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Emotion and action

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ABSTRACT *The role of emotion in human action has long been neglected in the philosophy of action. Some prevalent misconceptions of the nature of emotion are responsible for this neglect: emotions are irrational; emotions are passive; and emotions have only an insignificant impact on actions. In this paper we argue that these assumptions about the nature of emotion are problematic and that the neglect of emotion's place in theories of action is untenable. More positively, we argue on the basis of recent research in cognitive neuroscience that emotions may significantly affect action generation as well as action execution and control. Moreover, emotions also play a crucial role in people's explanation of action. We conclude that the concept of emotion deserves a more distinctive and central place in philosophical theories of action.*

1. Introduction

The concept of emotion is largely absent from contemporary theories of action. Philosophers of action concern themselves with intentions, wants, purposes, desires, beliefs, plans, and volitions, and account for the nature of action by elaborating these theoretical constructs, whereas scant attention has been given to emotions. This treatment is at odds with our commonsense psychological practices, in which emotions and moods are frequently used for justifying actions and for predicting and explaining social behaviors.

The neglect of emotions' role in the enterprise of understanding human action is very likely based on some long-standing but misconceived notions of the nature of emotion: (1) emotions are irrational and disruptive; (2) emotions are things that *merely happen to* people rather than that people do *voluntarily*; and (3) the impact of emotions on action is at best indirect and insignificant. So emotions are irrelevant to human actions. In this paper, we will show that these assumptions about the nature of emotion are dubious and argue that emotions need to be incorporated into philosophical discussions of action.

In the following section we will analyze how some prevalent misconceptions of the nature of emotion impede our appreciation of the significance of emotion in human action, and argue that the neglect of emotion's place in theories of action is

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untenable. After presenting an outline of the neural substrates of human motor system (Section 3) and emotion mechanisms (Section 4), we argue that emotion can influence action generation (Section 5) as well as action execution and control (Section 6). In addition, we argue that emotion also has a significant place in the explanation of action (Section 7). We conclude that the neglect of the role of emotion in contemporary theories of action is unjustified, and that the concept of emotion deserves a distinctive position in our understanding of human action.

2. Emotion: a neglected dimension in theories of action

Emotion is conventionally considered as opposed to the finest human ability, reason. Emotion is primitive, bestial, destructive, unpredictable and undependable, and thus needs to be controlled by reason. The metaphor of a charioteer steering a wild horse, originated by Plato (*Phaedrus*), is an enduring characterization of the relationship between reason and emotion. Three features displayed in this metaphor still determine much of the philosophical and commonsense views of emotion. First, there is the reason–emotion dichotomy: we are dealing with two different kinds of mental phenomenon, two conflicting and antagonistic aspects of the mind. Second, emotion is inferior: emotions are primitive and disruptive to the normal and optimal functions of mind. Third, emotion should be under the control of reason for the sake of our normal activities of thought and action. Even though the superiority of reason has sometimes been challenged in the history of thought, for example, in David Hume famous declaration that "reason is, and ought only to be the slave of passions" (1978, p. 415), the reason–emotion distinction itself is widely maintained.

In the last few decades, this dichotomy between emotion and reason has been questioned by a number of philosophers, psychologists, and neurobiologists (Ben-Ze'ev, 2000; Churchland, 1996; Damasio, 1994; de Sousa, 1987; Elster, 1999; Frank, 1988; Greenspan, 1988; Lazarus & Lazarus, 1994; Oatley, 1992; Solomon, 1976; Turski, 1994). The relation between reason and emotion may be that they are integral and supportive to each other, rather than antagonistic and conflicting as widely conceived. Even though emotions are typically not the result of deliberative, intellectual calculations, they are not *necessarily* irrational or nonrational. Emotions are evaluative and responsive patterns that emerge through the evolution of the species and the development of individuals. They serve the function of providing appraisals about whether what is happening is harmful, threatening, or beneficial to our well-being under certain conditions. In many cases, emotions, rather than deliberate intellectual calculations, supply the most reliable information about the situations and ourselves, and provide the best ways to efficiently achieve our ends. Moreover, emotion may also be integral to the processes of reasoning and decision-making (Damasio, 1994). Some patients with neurological damage in specific sites of their brains who lose their ability to process emotion normally also lose their ability to make rational decisions in everyday life. But their abstract reasoning and logic skills remain intact. This evidence suggests that emotions probably assist reasoning, especially when it involves complex personal and social matters. "Well–

matters. "Well–tuned and deployed emotion … is necessary for the edifice of reason to operate properly" (Damasio, 2000, p. 14).

It has long been maintained by many philosophers of action that explaining actions requires finding *reasons* agents have for doing what they do. Following Davidson (1963/1980), a number of philosophers view this kind of explanation as a species of ordinary causal explanation: reasons are real causes of actions (Audi, 1993; Dretske, 1988; Goldman, 1970). If the conventional dichotomy between reason and emotion is tenable, then ignoring the role of emotion in explaining human action is defensible. But if an integrative theory of the relation between reason and emotion is psychologically realistic, emotions cannot be excluded from explaining human action on the assumption that they are irrational.

