

**From (Unconscious) Perception to Emotion:
A Global-to-Specific Unfolding View of Emotional Responding**

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Chapter to appear in I. Nyklicek, A. Vingerhoets, & M. Zeelenberg (Eds.). *Emotion regulation and well-being*. Springer, New York, in press.

Abstract

We present research showing that emotional reactions unfold from global to more specific emotional reactions, depending on processing specificity. Initially, global processing of, for example, a filthy toilet occurs eliciting a general, negative emotional reaction. Subsequently, specific processing occurs, eliciting a more specific, disgust reaction. What is crucial according to our global-to-specific unfolding view of emotional responding is that both global and specific emotional reactions can emerge without knowing what caused these emotional reactions. The observation that emotional reactions emerge without conscious awareness of their cause substantiates the idea of a direct link between perception and emotion. In this Chapter, we provide more evidence for this link between perception and emotion, we explain how our view differs from mainstream appraisal theory, and we discuss the interplay between global and more specific emotional reactions.

Emotions are driven by people's perceptions. Seeing the picture of a loved one elicits happiness, smelling a dirty toilet elicits disgust, hearing the voice of an enemy elicits anger, and looking down from a steep cliff elicits fear. The emotions that arise in these cases are not surprising: Happiness arises from positive events, disgust is triggered by health threatening conditions, anger occurs when treated unfairly, and fear is induced when encountering danger. What is less obvious, however, is how these emotions occur, and whether people need to be consciously aware of the emotional event. Do people need to know what caused their emotions before emotional reactions can arise? More generally, what happens between the exposure to an emotional event and the emotional reactions that follow?

The view on emotional responding that we put forward in this Chapter is that people's emotional reactions are primarily triggered by what people (unconsciously) perceive (see also Prinz, 2004). We assume that people's interpretations of the sensory input that enters the brain determine the emotions that arise. An important implication of this viewpoint is that emotional reactions may unfold in a way that is similar to the unfolding of perception. Based on Navon's (1977) idea that perception typically unfolds from global to specific, we propose that emotions unfold from global emotional reactions to more specific emotional reactions. First, the gist or essence of an emotional event is perceived, which triggers a global, positive-negative reaction. Then, specific details of the event -- necessary to trigger more specific emotional responses such as fear, disgust, or anger -- are perceived.

The core of our global-to-specific unfolding view of emotional responding is that emotional responses are not static or fixed, but that emotional responses unfold as a function of the emotional information that is perceived (Ruys & Stapel, 2009). This explains why the same emotional stimulus can elicit different responses. For example, an old picture of your grandfather may sometimes elicit general positive feelings because the picture activates the knowledge that your grandfather was such a wonderful person and at other times may elicit

sadness when the picture also activates more specific memories of the last years of his life when he suffered from Alzheimer's disease. The emotional response to an emotional event or stimulus depends on the specificity of the information that is perceived or activated in memory at the time the emotional response is triggered.

Another core assumption of our global-to-specific unfolding view on emotional responding is that people can experience emotions and their associated emotional reactions without knowing the cause of these emotions. Although our intuition rules out the idea of experiencing a specific emotion like fear or disgust without knowing why, there are important theoretical and empirical reasons to assume that emotional reactions may occur without conscious awareness of the emotion-eliciting stimulus.

We start this Chapter by clarifying and providing evidence for our global-to-specific unfolding view of emotional responding. After discussing research showing that initial emotional responses are mostly global and later emotional responses are more specific, we explain in detail why we think that emotional reactions unfold similar to perception, how this link between perception and emotion relates to unconscious emotions, and how our view differs from appraisal theories of emotion. Then, we discuss research involving the interaction between global and more specific emotional reactions, and speculate about how global and specific emotional reactions interact with further emotional processing such as recognition and simulation of facial emotional expressions.

Global-to-specific unfolding of perception

A global-to-specific unfolding view on emotional responding assumes that emotional responses parallel the perception of emotional stimuli. The question is then, how do people perceive emotional events? The ideas of the Gestalt psychologists --and Navon (1977) in particular-- suggest that visual perception unfolds from global to more specific processing

(see also, Derryberry & Tucker, 1994; Kimchi, 1992; Rosenthal, 2004; Werner, 1956). First, people typically extract the gist or essence of a visual scene as a result from global processing. Then, if necessary, people fill in the details of a visual scene by processing it in a more specific, fine-grained way. Thus, global processing primarily activates the big picture from a relatively distant perspective, whereas specific processing activates the details from a nearby, zoomed-in perspective (see Avramova & Stapel, 2008). For example, when you walk into a busy train station and notice the swarm of people going in and out of the station, you are unlikely to specifically perceive the individual persons passing by. What you see is a crowd while trying to find your way to the train. Suddenly, a familiar (and therefore positive) face triggers your attention, you “zoom in” and recognize the face of a colleague who is trying to catch the same train.

