciprocity*, which is not observed in other animals: cooperation with anonymous others at net personal cost even when reciprocal and reputational benefits are absent (Bowles & Gintis, 2011).

Evidence for this “strange” behavior is established using an experimental task called the public good game (PGG), which is regularly used to measure cooperation in social dilemma situations (Ledyard, 1995). In the PGG, each member of a group is asked to decide how much of an individual monetary endowment to contribute toward a group project and how much of it to keep for self (e.g., Fischbacher, Gächter, & Fehr, 2001). Importantly, contributing to the group project (i.e., the public good) in the PGG increases social welfare (i.e., the value of the project) while decreasing net personal earnings, thereby constituting a social dilemma (Dawes, 1980). Although standard theories of rational choice based on the assumption of pure self-regard predict absolutely no sharing of the endowment in the one-shot version of the PGG, participants in experimental studies across the globe have been found to routinely share large proportions of their endowment with anonymous others (Henrich et al., 2005).

This uniquely human trait of strong reciprocity can neither be explained by standard theories of evolution based on kinship, reciprocity, or reputation (Boyd & Richerson, 1989; Hamilton, 1964; Trivers, 1971). A widely accepted explanation of this phenomenon has been the idea that populations that culturally transmit a preference for strong reciprocity can gain benefits at the group level (Fehr & Fischbacher, 2003; Gintis, 2000). Given the likely evolutionary roots of strong reciprocity, alternative dual-process accounts of cooperation have also been proposed as explanations.

The predictions of these dual-process accounts of cooperation fall into one of two camps. A long line of research that we refer to here as *the self-control account* (SCA) argues that people are, mainly due to visceral reactions, intuitively selfish and that cognitive resources are needed to keep these urges under control in order to behave according to one's well-thought-out individual preferences or socially desirable ends (Hofmann, Friese, & Strack, 2009; Loewenstein, 1996; Metcalfe & Mischel, 1999; Myrseth & Fishbach, 2009). A more recent alternative, the self-labeled *social heuristics hypothesis* (SHH), instead posits that people



often rely on prosocial heuristics and that they become more self-regarding with deliberation in social dilemmas (Bear & Rand, 2016; Rand, Greene, & Nowak, 2012; for an early formulation of SHH see Kiyonari, Tanida, & Yamagishi, 2000). While SCA is consistent with the explanation of strong reciprocity as a deliberated preference for achieving a socially desirable end, SHH assumes people to be strictly self-regarding and puts doubt on the evidence for strong reciprocity as a “misapplied” heuristic. So how does the current evidence weigh between the two accounts?

A long list of studies has sought to experimentally test SHH. As SHH predicts higher cooperation by System 1 as compared to System 2 processes, these studies primarily used cognitive process manipulation methods (e.g., time pressure, cognitive-load, or cognitive-resource depletion) to increase reliance on one or the other system and thus to compare intuitively made and deliberated PGG decisions. We focus here on the more prevalent method of comparing decisions under time pressure (for increasing heuristics use) and time delay (for inducing deliberation): while a large-scale multi-lab replication has recently failed to find a robust effect (Bouwmeester et al., 2017), the originating studies (Rand et al., 2012, 2014), other replication attempts (Everett, Ingbreetsen, Cushman, & Cikara, 2017), and tests using improved methods (Isler, Maule, & Starmer, 2018) have found evidence for SHH. Indeed, a recent meta-analysis of time-pressure and other cognitive process manipulation studies have in the aggregate been shown to support SHH’s prediction that intuition promotes cooperation in social dilemmas (Rand, 2016).

