

CHAPTER 32

Emotion Generation and Emotion Regulation

Moving Beyond Traditional Dual-Process Accounts

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From classical philosophers such as David Hume to early psychologists such as Sigmund Freud, the distinction between processes that generate emotion and those that regulate emotion has featured prominently. This distinction has also dominated modern emotion theory and research (e.g., Gross, 1998a, 2001; Gross & Thompson, 2007; Koole, 2009). However, an alternative view that describes emotion and regulation as inseparably bound up with one another has emerged in recent years (e.g., Campos, Frankel, & Camras, 2004; Kappas, 2011; Mesquita & Fridja, 2011; Thompson, 2011). Recently, we have attempted to reconcile these contrasting views by suggesting that different theoretical perspectives on emotion lead to preferences to make (or not make) such a distinction (Gross & Barrett, 2011; Gross, Sheppes, & Urry, 2011a), and we have tried to define when the distinction is useful and when it is not (Gross, Sheppes, & Urry, 2011b).

In this chapter, we revisit this debate from the standpoint of a dual-process perspective. To that end, we begin by clearly defining emotion generation and emotion regulation, and by describing considerations that justify their separation (Gross, Sheppes, & Urry, 2011a, 2011b). We then describe a dual-process model that uses a classic framework according to which emotion gen-

eration is executed via associative processes and emotion regulation via reflective processes (Gross & Thompson, 2007; Sheppes & Gross, 2011, 2012). Although this model is broadly consistent with prior experimental work in the field, we argue that emerging evidence challenges this classic categorization and suggests the value of making a further division within the emotion regulation concept that includes the operation of both associative and reflective processes (e.g., Berkman & Lieberman, 2009; Gyurak, Gross, & Etkin, 2011; Mauss, Bunge, & Gross, 2007).

DEFINITION OF TERMS

Emotions play a central part in our lives. The experience of fear may help us to be more vigilant when we walk in a dark alley at night, and surprise followed by happiness may facilitate our appreciation when we meet an acquaintance we did not expect to see. We can then experience sadness when the acquaintance shares with us his recent job loss experience or switch to experiencing anger or even genuine disgust (Chapman, Kim, Susskind, & Anderson, 2009) if we perceive the reason for the job termination to be fundamentally unfair. Though clearly central in our lives, emotions are invoked in

unique circumstances and are not experienced all of the time. What are the unique circumstances in which emotions are called into being?

Emotion Generation

From an evolutionary perspective, emotions are induced to prepare the organism and to produce responses that will be advantageous to the organism or to its relations (Damasio, 1999). Specifically, emotions are generated when an organism attends to a certain situation that is given a valenced meaning, and this evaluation gives rise to a coordinated set of experiential, behavioral, and physiological responses (Gross, 1998a, 1998b, 2001, 2002). Going back to the previous example, if we attend to the features of the dark alley and appraise it as potentially dangerous, we experience fear, that involves behavioral (e.g., facial expressive behavior; Ekman, 1992) and physiological (e.g., increased sympathetic activation; Kreibig, 2010) responses.

In Figure 32.1, we present in schematic form the situation–attention–meaning–response sequence that constitutes an emotional response. We use a rather abstract definition here, which we call the “modal model” of emotion, because emotions form such a heterogeneous category, with different types, intensities, and durations, that it is difficult to make generalizations that apply to all cases. Despite fundamental differences between emotions, we wish to emphasize three common features for different emotional episodes.

First, emotions arise when a situation is construed as being relevant to one or more of an individual's personal strivings or active goals (Scherer, Schorr, & Johnstone, 2001). Some of these goals may be biologically

based (e.g., avoiding physical harm). Others may be culturally derived (e.g., protecting familial dignity). Some of these goals may be social (e.g., helping an older adult cross the street). Others may be self-focused (e.g., wanting to meet one's own expectations). Because many goals are usually active at any one time, the most dominant goal dictates which, if any, emotion will be activated and to what degree. Whatever the details of the emotion-generating goals that are active at a particular point in time, and whatever the details of the situation the individual faces, it is ultimately the situational meaning in relation to a goal that gives rise to an emotion. As either the goal or the individual's construal of the situation changes, so will the emotion.

