Affect and action : contrasting conscious and nonconscious processes

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CHAPTER 1

INTRODUCTION

The introduction of a scientific paper and/or dissertation usually starts with theoretical definitions of key concepts in the specific domain of interest. With regard to emotion at least this seems, however, a mission impossible from the start. This contrasts sharply with our human intuition that may be illustrated by paraphrasing William James (1884, p....) "Everybody knows what attention is". There have been many attempts to define emotions but without exception they were rather poor and/or surprisingly uninformative (see Strongman, 1996; Oatley & Jenkins, 1996; Rolls, 1999). This state of affairs has led Fehr and Russell (1984) one century later rephrasing James' words: "Everybody knows what an emotion is, until asked to give a definition" (p. 464).

This dissertation is not about emotion per se but is rather about affective information processing, action readiness, and, particularly, in relation with consciousness. Studies reported in this dissertation, however, could contribute to our understanding of emotion. Independent from their specific theoretical perspective most theorists recognize affect as a core process of emotion (Ortony & Turner, 1990). Although, there is less agreement with respect to action readiness as a core process of emotion, most theorists also recognize action readiness as an important property of emotion. Empirical studies of affect and action readiness can probably, therefore, reveal basic characteristics of emotion. Affect and action readiness, and how we have tapped them, will be discussed both in the following two sections. In the section about affect and consciousness the importance of the distinction between conscious and less conscious processes will be discussed. Finally, in the last section our research questions related to affect and action readiness in the context of the former distinction will be presented.

Affect and emotion

Affective valence is widely accepted as one of the primary properties (see, for instance, Cacioppo & Gardner, 1999; Frijda, 1986; Oatley & Jenkins, 1996; Ortony & Turner, 1990) of emotion and empirical research of affect could, therefore, contribute to a further understanding of

emotion. Affect is, for instance, the main feature by which emotional feelings (i.e., conscious content) are distinguished from other kinds of experience according to Frijda (1991; Ortony & Turner, 1990; Cacioppo & Gardner, 1999). Happiness, for instance, is a typically positively valenced emotion, whereas sadness is a typically negatively valenced emotion. Because affect can be characterized in this fashion I will start with a working definition of emotion that has been gaining acceptance to put the research on affect and action readiness in perspective (adapted from Oatley & Jenkins, 1996, p. 96):

1. An emotion is usually caused by a person consciously or unconsciously evaluating an event as relevant to a concern (a goal) that is important; the emotion is felt as positive when a concern is advanced and negative when a concern is impeded.

2. The core of an emotion is readiness to act and the prompting of plans; an emotion gives priority for one or a few kinds of action to which it gives a sense of urgency - so it can interrupt, or compete with, alternative mental processes or actions. Different types of readiness create different outline relationships with others.

3. An emotion is usually experienced as a distinctive type of mental state, sometimes accompanied or followed by bodily changes, expressions, and actions.

This working definition is mainly derived from Frijda's (1986) book on emotions. Moreover, because a complete overview of theoretical approaches to emotion and emotional processes is far beyond the scope of this dissertation, I will limit myself also to a simplified version of the theoretical proposal made by Frijda with regard to the emotion process itself. This theoretical approach will be used mainly for a brief introduction of some key concepts within different theories of emotion and is chosen because it is accepted widely. According to Frijda, an emotion is the final result of a set of the following stages:

1. Appraisal
2. Context evaluation
3. Action readiness
4. Physiological change, expression, and action.

Ad.1 In most current analyses cognitive content, often labelled as appraisal of the emotional event, is a central feature of emotion. Appraisal is used both for the process of interpreting a situation as meaningful and relevant for well-being, concerns, major goals, and for the resulting experience (Frijda, 1991). Appraisal theorists mostly assume that it can take place both consciously and nonconsciously but that there is no real (i.e., qualitative) difference between conscious and nonconscious appraisal.

Ad. 2 This process is characterized by thoughts about plans and ways to cope with the event that caused the emotion. It is probably better, for instance, although you are primarily angry, to walk (or better run) away when confronted with ten angry and aggressive hooligans, although, they insulted and attacked you physically and you feel the primary urge to attack them yourself.

Ad. 3 According to Frijda (1986), action readiness is the core of an emotion. This aspect of his theory is, generally, considered as an important (Oatley & Jenkins, 1996) scientific step forward. Although felt action readiness contributes to the emotional (subjective) experience, according to Frijda, it is not necessarily accompanied by consciousness.

