Facts and values in emotional plasticity

Luc Faucher and Christine Tappolet

1. Introduction

How much can we shape the emotions we experience? This is the question of the plasticity[1] of our emotions. Actually, it is rather misleading to speak of *the* plasticity *question*, for the question of how much we can shape our emotions hides a multitude of more particular questions. Depending on how the "we" is defined, the plasticity question splits into several sub-questions. For instance, to what extent is the agent herself able to control, cultivate and modify her emotions? This might well be the most important question from a personal and ethical point of view, but it is not the only one. For one might also ask to what extent surrounding people – parents, teachers, friends, etc. – are able to change the emotions of another person. More generally, to what extent does the socio-cultural environment determine what we feel? Correlatively, what part do our genes, or more generally, the elements of our natural environment that are not socio-cultural, play? Given that emotions involve several aspects or components – the emotional experience, the appraisal, the behavioral disposition, etc. – the plasticity question splits even further. To have a full account of the plasticity of emotions, the plasticity of each component has to be considered.

A further complexity comes from the diversity of the many things that fall or can be considered to fall into the class of the emotions. Is the plasticity of so-called "basic emotions", such as joy, fear or disgust, different from the plasticity of so-called "higher cognitive emotions", such as guilt, envy, jealousy? And what about emotions that are considered to be "socially constructed", like the Japanese emotion *amae*, which is characterized as a pleasurable feeling of dependency (Doi, 1973; Morsbach & Tyler 1986)?[2] From a methodological point of view, it might be

---

1. The term "plasticity" comes from the Greek *plastikos*, which meant *relative to sculpture* and has the same root as *plasma*, which originally meant "thing shaped or sculptured".

2. The question whether there are basic emotions and also what state would count as such is controversial.

thought that the best policy would be to first consider the question of the plasticity of each putative kind of emotion on its own terms, keeping in mind that our ordinary emotion-categories could well be misleading. Here, however, we plan to discuss more general considerations for and against the plasticity of emotions.

The question of the plasticity of emotions is not only of purely theoretical interest. It is also highly relevant for ethics or more generally for value theory. Whether one is a virtue ethicist or not, one has to acknowledge that moral theory has to make room for character traits, be they virtues or vices.[3] And it is generally acknowledged that Aristotle was right to claim that virtues and vices are concerned with both actions and passions (EN, 1106b). Virtues and vices can be defined as involving character traits, i.e. standing dispositions to act in characteristic ways in given contexts, but also to tone certain percepts, certain thoughts and to feel certain emotions.[4] Thus, the question as to what extent our emotional dispositions depend on us has to be considered if one wants to know to what extent an agent can improve himself. And the same is true of the question whether or not moral education is possible and how one should go about raising children in order to make admirable agents of them. As Aristotle stressed, if virtues involve dispositions to feel emotions, then moral education is as least partly a matter of educating our emotions (EN, 1106b21–23). Moral education would thus presuppose some amount of emotional plasticity.

The question of the plasticity of emotions also has a bearing on how we evaluate agents. For instance, if it turned out that the character traits, or more particularly the emotional traits we have are completely determined by our genes, we would in fact be the victims of chance or "moral luck", to use Bernard Williams' expression (1976). We could just hope for a nice genetic makeup or else try to develop some technology to change our genes (or to modify the genes' expression). In any case, if our emotional dispositions do not depend on us, it is not clear that we would, or should, go on praising the virtuous and blaming the vicious. Indeed, the very responsibility of agents is at stake. Responsibility seems to come with at least minimal control on the kind of persons we are. It seems that we have to agree with Susan Wolf when she claims that moral responsibility for our actions requires moral responsibility for the persons we are. According to Wolf (1987, p.

60), being responsible for who we are requires two things: a) the ability to evaluate our characters accurately and sensibly, and b) the capacity to transform ourselves in order to correspond to our self-evaluations.

Another idea which is often associated with an Aristotelian account of ethics is that emotions have a role to play in moral discernment.[5] Emotional experiences would key us, to use Karen Jones' phrase (2003), to certain morally relevant considerations – that an action would be a shameful thing to do, or that it would be cruel, for instance – in a way higher-order cognitive faculties could not. Put in a nutshell, the idea is that emotions are perceptions of values.[6] The question of the plasticity of emotions arises when we wonder whether or not we can refine our grasp of moral reality. But even for those who are uncomfortable with the idea of value perception, it is clear that some moral or more generally evaluative concepts are intimately related to specific emotional responses – *shameful* and *shame, disgusting* and *disgust, admirable* and *admiration,* to name but a few. To understand these concepts, we need to understand emotions. For instance, the question whether these concepts are relative to a socio-cultural group is closely tied to the question whether the corresponding responses are socio-culturally determined or not.

Finally, and in a way that is quite independent of any theoretical approach in ethics, the plasticity of emotion question bears on the question whether the many rules we have with respect to emotions make sense. We are not supposed to feel hate, envy or jealousy, we are not supposed to express too much pride, we are not supposed to act out of anger, we are not supposed to fear innocuous things, such as spiders or mice; but we are supposed to feel happy, to experience compassion or sympathy (but not pity, an emotion taken to involve feelings of superiority) with those who suffer, etc. These rules are of course cultural: they can be quite different depending on the time and place. And they are often addressed to specific portions of a population: men, women, children, boys and girls, not to speak of socio-economic or ethnic subgroups. The relevance of the plasticity question should be quite obvious. To put it bluntly, if emotions were completely determined, no such rule would make sense. This at least is true if one takes seriously the idea that *ought* implies *can,* in the sense that only what is humanly feasible can be morally required from us or, more generally, required from us from a practical point of view.[7]

---

3.   Sophisticated consequentialists such as Peter Railton (1984) and Philip Pettit (1994) claim that virtuous dispositions might be more conducive to the promotion of value than consciously aiming at the promotion of value; and even Kantians now admit that character traits are important (Baron, 1997).

4.   See Flanagan 1991, p. 277. The claim that there are such dispositions has been put into question by some, such as Harman (1999) and Doris (1998, 2002). We believe that Flanagan (1991) and Sreenivasan (2001) are right to say that situationist experiments only show that character traits are partly context-sensitive, not that there are no character traits.

5.   See Sherman (1989), p. 47.

6.   See Tappolet (2000) and Prinz (2004).

7.   This is often taken to be a conceptual truth, but it might also be taken to be grounded in the thought that requiring what is not feasible from an agent is both cruel and useless. In so far as a non-feasible ideal guides our requirement, we might also ask agents to approximate this ideal. As Flanagan notes (1991, p. 340, fn. 1), what is required might simply be almost feasible, an ideal we can try to approximate.

Thus, our normative practices appear to presuppose at least a certain amount of emotional plasticity.

Most would reject both the radically deterministic conception according to which the emotions we feel are entirely determined by nature and the fundamentally opposed view that claims that our emotions are entirely up to us, whether this is understood in existentialist terms – the individual shapes her own emotions – or in social-constructionist terms – the socio-cultural environment is thought to be the shaping force. As most would agree, emotions are partly under our control, partly not; partly shaped through education and culture, partly not; partly specified by our genetic endowment and our natural environment, partly not. However, though they are true, such statements are far from helpful for those who wish to undertake the moral education of actual human beings.

Our aim here is a very modest one. It is an attempt to draw a framework for future discussions about the plasticity of our emotions. We will consider empirical work only in order to indicate some of the places one might look for data concerning plasticity. We shall start our discussion with a conceptual exercise aimed at different possible models of emotional plasticity. As it is obvious to us that such an exercise is futile without specifying the nature of emotion, we will first propose an analysis of the components of emotions. After these theoretical considerations, we will present some empirical data that might be used to assess the degree of plasticity of emotions as well as the constraints that bear on emotions. In order to do this, we will mainly draw from developmental psychology. In considering the empirical data, it is by no means our intention to provide the last word on the question of plasticity, but we would be happy if we could convince our reader that there are some facts out there that could inform moral practice.

2. Conceptual clarifications

2.1 The components of emotions

In order to address the problem of emotional plasticity, it is useful to have a better idea of what emotions are. Let us start with the common distinction between *occurrent emotions*, such as the fear or the anger that a person experiences on a particular occasion, and *emotional dispositions*, such as the disposition to feel fear in certain circumstances.[8] Emotional dispositions can be more or less ingrained. A disposition like irascibility can be short lived – it can disappear as soon as you have

---

8. See Lyons (1980, p. 53-57). As discussed in Faucher & Tappolet (2002), this distinction is actually too crude for there are reasons to distinguish between what we call *long-term* occurrent emotions and *short-lived* occurrent emotions (cf. Goldie 2000).

---

had your morning coffee, for instance – but it can also be more like a trait. There seems to be a continuum here between passing emotional dispositions and something like a permanent irritability or irascibility. In the latter case, one can talk of *emotional traits*, a term that most naturally refers to the character-defining emotional disposition(s) of a person. We should distinguish between two kinds of emotional traits: temperament and personality trait. A *temperament* involves a set of emotional dispositions that displays variation among individuals and that have a physiological basis thought to be derived from the individual genetic make-up. Here is how Bates (2000) defines it: a temperament is "(...) a set of biologically rooted, early-appearing, and relatively stable individual differences in reactivity to stimuli and self-regulation of that reactivity (...)" (p. 384)[9]. Temperaments involve things like the tendency to be fearful in novel situations (what Kagan calls "inhibited"), to be easily distressed, to get angry easily or to be strongly attracted to potential mastery experiences (what Kagan calls 'uninhibited'). Temperament is thought to be an important part of *personality* (people do have basic emotional reaction styles), but the second cannot be reduced to the first. However, as Rutter (1994) puts it, "everyday functioning is also influenced by self-concepts, by social cognitions, and by values and attitudes. Humans are thinking beings, and as such their personality will be shaped by the way in which they deal with the temperamental qualities with which they have been endowed, and by the view of themselves and their social worlds that they acquire. Thus, we characterize ourselves and other people in terms of self-esteem, self-confidence, and self-efficacy, as well as by attributes such as suspiciousness, conscientiousness, empathy, and trustworthiness. It seems reasonable to suppose these qualities will be shaped, in part, by temperamental qualities (...)." (p. 28)

Given the distinction between occurrent emotions and emotional dispositions, be they passing or longer-lived dispositions, the plasticity question falls into two sub-questions: a) the plasticity of occurrent emotional states, and b) the plasticity of emotional dispositions.

The first question bears on the direct influence we can have on our occurrent emotions[10]. It is clear that there is some plasticity here. We might control or regulate the expression of an emotion when experiencing it, such as when we make a poker-face when losing an argument. We might get ourselves to experience an

---

9. Kagan (2003) gives a similar definition: "Temperament (...) is a stable psychological profile, characteristic of only a proportion of the population, that has a biological foundation, that emerges during childhood, that is associated with particular affective states and that is not a pathological category" (p. 321).