A second common feature is that emotions are multifaceted, embodied phenomena that involve loosely coupled changes in the domains of subjective experience, behavior, and peripheral physiology (Mauss, Levenson, McCarter, Wilhelm, & Gross, 2005). The experiential component of emotion, which is also defined as feeling, is a private state or an internal representation of the changes invoked by the emotional unfolding (Damasio, 1999). The behavioral component of emotion includes changes in activity in muscles of the face and body, and in what one says, as well as more general changes in basic motivational states, such as the likelihood of approaching or withdrawing from something in the environment (Frijda, 1986). The peripheral physiological component of emotion includes the autonomic and neuroendocrine responses that putatively provide metabolic support for anticipated and actual behavioral responses (Levenson, 1999).

A third common feature is that emotions play out in ways that are sensitive to the particular details of a given internal or external environment. This means that, under some circumstances, emotions can take full control (Frijda, 1986). For example, walking around the streets of Paris, a person's dominant goal may be sightseeing. But if a stranger pulls a knife and asks for all of the person's money, his or her dominant goal quickly becomes survival, and fear takes over. In this case, the emotion-related goal (survival) has overridden the non-emotion-related goal (sightseeing). However, emotions do not always trump other goal-driven

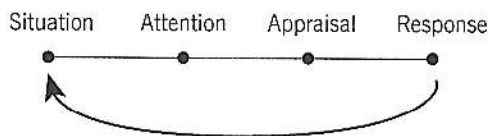


FIGURE 32.1. A schematic of the emotion generative process. From Gross and Thompson (2007). Copyright by The Guilford Press. Reprinted by permission.

processes (i.e., processes related to meeting active goals; e.g., sightseeing in the previous example that is unrelated to the emotion-generating goals). This means that emotions can be and often are adjusted to suit our needs in a given situation. It is this third common feature of emotion that permits us to regulate our emotions.

Emotion Regulation

Emotion regulation refers to the processes that influence which emotions we have, when we have them, and how we experience or express these emotions (Gross, 1998a). Recently, we highlighted that emotion regulation should be defined by the activation of a goal to modify the emotion generative process, and involves the motivated recruitment of one or more processes to influence emotion generation (Gross et al., 2011a). Whether we consult our own experiences or the empirical literature, it is clear that emotions may be regulated in many different ways (Gross, Richards, & John, 2006).

One important point of difference across emotion regulation episodes is whether the emotion regulatory goal is activated in the individual who is having (or is likely to have) an emotion episode or in someone else. An example of the first type of emotion regulation episode—which we refer to as *intrinsic emotion regulation*—is when someone tries not to think about something that is upsetting. An example of the second type of emotion regulation episode—which we refer to as *extrinsic emotion regulation*—is when a friend calms us down by putting an upsetting situation in perspective. While extrinsic emotion regulation remains important in adulthood, it is perhaps the most dominant form of emotion regulation in infancy where parents have a crucial role in helping infants to develop an ability to regulate their emotions (Macklem, 2008).

A second point of difference across emotion regulation episodes is whether the motivation to engage in emotion regulation is *hedonic* (the goal to feel less negative or more positive in the near-term) or *instrumental* (to achieve one's long-term goals) (Tamir, 2009). In some cases these two types of goals are congruent, for example, when a person tries to decrease fear and anxiety because it makes him or her jittery in the

moment and at the same time can hurt his or her long-term health. At other times these goals can compete, for example, when one wants to avoid a certain dreaded situation in order to feel relief in the short run that in the long run perpetuates the situation.

Finally, emotions can be *down-regulated* when the goal is to decrease the magnitude or duration of a certain emotion response, or *up-regulated* when the goal is to increase the magnitude or duration of an emotional response. While the obvious examples of down-regulation involve decreasing negative emotions, and the obvious examples of up-regulation involve increasing positive emotions, there are many instances in which one's instrumental goals are to down-regulate positive emotions or up-regulate negative emotions (Tamir, 2009). For example, a person on a diet might try to reduce his or her joy when eating high-calorie food, or a person who wishes to avoid certain dangers might prefer to up-regulate his or her fear levels (Tamir & Ford, 2009). Though all of these types of emotion regulation are clearly important, we focus in this chapter on down-regulation of negative emotions, because it is one of the most common and important types of regulation.