Ad. 4 With the publication of Darwin's famous book "The expression of the emotion in man and animals" in 1872/1998 most research on human expressions of emotion has focused on facial expressions. Emotions or at least affective states and mood could also be expressed through body posture, limb movement and, for instance, tone of voice (i.e., prosody).

Bodily changes mostly include changes that are controlled by the autonomic (i.e., symphathetic and parasymphathetic) nervous system such as heart rate, breathing patterns, and sweating. These changes generally result from activation of emotional effector systems (e.g., the amygdala-complex, hypothalamic and brain stem nuclei).

Emotions can also be reflected by more general patterns of behavioural action that are recognizable to others in specific situations and could be, moreover, highly functional. Society provides, for instance, culturally specific rituals for communal action on important occasions

(Cornelius, 1996). Funerals, for instance, allow a bereaved person to express grief, to withdraw from the usual actions of life, to receive support and recognition from relatives and friends.

Although, it may seem that a full-blown emotion is the final result of information processing in the numerical order of these four aforementioned stages this is probably not true for all emotions. It could be argued that in some emotions appraisal, for instance, is rather the resulting than the preceding stage in the emotion process (see also Parkinson & Manstead, 1992). This is probably the case in those emotions that are strongly inherited, primitive and evoked largely by nonconscious information processing. Other emotions, in contrast, depend largely on conscious information processing, learning and strong cognitive mediation (see Cornelius, 1996, for this conceptual distinction). An example of an emotion that is probably largely dominated by nonconscious information processing is fear. It is proposed by Öhman and Mineka (2001, but see also LeDoux, 1996), for instance, that automatic activation and relative impenetrability for conscious information processing are important characteristics of fear. This could be illustrated, for instance, by an anecdote from Darwin (1872/1998). He described that, although he intended not to withdraw from an attacking viper that was caged, he did this immediately the moment he was actually attacked. An example of an emotion that is probably dominated by more conscious information processing is shame. In this particular emotion social environment and culture (e.g., convention) determines largely its occurrence and phenomenology (see Frijda, 1991, and Cornelius, 1996). On the one hand, it seems important, therefore, to discriminate between different kinds of emotions (see leDoux, 1996; Panksepp, 1998; Rolls, 1999) for a full understanding of discrete emotions. On the other hand, it is important to investigate basic corresponding processes between emotions, such as affective information processing, because they can contribute to our understanding of probable general preceding and/or accompanying psychological processes in emotion.

Affect can be measured in many different ways but we have tapped it by means of three relatively simple dependent measures. Firstly, we asked participants simply for their affective evaluations to

infer their current affective states and their evaluations. Secondly, we measured electrical activity in their facial muscles (facial electromyography) to detect covert facial expressions of positively or negatively valenced affect. Thirdly, we measured latency times of affect specific actions.

Affect and action tendencies

From a biological point of view it is often argued that emotions and affective information processing have developed in human evolution as adaptive behaviour systems. They are of vital importance in a largely unpredictable (Evans, 2001; see also Damasio, 1994) and complicated (social) environment where little information is available and fast decisions and efficient action are required. In various theories of emotion it is, therefore, proposed that emotion is related more or less directly with specific action. In contrast with some less evolved species, however, humans are capable of instrumental acts, behavioural delay and response inhibition (Lang, Bradley, & Cuthbert, 1998). Action tendencies and action itself should, therefore, be distinguished, at least, in humans (see also Frijda, 1991).

Experienced action readiness is a second (besides affect) defining attribute of emotional experience according to Frijda (1986, 1991). Until recently (see Frijda, Kuipers, and ter Schure, 1989), however, experimental research of action readiness and action itself was very limited. Frijda, Kuipers, and ter Schure reported studies in which participants were asked to remember emotional experiences and to fill out a questionnaire on appraisal dimensions and action readiness modes. Action readiness was not measured directly and experimentally but was measured by means of retro- and introspection. It was assumed that an (conscious) emotion state "might be a reflection" (p. 213) of appraisal and behavioural and physiological response processes. This assumption was probable necessary, amongst others, because action readiness was associated with 32 discrete emotion states and not, for instance, with a smaller number of (basic) emotions (see, for instance, Oatley & Johnson-Laird, 1996) or even distinct (i.e., positive versus negative) affective information processing (see, for instance, Lang, 1995).

