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**The Emotional Influence on Human Decision-making
-On Damasio's Somatic Marker Hypothesis**

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Skriven av: Henrik Levinsson
Handledare: Ingar Brinck**

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1.0 Introduction

According to Damasio, emotions are essential for the decision-making process in the personal and social domain (Damasio, 1994, p.115). This idea supports Damasio's "somatic marker hypothesis". The hypothesis is about how emotions function to guide human decision-making processes. According to Damasio the action of emotions may be an indispensable foundation for rationality and decision-making is rational (Damasio, 1994, p.177, 200). Let me preliminary define a somatic marker as:

- a special instance of feelings generated from secondary emotions (Damasio, 1994, p.174).
- a function used for rational decision-making (Damasio, 1994, p.192).
- guiding and facilitating the decision-making process (Damasio, 1994, p.173).
- a survival-oriented function in the personal and social domain. Damasio defines survival as seeking well-being, avoidance of pain, potential pleasure, and looking for possible options for actions and possible future outcomes (Damasio, 1994, p.179).
- an adaptive function. But a normal culture and a normal brain are required for the somatic marker to work adaptively (Damasio, 1994, p.177).

Some of Damasio's claims above seem problematic and can be questioned from different perspectives. I partially agree with Damasio that emotional content is essential for decision-making. This argument can be strengthened by experimental data about decision-making in frontal lobe patients, whose emotional systems have become damaged.

My aim is to analyse the "somatic marker hypothesis". Nevertheless it is important to mention that Damasio's claims sometimes are quite vague. This ambiguity leads to the difficulty of fully comprehend the hypothesis. However, I will argue that the "somatic marker hypothesis" does not give an adequate explanation of human decision-making that fills survival-oriented functions in the personal and social domain. There are several reasons why I think so:

- Do automated somatic markers contribute to survival? Humans in the personal and social domain tend to make decisions that seem to decrease well-being. I will argue that somatic markers can influence the decision-making process in the personal and social domain negatively. Somatic markers may cause irrational consequences that are not survival-oriented. From an evolutionary point of view, this claim seems contradictory, somatic

markers should facilitate the decision-making process. But is it the case that somatic markers always fill survival-oriented functions? Survival-oriented functions should mean that one's life goes on as well as possible. It would be irrational to do something that one believes will be negative to oneself. In other words, what is rational is what brings the subject the greatest expected benefits (Parfit, 1984, p.8). In general, Damasio claims that somatic markers fill a positive function in the decision-making process and that emotional content is essential for a rational subject to make a decision.

- The cultural development may have a negative influence on human decision-making. The biological evolution does not develop as fast as the cultural evolution. According to Tomasello (1999, p. 4), human thinking and cultural changes develop much faster than the biological evolution. Cognitive skills also evolve very quickly (Tomasello, 1999, p. 54, 202). Therefore, I claim that there may exist a discrepancy between the biological evolution and the cultural evolution. If this is true, somatic markers do not necessarily have the primary function to ensure survival from an evolutionary perspective. If the cultural development and the modern society has lead to decision-making strategies that are not adaptive for human well-being, Damasio's hypothesis of the somatic marker at least has to be changed to account for the negative influence of the somatic markers. As I see it, Damasio should focus more on the negative aspects of somatic markers to get a complete explanation of their function.
- Damasio states that a normal culture is a requirement for somatic markers to function adaptively in the decision-making process. In fact, it is hard to say what a normal culture is. The essay would be too long, if I were to analyse the meaning of what a normal culture is, but this critique of the "somatic marker hypothesis" is based on Damasio's thought of a normal culture as a requirement for adaptive somatic markers. What counts as a normal culture is left as an open question.

2.0 The Scientific view of Emotions

In the 17th century, Descartes stated that mind and body were two separate entities (Descartes, 1990, p. 88). According to this dualistic approach, emotions were seen as a disturbance in the human reasoning-process and were also the opposite to reason (Damasio, 2002, p. 55) Emotions were not trustworthy because of their subjective and irrational content. This view of emotional content has led to the study of how cognition, emotions and rationality are intertwined. Damasio means that the passionate aspects of human thinking arise from the same system as the physical, the brain. Damasio tries to illustrate a physical, or neurobiological, explanation of the emotions.

According to modern science the role of emotions seems to be an unavoidable aspect in the reasoning-process. Descartes' dualistic view seems falsified by science. Ledoux states that:

“the struggle between thought and emotion may ultimately be resolved, not simply by the dominance of neocortical cognitions over emotional systems, but by a more harmonious integration of reason and passion in the brain, a development that will allow future humans to better know their true feelings and to use them more effectively in daily life”. (Ledoux, 1998, s. 21)

In recent decades, the importance of emotional content in reasoning-processes has been taken seriously and it is a strong evidence that emotions play a central role in the human decision-making process (Damasio, 1994, p. 78). This claim can be strengthened from findings in especially neuroscience and evolutionary biology.