However, evidence against SHH remains non-negligible, and a broad range of experimental findings instead provide evidence for SCA. For example, extreme time pressure, which arguably is better equipped in inducing intuitive reactions compared to relatively long time limits that merely limit deliberation (Myrseth & Wollbrant, 2017), has been found to increase selfishness compared to a time-delay condition (Capraro & Cococcioni, 2016). In addition, a series of papers find positive correlation between cooperative behavior on the one hand and individual ability for self-control (Kocher, Martinsson, Myrseth, & Wollbrant, 2017; Martinsson, Myrseth, & Wollbrant, 2014), delayed gratification (Curry, Price, & Price, 2008; Fehr & Leibbrandt, 2011), and analytic thinking (Lohse, 2016) on the other. Similarly, supporting the idea that selfish impulses have free rein in the lack of cognitive resources for self-control, various other studies found that depletion of resources available for energy metabolism (DeWall, Baumeister, Gailliot, & Maner, 2008) and disruption of self-control related brain functions (Knoch, Pascual-Leone, Meyer, Treyer, & Fehr, 2006) weaken prosocial behavior. In a revealing study, younger children were found less likely to reject unfair offers, which is interpreted as a form of prosocial punishment of norm violators, not because they did not understand the norms in place but because the regions of their brains related to self-control were not yet fully developed (Steinbeis, Bernhardt, & Singer, 2012).



These conflicting findings for SHH and SCA imply that there may be missing moderators that are not taken into account in the aforementioned studies. A possible explanation is that past experiences forming social heuristics may be heterogeneous (Rand et al., 2014). Accordingly, people internalize prosocial heuristics if they are accustomed to environments that are conducive to cooperation but not when they are repeatedly exposed to situations where people act selfishly. Consistent with this explanation, people from relatively more cooperative environments (e.g., experimental participants from the U.S. who are not experienced with the one-shot PGGs) show intuitive cooperation, whereas those from relatively less cooperative backgrounds (e.g., participants from India with weaker institutions than the U.S. or participants who are experienced with one-shot PGGs where cooperation is a self-defeating strategy) do not have this prosocial tendency (Nishi, Christakis, & Rand, 2017; Rand et al., 2014; also see Peysakhovich & Rand, 2015; Santa, Exadaktylos, & Soto-Faraco, 2018).

Therefore, a more general perspective on the role of intuition and deliberation on cooperation suggests that the applicability of SHH and SCA may depend on whether people have internalized heuristics that are prosocial or selfish. Supporting this generalized account, a recent experimental study (Isler, Gächter, Maule, & Starmer, 2019) shows that deliberation increases cooperation when social dilemmas induce selfish heuristics (e.g., when cooperation involves maintaining an already existing common resource) but not when they induce prosocial heuristics (e.g., when it involves providing a previously nonexistent public good).

## **Discussion**

So, can we rely on our intuitions? A comparison of the heuristics-and-biases, simple-heuristics, and naturalistic decision-making accounts indicated that expertise is built on regular feedback from a learning-friendly environment and that intuitions tend to be reliable when expertise matches the current decision environment. The question of whether intuitions can provide desirable judgments and behavior in moral and social dilemmas has a similar answer. Evidence on the dual-process accounts of cooperation indicates that both social heuristics and self-control may regulate intuitive cooperation to an extent dependent on the problem at hand (e.g., norms of strong reciprocity) and on the associations it may induce (e.g., selfish vs. prosocial heuristics). Likewise, the role of intuition and deliberation depends on which moral foundations are salient in the particular problem (e.g., hierarchy vs. fairness). Crucially, this overall result of context dependency does not imply a lack of systematic patterns of dependency. However, it implies the need for more research on the moderators and the boundary conditions regarding the consequences of intuitive and analytical thought processes. In conclusion, high returns should be expected from investigating the dual-process accounts of social and moral dilemmas, for example, in the managerial context.

