

Psychiatry in the context of extended emotion: is there a constitutive environmental contribution to panic attacks?

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## Introduction

Love. Fear. Surprise. These are only a few examples of the plethora of emotions people experience on a daily basis. Some say emotions are what makes us truly human, and this tells us something about the weight of importance we attach to our ability to feel.

In this dissertation I set out to synthesize a framework for extended emotion. Following from somatic theories of emotion to somatic appraisal theories, I introduce the concept of cognitive extension into emotion research and attempt to create a framework which counters a purely internalist perspective on emotion.

In the first chapter I outline the James-Lange somatic theory of emotion and show how recent developments in neuroscience have informed this view and lead to a neo-Jamesian approach, which takes into account both the body and the brain when it comes to emotion. A James-Lange theory asserts that emotions are the feelings of changes in the body which are triggered by some emotionally significant object. However, this theory was neglected in favour of cognitivist explanations for many decades, yet the work of Antonio Damasio has shown that a somatic theory is well grounded in evidence and emotions are not opposable to rationality, but are in fact an integral part of the human decision making capacity. The picture is not complete though, because emotions are also to some extent cognitive. This leads to the neo-Jamesian approach by Jesse Prinz, who developed an embodied appraisal theory of emotion, as well as Paul Griffiths' elaboration which states that there are multiple levels of appraisal.

In the second chapter I introduce the extended mind theory with the main premise that cognition does not take place solely in the head, but cognitive processes are extended in the world through coupling with the environment. I then show that what I consider as a sufficiency condition of mind extension, the concept of self-stimulating feedback loops, can also be appropriated when looking at emotional appraisals. I then outline a situated perspective on emotion as proposed by Paul Griffiths and Andrea Scarantino, who assert that emotions are skilful interactions with the world that are scaffolded by the environment on two temporal dimensions, synchronic and diachronic. The approaches presented in this chapter allow me to move on to develop a sketch for an extended emotion framework.

In the third chapter I illustrate how a multi-level somatic appraisal theory of emotions and the extended mind thesis can be bridged together leading to a view of emotional states from a new perspective—as partially extended into the world. I argue that the affordances perceived by the individual at low level appraisal participate in self-sustaining feedback loops between the agent and his environment, thus emotions can sometimes be extended. I also note

the possibility that through niche construction and synchronic scaffolding we can meaningfully talk about extension at higher level appraisals as well. I argue that an extended as opposed to an embodied emotion theory, can yield explanatory power in certain cases. My initial test case for this theory describes panic attacks, which are the most significant feature of anxiety disorders.

In the fourth chapter I characterize and discuss diagnostic criteria of panic attacks, provide a report on their link to emotional states and move on to assess whether an extended emotion approach can provide more useful explanations than the internalist ones already in place. After analysing a paradigmatic case of specific phobia I conclude that the excessive fear response occurring in a cued panic attack may eventuate as a result of a broken feedback loop. The emotional state is extended, yet the individual's interactions with the world do not allow for a correction of the initial appraisal.

I conclude with a brief overview of my argument and by stating some of the future directions this research may shape into. This work is a preliminary account of an extended emotion mechanism and can lead to interesting and valuable future inquiry which may eventually lead to practical implications regarding mental disorder.

# 1. Embodied emotion: from James-Lange to Prinz

## 1.1. Early approaches: emotions as perceptions of bodily changes

Imagine a moment in life when you were gripped by intense fear. How did it feel? It is likely you will be able to mention a range of physical experiences connected to that fearful moment—an elevated heartbeat, sweaty palms, perhaps even shortness of breath and chills down the spine. These are all physiological manifestations of a feeling, and some would argue that our experiences of such physical symptoms are, in fact, emotional experiences. In other words, an emotion is somatic because it arises from the bodily feeling experienced by the individual.

In the 19<sup>th</sup> century this somatic theory of emotions was independently proposed by William James and Karl Lange, and has since become known as the James-Lange theory of emotion (Prinz, 2004a). The basic premise of this approach is viewing emotions as “perceptions of patterned changes in the body” (Prinz, 2006, p. 137). James asserted that emotions are perceptions of our own bodily changes as the body undergoes a certain sensation elicited by some emotional trigger, that is, an *emotionally significant object*. In the case of being suddenly frightened by, say, a snake, one’s sensation of fear would arise from feeling those physical symptoms of fear I described above. If someone feels elated due to a happy event, the physical experiences related to this event will attribute to the emotion. To James emotions are merely the perceptions of such physical symptoms and nothing more (see fig. 1.1).

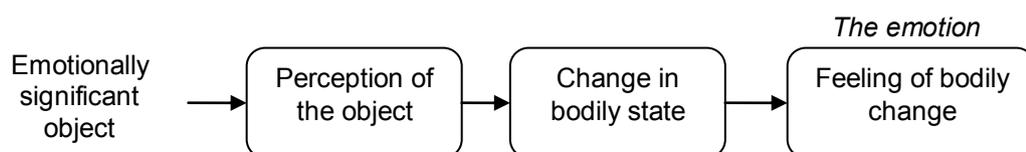


Figure 1.1. The somatic feeling theory (from Prinz, 2004a, p. 5)

Lange’s intuition was very similar to that of James’, but he was even more specific and narrow in his assertions and claimed that the basis of all emotions was stimulation of the vasomotor centre (Cannon, 1927). If we tried to abstract from the physiological effects that arise with emotions, there would be nothing left to attest to since, to Lange, emotions *are* the perceptions of said bodily effects, as carried out by the nervous system in the body. This principle can also be used as an argument in favour of James’ approach. Given the strong similarities between both theoretical stances it comes as no surprise that they have been unified under the terminological umbrella of *somatic theory of emotion*. This embodied view

was, however, largely neglected over the course of the 20<sup>th</sup> century; most philosophers considered emotions as something that involves more than just perceptions of bodily sensation, or even as something that is not about bodily sensation at all. This is understandable, because intuitively emotions appear to be more like thoughts or judgements which serve the purpose of letting us understand our interactions with the world (Prinz, 2004b). Paul Griffiths refers to this as a *propositional attitude* approach, which relies on concepts based in folk psychology; it is also often called cognitive, because in this theory emotions “involve the occurrence of mental states which represent states of affairs in the world” (Griffiths, 1997, p. 19). Thus, if emotions are in this sense cognitive, one may not need to discuss the role of the body, because it is not the bodily sensations that constitute the emotion. Instead, emotions involve beliefs, for example, fear involves the belief that there is danger, anger involves the belief that you have been treated unjustly, happiness involves the belief that a positive event has occurred and so on. However it must be noted here that the label ‘cognitive’ is slightly misleading and unhelpful, because emotions have long been contrasted with thought and rationality, with the latter two understood as aspects of the mind that inhabit the higher cognitive domains. According to Antonio Damasio, most of 20<sup>th</sup> century science did not concern itself with studying emotion, because it was not in this sense rational and belonged to the “lower neural strata associated with ancestors who no one worshipped” (Damasio, 1999, p. 39). When it came to scientific studies on human cognition and the different facets of the workings of the mind, matters of emotion and feelings would be neglected, and this continued the long-standing tradition of opposing reason and emotion. However, as we will see, in the recent decades a neuroscience-based revival of the James-Lange theory has shown that not only emotions are indeed based on bodily sensation and thus embodied in a general sense, but also how valuable and indispensable they are to human rationality, such as mechanisms that concern decision-making.

Drawing from James-Lange, Jesse Prinz has endorsed the view that emotions are embodied, although stressing that the original somatic theory requires updating, because emotions are *also* to an extent cognitive, as I shall elaborate later (Prinz, 2004a; 2004b; 2006). This update allows for an escape of the unhelpful strain between a somatic approach and a cognitivist approach. The arguments in favour of such a hybrid theory are supported by a wide range of observations and psychological experiments which do in fact establish a link between bodily states and emotion. Already Lange observed (as have many people during a night out) that affect is changed after alcohol consumption; more recent studies have shown

that basic emotional expressions<sup>1</sup> correspond to unique bodily patterns; also, emotions can be changed by simply changing the bodily state (Prinz, 2004b). Damasio has observed that neural pathways involved in bodily perception are also those associated with emotion; for example, the insular cortex and the second somatosensory cortex (Damasio, 1999). Some will claim this body-emotion link is merely a correlation, some suggest that bodily states are necessary and yet others—that they are sufficient for emotions. The sufficiency argument also emerges in the original James-Lange theory as the appeal to subtraction—if one tries to abstract from the bodily states consciously felt when experiencing an emotion, they will see that there is nothing left (Prinz, 2005). To reiterate—take away the elevated heartbeat, sweaty palms and chills from someone who is experiencing fear, and only a state of clear thought will remain, with no symptoms to testify for their agitation. Yet this appeal is not entirely grounded in evidence, even though it does demonstrate why emotions should be caused by bodily change rather than vice versa, because a state of clear thought is attainable in the absence of bodily sensation or despite it, but it is not a default.

The most prominent criticisms of the original James-Lange theory are concerned with the strength of the *link* between bodily sensations and emotion. For example, some observations have asserted that diminished bodily perception does not always include diminished emotions and that some emotions do not involve bodily change. This does not show that the somatic theory of emotions is false, but it indicates that this theory does not generalize. As Griffiths points out when arguing against the establishment of a universal approach: “the psychological, neuroscientific, and biological theories that best explain any particular subset of human emotions will not adequately explain all human emotions” (Griffiths, 2004, p. 233). This allows us to accept that emotions form a mongrel category, and that any explanatory frameworks can make assertions about subsets of this category or aspects of it, but not everything that it comprises.

Prinz, however, has suggested that “the somatic approach can subsume anything that deserves to be called an emotion.” (Prinz, 2004b, p. 49). To him cases of disembodied emotions, such as an art critic’s alleged exclaim of delight upon seeing some artwork but showing no somatic response, are imitations rather than ‘real’ emotions. However this assumption indicates that the somatic theory does not in fact answer the fundamental question—what emotions actually *are*. Given that the range of emotions we can experience is very wide and some of them seem to have more obvious bodily correlates whereas others seem to have none, we yet again arrive at the problem of distinguishing between different

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<sup>1</sup> Biologically basic emotions, such as Paul Ekman’s “Big Six”; I shall elaborate on that in the last section of this chapter.

kinds of emotions and assessing whether they *can* always be somatic. Since some emotions, such as love, can be long-term and not involve obvious bodily correlates that would be present all of the time (say, many years of marriage), the somatic theory again does not provide a sufficient account.