10. In his discussion, Ben-Ze'ev (2000) mainly concentrates on the impact we can have on emotional experiences.

emotion, for instance by thinking about our worst enemy. Or we might attempt to get rid of emotion, such as when we try to calm down by going for a walk. However, most of the long-term and deep impact we can hope for depends on the plasticity of our emotional dispositions. Thus, it is important to know whether or not we can change our dispositions so our emotional reactions would be triggered by different kinds of things, whether or not we can suppress (some or all) emotional dispositions altogether, whether or not we can extend the range of emotions we are able to experience by acquiring new emotional dispositions. If we could achieve such changes, we might become quite different persons.

Obviously, changes in our emotional dispositions will have an impact on the occurrent emotions we experience. If we get rid of a spider phobia, we will not experience fear when confronted with a small innocuous spider. By contrast, it seems that the impact we can have on our occurrent emotions will make no difference to our emotional dispositions. Someone who learns to control his fits of fear when seeing spiders such as to behave almost normally has not yet been able to get rid of the phobia itself. This is why in general the question of the plasticity of emotional dispositions is seen as the most important one. In fact, as we will see later, things are a bit more complicated. It is possible that one way to get rid of a phobia is to "take one day at a time" and get control over our fear on every occasion, until we are not afraid anymore. In the case of temperament, it is possible that the occurrent emotions we express are disposing people to react a certain way to us, hence making us more likely to express the emotion again and fortifying the disposition we have.

In any case, to understand the nature of emotional dispositions, we have to begin with emotions. Emotions have often been taken to involve different components, some of which, but not all, were thought essential. The debate about the emotion component is of importance for the purpose of our discussion, because different components of a same emotion could be plastic to a different degree. Here is the list of what can be considered the different components of emotions:

1. *The cognitive or informational component*: If you experience fear of a dog, you need to see (or hear or smell) the dog, or to have specific beliefs about the dog – that the dog is around or running towards you, for instance.[11] Emotions have a cognitive or at least an informational basis: an object needs to be grasped in one way or another for it to become the intentional object of the emotion. It is worth noting that this cognitive or informational state need not involve concepts.

11. It might in fact be sufficient to imagine certain things (that the dog is around, etc.).

2. *Appraisal or evaluative component*[12]: According to some, emotions involve an evaluative or normative judgment. However, if judgments are taken to require conceptual skills, this claim appears to be overstated. As cases of so-called irrational emotions show, the evaluative component is better not conceived of as a judgment in the standard sense of the term[13]. However, it is plausible to claim that emotions involve an evaluative appraisal or an evaluative perception. Fearing something involves assessing that thing negatively, as something that threatens you.

3. *Expression and bodily changes*: Emotions are usually taken to come with characteristic bodily changes. The changes involve a variety of systems controlled by the autonomic nervous system, such as the respiratory, the circulatory, the digestive, the musculoskeletal, the endocrine or the immune system.[14] Thus, an emotion like fear is characterized, among other things, by an increase in the heart rate. Some of these changes, such as when you get red in the face out of anger, are visible to an external observer. They are part of the facial or bodily expressions of emotions. Other aspects of the emotional expressions are not directly related to the activation of the autonomic nervous system.

4. *Emotional Experience*: When you are in a state of fear, you typically undergo an experience which is characterized by a certain feel. Some consider emotional experiences to be related to bodily changes. James, for instance, considered that emotions are perceptions of bodily changes (James, 1884). Damasio (1994, 1999, 2004) recently revived the Jamesian tradition, but added the claim that actual bodily changes are not necessary to experience the emotion: imagining an emotional experience, for instance, activates somatosensory regions and gives rise to emotional experience as well (see also Damasio et al., 2000).[15] Others, like Frijda

12. We are conscious that the literature on emotions usually does not distinguish 1 and 2, but we think that there is reason to do so. Perceiving a dog running towards you is not yet to appraise it as a threat.

13. As noted by Griffiths (2003): "Appraisal theorists have come to accept that even (…) apparently conceptually complex dimensions of evaluation as Richard Lazarus's 'core relational themes' can be assessed: 1. Without the information evaluated being available to other cognitive processes, 2. Before perceptual processing of the stimulus has been completed, and 3. Using only simple, sensory concepts to define the property that has to be identified." (p. 41)

14. See Damasio (1994), p. 135. But cf. Nussbaum 2001 for the claim that bodily changes might not be necessary for emotions.

15. Another proposal has been offered by Panksepp (2000, 2003). According to him emotional experiences are the result of the activation of phylogenetically ancient and individually specified subcortical systems (like the rage/anger system or the play/joy system). This is true of what Panksepp calls "blue-ribbon emotions", that is a group of seven basic emotions. According to him, emotions like guilt and shame "(…) do not really exist as fundamental processes, even in the human brain, but they can easily arise as derivative processes based on social learning that

(2005), think that it would be a mistake to reduce the emotional experience to the perception of bodily feelings or to a kind of unanalyzable quale. According to Frijda, the structure of experience "contains conscious reflections of the four major nonconscious components of the process of emotions: affect, appraisal, action readiness, and arousal. In addition, it may include the emotion's felt 'significance'" (2005, p. 494). Frijda argues further that how emotions will be experienced depends upon where one's attention is directed[16]. For instance, attention can be turned towards the world or towards oneself. If the attention is turned towards the world, you might experience the situation as depressing or the object as disgusting. If attention is turned towards yourself, you might experience the action tendency characteristic of the emotion or your experience might be more conceptual, such as when you feel that you are a failure. Experience can also be modified by cognition (Frijda calls this sort of experience, "second order experience" and contrasts it with the "core phenomenology" that arises from the amalgam of the unconscious component of emotions plus the direction of attention). He claims that cultural differences in the way situations are appraised and expectations about how one should react to them translate into differences in phenomenology of emotions. While the question of who is right between the advocates of the perception of bodily changes or of a more elaborate view of the emotional experience is far from settled, almost everyone would agree that emotional experience is an essential constituent of emotion.[17]

5. *Action tendencies*: Fear typically comes with either an urge to run away or a tendency to freeze[18]. More generally, emotions are often thought to involve dispositions to act in certain specific ways. Some, like Frijda (1986) even claim emotions are essentially action-tendencies, though his conception of what counts as an action-tendency is very liberal. Others, like Prinz (2004), take the relation to action to be looser. Emotions do not prompt specific behavior, but the bodily changes they involve facilitate action, and the negative and positive valence of emotions dispose us to act in certain general ways, choice being necessary for specific action to ensue.

---

weaves such basic feelings as separation distress and social bonding into more complex sociocultural realities" (2000, p. 138). Noting that decorticated animals still exhibit emotions and that emotional feelings can be triggered by direct electrical stimulation of the subcortical brain systems, Panksepp suggests that emotional experience is independent of cognition: it is a primitive conscious experience, a direct readout from an emotional neural circuit.

16. This position, like Russell's that we present later, is inspired by the work of Lambie and Marcel (2002).

17. Cosmides and Tooby (2000), Ledoux (1996) and Zajonc (1980) are exceptions.

18. In fact, the behavioral tendencies of fear are more varied. See Tappolet forthcoming.

In addition to these five components, we would like to distinguish two other aspects of emotions. These aspects are not usually taken to be constituents of emotions, but given their importance to the plasticity question it is useful to consider them.

6. *Knowledge about emotions*: Knowledge about emotions comes in many forms.
  a. *Conceptual knowledge about emotions*: This includes what types of emotions there are, what the prototype of a particular emotion is, what situation typically elicits this emotion, what kind of behavior typically follows the emotion, etc.
  b. *Social norms about emotion*: This includes norms concerning when it is appropriate to experience an emotion, when it is appropriate to express (or suppress) the expression of an emotion (i.e. it can be appropriate to feel fear, but not to express it), who can express an emotion, etc.
  c. *Personal knowledge about one's own emotions*: With time, it is likely that you come to acquire knowledge about your own emotional dispositions. This knowledge can play a role in keeping you away from certain situations (not drinking with attractive men or women when you are away from home if you want to stay faithful to your partner), or in making you express some emotions more or less often.
  d. *Knowledge about others' emotions*: It is crucial for social interaction to be able to perceive and identify others' emotions. Some of this knowledge (but not all, by any means) might be brought by empathy. Recent work (Decety & Jackson 2006) shows that, at least in some cases, empathy works by using most of the emotional neural structures that are usually active when actually experiencing the target emotion.

7. *Coping or regulating skills*: It is something to know the social norms about emotions, but it is another to be able to comply with them by either *not expressing an emotion* or by "*influencing which emotions we have, when we have them, and how we experience and express them*" (Gross, 2002, p. 282). People might be thought to differ in their ability to cope with or regulate their emotions. Coping or regulating skills are the skills required to comply with social norms, but also with social situations where norms are not spelled out. According to one model we favor on this question, there are at least two ways to cope with an emotion (Gross 2002; Ochsner & Gross 2005): a cognitive and a behavioral one. The first way is to modify your appraisal of the situation (for instance, seeing the fact that you are not getting a job not as a defeat, but as a learning experience) so you don't experience the emotion that you would normally experience (cognitive regulation). The second way is to decrease or hide the expression of emotion (behavioral regulation). Gross has found that decreasing or hiding an emotion is cognitively more demanding and has an impact on performance on certain cognitive tasks (for instance, it makes

you less responsive to others, maybe because you keep thinking about hiding or expressing your emotions). People might be thought to differ in their degree of control or regulating skills, or by their tendency to use one or the other strategy to regulate their emotions.

Components (6) and (7) can be seen as elements of what is now known as "emotional intelligence" (Pizarro & Salovey, 2002; Salovey et al. 2000; Salovey & Grewal 2005)[19]. Researchers have created this concept to make some order in the growing literature on emotions and their relations to cognition and behavior. According to the definition of some of the leading psychologists working on the issue, emotional intelligence comprises four basic abilities (Salovey et al., 2000):

A. the ability to perceive (in us or in others), to appraise (in us or in others) and to express emotion
B. the ability to use feelings in cognitive activities
C. the ability to understand emotion and emotional knowledge
D. the ability to regulate or manage emotions to promote emotional and intellectual growth.

It is clear that the plasticity question also applies to "emotional intelligence". Indeed, a large amount of the literature on moral development concerns aspects of emotional intelligence, like, for instance, the development of empathy (Eisenberg, 2000; Hoffman, 2000), or the development of the knowledge of the emotional effects of wrongdoing (Arsenio & Kramer 1992). Researchers have already started to look at ways to produce or "increase" emotional intelligence (for a review, see Pizarro & Salovey, 2002)[20]. But since we are interested mainly in the question of the plasticity of emotion *per se*, we will leave the exploration of the topic of emotional intelligence for another time.

2.2 Models of plasticity

It is possible to imagine different scenarios about what we come equipped with at birth. For instance, either we come equipped with a fully constituted emotional system, or with a program specifying how to build the emotional system, or the emotional system is the result of contingently putting together different constitu-

---

19. As Peter Zachar reminded us, these features of emotional knowledge are called "psychological mindedness" in clinical psychology. It is thought to be what people with Autistic Disorder and Asperger's Disorder lack, and what many successful psychotherapy clients possess.

