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Demystifying the Role of Emotion in Behavior: Toward A Goal-Directed Account

Agnes Moors^{1,2} & Maja Fischer¹

¹ Research Group of Quantitative Psychology and Individual Difference; Centre for Social and Cultural Psychology, KU Leuven, University of Leuven, Belgium

² Department of Experimental Clinical and Health Psychology, Ghent University, Belgium

Corresponding author: Agnes Moors, KU Leuven, Tiensestraat 102, 3000 Leuven, Belgium,
Tel. +3216373279, agnes.moors@kuleuven.be.

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Abstract

The paper sketches the historical development from emotion as a mysterious entity and the source of maladaptive behavior, to the proposal of emotion as a collection of ingredients and the source of also adaptive behavior. We argue, however, that the underlying mechanism proposed to take care of this adaptive behavior is not entirely up for its task. We outline an alternative view that explains so-called emotional behavior with the same mechanism as non-emotional behavior, but that is at the same time more likely to produce adaptive behavior. The phenomena that were initially seen as requiring a separate emotional mechanism to influence and cause behavior can also be explained by a goal-directed mechanism provided that more goals and other complexities inherent in the goal-directed process are taken into account.

Keywords: emotion, behavior, decision making, goal-directed, stimulus-driven, appraisal

Demystifying The Role of Emotion in Behavior: Toward A Goal-Directed Account

There was a time when emotional phenomena were largely ignored in behavior research conducted in psychology, economics, and philosophy (Volz & Hertwig, 2016; Wälde & Moors, 2017). Across these disciplines, behavior was typically explained by a goal-directed process in which the expected utility of behavior options is compared and the behavior option with the highest utility is chosen (Kahneman, Wakker, & Sarin, 1997)¹. The expected utility of a behavior option refers to the product of the subjective value of the outcomes of that behavior option and the expectancy that the behavior option will lead to this outcome. The behavior resulting from this process was considered rational or adaptive (Tolman, 1951; Bratman, 1987). When empirical research revealed that behavior did not always conform to the predictions based on expected utility, but sometimes qualified as irrational or maladaptive, the search for moderators began.

Behavior Research: Emotions as Explanans of Maladaptive Behavior

Behavior researchers started taking emotions on board (Loewenstein, Weber, Hsee, & Welch, 2001; see also Volz & Hertwig, 2016), not only as moderators but also as mediators. Emotions that are unrelated to the decision at hand, called incidental emotions, are often cast in the role of *moderators* that bias rational behavior. For instance, a previous fear episode makes people avoid high-risk options that are more beneficial (Raghunathan & Pham, 1999). Emotions about potential outcomes of the decision, called integral anticipatory emotions, are often seen as *mediators* of maladaptive behavior. For instance, fear of a plane crash makes people choose to travel by car instead, which is more risky (Gigerenzer, 2004). Anger about an unfair offer makes people choose to engage in costly aggression thereby sacrificing their

¹ In some theories, the notions of utility and value are spelled out in terms of feelings of pleasure and pain, and hence do have an affective connotation. In other theories, however, the ambition was to define utility in non-mental (and hence non-affective) terms (Wälde & Moors, 2017).

own profit (Matarazzo, Pizzini, Greco, & Carpentieri, 2016; Pillutla & Murningham, 1996; Sanfey, Rilling, Aronson, Nystrom, & Cohen, 2003).