## References

- Aktas, B., Yilmaz, O., & Bahçekapili, H. G. (2017). Moral pluralism on the trolley tracks: Different normative principles are used for different reasons in justifying moral judgments. *Judgment and Decision Making*, *12*, 297–307.
- Artinger, F., Petersen, M., Gigerenzer, G., & Weibler, J. (2015). Heuristics as adaptive decision strategies in management. *Journal of Organizational Behavior*, *36*(S1), S33–S52.
- Basel, J. S., & Brühl, R. (2013). Rationality and dual process models of reasoning in managerial cognition and decision making. *European Management Journal*, *31*(6), 745–754.
- Bear, A., & Rand, D. G. (2016). Intuition, deliberation, and the evolution of cooperation. *Proceedings of the National Academy of Sciences*, *113*(4), 936–941.
- Bouwmeester, S., Verkoijen, P. P. J. L., Aczel, B., Barbosa, F., Bègue, L., Brañas-Garza, P., ... Espín, A. M. (2017). Registered Replication Report: Rand, Greene, and Nowak (2012). *Perspectives on Psychological Science*, *12*(3), 527–542.
- Bowles, S., & Gintis, H. (2011). *A Cooperative Species: Human Reciprocity and Its Evolution*. Princeton, NJ: Princeton University Press.
- Boyd, R., & Richerson, P. J. (1989). The evolution of indirect reciprocity. *Social Networks*, *11*(3), 213–236.
- Capraro, V., & Cococcioni, G. (2016). Rethinking spontaneous giving: Extreme time pressure and ego-depletion favor self-regarding reactions. *Scientific Reports*, *6*, 27219.
- Curry, O. S., Mullins, D. A., & Whitehouse, H. (2017). Is it good to cooperate? Testing the theory of morality-as-cooperation in 60 societies. *Current Anthropology* *60*(1), 47–69.
- Curry, O. S., Price, M. E., & Price, J. G. (2008). Patience is a virtue: Cooperative people have lower discount rates. *Personality and Individual Differences*, *44*(3), 780–785.
- Dawes, R. M. (1980). Social dilemmas. *Annual Review of Psychology*, *31*(1), 169–193.
- DeMiguel, V., Garlappi, L., & Uppal, R. (2007). Optimal versus naive diversification: How inefficient is the 1/N portfolio strategy? *The Review of Financial Studies*, *22*(5), 1915–1953.
- DeWall, C. N., Baumeister, R. F., Gailliot, M. T., & Maner, J. K. (2008). Depletion makes the heart grow less helpful: Helping as a function of self-regulatory energy and genetic relatedness. *Personality and Social Psychology Bulletin*, *34*(12), 1653–1662.
- Evans, J. S. B. T. (2008). Dual-processing accounts of reasoning, judgment, and social cognition. *Annual Review of Psychology*, *59*, 255–278.
- Everett, J. A. C., Ingbretsen, Z., Cushman, F., & Cikara, M. (2017). Deliberation erodes cooperative behavior—Even towards competitive out-groups, even when using a control condition, and even when eliminating selection bias. *Journal of Experimental Social Psychology*, *73*, 76–81.
- Fehr, E., & Fischbacher, U. (2003). The nature of human altruism. *Nature*, *425*(6960), 785–791.
- Fehr, E., & Leibbrandt, A. (2011). A field study on cooperativeness and impatience in the tragedy of the commons. *Journal of Public Economics*, *95*(9–10), 1144–1155.
- Fischbacher, U., Gächter, S., & Fehr, E. (2001). Are people conditionally cooperative? Evidence from a public goods experiment. *Economics Letters*, *71*(3), 397–404.
- Fiske, S. T., & Taylor, S. E. (2013). *Social Cognition: From Brains to Culture*. Los Angeles, CA: Sage Publications.
- Gigerenzer, G. (2008). Why heuristics work. *Perspectives on Psychological Science*, *3*(1), 20–29.
- Gigerenzer, G., Hertwig, R., & Pachur, T. (2011). *Heuristics*. New York: Oxford University Press.
- Gigerenzer, G., Todd, P. M., & ABC Research Group. (1999). *Simple Heuristics That Make Us Smart*. Oxford, UK: Oxford University Press.