20. "(…) In any future moral situations, children who were disciplined through the use of inductive methods will continue to act morally even in the absence of external authority or threat, as compared with children who were disciplined merely through an exertion of parental authority." (Pizarro & Salovey 2002, p. 258)

ents depending upon the physical and/or socio-cultural environment one is in. Here is a list of seven different ways of conceiving emotional systems, going from the degree zero of plasticity to full plasticity. It is easy to imagine many more models, but as we hope will be made clear these seven models cover the main theoretical options. Though it is possible that none of these models apply as such, we believe that they have heuristic value in that they allow one to consider the range of possibilities, as well as to specify the questions that need to be considered.

The fully equipped model (FEM): In this model, you come equipped at birth with a fully functional emotional system that is ready to use as soon as you come into the world or have to wait for other non-emotional components to develop. This is the degree zero of plasticity. Nothing changes.

The marble model (MM): In this second model, inspired by Leibniz's view on innateness, we basically come equipped at birth with a system of well-defined emotional dispositions that get shaped, following existing fault lines, by the environment. For instance, we would be disposed to acquire a fear of spiders, be disgusted by meat products, feel anger at cheaters, etc. But these dispositions become actual dispositions of fearing spiders or being disgusted by meat products only if we are exposed to a particular environment.

The avocado pear model (APM): According to Peter Goldie (2000, p. 99), emotion theorists such as Ekman (1980, p. 89) and Solomon (1994, p. 267) make the error of embracing what he calls "the avocado pear conception" of our emotional capabilities. This model is a version of the marble model, except that it adds a twist to it. We come equipped with innate emotional systems (this is the hard core), but these systems could be superficially modulated (this is the soft skin). For instance, while some situations activate the emotional expression system, cultural norms or other reasons might make you hide your facial expression. The same idea is captured by Ekman when he claims that emotional kinds, or families, have both themes and variations, for he claims that "the themes may be largely the product of our evolution and given genetically, while the variations reflect learning, both species constant and species variable learning experiences." (1999, p. 173)

Goldie claims that the avocado pear model should be replaced by a picture of a "single developed capability which has itself been shaped by the culture and environment in which the individual is placed." (2000, p. 101) Biology and culture interact to shape our emotional systems, but it is not a coherent project to try to disentangle what's 'hard' or neurological and what's 'soft' or cultural. Thus, smiling is "developmentally open or plastic", but it cannot be decomposed into an "invol-

untary emotional response and a voluntary control thereof" (*ibid.*).[21] At least on what we take to be a sensible interpretation of them, this is what happens according to the last three models we propose.

The clay model (ClM): Clay is obviously different from marble in that it is malleable at first, but then, after drying it loses its plasticity. In such a model, the emotional system is constructed (maybe psychologically constructed) in the first few years of life, but it would lose its plasticity after this period. This is analogous to the concept of critical period in animal learning. Peter Gould explains how some birds acquire the songs characteristic of their group (Gould & Marler, 1987). According to him, at a certain critical period of development, a window opens when birds will register the songs of the group of birds they are with. A few days later, using a model of what they heard, they start trying to imitate their fellows. In certain species of birds once this song is learned it crystallizes and stays the same for the rest of their life (other species of birds have to learn songs every season. These species are an example of the next model).

The wax model (WM): According to this model, the emotional system would not only be malleable at the beginning of our life. Just as wax tends to loose its plasticity when it cools down but can be reheated and reshaped forever, the plasticity of the emotional system would last over the years. Thus, though the reshaping of emotions would require some energy, the emotional system would be open to changes even at later stages of ones' life.

The silly-putty model (SPM): Silly-putty is a toy that was a craze among youth in the sixties. Basically, silly-putty can take on any forms you want and keep its malleability for a long time. Not only can silly-putty be used to sculpt your favorite form or used as a ball (it can be bounced as well), it can also, when applied to a printed image, transfer it so you would have a copy of the image. In such a model, the emotional system is considered plastic not only in that it can take different forms, be directly influenced by culture, or assume different functions, but because it also retains its plasticity for the whole life of the subject. This is full plasticity.

These models need not apply only to emotional systems as such. They can apply also to particular emotional dispositions or to emotional traits. Shyness, for instance, could be the result of a disposition that we are born with[22] and on which the

---

21. Prinz makes a similar, but weaker, claim to the effect that we cannot easily tease apart the contributions of nature and nurture; however, he allows that the disentangling can be done if one looks at a particular emotion's history (2004, p. 158).

22. For instance, as suggested by Thomas and Chess in their landmark study on temperament (1977), maybe those who grow up to be shy are the same who were identified as "slow to warm up" as children.

environment, be it physical or social, has little impact, so that it would be best described by the FEM or the MM. Actually, it might well turn out that different models apply to different kinds of emotional dispositions, or even to different kinds of occurrent emotions. Friends of the distinction between basic and higher-cognitive emotions, for instance, might claim that a model like the MM or the APM applies to our dispositions to experience basic emotions, whereas the social nature of higher-cognitive emotions would make one of the last three models more suitable. Moreover, the models can apply to the components of emotional dispositions. For instance, one might think that the disposition to make given appraisals and the disposition to undergo certain bodily changes and certain conscious experiences, given those appraisals, come together at birth, while the disposition to acquire certain information about our environment has parameters that have to be set by the environment, and the resulting action tendencies are a mix of innate dispositions and social learning.

Now that we have provided a typology of the alternative models of plasticity as well as having offered some precision as to what the different questions of plasticity amount to, the next step is to consider some empirical data. As one might expect, there are many domains of inquiry that produce data that are relevant to questions about the plasticity of emotions. If we were to embark on an exhaustive study we would consider domains like evolutionary theory, animal cognitive ethology, social psychology, neuroeconomy, clinical psychology, anthropology, among others. Such an exhaustive study is desirable and necessary to answer the plasticity question. But for the sake of space, we will concentrate our attention on only one of these domains: developmental psychology.

3.   The development of emotions

In this section, we explore the question of plasticity by looking at the development of emotional capacities and dispositions in individuals. As it will become clear, no definitive consensus has been reached as to which model of development is the right one. But the evaluation of the models discussed in the literature might help us to get a clearer idea about our options concerning plasticity. Before presenting these models, we will take a look at the sequence of development of emotions, since it will help narrow our investigation somewhat.

3.1   Order of development of emotions

When do the emotions come 'on-line' for the individual? Which emotions are there at birth (or at least very early), which emotions appear later? One reason to

ask ourselves these questions is that we can assume that the later an emotion comes on-line the more plastic it is, or at least the more open to external influences it is. The more time something takes to mature, the more chances there are for external factors to play a role in its making (this seems to be true of the cortex (Quartz & Sejnowski 2002); the amygdala is not fully developed before the first year it is possible to think that it is also subject to the influence of culture, see Joseph 1999 for that kind of view).

The standard account of the sequence of the development of emotions is given by Lewis (2000a)[23]. According to him, what he calls "the primary emotions" (joy, surprise, sadness, disgust, anger and fear) appear in the first six months of life[24]. Another group of emotions and emotional capacities (embarrassment, envy and empathy) have to wait for self-consciousness to develop until they can appear. Self-consciousness typically develops around the age of two-and a-half. Finally, at the age of three, when individuals can evaluate their own actions according to social standards and norms, shame, guilt, pride, embarrassment, and hubris appear. Lewis (2000b) calls the last group *self-conscious evaluative* emotions.[25] In this account, the last two classes of emotions thus have to wait for the development of non-emotional capacities (the capacity to distinguish self from other and the capacity to understand and recognize norms).

3.2   Models of development

Now how to explain this sequence? There are, as far as we can tell, three ways for explaining the sequence of emotion.

---

23.   If there is agreement on the sequence, there is disagreement as to the details of the sequence. For instance, some, like Campos et al. (1996) and Barrett (1998), are interested in emotions we could call "proto-shame" or "proto-pride", that is, the early predecessors of shame and pride proper (for a similar idea, see also Griffiths and Scarantino, ms). For them, the roots of a sense of shame and pride are to be found early in infancy. Others, like Lewis (2000a, b), do not seem to consider that possibility: for them, shame and pride appear as a whole at a particular age.

24.   It is not clear that disgust belongs to this group of early emotions. People like Rozin think that disgust appears later in development via the co-optation of distaste facial expressions (Rozin and Fallon 1987). The reason given for this late appearance is that disgust is some kind of "revulsion at the prospect of (oral) incorporation of an offensive substance. That substance has contamination properties if it contacts an otherwise edible substance, it renders it inedible" (Rozin & Fallon 1987, p. 23). So while distaste's elicitors are confined to the sensory world (bitter taste, weird texture), the elicitors of disgust are 'ideational' or 'highly cognitive' properties.

25.   Note that even if Lewis is not concerned about emotions in other cultures, it is possible to accommodate emotions that are not in our repertoire by identifying their cognitive requirements.

---

1.   *The strongly determinist biological view (SDB)*: According to this model, which is the most widely known and researched of scientific accounts of emotions, at least one group of emotions (the "primary emotions" or "basic emotions"[26]) develops according to specification of the genome and according to a predetermined timetable:

> Some features of the emotion system, the overall organization of the discrete emotions as a functional complex, *are primarily a matter of biological development and the unfolding of genetic processes.* (Izard,1994, p. 361; our emphasis)

The SDB model also postulates that emotional experiences are distinct and differentiated from the start, so that the experience-expression link is basically the result of phylogeny and is not learned. Overall, SDB suggests a minimal role for the environment in the construction of primary emotions. The explanation of the organization of primary emotion is couched in terms of *biological* maturation, not in terms of *psychological* development (for instance, in terms of learning). Though it usually restricts its claims to emotions that appear early, SDB could also make similar claims for later-developing emotions. For instance, Steinberg (2005) mentions that for romantic love:

> "There is evidence that pubertal development directly influences the development of romantic interest and sexual motivation. There is also evidence that some changes in the frequency and intensity of parent adolescent conflict may be more closely linked to pubertal maturation than age."

Thus, in this case too, the explanation of the development of emotions is couched in biological terms, not in psychological ones.

2. *The developmental system view (DS)*[27]: We are borrowing the name of this view from a general theoretical perspective on development, heredity and evolution championed by, among others, Paul Griffiths and Russell Gray (1994). According

---

26.   Izard calls them "independent emotions" by contrast to emotions that need the development of cognitive structure before being able to develop (Dougherty et al, 1996, p. 29).

27.   We are conscious that we are grouping together people under a single heading that they might not be familiar with. From our point of view though, they all defend, one way or another, the idea that the diachronical unfolding of emotions is scaffolded by the environment. The same people also sometimes defend the view that the (synchronic) unfolding of a particular emotion is scaffolded by the environment. Griffiths and Scarantino (ms) call the perspective integrating dynamical and synchronical scaffolding of emotions, the "situated perspective" on emotion (another name for that perspective is the "dynamical perspective", see Lewis 2005). Because we are mainly interested in the developmental aspect of this perspective, we prefer to use the phrase "developmental system model" to group together the studies that challenge the SBD model.

to this perspective, the genes are not the only developmental resources, nor the most important (a thesis called "causal democracy"):

> (...) The genes are just one resource that is available to the developmental process. There is a fundamental symmetry between the role of the genes and that of the maternal cytoplasm, or of childhood exposure to language. (Griffiths & Gray 1994, p. 277)

We will not go into a detailed discussion of this perspective and its limits; suffice it to say that the developmental system model underscores two things of interest for us: (A) the source of control of development is not centralized, that is, the adult emotion phenotype is not programmed in the genes, but it depends on the input of many sources including genes, physical factors such as patterns of locomotion, and socio-cultural factors such as parental reactions as well as culturally-dependent concepts of emotion; (B) local constraints channel the development in one direction, a direction not necessarily programmed in the genotype[28].