According to evolutionary theories of emotions, they play an important role for the biologically preparedness and for the development of environmental responses. Fear is a good example that illustrates this. From an evolutionary perspective, emotional systems evolved as ways of matching bodily responses with the demands being made by the environment (Ledoux, 1998, p. 237). According to Ledoux, humans are in an evolution progress (1998, p. 303).

As one can understand from the book-title “*Descartes Error*”, Damasio states that it was a mistake of Descartes to claim that passion was separated from reason. Damasio, as well as Ledoux, underlines the important interrelationship between reason and emotion. This fact also strengthens the statement that emotions influence actions and decisions. The physiological processes are what make the fundament of emotions. Damasio defines an emotion as:

“the collection of changes in body state that are induced in myriad organs by nerve cell terminals, under the control of a dedicated brain system, which is responding to the content of thoughts relative to a particularly entity or event”. (Damasio, 1994, s.139)

Emotions are a set of neural circuits that is located in the subcortex (Damasio, 1994, p.128). But the reasoning-process is located in neocortex and cannot function without assistance from the subcortical parts of the brain. According to Damasio, rationality is rooted in biological regulations and neocortex. He states that the neocortical structure “comes engaged along with the older brain core” (Damasio, 1994, p.128) and that decision-making processes are related to it. Neocortex is to be seen as “the evolutionary modern sector of the brain” (Damasio, 1994, p.127). It is also important to mention that the amygdala has a greater influence on the cortex than vice versa and explains why emotions dominate and control thinking (Ledoux, 1998, s.303).

2.1 The frontal lobe argument

Human reasoning and action are related to the frontal lobe and lead humans from reaction to action (Ledoux (1998, p. 177). This fact illuminates why emotional mechanisms are crucial for reasoning and decision-making. Damasio refers to his own studies on prefrontal damaged patients, who make irrational decisions because of the damaged link between the frontal lobe and the limbic system. (The limbic system includes the amygdala.) Damasio states that emotions are essential for decision-making and argues that frontal lobe patients can not make normal decisions with damaged emotional systems (Damasio, 2002, p. 57). Impaired emotional mechanisms cause the reasoning-process to negatively influence decision-making in the personal and social domain, which also results in the inability to reach a final decision. For example, research has showed that the brain-damaged patients do not show skin conductance to emotional stimuli (Damasio, 1994, p.209).

3.0 The somatic marker hypothesis

Below I will describe the “somatic marker hypothesis” and thereafter present various kinds of emotions that relate to the hypothesis and the decision-making process, seen from Damasio’s point of view.

Regarding decision-making, Damasio advocates his own hypothesis, which is called “the somatic marker hypothesis”. Damasio proposes that somatic markers facilitate the decision-making process:

“Somatic markers probably increase the accuracy and efficiency of the decision process”. (Damasio, 1994, p.173)

“Soma” is about the body and the term “marker” is defined as the image that becomes marked, a representation of what will happen next (Damasio, 1994, p. 173). Damasio further explains:

“The automated signal protects you against future losses, without further ado, and then allows you to choose from among fewer alternatives”. (Damasio, 1994, p.173)

Damasio claims, that the somatic markers function as alarm bells, especially in situations where humans have to make rapid decisions. An example might be a threatening situation where the subject has to fight or flight. As I see it rapid decision-making is evolutionarily advantageous for survival.

It is important to mention that somatic markers work both on an overt and covert level (Damasio, 1994, p.185) and that somatic markers are automatic:

“Somatic markers do not deliberate for us. They assist the deliberation by highlighting some options (either dangerous or favorable) and eliminating them rapidly from subsequent consideration”. (Damasio, 1994, p.174)

The mechanisms that relate to decision-making are body-based and survival-oriented (Damasio, 1994, p.190). As was explained, emotions are essential in the decision-making process. The role of emotions for decision-making is to have a regulative function and lead to a situation that is positive for the subject (Damasio, 2002, p. 68). Regarding evolution, Damasio writes:

“it has had available, in the brains of numerous species, decision-making mechanisms that are body-based and survival-oriented, and those mechanisms have proven successful in a variety of ecological niches”. (Damasio, 1994, p. 190)

The quote above seems to be one of the strongest arguments concerning somatic markers and their role for decision-making. As I see it, a somatic marker can be characterised as a guide that leads the subject in right directions toward different decision alternatives. This process seems survival-oriented in Damasio’s sense.

3.1 Primary and secondary emotions

There are two types of emotional systems that cause the somatic markers to influence the decision-making process. Damasio distinguishes between *primary* and *secondary* emotions. Even if the distinction is important, secondary emotions originate from the primary. Below I will define the two types of emotions and show their key roles in the decision-making process.

According to Damasio, primary emotions are the basic mechanism for emotional behaviour and fulfil useful goals, for example, rapid concealment from predators. Primary emotions also help humans to respond quickly and adaptively at an automated level. (As I understand Damasio, automated processes explain why they are evolutionarily advantageous.) Primary emotions are to be seen as innate and pre-organised and depend on the limbic system (Damasio, 1994, p.133). But damage to the limbic system impairs the processing of primary emotions (Damasio, 1994, p.140).