The idea that people initially process a visual scene in a global, holistic way, followed by more specific, detailed processing of the visual scene can be illustrated by Navon's (1977) now classic experiments. In one of these experiments participants looked at pictures that consisted of a large character made out of small characters, for example, a big capital letter L made up of small capital letters P. The task of the participants was to name the identity of the large character, or the identity of the small characters as quickly as possible. The results showed that the identity of the small characters did not influence how quickly participants identified the large character, indicating that participants did not process the small characters before identifying the large character. Interestingly however, the identity of the large character did influence how quickly participants identified the small characters, indicating that participants processed the identity of the large character before identifying the small characters. This experiment points out that global perception typically occurs prior to more specific perception.

Global and specific emotional reactions

The question is whether the global-to-specific unfolding that occurs in visual perception also occurs in the emotional reactions that emotional events trigger. We propose that not only seeing and thinking, but also feeling unfolds from global to specific. A global way to represent an emotional event is in terms of its positive or negative valence, whereas specific processing is focused on features and details. Therefore, we expect that global processing of an emotional event typically elicits positive-negative emotional reactions such as a positive or negative mood, and that specific processing of an emotional event elicits more fine-grained emotional reactions such as fear, anger, or disgust. Thus, a sudden glimpse of a dangerous, poisonous snake crossing your trail when you are hiking in the woods may elicit a general negative reaction, but may also elicit a more specific fear reaction that takes into account specific characteristics of the snake such as its colors and size. On a concrete action level, a general negative reaction may be the preparation of an *avoidance* response (as opposed to *approach*), whereas a more specific fear reaction may be a *freeze* or *flight* response.

Two experiments directly show that emotional reactions may indeed develop from global to specific. In this research of Ruys and Stapel (2008a) participants were either quickly or super quickly subliminally exposed to fearful pictures (e.g., a growling, mad dog, a pointed gun), disgusting pictures (e.g., a dirty, non-flushed toilet, a moldy cooking pot), or neutral pictures (e.g., a horse, a chair) in a parafoveal vigilance task (see also Bargh & Chartrand, 2000; Stapel, Koomen, & Ruys, 2002). The hypothesis was that *super quick* subliminal exposure to these emotional stimuli would merely allow for global processing of the emotional stimuli and therefore that super quick exposures to these emotional stimuli would trigger global, emotional reactions. Thus, participants who were super quickly exposed to fearful or disgusting pictures would show a general, negative emotional response compared to

participants who were exposed to neutral pictures in the parafoveal vigilance task. A second hypothesis was that *quick* subliminal exposure to these emotional stimuli would also allow for more specific processing of the emotional stimuli and therefore that quick exposures to these stimuli would trigger specific emotional reactions. Participants who were quickly exposed to fearful or disgusting pictures would thus show a fear or disgust response, respectively, compared to participants who were exposed to neutral pictures.

These hypotheses were examined by assessing participants' global and specific emotional responses with cognitive, feeling, and behavioral measures (see Ruys & Stapel, 2008a). Results on the cognitive measures --a word-completion task and a scenario measure-- showed that super quick exposures to either disgusting or fearful pictures increased the cognitive accessibility of general negative concepts (i.e., bad, stupid), whereas quick exposures to disgusting pictures increased the cognitive accessibility of concepts related to disgust (e.g., vomit, sick) specifically and quick exposures to the fearful pictures increased accessibility of the concept of fear (e.g., worry, panic). The feeling measures showed a similar pattern of results. Super quick exposures to either disgusting or fearful pictures resulted in more negative mood reports than exposures to neutral pictures, whereas quick exposures to disgusting pictures resulted in specific feelings of disgust and quick exposures to fearful pictures resulted in specific feelings of fear. As a measure of behavior, participants were asked to choose between seeing scary movies or sampling exotic, potentially disgusting food. We expected that fearful participants would choose the strange-food test to avoid more fear-eliciting materials, whereas disgusted participants would choose the scary-movie test to avoid exposure to exotic, potentially disgusting food. The results indeed showed that participants were more likely to choose the scary movies over the exotic food after quick exposures to disgusting compared to fearful pictures. The behavioral results are especially important because semantic activation of the concepts of disgust and fear would produce the opposite

pattern of findings. The behavioral results thus support the idea that the subliminally presented emotional pictures triggered genuine emotional responses.

