Emotion regulation as a change of goals and priorities

Question 7. How are emotions regulated by context and cognition?

Emotion regulation as a change of goals and priorities

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At first glance, the notion of "emotion regulation" seems intuitive and distinct from "emotion" per se. When asking someone to describe what they think emotion regulation is, some notion of "controlling" the emotion or "changing" the emotion as a function of the context is often brought forth. However, the differentiation between "emotion" or "emotion reactivity" and "emotion regulation" is in fact tricky. In classes and empirical work, we often quote Thompson's (1994) definition of emotion regulation: "Emotion regulation consists of the extrinsic and intrinsic processes responsible for monitoring, evaluating, and modifying emotional reactions, especially their intensive and temporal features, to accomplish one's goals" (p. 27-28). Put more simply: regulation refers to a process, different from the original one that elicited the emotion in the first place, that changes the original emotion. The latter part is the crux of the issue: As we often discuss with our students, when does the reactivity stop and the regulation start? Can you distinguish emotion-generative processes from emotion regulatory processes, especially when one considers the emotion process to be iterative? This issue was at the core of a discussion between Gross et al. (2011) and Mesquita and Frijda (2011). The viewpoint we adopt here is that emotion regulation results from a change of one's goal (cf. Mesquita and Frijda, 2011), the adoption of an additional goal, or a change in the weighting or importance that we assign to different goals. However, unlike Mesquita and Frijda, we think that the goal does not have to be emotional in nature. Indeed, sometimes the quality or intensity of emotion is changed due to pursuance of a cognitive or social goal that is non-emotional. Studying for an exam is a good example, whereby anxiety experienced at the thought of failure may get in the way of the cognitive processes required for learning the course material. Emotion regulatory processes then consist of prioritising the goal of "learning the course material", and attempting to block out thoughts about one's ability to perform in the exam hall. A variety of experimental paradigms have been applied to understanding emotion regulatory processes, with a considerable increase since the early 2000s. In what follows, we review a few such paradigms, and discuss where these paradigms "sit" within the framework of emotion regulation.

A frequently employed paradigm, firstly developed by James Gross and colleagues (e.g. Gross, 1998) and adopted by many since including us, is that of instructed emotion regulation. The paradigm consists of instructing participants to employ one of several strategies to change their emotion in a given direction (most commonly decreasing negative emotions, though increasing both positive and negative emotions has also been examined in some studies). Strategies for emotion regulation have included reappraising the emotion-eliciting stimulus by reframing the meaning in a more positive or less negative light, distancing oneself from the object of the emotion (e.g. "the situation is not real or does not concern me"), shifting one's attention to different aspects of the situation or context, as well as response-focussed regulation such as suppressing the (expressive) reactions to an emotion-eliciting stimulus. Typically, conditions in which participants are asked to invoke one of these strategies are compared to a "respond naturally" condition. Over the years, researchers have demonstrated the efficacy of reappraisal in reducing negative emotional responses (e.g. Jackson, Malmstadt, Larson, & Davidson, 2000; Hajcak & Nieuwenhuis, 2006), that suppression may be less effective than reappraisal in dampening negative and positive emotion (e.g. Kalokerinos, Greenaway, & Denson, 2015) and can have negative social consequences (e.g. English & John, 2013), and that attentional shifts might explain differences in how effectively individuals are able to regulate their emotions (van Reekum et al., 2007). Since the early 2000s, brain imaging research has provided insights into the neural pathways underlying successful employment of reappraisal (Ochsner, Bunge, Gross, & Gabrieli, 2002; Schaefer et al., 2002; see Buhle et al., 2014, and Frank et al., 2014, for recent meta-analyses), and highlighted differences in the processes underlying reappraisal in clinical populations (e.g. Johnstone, van Reekum, Urry, Kalin, & Davidson, 2007; Ball, Ramsawh, Campbell-Sills, Paulus, & Stein, 2013) and those at risk for psychopathology (e.g. Erk et al., 2010; Uchida et al., 2015).

Instructed emotion regulation paradigms are useful in examining the ability of individuals to change the emotional response elicited by a stimulus or event when given a specific regulatory strategy. At the same time, experimental and conceptual issues limit our ability to examine the regulatory processes with a high degree of specificity. A major issue is knowing what the person is "doing" when instructed to, for instance, think of a less negative outcome for a picture depicting a car crash, or a mutilated body part. Are they following instructions to use reappraisal? And if they are, is that the only thing they are doing? As highlighted by our findings employing pictures to elicit negative affect (van Reekum et al., 2007), when people are instructed to reappraise an image, they also change the way that they visually scan the image. So the extent to which changes to emotional responses are attributable to the putative regulatory mechanism is not known. One can attempt to control for such confounds with appropriate measures (cf. van Reekum et al., 2007) but a better approach is to explicitly manipulate them (e.g. Urry, 2010). Another issue, one that has been with emotion research for decades, is that self-report is often the sole dependent measure of emotion regulatory outcome. In instructed emotion regulation paradigms, there is no attempt to disguise the purpose of the experimental instructions. When explicitly instructed to reappraise a stimulus in such a way as to make it less emotional, isn't it obvious that many people will subsequently rate their subjective feeling state as less emotional? The use of emotional response measures that are less prone to demand characteristics is imperative in supporting any claims that the wilful employment of regulatory strategies changes the emotional response. In any case, emotion is comprised of a multitude of components, all of which deserve the attention of the emotion regulation researcher. Self-report of subjective feeling should enjoy no privileged status.

