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**Cognitive and Affective Processes of Prosociality**

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## Abstract

One piece of the puzzle to prosocial behavior is understanding its underlying cognitive and affective processes. We discuss how modeling behavior in social dilemmas can be expanded by integrating cognitive theories and attention-based models of decision processes, and models of affective influences on prosocial decision-making. We review theories speaking to the interconnections of cognition and affect, identifying the need for further theory development regarding modeling moment-by-moment decision-making processes. We discuss how these theoretical perspectives are mirrored in empirical evidence, drawn from classical outcome-oriented as well as contemporary process-tracing research. Finally, we develop perspectives for future research trajectories aiming to further elucidate the processes by which prosocial decisions are formed, by linking process measures to usually unobservable cognitive and affective reactions.

*Keywords: prosociality, social preferences, cognition, affect, process*

### **Cognitive and Affective Processes of Prosociality**

Individual behavior in a plethora of pressing societal challenges, ranging from taking action to stop climate change, removing inequalities in global health, and becoming an antiracist ally, can be abstractly described as prosocial decision behavior in social decision problems. This class of decision problems involves a trade-off between self-interest and taking into account the interests of others affected by the decision-maker's choices : decision-makers decide whether to prioritize their own outcomes, or to behave prosocially and (also) benefit others, potentially at a cost to themselves. Because the consequences of decisions in social decision problems loom large and are embedded in one's subjective mental representation of social norms, expectations, and other social concerns [1,2], these decision problems trigger an intricate mix of cognitive and affective processes while decision-makers make up their mind about what to do. Decision-makers cognitively engage with the decision setting to construct a mental representation of the situation and their preferences over the alternatives to choose from. Social decision problems can also spark affective engagement with the decision situation, for instance because they can make decision-makers feel good about helping, or trigger shame by touching on decision-makers' social image through reputation concerns, and guilt by touching on their self-image through involving moral convictions and core values about fairness and helping. At the same time, cognitive and affective processes can influence each other, for instance when decision-makers avoid informing themselves about specific features of the decision problem to protect themselves from potentially feeling guilty for not behaving prosocially. Therefore, studying the cognitive and affective processes by which decision-makers arrive at their choices to prioritize their own interests or to behave prosocially promises an improved understanding of prosocial behavior [3-5]. Such an intimate understanding of the decision processes is needed

to design effective interventions fostering prosocial societal interactions and averting behavior with harmful consequences for others.

However, research in the area of prosociality has so far largely missed out on investigating the underlying processes of decision behavior in social dilemmas, instead focusing primarily on decision outcomes [6]. Drawing inferences about the way how decisions are made from classical outcome-focused behavioral research, however, requires carefully calibrated designs and can nevertheless be muddled by perturbations of the decision process through the design itself [7]. Similarly, introspective (post-hoc or ad-hoc) self-reports are limited in the conclusions they allow with regard to moment-by-moment cognitive and affective processes [7]. Instead, using fine-grained and unobtrusive process measures, such as response time measurements, measurements of eye gaze revealing information search elaborateness and strategies, measurements of mouse cursor movements indicating the degree to which decision-makers were torn between the options, or facial expressions of emotions (for comprehensive method reviews see Mauss and Robinson [8], and Schulte-Mecklenbeck et al. [9]), facilitates a more nuanced understanding of the complex cognitive and affective processes ongoing while decision-makers make up their minds. To highlight the potential for understanding prosocial decision-making better by employing a process perspective, we review the literature on cognitive and affective processes of prosociality, drawing on theoretical perspectives on (decision-making) processes as well as on process data captured via state-of-the-art process tracing methods.

### **Cognitive Processes of Prosociality**

Building on rational choice theory, behavioral economic models of prosocial decision-making assume that individuals maximize utility, i.e., the satisfaction derived from the choice they make, as a function of individuals' social preferences (i.e., their preferences over the decision alternatives as they relate to outcomes for themselves and others), the

decision context, and the interaction between preferences and context. Such outcome-focused theories posit that decision-makers behave “as if” they were weighing their own interests against those of others affected [10-13]. While these theories, therefore, make basic predictions about what decisions people make, they fall short of modeling the decision processes as they unfold in the seconds during which the choice is made. Going beyond “as if”, broader process models originally developed in the context of perception research allow a description of the computational steps undertaken to form prosocial decisions. The most prominent class of such theories, sequential sampling models, posits that decision-makers acquire information sequentially and decide after having accumulated a sufficient amount of evidence in favor of one of the options [14]. Evidence suggests that general sequential sampling models of decision processes, such as attentional drift diffusion models [15,16], also apply to value-based decisions such as prosocial decision-making [17,18]. One extension, the gaze-informed attentional drift diffusion model, posits a bidirectional relationship of attention and value, suggesting that individuals’ social preferences determine how visual attention is deployed to inform the decision, but also that the extent of attention allocated to features of the decision problem feeds back into preference construction, amplifying the value of fixated attributes moment-by-moment [19]. In support of these theoretical perspectives, recent empirical evidence suggests that information about one's own outcomes, others’ outcomes, and about fairness is sampled to construct one’s current social preference over the available alternatives at each moment of the decision process [19].