Distinguishing Emotion Generation from Emotion Regulation

The difference between emotion generation and emotion regulation is a distinction between the processes that generate an emotion in a particular situation, and the processes that are engaged to modify these emotion generative processes.

Recently, we have argued that although both emotion generation and emotion regulation involve goals, a process is emotion regulatory if, and only if, it is instantiated in pursuit of a goal to influence an ongoing or future emotion (Gross et al., 2011a). Therefore, the target of an emotion regulation goal is always the emotion-generative process. This is in contrast to the goals that generate emotion, namely, those that are instantiated in pursuit of a particular outcome. Therefore, the target of an emotion generation goal can be either the internal or the external environment. As we explain below, it is often difficult to discern when a goal to regulate emotion has been activated, and

emotion generation and emotion regulation often (but not always) co-occur. However, it is the targeting of an ongoing or future emotion generative process for change that constitutes emotion regulation.

In most everyday situations, the emotion trajectory that we observe is the result of a complex interplay between emotion generative and emotion regulatory processes. The challenge is to determine—for any given case—whether a goal to modify an emotion has been activated, leading to the recruitment of regulatory processes and (often) to the alteration of the emotion response trajectory. We find it useful to imagine a continuum of possibilities, ranging from cases where there are clear and compelling grounds for inferring that emotion regulation processes are operative to those in which there is little ground for thinking that emotion regulation processes are operative.

At one end of this continuum, there are clear signs that a stable, dominant emotion regulation goal has been activated, leading to the recruitment of regulatory processes and to the alteration of the emotion response trajectory. In these situations, it seems useful to postulate two separable factors that govern the way the individual is responding in that particular situation: emotion generation and emotion regulation. At the other end of the continuum, there is no clear indication that a stable, dominant emotion regulation goal has been activated or that the emotion response trajectory has been altered (e.g., the individual behaves in a way that is similar to his or her behavior when freely expressing a certain emotion). In this case, it seems most parsimonious to invoke only emotion generative (and not emotion regulatory) processes.

Perhaps most interesting are cases in which (1) there are clear indications that an emotion regulation goal has been activated, yet we cannot detect any change in the emotion trajectory, or (2) there is no clear sign that an emotion regulation goal has been activated, yet the emotion trajectory is altered. In the former case, we might invoke ineffective (or failed) emotion regulation. In the latter case, if there is no indication that an emotion regulation goal has been activated, and no evidence for the recruitment of emotion regulatory processes, the individual's response may best be explained more simply, in terms of

emotion generative (and not emotion regulatory) processes. These “intermediate” cases may be more the norm than the exception as one moves away from controlled laboratory studies toward everyday social interactions, where most of our emotions play out, and where the interdigitation of emotion generation and emotion regulation may be most pronounced (Campos, Walle, Dahl, & Main, 2011).

Wherever we are on this hypothetical continuum, invoking emotion regulatory processes requires activation of an emotion regulatory goal, and in many cases results in an observed emotion trajectory that is different from the (hypothetical) emotion trajectory that would have unfolded in the absence of emotion regulation. This highlights the fact that statements about emotion regulation—like other psychological constructs—are inherently probabilistic.

A DUAL-PROCESS ACCOUNT OF EMOTION GENERATION AND EMOTION REGULATION

Distinctions between emotion generation and emotion regulation are important, but what is essential is defining the processes underlying each. Consider the process model of emotion regulation (for reviews, see Gross, 1998a, 2001, 2002; Gross & Thompson, 2007). According to this model, the analysis of emotion regulation processes involves considering which parts of the emotion generative process are primary targets of an active goal to influence emotion. To examine this dimension of variation, we take the emotion generation model depicted in Figure 32.1 as a starting point. Emotion regulatory acts are seen as having their primary impact on different stages of the emotion generative process (Gross, 2001). In Figure 32.2, we highlight five points in the emotion generative process at which individuals can regulate their emotions, corresponding to five families of emotion regulation processes: situation selection, situation modification, attentional deployment, cognitive change, and response modulation.