This model of emotional development (advocated by Campos, Kermoian & Witherington 1996; Camras 1994, 2000; Lewis 2005; Russell 2003) typically postulates that we start in life with undifferentiated affective states and that development is a process of differentiation of those states, a process affected by a host of social and cultural factors (cf. de Sousa 1987; Russell 2003). Thus DS assumes a greater plasticity at birth than the SDB view. Advocates of DS also typically assume that there is a greater plasticity to emotions than SDB does (see note 25 and the "Expression" section below).

3. *The social constructionist's view*: To be quite frank, constructionists are not big on trying to find an explanation as to why the development of emotions is sequenced the way it is (though see some passing remarks in Averill, 1986). Given that, for them, emotions *are* "transitory social role[s]" (as Averill puts it), social constructionists are committed to the idea that you cannot experience emotions before you have assimilated some cultural elements, which is pretty late (acculturation can start early, but if having an emotion is a question of mastering certain cultural rules, it seems unlikely that infants can have emotions). Some social constructionists recognize that some of the components of what they call "emotional syndrome" might be innate, but these components still need to be coordinated to

form an emotion *per se*. Advocates of this view, like Averill et al., (2001), make claims like the following:

> [emotional syndromes] are folk-theoretical constructs, recognized in ordinary language by such abstract names like 'grief' in English, *hwa* ('anger') in Korean, *amae* ('dependency') in Japanese (...) the meaning of emotion qua syndrome depends on a matrix of cultural beliefs (implicit beliefs) about the nature of emotion, (...) emotional syndromes are constituted, in part, by the existential beliefs we hold about them (...) Emotions (...) literally embody the values of society. *Stated more formally, emotional syndromes are constituted by social rules as well as by existential beliefs (...) Without the rules of anger, say, there would be no anger, only inarticulate expressions of rage and frustration.* (2001, p. 168)

Social constructionists are mainly interested in how emotions are elaborated by beliefs and social rules; they are not very interested the details of the underlying biology of the components of the emotional syndrome. So basically a social constructionist model of the development of emotions is a model of the development of the capacity of acquisition of beliefs and social rules about emotions, but also of the capacity to recognize the situations that are thought to make emotions appropriate. Their developmental story is about how agents internalize the rules and beliefs about emotions (what they call "emotional schemas") or how they get more skilled at appraising emotions and using emotions' categories.[29] Because, from this perspective, the development of emotions rests mainly on the acquisition of non-emotional skills, their developmental story is a non-specific one:

> "From a social constructionist view, emotional development — whether in childhood or as an adult — typically follows a more subtle and non-specific course. Like the development of most other complex forms of behaviour, emotional development tends to be slow, piecemeal and cumulative; indeed, for the most part, emotional development is not even particularly emotional." (Averill, 1986, p. 112)

Because social constructionists have nothing precise to say about the development of early emotions, we won't consider them as contenders here. (Another reason for not considering them is that an important part of their claims can be subsumed by the DS view, which also insists on the idea that culture plays an important role in the shaping of the emotions.)

As we see it, the primary battle is between the strongly determinist biological view and the developmental system view. Our strategy in the next sections will be the following. We will first look at some work concerning the construction of components of basic emotions (specifically, the front end and the tail end of emotions,

---

28. "(...) the role of developmental context is not restricted to activating alternative outcomes prefigured in a 'disjunctive genetic program' (Griffiths, 1997; Griffiths & Stotz, 2000). Developmental systems are usually competent to produce viable phenotype outside the specific parameter ranges in which they have historically operated. (...) the biological endowment of a healthy human infant determines a norm of reaction which includes a large range of emotional phenotypes, not all of which have been specifically selected for, and not all of which need to have occurred before in human history" (Griffiths & Scarantino, ms).

---

29. As Averill puts it : "From a social constructivist point of view, (...) the most important feature of emotional development involves the acquisition of the social norms and rules that provide the component responses with their meaning and co-ordination." (1986, p. 105)

that is, the appraisal mechanism and the expression mechanism), but also at the emotional experience. We will leave aside action tendencies for if it can be shown that appraisal mechanisms and expression mechanisms are plastic, then there are strong reasons to believe that action tendencies are also plastic. If both are genetically determined, then there are strong reasons to think that action tendencies are also genetically determined.

Our goal in the next sections is to show that, contrary to the dominant trend in the study of emotions, there is more leeway in the construction of basic (or primary) emotions than acknowledged by advocates of the major theories of basic emotions. If basic emotions are plastic, we can imagine that the same goes for other non-primary emotions. We will then look at work on emotional dispositions. Our goal in this case will be to show that even if emotional dispositions were fixed at birth there are reasons to think that we are not condemned to a particular emotional regimen. Overall, we will argue that there is much more plasticity to our emotions then what SDB typically proposes.

3.3   The plasticity of emotional components

3.3.1   *Appraisal mechanisms*

Appraisal mechanisms are generally considered to be quite plastic. Most people, from the constructionists to the evolutionary psychologists, agree that what we are afraid of or what we are disgusted by is potentially quite different from culture to culture, from individual to individual, and from one period of the life of an individual to another (see for instance, Rozin, 2003, p. 848). For instance, while banging a spoon on a table may make an infant laugh, it takes much more (we hope!) to make an adult philosopher laugh.

Some of these changes in appraisal are due to changes in cognitive capacities. Hoffman (1982) proposed, for instance, that empathy gets less and less egocentric as children are more capable of differentiating their own internal states from others and their responses become less situated as they get better at imagining "that people can continue to exist over time and contexts" (Eisenberg, 2000, p. 678). Other changes might come from the re-evaluation of goals as one ages (Carstensen & Lockenhoff, 2003).

So, everybody agrees that there are modifications in appraisal, but this agreement masks a deeper disagreement that might have gone unnoticed. For as we have seen in the previous section, biological determinists do not think that the appraisal mechanisms are totally plastic. First, they think that some appraisal mechanisms are set at birth to evaluate a small group of stimuli in a certain way (loud noise are frightful, for instance). Second, the set of things one might be afraid of or disgusted by is seen as somewhat constrained. Certain things could

not but be appraised in a certain way (by normal subjects). Miller (1997), for instance, remarks that:

> (…) the variation in elicitors of disgust across cultures will hardly look like a random sampling of all things or all actions in the world.
> Cultures, it seems, have much more leeway in admitting things or actions to the realm of the disgusting than in excluding certain ones from it. Yet even here there are limits. Some things seem almost incapable of eliciting disgust. Animals and animal substances, we can safely assume, will figure more frequently as elicitors of disgust than plants and inanimate objects. And is snow polluting anywhere? Are stones? (…) (p. 16)[30]

Third, not only are there things that are universal elicitors of particular emotions, but there are also mechanisms preparing us to learn to associate certain stimuli with certain emotions. So for instance, we would more easily learn to associate spiders and heights with danger than more recent dangerous stimuli, like guns and electric outlets (Öhman & Mineka, 2001). Not only are those associations easier to establish, but it has been shown that they are also more difficult to undo.

We will leave aside the question of universal elicitors for it would take us away from the literature on development and force us to a fray into the anthropological literature. We will instead concentrate first on learning preparedness.

In his "Preparedness and Phobias" (1995), Davey argues that the phenomena explained by the specific evolved association mechanisms traditionally postulated by psychologists would be better explained by a "human model of classical conditioning". The human model (described in details in Davey 1992) is different from animal models in that it adds a cognitive dimension to the traditional model of conditioning. According to that model, the determinants of Conditioned Stimulus-UnConditionned Stimulus association (for instance, the association of a spider and a pain sensation or an electric shock) are not only and exclusively dependent on the contiguity of the stimuli (the fact that the subject has actually felt pain or received an electric shock after encountering a spider). It is also dependent on a prior evaluation by the subject of the likelihood of the encounter to be followed by an aversive consequence as well as the evaluation of the degree of pain that such an encounter will cause. Davey calls those determinants "cognitive expectancy biases"[31].

---

30.   Cosmides and Tooby make a similar claim: "Emotion programs, for example, have a front end that is designed to detect evolutionarily reliable cues that a situation exists". (2000, p. 93)

31.   As shown by Olson et al. (2007), evaluation of the degree of pain that a stimulus will cause can be acquired through verbal means (after all, phobics of microbes fear things that they have never seen, but only been told about) or visual means (like someone else receiving a shock when being presented blue squares).

In other words, your prior fear of an object, as well as your evaluation of the pain that will result from the encounter, are more important factors in establishing the strength of the association between an object and an aversive consequence than what really happens during that encounter. Because the determinants of the expectancy bias are things like estimates about how dangerous something is, "semiotic" similarity between stimuli (angry faces and screaming, for instance) and prior fear about some stimuli, it becomes clear that cultural and ontogenetic factors could play an important role in the explanation of certain characteristics of fear and phobia. For instance, Davey thinks he can explain why fear of spiders is acquired so fast and why it resists extinction by making references to ideas associated with the dangerousness of spiders (and because we fear them we do not approach them, we do not give ourselves the chance to change these beliefs)[32].

Another source of criticism of the SDB explanation comes from the work of Campos and his colleagues (Campos et al., 1996). Campos showed that contrary to what advocates of SDB think, fear of heights is not genetically programmed. According to him, wariness of heights is the result of an experientially constructed process that is linked with the advent of locomotion. It has been shown by putting infants on a glass surface with one shallow side and one deep side that locomotor infants experience a fear of heights while prelocomotor infants do not. If the infant shows signs of cardiac acceleration when put on the deep side, or if he tries to go as quickly as possible to the other side, he is considered to be showing a fear of heights. According to Campos, the origin of this fear is dependent of an expected correlation between visual and vestibular input that is usually characteristic of self-movement. This correspondence is gained by moving voluntarily. Thus, it is only when infants are starting to move by themselves that this correspondence is built and only then that it can be violated. Again, fear seems to depend of an acquired expectation.

3.3.2   Emotional expression

There are a few questions we might ask here about emotional expressions in relation with development (Oster, 2005): (A) are the discrete emotions present at birth or do they develop through a process of differentiation from more global states? (B) Are the expressions characteristic of basic emotions present in their adult-form early in infancy or do they go through transformations? (C) Do facial expressions

---

32. Isabelle Blanchette (2006) has defended a related idea. Working on visual attention and comparing evolutionary threat relevant stimuli (snakes and spiders) and modern threat stimuli (guns and syringes), she showed that subjects were typically more efficient at locating modern threat than evolutionary-relevant threat. As she noticed, this is in contradiction with predictions from Öhman and her colleagues and more consistent with the DST approach since it implies that the threat detection system is indeed open to ontogenic contingencies.

reliably reflect infants' affective state or emotional experience at the beginning of life, or does the development allow expression and experience to get disentangled?