Another problem with James-Lange theory is that it does not accommodate for the intentionality of emotions and lacks explanatory power on how emotions can have formal and particular objects. In other words, it does not account for the ‘cognitiveness’ of emotions I described earlier. Damasio, whose somatic-marker hypothesis provided a new account of embodied emotions in the mid-90s, suggests that here James and Lange are overemphasizing the role of feeling and that we should instead “identify emotions with sensations of bodily changes *coupled with* a mental evaluative process” (Prinz, 2004a, p. 55). This means reconciliation with cognitive theories and offers a hybrid perspective where conscious appraisals play a role in constituting an emotional state. I shall return to this idea after an elaboration on the scientific findings by Damasio. The idea of emotions stemming from bodily sensations has re-entered the philosophical scene due to the general paradigm shift of an embodied approach to cognition, and especially due to Damasio’s work in the field of affective neuroscience. The next section provides a brief overview of the somatic marker hypothesis, which has been a major driving force in bringing emotion back into the picture when we talk about humans as rational and cognitive agents, as well as showing how the body is intrinsically important for emotional reaction in the individual. Such evidence is vital for establishing the James-Lange theory on solid ground so that it can be further updated with ideas from the opposing perspective in order to provide a comprehensive picture of emotion as both a bodily and cognitive phenomenon.

### *1.2. Somatic marker hypothesis in embodied emotion*

The basic premise of the somatic-marker hypothesis (SMH) is the following: emotions are essential to decision-making and one’s orientation in the world. This has been asserted by a body of empirical evidence which was acquired from research done in Antonio Damasio’s laboratory in the 1980s and 1990s. The human is not an entirely rational animal whose pure reason is guiding his actions and decisions, while instinct, emotion and passion are held in check lest they intervene with these processes of deliberation; to the contrary, emotions are powerful influencers of information-processing and discarding them leads to flaws in decision making. This account of the role of emotion presented by Damasio in the book *Descartes’ Error* (1994) and stands in very good terms with the James-Lange theory; thus it is often

referred to as a *neo-Jamesian* view (Prinz, 2004a; Griffiths & Scarantino, 2009). I will provide an account of this view because it is an important step towards the reconciliation of cognitivist and embodied approaches to emotion.

SMH claims that emotions play a role in decision-making by emerging in certain situations and either overtly or covertly influencing our behaviour (Bechara et al., 1994; Damasio, 1994). For Damasio emotions are closely related to somatosensory states which require bodily involvement, like the type of responses that in folk terms we refer to as ‘gut feelings’ or instincts. These feelings are learnt from previous experience and are generated when we face specific circumstances; they are somatic because they have a visceral component. The automated nature of somatic markers makes them an efficient mechanism for providing the embodied agent with fast and reliable feedback about the state of his body and its reaction to dangerous or, to the contrary, advantageous events. Somatic markers may also employ “*as-if*” loops between the brain and the body—best described as neural imitations or predictions of the outcome of a reaction that allow the individual to react to environmental events in a timely manner (see fig. 1.2). The addition of said “*as-if*” loops serves as a valuable update for the James-Lange theory, because it allows for non-conscious emotions to partake in the picture, as well as for emotions to take place when seemingly no bodily signs are present. It is useful to delve into some of the evidence behind this concept in order to establish the grounding for emotion embodiment.

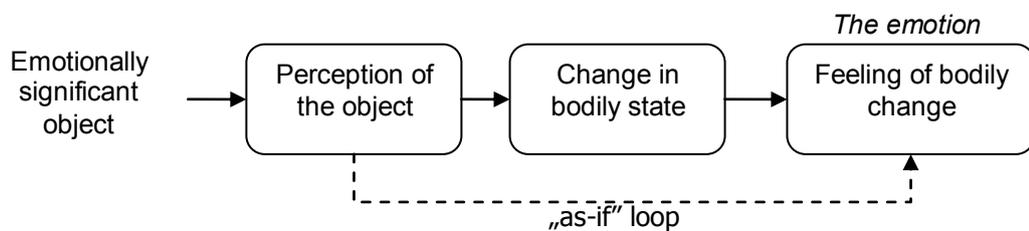


Figure 1.2. Damasio’s somatic theory (from Prinz, 2004a, p. 6)

The reasoning behind SMH was initially based on the relationship between specific brain structures and the modulation of emotion in individuals with impairment in these structures. A patient (referred to as Eliot), had extensive lesions in the ventromedial prefrontal cortex (VMPFC);<sup>2</sup> he scored normally in all typical intellect, problem-solving, logic ability and memory tests, showing no perseverative errors or impulsivity (Bechara et al., 1994). Yet when it came to everyday life, Eliot would often make impulsive decisions that eventually lead to disastrous consequences—job loss, risky business deals, divorce. He would take a very

<sup>2</sup> A brain area above the eyes, part of the frontal lobes which are generally implicated in higher reasoning and problem-solving.

long time deliberating about very simple choices, such as which pen to write with or which restaurant to have dinner at. This rendered Eliot incapable of leading a normal life, as he would spend hours in fruitless cost-benefit analyses without being able to actually reach a conclusion (Damasio, 1994). However it was not clear why his ability to make decisions was impaired, because laboratory tests would not show any intellectual deficits. Damasio and colleagues came up with a task that reflected decision-making in a way that would incorporate uncertainty and inaccessible information, as well as risk taking—resembling the situations we have to deal with in everyday life as opposed to laboratory tests. It is important to note here that being able to deal with uncertainty or take risks are capacities that require not only reasoning, but also emotional responses. Iowa Gambling Task (IGT) was an experimental paradigm constructed to be as reminiscent of real life circumstances as possible, and to account for decision making processes analogous to those met in everyday life (Damasio, 1994). The basic setting of the task is as follows (adapted from Bechara et al., 1994; Damasio, 1994): the participant is given a pretend money loan from the experimenter and is instructed that the goal of the game is to generate as much income as possible while losing the least amount of money in the process. In front of the participant four decks of cards are set, and the game consists of the player picking up cards one by one from the decks in whatever order she prefers. Each of the cards will result in gaining some money, but every now and then some cards in addition to winnings will also cause her to lose a certain amount. Two of the decks would always provide a larger profit per card, but are also designed to make the player lose money in the long term. Two other decks are ‘safe’—providing the participant with less profit per card, but also generating smaller losses. Since due to the pace of the game the participant cannot keep an explicit mental account of how much money she is winning or losing, the prediction was that she would instead develop a “hunch” regarding which decks seem more advantageous. Remarkably, this proved to be the case, as healthy subjects developed a preference for advantageous decks. Patients like Eliot would, however, choose from the deceptive decks more frequently, losing the money before the game was over. Importantly, they would not learn from their experiences and keep returning to the deceptive decks (Damasio, 1994; Bechara et al., 1997).

How does this link to emotion? The version of IGT I described does not provide direct physiological evidence for SMH; it only shows impairment in decision-making and risk taking behaviour. The researchers made an addition to the task which would directly help evaluate the possible role of somatic markers—measurement of skin conductance responses

(SCR<sup>3</sup>). Normal participants generated anticipatory SCRs before choosing cards from the bad decks. Patients, however, would never generate anticipatory SCRs and would continue to choose in a way that would cause them loss (Bechara et al., 1997). These results suggest that, in accordance with SMH, non-conscious bodily responses signal the agent to choose advantageously even before they can explicitly weigh the advantages and disadvantages of the situation. In everyday life when we make decisions under uncertain conditions, somatic markers provide both implicit and explicit shortcuts in the form of emotional or instinctive preferences (“I *like* that one better”; “I *feel* this would be the right thing to do”) to help the reasoning process and prevent us from becoming “stuck” on the countless possible options. For patients like Eliot the availability of somatic markers is compromised, and due to this lack of emotional feedback so are their decision-making abilities. This research provides strong evidence for the bodily basis of emotion, becoming a cornerstone of a neo-Jamesian approach.

In development of his somatic emotion theory Damasio draws a valuable distinction between primary and secondary emotions. Primary emotions (PE) are basic mechanisms, innate and pre-organised, and initiated viscerally—for example, the reflex of running away when encountering a snake or ducking when a predator flies overhead. These mechanisms rely on the limbic system, especially the amygdala and the anterior cingulate<sup>4</sup> (Damasio, 1994). The automatic mechanism is evolutionarily beneficial, however the embodiment of emotion does not stop here, because humans also develop a conscious feeling of that certain emotional bodily response, and this awareness allows for being able to predict certain emotional responses in oneself before they take place. According to Damasio, *feelings* are defined as the experience of the set of changes elicited by emotion, the continuous monitoring of the said changes and the experience of their juxtaposition to the previous state—once again, this clearly resonates with the James-Lange view (Damasio, 1994). Because of our capability to feelings as Damasio describes them, we also develop secondary emotions (SE), which “occur once we begin experiencing feelings and forming systematic connections between categories of objects and situation, on the one hand, and primary emotions, on the other” (Damasio, 1994, p. 134). SE for Damasio include a cognitive evaluation of the situation, thus there is an element of conscious appraisal, which one can ask for when viewing emotions as something more than just perceptual states of bodily change. This distinction is essential for the provision of a hybrid account of emotion, as I will show in the following section.

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<sup>3</sup> Autonomic nervous system responses measured by a slight increase in the activation of sweat glands on the skin, just enough to be measured by electrodes placed on the skin and a polygraph (Damasio, 1994, p. 207).

<sup>4</sup> Evolutionarily ‘older’ parts of the brain, often implicated in emotional processing.

