Affect and action : contrasting conscious and nonconscious processes

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CHAPTER 7

SUMMARY AND DISCUSSION

Summary of Results

The present dissertation investigated whether the stronger suboptimal than optimal affective priming affect obtained by Murphy and Zajonc (1993; Murphy, Monahan, & Zajonc, 1995; see also Stapel, Koomen, & Ruys, 2002) could be replicated, extended to alternative dependent measures, and replicated in a different experimental paradigm. Moreover, a measure of affect specific action disposition was developed and investigated for the occurrence of stronger action tendencies with suboptimal than with optimal affective information processing. In the last experimental chapter a possible correspondence between memory processes and affective processes was investigated. In this concluding Chapter, I will first give a short summary of the main findings of this dissertation. Subsequently, I will try to present an interpretation of these findings.

Chapter 2 investigated whether suboptimal affective information processing could be distinguished from optimal affective information processing in two different dependent measures. In the affective priming paradigm neutral ideographs (i.e., targets) were preceded by facial expressions (i.e., primes) of emotion (see Murphy & Zajonc, 1993, Experiment 1 & 2). The primes were presented very shortly (i.e., suboptimal) or shortly but clearly visible (i.e., optimal). Participants were instructed to evaluate the ideographs affectively while ignoring the primes.

Stronger suboptimal than optimal priming was obtained in the affective evaluations of neutral Japanese ideographs in the first experiment without confounding across conditions of instruction and presentation time (as in Murphy & Zajonc, 1993). This pattern of results does not seem to be due, therefore, to the participants actively trying to ignore the primes only in optimal conditions. Because different instructions (i.e., passive or active ignore instructions) had no clear impact, moreover, it seems likely that the pattern of results is relatively robust and insensitive to the precise wording of the instructions.

In the second experiment of Chapter 2 the stronger suboptimal than optimal affective priming effect was obtained in covert facial muscle activity but not in the affective evaluations of the ideographs. These results suggest that facial muscle activity is not simply a derivate of subjective evaluation. In sum, the stronger-suboptimal-than-optimal affective priming pattern can be considered at least a replicable finding. Based on personal communications and experiments performed in our laboratory (Rotteveel & Phaf, 1994, Unpublished data; see also the affective evaluations of Experiment 2 described in Chapter 2), however, we suspected that this pattern of results (see also Kemps, Erauw, & Vandierendonck, 1996) is rather brittle, probably due to the dependence on specific experimental conditions (e.g., modus of stimulus presentation).

Experimental set-up seems to be important in obtaining the stronger-suboptimal-than-optimal affective priming results. Tachistoscopic stimulus presentation by means of slide projectors outfitted with LCD-shutters may be more suited for establishing suboptimal conditions than stimulus presentation by means of a computer screen. With the extremely short presentation time on the computer screen (i.e., 15 ms) reliable single-frame presentation of prime and mask (e.g., target) is required and this may be difficult to obtain reliably with most software. It is, moreover, impossible to present a full picture, whereas with slide projectors with LCD-shutters not only a full picture but also a reliable short presentation time can be obtained. In Experiment 2 pictures of facial expressions of emotions were, therefore, presented as black and white pictures instead of in grayscales (or even in full color) to relieve demands on the software.

The experimental priming paradigm itself probably contributes to the dilution of the stronger suboptimal than optimal pattern. Because in suboptimal conditions the pictures are presented extremely shortly, it is relatively easy for participants to miss these stimuli due to eye-blinks or saccades. Because one is effectively blind during a saccade (Morgan, 1994; Tovée, 1996), a brief stimulus presented during the saccade cannot exert a priming effect. This only applies to suboptimal conditions, so that the stronger suboptimal than optimal affective priming pattern may be weakened by the extremely short presentation time. It seems, therefore,

worthwhile to create suboptimal conditions with longer presentations, and ideally as long as in optimal conditions.