Emotions are often treated by behavior researchers as mysterious entities that are separate from cognition and behavior. Emotions are allowed to influence cognition and behavior but the guiding model (still today) is a dual system model in which different processes are responsible for “cognitive” vs. “emotional” influences or pathways towards behavior (e.g., Anderson, 2003; Bartlett & DeSteno, 2006; Feng, Luo, & Krueger, 2015; Ho, Gonzalez, Abelson, & Liberzon, 2012; Kahneman & Frederick, 2007; et al., 2001; Loewenstein et al., 2001; Williams & DeSteno, 2008; see reviews and criticism by Beer, 2017; Klein, 2011; Lerner, Li, Valdesolo, & Kassam, 2015; Phelps, Lempert, & Sokol-Hessner, 2014; Volz & Hertwig, 2016). In particular, the cognitive system comprises the goal-directed process mentioned above, carried out by rule-based operations. This process is seen as complex and therefore flexible but nonautomatic. The emotional system, on the other hand, comprises a stimulus-driven process in which a stimulus activates an association between the representation of specific stimulus features and the representation of a specific action. This process is seen as simple and therefore automatic but also rigid (i.e., quick and dirty). Because the goal-directed process is more flexible, it is better able to produce adaptive behavior across contexts with varying outcome structures. The automatic nature of the stimulus-driven process, on the other hand, makes it more adaptive under poor operating conditions (e.g., a lack of time and attention) provided that the outcome structure is highly stable. The interplay between both systems is often captured in a default-interventionist architecture with the emotional system as the default determinant of behavior and the cognitive system as one that can intervene when conditions allow it (e.g., when there is enough time, attention, and motivation; Moors et al., 2017).

Emotion Research: Emotions as Explanandum and as Explanans of Adaptive Behavior

In parallel with the aforementioned behavior researchers, whose primary interest is in explaining behavior and who treat emotion as a possible explanans, another group of researchers developed an interest in explaining emotion itself, thus treating emotion as the explanandum. The latter emotion researchers tried to unpack the ingredients of emotion (i.e., constitutive explanation) and to formulate hypotheses about the mechanisms causing emotions (i.e., causal-mechanistic explanation). Early emotion theories identified emotion with feelings or experience. Gradually, more ingredients were included in the emotion such as information processing (cognition), action preparation in the form of action tendencies (motivation) and physiological responses (somatic responses), and (impulsive forms of) overt behavior (motor responses) as in facial and vocal expressions.

By unpacking the ingredients of emotion, emotion researchers planted the first seeds toward the demystification of emotion. If emotions are considered collections of other stuff (cognition, motivation, overt responses, and feelings), the question that inevitably comes to mind is whether they can be reduced to this other stuff (Russell, 2003), or whether there is still a “mark of the emotional”.

In an attempt to find such a mark, emotion theories have proposed causal mechanisms of emotions. For instance, evolutionary emotion theories (e.g., Ekman, 1999) hypothesize that a stimulus elicits an emotion when it activates an affect program, a neural circuit that is dedicated to one of a limited set of basic emotions. Appraisal theories (see Moors, Ellsworth, Scherer, & Frijda, 2013) hypothesize that a stimulus elicits an emotion when it is appraised as relevant for a goal with a high value. Further appraisal of this stimulus in terms of its goal-in/congruence, controllability, and causal origin shapes the nature of the other ingredients.

Both emotion theories are in general agreement with the idea in behavior research that emotions can act as *mediators* between stimuli and overt behavior. Unlike early behavior researchers, however, emotion theories have emphasized the adaptive, rather than the

maladaptive nature of this emotional behavior. Evolutionary theories see affect programs (e.g., for fear) as domain-specific solutions shaped by evolution to recurring life problems (e.g., threats). Appraisal theories see appraisal as a domain-general process that serves to monitor and advance the satisfaction of any goal. Maladaptive behavior may still occur, but only as the result of misfirings that count as exceptions rather than the rule.

A number of behavior researcher have made an effort to incorporate insights from emotion theories in their emotional explanations of behavior. This enabled these researchers to also emphasize the adaptive role of emotions (Damasio, 1994; Fessler, Pillsworth, & Flamson, 2004; Lerner & Keltner, 2000; Raghunathan & Pham, 1990). For instance, Lerner and Keltner (2000) proposed that the influence of specific incidental emotions on decision making is mediated by the appraisals underlying these emotions. Once these appraisals are induced, people tend to interpret subsequent information in line with these appraisals. For instance, procedures to manipulate anger/fear do so by manipulating the central appraisals of high/low control and certainty, which carry over to subsequent risk perceptions and hence behavior.