According to the communicative theory of emotions (Oatley & Johnson-Laird, 1996) several behaviour systems are distinguished that

correspond with a few different emotions. The primary function of these basic emotions is preparation and production of adaptive action. Oatley and Johnson-Laird further distinguished two different kinds of signalling in the nervous system. One kind is informational and carries information about events. Another and evolutionary older signal controls the brain by setting it into particular modes of organization which underlie different emotions and preparation of related actions. For negative events, for instance, interruptions of activity occur, attention is redirected and action, such as withdrawal from an attacking animal, is prompted directly. In this approach it is, moreover, not necessary that eliciting conditions for an emotion require consciousness. Oatley and Johnson-laird proposed nine (happiness, sadness, anger, fear, attachment love, care giving love, sexual love, disgust, and contempt) emotion modes (Oatley & Jenkins, 1996), control signals, and consequently modes of organization of the brain. Happiness, for instance, is elicited by the achievement of (sub) goals and the related actions are cooperation, and expression of affection. Disgust is elicited by contamination and is related with rejection and withdrawal. As in Frijda (1986), although the absolute number of discrete emotions was reduced, still nine patterns of action were proposed by Oatley & Johnson-Laird. Our interest in action readiness was primarily influenced by our interest in affective information processing and, therefore, an even smaller number of measurable actions would be preferable.

Lang (1995; see also Lang, Bradley, & Cuthbert, 1990) proposed a biphasic theory in which two motivational systems were distinguished. In his view emotions are action dispositions (e.g., central activation and preparation). Lang recognized emotions as complex and multilevel responses that are, however, organized into two simpler, underlying motivational systems. On the one hand, he distinguished an appetitive approach system (sexual and nurturing behaviour) and, on the other hand, an avoidance system (e.g., defensive behaviour). He assumed that both systems are located largely subcortically and can give rise in the end to different kinds of full-blown emotions. Moreover, affective valence itself is determined by activation in one or both of these systems and arousal reflects the level of activity in these two systems (see also Cacioppo & Berntson, 1994; Cacioppo & Gardner, 1999). Affective valence (positive versus negative) is, therefore, inherent to activity in the

motivational behaviour system that is assumed to facilitate specific actions, directly. What kind of actions should be considered affect specific though?

All kinds of (expressive) behaviour (e.g., whole body movement, limb movement, tone of voice) that concern maintaining or changing particular kinds of relationships (e.g., relative distance) with some objects or others in the (social) environment (or in thought) could reflect modes of action readiness in emotion according to Frijda (1986). Not all of these behaviours are, unfortunately, necessarily affect specific in their directions. Facial expression (i.e., smiling and frowning) can be considered, however, an example of affect specific action (Lang, 1990, see also Frijda, 1986; Frijda & Tcherkassof, 1997). Recently, evidence was obtained for this specific link between affect and facial expressions. Affective ratings of affectively valenced stimuli with a congruent (i.e., corresponding) facial expression (e.g., a positively valenced word with a smile) were performed faster than with an incongruent facial expressions (e.g., a positively valenced word with a frown; Neumann, Förster, and Strack, 2003). Because for this kind of experiments facial muscle measurement is a prerequisite we considered another kind of affect-specific action that was easier to tap.

Chen and Bargh (1999, see also Bargh, 1997; Neumann & Strack, 2000 a; Neumann, Förster, & Strack, 2001; Solarz, 1960) suggested that arm movement could result directly, without extensive conscious information processing, from affective information processing. They reasoned that as in walking or running, arms are used for changing relative distances to affectively valenced objects in the environment. Moving something away with your arm should be easier for a negatively valenced object (e.g., a rotten apple) than for a positively valenced object (e.g. a red, tasty looking apple). Moving something towards oneself, in contrast, should be easier for positively valenced than for negatively valenced objects. In their first experiment one group of participants was instructed to push a response lever away if the stimulus word presented on a given trial was negative and to pull the lever towards them if the stimulus was positive. The remaining participants received the opposite instruction (i.e., incongruent instruction). Participants were faster when pulling the lever with positive words than when pushing the lever away. With negatively valenced words, on the other hand, the lever was

pushed faster than pulled. Chen and Bargh (1999) concluded that affect-congruent movements were performed faster than affect-incongruent movements. Arm movement, therefore, seems to reflect variations on the affect dimension. It was, furthermore, suggested by Chen and Bargh (Experiment 2) that consciousness is not a prerequisite for this dependent measure and less conscious affect should, therefore, be reflected by this dependent measure.