The research of Ruys and Stapel (2008a) illustrates how an emotional response unfolds over time from a global mood, to a specific, meaning-based emotion like fear or disgust. Importantly, a global-to-specific unfolding of emotional responses was revealed on various emotion measures, in line with a multi-component perspective on emotion (Frijda, 1988; Scherer, 1984). When little time was available to process the emotional pictures, suggesting that participants only perceived global, evaluative information, this elicited a global, negative mood and activated general negative cognitions. However, when relatively plenty of time was available to process the emotional pictures, suggesting that participants also perceived specific fine-grained information, this triggered specific emotions. Thus, emotional stimuli may on the one hand elicit global emotional responses such as a positive or negative mood and accessibility of general positive or negative concepts, and on the other hand elicit specific emotional responses such as feelings of disgust or fear, accessibility of specific emotion concepts, and the inclination to make a specific choice. These various emotional reactions can occur directly in response to the emotional event and together form the emotional experience.

To obtain more evidence for a global-to-specific unfolding of emotional responding Ruys and Stapel performed two additional studies that examined participants' global and specific emotional responses to facial emotional expressions (Ruys & Stapel, 2008c). In this research, participants were either super-quickly or quickly subliminally exposed to disgusted, fearful, angry, or neutral faces in a parafoveal vigilance task. After the exposure phase, participants completed global and specific measures of feeling and cognition, similar to the ones used in Ruys and Stapel (2008a). In line with global-to-specific unfolding, the results showed that super quick exposures to disgusted, fearful, or angry faces primarily activated a

global, negative evaluative response that was reflected in participants' moods and an increased accessibility of general negative cognitions. Interestingly however, quick subliminal exposures to disgusted, fearful, or angry faces resulted in the activation of specific emotion knowledge, without influencing people's global and specific feelings.

These results indicate that people's responses to facial emotional expressions differ from responses to other, more direct emotion elicitors (Hariri, Tessitore, Mattay, Fera, & Weinberger, 2002; Ruys & Stapel, 2008a, 2008c). Initially, facial emotional expressions and other emotion elicitors like poisonous snakes or favorite desserts elicited similar, positive-negative responses, whereas later, more specific, fine-grained responses differed such that more direct emotion elicitors elicited a corresponding specific emotion (e.g., disgust or fear) and facial emotional expressions merely activated emotion knowledge (e.g., increased accessibility of emotion related words). This makes perfect sense because automatically taking over other people's emotions can be quite dysfunctional. It does not seem functional to always feel angry when other people feel angry, or to feel scared when other people feel scared. It does seem functional, however, to immediately know about other people's feelings of anger or fear, as to determine your own optimal course of action.

Unconscious perception triggers emotional responses

Besides showing a global-to-specific unfolding of emotional responses, the research of Ruys and Stapel (2008a) illustrates another important aspect of our unfolding view, namely that emotional responses may occur *without being consciously aware* of their cause: Participants felt scared without knowing about the frightening pictures that caused their fear and participants felt disgusted without knowing about the sickening pictures that caused their disgust (Ruys & Stapel, 2008a). Thus, people actually experienced specific emotional feelings

and showed emotional behavior after being unconsciously exposed to emotion-eliciting stimuli. To our knowledge, this research was the first to show the unconscious nature of specific emotions without using facial emotional expressions as emotional stimuli (Ruys & Stapel, 2008a). Because facial emotional expressions are principally *reactions* to emotional stimuli (see Ruys & Stapel, 2008c), it was important to show the unconscious elicitation of specific emotions like fear and disgust by subliminally exposing people to regular emotional stimuli like growling, mad dogs and dirty, non-flushed toilets.

As we also point out in the title of this Chapter, the influence of perception on emotional responding is thus not restricted to conscious perception. We should acknowledge however, that the likelihood that perceivers consciously perceive an emotional stimulus during specific, fine-grained processing may be greater than during global, positive-negative processing because specific processing starts later and takes more time to complete than global processing. However, there are several important reasons why we assume that both global and specific emotional information processing do not need awareness to occur.