Secondary emotions are not innate. Secondary emotions have been shaped from an environmental learning-process when humans began to create associations to objects and situations. According to Damasio,

“somatic markers are a special instance of feelings generated from secondary emotions. Those emotions and feelings have been connected, by learning, to predicted future outcomes of certain scenarios”. (Damasio, 1994, p. 174)

Damasio further explains:

“Nonetheless, most somatic markers we use for rational decision-making probably were created in our brains during the process of education and socialization, by connecting specific classes of stimuli with specific classes of somatic state. In other words, they are based on the process of secondary emotions”. (Damasio, 1994, p. 177)

Concerning the above quotes, it is also important to note that secondary emotions are individual because of subjective experiences (Damasio, 1994, p.136). The environmental development has led to a wide range of different stimuli that evoke emotions. Therefore, emotional stimuli also come from experience. Damasio therefore states that emotions are a mental evaluative process resulting in mental changes (Damasio, 1994, p.139). It is the situation and the emotional response that evoke a secondary emotion, at both conscious and unconscious levels. As was explained, somatic markers mainly act on secondary emotions but also influence from innate dispositions, the primary emotions.

Like the primary emotions, the secondary emotions are linked to the limbic system, but are also involved in processes in prefrontal and somato-sensory areas of the cortex (Damasio,

1994, s.134). Because it is the reasoning-process that have become damaged in the frontal lobe patients, Damasio points to the importance of the secondary emotions that play the keyrole in the decision-making process (Damasio, 1994, p.138).

But both primary and secondary emotions are important concerning the somatic markers.

Damasio states that:

“The interaction between an internal preference system and sets of external circumstances extends the repertory of stimuli that will become automatically marked”. (Damasio, 1994, p. 179)

Damasio further explains:

“Somatic markers are thus acquired by experience, under the control of an internal preference system and under the influence of an external set of circumstances which include not only entities and events with which the organism must interact, but also social conventions and ethical rules”. (Damasio, 1994, p. 179)

The internal preference system is posed to ensure survival, the aim of homeostasis, the reduction of unpleasant body-states and well-being in social situations (Damasio, 1994, p. 179). Regarding social conventions and ethical rules, somatic markers require that the culture and brain must be normal (Damasio, 1994, p. 177). But Damasio also claims that a

“...sick culture on a normal adult system is less dramatic then the effect of a focal area of brain damage in that same normal adult system”. (Damasio, 1994, p. 179)

I will discuss the role of culture later in the essay in relation to Damasio’s view of somatic markers as survival-oriented in the decision-making process.

Primary and secondary emotions seem to be necessary, or at least essential, for the decision-making process no matter if one is conscious of them or not. Without intact emotional mechanisms somatic markers can not work adaptively and therefore humans can not make rational decisions in the personal and social domain.

3.2 Affective memory

Decision-making processes are rooted in affective memories, which can be both conscious and unconscious. Affective memories are about how events have made humans feel and the role affective consequences to prior experiences play for the subject. Affective memories seem essential in the decision-making process. The affects lead to both positive and negative states. For example, a person is using affective memories about the red light when driving his (her) car. A stopping at a traffic light does not only concern the traffic-rule to stop, but the

driver stops because he associates red light with danger. (The thought to become hurt in a car accident.) This example shows that associations can include emotional content (Gazzaniga, 1998, p. 450) and helps the subject to act in the environment.

3.3 A few comments on Damasio's view of emotions

About the primary and secondary emotions Damasio writes:

“...biological drives and emotions *can* demonstrably influence decision-making. (Damasio, 1994, p. 192)

Damasio states that emotions *can* give rise to decisions. The word *can* in the quote above does not imply that the emotional content in decision-making processes is necessary. Therefore it makes it difficult to fully comprehend the function of the somatic markers. Why I think so is because Damasio generally points to the importance of the emotional influence in human decision-making processes and that emotional content is essential for human decision-making in the personal and social domain (Damasio, 1994, p.115).

According to Damasio, emotions seem necessary and fill a survival-oriented function that is advantageous for decision-making. But humans constantly make decisions in their everyday lives. For instance, the decision could concern a situation that has a self-evident alternative among other alternatives (such as choosing coffee instead of tea), or whether to decide if I should break up with my partner or not. The different situations where somatic markers influence decision-making are many. As I see it, the function of somatic markers and their role for the decision-making process is unclear regarding simple in contrast to complex situations.

Regarding affective memory, I think that the explanation presented above gives a proper picture of its function. I interpret affective memory as a kind of the somatic markers. It could be the case that other scientists than Damasio are using the word “affect” instead of somatic marker.

4.0 Arguments against Damasio's view

It seems plausible that somatic markers are essential for decision-making processes. The explanation of how human decision-making work also seems correct. But, as will be argued,

the explanation of the function of the somatic markers as survival-oriented is incomplete. According to Damasio, somatic markers are to be seen as advantageous to decision-making processes and help the subject to sort out the best decisions and to decrease the bad ones. I view the “the somatic marker hypothesis” as problematic. Below my arguments against “the somatic marker hypothesis” are presented.