Obstacles

The development outlined above may seem a promising step forward, yet a couple of flies seem to sit in the ointment. First, despite the adaptationist agenda of emotion theories and of behavior research inspired by them, we argue that the proposed mechanisms still have an essentially stimulus-driven format and hence lack the flexibility to produce truly adaptive behavior (see Moors, 2017a, 2017b; Moors, Boddez, & De Houwer, 2017). Indeed, in affect program theories, representations of stimulus features (e.g., the form of a snake) are wired together with specific action tendencies (e.g., to flee), and the latter can be considered as representations of actions. Likewise, in appraisal theories, specific patterns of appraisals,

which can be considered as patterns of representations of abstract stimulus features, are also linked up with specific action tendencies (e.g., to flee)².

Both evolutionary theories and appraisal theories accept that after the stimulus-driven process has triggered an early action tendency, a goal-directed process can take over either to refine the action tendency into a more concrete one (e.g., fighting can be done by kicking, punching, or shouting) or to correct it and replace it with an action tendency with a higher expected utility (e.g., fighting can be replaced by fleeing if fighting turns out to have low expected utility). Thus, emotion theories seem to stick to a dual system model with a default-interventionist architecture, in which a default stimulus-driven process delivers the “emotional” aspect of behavior and a goal-directed process can intervene to take care of the “cognitive” or non-emotional aspects involved in planning and regulation. Thus, it seems that behavior researchers who turned to emotion theories to justify the adaptive role of emotion in behavior must return empty-handed. The truly adaptive part is still furnished by the “cognitive” process.

Second, and perhaps more seriously, affect programs and appraisal-action tendency pairs can only be invoked as causal mechanisms of emotions—and ultimately of behavior—if there is evidence for their existence. Skeptical reviews have offered both empirical and logical arguments against the existence of dedicated neural circuits for each basic emotion (Lindquist, Wager, Bliss-Moreau, & Barrett, 2012; Moors, 2017a; Ortony & Turner, 1990; Russell, 2017) and for emotions in general (Beer, 2017). Meta-analyses have shown that direct evidence for the existence of dedicated neural circuits for emotions is weak and inconsistent (see Barrett, & Satpute, in press), and that indirect evidence for such circuits (i.e., evidence based on the universality of emotion ingredients or the coherence among these ingredients) is lower than

² Appraisal theories allow for flexibility in the step going from the raw stimulus input to the appraisals, but not in the step going from the appraisals to the action tendency (for extensive discussion see Moors, 2017a; Moors et al., 2017).

evolutionary theories would predict (e.g., Quigley & Barrett, 2014; Durán, Reisenzein, & Fernández-Dols, 2017). Moreover, questions have been raised about the interpretation of the evidence. For example, it has been suggested that direct evidence for emotion-specific neural circuits often can be re-interpreted as evidence for behavior-specific neural circuits. For another example, it has been argued that indirect evidence based on the universality of facial expressions may not point at hard-wired circuits but rather at universal learning histories (Crivelli, Jarillo, & Fridlund, 2016).

These (and many other) arguments have led Russell (2003; see also Fridlund, 2017) to conclude that neither basic emotions, nor emotions in general, constitute a fruitful scientific set. This marks a radical step towards the further demystification of emotion. Russell (2012) further argued that the ingredients of the episodes that people call emotional may be better candidates for scientific kinds and that it remains possible to investigate the relations among these ingredients. A subset of appraisal theorists (called dimensional appraisal theorists) have done just that (Moors, 2017a). They formulate and test relations between appraisals and action tendencies, somatic responses, expressive behavior, and feelings, without linking any of these to specific emotions (Scherer & Moors, in press) and they thereby sidestep the issue of whether a given set of ingredients is truly emotional or not.