One current view on emotional expression development is embedded in Izard's Differential Emotions Theory (DET) (Izard, 1994; Dougherty et al., 1996; Ackerman et al. 1998). According to DET, emotional expressions, as functional adaptations and the result of phylogeny, are genetically programmed to come in integrated well-organized patterns or modules. Modules do not develop (that is, they are not the result of the process of learning), they mature (leaving some role for a child's experience):

> Emergence of these emotions expressions is primarily a function of the maturation of neural circuits and is independent of cognition. (Ackerman et al. 1998, p. 87)

These patterns or modules are independent of cognitive development or appraisal processes for their activation and they are identical in essential respect to the adult expressions. Moreover, because expressions are, in young infants, directly determined by the emotional experiences it follows that:

> The structures of the neural-evaluative component of these emotions must also be functional at birth. (Izard 1994, p. 358; see also Ackerman et al. 1998, p. 9)

According to this view, development allows the individual to have better control over his expression and therefore to sometimes dissociate the experience and the expression or to modulate the expression (blending it, minimizing it, masking it with smiles, etc., (see Keltner 1996, p. 396; for a similar view, see Panksepp and Smith-Pasqualini, 2005). Development consists also in connecting invariant feelings with changing images and thought as well as acquiring better emotional understanding and regulation.

This strong position is opposed by numerous people. For instance, Camras (1994, 2000) proposes that:

> (…) the face can assume only a limited number of patterned states due to constraints imposed by lower-order synergistic relationships among muscle actions (i.e. coordinative motor structures). (2000, p. 136)

It is the "coordinative motor structures" – that is, when you move some muscles, you automatically move some others because of the ways in which they are linked – which are responsible for the impression of a well organized system of emotional expression. As Camras shows, these expressions appear also in non-emotional settings. For instance, an infant might show a typical expression of surprise when she raises her head towards a familiar lamp she likes. Moreover, expressions characteristic of sadness, anger and pain/discomfort are seen together in a range of situations from medical inoculations to separation from the mother. This seems

to show that there is no connection between the expression and the emotion in very young children.

More recent work from Camras and her colleagues (Camras et al. 2003), as well as from Oster (2005), has looked at faces of babies in fear and anger situations. What they found is that babies do not produce discrete adult-like facial expressions of these emotions, but instead show varying expressions of distress that do not look like prototypical expressions of anger or fear (though there are differences in visual fixation and body movements). Brow and mouth configurations identified as specific to fear and anger were not differentially produced in the fear or anger paradigms.

Camras, like Russell (2003), and Frijda and Mesquita (1998), as well as some functionalists like Barrett (1998), believes that there is no need to explain the packaging of components in one unified whole, because there is simply no such thing. Using, among other things, ideas about communication put forth by ethologists (Evans & Marler 1994), she proposed that emotions are much less rigid than supposed by the tenants of the DET. On certain occasions it might be useful to smile, while on other occasions it is preferable to keep your smile to yourself. What you will express often depends on who is present. This is obvious in the case of emotions expressed in social relations where hierarchy is involved (but see also Ruiz-Belda et al. 2003, about bowling players that smile after a strike only when they are facing the audience). If such is the case, emotions do not induce facial expression but may only facilitate them.

3.3.3 Emotional experience

As we said earlier, partisans of DET are not only suggesting that facial expressions are genetically determined and present early on in life, but also that there is an innate link between the appraisal mechanisms and the emotional expressions. One consequence is that emotional experience (or what they call "emotional feeling", granting that feelings can involve cognition; Ackerman et al., 1998) is also present early in life because emotional experience is a product of what is called the "neuro-evaluative" or the "emotion activation process" (Izard also talks of a "non-cognitive motivational condition"). The consequence of this position is that

> (…) emotion experience does not change with development. More specifically, the basic motivational/feeling state of an emotion is invariant. (Izard, 1994, p. 359)

or

> DET assumes that the core feeling state of any discrete emotion is constant across the life span. (Dougherty et al. 1996, 30)

Or again

> The infant experiences anger as a primitive organic sensation. (Magai & McFadden, 1995, p. 154)

This view has been opposed by many, such as Camras (1992), who suggests that development goes from less differentiated forms of motivation (like distress) to more differentiated states (like anger or sadness). Other psychological or social constructionists seem to be committed to this view, because they place cognitively elaborate interpretations (typically not given at birth and subject to learning) at the center of emotional experience. This is the view endorsed by Lewis (2000a), for whom

> Emotional experience is the *interpretation and evaluation* by individuals of their perceived emotional states (i.e. changes in their neurophysiological behavior), as well as the situations in which the changes occur, the behaviors of others, and their own expressions. (Lewis, 2000a, p. 272; our emphasis)

Russell (2003, 2005) develops a similar position. For him, our emotional experience is what he calls a form of "secondary consciousness". What he means by that is that our experience depends on the culturally and socially informed categorization of some raw feelings. These raw feelings, or "core affects", as he calls them, vary according to two dimensions: pleasure/displeasure and activation/deactivation. By themselves, the core affects are not 'emotional'. As Tim Schroeder humoristically puts it: "A woman who tears up because of a blustery wind, while an ill-advised burrito weighs heavily upon her digestive tract, feels an impressive number of the sensations felt by someone who is gut-wrenchingly sad." (forth.). Imagine moreover that, as you might expect, her state causes her displeasure. You would still not be tempted to say that she is feeling sad. Emotional experiences necessitate the categorizing the core affects. As Russell says, "[one] does not simply introspect and register the reality of a state of fear, (…) rather, (…) much information processing intervenes between the registration of the raw data and the final percept (…). To experience fear is to perceive a strong resemblance between one's current state as one knows it and the mental script for fear" (2003, p. 164).

This view is also the one favored by the constructionists:

> Even responses that are relatively automatic are experienced as emotional only to the extent that they are interpreted within the framework of an emotional syndrome: for example, it is this reflexivity that transforms mere arousal (from climbing the stairs, say) into emotional arousal (e.g., an angry episode). (Averill et al., 2001, p. 170)

It is hard to see how we could settle this debate, as we cannot put ourselves in babies' heads to know whether or not they feel distinct emotions. One possible strategy would be to use brain imagery to look at the patterns of activation in babies'

brains when they appear to experience emotions. Some work (Damasio et al., 2000; Lawrence & Calder, 2004) have already shown particular patterns of activation for different emotions in adults. If babies' anger, for instance, shows patterns of activation similar to adult anger, then one might be tempted to conclude that babies have the same emotional experiences as adults. But we take it that psychological and social constructionists would probably not be moved by this. The raw feel that children would have when being frustrated or when being joyful is not what they want to call "emotional experience". To experience these feelings as emotional, one needs concepts (and scripts). So it seems that here the debate could be semantical, each party having its own understanding of what the expression "emotional experience" means.

3.3.4 Emotional dispositions

Some data from longitudinal studies seems to indicate that the plasticity of emotional dispositions or temperament is somewhat of a vain dream. Some of the best of those studies are the ones conducted by Caspi and his colleagues on a largely intact cohort of 1037 subjects in New Zealand that has been studied every three years from age 3 to 26[33]. The findings are summarized by Caspi (2000) as follows: undercontrolled kids (kids who were impulsive, restless, negativistic, distractible, and labile in their emotional response) at 3 were rated as exhibiting more externalizing problems (fighting, bullying, lying, disobeying) at age 5, 7, 9, and 11, as well as adults. Caspi writes of these children that:

> [I]n terms of their personality structure at age 18, they were characterized not only by high levels of impulsivity and thrill seeking but also by aggression and interpersonal alienation. By age 21, undercontrolled children reported more employment difficulties and higher levels of interpersonal conflict at home and in their romantic relationships. They had extensive brushes with the law, and their successful assumption of adult roles was compromised by their abuse of alcohol. People who knew them well corroborated this profile of conflicted interpersonal adjustment in describing undercontrolled children grown up as unreliable and untrustworthy (Caspi, 2000, p. 168).

The stability exhibited by children with a certain temperament, combined with the discovery of the fact that some genes are associated with predisposition to violence or depression (see next few paragraphs), seems to favor an interpretation of the

development of emotional traits focused only on the infant's (innate) biological contribution.[34]

One should avoid jumping too quickly to this conclusion. Recent work by Caspi and his colleagues (2002, 2003) on depression and violence in adults who have been identified since age 3 as having a certain temperament underlines the role of environment in the shaping of emotional dispositions..

Depression for instance, has been linked with a certain form of polymorphism in the promoter region of the serotonin transporter gene (5-HTT), such that those having one or two copies of the short allele of the 5-HTT exhibited more depressive symptoms than those having two long alleles, but only if having been exposed to stressful life events. As they write in the conclusion of their paper: "(…) no direct association between 5-HTT gene and depression was observed" (p. 389). The simple possession of the gene is not enough because "the gene's effects are expressed only among family members exposed to environmental risks" (p. 389; For a similar conclusion concerning violence, see their 2003, p. 853).

For violence, the same kind of polymorphism exists for the promoter of the Monoamine Oxidase A gene (MAOA). It is known that genetic deficiencies in MAOA are linked with aggression in humans (since it is a X-linked gene, it is more likely to affect males) and in mice (in mice deletion of the gene encoding MAOA increases aggression as well as levels of norepinephrine (NE), serotonin (5-HT) and dopamine (DA), while aggression is restored to a normal level by restoring the expression of MAOA).

Caspi et al. (2002) report that animal studies show that the stress associated with maltreatment early on in life alters the production of neurotransmitters like NE, 5-HT and DA (not to talk about the effect of stress that has also been shown on cerebral structures central to some emotions like the amygdala, see Joseph 1999). Caspi et al. have shown that anti-social behavior is predicted by an interaction between a gene (low activity MAOA genotype) and an environment (maltreatment in early age). By themselves, genes are not enough for one to develop anti-social behavior. As they put it: "[]males with low-MAOA activity genotype who were maltreated in childhood had significantly elevated antisocial scores relative to their low-MAOA counterparts who were not maltreated. In contrast, males with high-MAOA activity did not have elevated antisocial scores, even when they had experienced childhood maltreatment" (2002, p. 853).

So it is not only the genes that are responsible for later behavior and emotional dispositions, but the environment we grow in contributes to a large extent too. That might be a reason to rejoice: despite the gloomy prospects of the longitudinal stud-

---

33. Using a totally different paradigm, Keltner (2003) has looked at women's college yearbook photos and asked raters to code for the intensity of the smile. They then measured personality, relationships quality and personal well-being over the next 40 years. They have shown that women with the most intense Duchenne's smiles are, among other things, less likely to remain single and more likely to experience a satisfying marriage.