Merikle and Joordens (1997) suggested that dividing attention during presentation has parallel effects to masked presentation. The advantage with such a divided versus focused attention paradigm would be comparable presentation times between conditions (i.e., suboptimal versus optimal), and dilution of the contrast due to eyeblinks and saccades is consequently prevented. In Chapter 3 the affective priming paradigm was implemented in a divided versus focused attention paradigm. If we were able to replicate the stronger suboptimal than optimal affective priming results in this alternative paradigm it would furthermore underline the robustness of this specific pattern of results.

In the affective priming task of the experiment participants evaluated the ideographs more congruently to the primes in suboptimal than in optimal conditions. This was probably due to stronger influences of the affective primes in suboptimal than in optimal conditions. Alternatively, it could be argued that participants were less able in suboptimal conditions to comply with the instruction to ignore the primes than in optimal conditions. Results of the nonaffective task, however, suggested that such an explanation does not hold. When participants were instructed to evaluate ideographs as representing something 'male' or 'female', and were simultaneously instructed to ignore the preceding male or female neutral faces, no congruent priming was obtained in suboptimal but in optimal conditions.

The theoretically important question is raised whether this pattern of results is indicative particularly of emotion. Affective information processing is defined in Chapter 1 as a core process of emotion and its characteristics could, therefore, be reflected in emotion. Because action tendencies are considered in several theories as defining attributes of emotion we have investigated valence specific action tendencies as a function of consciousness in Chapters 4 and 5. We expected that in line with our findings on affective priming less conscious affective information processing should be accompanied by stronger action tendencies.

In Chapter 4 we investigated the link between affect, valence specific action tendencies in three experiments in which consciousness of affect (i.e., affective evaluation) was manipulated by different task

instructions. Action tendencies were measured by means of the latency time of the initiation of enforced arm flexion or extension due to instructions with respect to response buttons in a vertical stand. Pushing the upper button was expected (due to flexion) to be congruent with positive (and incongruent with negative) evaluations and pushing the lower button was expected (due to extension) to be congruent with negative (and incongruent with positive) evaluations. It was expected that responses should be faster when pushing congruent than when pushing incongruent buttons. This pattern of result was obtained in Experiment 1 in which participants were instructed to consciously evaluate happy and angry faces. This pattern of results was probably due to this specific instruction as was suggested by the second and third experiment.

In Experiment 2 participants were instructed to evaluate the same affectively valenced targets as in Experiment 1 but now on a male/female and not on a positive/negative dimension. No clear evidence was found for automatic action tendencies in this experiment. When the stimuli that were previously used as targets were used instead as primes in a sequential priming paradigm (Experiment 3) also no influence on latency times were obtained. Because simultaneously faster responses were found for corresponding prime-target pairs (e.g., positive prime followed by a positive target) than for pairs with opposing valences (e.g., positive prime followed by a negative target) priming trials, it was concluded that the affective content of the prime was processed. The affective judgment of the affective features of the target is probably a prerequisite for affective action tendencies as measured with flexion and extension responses. Clearly, there are no indications in these experiments for stronger action tendencies with decreased consciousness for the affective content of the stimulus.

In Chapter 5 the link between affect and action tendencies as measured with instructed arm movements on a button stand was investigated further. It is clear from Chapter 4 that at least an affective judgment of the target is necessary for affective action tendencies to appear. This was interpreted as an indication for an indirect, rather than a direct, link between affect and action tendencies in Chapter 4. To address the initial question, however, whether decreased consciousness would result in stronger action tendencies as measured in Chapter 4,

consciousness should be varied for a valenced target stimulus. We varied, therefore, consciousness for an affectively valenced target as in Chapter 3. Participants were instructed to evaluate happy and angry facial expressions while keeping a digit-letter string active in working memory. Divided attention was contrasted in this way with focused attention for the facial expressions of emotion.