A further issue often underappreciated in instructed emotion regulation studies is how the choice of the control condition can influence the results and their interpretation. To use the example of reappraisal of negative emotion, how many studies have compared a reappraisal condition designed to reduce negative emotion with a reappraisal condition designed to be emotionally irrelevant? Studies that have included an “increase” as well as a “decrease” condition go some way to addressing this problem. Still, only by using an equally demanding, carefully matched, *neutral* reappraisal control can we be sure that a reduction in emotional response is due to specific reappraisal goals, and not the automatic dampening effect that *any* evaluative process might have on emotional responding.

A final issue to consider, particularly in studies that examine individual differences, is that emotional responses in the control condition might already be regulated by some of the participants, even if not deliberately so. Indeed, in most laboratory settings, some form of regulation likely intrinsically occurs, given the presence of an experimenter and that the participants know that their responses are recorded. Emotion is a process in which a continuous re-evaluation of our environment and our goals leads to updating of our emotional responses. Why should the outcome of one such evaluation be considered “response” and another “regulation”? Yet it does seem useful to distinguish between one’s initial emotional response to a situation and how one subsequently can modify that response. One possible way to address this issue at a psychological level of description is to make a distinction between intrinsic or spontaneous regulation, as opposed to wilful, or deliberate regulation (see also Gyurak, Gross, & Etkin, 2011). Alternatively, at a neural level of description it might be possible to separate emotional responses from regulation of those responses, though even that turns out to be less clear than one might think (see Question 4).

The empirical study of “intrinsic” or “spontaneous” regulation can be achieved in different, more constrained, ways, however. One way is to affect the task goal or context within which an emotional stimulus is presented: A participant can be asked to complete a non-emotional task (e.g. a working memory task) while at the same being exposed to emotional stimuli that serve as task-irrelevant distractors. In this case, the participant is not explicitly told to instigate, or change, a regulatory goal with respect to the emotional state or stimulus, but is provided with a different goal - that of performing in a cognitive task - that requires dampening of any emotional response to the distractor stimulus, particularly as task demand increases. For example, Clarke & Johnstone (2013) asked participants to perform a visuospatial N-back task under threat of electric shock designed to elicit anxiety (see also Shackman et al., 2006). In the low cognitive load (2-back) condition, threat of shock was found to interfere with task performance, but this interference was not seen for the 3-back condition. Brain imaging and psychophysiological measures indicated that this was the result of recruitment of prefrontal cortical regulation systems in the high cognitive load condition. A number of studies have applied similar paradigms to show that under high cognitive load, individuals can reduce or eliminate interference by a variety of emotional distractors (e.g. Van Dillen, Heslenfeld, & Koole, 2009; Uher, Brooks, Bartholdy, Tchanturia, & Campbell, 2014). An interesting question arising from such studies is what is actually being regulated? Although interference of emotional distractors on a cognitive task is reduced, other indicators of emotional response (e.g. autonomic responses) may not be. The components of an emotional response that are regulated might depend very much on the specific context.

Another example of the spontaneous regulation of emotional responses is fear extinction. Extinction of learned fear is considered an active process that involves the learning of a new association that competes with the one stored in memory during acquisition (e.g. Pearce & Hall, 1980; see also Vurbic & Bouton, 2014), which differs from older accounts emphasising the weakening of previously learned associations through repeated presentations of non-reinforced CS+. In terms of the underlying processes, fear extinction is relatively well understood. The consistency with which areas in ventromedial prefrontal cortex (VMPFC) are involved in fear extinction across animals (e.g. Milad & Quirk, 2002) and humans (Phelps, Delgado, Nearing, & LeDoux, 2004; see also VanElzakker, Kathryn Dahlgren, Caroline Davis, Dubois, & Shin, 2014 for a review) indicates the central role this area plays in the flexible assignment of value to stimuli or context, biasing activation in the amygdala. Neuroimaging findings underscore the functional overlap in neural circuitry underlying extinction of conditioned fear, reversal of fear conditioning and voluntary regulation of learned fear (Schiller & Delgado, 2010) including the VMPFC. The overlap would suggest that at least some processes are shared across these 3 fear-modulatory strategies. Indeed, recent evidence obtained from lesion patients suggests that the VMPFC plays a crucial role in the regulation of amygdala activity (Motzkin, Philippi, Wolf, Baskaya, & Koenigs, 2015). The well-demarcated crucial part of the network, a solid grasp on the processes involved in extinction, and the relevance to psychological treatment, renders fear extinction useful to the study of psychopathology, particularly PTSD and anxiety. Recent findings from our laboratory suggest that intolerance of uncertainty, a component of anxiety, is associated with the ability to recruit VMPFC during extinction. This relationship holds after controlling for general trait anxiety (Morriss, Christakou, & van Reekum, 2015). Despite their importance, however, conditioning paradigms are limited to the study of regulation of a relatively small set of affective states.