The original word for emotion was *passion*. It comes from the Greek *pathos* and the Latin *pati*, which means "passive" and "patient". Like diseases, emotions are commonly considered as things that happen to us, out of our control, and involuntary. The passivity of emotion is usually in contrast to *activity*, the hallmark of action and agency. Actions are generally understood as things that we do, perform, and initiate, rather than things that merely happen to us. The concept of action is intimately associated with notions of responsibility and freedom: responsibility entails agency; we are responsible only for the things we bring about. Therefore it might seem reasonable to exclude emotions from theories of action, which primarily concern the active and voluntary features of human behavior.

But it would be hasty to dismiss the role of emotion in our active behavior. The passive feature of emotion should not be overstated. It is obvious that there are many circumstances in which we do impute responsibility to persons for their emotions. We often commend or criticize people for their emotional feelings: it is good to feel sympathy for others' pain and bad to take pleasure in others' misfortune. People may be properly considered responsible for an emotion even if in certain circumstances it would be morally inappropriate to punish them (Sankowski, 1977). Moreover, people have responsibility for the expression of emotions, which is inherently an important means of social interaction and may have a crucial impact on the life of others. Regulating emotions is quite common in our everyday life. Emotion regulation is increasingly recognized as an important skill of coping with social and personal problems (Gross, 1998), and is viewed as part of so-called "emotional intelligence" (Goleman, 1995, 1998; Salovey & Mayer, 1990, Salovey & Sluyter, 1997). There is no doubt that we can control and manage our emotions to a certain extent and it is clearly mistaken to equate emotions with purely passive behaviors such as reflexes and instincts. "Emotions fall somewhere in between clear cases of activity (intentional actions) and clear cases of passivity (involuntary physiological processes)" (de Sousa, 1987, p. 10). Acknowledging that emotions are not the same as actions does not imply that emotions can be separated from our understanding of the nature of action.

Another reason for ignoring emotion in theories of action is that emotions can serve only as background factors, indirectly affecting the motivational component of action. Explaining an action is typically finding appropriate motivational factors and related epistemic factors. The former is usually understood as a *pro attitude* toward

actions of a certain kind (Davidson, 1963/1980), which might be desires, intentions, or purposes, while the typical epistemic factor consists of beliefs. Davidson calls this pair of factors the *primary reason* why an agent performs an action. A primary reason consists of a belief and an attitude, and any explanation of an action can ultimately be reduced to a primary reason. Therefore, "it is not necessary to classify and analyse the many varieties of emotions, sentiments, moods, motives, passions, and hungers whose mention may answer the question, 'Why did you do it?' in order to see how, when such mention rationalizes the action, a primary reason is involved" (Davidson, 1963/1980, p. 7). It is fair to put emotion into the category of a pro or con attitude toward actions. Most contemporary theorists of emotion agree that evaluative appraisal is one of the most distinctive dimensions of emotion, which involves detecting and judging a personally significant change in certain situations (see Scherer, 1999 for a review). A motivational component is also generally considered as an inherent part of emotion (Ben-Ze'ev, 2000). The problem is that, whereas some pro attitudes such as desire, intention and want receive intensive treatment from theorists of action, emotions have been largely omitted. The principal aim of this paper is to establish that emotion really does matter to human actions.

The central task of a philosophical theory of action is to account for the distinction between the things that people do and the things that people undergo or that merely happen to them. On the one hand, there are some activities that people seem clearly to bring about, such as raising a hand to vote. First, we are *aware of* the intention, choice, or decision to vote. Then the intention, choice, or decision results in the lifting of the hand. Our raising our hand in this case is understood as intentional, voluntary, deliberate, mindful and conscious. It is controlled by will. On the other hand, there are some bodily events that just happen to us, such as blinking or kicking a leg reflexively when hit on the knee. These behaviors are unintentional, involuntary, mindless, and usually unconscious. The dichotomy between what we do and what merely happens has shaped the philosophical discussion of action in the last several decades, resulting in neglect of a wide range of activities that fall between the two extremes of the spectrum. As Harry Frankfurt remarks: "The occurrence in human life of events that are neither actions nor mere happenings is sometimes overlooked, but it should not be surprising … One result of overlooking events of this kind is an exaggeration of the peculiarity of what humans do. Another result, related to the first, is the mistaken belief that a twofold division of human events into actions and mere happenings provides a classification that suits the interests of the theory of action" (Frankfurt, 1977/1988, p. 58).

Thus it is also not surprising that emotions have been largely ignored by philosophers of action who endorse this dichotomous framework for understanding action. The occurrence of an emotion is generally understood as an involuntary and non-deliberative event. So emotional behaviors are apparently not the things that people do deliberately. Therefore emotions are things that merely happen to people, beyond the scope of the philosophy of action.