4.1 Are somatic markers trustworthy for decision-making?

Is it always positive to make a decision with the help of automatic somatic markers? It does not seem that somatic markers only help humans to make one of the best decisions when it matters most. For example, how can one trust that the emotional reaction a somatic marker gives rise to in a situation will lead to positive consequences? If this was the case, it would be fairly easy to make a decision, but in some instances it is not. One can question if it is trustworthy to be guided by somatic markers. If one was convinced of trusting somatic markers as positive for well-being, life should be quite easy to live. Elster states:

“ In particular, I know of no convincing argument that all emotional dispositions exist because of their contribution to biological fitness or to social optimality.” (Elster, 1996, p. 1389)

It must be the fact that somatic markers guide the subject in both simple and complex situations. If Damasio is right, it should generally be fairly easy to make decisions because of the guidance somatic markers give rise to at both the social and the personal level. One can question if a specific somatic marker (that is a special instance of feelings, generated from secondary emotions), in a specific situation, always is a relevant cue to make good decisions. I think that well-being in some cases will be decreased. Decision-making can be the cause of negative somatic markers that will lead to insensitivity to future consequences. For example, craving hinders other possibilities to make better decisions. To be emotionally dependent is not advantageous, because of the difficulty to see other alternatives. People may also make decisions based on irrelevant or unreliable information (for example prejudices).

Somatic markers can be defined as changes in bodily states. The body reacts to an external stimuli, which then leads to a mental evaluation process with bodily reactions. Of course, this process also involves brain-structures that in turn can give rise to mental changes (for example the involvement of neurotransmitters.) But I do not think that phenomena like negative physiological states in e.g. hypochondria can support the function of somatic

markers as survival-oriented. In a hypochondriac, the bodily signals become interpreted in a negative way and mislead the subject to think that he is weaker than what he really is. The subject may think he is sick, but maybe he is not.

However Damasio mainly points to the positive role regarding the function of the somatic markers. For example, suffering is to be viewed as the best protection for survival (Damasio, 1994, p. 264) and decision-making mechanisms are survival-oriented (Damasio, 1994, p. 190). Damasio also mentions that defective reasoning *can* influence decision-making negatively. Considering the fear of flying, the subject creates an image of e.g. a plane crash that will dominate the reasoning-process instead of a statistical calculation of it (Damasio, 1994, p.192). But defective reasoning is still, according to Damasio, survival-oriented. Damasio claims that:

“...biological drives and emotions can demonstrably influence decision-making, and it suggests that the body-based “negative” influence”, although out of step with actual statistics, is nonetheless survival-oriented...”. (Damasio, 1994, p. 192)

As I see it, a deeper understanding of how different somatic markers have evolved is needed to get a better understanding of their function as survival-oriented. It seems that human reasoning influenced by somatic markers can also decrease well-being. According to Nesse (1990, p. 267), not all mental suffering is useful from an evolutionary point of view. The regulatory mechanisms can be normal, but the emotional response may not be useful. Let us consider the case of somatic markers and medical treatment. The aim with the treatment would be to reduce the occurrence of negative emotional states, for example, states caused by somatic markers. But if the function of the somatic markers is survival-oriented, well-being should decrease, if we are blocking specific somatic markers with the help of psychotropic drugs or anti-depressive medicines. It may be the case that useful responses become blocked.

Still I think the use of treatments that block specific somatic markers from arising are important for well-being. The life-situation for people having medical treatments would be worse if not having it. Some persons may need anti-depressive treatment just like diabetics who needs insulin. I think that there are somatic markers that do not seem to increase well being. They can probably do the opposite and therefore one can question if somatic markers are trustworthy for decision-making.

4.2 “The action of emotions may be an indispensable foundation for rationality”

I have difficulties in understanding the functional role of the somatic markers Damasio presents. Damasio claims that:

“the action of emotions may be an indispensable foundation for rationality”. (Damasio, 1994, p.200)

But he also states that:

“emotions can demonstrably influence decision-making”. (Damasio, 1994, p.192)

There is a difference between stating that x may be an indispensable foundation for y and that x demonstrably *can* influence y. The two quotations cited here make the function of the emotions, as somatic markers, more difficult to understand. But as I understand Damasio, somatic markers are crucial for the decision-making process and that process is rational (Damasio, 1994, p. 177).

If some somatic markers negatively influence decision-making, being the cause of irrational behaviour, what would characterise the situations where somatic markers fill rational functions? Damasio means, that somatic markers are essential for *some* rational behaviours in the personal and social domain, but they may also be negative in *certain* circumstances, e.g. overriding bias against objective facts (Damasio, 1994, p.192). But is not overriding bias against objective facts an example of a situation that occurs especially in the personal and social domain regarding decision-making? What does Damasio mean by *some* rational behaviour?