Situation selection refers to efforts individuals make to influence the situations they encounter, with a view toward increasing (or decreasing) the likelihood that certain

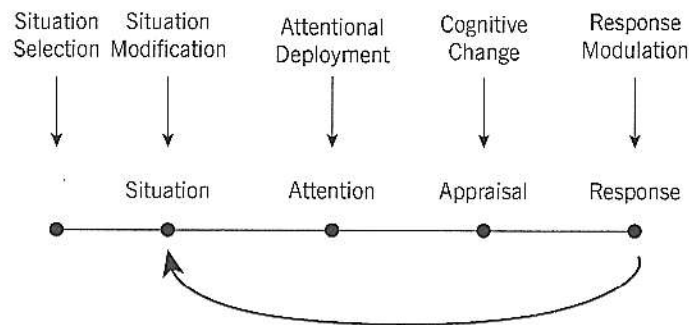


FIGURE 32.2. A process model of emotion regulation that highlights five families of emotion regulation strategies. From Gross and Thompson (2007). Copyright by The Guilford Press. Reprinted by permission.

emotions will arise. *Situation modification* refers to attempts to change the external features of a situation in a way that will alter one's emotional response to that situation. Moving from efforts to regulate the external features of an emotional situation to regulations efforts that influence internal representations (i.e., the "black box"), *attentional deployment* refers to directing attention in such a way that the emotion–response trajectory is altered. *Cognitive change* refers to altering a situation's meaning in a way that influences the emotions that situation will produce. Finally, *response modulation* refers to targeting the experiential, behavioral and/or physiological components of an activated emotion response for change.

Within this broad framework, of course, it is possible to drill down and analyze more specific processes of each of the strategies that make up each family of regulatory processes. For example, we recently considered in greater detail the underlying mechanisms involved in attentional deployment and cognitive change (Sheppes, 2014; Sheppes & Gross, 2011; Sheppes & Levin, 2013; Sheppes, Scheibe, Suri, & Gross, 2011; Sheppes et al., in press). According to our perspective, emotion regulatory strategies can modify the cognitive processing of emotional information at two major stages.

Incoming emotional information can be regulated at an early processing stage via a filtering mechanism that blocks it from capturing selective attention. Such early disengagement from cognitive processing of emotional information does not permit

elaborative processing that may be important for fully evaluating the situation and preparing an adaptive response (Bradley, Codispoti, Cuthbert, & Lang, 2001; Wilson & Gilbert, 2008). However, early disengagement, before emotional information gathers force, can successfully modulate low and high emotional intensity information. A classic early disengagement regulation strategy is *distraction*, which involves disengaging from negative emotion by producing neutral thoughts, using an early filter that blocks emotional information before it is represented in working memory for further evaluative processing (see Figure 32.3a).

Incoming emotional information that passes the early filter can still be regulated at a late stage via a second filtering mechanism that operates at the semantic meaning level and determines the final output of the system. Engagement with emotional processing allows elaborated cognitive processing of emotional information, but because emotional information gathers force prior to its late modulation, it is less effective at modulating high-intensity emotional information. A classic late engagement strategy is *reappraisal*, which involves engaging with negative emotion by allowing emotional information to be represented in working memory and provided with elaborated meaning before it is reinterpreted via a late filter (see Figure 32.3b).