---

34. As such, the Caspi studies tell us nothing about how the children comes to have a particular temperament in the first place.

ies of Caspi and Kagan, emotional dispositions are not established once for all. Changes are possible (indeed, childhood prognoses are accurate up to ones 20's, but they do not yield groupings that are valid over one's entire life). This becomes more apparent when we consider that part of the stability of temperament during one's life may be created by the fact that "people create environments that maintain stability". To give just one example, people who choose spouses similar to them appear to be less likely to go through personality changes than those who choose spouses dissimilar to them (Krueger et al. 1998; Carstensen et al., 2003, p. 728).

The choice of a mate is not the only way by which an individual might contribute, by his actions and choices, to the stability or change in his emotional dispositions. Studies like those by Caspi show that undercontrolled boys are less likely to become involved in crime if they stay in school[35]; other studies show that investment in social bonds in adulthood can be a turning point in a criminal life; or that a good marriage (not a shotgun one!), regardless of the spouse's own deviant behavior, or a good job, can make one abandon criminal life (Laub, Nagin & Sampson 1998; Sampson & Laub 2004). Finally, experiments done over a period of six months by Keltner (2003) show that romantic partners and roommates are getting closer together emotionally compared to controls, proving the effects that intense and frequent contact with others might have on emotionality.

Changes are not only taking place later in life, they can take place much earlier, as shown by Kagan's data according to which a large number of children who are shy in infancy are no longer shy when they enter preschool. It seems that parents were instrumental in the disappearance of the trait (by, for instance, facilitating encounters in safe environments for inhibited children). Caregivers also promote empathy in helping to notice the effects of transgression on others. The attitudes of the parents towards the emotional demonstrations of their children also have an effect on future emotional regulation. For instance, the reaction of parents to a demonstration of anger by a child has an influence on later use by the child of this this strategy (it should be noted that the acceptance of irritability is a function of cultural norms and social contexts[36]). As Lemerise and Dodge note:

---

35. True the decision is not always theirs, but this still shows that social factors (like the decision of educators or parents) impact the development of temperament and personality, therefore it is predetermined or inflexible.

36. As Kopp and Neufeld put it: "In Western urban samples, data reveal that infant irritability has long-term adverse relationship consequences. (...) However, it is unclear whether adverse parental responses to infant irritability are a function of the demands of urbanized societies (e.g. job responsibilities, spatial constraints), prevailing cultural norms (e.g. acceptance or rejection of acting out), or a combination of the two (e.g. low tolerance of irritability magnified in families who operate on tight schedules versus high tolerance for toddler irritability where family scheduling is loose). Stated another way, the issue is the extent to which infant and toddler irritabi-

---

For example, mothers who responded to toddlers' anger with calm neutrality or cheerful displays had toddlers who showed interest in the environment, positive emotions, and positive responses to strangers in the mothers' absence. (...) On the other hand, (...), angry maternal responding to toddlers' difficult behaviors was associated with toddlers' persisting in angry, noncompliant behavior and being less likely to respond empathically to others. (Lemerise & Dodge 2000, p. 597; see also Kochanska et al. 2005, p. 19[37])

Anger during interactions with children produces shyer children, less pro-social behavior towards parents and peers and a poorer understanding of emotion in children. This translates into less social competence and therefore into difficulty in getting others to do what one wants, or more occasions when one gets angry. Indeed, a more general positive disposition of the mother towards the infant contributes to establishing a "form of positive disposition that was more enduring than a mere positive mood (...) More likely, it promoted the child's deeper and lasting positive disposition toward the mother, which in turn, over time, fostered his or her eagerness to embrace the mother's rules and values" (Kochanska et al. 2005).

Another factor that has been thought to affect children is inter-parental conflict. It is thought that exposure to inter-adult anger sensitizes children towards anger and makes them more aggressive[38]. But this is not true of every case:

---

lity is differentially accepted as a function of cultural norms and the circumstances that must be present within a culture such that early irritability leads to later relationship and other problems." (2003, p. 357). De Vries (1994) illustrates how the nature of the fit between a child's temperament and his socio-cultural environment can have an effect on the developmental outcome. More generally, his "transactional model" insists on the interplay between biological, socio-cultural, physical and economical, and parental factors in the shaping of children's later dispositions.

37. In fact, the appropriateness of mothers' responses depends on the type of kids they are reacting to: "Importantly, Kochanska (1997) shows that maternal styles interact with toddlers' temperament in the development of conscience. In fearful children, gentle discipline is ineffective; instead, positive responsiveness from the mother is required for socialization of conscience" (Carstensen et al., 2003, p. 731). Bates makes a similar point concerning the effect of different parenting styles on children with different temperaments: "Resistant children with mothers who responded relatively often to their actual and potential misbehaviors were not as likely to develop externalizing behaviors as resistant children with less controlling mothers; at the same time, nonresistant children with highly controlling mothers showed higher levels of behavior problems than nonresistant children with less controlling mothers." (2000, p. 391)

38. Harris (1995) maintains that the influence of parents on children is circumscribed to the home. According to her, socialization is context specific, therefore, outside the house, children adapt their behavior and reactions to their peers. As she puts it, 'Intra- and intergroup processes, not dyadic relationships, are responsible for the transmission of culture and for environmental modification of children's personality characteristics' (1995, 458). This seems to contradict the studies we are presenting in this section. But since we are interested in showing that emotional dispositions are open to socio-cultural influence, we would be as happy if Harris was right.

Jenkins and Smith (1990) found that the presence of a grandparent to whom the child was close was associated with a much reduced risk of psychopathology in children experiencing high levels of interparental conflict. Presumably through such relationships children develop a sense that relationships other than those based on dominance can occur. (Jenkins & Oatley 1996, p. 434)

So it seems that all in all emotional dispositions can not only be explained by the infant's biological contribution, but rather by some kind of dynamical process in which the temperament of the infant, the parents, the social environment and the cultural norms all play a part.

3.4   Discussion

So what are we saying about plasticity in development? We pitted two models against one another in this section and we think that the developmental system model has shown that it has to be considered as a serious contender in the explanation of the development of emotions. As such, this might be considered by some as a meager result. But it is not.

First, let us look back at the plasticity models. We saw that biological determinists are tempted by versions of the Marble Model or the Avocado Pear Model both with respect to the entire emotion package and with respect to particular emotional dispositions. Others, the advocates of the developmental system model, are more in favor of something like the Wax Model or the Silly-Putty Model. The results considered (results bearing on children's development) do not favor the Clay Model as emotional dispositions seem to be open to change during the whole period of childhood and even later. What about the WM (Wax Model) and the SPM (Silly Putty Model)? We see dynamical system advocates as possibly endorsing one of the two. People like Russell make it clear that "each emotional episode (...) is constructed on the occasion of its occurrence. As suggested by dynamic systems theorists (...), no overall pattern is fixed ahead of time" (2003, p. 166-7). This is clearly suggestive of total plasticity all the time, more SPM than WM. On the other hand, given that the categories used to construct the emotions, as well as the core affects, are relatively stable once a person is an adult, WM might be more accurate as a model of adult plasticity.

Now, considering the different components or aspects of emotions, the results are the following:

a. Everybody in the debate acknowledges that the *appraisals* we make are culturally influenced and that appraisal is pretty plastic. The unsettled issue is how to think about "preparedness", is it or is it not the result of a complex form of conditioning? If it is, appraisal might be totally plastic (and we are back to the heyday of the behaviorists!). Another issue we mentioned is the one concern-

ing genetically programmed fear. DS advocates claim that this kind of fear appears only in certain conditions, i.e. when children start locomoting. If such is the case, this would be another blow to the SDM model.

b. Concerning the *expression* of emotions, we have shown that the debate is still on-going concerning whether they are present at birth or whether they are constructed afterwards. One thing for sure is that it seems their development is pretty much canalized, that is to say whatever the cause of our expressions everybody ends up pretty much with the same set of expressions. However, work by Camras et al. (2003) shows that culture might act quite early on emotional expression, as witnessed by their discovery that 11-month old Chinese exhibit emotions less than Japanese and Americans of the same age. This would suggest some level of plasticity very early on.

c. The debate concerning *emotional experience* seems to revolve around two things. The first one is, do infants have a set of discrete emotional experiences or are they experiencing some kind of blurred experience that gets more and more defined with age? The second one concerns the construction of the experience. Is it done around a very well defined emotional experience (this would be a form of APM, Avocado-Pear Model), or around global hedonic experiences (the core of the avocado would not be emotional).

It might seem that the scientific literature on the plasticity of the appraisal mechanism, of expression and of experience, is not very conclusive. But fixed or plastic, the emotions we undergo are shaped by family and peers' responses to them. This is good news for us. Put aside the question of the capacity of emotions to be psychologically or socially constructed, it would appear that whatever the temperament or the emotional dispositions you are born with, you can change[39]! More precisely, the social environment plays an important role in shaping our emotional dispositions. What we need is some social or family engineering.

4.   Conclusion

What do our findings entail with respect to evaluative questions? As we have seen, the question of the plasticity of emotion has a bearing on different ethical and evaluative issues. We noted that virtues and vices are usually thought to involve dispositions to feel certain emotions in certain situations. Thus, the plasticity question is relevant to the question whether or not we can get ourselves to become

---

39. As philosophers, we are interested by the mere theoretical possibility of change. Most people do not choose their family and therefore are determined by this aspect of their environment. So for most people, it is quite possible that this change is not under their control.

more virtuous agents and whether or not we can educate children to become vir-
tuous. As we mentioned, there are reasons to think that the possibility of shaping
ourselves emotionally is not only a condition for becoming better agents, but for
moral responsibility quite generally. Moreover, given the link between emotions
and values, the plasticity of emotions is required if we want to make room for the
idea that our grasp of evaluative considerations can improve. Finally, plasticity is
presupposed to make sense of the different norms that pertain to emotions.

Now, even though we haven't tried to give a picture of what the education of
emotion involves, the literature we have reviewed allows us to be optimistic about
these issues. Firstly, there are reasons to think that appraisal is importantly plastic,
so that the kinds of fears or disgust, etc., we experience are not fixed. Secondly, we
have seen that emotional dispositions can change. What has to be emphasized is
the role of the social environment in shaping emotional dispositions and more
generally our temperament. This suggests that often the best an agent can do is to
try and immerse herself in the right social environment.

These questions bear on the plasticity of our emotional dispositions. As we
have seen, this question has to be distinguished from that of the plasticity of our
occurrent emotions, something which involves the possibility of controlling the
different components of emotions. We said little about this, but as we mentioned
in the section on emotional dispositions, coping skills are something which can be
acquired and which depends on the social environment. This question merits fur-
ther investigation. In particular, the question of how we can get ourselves in and
out of occurrent emotions needs to be addressed (Ben-Ze'ev, 2000).