I believe that somatic markers can lead to irrational behaviour such as common phobias, e.g. agoraphobia or other social phobias. These phobias are common to many people in their everyday lives. For example, fear of flying is a common phobia. Phobias may develop at any point in life (Passer & Smith, 2001, p. 595). Would Damasio claim that this kind of phobia is survival-oriented and guides the subject to make decisions in positive directions? Of course, there is the question of normal brains, which Damasio claims to be a requirement for somatic markers to work adaptively. But where to draw the line between pathological and normal phobias, if some sort of phobias are usual for several people in their everyday lives? Have all those people psychopathological deficits?

If, as it seems, some phobias, e.g. fear of flying, are normal (in the sense of being common), they nevertheless do not seem to facilitate the decision-making process in a positive sense. I think they instead can lead to irrational decision-making. Consider the following example: Mary is afraid of flying and has got a dangerous disease and will die in a few weeks. The only surgery that can help her to survive is far away from where she lives. To survive, Mary is demanded to take the plane. A negative somatic marker, about flying, may now influence her reasoning-process. Will the negative influence of the fear of flying hinder her opportunity to survive her disease or not? There may, in this situation, be two concurrent thoughts for survival. Maybe Mary thinks she will die if taking the plane or she will die if staying at home. I believe that the situation can lead to an irrational decision because of a negative somatic marker that marks a traumatic image of a plane crash. I do not deny that negative somatic markers can influence the decision-making process in a positive sense, e.g. fear or anxiety in dangerous situations where human beings have to react rapidly, but is it really always the case?

4.3 Unconscious processes

Do unconscious processes always fill a survival-oriented function and are unconscious processes always advantageous? Consider negative and repressed affective memories. Will the subject who is guided by these affects, consciously or not, make a decision that is survival-oriented? Humans do not always make decisions that are optimal for well-being. But according to Damasio, well-being must be a part of the survival-oriented content in social and personal contexts (Damasio, 1994, p.179). However this line of reasoning seems to lead to the conclusion that the unconscious processes involved in the decision-making process do not in fact always fill a survival-oriented function.

Another critical issue concerns how the role of unconscious affects should be explained. Memories from the past may have been learned unconscious and are used implicitly by the subject, like automatic somatic markers that influences on behaviour. Cleeremans states that:

In particular, while popular belief has often tended to ascribe powerful abilities to the unconscious, empirical exploration of the level of analysis at which processing occurs in the absence of consciousness has failed to offer convincing demonstrations that unconscious processing can be as flexible or as deep as conscious processing. Rather, the evidence suggests that unconscious processing can bias conscious processing in a way that reflects strong or habitual responses. (Cleeremans, 2001, p. 2586)

One can question if the subject has the opportunity to control these kinds of states in the decision-making process? According to Cleeremans (2001, p. 2584), it is common to view cognitive processes as not open to any sort of introspection. It can sometimes be the case that the subject is unaware of the somatic response that influenced him (or her) but also unaware of the affect that resulted in the decision-making. Consider the influence of early development on how the somatic markers work in the individual case. For example, a hypersensitive or idiosyncratic learning history may have resulted in maladaptive affects that will disfavour the decision-making process. Past experiences may not only enhance decision-making in the personal and social domain in a positive direction.

4.4.1 The cultural influence on decision-making

Social and cultural influences or trends can lead to bad decisions for the self because of the agent's relation to a specific social context. Culture, political values etc. can be primary factors that influence decision-making in a positive sense, but there can also be a discrepancy between my own preferences and what the environment demands from me. Decision-making will not, if acting upon the demand from the environment, necessarily increase well-being. If somatic markers are influenced by cultural factors, they may limit what one really wants to do, that which would be the best for oneself. Stress is a good example that shows that the actions humans think will give a lot of benefits in the future rather decrease well-being than vice versa. How can one say that stress that causes bodily changes and gives rise to specific somatic markers fills a survival-oriented function?

Regarding the social and personal context, which of these is primary or preferable for well-being? Is it most important that the decision will favour my personal preferences or is it the influence from the social environment? The social context can be the primary for well being, but there exist situations where the social environment influences decision-making in a negative sense. For example, in deindividuation processes where people lose the sense of themselves as individuals, the internal standards become reduced (Ehrlichmann, 1998, p. 387). It means that a person becomes impulsive and his own norms and rules that he has in daily life become invalid. Deindividuation processes happen together with other people where the subject has the opportunity to be anonymous. The influence from the group decreases the individual responsibility and can lead to a decision-making without thinking (Nilsson, 1996, p. 42). Deindividuation processes can occur in situations that evoke feelings or in social

contexts where the influence from the group collides with the personal domain, like demonstrations or concerts.

4.4.2 Suppressing emotions- a cultural view

A common and often used metaphor for explaining human behaviour is the machine, or computer-like models that simulate human behaviours. Regarding this “mechanistic” approach, one can claim that emotions have been suppressed at the expense of intellectuality and thus prevented the emotional development. This development may also include the development of somatic markers. The approach could be viewed as a “switch off” of the emotional reactions in modern societies. But from Damasio’s point of view, somatic markers and their emotional content have the function to guide and facilitate the decision-making process.

