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Demystifying the role of emotion in behaviour: toward a goal-directed account

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ABSTRACT

The paper sketches the historical development from emotion as a mysterious entity and the source of maladaptive behaviour, to emotion as a collection of ingredients and the source of also adaptive behaviour. We argue, however, that the underlying mechanism proposed to take care of this adaptive behaviour is not entirely up for its task. We outline an alternative view that explains so-called emotional behaviour with the same mechanism as non-emotional behaviour, but that is at the same time more likely to produce adaptive behaviour. The phenomena that were initially seen as requiring a separate emotional mechanism to influence and cause behaviour 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.

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There was a time when emotional phenomena were largely ignored in behaviour research conducted in psychology, economics, and philosophy (Volz & Hertwig, 2016; Wälde & Moors, 2017). Across these disciplines, behaviour was typically explained by a goal-directed process in which the expected utilities of behaviour options are compared and the behaviour option with the highest expected utility is chosen (Kahneman, Wakker, & Sarin, 1997).[1] The expected utility of a behaviour option refers to the product of the subjective value of the outcomes of that behaviour option and the expectancy that the behaviour option will lead to this outcome. The behaviour resulting from this process was considered rational or adaptive (Bratman, 1987; Tolman, 1932). When empirical research revealed that behaviour did not always conform to the predictions based on expected utility, but sometimes qualified as irrational or maladaptive, the search for moderators began.

Behaviour research: emotions as explanans of maladaptive behavior

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

Emotions are often treated by behaviour researchers as mysterious entities that are separate from cognition and behaviour. Emotions are allowed to influence cognition and behaviour 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

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behaviour (e.g. Anderson, 2003; Bartlett & DeSteno, 2006; Feng, Luo, & Krueger, 2015; Ho, Gonzalez, Abelson, & Liberzon, 2012; Kahneman & Frederick, 2007; 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 behaviour 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 behaviour and the cognitive system as one that can intervene when conditions allow it (e.g. when there is enough time, attention, and motivation; Moors, Boddez, & De Houwer, 2017).

Emotion research: emotions as explanandum and as explanans of adaptive behavior

In parallel with the aforementioned behaviour researchers, whose primary interest is in explaining behaviour 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 behaviour (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) hypothesise 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) hypothesise 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 behaviour research that emotions can act as *mediators* between stimuli and overt behaviour. Unlike early behaviour researchers, however, emotion theories have emphasised the adaptive, rather than the maladaptive nature of this emotional behaviour. 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 behaviour may still occur, but only as the result of misfirings that count as exceptions rather than the rule.

A number of behaviour researcher have made an effort to incorporate insights from emotion theories in their emotional explanations of behaviour. This enabled these researchers to also emphasise the adaptive role of emotions (Damasio, 1994; Fessler, Pillsworth, & Flamson, 2004; Lerner & Keltner, 2000; Raghunathan & Pham, 1999). 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 behaviour.

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 behaviour 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 behaviour (see Moors, 2017a, 2017b; Moors et al., 2017). Indeed, in evolutionary 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 behaviour 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 behaviour researchers who turned to emotion theories to justify the adaptive role of emotion in behaviour 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 behaviour – 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, Kober, 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 evolutionary theories would predict (e.g. Durán, Reisenzein, & Fernández-Dols, 2017; Quigley & Barrett, 2014). 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 behaviour-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 fruitful scientific kinds. 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 behaviour, 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 hypothesised 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 (behavioural choices 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; Fischer, Bossuyt, & Moors, 2018; Richardson, Vandenberg, & Humphries, 1986).

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 behaviour 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 behaviour researchers discussed at the outset of this paper were first confronted with behaviour 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 emotions. 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; Schank, Miller, & Smaldino, 2017).

For instance, when a participant in an ultimatum game engages in costly aggression after receiving an unfair offer (Matarazzo 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 maximising profit and in which aggressive behaviour has the highest expectancy for reaching that goal (Civai, Corradi-Dell'Acqua, Gamer, & Rumiati, 2010; Turillo, Folger, Lavelle, Umphress, & Gee, 2002).

The goal-directed process is highly flexible and therefore can produce the adaptive behaviour that behaviour researchers seem to be after. In fact, much behaviour 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 behaviour 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 behaviour 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 behaviour, 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 behaviour) 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 behaviour options with a high enough expectancy to end this vicious cycle, leading to the blocking of her behaviour.

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 ones,[3] 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 behaviour 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 et al., 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 behaviour, but also for moralising behaviour (which should have a higher expectancy than the other behaviours 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 realise 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 behavioural outcomes. In this way, we believe the goal-directed account caters for better understanding, better prediction, as well as better strategies for behaviour 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 behaviour requires information about values and expectancies (i.e. the proximal causes of behaviour) of behaviour options rather than an extensive list of situational features (i.e. the remote causes of behaviour). An obvious challenge is the large number of potential goals, meta-goals, and their variability over time, which will ask for sophisticated statistical modelling. A final promise of the goal-directed account is that it

promotes different strategies for behaviour 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 providing behaviour options with higher expectancies for reaching them (see Moors et al., 2017).

Notes

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).
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).
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. accomodation), or by re-interpreting the stimulus (i.e. immunisation; see Brandtstädter & Rothermund, 2002). If an action tendency is chosen and implemented in overt behaviour, the outcome of this behaviour is fed back to the comparator as the input to a new cycle.The cycle is repeated until there is no discrepancy left.

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