Unfortunately, empirical evidence for hypothesized relations between specific appraisals and specific action tendencies (the two central ingredients) appears to be less than satisfactory. Correlational studies in which both ingredients are measured with self-report have yielded reasonable support for the predicted relations (e.g., Frijda, Kuipers, & ter Schure, 1989). However, experimental studies in which appraisals are manipulated with real stimuli and action tendencies are measured with indirect objective methods (behavioral choice and reaction times) often produce mixed results (see review by Scherer & Moors, in press). For instance, the hypothesis that goal-incongruent stimuli that are easy/difficult to control

activate the tendency to attack/avoid has not been confirmed, with several studies showing that low control leads to an increase rather than a decrease in aggression (e.g., Donnerstein & Wilson, 1976; Richardson, Vandenberg, & Humphries, 1986; Fischer, Bossuyt, & Moors, 2018).

In an attempt to salvage their theories, evolutionary theorists and appraisal theorists have invoked moderating factors (e.g., mixed emotions, additional appraisal criteria) and moderating processes such as the goal-directed processes involved in planning and emotion regulation discussed above. In brief, if a controllable goal obstacle does not always lead to aggression, this might be because the obstacle was not caused by another person or because the person suppressed her tendency to aggress. We doubt whether the strategy to keep adding moderators whenever findings do not replicate across studies is a fruitful one. It ultimately leads to behavior explanations in terms of large collections of disjointed factors and processes (see Moors, 2017b). We believe a more parsimonious approach imposes itself.

The Goal-directed Process as a Parsimonious Alternative Explanans for Behavior

If so-called emotional action tendencies (e.g., to fight, flee) are not explained by affect programs on the neural level, nor by fixed appraisal patterns on the mental level, which mechanisms do explain them? One potential candidate that has sometimes been overlooked is the goal-directed mechanism that is typically reserved for non-emotional action tendencies (Moors, 2017a, 2017b; Moors et al., 2017; see also Bindra, 1969; Eder & Rothermund, 2013).

When the behavior researchers discussed at the outset of this paper were first confronted with behavior that deviated from the predictions based on the goal-directed process, they resorted to other factors such as emotions and the stimulus-driven mechanism thought to underlie them. They could also have taken an alternative, more parsimonious approach, however. Instead of expanding the number of mechanisms, they could have chosen to expand the number of goals involved in the goal-directed process and to consider other

complexities inherent to this process (e.g., see Berkman, Hutcherson, Livingston, Kahn, & Inzlicht, 2017; Shank, Miller, & Smaldino, 2017).

For instance, when a participant in an ultimatum game engages in costly aggression after receiving an unfair offer (Mattarazzo et al., 2016), there is no need to postulate the mediating role of anger or a stimulus-driven process by which a slight by another person invariantly causes the tendency to aggress. It would be more parsimonious to assume a goal-directed process in which the participant's goal to enforce moral norms is more important than maximizing profit and in which aggressive behavior has the highest expectancy for reaching that goal (Civai, Corradi-Dell'Acqua & Rumiati, 2010; Turillo, Folger, Lavelle, Umphress, & Gee, 2002).

The goal-directed process is highly flexible and therefore can produce the adaptive behavior that behavior researchers seem to be after. In fact, much behavior that seems maladaptive at first sight may turn out to be adaptive if one gains insight in the often hidden goals that are at stake and the environmental constraints imposed on a person's action repertoire. Evidently, adaptation is not olympic because the assessment of values and expectancies is a subjective matter and people do not have complete knowledge about all behavior options and all their potential outcomes. These imperfections, however, do not require postulating emotion or an extra mechanism. They can simply be considered as errors in the goal-directed process.