### *1.3. Reuniting the body and emotion: a neo-Jamesian approach*

Overall, the account of embodied emotion is a view consistent with the general paradigm of embodied cognition, because rather than focusing on a problem-solving mind, the theoretical focal point is “a body that requires a mind to make it function” (Wilson, 2006, p. 625). We cannot understand the mind without also viewing its relationship to the body it is physically linked to, as well as the environment that body is situated in. So in a brain-body-environment system a somatic emotion theory is more grounded than one that views emotions as mere cognitive tools for decision-making and motivating behaviour, or as belief-based judgements and propositional attitudes. Because we have evolved from beings whose neural resources were mostly devoted to real-time perceptual input processing and engagement with the immediate environment, there is no reason to overlook this perspective when assessing higher cognitive functions as well. Following this suit, Prinz has attempted “to bring body, mind, and world together” by proposing his own adjustment of the somatic emotion theory (Prinz, 2004a, p. 20). Here we should review the types of explanations that have been appropriated to what emotions are and what they do.

Emotions and the functions they serve have been viewed through two wide theoretical lenses—one argues that emotions are evolved adaptations, while the other claims they are socially constructed. In order to come up with a comprehensive theory of emotions, one needs to establish whether emotions can be natural kinds or, in other words, if there is such a thing as biologically basic emotions. This echoes the question I briefly addressed in the first section, namely, the categorization of emotions. Paul Ekman famously established six basic emotions—anger, disgust, fear, happiness, sadness and surprise. His cross-cultural studies showed that these emotions are prevalent across different cultures, and each of them is characterised by a distinctive bodily pattern and facial expression (Griffiths, 2003b). This finding seems to support an evolutionary approach to emotions, which also fits naturally with a somatic (James-Lange) theory. Biologically basic emotions relate to certain adaptive functions, for example fear lets us avoid dangerous objects, disgust guards us from eating possibly poisonous substances, etc. And, as already established in the previous section, emotions are definitely linked with patterns of bodily change which in turn are picked up by brain structures involved in self perception. There is plenty of supportive evidence for a somatic emotion perspective and thus also the evolutionary approach to emotions. Yet, if we look at emotions simply as bodily states which are detected by certain brain systems, then it can be claimed that bodily arousal is indeed sufficient for emotional reactions. However from Damasio’s theory and his distinction of PE and SE it becomes clear that emotions require

cognitive interpretation as well—they start with a bodily change, but are subsequently appraised by the individual.

A view which comes into strain with the evolutionary and embodied perspective centred around basic emotions, is a social constructionist approach, which claims that emotions are not biologically basic or embodied, but are instead a product of nurture rather than of nature. Instead of being automated bodily responses, emotions can be viewed as “cognitive appraisals nested in behavioural scripts. An appraisal is a judgement about how one’s situation bears on well-being. [...] Scripts are instructions about what to do when something of concern transpires” (Prinz, 2004c, p. 74). These instructions and their appraisals are dependent on the cultural context of the individual. Such a cognitivist approach helps explain matters of social context that an evolutionary perspective cannot account for, as well as emotions which seem to extend over longer periods of time and not to have any obvious bodily correlates, such as the previously mentioned love, shame or guilt. An *appraisal* is a representation of the relations between the organism and the environment with respect to well-being. Here ‘environment’ is understood broadly, however in later chapters I will argue that these relations can be explicated more specifically. Appraisal occurs in part depending on context, including cultural and social context. For example, similar bodily experiences (increased heartbeat, sweaty palms, chills down the spine) can be perceived either as fear or anger, and the appraisal will depend on what the individual has experienced a moment ago, what interactions with the world have taken place and what the context of these interactions has been. If the person has encountered a snake, then it is fear, however if the same physiological changes have occurred after having a fight with a spouse, then the context indicates that this time the emotion elicited is anger. Also, some cultures around the world have terms for emotions that others do not, for example, the Japanese notion of ‘amae’ which can be described as a feeling of dependency akin to that newborns feel for their mothers—a special sort of social bonding that Western cultures do not have an equivalent for (Prinz, 2004a).

Prinz has suggested that the answer for exiting the strain between the evolutionary and the constructionist or cognitive approach lies somewhere in the middle. Both of these theories are supported by ample evidence, yet none of them is exhaustive in explaining all emotion-related phenomena. Cognitive appraisals which are based in the cultural context of the individual fail to explain basic emotions, and evolutionary accounts fail to explain cases where emotion clearly has a cultural component. A strategy for exiting this strain is a proposal of a new, unifying theory, and Prinz suggests what he calls a *somatic appraisal theory*. According to this approach, embodied emotional states are supplemented by semantic mental

states, and the meaningfulness of emotion comes from joining together the bodily sensation and the evaluative judgement of the sensation (Prinz, 2004b). In line with Damasio's perspective on bodily feelings that form secondary emotions and thus let us develop somatic markers, the process of appraisal as understood by Prinz is part and parcel of an emotional state. It is worth noting, however, that this evaluation of the bodily feeling need not be entirely conscious or real-time and can instead take place through the previously "as-if" loops. This approach brings together the strongest aspects from both sides of the discussion. I will revisit appraisals and their link to somatic states in a later chapter when I shall elaborate on Griffiths' multi-level appraisal theory, which in my opinion is the most successful hybrid approach.

As comprehensive and well-established the neo-Jamesian theory is according to the recent works of Damasio and Prinz, there is also a significant element lacking in its accounts of what the more social or contextual function of emotions is, as well as a more specific discussion about the functional role of external mechanisms. Damasio discusses at length the importance of emotion in rational decision making, and that seems to be the general line of argument—emotions as part of the whole motivational and informative cognitive system that lets an individual thrive better in their everyday life. But the embodied emotion perspective does not provide much emphasis on the environmental<sup>5</sup> contribution to emotions and emotional states, and one can definitely expand the theory to account for other purposes filled by emotional responses, such as social interaction, social signalling, non-conceptual engagement with the environment and even coupling with the environment (Griffiths & Scarantino, 2009). This expansion is therefore addressed in the next chapter, where I outline an extended cognition view, as well as provide a situated view on emotions and a multi-level appraisal account. I then bridge these perspectives to provide an *extended emotion theory*, which could serve as an explanatory framework for certain phenomena related to emotional states, such as mental disorder.

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<sup>5</sup> That is, external. Again, here the term 'environment' is to be understood broadly as the world surrounding the individual.

## 2. The extended mind and situated emotion: towards an extended approach to emotion

### 2.1. *The extended mind in a nutshell: body-world coupling in cognition*

In 1998 Andy Clark and David Chalmers published a seminal paper that started a new range of discussions in philosophy of mind and cognitive science. The article was titled *The Extended Mind* and proposed a radical perspective for viewing cognitive processes as not simply bound to the head. According to this new thesis, the original assertion of the authors was that cognition extends into the environment by means of a two-way interaction—*coupling* between an agent and an object. The authors introduced a principle that called for treating internal and external parts of cognition as functionally equivalent without the bias of location: “if, as we confront some task, a part of the world functions as a process which, were it done in the head, we would have no hesitation in recognizing as part of the cognitive process, then that part of the world is (so we claim) part of the cognitive process” (Clark & Chalmers, 1998, p. 222). This assertion is referred to as the *parity principle* (or ‘fair treatment’ principle, see Sprevak, 2009) and invites us to revise our view on the distinction between the mind and the world, and what this distinction entails for cognitive science. The principle urges us to consider cognition as a process smeared across the brain, body and world, rather than constrained by the biological machinery within the head. This view obviously challenges an internalist perspective on cognition, where the boundary for cognitive processes is set at the boundary of the body and the world.

The authors claimed that this theoretical approach<sup>6</sup> enables us to explain all sorts of cognitive processes and provides the outlook on mind and the world as a single cognitive system with external and internal components. For example, when we choose words in Scrabble, the physical arrangement of letters on the board aids the process; if we want to do long division, a pen and paper will aid in this task; when we have problems remembering facts, a reliably coupled (I shall elaborate on this notion shortly) notebook can serve as an external part of our memory. The parity principle serves as a “veil of ignorance” when we consider such examples, letting us assess the internal and external components of a cognitive process not depending on their location, but on the function they serve in this process. This indicates that the approach is related to functionalism about the mind, and I shall return to this later in the section. The ETM approach is a radical version of the embodied view of cognition. Orthodox cognitive science would regard the aforementioned tools (such as pen and paper) as external props to cognition, which itself happens neurally. An embodied-embedded view of

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<sup>6</sup> I will refer to it as extended cognition and EMT (Extended Mind Theory) interchangeably.

cognition takes the focus off the neural location, yet the pen and paper would still be considered an external prop, and a cognitive process in this case arises from the “structured embodied interactions with the external pen-and-paper system” (Wheeler, 2010, p. 247). The step taken by EMT is a transition from this embedded view to a more radical notion, where the external and internal parts all constitute a structured cognitive process, thus, in a sense, granting the external contributions a cognitive status. This, however, calls for clarification, because one may easily fall into the trap of disregarding the notion because tools cannot possibly be ‘cognitive’ in the sense that our minds are<sup>7</sup>.

To better understand what kind of relationship between internal and external components Clark & Chalmers were originally arguing for, it is helpful to begin by briefly revisiting the following famous thought experiment. Two New Yorkers, Otto and Inga, hear about an art exhibition at the Museum of Modern Art (MoMA) and decide they want to go. Inga ponders for a bit, remembers the museum’s address and sets off. Otto suffers from mild Alzheimer’s disease and thus has problems remembering facts—such as the address of a museum. Because of this problem, Otto always carries a small notebook where he writes down new information as he learns it. At some point he has written down the museum’s address; so when he decides to go there, he consults the notebook to find the address. The authors argue that in Otto’s case the notebook is coupled to him in a way that affords for it to become a part of his cognitive process, namely, a part of his memory. It satisfies the parity principle, because there would be no hesitation to call Otto’s case ‘remembering’ if any part of the process (e.g., the notebook) was not located outside his head, as it is for Inga. So for Clark & Chalmers both cases are analogous: two agents have the same goal—to retrieve a particular fact from memory where it has been stored at an earlier time in order to complete a certain action; one of them (Inga) carries out the process internally, while the other (Otto) uses an external prop. Yet regardless of the format of the process, they both arrive at the same conclusion and both end up at the correct place. Under fair treatment, then, they both have *remembered* the address of MoMA.