We have developed a button-stand in our laboratory that allowed us to measure action readiness that is conceptually comparable to the action readiness that was measured by Chen and Bargh (1999). We were, moreover, also able to distinguish action readiness from the actual execution of affect specific action (See Frijda, 1991, and Chapters 4 and 5). Because it has been argued that activation of the affective information system (with probable direct behavioural consequences) is adaptive only when it is independent from consciousness (Cacioppo et al., 1993: Neumann & Strack, 2000 a; Wentura, Rothermund, & Bak, 2000; See Chapter 5) we will consider this issue explicitly in the subsequent section.

Affect and consciousness

Emotion is considered, almost by definition, a conscious content according to many prominent researchers in this domain (see, also for an opposing perspective, Kihlstrom, Mulvaney, Tobias, & Tobis, 2000). This theoretical position does, however, not exclude a-priori empirical studies of nonconscious processes (such as affective information processing) that could contribute to an understanding of emotion. It is evident in cognitive psychology today that most psychological functions such as perception and memory consist of both conscious and nonconscious information processing. Empirical study of both kinds of processes contribute, therefore, to our understanding of psychological functions such as memory and perception, and probably also to our understanding of affect and emotion. In the latter the distinction between both kinds of processes is probably even more necessary because control is an ubiquitous aspect of the emotional process and is, for instance, even evident in animals. This control restrains not only behavioural action but may inhibit affect and the very emotion itself. Frijda illustrates this, for instance, by mentioning the absence of aggressive behaviour of male chimpanzee's towards the young in its group even when bothered.

It could be assumed that the most direct effects of affect could be obtained when interference by conscious processing (e.g., inhibition) is eliminated. In several studies stronger experimental effects were obtained in conditions with reduced consciousness than with full consciousness of affective stimuli (Janssen, Everaerd, Spiering, & Janssen, 2000; Murphy & Zajonc, 1993; Murphy, Monahan, & Zajonc, 1995; Stapel, Koomen & Ruys, 2002). Murphy and Zajonc (1993), for instance, investigated in a series of six experiments effects of different types of primes on the affective and non-affective evaluation of unfamiliar Chinese ideographs. Murphy and Zajonc (1993) adopted the more cautious terminology of suboptimal and optimal, instead of subliminal and supraliminal, or even nonconscious and conscious conditions because the absence of an effect in a (direct) task measuring conscious effects does not guarantee that consciousness has been excluded with suboptimal presentation (Cheesman & Merikle, 1984). Affective (i.e., faces with happy or angry emotional expressions) and non-affective (e.g., polygons, faces with neutral expressions) stimuli were presented either in a suboptimal (4 ms) or optimal fashion (1000 ms) by means of a projection tachistoscope. Participants were instructed to ignore these primes in optimal conditions in their evaluations of the subsequently presented Chinese ideographs.

Happy and angry faces led to reliable, valence-congruent, shifts in affective evaluation of the ideographs (compared to empty and polygon priming conditions) only with suboptimal presentation of these primes. In optimal conditions the direction of the priming effect even tended to reverse (i.e., incongruent), at least in Experiment 1. Non-affective priming of size (Experiment 3) and symmetry (Experiment 4), however, only revealed congruent shifts in optimal conditions. Evaluation of whether the ideograph represented a feminine or masculine object (Experiment 5), when preceded by male or female faces also revealed congruent priming only in the optimal conditions. Experiment 6, finally, indicated that with prior suboptimal presentation, happy and angry faces could be discriminated in a 'two-alternative-forced-choice' recognition task, whereas male and female faces could not be discriminated.

It seems that affective information processing is "something special" with respect to consciousness (but see Clore & Colcombe, 2003). Whereas non-affective stimulus attributes biased judgments congruently

only in optimal conditions, affective attributes biased judgments congruently only in suboptimal conditions. This could be due, at least in part, to privileged processing of affect (see, for instance, LeDoux, 1986, 1996; Moris, Öhman, Dolan, 1998; Moris, Öhman, Dolan, 1999; Öhman & Mineka, 2001) and/or to discounting or inhibitory processes in optimal (i.e., conscious) conditions. Theorizing on affect and emotion purely based on empirical evidence in which consciousness (i.e., optimal conditions) prevails seems, therefore, at least prone to biases.