To illustrate this point, even influences of incidental emotions on decision-making, which may often count as irrational, can be re-interpreted in a goal-directed framework. Consider Raghunathan and Pham's (1999) finding that participants who underwent a fear induction procedure (in which they had to imagine waiting for potentially bad news from their doctor) subsequently avoided choosing high-risk high-reward options. Instead of readily accepting that the fear induction procedure indeed induced fear (perhaps via an appraisal of

the stimulus as difficult to control and uncertain), and that it was the fear (or the tendency to appraise stimuli in a certain way) that carried over from one episode to the next, it would be more parsimonious to assume that the induction procedure temporarily increased the value of the goal for safety and/or the expectancy that risk avoidance is a good strategy to reach safety, and that it was the tendency to evaluate behavior options in certain ways that carried over. Another possibility is that the action tendency chosen in the first episode (e.g., avoidance) remained prominent in the person's action repertoire so that it was more easily chosen again in the next episode. These re-interpretations bypass the notion of fear (and of appraisal of the stimulus).

Even cases in which emotions produce clearly maladaptive behavior, such as when a speaker paralyses during a public speech out of fear, can be re-interpreted in a goal-directed way. Suppose the person has the goal to avoid making mistakes and judges that self-monitoring (i.e., a mental behavior) has a high expectancy for reaching that goal. This strategy may turn out to be unsuitable, however. Indeed, it may be that when a person engages in self-monitoring, she gets distracted from the content and starts making mistakes. This in turn may trigger an increase in self-monitoring with even more mistakes as a result. Soon enough, the person may see no behavior options with a high enough expectancy to end this vicious cycle, leading to the blocking of her behavior.

The above examples show that in addition to parsimony, the goal-directed account has a wide scope: It provides a proximal causal mechanism in terms of values and expectancies for a broad range of phenomena. The moderators that have turned up in prior research can be considered as remote causal factors that feed into these proximal factors. For instance, the moderating role of emotional intelligence on the influence of fear on risk perception, traditionally understood in terms of the capacity to identify and hence screen out the influence of fear (Yip & Côté, 2013), can alternatively be understood in terms of the capacity to make

more objective assessments of expectancies. In sum, the goal-directed account proposes that we should get rid of the concept of emotion as an explanatory category for irrational effects, and instead replace it with an analysis of goal-directed processes at the service of multiple, often competing, goals.

All this said, we do not want to go so far as to deny the existence of stimulus-driven processes. In a recently developed alternative dual process model (Moors, 2017a, 2017b; Moors & Boddez, 2017; Moors et al., 2017), stimulus-driven processes still have a place next to the goal-directed ones³, but the explanatory territory of these stimulus-driven processes is shrunk drastically. This is because the interplay between both processes is captured by a parallel-competitive architecture in which both processes often operate in parallel (because both can operate automatically) and compete with each other, and in which the goal-directed process wins the competition and dominates the resulting action tendency.

The alternative dual process model invites a close re-examination of purported evidence for the influence of emotions on behavior as we did in a previous paragraph. A proper test of the goal-directed account against the now dominant emotional account, however, requires experimental designs in which both accounts predict different initial action tendencies. This asks for a procedure in which the action tendency predicted by emotion theories does not have the highest expectancy for reaching the goal at stake. Several researchers have already taken this approach (e.g., Civai, Corradi-Dell'Acqua, Gamer, & Rumiati, 2010). In a recent study from our lab, for instance, we found that when socially excluded participants could choose not only between antisocial and prosocial behavior, but

³ In this model, the goal-directed process is embedded in a control cycle starting with a comparison between a stimulus and a first goal. If a discrepancy is detected between the stimulus and this first goal, a second goal to reduce the discrepancy is activated. Reducing the discrepancy can be done either by choosing an action tendency via the goal-directed process (i.e., assimilation), by changing the first goal (i.e., accommodation), or by re-interpreting the stimulus (i.e., immunization; see Brandtstädter & Rothermund, 2002). If an action tendency is chosen and implemented in overt behavior, the outcome of this behavior is fed back to the comparator as the input to a new cycle. The cycle is repeated until there is no discrepancy left.

also for moralizing behavior (which should have a higher expectancy than the other behaviors because it has more benefits and less costs), participants no longer chose to aggress but rather to lecture their perpetrators (Fischer, Kuppens, Mesquita, & Moors, 2018).