An important theoretical reason for our assumption that emotional responding emerges without awareness of its cause, is the survival value of emotions and emotional reactions. According to an evolutionary perspective on emotions, quick emotional reactions such as immediate flight or withdrawal increase people's chances of survival (Cacioppo & Gardner, 1999; Ekman, 1984; Frijda, 1994; Keltner & Gross, 1999; Öhman, 1992; Scherer, 1984). Fear, for example elicited by a big truck that is quickly approaching, may reduce risk-taking behavior (Lerner & Keltner, 2001) and may elicit a freeze response before crossing the street. Considering that the speed of emotional responding increases when instigated before an emotional event reaches awareness, it seems likely that emotional responses indeed occur unconsciously. An evolutionary perspective also entails that not only humans, but also non-human animals display specific emotional reactions (e.g., Darwin, 1872; Frijda, 1986;

Panksepp, 1998). However, most non-human animals are not widely assumed to be consciously aware of their actions, let alone being aware of the reasons behind their actions.

For adequate responding, our emotional system should be able to automatically detect the valence of the stimulus as well as its specific meaning. Specific body posture cues may for example reveal whether one should fear or aggress a potential attacker (Parkinson & Manstead, 1992). The idea that awareness is not necessary for the emergence of both global and specific information processing has also received empirical support. In addition to the research of Ruys and Stapel (2008a, 2008c), neuro-imaging techniques have shown that unconscious exposure to disgusted, fearful, sad, angry, and happy facial emotional expressions led to differential levels of amygdala and anterior cingulate activity (e.g., Killgore & Yurgelun-Todd, 2004; Morris, De Gelder, Weiskrantz, & Dolan, 2001; Palermo & Rhodes, 2007; Phillips et al., 2004). Furthermore, physiological techniques have demonstrated that unconscious exposures to happy and angry facial emotional expressions evoke distinctive facial electromyographic (EMG) reactions in emotion-relevant facial muscles (Dimberg, Thunberg, & Elmehed, 2000).

Thus, research provides strong support for the idea that emotions can occur without conscious awareness of their cause. However, does this mean that emotions can be unconscious altogether? To answer this question, we need to define more closely what we mean by unconscious emotions. We can distinguish between being unconscious of the emotional event, being unconscious of the link between the emotional event and the experienced emotion, and being unconscious of the emotion or emotional reactions itself. Thus, the emotion elicitor can be unconscious, the link between emotion and elicitor can be unconscious, and the elicited response can be unconscious (Prinz, 2004).

We think the first case –being unconscious of the emotional event-- is most interesting, because it allows us to study relatively “pure” emotional reactions. We say “pure”

because these emotional reactions are less contaminated with folk ideas on the causes of emotions and the appropriate emotional reactions. When emotions are elicited unconsciously, people need more time to consciously control their emotional responses and expressions than when they are conscious of the emotion induction because the emotion has already kicked in. When people are unconscious of the link between a specific emotional event and the experienced emotion, for example when multiple possible causes are present, people are likely to regulate their emotional reactions, despite the fact that they are unaware of the actual cause of the emotional reaction. Regarding the last case, being unconscious of the emotional reactions, one may question what it means if people are unconscious of the emotion itself. As we have argued previously, when people do not become aware of their emotional reactions following an emotional event, this could mean that these emotional reactions are not very intense (see also, Ruys & Stapel, 2008a). When an emotional event is meaningful, the event is likely to trigger an intense emotional reaction and reach awareness. This reasoning is in line with Rolls (2008) who proposed that people become aware of their emotional state because emotions often arise in situations where higher order behavior planning is necessary to deal with an emotional event.

The perception-emotion link and appraisal theories

A global-to-specific unfolding view on emotional responding entails that emotional responses may arise without conscious awareness of their cause. Initial global processing of an emotional event results in global positive-negative reactions and later, more specific processing results in specific, fine-grained emotional reactions. An important question to address is whether this prediction is unique or whether this prediction can also be derived from other theories of emotion, such as appraisal theories. We primarily relate our unfolding view to appraisal theories of emotion to illustrate the assumptions underlying our global-to-

specific unfolding view on emotional responding in more detail.