Decision-makers’ chronic social preferences differentially determine their information search behavior [20], with more prosocial decision-makers investing more effort into informing their decisions and attending more to others’ outcomes than comparatively individualistic decision-makers [21-23]. Extending this interindividual differences perspective, Konovalov and Krajbich [24] recently showed that the strength of individuals’

social preferences over different constellations of decision outcomes is mirrored in response times: When decision-makers had strong prosocial or individualistic preferences for one alternative, choices were faster than when these decision-makers were indifferent, i.e., when they lacked a clear preference for one alternative over another. Laypersons correctly infer from such short decision times that decision-makers have strong preferences and condition their respective behavior [25,26]. Moreover, features of the decision situation, such as time pressure [19], the decision frame (e.g., gains vs. losses in Fiedler & Hillenbrand [27]), or whether the decision has consequences for in- or outgroup members [28], affect the deployment of visual attention to own vs. others' outcomes as well as information processing effort and subsequent prosocial decision behavior.

Finally, differentially deployed attention is not only a by-product of the prosocial decision-making process, but also causally influences subsequent choices: Directing decision-makers' visual attention towards others' outcomes (vs. own outcomes) has been shown to increase prosociality (but holds only under certain boundary conditions [19,29,30]; see Fosgaard et al. [31] for a recent application to cheating).

Taken together, first evidence on the moment-by-moment cognitive processes of prosocial decision-making shows that cognition and choices are related, and that taking a perspective of interindividual differences is necessary to understand the underlying mechanisms of social decision-making (see Thielmann et al. [32] for a similar argument on the choice-level).

### **Affective Processes of Prosociality**

As for cognition, "as if" models of affect in prosocial decision-making have been developed based on economic models of decision behavior. Classically, the theory of warm-glow giving holds that decision-makers derive rewarding, positive affect from making prosocial decisions, the anticipation of which is integrated in their utility function [34] (for a recent empirical investigation, see Ottoni-Wilhelm et al. [35]). This means that people may



also have obtaining the pleasant buzz of doing something good in mind when deciding whether to behave prosocially. However, theoretical developments regarding affective processes have so far not been extended to match the temporal resolution achieved in their cognitive counterparts.

Empirically, prosocial behavior has often been linked to experiencing positive affect [35-41]. Recent evidence comes from large-scale surveys [42,43], but also from studies providing causal evidence by inducing a prosocial mindset [44], affect itself [45] or studies recording facial expressions of happiness [46]. Yet these results appear to mismatch findings that decision-makers who are feeling good respond less prosocially to donation appeals than decision-makers who are feeling bad, because people in a good mood may anticipate or experience their good mood being ruined, for instance by a heartbreaking appeal to help [47,48]. A better understanding of the underlying processes is needed to reconcile such mixed findings.

Empirical evidence more narrowly focusing on the affective processes unfolding during prosocial decision-making is sparse. Even though methods such as facial expressions recordings [46] or skin conductance responses [49] are, in principle, suitable for tracking affective processes over the course of the decision process, data tends to be collapsed and only compared between conditions instead of leveraging the available temporal resolution to analyze moment-by-moment observations. Future research could leverage the full potential of comparing moment-by-moment affective developments to predict and explain decision outcomes in general and prosocial behavior in particular.

Taken together, understanding affective processes of prosocial decision-making necessitates more theory development on a higher temporal resolution, as well as more clearly operationalized dependent variables. The development of measures of affective processes is still ongoing. Some measures such as skin conductance recordings or

pupillometry fall short of revealing affect itself, instead only capturing arousal. These measures do not capture valence and may therefore be lacking in specificity. Other measures, such as recordings of facial expressions or facial muscle activation, as well as affective thermal responses of the face, are argued to be more specific to different types of affect, but are nevertheless hotly debated (for a critical discussion, see Mauss and Robinson [8]). In addition, the literature on moment-by-moment affective processes is largely missing the interindividual differences perspective prominently applied regarding cognitive processes.

### **Intersection of Cognition and Affect**

The literature on prosocial decision-making has only begun to consider links between cognitive and affective processes and the subsequent decision behavior. Consequently, the interconnection between cognition and affect has also received little attention.

From a theoretical perspective, in Simon's [50] theory of affect and cognition, the role of affect is to interrupt and redirect the cognitive process in response to evolving needs. Theories in the vicinity of the general dual-process view of decision-making, distinguishing intuitive cognitive processing from deliberate processes [51-53], tend to assume that affective influences on behavior primarily co-occur with limited cognitive processing [54]. Applied to the context of prosocial decision-making, the social heuristics hypothesis, positing that prosocial behavior is an intuitive behavioral tendency while selfish choices require more deliberation [55], however, makes no specific predictions about the role of affect in the decision process.