In closing, we would like to make a few remarks about additional limits of our
discussion and the directions in which further research should be headed. One
problem we have not touched upon much is the plasticity of adult emotions
(though we did mention that anti-social behavior can sometimes diminish or dis-
appear, as in the case of an individual who finds himself in a good marriage). Is it
possible for adults to change? In ethics, the question is generally not to be
understood as "Can we feel the emotions felt in another culture?", but "Can I react
differently to certain situations or people, can I break the mold of my emotional
habits?". We have not really talked about this, but here is a relevant closing obser-
vation. Magai and Nusbaum (1996) have been interested in personality changes in
adulthood. They propose that some important personality changes appear to be
the result of 'life crises', that is, some turning point in someone's life. In order to
endure, they note, these crises have to be followed by a period of reflection and
emotional work. As they say:

> Perturbation in the working system that is personality creates conditions in which
> established feedback loops are temporarily disrupted, setting into motion novel
> positive and negative feedback interactions. (Magai and Nussbaum 1996, p. 407)

Those more likely to make changes are those who possessed not only motivation
(for instance, because of the "crystalisation of their discontent") but also those
who possessed the cognitive and verbal tools "that fostered active self-reflection".
This is clearly a fruitful research direction. It would imply that one very important
tool for change is "emotional intelligence".

Another issue we left aside (for now) is how we can modify our dispositions to
experience an emotion through art (Nussbaum, 1990). Quite obviously, it would
also be important to look into the vast empirical literature about different kinds of
psychological therapies and their efficiency. Neither did we consider how moods
and emotions are produced by drugs or by the manipulation of our genes. We have
no principled objections against such strategies. Some theorists might object to
that such changes would not involve any personal work, and therefore conclude
that they has no moral worth. But this is an open question.[40]

References

Ackerman, B. P., Abe, J. A. A. & C. E. Izard, C. E. (1998). Differential emotions theory and emo-
tional development. In M. F. Mascolo & S. Griffin (Eds.), *What develops in emotional devel-
opment?* (pp. 85–106). New York, NY: Plenum Press.

Aristotle. (1998).. *Nicomachean ethics*. Trans. D. Ross. Oxford, UK: Oxford University Press.

Arsenio, W. & Kramer, R. (1992). Victimizers and their victims: Children's conception of the
mixed emotional consequences of moral transgressions. *Child Development*, 63(4),
915–927.

Averill, J. R. (1986). The acquisition of emotions during adulthood. In R. Harré (Ed.), *The Social
construction of emotions* (pp. 98–118). Oxford, UK: Basil Blackwell.

Averill, J. R., Chon, K. K., & Hahn, D. W. (2001). Emotions and creativity, East and west. *Asian
Journal of Social Psychology*, 4, 165–183.

Baron, M. W. (1997). Kantian ethics. In M. W. Baron, P. Pettit, & M. Slote (Eds.), *Three Methods
of Ethics*. Oxford, UK: Blackwell.

Barrett, K. C. (1998). A functionalist perspective to the development of emotions. In M. F. Mas-
colo S. Griffin (Eds.), *What develops in emotional development?* (pp. 109–133). New York,
NY: Plenum Press.

Bates, J. E. (2000). Temperament as an emotion construct: Theoretical and practical issues. In Lewis, M., & Haviland-Jones, J.M. (Eds.), *Handbook of emotions* (2nd edition) (pp. 382–396). New York, NY: The Guilford Press.

Ben-Zeev, A. (2000). *The subtlety of emotions*. Cambridge, MA: MIT Press.

Blanchette, I. (2006). Snakes, spiders, guns, and syringes: How specific are evolutionary constraints on the detection of threatening stimuli? *The Quarterly Journal of Experimental Psychology*, 59(8), 1484–1504.

Campos, J. J., Kermoian, R., & Witherington, D. (1996). An epigenetic perspective on emotional development. In R. Kavanaugh, B. Zimmerberg and S. Fein (Eds.), *Emotion: Interdisciplinary perspectives*, Lawrence Erlbaum, 119–138.

Camras, L. A. (1992). Expressive development and basic emotions. *Cognition and Emotion*, 6(3,4), 269–284.

Camras, L. A. (1994). Two aspects of emotional development: Expression and elicitation. In P. Ekman and R.J. Davidson (Eds.), *The nature of emotion: Fundamental questions* (347–351). Oxford, UK: Oxford University Press.

Camras, L. A. (2000). Surprise! Facial expressions can be coordinative motor structures. In M. D. Lewis and I. Granic (Eds.), *Emotion, development, and self-organization: Dynamic systems approaches to emotional development* (pp. 100–124). Cambridge, UK: Cambridge University Press.

Camras, L.A., Oster, H., Campos, J.J., & Bakeman, R. (2003). Emotional facial expressions in european-american, japanese, and chinese infants. *Annual New York Academy of Science*, 1000, 135–151.

Carstensen, L. L., Charles, S. T. Issacowitz, D. M., & Kennedy, Q. (2003). Emotion and life-span personality development. In R. J. Davidson, K. Scherer & H. H. Goldsmith (Eds.), *Handbook of Affective Sciences* (pp. 726–744). Oxford, UK: Oxford University Press.

Carstensen, L.L. & Lockenhoff, C.E. (2003). Aging, emotion, and evolution. *Annual New York Academy of Science*, 1000, 152–179.

Caspi, A. (2000). The child is the father of the man: Personality continuities from childhood to adulthood. *Journal of Personality and Social Psychology*, 78(1), 158–172.

Caspi, A., J., McClay, T.E., Moffit, J., Mill, J., Martin, I.W., Craig, A. & al. (2002). Role of genotype in the cycle of violence in maltreated children. *Science*, 297, 851–854.

Caspi, A., Sugden, K., Moffitt, T. E., Taylor, A., Craig, I. W., Harrington, H. L., et al. (2003). Influence of life stress on depression: Moderation by a polymorphism in the 5-HTT gene. *Science*, 301(5631), 386–389.

Caspi, A., Taylor, A., Moffit, T. E., Plomin, R.. (2000). Neighborhood deprivation affects children's mental health: Environmental risks identified in a genetic design. *Psychological Science*, 11(4), 338–342.

Cosmides, L. & Tooby, J. (2000). Evolutionary psychology and emotions. In Lewis, M., & Haviland-Jones, J.M. (Eds.). *Handbook of Emotions* (2nd edition) (pp.91–115). New York, NY: The Guilford Press.

Damasio, A. (1994). *Descartes' error: Emotion, reason and the human brain*. New York, NY: Gossett/Putnam.

Damasio, A. (1999). *The Feeling of what happens: Body and emotion in the making of consciousness*. New York, NY: Harvest Books.

Damasio, A. (2004). William James and the modern neurobiology of emotion. In D. Evans & P. Cruse (Eds.), *Emotion, evolution and rationality* (pp. 3–14). Oxford, UK: Oxford University Press.

Damasio, A. R., Grabowski, T.J., Bechara, A., Damasio, H., Ponto, L.B., Parvizi, J. et al. (2000). Subcortical and cortical brain activity during the feeling of self-generated emotions. *Nature Neuroscience*, 3, 1049–1056.

Davey, G. (1992). An expectancy model of laboratory preparedness effects. *Journal of Experimental Psychology: General*, 121, 24–40.

Davey, G. (1995). Preparedness and phobias: Specific evolved associations or a generalized expectancy bias? *Behavioral and Brain Sciences*, 18(2), 289–325.

Decety, J. & Jackson, P. (2006). A social-neuroscience perspective on empathy. *Current Directions in Psychological Science*, 15(2), 54–58.

de Sousa, R. (1987). *The rationality of emotions*. Cambridge, MA: MIT Press.

De Vries, M. W. (1994). Kids in context: Temperament in cross-cultural perspective. In W. Carey and S. C. Devitt (Eds.), *Prevention and Early Intervention: Individual Differences as Risk Factors for the Mental Health of Children* (pp. 126–139). New York, NY: Brunner/Mazel.

Doi, T. (1973). *The anatomy of dependence*. Tokyo, Japan: Kodansha International.

Doris, J. M. (1998). Persons, situations, and virtue ethics. *Noûs*, 32, 18–22.

Doris, J. M. (2002). *Lack of character. personality and moral behaviour*. Cambridge, UK: Cambridge University Press.

Dougherty, L. M., J. A. Abe, C. E. Izard. (1996). Differential emotions theory and emotional development in adulthood and later life. In C. Magai & S. H. McFadden (Eds.), *Handbook of emotion, adult development, and aging* (pp. 27–41). San Diego, CA: Academic Press.

Eisenberg, N. (2000). Empathy and sympathy. In Lewis, M., & Haviland-Jones, J.M. (Eds.), *Handbook of Emotions* (2nd edition) (pp. 677–691). New York:, NY The Guilford Press.,

Ekman, P. (1980). Biology and cultural contributions to body and facial movement in the expression of emotions. In A. Rorty (Ed.), *Explaining emotions* (pp. 73–101). Berkeley, CA: University of California Press.

Ekman, P. (1999). Basic emotions. In T. Dalgleish and M. Power (Eds.), *Handbook of Cognition and Emotion* (pp. 45–60). Sussex, UK: John Wiley & Sons, Ltd.

Evans, C. S., & Marler, P. (1994). Food calling and audience effects in male chickens, Gallus gallus: Their relationships to food availability, courtship and social facilitation. *Animal Behaviour*, 47, 1159–1170.

Faucher, L. & C. Tappolet. (2002). Fear and the focus of attention. *Consciousness & Emotion* 3(2), 105–144.

Flanagan, O. (1991). *Varieties of moral personality*. Princeton, NJ: Harvard University Press.

Frijda, N. (1986). *The emotions*. Cambridge, UK: Cambridge University Press.

Frijda, N. (2005). Emotional experience. *Cognition and Emotion*, 19(4), 473–497.

Frijda, N. & B. Mesquita. (1998). The Analysis of Emotions: Dimensions of Variation. In M. F. Mascolo & S. Griffin (Eds), *What develops in emotional development?* (pp. 273–292). New York, NY: Plenum Press.

Goldie P. (2000). *The emotions: A philosophical exploration*, Oxford, UK: Oxford University Press.

Gould, J.L., & Marler, P. (1987). Learning by instinct. *Scientific American*, January, 256, 74–85.

Griffiths, P. E. (2003). Basic emotions, complex emotions, machiavellian emotions. In A. Hatzimoysis (Ed.). *Philosophy and the Emotions* (pp. 39–67). Cambridge, UK: Cambridge University Press.

Griffiths, P. E., & Gray, R. D. (1994). Developmental systems and evolutionary explanation. *Journal of Philosophy*, 91(6), 277–304.

Griffiths, P. E. & Scarantino, A. ms. Emotions in the wild: The situated perspective on emotion. In P. Robbins & M. Aydede (Eds), *Cambridge handbook of situated cognition.*

Gross, J.J. (2002). Emotion regulation: Affective, cognitive and social consequences. *Psychophysiology*, 39, 281–291.

Harman, G. (1999). Moral philosophy meets social psychology: Virtue ethics and the fundamental attribution error. *Proceedings of the Aristotelian Society*, 99, 315–31.

Harris, J. R. (1995). Where is the child's environment? A group socialization theory of development. *Psychological Review*, 102 (3), 458–489.

Hoffman, M. L., & Saltzstein, H. D. (1967). Parent discipline and the child's moral development. *Journal of Personality and Social Psychology*, (5), 45–57.