Whereas our global-to-specific unfolding view can be distinguished from other theories of emotion by its emphasis on emotional responses, appraisal theories of emotion can be distinguished by their emphasis on cognition. A core assumption of appraisal theories is that estimates of the situation (i.e., appraisals) generate specific emotions (e.g., Arnold, 1960; Frijda & Zeelenberg, 2001; Lazarus, 1968). Specifically, a detailed set of appraisal criteria predicts which particular configuration of appraisals will produce a specific emotion in an individual (Frijda, 1988; Lazarus, 1991; Scherer, 1984; Manstead & Fischer, 2001; Zeelenberg, van den Bos, van Dijk, & Pieters, 2002). One could argue that appraisal theories also distinguish between global and specific processing of emotional events. The component process model of Scherer (1984, 1999), for example, postulates a fixed number of predefined stimulus evaluation checks (i.e., appraisals of novelty, intrinsic pleasantness, goal/need conduciveness, coping potential, and compatibility with standards) that determine whether people experience an emotion and what kind of emotion people experience. These stimulus evaluation checks, which are hypothesized to occur sequentially, can be seen as increasingly specific (Grandjean & Scherer, 2008).

A crucial difference between our global-to-specific unfolding view on emotional responding and appraisal theories is that appraisal theories invoke a limited set of cognitive computations (i.e., appraisals) to arrive at emotional reactions, whereas we assume that emotional reactions are directly related to what people perceive. An important example of research showing the relation between perception and emotion is the work of LeDoux (1989), who demonstrated a subcortical pathway between the retinae of our eyes and the amygdala via the thalamus, through which fear responses could be elicited. The thalamus can distinguish coarse visual features that are sufficiently specific to elicit emotional reactions. This work strongly suggests that emotional responding can occur without mediation of the neocortex and

thus without cognitive appraisals. Of course, the fact that emotions occur without cognitive processing does not mean that emotional reactions always occur without cognitive processing. We only refer to this work (and we are not the first) to show that appraisals need not be a prerequisite for emotional responding.

The question is how perception “translates” to emotional reactions without intermediate appraisal processes. In keeping with an embodiment perspective (Niedenthal, Barsalou, Krauth-Gruber, & Ric, 2005), we assume that emotional reactions are associated to specific emotional events or stimulus configurations, just like other physical reactions can be associated to concepts. First, people learn to associate certain stimulus configurations with particular positive or negative consequences and their physical, emotional responses to these consequences. Then, the activation of these stimulus configurations may trigger the associated emotional reactions even before the positive or negative consequences have yet occurred through an automatic pattern completion mechanism. For example, when the brain “recognizes” a stimulus configuration that was associated to a dangerous situation in the past, the system automatically reproduces the associated fear response that accompanied the previous dangerous situation. Consequently, the more specific the information that is available, the more specific the emotional reactions that occur.

The idea that the specificity of the information that is available determines the specificity of the emotional reaction can more easily explain individual differences in emotional responding than the assumption that each emotional event is always appraised on a specific set of universal appraisal dimensions. It also solves the debate between appraisal theorists on which specific, universal appraisals are necessary to distinguish between different emotions. According to some theorists emotional events are primarily appraised in terms of personal significance followed by secondary coping appraisals (e.g., Lazarus, 1991; Weiner, 1985), whereas other appraisal theorists argue that emotional events need to be differentiated

along a relatively larger number of appraisal dimensions (e.g., Evers, Fischer, Mosquera, & Manstead, 2005; Manstead & Fischer, 2001; Parkinson & Manstead, 1992; Scherer, 1984, 1999). Our global-to-specific unfolding perspective on emotional responding predicts that the stimulus configurations that trigger emotional reactions vary between persons, not because different people make different appraisals, but because different people have different prior experiences and have acquired different associations between emotional events and emotional reactions. For example, for people who witnessed the assault on the Dutch queen that was committed by a person driving a black Suzuki Swift, the confrontation with a black Suzuki Swift is likely to trigger fear, despite the realization that other black Suzuki Swifts (and their drivers) are unlikely to be dangerous. For people who did not witness the assault, exposure to a black Suzuki Swift is unlikely to trigger fear.

Our global-to-specific unfolding view of emotional responding also assumes that people can be flexible in how they process information. In contrast to for example the component process model (Scherer, 1984, 1999), we argue that global and specific emotional reactions do not have to occur sequentially. Sometimes people extract specific, detailed knowledge before global, evaluative meaning (see Stapel & Koomen, 2006). Often it makes sense to immediately extract global, positive-negative information, for example to see whether an animal is cute or threatening. However, sometimes it more useful to know whether an animal is a wasp or a mosquito by extracting detailed information. Specifically, immediate specific processing occurs when the emotional event is processed *top-down*. This means that people are already attuned to a specific kind of information, for instance due to the activation of a particular goal or when specific features are diagnostic for a task (Storbeck & Robinson, 2004; Corbetta & Shulman, 2002). However, when information processing is stimulus-driven or *bottom-up*, we assume that a global-to-specific unfolding of emotional responding occurs. Thus, when people are confronted with an unexpected emotion elicitor (e.g., a favorite

dessert, a poisonous snake, a smiling face) global, positive-negative reactions typically occur prior to specific, detailed emotional reactions.