In other general models of cognition and affect, cognitions have been modeled to act on or precede affective processes (for a recent review, see Oatley and Johnson-Laird [56]), and vice versa, affect has been modeled to act on cognitive processes (for reviews, see Bless and Fiedler [57], as well as Mitchell and Phillips [58]). Theories on the influence of affect on cognition can be summarized in three categories. First, the affect-as-information account

posits that positive affective states invite broader and heuristic processing, while negative affective states engage processors in more deliberated, concrete processing (for recent reviews, see Bless and Burger [59], as well as Vanlessen et al. [60]). Second, theories appealing to cognitive load [61,62] posit that affect generally hampers cognitive processes by depleting cognitive resources. Third, the mood-as-facilitator perspective [63] argues that executive functions are facilitated by positive affective states through increased mental flexibility.

Empirical studies investigating the effect of cognition on subsequent affect present first evidence that broader, more global attention increases positive affect [64-66]. The literature on affect regulation suggests that information processors may strategically boost their affective states by selectively allocating attention to suitably affectively charged stimuli (for a review, see Gross [67]).

Testing the three models of the affective influence on cognition reveals mixed evidence. While some studies show a positive correlation between negative mood and information search as well as processing effort [68-70], others present contrary evidence that positive mood boosts processing [71,72]. Research investigating the effect of affect on attentional shifts within the process shows that attention is drawn towards affect-congruent stimuli [73,74] (for a recent meta-analysis in clinical samples, see Suslow et al. [75]). Applications studying the interplay of cognition and affect in the context of prosocial decision-making are largely lacking, but Bebko et al. [76] recently provided first indications that visual attention to affectively laden donation appeals was modulated by self-reported affect, and that the observed gaze characteristics predicted subsequent recommendation to donate. Taken together, this evidence suggests that the link between cognition and affect is crucial to understand the underlying decision-making process. However, the theoretical

developments on the interaction of cognition and affect largely lack the fine-grained predictions of moment-by-moment theories of decision processes.

### **Future Perspectives**

In 1967, Simon [50] wrote that “[i]nformation-processing theories [...] have generally been silent on the interaction of cognition with affect” (p. 29). Since then, much research has been devoted to demonstrating that cognitions and affect shape human behavior generally, and prosocial behavior specifically. Nevertheless, an overarching, integrative theoretical model about the specific, moment-by-moment cognitive and affective processes, and their interplay in prosocial decision-making still needs to be developed. The context of prosocial decision-making is especially ripe for such an integrative and fine-grained model because prosocial decisions not only require cognitively engaging in trade-offs between prioritizing own vs. others’ outcomes, but also trigger affective engagement with the decision setting because of their social embeddedness. Jointly modeling cognitive and affective decision processes could give a more holistic impression of the specific representations of the decision situation that decision-makers hold in mind. Especially when overt behavior is limited to choosing one of few alternatives, making the same choice misleadingly suggests that these choices are fueled by the same underlying processes. Understanding the antecedents of these overtly equivalent choices, however, can unearth surprising differences in how these decisions are reached. Considering in detail how affect and cognition dynamically shape the processes of prosocial decision-making also offers an opportunity to resolve the inconsistencies and gaps still apparent in the existing literature regarding the relation of affect and prosocial behavior, regarding the cognitive operations involved in making selfish and prosocial choices, and the interplay of affect and cognition.

Given the development of an integrative model of prosocial decision-making, a number of exciting avenues for future research would open up. Research could address

questions regarding the stability and universality, or the constructed nature of decision preferences [78] in social dilemmas. Another line of research could focus on how the complex interconnections of interindividual differences relating cognition (e.g., conscientiousness, need for cognitive closure), affect (e.g., emotional sensitivity, hedonism) and prosociality (e.g., social value orientation, honesty-humility) play out in fine-grained process measurements. For instance, is the experience of affect in social dilemmas conditional on decision-makers' prosociality? Comparing decision-makers who are more sensitive to experiencing affect to more stoic decision-makers, do the former cognitively engage with the decision situation differently and consequently make different choices than the latter? Further, the context of the decision setting could warrant closer investigation, offering an improved understanding of the conditions under which the relative influence of affect and cognition on the decision process changes. For instance, time pressure or a social high-risk-high-reward situation could boost how affective influences on the decision to behave prosocially unfold during the decision-making process.

An improved understanding of the heterogeneity and context-dependence of cognitive and affective processes, their interactions and their antecedents can subsequently be channeled into tailored interventions acting specifically on the prosocial decision-making process itself, spilling over into behavioral consequences. Developing such interventions through the lens of social dilemmas, in turn, can help face the complex social challenges which require individual decision-makers to consider how their choices will affect others.

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