There are two key points here that need to be stressed. Firstly, an extended approach to the mind is entailed by functionalism about the mind, which claims that a mental state is mental “because of the causal relations it bears to sensory inputs, behavioural outputs, and other mental states” (Wheeler, 2010, p. 247). Functionalism gives rise to the idea of multiple realizability, which affords the constitution of mental states by all kinds of material processes

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<sup>7</sup> An elaboration on this would lead to a discussion on what should be regarded as cognitive at all, namely, what counts as a cognitive process. In the current literature this debate is coined as a search for “the mark of the cognitive”; the question, however, is far from resolved and for the purposes of the current discussion I need not elaborate on it.

and substrates. Creatures with neural systems and brains that are built differently from ours may still have cognitive processes and mental states; it is not what the system is made of, but rather how the system performs its actions that allows us to call it cognitive. It is thus clear that an extended approach to the mind is really an extended functionalist approach. The parity principle makes this connection salient in its appeal to dropping the bias for the mental substrate spatial location and instead focusing on its functional contribution.

The second important point regarding EMT and the aforementioned thought experiment is the concept of *cognitive coupling* between the individual and the environment; it must be stressed that not just any relation to an external object will count as coupling. Clark & Chalmers propose several criteria for establishing what a reliable coupling would be like, and Clark later refers to them as broad “glue and trust” conditions (2009): for an object to be coupled with an individual, it must be reliably available and easy to access, the information retrieved should have been consciously endorsed at some earlier point, and it should be endorsed automatically without questioning the content. These conditions are intended to shield us from “cognitive bloat” where the parity principle alone does not suffice—an external prop may often contribute to the cognitive process yet remain external rather than coupled to the agent. For example, the meditative music a student has playing in the background while he writes an assignment may be aiding his thought process, providing rhythm for his thoughts or setting a specific mood that helps him concentrate, yet it does not meet the glue and trust conditions and thus is not a *part of* the writing process.

Nonetheless critics of EMT have argued that even the glue and trust conditions together with the parity principle do not provide a sufficient argument for cognitive extension. Criticism against the hypothesis has often been raised concerning the question of what ‘counts’ as a mind extension and what does not. An object and agent relationship may fulfil the aforementioned criteria of coupling, but why should we favour an interpretation of this relationship that calls it a cognitive system over an interpretation that deems this simply to be tool use? In other words, why prefer an extended functionalism explanation over an embodied-embedded one? Fred Adams and Kenneth Aizawa have repeatedly pointed out that “coupling relations are distinct from constituting relations” (2009, p. 68) and that an extended view is prone to a *coupling-constitution fallacy*—namely, one draws attention to a case where an agent is coupled in some way to an object (like the said notebook, or perhaps pen-and-paper) and then “slides to the conclusion that the object or process constitutes part of the agent’s cognitive apparatus or cognitive processing” (Adams & Aizawa, 2009, p. 68). They claim that this way of reasoning about cognition is wrong, because X being coupled to Y by no means leads to a conclusion that X is a part of Y. To illustrate, the authors use an example

from physiology—neurons which innervate a muscle are coupled to it, but are not a part of it, and there is no reason for us to consider otherwise. Adams & Aizawa defend a ‘cranialist’ perspective on cognition, claiming that it is based on neural processing. Robert Rupert also raises worries about EMT and has argued that the fine-grained causal structure of the internal and extended methods is large enough for them to be treated as distinct kinds (Rupert, 2004); also, because of the counterintuitive approach that cognitive extension lends to theorising about psychological and cognitive mechanisms, the cost of analysing them in a conceptually different manner would be greater than the theoretical benefit.

Clark, however, dismisses the above mentioned worries and argues that they partly emerge from “a persistent misreading of the parity claim” (Clark, 2008, p. 114). Aizawa and Adams have used a slightly mocking example of the extension intuition where they conclude—a pencil thinks that  $2+2=4$  because it was coupled to the mathematician (2009). This illustrates the misreading quite well. It is important to note that the crux of EMT is not to treat external and internal parts as belonging to the same kind; in order for even an entirely internal cognitive system to function it is not necessary that all its bits and pieces share a deep similarity. As Clark puts it, “parity is not about the outer performing just like the human-specific inner” (2008, p. 114). It is the functional contribution to the cognitive system that matters, rather than the spatial location of the object or its fine-grained structure. Wheeler has made a similar argument stating that, when properly understood, the parity principle is not parity with the inner, but “parity with the inner with respect to a locationally uncommitted account of the cognitive” (Wheeler, 2009, p. 253). Therefore sometimes information processing (that is, cognizing) is carried out by functional systems whose components may be partly located in the external world. Such extended cognitive enhancements can have different temporal dimensions, both for the short-term processing benefit and for longer term storage or encoding (Clark, 2008). One should take great care not to confuse the content of a mental state with its vehicle when extended cognition is discussed: “the ‘extended mind’ hypothesis is really a hypothesis about extended vehicles—vehicles that may be distributed across brain, body, and world” (Clark, 2008, p. 76). It is not the memory itself that is “out there” in the world, according to Clark; instead, it is the vehicle of a mental state that can be located externally to the cognitive agent. This approach allows us to view the mind as a softly-assembled dynamic system that changes over time in regard to what processes and ‘extensions’ are employed in a particular situation at a particular moment in order to solve a particular problem. It does not follow, however, that all cognitive processes are extended or that all kinds of objects can suddenly claim a cognitive status simply because cognition is not bound to the head. Clark has repeatedly stressed that the glue and trust criteria simply serve as

intuitions for what kinds of interaction might constitute extension, rather than the more problematic claim for granting certain objects a cognitive status (Clark, 2010). He also dismisses Rupert's worries about EMT stripping cognitive agents of their role as persisting, stable systems—cognitive extension allows for a core persisting agent (the human mind) to remain in its place while offering a perspective that lets one explain specific cognitive performances with regard to the external world rather than without it. Biology does not provide the internal/external bias that is so intuitive for Rupert; when it comes to theorizing about cognitive systems and their processes, the interest is laid upon cost-effectiveness first and foremost (Clark, 2008, p. 121). This means that a theoretical explanation of a cognitive system does not require the internal/external part distinction to work; instead, focus is laid upon the functional system as a whole and the interaction of its parts.

Still, even with the aforementioned worries dismissed in this fashion, cognitive coupling under the criteria described earlier is not enough to make the claim for constitution over causality. Often it will be enough to describe the interaction between the world and the agent as a unified cognitive engine. The meditative music I mentioned earlier is merely a backdrop for concentration when one is writing an academic paper, thus one would not argue that it is part of the cognitive process; however, if a composer is sitting by the piano and experimenting with sounds and tonalities, pressing the keys as he is trying to write a new piece, the sounds created by the musical instrument are a part of the composition process, and the interaction between the agent and the world becomes much more integral to this process. Clark thus argues that the most interesting kind of cognitive extension will be “when we confront a recognizably cognitive process, running in some agent, that creates outputs (speech, gesture, expressive movements, written words) that, recycled as inputs, drive the cognitive process along” (Clark, 2008, p. 131). This describes the interaction between the agent and the world as a self-stimulating system, and the feedback loops involved in this process spread across the body and the world.

For the purposes of my argument about extended emotion, in agreement with Clark I accept that a sufficient condition for cognitive extension is a *self-stimulating feedback loop* which involves the internal and external components of the cognitive process. Such ongoing interaction loops already take place at the bodily level, for example, when a perceptual input changes processing at a neural level, which then has a direct effect on some bodily processes or movements, and those in turn have an effect on the neural processes again. Described in this manner, cognitive extension is not functionally different from such a loop, and the main difference between an extended account and the one above is simply that certain parts constituting this loop shall be located externally to the cognitive agent's body. Take, for

example, the case with the composer and his piano. He presses a key and produces a sound, which he listens to, and in his mind compares to other sounds, or perhaps imagines a sequence of what might come next in the musical phrase. These mental images in turn affect his bodily response and motivates action, so he presses more keys in order to produce the sounds he's just imagined. The aural perception of the key tones in turn changes the internal mental states, and so on. Therefore the process of composing is constituted not only by what goes on in the composer's head, but by his interactions with the piano and his perceptions of what these interactions produce. I argue that the self-stimulating feedback loop operated under the parity principle provides a more robust case for extension than glue and trust conditions.

The specific kind of feedback loops I shall address and employ in the extended emotion case are ones where the relationship between the agent and the environment can be explained by employing the concept of *affordance* as it was defined by psychologist J. J. Gibson. An affordance is "something that refers to both the environment and the animal in a way that no existing term does. It implies the complementarity of the animal and the environment" (Gibson, 1979, p. 127). For example, the surface of a fence pole affords a passing bird landing space, whereas for a human it does not afford support because it is too narrow. Similarly, for a composer the piano keys afford a manner for engaging with music in a way that is different from what these keys afford to someone who is music-illiterate. These affordances participate in the self-stimulating feedback loops that allow cognition to extend in the environment. I shall revisit the concept of affordances and expand on it in the next chapter while discussing the theory of emotion extension.

## *2.2. A note on cognitive niche construction*

As I shall illustrate later on, the extended perspective on cognition works not only in cases when cognition is understood primarily as information processing, but also when applied to more temporally extended cases. The concept of feedback loops confirms that the ways we interact with the environment are inherent to what cognitive extension is about, namely, a two-way interaction which takes into account what the environment can afford us to achieve. But we also modify the environment around us to help us achieve our goals. This is exemplified by a pervasive concept in the natural sciences, *niche construction*. Agents are situated in the world and, in order to thrive, they need to construct environmental niches: "all animals act on their environments and, in so doing, alter those environments in ways that may sometimes change the fitness landscape of the animal itself." (Clark, 2008, p. 62). Examples from the animal world often cite cases like spider webs, bird nests and the like. Temporally

such niche construction bears changes in the environment which then reflect on biological evolution. Humans also construct niches, and subsequently the feedback from the environment impacts their well-being and selects for certain traits adaptive in the new environment. Niche construction can happen at a cultural level. For example, domesticating cattle and consuming dairy slowly led to selection pressure for lactose tolerance in the particular cultures, but not in those where dairy consumption was not prevalent (Clark, 2008).

This notion of niche construction can analogously be applied to human cognition, creating a principle Clark refers to as “cognitive niche construction”. This means that an individual can shape his environment in ways that are beneficial to problem-solving and performing tasks. There is a range of everyday life examples where we do this—for example, arranging ingredients on the kitchen counter in a specific order before starting to cook or grouping different reading materials according to relevance while doing research on an essay. A cognitive niche can be an example of a feedback loop—we change something about the world around us, which in turn changes the ways we interact with the world and what it affords us, and these interactions again change something in the environment.