If our intuitions about the goal-directed account turn out to be correct, explanations in terms of emotions may be approximations at best (Ortony & Turner, 1990). Emotions may point in imprecise ways to other factors (values and expectancies) that do the actual causal work. If so, it may be time to replace explanations in terms of emotions with explanations in terms of these other factors. We realize that this message is a tough sell, given that some readers may see it as a return to square one. Yet we believe it is perfectly possible to study the hot phenomena that people label as emotional but to propose a parsimonious mechanistic explanation in which the hot stuff is preserved in the values of the behavioral outcomes. In this way, we believe the goal-directed account caters for better understanding, better prediction, as well as better strategies for behavior change. The goal-directed account yields insight in phenomena without taking recourse to mysterious jumps. Better understanding should also breed better prediction. Predicting people's behavior requires information about values and expectancies (i.e., the proximal causes of behavior) of behavior options rather than an extensive list of situational features (i.e., the remote causes of behavior). An obvious challenge is the large number of potential goals, meta-goals, and their variability over time, which will ask for sophisticated statistical modeling. A final promise of the goal-directed account is that it promotes different strategies for behavior change than models that rely heavily on stimulus-driven explanations. Instead of promoting the retraining of stimulus-response links or the regulation of emotions, the goal-directed account promotes strategies aimed at changing values of goals and subgoals and handing behavior options with higher expectancies for reaching them (see Moors et al., 2017).

References

- Anderson, C. J. (2003). The psychology of doing nothing: forms of decision avoidance result from reason and emotion. *Psychological Bulletin*, 129(1), 139-167.
- Barrett, L. F., & Satpute, A. B. (in press). Historical pitfalls and new directions in the neuroscience of emotion. *Neuroscience Letters*.
- Bartlett, M. Y., & DeSteno, D. (2006). Gratitude and prosocial behavior: Helping when it costs you. *Psychological Science*, 17(4), 319-325.
- Beer, J. S. (2017). What do we know about emotional influences on social cognition? A social neuroscience perspective. *Emotion Review*, 9(2), 172-180.
- Berkman, E. T., Hutcherson, C. A., Livingston, J. L., Kahn, L. E., & Inzlicht, M. (2017). Self-control as value-based choice. *Current Directions in Psychological Science*, 26(5), 422-428.
- Bindra, D. (1969). A unified interpretation of emotion and motivation. *Annals of the New York Academy of Sciences*, 159(1), 1071-1083.
- Brandtstädter, J., & Rothermund, K. (2002). The life-course dynamics of goal pursuit and goal adjustment: A two-process framework. *Developmental Review*, 22, 117–150.
- Bratman, M. E. (1987). *Intention, plans, and practical reason*. Cambridge, MA: Harvard University Press.
- Civai, C., Corradi-Dell'Acqua, C., Gamer, M., & Rumiati, R. I. (2010). Are irrational reactions to unfairness truly emotionally-driven? Dissociated behavioural and emotional responses in the Ultimatum Game task. *Cognition*, 114(1), 89-95.
- Crivelli, C., Jarillo, S., & Fridlund, A. J. (2016). A multidisciplinary approach to research in small-scale societies: studying emotions and facial expressions in the field. *Frontiers in Psychology*, 7, 1073.