However, the dichotomy between deliberative, intentional action and mere happenings itself is quite questionable. Some recent evidence from psychology and

neuroscience requires us to reconsider this twofold classification of human behavior. First, there is an increasing number of psychological findings indicating that a great deal of our daily life is driven by automatic, unintended and unconscious mental processes, which involve little intention, attention, effort, control and awareness (Bargh, 1997, Bargh & Chartrand, 1999; Kirsch & Lynn, 1999). Automaticity penetrates into almost every aspect of our mental life, including perception, social cognition, motor performance, the setting of behavior goals and motivations, and subjective evaluations and judgements. Many forms of automatic mental activities develop out of repeated learning and experience from intentional, mindful, and effortful cognition and action. Second, intentional actions can also involve substantive automatic elements. Once the critical situational context is encountered, people with specific prior intentions or simple plans on when, where, and how to act can initiate intended actions immediately, efficiently and effortlessly, which does not require conscious and deliberative control (Gollwitzer, 1996, 1999). Third, there is some neurobiological evidence showing that even in typical voluntary action the readiness potential to act takes place *before* the subjective experience of intention or decision (Libet, 1985), which means that voluntary actions can be initiated by unconscious brain processes instead of conscious intention or decision, as assumed by folk psychology. These findings suggest that the classical dichotomous framework for understanding human behaviors is too simple to describe human activities. The voluntariness and deliberateness of human action are not all or none, but rather a matter of degree. Between the two ends of endogenously and intentionally initiated, fully controlled human actions and simplest reflexive behaviors, there is a wide range of activities of which a theory of action needs to make sense. Only within this enlarged perspective can we appreciate the significance of emotion in human action.

3. The hierarchy of the human motor system

Actions are usually embodied in voluntary bodily movement, under control of the motor system. The motor system is organized functionally as well as anatomically in a hierarchy (Gallistel, 1980; Gazzaniga et al., 1998; Ghez & Krakauer, 2000) (see Figure 1).

> [T]he lowest level of this hierarchy is the spinal cord. Not only do spinal mechanisms provide a point of contact between the nervous system and muscles, but also simple reflexive movements can be controlled at this level. At the highest level are premotor and association areas. Processing within these regions is critical for action planning based on present perceptual information, past experience, and future goals. The motor cortex and brainstem structures, with the assistance of the cerebellum and basal ganglia, translate an action into movement and coordinate the execution of an action plan. (Gazzaniga et al., 1998, p. 378)

The brainstem contains most of the neural structures essential for rhythmic activities involving breathing, eating, eye movements, and facial expressions. In addition, the

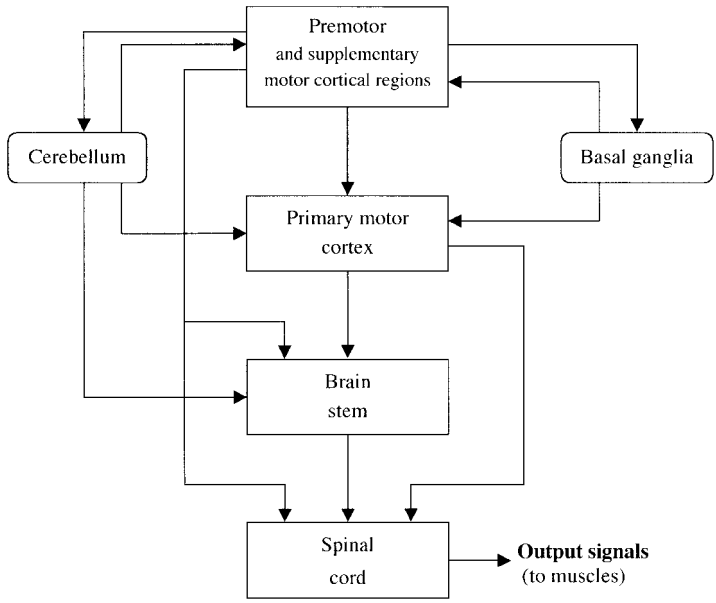

FIG. 1. The motor hierarchy (adapted from Gazzaniga *et al.*, 1998, p. 378).

brainstem also projects to the spinal cord. It is a primary source of control over spinal activity.

The anatomical hierarchy of the motor system supports the functional hierarchy of action organization. Abstract action intentions or plans are formed on the highest levels, transformed into motor programs at intermediate levels, and then implemented at the lowest levels of the hierarchy. Endogenous voluntary movement originates in the cortex (Krakauer & Ghez, 2000). The intentions, plans, or goals of action need not be concerned with the details of a bodily movement. Lower levels of mechanisms are needed to translate and realize motor commands into muscular movements. The premotor and supplementary motor areas are important for planning and coordinating complex and novel sequences of movement. They are in turn influenced heavily by the prefrontal cortex, which is believed to be involved in higher-level planning, attention, working memory, decision-making, and emotional feelings. The primary motor cortex controls relatively simple and routine features of movement. The cerebellum and the basal ganglia provide feedback circuits that regulate cortical motor areas and the brainstem. They are necessary for smooth and accurate movement and posture.