As I see it, to be mentally effective today, a person has to suppress her feelings and her inner life. But if one ignores the importance to feel, life will be experienced as empty and meaningless. The lack of substance may result in a loss of the core of her self. A result of blocking or suppressing emotions and attempting not to experience them is unpleasant body states, e.g. chronic tension-states in immune-defences, but also in autonomic and endochrinal systems. In many cultures there seems to be a strong belief that “I am my performance”, (it means that a person for example defines herself as what she is doing at work) even if the inner physiological system warns through different emotional reactions and bodily symptoms. There is the risk of the person’s placing her identity outside of herself. The objective, measurable and mechanistic view of man runs the risk of leading to an unbalanced relation between the outer and the inner world. I think that the objective and scientific view in turn can cause scepticism of the subjective reality. A possible explanation of this scepticism would be that the cultural changes have lead to a view that regards the subject as a person not to trust himself. It can be argued that the cultural development of modern society has created an unbalanced society where decisions are made on weak grounds and are negatively influenced by the somatic markers.

4.4.3 Cultural norms and rules

Somatic markers may depend on contextual interpretations of bodily changes. Ginsburg & Harrington maintain that there are no clear internal markers of emotions and that biological features may not be necessary for the occurrence of emotions. It can be argued that a

culturally competent person can choose or decide to be emotional. This means that the person is capable of performing those movements and expressions and of thinking the thoughts that constitute a specific emotion. These kinds of actions would rather be guided by emotion-norms and rules than by biological emotions (Harre & Parrot, 1996, p. 250). (In relation to Harre's & Parrot's view presented here it is important to mention that Damasio do not claim that actions are guided by biological emotions only.)

According to Ginsburg & Harrington, emotions can be explained as being part of a broader cultural matrix. But they may also be dependent of, as also Damasio claims, experience, socialisation and gender (Harre & Parrot, 1996, p. 176). An example of cross-cultural difference is the definition of sadness and anger. The ordinary view is that these two concepts are distinct from each other. For example, sadness implies tears. But with the English-speaking Ugandans the difference between sadness and anger does not exist (Harre & Parrot, 1996, p.176).

The question is if somatic markers can be shaped culturally only in a positive sense, as Damasio seems to mean (as long as the culture is "normal"). If that was the case, it should be hard to classify somatic markers as positive because different cultures define which kinds of situations call for specific emotions (Kitayama & Markus, 1994, p.100). As I see it, it is difficult to classify or reduce experiences to a few fundamental and unique somatic markers. They may vary from culture to culture. It may not just be the bodily change alone that leads to the decision-making for the subject. The bodily change may be dependent on a cultural context because of the interpretation of it.

I agree with Damasio that a pre-wired biological program for somatic markers is not enough for decision-making. Culture plays a role in shaping the somatic markers.

Damasio claims, that a normal brain in a normal culture is required for the somatic markers to function at their best (Damasio, 1994, p.177). In fact, it is hard to see what a normal culture would be. I think it is quite confusing and controversial to state that a "normal" culture is required, and that the statement about normal cultures is problematic if it is meant to say that somatic markers would not play a survival-oriented function in cultures that do not seem normal (if Damasio is right). Who is to define a normal culture, or subculture? As I see it, it is difficult to define specific somatic markers only in a positive sense. Is there a possibility that some somatic markers can be absent in a culture? If that would be the case, somatic markers would not be general, as often is claimed by science. Somatic markers can be interpreted in various ways. As was explained above, somatic markers can for instance be seen as cultural conventions.

4.5 Filipic about automatic processes, conscious reasoning and the evolving environment

Suzanne Filipic (2001) illuminates the importance of the evolving environment for the evolution of somatic markers. She writes:

“We might suggest that as long as an environment is stable, human needs do not evolve, and thus the situations or the objects that humans look for are always similar. Their survival is much more easy if an automatic process (like the action of somatic markers, if we accept Damasio’s theory) enables them to predict the outcome of familiar experiences. Yet, in a constantly evolving environment in which many experiences are unique, an automatic decision-making-process might not always be the most efficient one.” (Filipic, 2001, p. 3)

Filipic argues that somatic markers and their role for decision-making is more complex in reality (Filipic compares with Damasio’s gambling experiments) (see Damasio, 1994, p. 212-217). The gambling experiments only show a limited category of real life events (Filipic, 2001, p. 3). Regarding survival in real life situations, decision-making is a more complex process because modern society evolves rapidly. It therefore seems to be difficult to acquire these automatic processes through learning. Would they really help humans to make decisions on the personal and social level? According to Filipic, Damasio is trying to simplify typical decision-making through his gambling experiment (Filipic, 2001, p. 3).

Filipic points to the important distinction between the production of somatic markers and the evolution of them. As I understand Filipic, the environment has to be stable for somatic markers to work adaptively. But, as I see it, the environment is not stable because cultural changes develop too fast in relation to the biological evolution (see section 4.6 about Tomasello’s view). I agree with Filipic that an automatic process, like a somatic marker, may not be the most efficient one in some situations. It could be the case that hereditary somatic markers can influence the decision-making process negatively. For example, how do humans in modern societies interpret the evolutionary old “fight or flight” response? Does this response fill the same survival-oriented function today as it did earlier or can this automated process be interpreted in another way?