While the process model and its elaborations favor a separation between emotion generation processes and emotion regulation processes, an important ques-

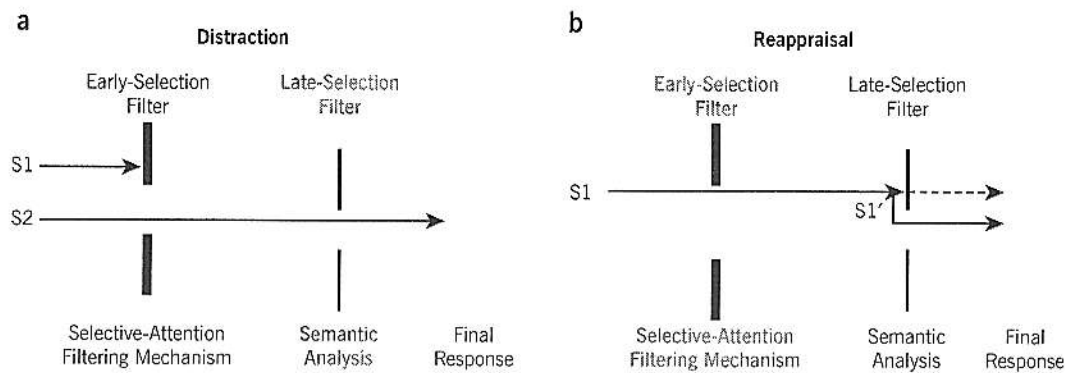


FIGURE 32.3. Illustrations of the underlying operation of distraction and reappraisal. The thickness of the lines representing the early-selection and late-selection filters reflects the ability of these filters to block emotional processing. In disengagement distraction, which is shown in Panel *a*, incoming emotional information (represented by the arrow for Stimulus 1, S1) is filtered out at an early attentional selection phase. A neutral stream of information (represented by arrow S2) that corresponds to the neutral thoughts produced in distraction and that is semantically independent from the original emotional information dominates the final response. In engagement reappraisal, which is shown in Panel *b*, incoming emotional information (represented by arrow S1) passes the early filter, is attended, undergoes semantic analysis, and is provided with elaborative meaning prior to modulation via a neutral reinterpretation (represented by arrow S1'), which is semantically dependent on the original emotional information. High-intensity emotional information (represented by the dashed arrow) passes through the late-selection filter and affects the final response. Adapted from Sheppes, Scheibe, Suri, and Gross (2011). Copyright by the Association for Psychological Science. Adapted with permission from Sage Publications, Inc.

tion is how best to capture the relationships between these two sets of processes. In neighboring fields such as that of self-regulation (which includes emotion regulation, as well as the regulation of thoughts, drives, beliefs, behaviors, and goals), classic dual-process accounts have been proposed (e.g., for reviews, see Hofmann, Friese, & Strack, 2009; Strack & Deutsch, 2004). For example, some models have highlighted that deliberate self-control is initiated when a conflict is identified between central goals and opposing associative temptations (e.g., Fujita & Carnevale, 2012; Myrseth & Fishbach, 2009). In these cases deliberate self-control is activated to resolve the conflict in accord with goal pursuit. Borrowing from these models, emotion generation has often been considered to involve an associative mode that involves lower-order mental operations that are achieved through relatively fast automatic and effortless processes, and emotion regulation has often been viewed as a reflective mode that involves higher-

order mental operations that are achieved via relatively slow, deliberate, and effortful processes.

While the process model and its elaborations do not explicitly limit emotion generation to an associative mode and emotion regulation to a reflective mode, the most common interpretation of this model and related findings across multiple levels of analysis is congruent with this view (reviews of self-report studies: Aldao, Nolen-Hoeksema, & Schweizer, 2010; cognitive and physiological studies: Webb, Miles, & Sheeran, 2012; electrophysiological studies: Hajcak, MacNamara, & Olvet, 2010; neuroimaging studies: Berkman & Liberman, 2009; Ochsner & Gross, 2005, 2008). In these studies a clear demonstration of this dual-process nature is also observed in the experimental manipulation in which participants are required to generate emotional responses in a relatively effortless way (e.g., viewing pictures), and most manipulations of emotion regulation have involved ask-

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ing participants to deliberately instantiate effortful strategies whose aim is to modify the natural emotional responses.

ELABORATING ON THE DUAL-PROCESS ACCOUNT

While the classic dual-process account of linking emotion generation with an associative mode and emotion regulation with a reflective mode has been fruitful, in recent years it has become quite clear that emotion regulatory processes can also be initiated relatively automatically via fast, associative modes of operation (Gyurak et al., 2011; Koole, & Rothermund, 2011; Mauss et al., 2007).