Appraisal theories of emotion and our global-to-specific unfolding view on emotional responding also differ in that our view emphasizes emotional *reactions* rather than the cognitions that may precede emotions. In contrast to most appraisal theories of emotion, our global-to-specific unfolding view on emotional responding provides more detail on emotional reactions that develop in response to an emotional event. At present it remains relatively unclear how people react in response to the generation of appraisals. We propose that which specific emotion is produced after exposure to an emotion-eliciting stimulus depends on the information that is cognitively activated during such exposure and on prior emotional experiences. The accessibility of global positive-negative feelings, cognitions, and behaviors is increased after global processing of the emotional event, which may result in a positive or negative mood. Accessibility of specific, fine-grained emotional responses is increased after specific processing of the emotional event, which may result in a specific emotion like fear, anger, happiness, disgust, surprise, or sadness. Thus, moods can be characterized by the activation of global, diffuse evaluative information, whereas emotions are characterized by the activation of specific, fine-grained information.

At first sight, our global-to-specific unfolding view on emotional responding might seem similar to appraisal theories of emotion. However, as we made clear, the assumptions underlying both viewpoints show profound differences. Most important is our assumption that emotions unfold in a way that is similar to the unfolding of perception because emotions arise as a result of prior associations with these perceptions. We also assume that emotional responding is flexible in the instigation of global and specific processing and emphasize people's emotional reactions in terms of feelings, cognitions, and behaviors.

Interaction of global and specific processing

In the previous sections of this Chapter we have emphasized the idea that emotional events can be processed globally and more specifically resulting in global and specific emotional responses. A natural question is whether the systems that are responsible for these two modes of processing operate independently, or whether these systems interact. We argue for the latter option and assume that initial, diffuse evaluative reactions (resulting from global processing) may influence the kind of specific, fine-grained reactions that occur (resulting from specific processing). For example, the initial, positive or negative reaction to a friend's proposal to go on a skiing trip to Austria might influence whether you focus on the positive aspects of the skiing trip (e.g., snow guaranteed) or the negative aspects of this trip (e.g., long drive). Thus, an intriguing possibility is that initial, evaluative reactions resulting from global, coarse information processing may determine the details that receive attention during specific information processing.

This possibility that initial, evaluative reactions influence later, detailed, specific reactions is supported by neurological evidence. Neurological research indicates that global and specific processing depend on different systems in the brain (Adolphs, 2003; Derryberry & Tucker, 1994; Fink, Halligan, Marshall, Frith, Frackowiak, & Dolan, 1996; LeDoux, 1989; Tucker & Williamson, 1984; Zajonc, 2000). Adolphs (2003) for example suggested that coarse perceptual processing is initiated at the superior colliculus and feeds into the amygdala, striatum, and orbitofrontal cortex, whereas detailed perceptual processing takes place at the higher-order sensory cortices, including the fusiform gyrus and the superior temporal gyrus. Importantly, the coarse processing system, responsible for global, evaluative reactions to stimulus events has numerous physical interactions with the fine-grained processing system responsible for specific, descriptive processing (Adolphs, 2003). Thus, if we consider that global, evaluative processing of a stimulus ends before specific, descriptive processing is

complete, it seems likely that through the interactions between the two systems, early positive-negative reactions may serve as input for specific, descriptive processing.

A psychological phenomenon that illustrates how global, evaluative processing interacts with specific, descriptive processing is the formation of impressions. When positive impressions are important, many people refer to the following famous expression: “you never get a *second* chance to make a good *first* impression”. This folk wisdom suggests that initial, first impressions have a strong impact on the remainder of the person perception process. Thus, a positive first impression of a job candidate makes it easier to see the positive aspects of this person than a negative first impression. The idea that first impressions influence later, more secondary impression formation processes is in line with our global-to-specific unfolding view on emotional responding. Global-to-specific unfolding predicts that perceivers initially experience global, positive-negative reactions to a target person that are followed by more specific, fine-grained emotional reactions (Ruys & Stapel, 2008a, 2008b, 2008c; Stapel et al., 2002). An interesting, additional hypothesis is that global processing *interacts* with specific processing. Because global, evaluative reactions typically occur prior to more specific, detailed reactions, it seems highly plausible that global reactions indeed influence the content of more specific reactions.