The cerebral cortex can regulate the activity of spinal neurons in direct and indirect ways (Schieber, 1999). Direct connections are provided by the cortico-spinal tract, the descending pathway that originates from the cortex and terminates directly on the spinal cord. The cortico-spinal tract, one of the latest evolutionary adaptations appearing only in mammals, especially humans, has a major significant role in the execution of voluntary movement (Porter & Lemon, 1993). Indirect pathways from the cerebral cortex to the spinal cord involve centers in the brainstem. While the direct pathway has more control on distal limb muscles in behaviors

such as manipulation of small items, indirect pathways heavily influence proximal muscles during behaviors such as ambulation. The existence of two different pathways for voluntary control in the human motor system introduces both flexibility and complexity into human action.

4. The amygdala: a center for emotional information processing

Like action, emotions are also mediated by distinct neural circuits within the brain. An emotional state can be viewed as two distinctive components: a characteristic physical responsive pattern *and* a conscious feeling (Damasio, 1994, 1999, 2000; LeDoux, 1996). Emotional physical states are mediated by a family of peripheral, autonomic, endocrine, and skeletomotor responses. These responses involve subcortical structures, including the amygdala, the hypothalamus, and the brainstem. Conscious feeling is mediated mainly by the cerebral cortex, in part by the cingulate cortex and by the prefrontal cortex. When frightened we not only feel afraid but also undergo increased heart rate and respiration, dryness of the mouth, tense muscles, and sweaty palms, all of which are mainly regulated by subcortical structures.

Central to both bodily responses of emotional states and conscious feelings is the amygdala (Aggleton, 1992, Aggleton & Young, 2000; Emery & Amaral, 2000), a subcortical nuclear complex thought to coordinate both the conscious experience of emotion and the peripheral expressions of emotions, in particular fear (LeDoux, 1996). The amygdala may be properly called "the hub in the wheel of emotion", for it has a wide range of connections to both cortical and subcortical structures (Figure 2), and plays a crucial role in many kinds of emotion. Most of the bodily expressions of emotional states are mediated by the amygdala through its connections to the hypothalamus and the brainstem. The hypothalamus is a coordinating center that integrates somatic, visceral, and behavioral information to ensure that autonomic response (e.g. the change of heart rate) and endocrine function (e.g. release of various hormones) are coherent with emotional behavior. The brainstem organizes and coordinates most of the relatively simple, stereotypic motor responses and facial expressions, such as breathing, chewing, and walking. The amygdala, the hypothalamus and the brainstem constitute the neural substrate in charge of bodily responses and expressions of emotion. There are also massive reciprocal connections between the amygdala and the cerebral cortex, whereas the projections of the amygdala to the cortex are considerably greater than those from the cortex to the amygdala (LeDoux, 1996). The amygdala has extensive projections to the sensory cortex, which may have an important influence on perception and attention. It also has an impressive set of connections with long-term memory systems involving the hippocampus and regions of the cortex interacting with the hippocampus in long-term memory storage. There are notable connections between the amygdala and the lateral prefrontal cortex, the anterior cingulate cortex and the orbital cortex, all of which are the crucial neural components underlying working memory and executive functions, which subserve planning, decision-making, and consciousness. These pathways between the amygdala and the cortex are considered essential for conscious emotional feelings (Damasio, 1994, 1999; LeDoux, 1996).

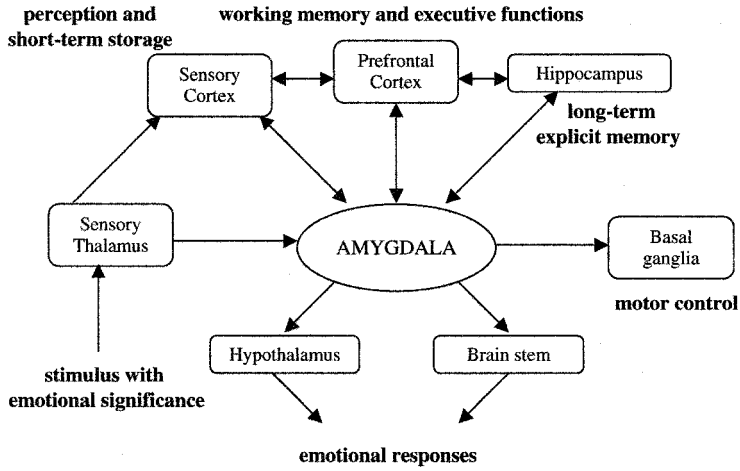

FIG. 2. The amygdala: hub in the wheel of emotion (based on LeDoux, 1996, Chapters 6 and 9).

From this schematic characterization of both the neural underpinnings of voluntary bodily movement and emotion, we can speculate that emotion and action may interact directly at two specific spots in the brain. At the low end, the mediation of skeletomotor responses of emotion and voluntary control of movement converge at the brainstem, which coordinates most of relatively simple, stereotypic motor movements and serves as a major controller of the spinal activities, which are at the bottom of the action hierarchy. At the high end, the emotional projections from the amygdala to the neocortex, in particular to the prefrontal cortex which underpins working memory and executive functions, may affect the high-level processing of action, including planning, decision-making, and cognitive assessment. In addition, there are rich possibilities that emotion may influence action indirectly. The emotional neural pathways may change autonomic responses (changes in blood pressure and heart rate, piloerection, sweating), hormonal responses (release of various hormones into the bloodstream), and the arousal states of the brain. The responses of internal organs and glands and the whole arousal state of the brain will in turn influence the feelings, cognition, and decision-making process taking place mainly in the cortex (Damasio, 1994; LeDoux, 1996).