Paul Griffiths and Andrea Scarantino have argued that these self-made environmental structures and our skilful engagement with them can play a role not only in thinking and cognizing about problem-solving, task performance or memory aids, but also exert influence on our emotional processes. They argue for a situated approach to emotion where the interactions with a certain environment are conducive to what emotions the individual experiences, and these emotions in turn shade the individual’s reaction to the environment. In the next chapter I will revisit this approach to illustrate how certain attributes of the environment can constitute emotion. However emotion extension can occur on more than one level of appraisal, and I will concentrate on low-level mechanisms which employ self-stimulating feedback loops that are based on affordances. There may also be high-level extension where a cognitive niche would play a crucial role, but for now I prefer to remain neutral whether on this scale emotions actually extend rather than benefit from external contributions supplied by the individual’s social and cultural niche.

### *2.3. A situated dynamic perspective on emotion*

As already briefly mentioned at the ending of the first chapter, a somatic appraisal theory of emotion, as accurate as it is in contrast to theories that neglect the bodily component of emotion and the neo-Jamesian evidence for it, still does not lend enough significance to the role of the environment, especially the individual’s interactions with it. Griffiths & Scarantino

provide a more dynamic and situated perspective in an article titled *Emotions in the Wild*. The main objective of the approach they propose is to refocus the functionality of emotion from decision-making and goal-achieving mechanisms to a social context (an approach heavily influenced by transactional theories of emotion), emphasizing that “an emotion is often an act of relationship reconfiguration brought about by delivering a social signal” (Griffiths & Scarantino, 2009, p. 2), and adding that emotions need not be mediated by conceptual thought, because they are rather a form of *skilful engagement* with the world. The authors emphasize that the way they focus on the social aspects of emotion draws from the transactional theory prevailing in contemporary psychology (Griffiths, 2003a; 2004b; Griffiths & Scarantino, 2009). While it emphasizes neglected aspects of emotions and their function in the world, the situationist perspective is still compatible with the embodied appraisal theory outlined in the first chapter. In fact, in the following chapter I will argue that the approaches complement each other substantially, and with influences from EMT can provide ground for a better understanding of the interplay between the body, brain and the environment when it comes to emotional states.

As I already showed in the previous section, accounts of cognitive extension often focus on exploiting the environment in ways that help achieve goals through reducing the cognitive load when performing particular actions, such as calculation, composition or remembering. In other words, the extended approach has been primarily dealing with cognition as information processing. A socially situated account of emotion emphasizes the functional role of social signalling when emotions are displayed (Griffiths & Scarantino, 2009). For example, if you get into an argument with a friend and she says something offensive, an angry response will signal to her that you have been hurt; smiling and laughing at someone’s witty remarks during a conversation will signal that you understand him and appreciate the humour. His jokes, in turn, may signal that he wants to be appreciated, thus your social interactions have a clear functional role. One will notice that such social signals will also determine the further course of a situation—the offender may become empathetic and apologise, or alternatively do something to fuel your anger even more if that is her intention. A person who feels understood and appreciated because you laugh at his jokes will feel stronger affinity towards you which can lead to successful social bonding. These examples are intended to emphasize a strategic aspect of emotion manifestation, one that is not accounted for when we simply look at the individual’s engagement with the environment with focus on preserving and enhancing well-being. The authors state that emotions “are also, and perhaps primarily, more or less *effective* goal-oriented responses” (Griffiths & Scarantino, 2009, p. 5). Emotional behaviour, just like problem-solving or tool use, can and often is a

means to an end. For example, if someone breaks your window, an outburst of anger directed at the person may eventually yield a higher chance of receiving compensation; sulking can also be analysed as a strategic behavioural strategy which eventuates in a negotiation process in a relationship where one party feels wronged and chooses to sulk in order to signal this.

Such explanations of emotional expression refocus from individuated emotional responses which are so beneficial for analysing in embodied appraisal theories (say, an encounter with a snake) and place emotion in a wider social and environmental context. Emotion expression is also important to consider when addressing questions of mental disorder and social situations—for example, social anxiety can stem from being unable to conform to imagined or perceived societal standards, thus causing excessive embarrassment for the individual. Yet there is another aspect of this approach that I want to stress—the situated emotion perspective, as proposed by the authors, not only accounts for social functions but also greatly emphasizes the environmental scaffolding of emotions, which, according to them, happens on two temporal dimensions:

- » *diachronic scaffolding*, provided by the environment and cultural context in which the individual grows up;
- » *synchronic scaffolding*, the environmental influence of emotional performances as they occur (Griffiths & Scarantino, 2009).

Both of these temporal dimensions are important when we attempt to provide an account for the environmental role in emotional episodes; however it is synchronic scaffolding to which I will attribute most weight when arguing for dynamic situated emotion as an extended process, because this temporal dimension accounts for real-time emotional processes. In an extended emotion approach, which I have synthesized from these previous theories, synchronic environmental scaffolding includes not only the social interaction aspect, which is the primary focus of Griffiths & Scarantino, but also the evaluation or appraisal aspect of one's emotional state. In a situated approach emotions are “dynamically coupled to an environment which both influences and is influenced by the unfolding of the emotion” (Griffiths & Scarantino, 2009, p. 2). Here the use of the term ‘coupling’ draws heavily from the concept of cognitive coupling I introduced in the previous section on EMT. I will, however, apply the extension condition of self-stimulating feedback loops to show how the individual can sometimes be coupled with the environment in such a way that the affordances it provides become a constitutive part of the emotional process. Therefore emotional states in certain situations can be described as extended.

Overall, a dynamic account of emotion requires “focusing on the temporal dynamics of skilful emotional engagement, exploring the way in which the emotional episode shapes

the context of its development and is in turn shaped by it” (Griffiths & Scarantino, 2009, p. 17). This requires emphasizing and discussing all aspects of the role of emotion—social, goal-oriented, pertaining to one’s well-being, etc. Also, a further development of the argument about environmental coupling is needed in order to try to distinguish the cases when such coupling takes place and what consequences that has on how we view emotional states in general. Eventually this can then be applied to cases of emotion gone wrong, that is, certain mental disorders. In the next chapter I will provide a model of how such emotional situations take place and then move on to inspect cases where it malfunctions to see if that provides ground for a better analysis of panic attacks—emotional episodes that involve intense bouts of fear and anxiety.

### 3. Cognitive appraisal and the environment: the feeling individual in the world

#### *3.1. Two levels of appraisal*

Proceeding from everything that has been outlined so far, I propose a theory of emotional responses that unites somatic appraisal theory, a dynamic situated emotion perspective and the concept of self-sustaining feedback loops from EMT to provide a comprehensive view on how an emotional state is triggered and how it can be partly constituted by external environmental attributes such as the affordances the environment provides us with.

The model of an extended emotional episode is based upon the somatic and appraisal theories of emotion outlined in the first chapter, however it differs from it in two aspects: firstly, there is more than one level of appraisal, and secondly, I introduce a mostly neglected aspect—the contribution of external factors and the context of the situation to an individual's bodily perception of a bodily feeling and its appraisals. As discussed in the previous section, Griffiths and Scarantino (2009) draw from transactional theories of emotion and argue for a situated perspective on emotion, placing emphasis on the role of social interaction. Nevertheless one's coupling with the environment may occur at more than one level of appraisal and the focus need not be on social situations only. The perception and appraisal of environmental circumstances such as affordances which are involved in the individual's emotional states through a self-sustaining feedback loop can constitute the emotional state of the individual.

As established in the first chapter, appraisal is a part of the emotion; however it would be impossible to account for all emotional states and all appraisals by using the same level of description, because emotions can fall into different categories. I will revisit some of the key points raised previously in order to establish my current proposition. We experience basic emotions such as surprise, anger, fear or joy, and these motivate us to actions that are characteristic of the adaptive problems that our ancestors faced when they were pressed to develop these responses. From this perspective fear is a response to a dangerous object and having this emotional response contributes to one's immediate well-being and survival in the world. Still, not all emotions that we can name will be reducible to such basic adaptive heuristics; love, guilt or shame are emotions as well, yet not only would it be more difficult to find distinct bodily correlates for them, but also the experiences of a person will be more varied and less universal (Prinz, 2004c). As Griffiths stresses, emotions are not a 'natural kind' (2004a). Even though we can argue for the aforementioned basic emotions and analyse them in terms of the affect programs they elicit and the social or individual functions they

serve, we also need to concede that emotions can arise in several levels, ranging from basic to more complex. This approach comes into agreement with Damasio's definition of primary and secondary emotions. I use it to describe how a multi-level model of appraisal can explain different emotional situations—ranging from the basic to the more complex ones. An important aspect here is the *affective primacy thesis* which claims that “emotional responses are independent of the rational evaluations we make of things” (Griffiths, 2003b, p. 43). Thus, as I mentioned before, we can be afraid of things which are actually harmless or feel happy about things which we believe are morally wrong. Studies have shown that individuals can prefer certain stimuli after being exposed to them only subliminally; for example, you have been shown a bunch of images in rapid succession without being able to identify them consciously, yet when later asked to pick images out of a collection, you go for ones that you've been exposed to. Such findings have been repeatedly confirmed (Griffiths, 2003b). This puts a strain on the cognitive appraisal theory because it hints that the cognitive component of emotion should correct for such ‘errors’. Yet it is important to stress here that the question is not about the cognitive appraisal as such but rather the more specific question of “whether the information processing that leads to an emotional response is separate from that which leads to paradigmatically cognitive processes such as conscious report and recall, and whether the two kinds of information processing are different in kind” (Griffiths, 2003b, p. 44). So, in accordance with affective primacy and the view on primary and secondary emotions and their relation to somatic feelings, we can speak of two levels of appraisal<sup>8</sup> (see also fig. 3.1).