Research questions and overview of this dissertation

The stronger suboptimal than optimal affective priming pattern of results (Murphy & Zajonc, 1993) has considerable theoretical relevance. In spite of its importance and, although, it is often cited in literature (183 times according to ISI Web of Science, 18th June, 2003), not all attempts to replicate their results have been successful. Kemps, Erauw, and Vandierendonck (1996), for instance, only obtained a congruent affective priming effect with 30 ms presentation of the affectively valenced primes, which even increased with longer presentation times. In other studies, only suboptimal but not optimal affective priming conditions were investigated (Winkielman, Zajonc, & Schwarz, 1997; Kemp-Wheeler & Hill, 1992). The priming effect on affectively valenced targets was, moreover, found to be as large in subliminal priming conditions by affective words (Greenwald, Klinger, & Liu, 1989) and faces (Raccuglia & Phaf, 1997). Only recently, the stronger suboptimal than optimal affective priming pattern has been replicated successfully by Stapel, Koomen, and Ruys (2002; but see also Murphy, Monahan, Zajonc, 1995).

The starting point of this dissertation was whether the stronger suboptimal than optimal affective priming (Murphy & Zajonc, 1993) pattern could be replicated and could, therefore, be considered a robust phenomenon. This empirical question was, moreover, motivated by a confounding factor in their experimental design. Only participants in optimal conditions were instructed to neglect the facial expressions but not the participants in suboptimal conditions. Because of this experimental flaw it is not clear whether the stronger suboptimal than optimal affective priming pattern is (also) due to different instructions or actually due to the variation of consciousness. This question is addressed in the first two experimental chapters (Chapter 2 & Chapter 3).

In Chapter 2 two experiments will be discussed in which the affective priming pattern as a function of consciousness of the prime is investigated with two different dependent measures. In Experiment 1 only preference judgments (as in Murphy & Zajonc, 1993) were measured, whereas in Experiment 2 also a more direct measure of affect (facial EMG of the musculus zygomaticus major an the musculus corrugator supercilii) was measured. In both experiments, moreover, in contrast with Murphy and Zajonc instructions in both suboptimal and optimal conditions were matched. It was expected that if the stronger suboptimal than optimal priming pattern is a reliable phenomenon we should be able to obtain this pattern of results in both dependent measures. We expected, moreover, that we would be able to exclude trivial explanations for the stronger suboptimal than optimal affective priming pattern.

In Chapter 3 two experiments will be discussed that used an alternative experimental paradigm for consciousness. In both experiments consciousness was not varied by means of presentation time but by means of the manipulation of attention (i.e., focused versus divided attention). Attention was divided by means of a working memory load. It was expected that if the stronger suboptimal than optimal pattern would be reliable we should be able to obtain a comparable pattern of results in this paradigm.

In Chapter 4 three experiments will be discussed that were designed to study behavioural tendencies to approach or avoid affectively valenced stimuli. As mentioned already in, action readiness is considered in different theories of emotion as the core of an emotion (e.g., Frijda, 1986). Until recently, however, the experimental study of behavioural tendencies was very limited. The first experiment was designed to establish a pattern of results that would reflect behavioural predispositions (i.e., approach versus avoidance) with regard to emotional facial expressions with a new and in our laboratory constructed experimental set-up. In the second and third experiment conscious processing of affective stimuli was decreased by means of instruction and affective priming, respectfully. In line with Murphy and Zajonc (1993) it was expected that decreased consciousness of affectively valenced stimuli (i.e., facial expressions of emotion) would be accompanied by stronger action tendencies.

In Chapter 5 an experiment is described in which the same experimental set-up was used as in Chapter 4. The experimental manipulation of consciousness differed from those used in Chapter 4, however, but the same as in Chapter 3 (i.e., focused versus divided attention). This experiment was performed to explore further the relationship between affect and affect specific action.

One experiment will be discussed in Chapter 6 in the context of affect-cognition interactions. As proposed by Oatley and Johnson-Laird (1996) emotions are related with different modes of organization of different kinds and levels of information processing. We investigated, specifically, the influence of affective information processing on memory performance as a function of consciousness. This experiment should be considered as a starting point for further research, and could shed some light on basic and probable corresponding processes in memory and emotion.

In Chapter 7, finally, a discussion of findings and main conclusions will be presented.