- Gintis, H. (2000). Strong reciprocity and human sociality. *Journal of Theoretical Biology*, 206(2), 169–179.
- Graham, J., Haidt, J., & Nosek, B. A. (2009). Liberals and conservatives rely on different sets of moral foundations. *Journal of Personality and Social Psychology*, 96(5), 1029.
- Graham, J., Nosek, B. A., Haidt, J., Iyer, R., Koleva, S., & Ditto, P. H. (2011). Mapping the moral domain. *Journal of Personality and Social Psychology*, 101(2), 366.
- Greene, J. D. (2007). The secret joke of Kant's soul, in Sinnott-Armstrong, W. (ed.), *Moral Psychology, Vol. 3: The Neuroscience of Morality: Emotion, Disease, and Development*. Cambridge, MA: MIT Press.
- Greene, J. D. (2007). Why are VMPFC patients more utilitarian? A dual-process theory of moral judgment explains. *Trends in Cognitive Sciences*, 11(8), 322–323.
- Greene, J. D., Sommerville, R. B., Nystrom, L. E., Darley, J. M., & Cohen, J. D. (2001). An fMRI investigation of emotional engagement in moral judgment. *Science*, 293(5537), 2105–2108.
- Haidt, J. (2001). The emotional dog and its rational tail: A social intuitionist approach to moral judgment. *Psychological Review*, 108(4), 814.
- Haidt, J. (2007). The new synthesis in moral psychology. *Science*, 316(5827), 998–1002.
- Haidt, J. (2012). *The Righteous Mind: Why Good People Are Divided by Politics and Religion*. Vintage.
- Hamilton, W. D. (1964). The genetical evolution of social behaviour. I. *Journal of Theoretical Biology*, 7(1), 1–16.
- Hauser, M. D., Chen, M. K., Chen, F., & Chuang, E. (2003). Give unto others: Genetically unrelated cotton-top tamarin monkeys preferentially give food to those who altruistically give food back. *Proceedings of the Royal Society of London. Series B: Biological Sciences*, 270(1531), 2363–2370.
- Henrich, J., Boyd, R., Bowles, S., Camerer, C., Fehr, E., Gintis, H., ... Ensminger, J. (2005). "Economic man" in cross-cultural perspective: Behavioral experiments in 15 small-scale societies. *Behavioral and Brain Sciences*, 28(6), 795–815.
- Hodgkinson, G. P., Bown, N. J., Maule, A. J., Glaister, K. W., & Pearman, A. D. (1999). Breaking the frame: An analysis of strategic cognition and decision making under uncertainty. *Strategic Management Journal*, 20(10), 977–985.
- Hofmann, W., Friese, M., & Strack, F. (2009). Impulse and self-control from a dual-systems perspective. *Perspectives on Psychological Science*, 4(2), 162–176.
- Isler, O., Gächter, S., Maule, J., & Starmer, C. (2019). Intuitions and deliberated strong reciprocity explain cooperation in maintenance and provision dilemmas. Manuscript submitted for publication.
- Isler, O., Maule, J., & Starmer, C. (2018). Is intuition really cooperative? Improved tests support the social heuristics hypothesis. *PLoS One*, 13(1), e0190560.
- Kahane, G., Everett, J. A. C., Earp, B. D., Farias, M., & Savulescu, J. (2015). 'Utilitarian' judgments in sacrificial moral dilemmas do not reflect impartial concern for the greater good. *Cognition*, 134, 193–209.
- Kahneman, D. (2011). *Thinking, Fast and Slow*. London: Macmillan.
- Kahneman, D., & Klein, G. (2009). Conditions for intuitive expertise: A failure to disagree. *American Psychologist*, 64(6), 515.
- Kahneman, D., & Tversky, A. (1979). Prospect theory: An analysis of decision under risk. *Econometrica*, 47(2), 263–291.
- Khatri, N., & Ng, H. A. (2000). The role of intuition in strategic decision making. *Human Relations*, 53(1), 57–86.