Low-level appraisals pertain to what Damasio refers to as primary emotions, those that are widely regarded as basic. Such emotions are directly related to the perception of a certain bodily state, they are endorsed automatically as direct responses to emotional triggers, heuristically they enhance survival and well-being of the individual; these responses are not conscious (that is, not paradigmatically cognitive) and can be incorrect. For example, the flight response elicited by seeing something that looks like a snake is a low-level automatic emotional appraisal response intended to bring the individual away from a perceived dangerous object, regardless of whether it is actually potentially harmful to the person (Griffiths, 2004b). High-level appraisals add a new layer to the emotional situation and account for the conscious (that is, paradigmatically cognitive) and contextual appraisal of the bodily state. They pertain to complex or, according to Damasio, secondary emotions. High-level appraisals are responsible for the evaluation of an emotion and the whole situation; they

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<sup>8</sup> According to Griffiths (2004b), it has not been determined how many appraisal levels there could be in general, so I am adhering to the two-level distinction proposed by him. It could, however, be the case that additional levels can be distinguished.

can come into direct conflict with a low-level appraisal, thus also allowing for a condition of correctness (what looks like a dangerous snake turns out to be a piece of rope, for example). This shows that the distinction between basic emotions and more complex emotions is not clear-cut. The two-level extended emotion model means that perhaps it is better to talk about *basic responses* instead of ‘basic emotions’ where automatic appraisals are concerned; emotion is therefore defined as the junction of bodily feeling, low- and high-level appraisal, and the external aspects which may or may not play a role in the particular situation.

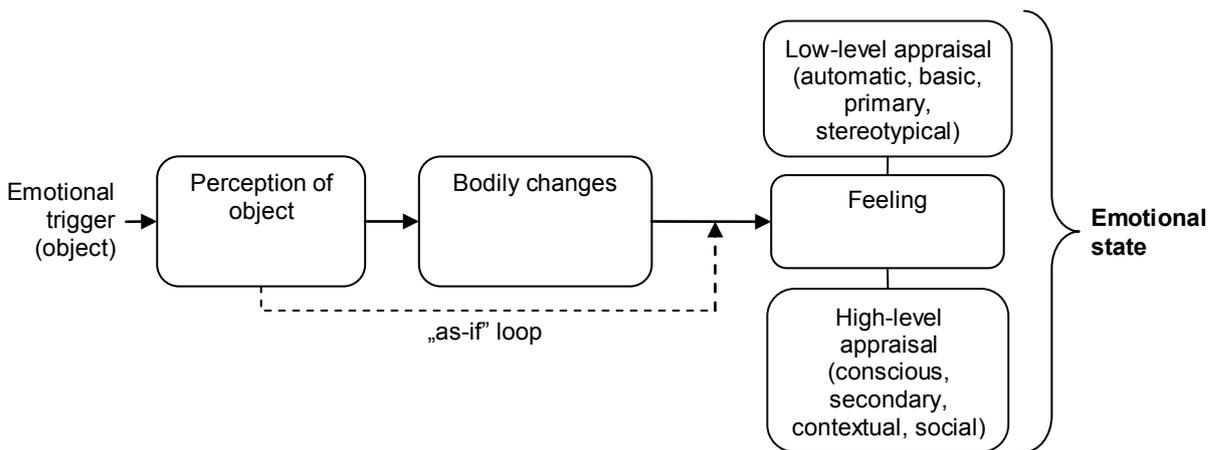


Figure 3.1. Two-level appraisal model

According to the two-level appraisal model, the emotional state occurs as a complex combination of polymodal representations (appraisals) of the situation/trigger and the somatic state it elicits. The two levels of appraisal refer to different kinds of representation and show that conscious evaluation can come into the picture only after an automatic response has already taken place. Yet without the higher level we would be at a loss to explain situations of affective primacy which are then corrected by the individual, such as going from being aware of danger to seeing there actually is no danger. This also allows us to ask questions about cases when correction of the emotional response does not occur even though the person is aware that the response does not correspond to reality. The most salient case here concerns phobias—when individuals repeatedly experience a strong reaction of fear towards objects which they otherwise know to be harmless. Such cases illustrate not only the affective primacy thesis and multi-level appraisal model, but also invite us to inquire into the cause of the mistake in order to establish why such conditional fear responses occur uninfluenced by the high-level appraisal.

### 3.2. Emotion extended - affordances and low-level appraisal

I propose that the two-level appraisal model is missing a crucial component: the *external constitutive part of the appraisal process*. Depending on the level of analysis imposed on a particular episode one may argue that the combination of a bodily feeling and low-level appraisal is enough to describe an emotional response, because automatic appraisals are often enough to motivate behaviour/action, and thus fulfil the functional role of the emotion. This is a fruitful approach when discussing basic responses, and stands well with the adaptive perspective on emotion. Yet at this level we can interpret the appraisal process through the lens of cognitive extension and show how the embodied interactions with the world not only shape the response, but constitute it. When the agent perceives an emotional trigger, the low-level appraisal of this trigger is an extended cognitive process—the trigger affords the individual a certain emotional response, which is modulated by the said appraisal,

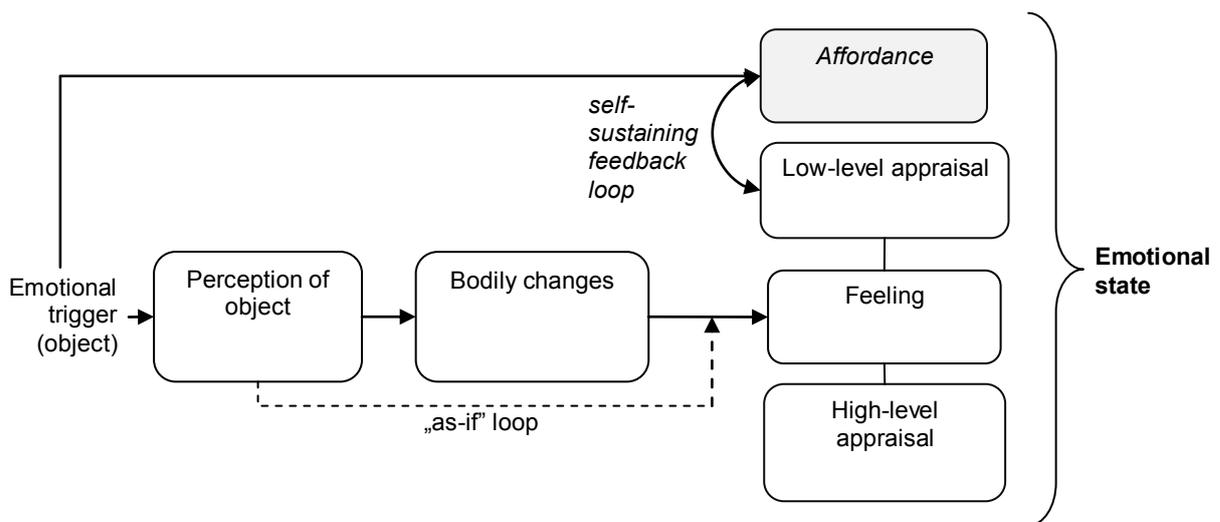


Figure 3.2. Low-level extended emotion

and the automatic behaviour motivated by the emotional state can change the initial affordances.

To provide a clear example, I will apply this model to the emotional response of fear when an individual encounters a dangerous object (in this case a venomous spider; see fig. 3.2). The person knows that this particular species is very dangerous and has seen such spiders in the past. Thus he has developed a conditional response, which kicks in automatically as soon as he encounters a spider of this kind. The individual perceives the spider and has a somatic response which leads to a feeling that is appraised on a low-level

pathway. The low-level appraisal elicits an automatic response and the person jumps away from the spider, because the body has basically (and correctly) indicated “Danger!” to him. The resulting behaviour however, changes the immediate circumstances of the individual—because he quickly moved away, the spider now does not afford as much danger as it did initially. This in turn has an impact on the somatic state of the person, and the appraisal indicates that there is now less danger. The emotional state therefore changes from fearful to less fearful, or it can be altogether replaced by a feeling of relief. This description of the appraisal process alludes to the concept of a self-stimulating feedback loop that I elaborated on in the previous chapter and that I argue is a sufficient condition for cognitive extension. Therefore in situations where emotional states are elicited by certain external triggers, we can describe the interactions of the individual and the world as functionally extended. Because the affordances presented by the trigger constitute the appraisal process in the aforementioned manner, I argue that this leads to a conclusion about the *extended nature of certain emotional states*. Not only is the low-level appraisal a representation of the environment-body relations, but the relations also contribute to the appraisal. This whole appraisal system, linked to the affordances of the emotional trigger through a feedback loop, is an emotional state constituted both by internal cognitive architecture and by an synchronic external contribution.

Overall this model paints the picture of an individual as a cognitive and emotional agent whose emotional processing is distributed between the internal appraisal processes and the world. With this claim I take a step further than the situated approach endorsed by Griffiths & Scarantino (2009), who prefer to remain neutral on whether emotion extends or not, stating that “this sort of ontological claim may be interesting in principle, but we do not think that its possible heuristic value for the psychology of emotion is likely to be worth the fuss it causes” (p. 21). However, I wish to argue that the environmental constitution of some cases of emotional episodes is crucial in understanding how these episodes unfold, especially when we wish to describe cases of dysfunction. In the next section I briefly touch upon the issue of situated extension, that is, the possibility of extension at the high-level of appraisal.

### *3.3. High-level appraisal and situated extension*

The connection between cognitive appraisal and environment can definitely be situational. To borrow an example used by Griffiths and Scarantino (2009), the angry automatic response of someone who has been poked in the back can be modulated to a more levelled one if the situation turns out to be inoffensive (the poke was accidental, for example). The two-level appraisal model of extended emotion applies: a poke initiates a bodily reaction which causes

an automatic response of anger and an action it motivates. This response is then appropriated to the situation by high-level appraisal of the contextual environmental circumstances. Namely, the person realises he is angry, assesses the cause of his reaction and adjusts his behaviour accordingly. A social interaction will likely become a part of this process as well, in vein of situated emotional episodes described by Griffiths & Scarantino (2009). More inquiry would be needed about the interaction processes involved at the high level of appraisal in order to discuss whether extension takes place here as well. I have focused on the low-level and the feedback loops involved in appraising affordances, yet it is possible that in situated cases where the function of emotions is more socially bound and emotional states are influenced by social interactions, the mechanisms involved could be described as extended. I will currently remain neutral regarding this idea, however it provides an interesting perspective for future inquiry, because an extended account of social interactions and social scaffolding may bear implications on some cognitive distortions<sup>9</sup>.