The idea that global, evaluative reactions to a person influence later, specific processing is supported by a study of Niedenthal and Cantor (1986). They showed that people are more likely to apply a given description to a target person when this description and the first impression of the target person have the same valence (i.e., are evaluatively congruent). Participants judged it for instance more likely that a target person was a “recreational sportsman” (a positive description) than a “scheming politician” (a negative description) when this target person displayed dilated pupils that typically cause a positive first impression, rather than constricted pupils that typically cause a negative first impression (Niedenthal &

Cantor, 1986). Thus, people's initial, global impressions of a target person determined to what extent people were willing to apply specific, detailed information to this target person.

A next question is whether global, evaluative reactions to a target person also spontaneously influence later, specific, fine-grained processing of features that are inherent to the target person. Is it for instance the case that global, evaluative reactions facilitate the spontaneous activation of evaluatively congruent, descriptive features? If global, evaluative processing indeed interacts with specific, descriptive processing, this could mean that perceivers are likely to focus on those specific features (e.g., gender, race, dress) that are evaluatively congruent with the perceivers' first impression. For example, when exposure to a very unattractive, cigarette-smoking woman initially elicits a global, negative reaction, it seems more likely that this negative reaction facilitates the activation of "smoking" (an evaluatively congruent, negative feature), than the activation of "woman" (an evaluatively incongruent, positive feature).

Ruys, Dijksterhuis, and Corneille (2008) tested the hypothesis that initial, global evaluative reactions spontaneously facilitate the activation of evaluatively congruent specific information. In two, speeded dichotomous categorization experiments, participants were instructed to indicate (as quickly as possible) the social category of the target person that appeared on the screen, choosing between a positive and a negative social category. Ruys and colleagues (2008) expected that *attractive* target persons would elicit a global *positive* reaction that would lead to faster and more accurate responses when the remaining specific features of the target person were also positive (e.g., "fellow-citizen", "bride"), compared to when these features were negative (e.g., "foreign", "prostitute"). They also expected that *unattractive* target persons would elicit a global *negative* reaction that would lead to faster and more accurate responses when the remaining specific features of the target person were also negative, compared to when these features were positive. Participants should thus respond

more quickly and more accurately when global, evaluative reactions to a target person evaluatively match the specific features of the person, because these global evaluative reactions facilitate the activation of evaluatively congruent specific features (Ruys et al., 2008).

In one study, Ruys and colleagues (2008) tested this hypothesis by having participants categorize target persons either as “foreign” or as “fellow-citizen”, features that were pre-tested as negative and positive respectively. To remove the inter-group confound, they also conducted a second study where participants categorized target persons either as “prostitute” or as “bride”. Both studies show that categorization was more rapid and more accurate when the attractiveness of the person evaluatively matched the remaining specific features (e.g., with “unattractive foreigners”, “unattractive prostitutes”, “attractive fellow-citizens”, and “attractive brides”), than when the attractiveness of the person evaluatively mismatched the remaining specific features (e.g., with “attractive foreigners”, “attractive prostitutes”, “unattractive fellow-citizens”, and “unattractive brides”). These findings indicate that initial global, evaluative reactions may indeed facilitate the activation of remaining specific information when this information is evaluatively congruent (Ruys et al., 2008). On a more general level, these studies provide evidence for the hypothesis that global and specific processing interact.

Interestingly, these recent findings (Ruys et al., 2008) and our global-to-specific unfolding view contradict the common view that the activation of stereotypes guides initial impressions of people (Allport, 1954; Brewer, 1988; Kawakami, Dion, & Dovidio, 1998; Macrae, Milne, & Bodenhausen, 1994). According to this view, when perceivers form an impression, they categorize people as Black, female, or skinhead, and this categorization process results in the activation of specific knowledge associated with that category (i.e., the stereotype). The activated specific knowledge, in turn, further guides the impression

formation process. We call into question whether the activation and application of stereotypes is indeed the first thing social perceivers do upon encountering a person, and suggest that stereotype activation is better characterized as a “downstream” process that follows from earlier processes. As predicted by global-to-specific unfolding and demonstrated empirically, most stimuli initially elicit global, evaluative reactions (“Barney is nice”) prior to more specific, detailed reactions like the activation of stereotypical information (“Barney is a priest”).