Finally, the study of the time course of emotional processes, or “affective chronometry”, a term first coined by Davidson (1998), is relevant to questions concerning what constitutes emotion regulation (see also Kuppens & Verduyn, 2015). Whereas the dynamics of emotional processes have been under study in the past using self-report (e.g. Sonnemans & Frijda, 1994; Verduyn, Delvaux, Van Coillie, Tuerlinckx, & Van Mechelen, 2009), psychophysiological responses (e.g. van Reekum et al., 2004) and ERP (e.g. Schupp et al., 2000), the focus in past work has been on the time course of emotion-eliciting processes and overall duration, rather than on the time course of the termination of emotion (but see Sonnemans & Frijda, 1994, for an early assessment of how felt intensity and duration are modulated by emotion “ending” processes including active regulation). More recently, the study of “emotional recovery” - that is the time it takes for an emotional response to reduce to a relative baseline after reaching it’s nadir - is rightfully gaining more attention in the field. Two approaches to study emotional recovery have proven informative: The first provides information about how the various components of emotions demonstrate continued modulation by emotion-relevant stimuli after the offset of the stimuli, and the second focuses on how individual differences in personality and emotional disposition predict the recovery from emotional challenges.

With regard to the first approach, several studies (Ihssen, Heim, & Keil, 2007; Weinberg & Hajcak, 2011; Morriss, Taylor, Roesch, & van Reekum, 2013) employed event-related potentials (ERP) to demonstrate disrupted processing in task-relevant stimuli presented up to 3.5 s after the offset of emotionally arousing pictures. Various psychophysiological indicators such as the late positive potential (e.g. Hajcak & Olvet, 2008), eyeblink startle (e.g. Jackson et al., 2003) and corrugator activity (e.g. van Reekum et al., 2011), suggest that emotional pictures continue to modulate responses between 1 and 5 seconds after offset. Further work should establish the extent to which different emotions and the components of each emotion may have different recovery profiles, including felt emotion, emotional expressions, and bodily concomitants of emotion. It will also be necessary to augment lab-based studies with experience sampling of emotions in daily life, to determine how lab findings generalise to everyday experienced emotions that can stretch over minutes, hours, even days.

Emotional recovery has most commonly been studied in terms of individual differences (e.g. Jackson et al., 2003), in an effort to increase our understanding of how positive and negative emotional disposition, well-being and resilience, age and cognitive reserve, interpersonal experience, and psychopathology are related to the time course of emotional responding and recovery. Recent research has highlighted the utility of this approach: Marital stress has been found to be associated with shorter-lived responses to positive pictures but was not associated with reactivity to or recovery from negative pictures (Lapate et al., 2014). Advancing age was seen to be related to a slower recovery from a social-cognitive stressor (Wrzus, Müller, Wagner, Lindenberger, & Riediger, 2014) although this may be situation-dependent, since another study found little effect of age-related differences in the recovery from positive and negative pictures (van Reekum et al., 2011). Anxious apprehension has been associated with eyeblink potentiation after the offset of negative and positive pictures, whilst anhedonic depression was characterised by a continued blunted response to positive pictures after picture offset, although no differences were found between those high in anhedonic depression and controls in the recovery from negative pictures (Larson, Nitschke, & Davidson, 2007). Similarly, individuals diagnosed with major depressive disorder demonstrated less sustained responding to positive emotional stimuli over time in frontostriatal networks compared to controls (Heller et al., 2009), whilst enhanced responding in this network over time has been associated with high self-reported psychological well-being and lower cortisol output in daily life (Heller et al., 2013). In summary, these studies illustrate that variability in the time course of the emotional response, particularly after the offset of the challenge, is an important factor in understanding emotional disorder and well-being. Whilst still in its infancy, the study of emotional recovery can provide important clues to psychological intervention.

All of these forms of emotion regulation have one thing in common: they all involve the change of goals or the way we prioritise different goals. We can bring about this change via deliberate cognition, but in many instances the change in goal priorities might come about unconsciously, as an adaptive response to changing context.

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