- Damasio, A. R. (1994). *Descartes' error: Emotion, research and the human brain*. New York: Putnam
- Donnerstein, E., & Wilson, D. W. (1976). Effects of noise and perceived control on ongoing and subsequent aggressive behavior. *Journal of Personality and Social Psychology*, 34(5), 774-781.
- Durán, J., Reisenzein, R., & Fernández-Dols, J.M. (2017). Coherence between emotions and facial expressions. In J. M. Fernández-Dols & J. A. Russell (Eds.), *The science of facial expression* (pp.107-129). Oxford, UK: Oxford University Press.
- Eder, A. B., & Rothermund, K. (2013). Emotional action: An ideomotor model. In C. Mohiyeddini, M. Eysenck, & S. Bauer (Eds.), *Psychology of emotions* (pp. 11–38). Hapage, NY: Nova Science Publishers.
- Ekman, P. (1999). Basic emotions. In T. Dalgleish & T. Power (Eds.), *The handbook of cognition and emotion* (pp. 45-60). Sussex, UK: Wiley.
- Feng, C., Luo, Y. J., & Krueger, F. (2015). Neural signatures of fairness-related normative decision making in the ultimatum game: A coordinate-based meta-analysis. *Human Brain Mapping*, 36(2), 591-602.
- Fessler, D. M., Pillsworth, E. G., & Flamson, T. J. (2004). Angry men and disgusted women: An evolutionary approach to the influence of emotions on risk taking. *Organizational Behavior and Human Decision Processes*, 95(1), 107-123.
- Fischer, M., Kuppens, P., Mesquita, B., & Moors, A. (2018). Expected utility matters: When socially excluded people prefer moralizing behavior over anti- and prosocial behavior. Manuscript in preparation.
- Fischer, M. Bossuyt, E., & Moors, A. (2018). Experimental evidence that low control leads to the tendency to fight. Manuscript in preparation.

- Fridlund, A. J. (2017). The behavioral ecology view of facial displays, 25 years later. In J. M. Fernandez-Dols & J. A. Russell (Eds.), *The science of facial expression* (pp. 77-92). Oxford, UK: Oxford University Press.
- Frijda, N. H., Kuipers, P., & Ter Schure, E. (1989). Relations among emotion, appraisal, and emotional action readiness. *Journal of Personality and Social Psychology*, 57(2), 212-228.
- Gigerenzer, G. (2004). Dread risk, September 11, and fatal traffic accidents. *Psychological Science*, 15(4), 286-287.
- Kahneman, D., & Frederick, S. (2007). Frames and brains: Elicitation and control of response tendencies. *Trends in Cognitive Sciences*, 11(2), 45-46.
- Kahneman, D., Wakker, P. P., & Sarin, R. (1997). Back to Bentham? Explorations of experienced utility. *The Quarterly Journal of Economics*, 112(2), 375-406.
- Klein, C. (2011). The dual track theory of moral decision-making: A critique of the neuroimaging evidence. *Neuroethics*, 4(2), 143-162.
- Ho, S. S., Gonzalez, R. D., Abelson, J. L., & Liberzon, I. (2012). Neurocircuits underlying cognition–emotion interaction in a social decision making context. *NeuroImage*, 63(2), 843-857.
- Lerner, J. S., & Keltner, D. (2000). Beyond valence: Toward a model of emotion-specific influences on judgement and choice. *Cognition & Emotion*, 14(4), 473-493.
- Lerner, J. S., Li, Y., Valdesolo, P., & Kassam, K. S. (2015). Emotion and decision making. *Annual Review of Psychology*, 66, 799-823.
- Lindquist, K. A., Wager, T. D., Kober, H., Bliss-Moreau, E., & Barrett, L. F. (2012). The brain basis of emotion: a meta-analytic review. *Behavioral and Brain Sciences*, 35(3), 121-143.