Recognition and simulation of facial emotional expressions

Besides examining the interactions between global and specific emotional reactions, another interesting angle is to examine how global and specific emotional reactions interact with further emotional processing such as recognition and simulation of facial emotional expressions. We speculate that global and specific emotional reactions have a differential impact on these processes.

Based on affective priming research in general (e.g., Fazio, 2001) and research regarding the interaction of global and specific processing of emotional information in particular (Niedenthal & Cantor, 1986; Ruys et al., 2008), we expect that global emotional reactions (i.e., positive or negative moods) facilitate the recognition of affectively congruent facial emotional expressions and delay the recognition of affectively incongruent facial emotional expressions. Thus, people detect and recognize a happy facial expression more readily than a fearful or angry facial expression when they feel good compared to when they feel bad.

Specific emotional reactions might impact the recognition of facial emotional expressions in a different way. Researchers have proposed that covert or overt simulation of a facial emotional expression facilitates the recognition of that facial emotional expression

(Enticott, Johnston, Herring, Hoy, & Fitzgerald, 2008; Gallese, 2006; Goldman & Sripada, 2005; Hess & Blair, 2001; Niedenthal, Brauer, Halberstad, & Innes-Ker, 2001; Oberman, Winkielman, & Ramachandran, 2007). For example, recognition of a joyful expression is facilitated when the joyful expression also activates the same joyful expression in the perceiver.

This assumption -- that simulation facilitates recognition -- suggests that impeding simulation of a particular facial emotional expression also impedes recognition of that facial emotional expression in someone else. We think that the experience of a specific emotion might be a situation wherein simulation of the associated emotional expression is impeded. When people experience a specific emotion such as fear, this involves the (micro) activation of a fearful facial emotional expression. In particular, experiencing a specific emotion activates the motor program that is responsible for contracting or relaxing of the facial muscles that produce the associated facial expression. The occupation this motor program and activation of the associated facial musculature could impede imitation of a similar facial emotional expression. Thus, the experience of fear might render recognition of fearful facial expressions more difficult.

The idea that the experience of a specific emotion hinders recognition of the facial emotional expression associated to that emotion received some empirical support (Niedenthal et al., 2001). In this research, participants indicated, after the induction of happiness or sadness, the offset of a happy (or sad) facial expression that changed into a sad (or happy) facial expression. The results showed that participants more quickly detected the offset of a congruent facial emotional expression than the offset of an incongruent facial emotional expression. Another interpretation of these results is that participants more quickly detected the *onset* of an incongruent facial emotional expression than the *onset* of a congruent facial emotional expression. The experience of happiness or sadness thus seemed to delay

recognition of the corresponding facial emotional expression. This is in line with our idea that experiencing a specific emotion hinders recognition of the associated facial expression in others. However, to conclude that the experience of a specific emotion hinders recognition of the facial emotional expression associated to that emotion more evidence is necessary.

A final note we need to make is that the impact of simulation on the recognition of a facial emotional expression is minimal when recognition of the expression is fairly easy. Simulation of facial emotional expressions plays a more profound role in recognition when facial emotional expressions are more difficult to distinguish. Consequently we assume that the influence of experiencing a specific emotion on the recognition of the associated facial emotional expression increases when the facial emotional expression becomes harder to decipher. However, these claims remain to be tested empirically.

Conclusion

In this Chapter we presented a global-to-specific unfolding view on emotional responding. This view entails that emotional responses follow the unfolding of perception and processing of emotional events. In keeping with the contention that perception typically unfolds from global to specific (Navon, 1977), we showed that emotional responding develops from global, positive-negative emotional reactions (e.g., moods) to more specific fine-grained emotional reactions (e.g., anger, fear, disgust). We also demonstrated that both global and specific emotional reactions occur without knowing the cause of these emotional reactions. Thus, both moods and emotions can be triggered unconsciously.

We discussed the assumptions that underlie our global-to-specific unfolding view on emotional responding in more detail by contrasting our view with appraisal theories of emotion. One assumption is that the two systems responsible for global and specific processing are highly intertwined. We discussed research suggesting that global and specific

processing do not operate independently but may interact. We ended this Chapter by speculating about the differential impact of global and specific emotional responding on recognition of facial emotional expressions. Looking into the consequences of global and specific emotional responding on further emotional processing seems a promising avenue for future research.

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