5. Emotion and the generation of action

Let us turn to a more specific discussion on how emotion and action may interrelate *functionally*. Any human action can be divided into two separated phases: the generation of an action and the execution and control of an action. The first phase includes how a plan or intention is formed, what decision or choice is made, and how an action is initiated. The second phase specifies how a plan or intention is executed or carried out by human body. While most proponents of causal theories of action concern themselves mainly with the first stage of action, namely, the antecedents of action (e.g. Bishop, 1989; Davidson, 1980; Goldman, 1970), advo-

cates of non-causal theories tend to pay more attention to the second stage (e.g. Frankfurt, 1978; Ginet, 1990). We argue that emotion has an impact on both of these phases of human action.

5.1. Emotion and action tendency and readiness

Emotions can influence the generation of an action in two ways: the tendency and readiness to act, and the decision to act. Different emotions correspond to different patterns of action. For example, anger usually leads to aggression and retaliation; fear is involved in preparing for rapid escape from a dangerous situation. Moreover, different emotions contain the impulse to act in certain ways appropriate to the quality of particular feelings. For instance, when angry, you may feel a strong urge to react to some target; when you are afraid, you may experience the desire to run away. Thus it is reasonable for some psychologists to propose that emotions can be defined and identified by different sets of action tendencies (Arnold, 1960; Frijda, 1986). Action tendencies are states of readiness to execute a given kind of action, involving both bodily arousal and psychological preparation following emotional appraisal. For human beings, an action tendency does not *necessarily* commit the corresponding action to be actually initiated and realized. Even if you are intensely angry in a situation, you may be able to control your temper. But the action tendency and readiness to act induced by emotional appraisal remains.

The connection between emotion and action tendency can find a natural place in various appraisal theories of emotion (Arnold, 1960; Frijda, 1986; Lazarus, 1991). Emotional appraisal is a mental assessment of the potential harm or benefit of a situation relevant to one's personally significant concerns. According to the various versions of the appraisal theory of emotion, one of the most distinctive features of emotion is the evaluative component that assesses the current context as being good or bad, beneficial or detrimental, morally admirable or degrading. This evaluation may have two basic facets (Lazarus, 1991). *Primary appraisal* specifies whether the situation is relevant for personal well-being. *Secondary appraisal* focuses on the possible ways of coping with the situation, such as "What, if anything, can be done about the situation?" The contents and criteria of emotional appraisal emerge from and have been modified throughout the evolution of the species and the development of individuals, as a consequence of adaptation (Lazarus, 1991). The process of appraisal is understood as taking place prior to emotional responses and conscious feelings. From the point of view of appraisal theory, action tendencies and readiness are natural consequences of a given emotional appraisal of how to cope with the situation. They are also shaped by evolution and adaptation. In this view, different emotions serve different survival-related goals and therefore prepare the organism for adaptive behavioral response to the current situation. For example, the evolutionary purpose of anger might be to protect an organism from enemies, so the state of anger prepares the organism for aggression and deterrence.

In his work on fear, neurobiologist Joseph LeDoux shows there are two separate

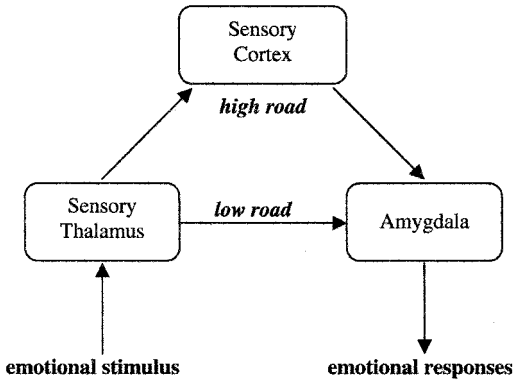

FIG. 3. Two separate pathways from sensory stimulus to emotional responses (adapted from LeDoux 1996, p. 164).

pathways mediating between sensory stimulus and fear responses (see Figure 3):

> Information about external stimuli reaches the amygdala by way of direct pathways from the thalamus (the low road) as well as by way of pathways from the thalamus to the cortex to the amygdala. The direct thalamus–amygdala path is a shorter and thus a faster transmission route than the pathway from the thalamus through the cortex to the amygdala. However, because the direct pathway bypasses the cortex, it is unable to benefit from cortical processing. As a result, it can only provide the amygdala with a crude representation of the stimulus. It is thus a *quick and dirty* processing pathway. The direct pathway allows us to begin to respond to potentially dangerous stimuli before we fully know what the stimulus is. This can be very useful in dangerous situations. However, its utility requires that the cortical pathway be able to override the direct pathway. It is possible that the direct pathway is responsible for the control of emotional responses that we don't understand. (LeDoux, 1996, p. 164)