Another thing must be emphasized here. The extended emotion approach is not universal, because an emotion can also take place without direct environmental contribution and involve only the appraisal aspects. This can be the case when the trigger for a response is internal, such as a thought or a memory. In such introspective emotional episodes the environment does not play a constitutive role, because no feedback loop with environmental affordances is necessary for an appraisal of the feeling—it is generated internally and there is no engagement with the world<sup>10</sup>. Instead, the appraisal is internal and the elicited emotion does not rely on external factors. For example, a memory of a very happy event can trigger the feeling of happiness (through either simulated or real physical changes in the body), and the person can smile (an automatic response), and upon the realisation that this memory brings them happiness reinforce it by reflecting upon it even more.

To echo some of the arguments against EMT: why should we favour an extended emotion approach to an embodied one? Perhaps Griffiths & Scarantino are right and the fuss caused by such a radical claim is not worth the discussion. Nonetheless I beg to differ on this matter and argue that a perspective of emotion extension at the low level of appraisal can provide insight into cases of emotional dysregulation—for example, panic attacks, which are characterised by intense episodes of fear. If, according to an extended emotion model, the emotional state is partly constituted by the affordances presented by the environment, a panic attack can be accordingly described taking this extended interaction into account.

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<sup>9</sup> For an interesting perspective on ETM and cognitive distortions, see Ward (2009) and Ward & Casey (2010).

<sup>10</sup> Although it should also be noted that a temporally extended emotional state—a mood—can and does colour the short-term emotional responses, and here the surroundings of the person definitely will exert an influence. I would not, however, argue that this influence amounts to cognitive extension (recall the example of meditative music from the previous chapter).

## 4. Mental illness and extended emotion: the case of panic attacks

### 4.1. Panic attacks: symptoms, types and relation to specific disorders

The Text Revision of the Diagnostic and Statistical Manual of Mental Disorders IV (DSM-IV-TR) defines panic attacks (PA) as discrete periods of “intense fear or discomfort in the absence of real danger that is accompanied by at least 4 of 13 somatic or cognitive symptoms” (DSM-IV-TR, 2000, p. 430). The cognitive and somatic symptoms are listed in box 4.1, organised into 11 physical symptoms and 2 fear symptoms, as has been suggested for the next edition of DSM. In clinical studies the most commonly reported of these are cardiac symptoms and dizziness, whereas choking and paresthesias are reported the least. It is also useful to recognize that PAs can occur from a calm state or an anxious state (Craske et al., 2010). The surge of discomfort is abrupt and reaches its peak in ten minutes, although according to some studies, about a third of individuals do not satisfy this criterion and the severity of symptoms peaks later, while satisfying the PA criteria otherwise. This phenomenon may be due to “discordance between the physiological response and the subjective response” (Craske et al., p. 97).

There are currently three types of PAs, which is an important distinction for

the purposes of the intended analysis of panic and extended emotion. DSM-IV classification divides PAs into unexpected (uncued), situationally bound (cued), and situationally disposed. The different types are defined by the “relationships between the onset of the attack and presence or absence of situational cues that are either external [...] or internal” (p. 430). This means that an unexpected (uncued) PA will happen in the absence of an identifiable trigger and the individual will report that it seemingly occurs “out of the blue”, whereas a cued (situationally bound) PA will happen due to a certain trigger, e.g. the presence of a spider in the case of arachnophobia. The third type, situationally predisposed PA, is one that can be cued by a certain trigger or event but is not necessitated by it: for example, in some cases a

#### 4.1. List of PA symptoms

##### *Physical*

1. Palpitations, pounding heart, or accelerated heart rate
2. Sweating
3. Trembling or shaking
4. Sensations of shortness of breath or smothering
5. Feeling of choking
6. Chest pain or discomfort
7. Nausea or abdominal distress
8. Feeling dizzy, unsteady, lightheaded, or faint
9. Paresthesias (numbness or tingling sensations)
10. Chills or heat sensations („hot flushes”)
11. Derealization (feelings of unreality) or depersonalization (being detached from oneself)

##### *Fear*

12. Fear of losing control or going crazy
13. Fear of dying

person may experience symptoms when she has to face a social situation, whereas in other cases she will do just fine.

As the reader may notice, this distinction between PA types in DSM-IV-TR is not entirely clear and some terms are used inconsistently (Craske et al., 2010). For example, it is easy to confuse situationally bound and situationally

#### 4.2. Types of PAs

##### A) Uncued/unexpected

- no obvious trigger
- can happen in different situations

*Subtype:* sometimes triggered by a certain cue, but not reliably

##### B) Cued/expected

- trigger obvious to the person
- happens in certain situations

predisposed panic attacks. Thus it has been proposed to revise the distinction of PA types into two main groups (see box 4.2): expected/cued and unexpected/uncued, which would simplify the terminology and raise clinical utility of the distinction.<sup>11</sup> Under this revision an expected PA takes place when there is an obvious trigger from the individual's perspective, and the attack occurs in anticipation or presence of it; in contrast, an unexpected PA appears to occur without an obvious trigger and cannot be anticipated. Thus, if an individual suffers from agoraphobia, he will have expected panic attacks which are cued (triggered) by leaving the house and entering open spaces. Also, a subtype of unexpected PAs is proposed, when a PA "sometimes but not invariably occurs in response to a cue" (Craske et al., p. 103). This is an adjustment from the previous division where such occurrences were named as "situationally predisposed". Over time the unpredictable attacks can contribute to the individual developing a generalised panic disorder.

PAs themselves are not a disorder or a condition, however they can occur in the context of any anxiety disorder, and recurrent unexpected PAs are the defining diagnostic criterion of panic disorder with or without agoraphobia. A panic disorder is diagnosed when the individual experiences more than one PA which is followed by persistent concern over following attacks, as well as worry over the implications of them, leading to a change in behaviour. Cued PAs (for example, due to a phobia) are ruled out, as well as general medical conditions that might cause the unpleasant symptoms for the individual. Sometimes a person will also develop agoraphobia (fear of open spaces) due to a panic disorder, and this is specified in the diagnostic criteria. Panic attacks are not limited to anxiety disorders but can also occur in relation to other psychopathologies, such as mood disorders, severe psychopathology (e.g. schizophrenia), substance abuse and even some general medical

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<sup>11</sup> A fresh study currently in press for *Biological Psychiatry* has challenged the distinction between cued and uncued PAs, because 24-h ambulatory monitoring of panic disorder sufferers indicated that the somatic changes may happen up to an hour before the person is actually aware of them. This has interesting implications for future research and suggests that internal PA cues are present, but not perceived; whether a PA is expected or not may depend not on the mechanism of it but the person's sensitivity to bodily change. See Meuret et. al. (2011) for details.

conditions (cardiac, respiratory etc.). The explanations for such comorbidity are varied; for example, it has been speculated that the occurrence of PAs may cause an individual to develop depression, or an individual may be self-medicating with substances for already present anxiety and thus develop a substance-abuse problem; the presence of PAs can also be due to shared psychological vulnerabilities across different personality disorders. The data on all this vary and speculations remain, yet a reliable conclusion can be drawn—although a panic attack itself is diagnostically unspecific, it serves as a potential marker for a wide range of neuropsychiatric dysfunctions (Craske et al., 2010).

Given this wide prevalence of PAs in different occurrences of mental disorder it becomes apparent that an inquiry into the mechanisms of panic triggers and their link to emotional states of the person would be a valuable tool for clinical assessment and evaluation of individuals who suffer from these disorders. In order to ascertain whether an extended emotion framework can provide a useful explanation here, the link between emotions and anxiety must be addressed beforehand.

#### *4.2. Emotion and anxiety*

Anxiety by itself is not detrimental to human well-being. In fact, it is rather the opposite—as a fundamental capacity it serves the function of keeping us alert when facing potential threats and motivating us when different challenges appear. For example, it is normal (and often advisable) to worry about your safety if you are walking home late at night and are aware that certain parts of the town should be avoided after dark. Such apprehensive anxiety, much like other emotional responses, motivates conscious and non-conscious actions which can directly enhance the survival possibilities for the agent. On the low appraisal level, the worries presented by possible dangers to your well-being will make you more alert and on guard, ready for immediate reactions if such would be required by a sudden attack. On the high appraisal level these worries will also help you consciously assess your immediate environment and look out for possibly dangerous things or places. Over extended periods of time anxiety can also serve as a motivating factor for carrying out actions.

Nevertheless, many people suffer from excessive levels of anxiety—to the extent that it becomes counterproductive and renders them unable to perform the same actions that would otherwise have been endorsed by the presence of worry (Simpson, Neria, Lewis-Fernandez, & Schneier, 2010). In cases where excessive worrying gives rise to prototypical symptoms and becomes pathologically disabling for the individual, the diagnosis of an anxiety disorder is appropriated. These disorders form a distinct categorical group of mental disorders with the

unifying criterion of excessive anxiety levels which is often manifested in PAs. As I already mentioned in the previous section, panic attacks are the unifying feature of all anxiety attacks.

The list of diagnostic symptoms in box 4.1 lets us identify fear as the main emotional component of anxiety. This is signified not only by the cognitive symptoms that are explicitly labelled as fear, but also the bodily responses connected to PAs. Many of these bodily sensations are present at a normal, non-excessive level whenever a person is afraid of something. They constitute the somatic component of a fearful state. Low-level appraisals of these sensations allow for immediate reactions to the trigger, and high-level appraisals allow for a conscious assessment of the situation and the environment, as well as for interactions with the world. A transactional account of emotions, when applied to anxiety, treats it as “an organized group of adaptive functions by which an organism senses, evaluates, and responds to cues of danger in its external (or internal) environment” (Simpson et al., 2010, p. 59).