Although overall latencies were slower with divided than with focused attention, there was no interaction with instruction (i.e., congruent versus incongruent) obtained. For movement time, however, such an interaction was obtained. Because participants responded on a button stand two different dependent measures could be obtained; initiation time and movement time. Initiation time was measured when participants released the home button. Movement time was calculated by subtracting the latencies (i.e., target-button time minus home-button time). Participants were slower with the execution of affect-incongruent movements in divided than in focused attention conditions, whereas no difference was obtained for affect-congruent conditions. It was concluded that with divided attention it was more difficult for participants to withdraw from their affect congruent movement tendencies than with focused attention.

In Chapter 6, finally, the association between affective valence and novelty was investigated in a recognition experiment. It was assumed that if affective valence corresponds to perceptual fluency manipulations of affect should also influence memory performance (in a conceptual reversal of mere exposure). Following the experimental design of Jacoby and Whitehouse (1989), neutral recognition test words were either primed by matching and nonmatching, or by positively and negatively valenced words. With suboptimal presentation both matching and positive primes led to more hits and false alarms in recognition performance, and thus a stronger bias to respond 'old', than nonmatching and negative primes. The effect was reversed only with optimal presentation of non-affective primes. These results support, therefore, a basic correspondence between, on the one hand, perceptual fluency and novelty, and on the other hand, positive and negative affective valence.

Discussion

On the basis of our research questions and results this discussion is subdivided in three subsequent sections. In the first section the starting point for this dissertation is discussed. We consider the stronger-suboptimal-than-optimal affective priming pattern that was obtained and discuss our findings in the context of the dual-route model of LeDoux (1986, 1996) and recent other findings. In the second section our findings with action readiness are considered in the light of the findings discussed in the former section. In the third section, a foretaste is taken of upcoming research by discussing a challenging finding within the domain of memory that seems to be interact with affective processes.

Affect and consciousness

The stronger-suboptimal-than-optimal pattern of results seems to be a replicable finding and does not seem to be due to only confounding instruction and presentation conditions (i.e., suboptimal and optimal) as in Murphy and Zajonc (Experiment 1 & 2, 1993). This conclusion is underpinned by the conceptually comparable patterns of results that were obtained with an alternative dependent measure (i.e., covert facial expressions) and an alternative experimental manipulation for decreasing consciousness of the primes (i.e., focused versus divided attention).

The observation that nonconscious processes are particularly important in affective information processing was proposed, amongst others, by Zajonc (1980) in his influential paper "Feeling and Thinking: Preferences need no inferences". Based on his own empirical work on mere-exposure (Zajonc, 1968; Kunst-Wilson & Zajonc, 1980), Zajonc proposed his 'affective primacy' hypothesis. This position holds that affective reactions can be elicited with minimal stimulus input and consequently without extensive cognitive processing. This theoretical position is in line with a tradition in emotion research that emphasizes the primitive, nonconscious, and biologically prepared processes in emotion. Zajonc rejected the view that affect is always cognitively mediated and that: "Affect is postcognitive." (p. 151, Zajonc, 1980). As a result a debate was initiated with, specifically, Lazarus (1982) who challenged Zajonc' theoretical position proposing that affect cannot

emerge without prior cognitive (i.e., appraisal) mediation. This position is in line with the tradition in emotion research that emphasizes learning and cognitive mediation (see Cornelius, 1996, for this conceptual distinction). Although this debate was contaminated by different definitions of key terms (see, for instance, Buck, 2000), such as "cognition", and "affect", it could be reinterpreted as a debate about the relative contribution of conscious versus nonconscious affective processes, as will also be argued here (see also Phaf, 1995). Both Zajonc and Lazarus acknowledge the existence of both kinds of processes but they differ in their emphasis on the importance for, and contribution to, affective feelings and in the end probably also emotion.