- Kiyonari, T., Tanida, S., & Yamagishi, T. (2000). Social exchange and reciprocity: Confusion or a heuristic? *Evolution and Human Behavior*, *21*(6), 411–427.
- Klein, G. (2008). Naturalistic decision making. *Human Factors*, *50*(3), 456–460.
- Klein, G. A. (1993). *A Recognition-Primed Decision (RPD) Model of Rapid Decision Making*. New York: Ablex Publishing Corporation.
- Klein, G. A., Calderwood, R., & Clinton-Cirocco, A. (1986). Rapid decision making on the fire ground, in *Proceedings of the Human Factors Society Annual Meeting* (Vol. 30, pp. 576–580). Los Angeles, CA: Sage Publications.
- Knoch, D., Pascual-Leone, A., Meyer, K., Treyer, V., & Fehr, E. (2006). Diminishing reciprocal fairness by disrupting the right prefrontal cortex. *Science*, *314*(5800), 829–832.
- Kocher, M. G., Martinsson, P., Myrseth, K. O. R., & Wollbrant, C. E. (2017). Strong, bold, and kind: Self-control and cooperation in social dilemmas. *Experimental Economics*, *20*(1), 44–69.
- Koenigs, M., Young, L., Adolphs, R., Tranel, D., Cushman, F., Hauser, M., & Damasio, A. (2007). Damage to the prefrontal cortex increases utilitarian moral judgements. *Nature*, *446*(7138), 908.
- Kohlberg, L., & Kohlberg, L. (1969). Stage and sequence: The cognitive-developmental approach to socialization, in Goslin, D. A. (ed.), *Handbook of Socialization: Theory and Research*. Chicago: McNally.
- Koudstaal, M., Sloof, R., & van Praag, M. (2018). Entrepreneurs: Intuitive or contemplative decision-makers? *Small Business Economics*, 1–20.
- Ledyard, J. (1995). Public goods: A survey of experimental research, in *Handbook of Experimental Economics*. doi:10.1016/0037-7856(73)90129-7.
- Li, J., & Tang, Y. I. (2010). CEO hubris and firm risk taking in China: The moderating role of managerial discretion. *Academy of Management Journal*, *53*(1), 45–68.
- Loewenstein, G. (1996). Out of control: Visceral influences on behavior. *Organizational Behavior and Human Decision Processes*, *65*(3), 272–292.
- Lohse, J. (2016). Smart or selfish—When smart guys finish nice. *Journal of Behavioral and Experimental Economics*, *64*, 28–40.
- Loock, M., & Hinnen, G. (2015). Heuristics in organizations: A review and a research agenda. *Journal of Business Research*, *68*(9), 2027–2036.
- Martinsson, P., Myrseth, K. O. R., & Wollbrant, C. (2014). Social dilemmas: When self-control benefits cooperation. *Journal of Economic Psychology*, *45*, 213–236.
- Metcalf, J., & Mischel, W. (1999). A hot/cool-system analysis of delay of gratification: Dynamics of willpower. *Psychological Review*, *106*(1), 3.
- Mill, J. S. (1863). *Utilitarianism*. London: Parker, Son and Bourn.
- Myrseth, K. O. R., & Fishbach, A. (2009). Self-control: A function of knowing when and how to exercise restraint. *Current Directions in Psychological Science*, *18*(4), 247–252.
- Myrseth, K. O. R., & Wollbrant, C. E. (2017). Cognitive foundations of cooperation revisited: Commentary on Rand et al.(2012, 2014). *Journal of Behavioral and Experimental Economics*, *69*, 133–138.
- Napier, J. L., & Luguri, J. B. (2013). Moral mind-sets: Abstract thinking increases a preference for “individualizing” over “binding” moral foundations. *Social Psychological and Personality Science*, *4*(6), 754–759.
- Nishi, A., Christakis, N. A., & Rand, D. G. (2017). Cooperation, decision time, and culture: Online experiments with American and Indian participants. *PloS One*, *12*(2), e0171252.
- Parikh, J., Neubauer, F.-F., & Lank, A. G. (1994). *Intuition: The New Frontier of Management*. Blackwell.