Filipic mentions the role of conscious reasoning regarding somatic markers when survival is secured. Filipic writes:

“But what are the processes that enable us to make decisions, when survival is secured? What is the role of conscious reasoning in those processes, probably the last to have appeared in evolution, and

still the least important in quantity, that enable us to imagine a solution to a new problem, or a new solution to an old problem, a melody, a new energy”? (Filipic, 2001, p. 4)

As I see it, conscious reasoning should be seen as evolutionarily advantageous to somatic markers and their role for decision-making. According to Filipic, we might through education learn how to analyse our somatic states and their causes. Humans may also learn how to ignore them (Filipic, 2001, p. 4). A conscious thought should evoke a somatic state and thereafter the subject has the opportunity to evaluate and decide if one should follow the marker’s advice or refuting it. But that seems not possible from Damasio’s view. According to Damasio, somatic markers are automatic processes. It seems that Filipic holds that Damasio only focuses on the emotional influence on reason. Filipic argues that reasoning may influence emotions, in the other direction. Therefore, conscious reasoning should not be underestimated concerning somatic markers and their role for decision-making.

Filipic’s thought about conscious reasoning is interesting, but in some situations humans have to react rapidly. I think somatic markers fill a positive function as automated processes in several decision-making situations such as rapid concealment from predators or the avoidance of unexpected objects in the surrounding (for example a speeding car in front of me), but not in all. Maybe conscious reasoning about a somatic state would “win” over a negative hereditary somatic marker through an evaluation process, to create a new and better decision-making strategy for survival. Through conscious reasoning, humans may create new somatic markers that function more adaptively over an evolutionarily old marker.

4.5.1 The discrepancy between the biological and the cultural evolution

Regarding the role of survival-oriented functions, it is an important question how the culture has developed in relation to the biological evolution. As was mentioned, survival is to be considered as an ultimate reduction of unpleasant body states, the avoidance of pain and the seeking of potential pleasure (Damasio, 1994, p.179).

Somatic markers are shaped through environmental changes. Damasio explains:

“The automated somatic-marker device of most of us lucky enough to have been reared in a relatively healthy culture has been accommodated by education to the standards of rationality of that culture. In spite of its roots in biological regulation, the device has been tuned to cultural prescriptions designed to ensure survival in a particular society. If we assume that the brain is normal and the culture in which

it develops is healthy, the device has been made rational relative to social conventions and ethics. (Damasio, 1994, p. 200)

As was mentioned above, cultural changes may have a negative influence on decision-making processes. But Damasio's view is that different cultures have evolved from the experiences of individual suffering that people have learned to cope with. The subject uses memories from past experiences to imagine future outcomes and future plans for action (Damasio, 1994, p.262).

According to Tomasello human development is dependent of both biological and cultural inheritance (Tomasello, 1999, p. 14) The time period for normal processes of biological evolution is not enough to create cognitive skills for the modern environment. For example, primitive versions of actions have been modified many times in the human history regarding adaptive functions. This process is called "the ratchet effect" (Tomasello, 1999, p. 5).

Tomasello further argues that from an historical point of view, much can happen.

Transformation took place in historical time, not in the evolutionary time (Tomasello, 1999, p. 7). The biological evolution has proceeded in many years, simultaneously as cultural changes have been developed the last centuries.

I believe that cultural changes have developed too fast relative to the biological evolution. Tomasello claims:

"We have at most only 6 million years, but much more likely only one-quarter of a million years, to create uniquely human cognition, and this is simply not sufficient, under any plausible evolutionary scenario, for genetic variation and natural selection to have created many different and independent uniquely human cognitive modules". (Tomasello, 1999, p. 5)

One might think of this phenomenon as a collision course between cultural changes and the biological evolution, a discrepancy between the biological evolution and cultural evolution (I do not claim that Tomasello holds this view). It is important to mention that somatic markers are a special instance of feelings generated from secondary emotions, and secondary emotions are shaped through environmental learning-processes (see section 3.1). Damasio does not state that biological evolution is the only factor influencing decision-making. Cultural influences are also essential, but according to Damasio, only in a positive sense. A possible explanation of the negative influence of the somatic markers on the decision-making process may be rooted in environmental factors. The modern environment is, from my point of view, different from the environment in which human evolved.

As was claimed earlier, the negative influence on decision-making can be the cause of an idiosyncratic learning history that today has resulted in maladaptive patterns. The mechanisms may be as normal as they should, but not the maladaptive somatic markers they produce. May there today exist dysfunctional somatic markers guiding decision-making because of the collision course between the biological and cultural evolution? I am also questioning whether the modern society is an appropriate example of a normal culture where somatic markers can function adaptively. Damasio think sizeable sectors in society today gradually becoming sick (Damasio, 1994, p. 179). Damasio writes about sick cultures from a historical perspective, but he does not develop the thought about the modern society any further (see Damasio, 1994, p.177).