Zajonc' theoretical position on affective primacy is founded on the subliminal mere-exposure phenomenon (Kunst-Wilson & Zajonc, 1980; Bornstein, 1989). In subliminal mere exposure, stimuli that were previously presented subliminally are preferred above novel stimuli without subsequent recognition of these stimuli. In his theoretical approach mere-exposure is basically characterized as intrinsically positively valenced (see also Harmon-Jones & Allen, 2001; Winkielman & Cacioppo, 2001, Zajonc, 2001). Mere exposure can, however, be explained alternatively, as an affective 'neutral' memory phenomenon. Consequently, the affective feeling is then literally the result of an (cognitive) attribution process of perceptual fluency, and such an explanation corresponds to the "affect is postcognitive" theoretical point of view. This contrast between theoretical positions is intrinsically due to the nature of the mere exposure task itself. Classically, repeated mere-exposure of meaningless (i.e., nonaffective) materials (e.g., geometric figures; but it holds true for an enormous variety of stimulus domains, Bornstein, 1989) leads to increased preferences and is the result of nondescriptive information processing (See Winkielman et al., 2001). This contrasts with affective priming where the material of interest (i.e., affective prime) is presented only once and affect is due to descriptive information processing. The stronger suboptimal-than-optimal affective priming pattern is in this fashion more convincing in favor of the affective primacy hypothesis (Zajonc, 1980, see also Murphy & Zajonc, 1993, and Murphy, Monahan, & Zajonc, 1995) than mere-exposure.

The question whether affect is post- or pre-cognitively (e.g., affective primacy) evoked strongly presumes the idea of sequential

information processing. Although we do not necessarily want to argue against this assumption we would prefer the assumption of parallel affective information processing. As already argued, the Zajonc-Lazarus debate can be reinterpreted as a debate concerning the relative contribution of conscious versus nonconscious affective processes. Within a parallel affective information processing approach both kinds of processes can be integrated (Buck, 2000; Cornelius, 1996). An example of such an approach is the neuro-anatomical dual route model of LeDoux (1986, 1996).

The dual-route model of LeDoux (1986, 1996) assumes two parallel neural pathways for processing affective information. Affective information can be processed through a direct and fast neural pathway for 'quick and dirty' processing from the thalamus to the amygdala, which are connected with several cortical areas (among which is the medial prefrontal cortex). The amygdala consequently facilitates species-typical action programs associated with fear and modulates patterns of activity of many other parts of the brain influencing, for instance attention and arousal. Affective information can, alternatively, also be processed through indirect pathways via the cortex that allow more elaborate and detailed processing resulting in amygdala activation. Consequently, the same effector-systems can be activated as when affect was processed though the direct pathway.

Stronger-suboptimal-than-optimal affective priming (and affective primacy for that matter) can be accounted for by the dual route model of LeDoux (1986, 1996). In suboptimal conditions it can be assumed that primarily the direct pathway is addressed by the masked facial expressions of emotion. It has been found that masked presentation (as in suboptimal conditions) of affective stimuli is processed mainly through the short and direct pathway (Morris, Öhman, & Dolan, 1998, 1999; see also Whalen, Rauch, Etcoff, McInerney, Lee, & Jenike, 1998). Direct processing probably leads to a strong tendency to respond congruently to the faces and: "(...) can therefore precede and alter subsequent cognitions." as proposed by (Murphy & Zajonc, 1993, p.725). In optimal conditions both direct and indirect pathways are presumably addressed by the facial expressions of emotion. Initial congruent affective responses due to direct affective information processing can be inhibited by similar but more extensive (i.e., cortical) processing through the indirect

pathways. LeDoux, for instance, suggested, on basis of lesion-studies, that the medial prefrontal cortex is needed for extinction of conditioned responses and, therefore, could inhibit useless or inadequate affective responses to prevent the organism for also acting on false alarms. In this way a smaller or even an incongruent affective response could be expected in optimal conditions because a strong affective response is not needed in the psychological laboratory (i.e., constitutes false alarm) and the initial affective response can be inhibited.