- Loewenstein, G. F., Weber, E. U., Hsee, C. K., & Welch, N. (2001). Risk as feelings. *Psychological Bulletin*, 127(2), 267-286.
- Matarazzo, O., Pizzini, B., Greco, C., & Carpentieri, M. (2016, October). Effects of a chance task outcome on the offers in the ultimatum game: The mediation role of emotions. In *Cognitive Infocommunications (CogInfoCom), 2016 7th IEEE International Conference on* (pp. 000295-000300). IEEE.
- Moors, A., Ellsworth, P., Scherer, K. R., & Frijda, N. H. (2013). Appraisal theories of emotion: State of the art and future development. *Emotion Review*, 5, 119-124.
- Moors, A. (2017a). Integration of Two Skeptical Emotion Theories: Dimensional Appraisal Theory and Russell's Psychological Construction Theory. *Psychological Inquiry*, 28(1), 1-19.
- Moors, A. (2017b). The integrated theory of emotional behavior follows a radically goal-directed approach. *Psychological Inquiry*, 28, 68-75.
- Moors, A., & Boddez, Y. (2017). Author reply: Emotional episodes are action episodes. *Emotion Review*, 9(4), 353-354.
- Moors, A., Boddez, Y., & De Houwer, J. (2017). The power of goal-directed processes in the causation of emotional and other actions. *Emotion Review*, 9(4), 310-318.
- Ortony, A., & Turner, T. J. (1990). What's basic about basic emotions?. *Psychological Review*, 97(3), 315.
- Phelps, Elizabeth A., Karolina M. Lempert, and Peter Sokol-Hessner. (2014). Emotion and decision making: multiple modulatory neural circuits. *Annual Review of Neuroscience*, 37, 263-287.
- Pillutla, M. M., & Murnighan, J. K. (1996). Unfairness, anger, and spite: Emotional rejections of ultimatum offers. *Organizational Behavior and Human Decision Processes*, 68(3), 208-224.

- Quigley, K. S., & Barrett, L. F. (2014). Is there consistency and specificity of autonomic changes during emotional episodes? Guidance from the conceptual act theory and psychophysiology. *Biological Psychology*, 98, 82-94.
- Raghunathan, R., & Pham, M. T. (1999). All negative moods are not equal: Motivational influences of anxiety and sadness on decision making. *Organizational Behavior and Human Decision Processes*, 79(1), 56-77.
- Richardson, D. R., Vandenberg, R. J., & Humphries, S. A. (1986). Effect of power to harm on retaliative aggression among males and females. *Journal of Research in Personality*, 20(4), 402-419.
- Russell, J. A. (2003). Core affect and the psychological construction of emotion. *Psychological Review*, 110, 145–172.
- Russell, J. A. (2012). From a psychological constructionist perspective. In *categorical versus dimensional models of affect: A seminar on the theories of Panksepp and Russell* (pp. 79–118). Amsterdam, the Netherlands: John Benjamins.
- Russell, J. A. (2017). Moving on from the basic emotion theory of facial expressions. In J. M. Fernandez-Dols & J. A. Russell (Eds.), *The science of facial expression*. Oxford, UK: Oxford University Press.
- Sanfey, A. G., Rilling, J. K., Aronson, J. A., Nystrom, L. E., & Cohen, J. D. (2003). The neural basis of economic decision-making in the ultimatum game. *Science*, 300(5626), 1755-1758.
- Schank, J. C., Miller, M. L., & Smaldino, P. E. (2017). The Evolution of Fair Offers with Low Rejection Thresholds in the Ultimatum Game. *bioRxiv*, 162313.
- Scherer, K. R., & Moors, A. (in press). The emotion process: Event appraisal and component differentiation. *Annual Review of Psychology*.
- Tolman, E. C. (1951). *Purposive behavior in animals and men*. Univ of California Press.

- Turillo, C. J., Folger, R., Lavelle, J. J., Umphress, E. E., & Gee, J. O. (2002). Is virtue its own reward? Self-sacrificial decisions for the sake of fairness. *Organizational Behavior and Human Decision Processes*, 89(1), 839-865.
- Volz, K. G., & Hertwig, R. (2016). Emotions and decisions: Beyond conceptual vagueness and the rationality muddle. *Perspectives on Psychological Science*, 11(1), 101-116.
- Wälde, K., & Moors, A. (2017). Current emotion research in economics. *Emotion Review*, 9, 271-278.
- Williams, L. A., & DeSteno, D. (2008). Pride and perseverance: The motivational role of pride. *Journal of Personality and Social Psychology*, 94(6), 1007-1017.
- Yip, J. A., & Côté, S. (2013). The emotionally intelligent decision maker: Emotion-understanding ability reduces the effect of incidental anxiety on risk taking. *Psychological Science*, 24(1), 48-55.