Hoffman, M. L. (1982). Development of prosocial motivation: Empathy and guilt. In N. Eisenberg (Ed.), *The development of prosocial behaviours*, New York, NY: Academic Press, 218–231.

Hoffman, M. L. (2000). *Empathy and moral development. implications for caring and justice.* Cambridge, UK: Cambridge University Press.

Izard, C. E. (1994). Intersystem connections. In P. Ekman & R. J. Davidson (Eds), *The nature of emotion: Fundamental questions.* Oxford, UK: Oxford University Press, 356–361.

James, W. (1884). What is an emotion?. *Mind*, 9, 188–205.

Jenkins, J. M., & Oatley, K. (1996). Emotional episodes and emotionality through the life span. In C. Magai & S. H. McFadden (Eds), *Handbook of emotion, adult development, and aging*, San Diego, CA: Academic Press, 421–441.

Jones, K, (2003). Emotion, weakness of will, and the normative conception of agency. In A. Hatsimoysis (Ed.). *The philosophy and the emotions*, Cambridge, UK: Cambridge University Press, 181–200.

Joseph, R. (1999). Environmental influences on neural plasticity, the limbic system, emotional development and attachment: A review. *Child Psychiatry and Human Development*, 29(3), 189–208.

Kagan, J. (2003). Behavioral inhibition as a temperamental category. R. J. Davidson, K. Scherer & H. H. Goldsmith (Eds.), *Handbook of affective sciences*, Oxford, UK: Oxford University Press, 320–331.

Keltner, D. (1996). Facial expressions of emotions and personality. In M. F. Mascolo & S. Griffin (Eds.), *What develops in emotional development?*, New York, NY: Plenum Press, 385–401.

Keltner, D. (2003). Expression and the course of life: Studies of emotion, personality, and psychopathology from a social-functional perspective. *Annals of the New York Academy of Sciences*, 1000, 222–243.

Kochanska G. (1997). Mutually responsive orientation between mothers and their young children: Implication for early socialization. *Child Development*, 68(1), 94–112.

Kochanska, G., D.R. Forman, N. Aksan & S.B. Dunbar. (2005). Pathways to conscience: Early mother-child mutually responsive orientation and children's moral emotion, conduct and cognition. *Journal of Child Psychology and Psychiatry*, 46(1), 19–34.

Kopp, C. B. & S. J. Neufeld. (2003). Emotional development during infancy. R. J. Davidson, K. Scherer & H. H. Goldsmith (Eds.), *Handbook of affective sciences*, Oxford, UK: Oxford University Press, 347–374.

Krueger, R. F., T. E. Moffitt, A. Caspi, A. Bleske, P. A. Silva. (1998). Assortative mating for antisocial behavior: Developmental and methodological implications. *Behavior Genetics*, 28(3), 173–186.

Lambie, J. A. & A. J. Marcel. (2002). Consciousness and the varieties of emotion experience: A theoretical framework. *Pychological Review*, 109(2), 219–259.

Laub, J.H., Nagin, D.D. & Sampson, R. J. (1998). Trajectories of change in criminal offending: Good marriages and the desistance process. *American Sociological Review*, 63, 225–238.

Lawrence, A. D. & Calder, A. J. (2004). Homologizing human emotions. In D. Evans & P. Cruse (Eds.), *Emotion, evolution and rationality*, Oxford, UK: Oxford University Press, 15–47.

Ledoux, J. (1996). *The emotional brain.* New York, NY: Simon and Shuster.

Lemerise, E. A. & Dodge, K.A. (2000). The development of anger and hostile interactions. In Lewis, M. & Haviland-Jones, J.M. (Eds.), *Handbook of emotions* (2nd edition), New York, NY: The Guilford Press, 594–606.

Lewis, M. D. (2005). Bridging emotion theory and neurobiology Through dynamic systems modeling. *Behavioral and Brain Sciences*, 28, 169–194.

Lewis, M. (2000a). The emergence of human emotions. In Lewis, M., & Haviland-Jones, J.M. (Eds), *Handbook of Emotions* (2nd edition) (pp. 265–280). New York, NY: The Guilford Press.

Lewis, M. (2000b). Self-conscious emotions: Embarrassment, pride, shame, and guilt. In Lewis, M., & Haviland-Jones, J.M. (Eds), *Handbook of Emotions* (2nd edition) (pp. 623–636). New York, NY: The Guilford Press.

Lyons W. (1980). *Emotion.* Cambridge, UK: Cambridge University Press.

Magai, C. & McFadden, S. H. (1995). *The role of emotion in social and personality development.* New York, NY: Plenum Press.

Magai, C. & B. Nusbaum. (1996). Personality change in adulthood: Dynamic systems, emotions, and the transformed self. In C. Magai & McFadden, S.H. (Eds.), *Handbook of emotion, adult development, and aging* (pp. 403–421). San Diego, CA: Academic Press.

Miller, W.I. (1997). *The anatomy of disgust.* Cambridge, MA: Harvard University Press.

Morsbach, H. & Tyler, W.J. (1986). A japanese emotion, *Amae.* In R. Harré (Ed.) *The social construction of emotions* (pp. 289–307).Oxford, UK: Blackwell.

Nussbaum, M. (1990). *Love's knowledge*, New York, NY: Oxford University Press.

Nussbaum, M. (2001). *Upheaval of thoughts. The intelligence of emotions.* Cambridge, UK: Cambridge University Press.

Öhman & Mineka. (2001). Fears, phobias, and preparedness: Toward an evolved module of fear and fear learning. *Psychologigal Review*, 8(3), 483–522.

Olson et al. 2007 Learning fear by observing others: the neural systems of social fear transmission. *Social cognitive and affective neuroscience.* Vol. 2, no. 1, 3–11.

Ochsner K. & Gross, J. J. (2005). The cognitive control of emotion. *Trends in Cognitive Sciences*, 9(5), 242–249.

Oster, H. (2005). The repertoire of infant facial expressions: an ontogenetic perspective. In J. Nadel & Muir, D. (Eds.), *Emotional development* (pp. 261–292). Oxford, UK: Oxford University Press,.

Panksepp, J. (2000). Emotions as natural kinds within the mammalian brain. In Lewis, M., & Haviland-Jones, J.M. (Eds.), *Handbook of emotions* (2nd edition) (pp. 137–156). New York, NY: The Guilford Press.

Panksepp, J. (2003). At the interface of the affective, behavioral, and cognitive neurosciences: Decoding the emotional feelings of the brain. *Brain and Cognition*, 52, 4–14.

Panksepp, J. & Smith-Pasqualini, M. (2005). The search for the fundamental brain/mind sources of affective experience. In J. Nadel & Muir, D. (Eds.), *Emotional development* (pp. 5–30). Oxford, UK: Oxford University Press.

Pettit, Ph. (1994). Consequentialism and moral psychology. *International Journal of Philosophical Studies*, 2, 1–17.

Pizarro, D. & Salovey, P. (2002). On being and becoming a good person: The role of emotional intelligence in moral development and behavior. In J. Aronson (Ed.), *Improving academic achievement: Impact of psychological factors on education* (pp.247–266). San Diego, CA: Academic Press.

Prinz, J. (2004). *Gut reactions: A perceptual theory of emotion*, New York: Oxford University Press, 2004.

Quartz, S. & Sejnowski. (2002). *Liars, lovers and heroes: what the new science of the brain reveals about how we become who we are*. New York, NY: Harper Collins.

Railton, P. (1984). Alienation, consequentialism and the demands of morality. *Philosophy and Public Affairs*, 13, 134–171.

Rende, R. (2000). Emotion and behavior genetics. In Lewis, M., & Haviland-Jones, J.M. (Eds.), *Handbook of emotions* (2nd edition) (pp. 192–202). New York, NY: The Guilford Press.

Rozin, P. (2003). Introduction: evolutionary and cultural perspectives on affect. In Davidson, R.J., Scherer, K., & Goldsmith, H.H. (Eds.), *Handbook of affective sciences* (pp. 839–851). Oxford, UK: Oxford University Press.

Rozin, P. & Fallon, A.E. (1987). A perspective on disgust. *Psychological Review*, 94(1), 23–41.

Ruiz-Belda, M.-A., Fernandez-Dols, J. M., & Carrera, P. (2003). Spontaneous facial expressions of happy bowlers and soccer fans. *Cognition and Emotion*, 17(2), 315–326.

Russell, J. A. (2003). Core affect and the psychological construction of emotion. *Psychological Review*, 110(1), 145–172.

Russell, J. A. (2005). Emotion in human consciousness: is emotion built on core affect. *Journal of Consciousness Studies*, 12, (8–10), 26–42.

Rutter, M. (1994). Temperament: changing concepts and implications. In Carey, W. & Devitt, S. C., (Eds.), *Prevention and early intervention: Individual differences as risk factors for the mental health of children* (pp. 23–34). New York, NY: Brunner/Mazel.

Salovey P. & Grewal, D. (2005). The science of emotional intelligence. *Current Directions in Psychological Science*, 14(6), 281–286.

Salovey, P, Bedell, B.T., Detweiler, J.B., & Mayer, J.D. (2000). Current directions in emotional intelligence research. In Lewis, M., & Haviland-Jones, J.M. (Eds.), *Handbook of emotions* (2nd edition) (pp. 504–520). New York, NY: The Guilford Press.

Sampson, R. J. & Laub, J.H.. (2005). A general age-graded theory of crime: Lessons learned and the future of life-course criminology. *Advances in Criminological Theory*, 14, 161–185.

Schroeder, T. 2006. An unexpected pleasure. In Faucher, L. & Tappolet, C. (Eds.), *The modularity of emotions*, 32, 255–272.

Sherman, N. (1989). *The fabric of character: Aristotle's theory of virtue*. Oxford, UK: Oxford University Press.

Solomon, R. (1994). The cross-cultural comparison of emotions. In Ames, R., & Marks, J. (Eds.), *Emotions in asian thought* (pp. 253–308). Albany, NY: State University of New York Press.

Sreenivasan, G. (2001). Errors about errors: Virtue theory and trait attribution. *Mind*, 111, 47–68.

Steinberg, L. (2005). Cognitive and affective development in adolescence. *Trends in Cognitive Sciences*, 9(2), 69–74.

Tappolet, C. (2000). *Émotions et valeurs*. Paris, France: Presses Universitaires de France.

Tappolet, C.(forthcoming). Les motivations de la peur. In Guillarme, B., & Ogien, R. (Eds), *La peur*. Paris: La Découverte.

Thomas, A. & Chess, S. (1977). *Temperament and development*. New York, NY: Brunner/Mazel.

Williams, B. (1976). Moral luck. *Proceedings of the Aristotelian Society*, supplementary volume L, 115–135.

Wolf, S. (1987). Sanity and the metaphysics of responsibility. In Schoemaker, F. (Ed.), *Responsibility, character and emotions* (pp. 46–62). Cambridge, UK: Cambridge University Press.

Zajonc, R. B. (1980). Feeling and thinking: Preferences need no inferences. *American Psychologist*, 35, 151–175.