The dual-route model can account (but see, for instance, also Rolls, 1999) for the stronger-suboptimal-than-optimal pattern but future research should investigate the strength of this account. The use of such a model can at the same time guide this research. Because LeDoux' model is well specified, it can be implemented quite readily in a computational neural network model. Only a few additions, such as nodes representing direct (i.e., evaluating the faces) and indirect (i.e., evaluating the ideographs) instructions are needed (see Den Dulk, Capalbo, & Phaf, 2002). Such an approach allows predictions concerning further conditions, for instance, when it will be difficult to obtain the stronger suboptimal than optimal priming effect. LeDoux (1996, see also Jacobs & Nadel, 1985) already suggested within the framework of fear conditioning that extinction due to the indirect pathway may be disabled by unrelated fear stimuli or stress, and that the conditioned fear response preserved in the direct pathway may return under these circumstances. Similarly, it was expected that the inhibition due to the indirect pathway would disappear in stressful or arousing circumstances. The stress was postulated to correspond with increased neuromodulator levels (e.g., norepinephrine) which may raise global levels of lateral inhibition in the network. The stronger suboptimal than optimal pattern indeed reversed in the model when lateral inhibition was raised. These simulations lead to the prediction that can be tested experimentally that relaxed participants will show the stronger-suboptimal-than-optimal pattern more easily than stressed participants. Extensive processing through the indirect pathway, entailing a regulation of affective responses, can be profited from most when arousal mechanisms, preparing the organism for vigorous action, do not seem to be already activated.

Although the dual route model can guide future research in its account of the stronger suboptimal than optimal pattern we suppose that

the most important theoretical contribution made by the LeDoux model is the concept of parallel affective information processing (see also Buck, 2000; Phaf & Wolters, 1997). It seems more important that affective information processing via both routes can take place simultaneously and evoke quantitatively and even qualitatively different affective states. The LeDoux model can even be taken as an integrative model for the different perspectives (e.g., Darwinian, Jamesian, Cognitive Appraisal) on emotion (see Cornelius, 1996, but also LeDoux, 1996). The LeDoux model "has the potential to provide a physiological basis for claims that emotions are both inherited, primitive, automatic reactions and learned, cognitively mediated responses" (Cornelius, p. 213).

Consciousness does apparently matter in the domain of affective information processing and emotion. Nonconscious and conscious processes can give at least quantitatively, but probably even qualitatively, different contributions to affect. A generalization of the dual-route model as proposed by LeDoux (1986, 1996) may be used as the basis for this theoretical position. The position that nonconscious processing is only a diluted form of conscious processing is, moreover, clearly violated by the stronger-suboptimal-than optimal pattern. Also the identity position (Mandler, 1985) with respect to both kinds of processes seems implausible. Subjective report alone does, probably, not represent the whole story of affect or even emotion. This is an important conclusion because, as already mentioned in the introduction (Chapter 1), it is an often implicitly assumed theoretical position in these domains of interest. Determining affect and perhaps even the full structure of emotion entails, therefore, empirical study of conscious as well as nonconscious processes going hand in hand.

Affect specific action and consciousness

The stronger-suboptimal-than-optimal pattern of results cannot simply be generalized to the domain of action readiness at least as measured with initiation time of arm flexion or extension. The results of Chapter 4 even suggest that action readiness is absent in the absence of consciousness (i.e., affective judgment) of affective features of the stimulus. These results suggest, therefore, a non-automatic relationship between affective information processing and action readiness as measured with arm movement (i.e., flexion and extension) because there

was simultaneously clear evidence of automatic and effective (i.e., priming) affective information processing.