From this perspective we can then analyse anxiety disorders as failures of the aforementioned functional processes, and I would argue that these failures may happen on multiple levels. For example, individuals with low appraisal of bodily changes and low awareness of medical symptoms are less likely to seek medical attention, whereas individuals who develop health anxiety (excessive worries about their physical well-being) have higher awareness of bodily changes and pay more attention to what may be medical symptoms. Even more interesting is the fact that individuals who have high awareness of bodily changes, yet do not necessarily assume they have medical symptoms, are more likely to develop a general anxiety rather than one that is related to health worries (Simpson et al., 2010, p. 103). This suggests a link between emotional appraisal levels and an individual’s disposition to excessive anxiety. Thus it can be argued that, given that anxiety is directly related to an excessive fear response, a PA is an over-sensitive response to the same low- and high-level appraisals that take place in normal situations where fear is elicited. Because the individual has heightened awareness of his internal states, a trigger which causes a fearful reaction not only causes this reaction, but heightens it to actual panic, rendering the person incapable of action. To provide an example, when an arachnophobic encounters a spider, she is literally incapacitated by fear, and is not able to function in a normal fight-or-flight pattern of action I described in the previous chapter, where the initial fear response (low-level appraisal) to a dangerous object would be modulated by the high-level appraisal and the imagined threat thus removed. Instead of this normal appraisal process, arachnophobics experience a cued panic attack, and cannot deal with the trigger at all, and often manifest avoidant behaviour (refuse to move or exit the room, ask someone to kill the spider, etc.). These excessive fear responses are often detrimental to some aspects of everyday life. For example, a person may live in

climates which venomous spiders do not even inhabit, yet the cognitive appraisal level (that is, having explicit knowledge that the spider is not, in fact dangerous and does not pose any kind of real threat) is not able to influence the automatic, low-level response.

This suggests that in the case of a cued PA the information from the higher level is not being processed properly at some point of the overall model of the emotional response. From an internalist perspective one could argue that this lack of appraisal correction may be due to a misconfiguration in the brain pathways that connect the limbic system with the prefrontal cortex. Another explanation might be that the problem occurs at the level of perceptual input processing—it may be the case that the perception of reality becomes distorted and the delivered information does not exactly correspond to reality. For example, phobics often exaggerate the size or level of dangerousness when speaking of their fear triggers. They can exclaim “That spider was huge!” when in fact they are talking about an arachnid no bigger than their thumbnail, which in addition is also completely harmless to humans. Research literature on anxiety disorders, including phobias, has shown that patients exhibit attentional or perception biases towards threatening stimuli (Dalglish & Power, 1999). This supports the idea that whatever is wrong in the appraisal process happens early in the processing continuum of the trigger. Studies have confirmed that phobic individuals even show responses to stimuli that are masked (that is, the subjects have unconscious fear reactions to their PA triggers), which also suggests that a perceptual processing bias may be involved (Öhman & Soares, 1994). Thus it has been concluded that “anxiety may be associated not with general impairment of information processing, but with unusual patterns of processing selectivity” (McNally, 1999, p. 448). I argue that a low-level emotion extension framework is consistent with these findings and may provide a fruitful perspective on the mechanisms of cued PAs.

#### *4.3. Once again about spiders: panic attacks extended?*

In the previous chapter I argued for an extended emotion theory, basing it on a multi-level somatic appraisal approach. I appropriated the concept of self-sustaining feedback loops from EMT as a sufficient condition for cognitive extension and showed that in some cases of emotional response at the low level of appraisal we can describe the interactions of the individual and the world as extended because of the presence of such loops. The mechanism of emotion extension relies upon the affordances of the emotional trigger looped together with the behaviours and actions it elicits through automatic appraisal processes. This provides that an emotional state, in cases where the feedback loop is present because the emotional trigger is external to the agent, is not merely embodied but rather extended. Emotional responses that

involve interacting with the individual's immediate environment can therefore be viewed in a new light. This functional extension of emotion indicates that current approaches sometimes do not provide a comprehensive account of what the emotional state is constituted of, yet this external component should be accounted for.

In the case of a cued PA, the conditioned automatic fear response to a trigger is much stronger than in normal cases and is not easily influenced by higher-level cognitive processes. For example, an individual with a specific phobia, who experiences a panic attack upon encountering a harmless object<sup>12</sup>, is generally aware of the irrational nature of his fear, yet this knowledge alone will not be enough to change his response to the trigger. Often it will also be unclear why the conditioned response has developed at all. In the previous section I reviewed some indications towards the possible cause of this problem, such as a perceptual bias or neural malfunction. Here I want to propose that an extended emotion perspective can also help understand the mechanism of a cued panic attack. I will illustrate this by once again revisiting the case of encountering a spider. Let us suppose that an agent who is located in a usual environment, say, the bathroom of his house, suddenly notices a spider crawling on the wall. A fear response kicks in immediately and the individual experiences the bodily sensations of fear. As I discussed before, in a normal case when the individual who is in a state of fear assesses in what manner the trigger either affords or does not afford danger to his well-being, he subsequently acts on this knowledge, for example, by making sure he is in a safe distance from the dangerous object. This interaction with the environment directly influences what the trigger originally afforded to the agent, and the danger is eliminated. The self-sustaining feedback loop thus modulates the emotional state. Yet in the case of a panic attack the individual does not produce a behaviour that would change the original affordances of the emotional trigger, so the (perceived) state of danger remains and the fear response escalates into a panic. It is clear that a feedback loop is not present in this case, and without this structured interaction with the environment the low-level appraisals persist on their initial assessment of the situation. In other words, the automatically triggered extended emotional state cannot be modulated because the feedback loop is broken.

Although this extended explanation is not necessarily the only angle available for assessing the mechanisms of a cued panic attack, current therapeutic approaches for treating specific phobias suggest that the extended emotion approach is a good candidate. Anxiety disorders are widely treated pharmacologically, yet the most successful cognitive-behavioral approach for phobias is *exposure therapy*, when the individual is gradually exposed to the trigger of fear in order to slowly overcome the automatic panic response (Dalglish & Power,

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<sup>12</sup> Some of the seemingly strangest phobias involve cotton wool, human feet, or even water.

1999). In the context of extended emotion, exposure therapy can be understood as a reconstruction of the feedback loops that the individual is lacking. It takes place through deliberate and repeated interaction with the trigger and confrontation with the (perceived) danger it affords, and subsequently the individual's perception of these affordances changes, allowing for a change in behaviour.

This approach may seem like one that is carried out the higher level of appraisal, yet a recent study using a novel exposure approach suggests that in fact it may work through modifying the low-level, automatic responses. Some severely phobic individuals may often refuse exposure therapy because their panic response to the trigger is too high; in order to address this, the study carried out by Granado, Ranvaud, and Peláez (2007) used a more subtle exposure technique, where individuals suffering from arachnophobia were exposed to sets of images that did not contain actual spiders, but only subsets of features that are characteristic of them, such as round objects with several leg-like protrusions, etc. After being repeatedly exposed to such images for four weeks, in a follow-up study after six months most patients were capable of approaching a live spider<sup>13</sup>. Not only do these results suggest that the non-conscious, automatic processing of a stimulus is enough to trigger a fear response, which is in accordance with the two-level emotional appraisal model, but also that the fear response can be modulated at the low-level, without even including an actual full blown version of the triggering object. Given the perceptual bias present in phobia, we can assert that perception of specific features characteristic of the trigger is enough for the person to afford a sense of danger or unpleasantness which may occur purely at the somatic level, and a consistent exposure to these affordances may be enough to reinstate a feedback loop which allows for a normal response rather than one of panic.

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<sup>13</sup> For a full report on the patient and placebo groups, as well as hypothetical assumptions, see Granado, Ranvaud, & Peláez (2007).

## Conclusion

The main goal of this dissertation was to develop a framework for emotion extension and appropriate it to panic attacks as a specific case of mental dysfunction. I set out by reviewing the somatic or James-Lange theory of emotion and the neo-Jamesian perspectives, specifically Antonio Damasio's somatic marker theory, which has led to establishment of emotion as an embodied phenomenon.

I have argued that the current embodied appraisal perspective, which has mainly been developed by Jesse Prinz, lacks an important focus on the external environmental contributions to the individual's emotional states. In order to introduce this focus, I appropriated the extended cognition approach from the works of Andy Clark as well as a situated emotion perspective which has been suggested by Paul Griffiths and Andrea Scarantino. In order to support my argument for emotion extension I laid out the following points:

- » emotional states are constituted by appraisals of bodily sensations, which in turn are elicited by emotional triggers;
- » appraisal occurs on at least two levels: for the purposes of current discussion I distinguished between low- and high-level appraisals;
- » low-level appraisals are automatic responses to the environment, and the interactions with it can occur through self-sustaining feedback loops which involve affordances presented by the environment;
- » I asserted that these feedback loops can count as a sufficiency condition for cognitive extension, therefore at the low level of appraisal emotions may sometimes be extended.

I also claimed that this extended approach may be helpful when applied to cued panic attacks, because it largely focuses on the individual's interaction with the trigger of fear rather than the internal processing alone.

Given the limited scope of this dissertation I want to stress that it is possible to develop several significant directions from my initial sketch of emotion extension, even though I have only mentioned them briefly and a full explication has remained behind the margins of this work. Most importantly, I have only addressed low-level extension at length, focusing on the role of affordances. However, current perspectives in emotion research suggest that social scaffolding and interactions play a vital role in our emotional states as well, therefore it would be valuable and necessary to inquire into high-level appraisals and their interaction with the

world in order to determine whether we can speak of emotion extension at higher levels as well. For now I wish to remain neutral on this idea, because firstly one needs to establish the condition for extension at this level; one of the ways to approach this issue would be to determine whether a self-sustaining feedback loop type of interaction is present in cases of social emotion scaffolding. It is also vital to stress that not all theorists agree with the conditions for cognitive extension that I argue for, so this ongoing discussion must be addressed as well.

More inquiry can and should also be directed at the practical aspect of the extended approach—such phenomena as social anxiety, agoraphobia and other anxiety disorders, as well as mood disorders, could be reviewed in a new light if the emotion extension framework is successfully elaborated upon. Given the perspective of current trends in psychiatry and the search for new approaches to defining mental illness, addressing this perspective can turn out to be a valuable addition to the current debate, especially when put in the context of issues surrounding neuroreductionism<sup>14</sup> and mental illness.

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<sup>14</sup> See Sprevak (forth) and Drayson (2009) for a discussion surrounding these matters.

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## Declaration

I have read and understood The University of Edinburgh guidelines on Plagiarism and declare that this written dissertation is all my own work except where I indicate otherwise by proper use of quotes and references.