So why are there two parallel pathways from emotional stimulus to responses? Why should there be the lowly thalamic road when there is also the high cortical road? LeDoux says (1996, pp. 163–165):

> Although the thalamic system cannot make fine distinctions, it has an important advantage over the cortical input pathway to the amygdala. That advantage is time. In a rat it takes about twelve milliseconds for an acoustic stimulus to reach the amygdala through the thalamic pathway, and almost twice as long through the cortical pathway. The thalamic pathway is thus faster. It cannot tell the amygdala exactly what is there, but can provide a fast signal that warns that something dangerous may be there ...
>
> Imagine walking in the woods. A crackling sound occurs. It goes straight to the amygdala through the thalamic pathway. The sound also goes from the thalamus to the cortex, which recognizes the sound to be a dry twig that

> snapped under the weight of your boot, or that of a rattlesnake shaking its tail. But by the time the cortex has figured this out, the amygdala is already starting to defend against the snake. The information received from the thalamus is unfiltered and biased toward evoking responses. The cortex's job is to prevent the inappropriate response rather than to produce the appropriate one ... From the point of view of survival, it is better to respond to potentially dangerous events as if they were in fact the real thing than to fail to respond. The cost of treating a stick as a snake is less, in the long run, than the cost of treating a snake as a stick.

The existence of the quick and direct pathway from the sensory thalamus to the amygdala suggests that emotional responses can occur even without the involvement of the higher-level information processing systems of the brain, systems believed to be involved in cognition, thinking, reasoning, and consciousness. These low-level neural mechanisms, including the autonomic, endocrine, skeletomotor, and arousal systems mediated through the amygdala, prepare the organism to cope with the situation involving significant change. The induction of action tendencies by emotional stimuli makes sense from the perspective of biological evolution and cognitive neuroscience.

The emotional responses mediated by the quick and direct pathway occur automatically and involuntarily. They take place before the brain has had a chance to deliberate about what to do and can be appropriately called *emotional reactions*. However, this is only part of the story for humans. In many circumstances, people can and are required to consciously or voluntarily inhibit and suppress emotional reactive responses. Our social life is replete with occasions for this kind of emotional control. We try not to laugh at solemn ceremonies, funerals, and the discomfort of others. We try to hide our fear in the situations where courage or valor is more desirable. We hold back our anger when it may hurt someone that we care about. We are often successful in controlling our emotional behaviors to a considerable extent (Levenson, 1994).

Little is known about how the human brain organizes the cognitive and control mechanisms which allow "the crucial shift from reaction to action" (LeDoux, 1996, p. 177). LeDoux suggests that the prefrontal cortex and the basal ganglia are essential for emotional action. The prefrontal cortex is the part of the cerebral cortex that evolved and developed late. It is currently considered as pivotal for planning, decision-making, working memory and executive functions, and also for emotional consciousness and feelings. The basal ganglion is a subcortical structure heavily implicated in motor control and its interactions with the amygdala may be important in emotional action. We conjecture that the direct voluntary control pathway, which bypasses the brainstem via the cortical-spinal tract, serves to inhibit and suppress the quick and direct emotional reactions: to gain time for deliberation, the brain has to suspend the automatic emotional response mechanisms. Much needs to be learned before we can get a clear picture of how an organism can precede from reaction to action. By understanding the contribution of emotion rather than ignoring it, we may have a better chance to explain the nature of human action.

5.2. Emotion and decision-making

Another notable aspect of action generation on which emotion may have an impact is the process of decision-making or choosing among alternative options. Decision-making is the process of choosing a preferred option or course of action from among a set of alternatives. The ability to make choices is viewed as the essential element in human action (Donagan, 1987) and is crucial to the conception of freedom (Rowe, 1987). To say a person can voluntarily or freely *do* something implies that he or she is able to *inhibit* or *refrain* from doing it. The capacities of doing otherwise and making rational decisions are essential to our general understanding of human action.

From our daily experience and ordinary psychological practice, it seems no less apparent that emotions impact heavily on people's decision-making process. When people are in emotional states such as anger, joy, fear, jealousy, embarrassment, shame, or depression, their decision-making may be quite different from cool deliberation. Even a six-year-old child knows it is better to request a new toy when a parent is in a good mood. From the point of view of folk psychology, emotion is a substantive element of decision-making. But the role of emotion in decision-making has long been ignored in the extensive experimental and theoretical research on decision-making. Even in the study of naturalistic decision-making that people perform in real life situations (Klein, 1998; Zsambok & Klein, 1997), the concept of emotion is neglected. This treatment is most likely based on a pair of misunderstandings of the relation between emotion and decision-making: that *descriptively*, emotion plays only an insignificant and negligible role in the real process of people's decision-making; and that *prescriptively*, emotions are a disruptive and destructive force undermining optimal decision-making.