The experiments performed in Chapters 4 and 5 were inspired by the affective priming results that were presented in the preceding Chapters. The absence of a stronger-suboptimal-than-optimal pattern can be interpreted as a limitation to the theoretical implications as discussed in the former section of this pattern of results. Alternatively, it can also be argued that although the initiation of arm movement apparently reflects action readiness, it is relatively insensitive to automatic and nonconscious affective information processing. This position is underlined further by yet unpublished results (Rotteveel, Luman, & Phaf, Unpublished results) that suggest that suboptimal affective priming of action readiness is absent. The same stimulus set was used in this experiment as in Experiment 1 of Chapter 4 but not as targets but as suboptimally (25 ms) presented primes. Participants were instructed to evaluate target stimuli (i.e., pictures of flowers and birds) that were preceded by the primes, as belonging to the category of flowers or birds. No influence was obtained of the affectively valenced primes on the initiation of subsequent arm movement (as in Experiment 3 of Chapter 4). It could be argued alternatively that prime presentation was too short to evoke affective information processing at all. Presentation time was, however, even longer than, for instance, in Experiment 1 of Chapter 2 in a comparable experimental setup. In the latter experiment, evidence was also obtained of affective information processing. It could, moreover, be argued that null results do not necessitate to rejection of the hypothesis of an automatic and nonconscious link between affect and action. We propose that the results of Rotteveel, Luman, & Phaf (Unpublished results) at least support the position that action readiness as measured with arm movement is non-automatically related with affective information processing.

Because the experimental setup represents an uncommon and relatively new way of investigating action readiness (see Chapter 1 and 4) some reservations should be made. First of all, arm flexion does not necessarily represent all sort of action tendencies related to affect. We would expect that (covert) facial expressions, for instance, are more sensitive to nonconscious affective information processing (e.g., see the results of Experiment 2 in Chapter 2). There were and are, moreover,

currently besides Chen and Bargh (1999), no indications in the literature about the function of consciousness for this specific measure. Evidently, our results are in contrast with Chen and Bargh's and our conclusions should be regarded, therefore, as a starting point for further investigations.

Interestingly, in Chapter 5 some evidence for the facilitation by divided attention with the execution, but not the initiation, of arm movement was obtained. It was more difficult for participants to withdraw, specifically, from their affect congruent movement tendencies with divided attention than with focused attention for an affectively valenced target stimulus. For the execution of affect incongruent movements attention is apparently required, as was also evidenced by participants' performance on the working memory task. This pattern of results seems to reflect the stronger suboptimal-than-optimal pattern of results. Optimal affective processes give rise to, or allow for, prime incongruent movements, whereas suboptimal affective processes probably induce affect congruent movements. It should be noted that instructions differed between affective priming with short versus long stimulus presentation, and with divided versus focused attention, on the one hand, and the experiment presented in Chapter 5 on the other hand. Participants in the affective priming tasks were instructed to ignore the affectively valenced prime and judge affectively neutral targets, whereas participants in the latter experiment were instructed to judge the affectively valenced targets.

Initiation of both affect congruent and affect incongruent movements probably engage comparable levels of consciousness. Consciousness is, however, relatively stronger engaged for the execution of affect incongruent than for the execution of affect congruent movements. This conclusion also seems to be warranted by the results of Experiment 3 of Chapter 4. In this affective priming experiment, in contrast with Experiment 1 presented in this Chapter, also effects of instruction were obtained in movement time. The latter task was evidently more complicated for participants than the affective judgments of Experiment 1.This was due to the preceding primes (i.e., corresponding versus non-corresponding affective valences of prime-target pairs) in Experiment 3 that had to be ignored. Apparently, when consciousness was engaged by working memory load or task difficulty,

execution of affect-incongruent but not affect-congruent movement was interfered with. In sum, consciousness is probably needed for the execution of affect-incongruent movements, whereas this is less the case for affect-congruent movements. Why this specific pattern of results was obtained is not clear but it suggests that consciousness does matter to some degree for the execution of adequate affect-specific movement.

Whereas in Chapters 2 and 3 results were presented that indicated the importance of nonconscious affective processes, in the Chapters 4 and 5 the importance of conscious processes was emphasized. These four Chapters seems to be, therefore, an example of the position formulated in the latter section that for determining the underlying mechanisms of affect and perhaps even of the full structure of emotion, the empirical comparison of conscious with nonconscious processes is necessary. The restriction of affect and probably even emotion to only one type of process does not seem warranted.