- Paxton, J. M., Ungar, L., & Greene, J. D. (2012). Reflection and reasoning in moral judgment. *Cognitive Science*, 36(1), 163–177.
- Peysakhovich, A., & Rand, D. G. (2015). Habits of virtue: Creating norms of cooperation and defection in the laboratory. *Management Science*, 62(3), 631–647.
- Piaget, J. (1965). *The Moral Judgment of the Child (1932)*. New York: The Free Press.
- Rand, D. G. (2016). Cooperation, fast and slow: Meta-analytic evidence for a theory of social heuristics and self-interested deliberation. *Psychological Science*, 27(9), 1192–1206.
- Rand, D. G., Greene, J. D., & Nowak, M. A. (2012). Spontaneous giving and calculated greed. *Nature*, 489(7416), 427.
- Rand, D. G., Peysakhovich, A., Kraft-Todd, G. T., Newman, G. E., Wurzbacher, O., Nowak, M. A., & Greene, J. D. (2014). Social heuristics shape intuitive cooperation. *Nature Communications*, 5, 3677.
- Rosenzweig, P. M. (2007). *The Halo Effect—And the Eight Other Business Delusions That Deceive Managers*. New York: The Free Press.
- Sadler-Smith, E., & Shefy, E. (2004). The intuitive executive: Understanding and applying ‘gut feel’ in decision-making. *Academy of Management Perspectives*, 18(4), 76–91.
- Santa, J. C., Exadaktylos, F., & Soto-Faraco, S. (2018). Beliefs about others’ intentions determine whether cooperation is the faster choice. *Scientific Reports*, 8(1), 7509.
- Sapolsky, R. M. (2017). *Behave: The Biology of Humans at Our Best and Worst*. Penguin.
- Shweder, R., Much, N., Mahapatra, M., & Park, L. (1997). Divinity and the “big three” explanations of suffering. *Morality and Health*, 119, 119–169.
- Simon, M., Houghton, S. M., & Aquino, K. (2000). Cognitive biases, risk perception, and venture formation: How individuals decide to start companies. *Journal of Business Venturing*, 15(2), 113–134.
- Steinbeis, N., Bernhardt, B. C., & Singer, T. (2012). Impulse control and underlying functions of the left DLPFC mediate age-related and age-independent individual differences in strategic social behavior. *Neuron*, 73(5), 1040–1051.
- Thomson, K. S., & Oppenheimer, D. M. (2016). Investigating an alternate form of the cognitive reflection test. *Judgment and Decision Making*, 11(1), 99.
- Tremolière, B., De Neys, W., & Bonnefon, J.-F. (2012). Mortality salience and morality: Thinking about death makes people less utilitarian. *Cognition*, 124(3), 379–384.
- Trivers, R. L. (1971). The evolution of reciprocal altruism. *The Quarterly Review of Biology*, 46(1), 35–57.
- Tversky, A., & Kahneman, D. (1974). Judgment under uncertainty: Heuristics and biases. *Science*, 185(4157).
- Tversky, A., & Kahneman, D. (1983). Extensional versus intuitive reasoning: The conjunction fallacy in probability judgment. *Psychological Review*, 90(4), 293.
- Van Berkel, L., Crandall, C. S., Eidelman, S., & Blanchard, J. C. (2015). Hierarchy, dominance, and deliberation: Egalitarian values require mental effort. *Personality and Social Psychology Bulletin*, 41(9), 1207–1222.
- Wright, J. C., & Baril, G. (2011). The role of cognitive resources in determining our moral intuitions: Are we all liberals at heart? *Journal of Experimental Social Psychology*, 47(5), 1007–1012.
- Yilmaz, O., & Saribay, S. A. (2017a). Activating analytic thinking enhances the value given to individualizing moral foundations. *Cognition*, 165, 88–96.
- Yilmaz, O., & Saribay, S. A. (2017b). Analytic thought training promotes liberalism on contextualized (but not stable) political opinions. *Social Psychological and Personality Science*, 8(7), 789–795.