This view of the relationship between emotion and decision-making has been challenged by Antonio Damasio (1994) and other researchers (Finucane et al., 2000; Isen, 2000; Loewenstein & Lerner, in press; Schwarz, 2000). Damasio studied some patients with brain damage in some specific spots in the prefrontal cortex and associated areas. These patients' intellectual abilities and general knowledge reflected in IQ and other measurements remain intact. But they have severe impairment in making decisions in real life situations, especially those involving complex personal and social matters. They cannot maintain a normal social life and they keep on making decisions that are disadvantageous to themselves and to persons close to them. They have no difficulty considering a rich variety of options for action and evaluating consequences accordingly, but they have difficulties making choices and initiating actions. Surprisingly, they also show apparent reductions in emotional feelings and responses. Damasio therefore conjectures that their deficiencies of decision-making arise because the brain damage prevents the patients from making emotional evaluations that are indispensable to decision-making in real life situations. Emotions do affect the process of decision-making, for better and for worse. Thagard (2000, 2001) developed a computational model to reconcile both emotion-based and deliberative decision-making mechanisms based on his theory of emotional coherence, and offered

suggestions on how to improve our practical reasoning performance using intuition and emotion.

Undoubtedly, emotions often have disruptive effects on optimal decision-making: they are biased, partial, and imprudent. But this does not mean that their role in the real process of decision-making is empty in the descriptive sense, nor that they cannot be utilized by people to make better decisions or choices in the normative sense. One obvious advantage of emotion-based decision-making is speed and efficiency: emotion helps to frame the options of action to be evaluated. Those courses of action associated with strong negative emotional feelings will be eliminated from consideration at the outset. The signal of emotion allows you to choose from fewer alternatives, which can substantially reduce the burden of computation in conventional calculation-based decision-making. This efficiency is consistent with the account of the connection between emotions and action tendencies given above, and enhances survival of organisms in threatening situations. Another striking advantage is that basing your decisions on emotions helps to ensure that the decisions are inherently significant to *you*, taking into account what you really care about. If you are pleased and excited about a possible action, that is a good sign that the action promises to accomplish the goals that are genuinely important to you. This feature can be crucial for helping people cope with complex social situations.

6. Emotion and the execution and control of actions

The outcomes of the phase of action generation are mental representations such as intentions, decisions, choices, or goals. These representations are usually on the higher level of the hierarchical organization of action and therefore are relatively abstract (Gallistel, 1980). There are a lot of things to be done before an intention or plan can be realized by muscle–skeleton systems. The intention or plan must be translated into appropriate motor programs in multiple levels. The internal goals need to be combined with information from periphery sensory and somatic sensory systems to generate motor commands. Feedforward and feedback types of control are both crucial to producing purposeful bodily movements with accuracy and smoothness. Since any meaningful bodily movement involves many groups of muscles and joints, the problem of sequencing, timing, and coordinating is definitely important to realizing an action. In short, there is an immense amount of information processing in action execution and control.

It seems evident from ordinary experience that emotion can intrude on the execution and control of actions. It is hard to put a thread through the eye of a needle when you are in a state of rage or anxiety, simply because you cannot accurately control your hands in such a mood. Your lips will tremble while speaking in a state of anger or fear. The reaction from the audience can directly influence the emotional states of orators, musicians and performers, and therefore has an impact on their performance. Athletes' emotions in a match can be influenced by the opponent's response, the referee's decision, as well as the audience's reaction, dramatically changing their performance. Ordinary people know a set of rules of thumb on how to manage and control their emotional states if performance is critical

for purposes such as exams, job interviews and presentations. It is a part of the professional training of athletes and performers to learn to use emotions to excel in games or shows.

The thesis that emotion affects action execution and control is unsurprising from the perspective of cognitive neuroscience. The pathways of emotional responses mediated by the amygdala descend to the brain stem (Figure 2), which organizes and coordinates most relatively simple, stereotypic motor responses and facial expressions (Figure 1). The projections from the amygdala to the prefrontal cortex and the cingulate cortex may have influences on working memory and executive functions, which are crucial to higher-level planning and control of voluntary movements. More profoundly, the change of bodily states affected by emotional responses, involving the autonomic and endocrine systems, may have more enduring and subtle effects on action execution and control, for these systems are not subject to direct voluntary control.

7. Emotion in the explanation of action

We have discussed how emotion might affect action, drawing much support from considerations about the neural substrates of both emotional and voluntary human movement. Here we turn to the problem of the explanation of action, another central issue in the philosophy of action, and argue that emotions also play a pivotal role.

When we inquire why people act in the ways that they do, sometimes we are looking for their *reasons* for acting. So explaining actions is finding the reasons why people act. Due to the long-held and prevalent conviction that emotion and reason are antagonistic, emotion has been omitted from the explanation of action. As a more integrative picture of the relationship between reason and emotion is becoming more appreciated (see Section 2), the role of emotion in the explanation of action needs to be reconsidered. If no sharp distinction between emotion and reason can be drawn, then no sharp distinction can be drawn between *acting emotionally* and *acting rationally*. Emotion hence deserves a legitimate position in the explanation of human action if the nature of explaining actions is to find the reasons why people act. In many occasions, a certain emotional response to a situation is not only understandable but also *morally right*, in the sense that failing to generate such emotions and actions should be regarded as a moral defect. For example, "Why was John punished heavily by his father last night?" "Because his father was very angry at his telling a lie." If the affective words are all eliminated, and we can only use emotionless terms such as beliefs and desires, it would be hard to make sense of this scenario. John's father believes that honesty is a virtue and lying is very bad conduct. He hopes that his son could be an honest man and thinks that giving him a severe lesson when he was lying is a good way to help him become an honest man. This belief–desire complex is indeed part of the reasons for John's father's behavior. But we can hardly say that these emotionless constructs alone serve well to characterize and explain the father's behavior. In such a situation, the father's emotional responses and feelings are crucial for understanding his action.