Affect and perceptual fluency

The study of conscious as well as nonconscious affective processes, its consequences (e.g., action readiness) and its implications is probably not only important for affect and emotion but also for other psychological functions such as, for instance, memory and perception. This is not surprising because as argued in the introduction of this dissertation one of the primary functions of affect is creating optimal conditions for maintaining or changing behavior in time and in specific situations (see also Oatley & Johnson-Laird, 1996). In this context it is, for instance, an advantage if you are able to recognize a safe and a familiar environment in which vigilance is not required primarily. The (subliminal) mere exposure effect that urged Zajonc to formulate his "affective primacy " hypothesis is literally a field of interest in which memory processes and affective processes affect each other. This is due to the interaction of mere repeated exposure and positive affect (See Kunst-Wilson & Zajonc, 1980; Winkielman & Cacioppo, 2001). As already mentioned, the mere exposure effect consists of mere repeated exposure and subsequent liking of (classically) affectively neutral stimuli. As in affective priming (See Murphy & Zajonc, 1993) this is also a domain of interest in which nonconscious processes seems to be evidently present in affective responses (see Panksepp, 1999). Less conscious processing in contrast

with full conscious processing of target stimuli seems to evoke even stronger preferences (Bornstein, 1989, but see Murphy, Monahan, & Zajonc, 1995).

We reversed the mere exposure effect conceptually in the Jacoby-Whitehouse paradigm by adding affectively valenced (i.e., positive and negative) primes (See Chapter 6). Our results suggest that positive affect indeed corresponds to perceptual fluency and is, therefore, more in line with Zajonc' account of mere exposure (2001; see also Winkielman & Cacioppo, 2001). It could still be argued that perceptual fluency itself is affectively neutral but this account seems to be at least less parsimonious than the account that the processes itself is affectively valenced. We have, moreover, extended this effect already to two different types of experimental manipulations of affect. When participants contracted facial muscles associated with a smile, they showed more false recognition than with a condition (Phaf & Rotteveel, Unpublished results), which was again higher than when frowning (see also Neumann & Strack, 2002). We have also manipulated participants' illusory dynamical distances to (neutral) target words. According to Neumann and Strack (2000a, & 2000b) illusional movements towards participants are related with positive affect, whereas movements away are intrinsically negatively valenced. Neutral target words that moved toward participants led indeed to more false recognitions than target words that moved away (Rotteveel, Mehra, & Phaf, Unpublised results).

Perceptual fluency induced by mere exposure seems to be positively valenced. This can, for instance, be accounted for by the absence of aversive events as an unconditioned stimulus in classical conditioning (Zajonc, 2001). Zajonc (2001) argues that: "(...) the absence of aversive consequences constitutes a safety signal that is associated with the CS." (p.225). This effect could rely on a "general state of reduced alertness and tension perhaps deriving from an attenuation of the orienting reflex " (Monahan, Murphy, & Zajonc, 2000; see also Hill, 1978). Such a state would allow at the same time perhaps for a more effective vigilance in actual confrontation with novel and potentially harmful stimuli. Mere exposure can probably even be taken further theoretically as a primitive basis of (social) attachments (Panksepp, 1999; Zajonc, 2001). It could account, for instance, for the hesitance of infants (across

species) to separate from their caregivers and their surroundings (Panksepp, 1999; Monahan, Murphy, & Zajonc, 2000).

In conclusion, mere exposure is similar to affective priming because both phenomena seem to be stronger in suboptimal than in optimal conditions. This probably stresses the relative importance of nonconscious processes in affective parallel information processing. It could even be argued, if one accepts mere exposure to reflect an intrinsically affective phenomenon, that this pattern of results is characteristic for affective information processing (at least in the laboratory) itself. Because some of the properties of mere exposure and affective priming phenomena differ (i.e., dynamic versus descriptive) it would be interesting to know how and when they merge in affect (See also Murphy, Monahan, & Zajonc, 1995 and Winkielman & Cacioppo, 2001).