5.0 Concluding Discussion

My aim was to show the complexity of the “somatic marker hypothesis” and the lack of an adequate explanation concerning decision-making in the personal and social domain. I think Damasio illustrates the function of the somatic markers and the emotional influence on decision-making in a quite superficial manner. I also think that human behaviour and its relation to somatic markers and decision-making is very complex. There needs to be more research with these problems in mind.

I partly agree with Damasio that research on frontal lobe patients illuminates the important involvement of somatic markers in the decision-making process. The results from the experiments on prefrontal-damaged patients are relevant empirical data that support Damasio’s view that somatic markers are essential for decision-making in the personal and social domain. Why I think so, is because these patients show a sociopathic behaviour. The patients seem to lack the emotional content in the reasoning-process. From a historical point of view, cold reasoning without the involvement of emotions would be seen as rational. But it is hard to hold that view as rational, because it does not seem to coincide with survival in the personal and social domain. Without well-functioning emotional mechanisms one is in danger for both one self and for the people in the surrounding environment. Damasio’s hypothesis is satisfactory from this perspective.

Concerning the scientific approach to somatic markers and their role for decision-making there is the problem of how to observe unconscious processes and which kinds of experiments that might be possible. There are some methodological challenges for science concerning

these kind of processes. For example, there exist differences between conscious and unconscious processes and do these two processes involve different brain regions? This may still be an open question (Cleeremans, 2001, p. 2589.). Cleeremans means that:

“dissociations between our ability to report on cognitive processes and the behaviours that involve these processes are not limited to action but extend to higher-level cognition as well.” (Cleeremans, 2001, p. 2584)

Many experiments about unconscious processes have reported positive findings, but these findings have been shown hard to replicate. Therefore the domain about conscious processes and the relation to cognition can be seen as controversial (Cleeremans, 2001, p. 2585). An often used method for measuring unconscious processes are the so-called “simple dissociation logic” (SDL). This kind of experiment aims at:

...comparing the sensitivity of two different measures to some relevant information: A measure C of subject’s awareness of the information, and a measure P of behavioural sensitivity to the same information in the context of some task. Unconscious processing, according to the SDL, is then demonstrated whenever P exhibits sensitivity to some information in the absence of correlated sensitivity in C.” (Cleeremans, 2001, p. 2584)

But there are some problems with the approach quoted above:

- C and P can not be seen as concurrently. It means that if C fails to be sensitive it does not imply with necessity that the information was processed at an unconscious level. Other factors like forgetting before the retrieval of the information may be relevant in these kinds of situations.
- Is the information in C relevant for P?
- How to ensure that C and P both are sensitive to the relevant information?
- According to Cleeremans there are no conditions where awareness can be turned off. It leads to the difficulty (or the impossibility) of finding no sensitivity in C, but that is a criterion in the SDL experiment (Cleeremans, 2001, p. 2587).

It is also a controversy if unconscious perceptual processes fill important functions for human beings (Merikle & Reingold, 1992, p. 56). The controversy is about what an adequate behavioural measure of conscious experience would be. If no consensus about satisfactory measures of conscious experience exist, one can argue that “unconscious perceptual processes have not been shown to play any important role in directing human behaviour.” (Merikle & Reingold, 1992, p. 76)

Another methodological issue for science, regarding unconscious processes, is the criterion of verifiable voluntary reports. These reports should be described consciously by the subject (Baars, 1996, pp. 211-216).

The “somatic marker hypothesis” is a good starting point aiming at exploring the deeper functions of somatic markers and their nature. However, I do not believe that the “somatic marker hypothesis” holds until a better explanation of the somatic markers and their role for decision-making has been given.

One should not underestimate the role of culture while attributing rational, or irrational, behaviour to biological functions. Damasio does not do that either. Emotional content must be studied from various perspectives and levels that demand deep analyses. Biology is not the only explanation. Social norms and conventions also influence human decision-making processes. What can one learn from different cultures and their socially constructed behaviour patterns and norms? A cultural framework is not incompatible with biological findings in explanations of the function of somatic markers. Both biology and culture should be critical in a positive sense (see also Tomasello, 1999). I think the combination of biological and cultural frameworks can lead to a better understanding of somatic markers and their influence on human decision-making, instead of viewing each framework separated from the other. Also, the development in computer science, for example AI, develops in parallel with findings in neuroscience and I think the development between these two disciplines can be seen as reciprocal to each other in both directions. Findings in neuroscience lead to better computer modelling and better computer modelling may lead to a better understanding of human cognition.

There is also the question of what is meant by *advantageous*. As I see it, explaining somatic markers in terms of advantages for survival is not enough, even if they seem to be an essential component in the decision-making process. Some somatic markers that decrease well-being may have become hereditary over other somatic markers in the evolutionary history or vice versa, but all somatic markers are not necessarily survival-oriented. If they were, they may not fill that specific function today that they might have filled earlier. The somatic markers may have evolutionary and cultural causes, but is that sufficient as an adequate explanation of their true nature as survival-oriented?

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