As we described in Section 2, contemporary philosophy of action often focuses on the notion of causation (Audi, 1993; Bishop, 1989; Davidson, 1963/1980; Dretske, 1988; Goldman, 1970). Causal theories of action hold that whether an event is an action or not depends on how it was caused. According to a causal theory of action, explaining an action is to find the right cause that brought about the action. A causal explanation is an explanation in terms of cause–effect connection of events. Every action is to be explained by the preceding mental states (events) that cause it. The typical mental states suggested as causes of action include intentions, wants, plans, and complexes of beliefs and desires. Emotions have been generally neglected, because, when there is a Davidsonian primary reason involved, "It is not necessary to classify and analyse the many varieties of emotions, sentiments, moods, motives, passions, and hungers whose mention may answer the question, 'Why did you do it?"' (Davidson, 1963/1980, p. 7). However, explaining why something happens is not always the same as finding the most abstract, fundamental, or direct nodes along causal chains. What we care about in an explanation are the matters that are most relevant to understanding and answering our questions. Tom has changed quite a lot of his behavior recently, quitting smoking and drinking, changing his hairstyle, and listening to classical music. We can say he has the desire to be attractive to Jane and the belief that the new behavior can help him attract her. But a fuller explanation is that Tom has fallen in love with Jane and is trying hard to gain her love in return.

An explanation is a structure or process that provides understanding. A distinctive function of explanation is to unify and systematize our body of knowledge (Friedman, 1974; Kitcher, 1981). Classifying and organizing our body of knowledge with common patterns and structures is essential to yield understanding. Generally, explanation is a process of applying a schema that fits what is to be explained into a systematic organization of information. An *explanation schema* typically consists of an *explanation target*, which is the why-question to be answered, and an *explanatory pattern*, which provides a generally acceptable way of answering the question. This unification-oriented approach of explanation has been adopted by some philosophers of science in accounting for the nature of explanation in science and medicine (Kitcher, 1989; Thagard, 1999).

Explaining emotional behavior can naturally be understood as applying emotion-based explanatory schemas. Emotions are evaluative and responsive patterns that emerge through the evolution of the species and the development of individuals. Some of them are innate, determined by our biological underpinnings. Some of them are acquired by learning and social interaction. When explaining an emotional behavior, people try to retrieve a suitable explanatory schema and match it with the circumstance in order to make sense of the event. For instance, to explain the anger of a father toward his son's lying, a typical explanatory pattern is activated: the involved social roles (father and child), the cause (lying), the effect (being angry), the act (spanking), and the purpose (to give the child a lesson). Whether or not an explanation is acceptable depends largely on how well the explanatory schema fits the situation.

The unification-oriented approach to explaining emotional behavior can be

consistent with both the reason-based and the causal theory of action explanation. The causal links between the inducement of an emotion and the emotional state, and between emotional state and emotional action can be naturally embedded into explanatory schemas of emotional action. To find the reason for an emotional action is a matter of applying the most appropriate explanatory schema which makes sense of the situation. These emotional explanatory schemas are products of long history of adaptation and social construction, shared by members of certain social groups and cultures.

A remarkable aspect that emotions contribute to the explanation of action is feeling, the qualitative subjective experience of emotion. Feelings can serve as labels of distinctive emotional behavior patterns, facilitating the matching of explanatory schemas to emotional actions. More importantly, feelings can evoke various mental processes, such as empathy, sympathy and analogy, which enable the inducement of one's own subjective experience to assist the understanding of another's behavior and mental state. Genuine love has never been a cold calculation of utility; so understanding love cannot be achieved through cold calculation either.

Whether explaining human action involves reasons or causes of action, and whether reason-based explanations of action are causal explanations, are questions beyond the scope of this paper. What we have attempted to show is that the importance of emotion to people's explanations of action must be taken into account by philosophical theories of action.

8. Conclusion

The link between passions and actions was a central concern to many early philosophers (James, 1997). Beginning with the work of Hobbes and Locke, desires were separated from passions as antecedents of action, while emotions were neglected (James, 1998). We have argued that the neglect of emotions in theories of action is untenable and is based on prevalent misunderstandings of the nature of emotion. More positively, we have drawn on recent cognitive neuroscience to argue that emotions contribute significantly to the processes of action generation as well as action execution and control. Emotions also play a crucial role in the explanation of human action. Therefore, the concept of emotion deserves a more central place in philosophical theories of action.

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