As we have emphasized, our definition of what constitutes emotion regulation does not specify the nature of the underlying processes (associative or reflective). Instead, our definition holds that a process is emotion regulatory if (and only if) it is instantiated in pursuit of a goal to influence an ongoing or future emotion (Gross et al., 2011). In the following, we examine the nature of recent evidence for the existence of associative emotion regulation processes, using the aforementioned continuum of possibilities that classifies whether emotion regulation processes can be assumed to be an independent entity that is separate from emotion generation processes.

As described earlier, at one end of the continuum, there are clear signs that a stable, dominant emotion regulation goal has been activated, leading to the recruitment of regulatory processes and to the alteration of the emotion response trajectory. An example of such a case is nicely illustrated in findings by Williams, Bargh, Nocera, and Gray (2009), who have shown that unconsciously priming the goal to reappraise resulted in attenuation of experiential and physiological signatures of anxiety. Similarly influential studies on implementation intentions have shown that forming a simple if-then regulatory rule reduced behavioral and early cortical signs of fear and disgust reactions (Gallo, Keil, McCulloch, Rockstroh, & Gollwitzer, 2011) and modulated emotion generative attentional and interpretation biases of threat in socially anxious individuals (e.g., Webb,

Ononaiye, Sheeran, Reidy, & Lavda, 2010). In each of these cases, it is evident from the pattern of outcomes that an associative emotion regulatory process has been engaged.

There also can be cases at the other end of the continuum, where there is no clear indication that an associative emotion regulation goal was activated or that the emotion response trajectory was altered. As stated earlier, these cases favor a parsimonious view that only includes the manifestation of emotion generative processes.

The challenge lies in the middle of the continuum, where there are clear indications that an emotion regulation goal was activated, yet we cannot detect any change in the emotion trajectory. Such situations arise in the context of studies that have manipulated goals (e.g., via unconscious priming or via the formation of implementation intentions) and observed that they were operative (e.g., via manipulation checks), yet failed to achieve a change in emotion generation processes. It is also interesting to consider cases where there is no clear sign that an emotion regulation goal was activated, yet the emotion trajectory was altered. Two such cases that fit this category are emotional conflict adaptation (e.g., Egner, Etkin, Gale, & Hirsch, 2008; Etkin, Egner, Peraza, Kandel, & Hirsch, 2006) and affect labeling (Hariri, Bookheimer, & Mazziotta, 2000; Lieberman et al., 2007; Lieberman, Hariri, Jarcho, Eisenberger, & Bookheimer, 2005); we turn now to these two cases.

Emotional conflict adaptation (e.g., Egner et al., 2008; Etkin et al., 2006) is an emotional variant of the classic Stroop task. In this task, participants are instructed to name an emotional expression (e.g., of a face displaying fear) while inhibiting the automatic reading of a superimposed emotional word (e.g., the word *sad* written on the forehead of a face displaying fear). As in the classic Stroop task, there are congruent and incongruent trial types. Importantly, the emotional conflict adaptation effect is observed when the response for an incongruent trial is faster if it is preceded by an incongruent trial than if it is preceded by a congruent trial. Related functional neuroimaging data suggest an interplay between brain regions associated with regulation (e.g., the anterior cingulate cortex and medial prefrontal cor-

tex) and brain regions associated with emotional reactivity regions (e.g., the amygdala). The interpretation of this effect is that performing an incongruent trial activates emotional control that implicitly persists into the next trial. In this case, it is hard to determine whether a clear regulatory goal was formed (because participants try to inhibit the reading of a word), but it is clear that regulatory processes were recruited.

In a similar vein, *affect labeling* (Lieberman et al., 2005, 2007) refers to a creative task context in which the consequence of processing affective features with words recruits an emotional regulation circuitry that is different from processing affective aspects in perceptual or experiential ways. Specifically, in this task, participants are presented with a target picture (e.g., an angry face) and asked to choose either a matching word (choosing the word *angry* over the word *sad*) or a matching perceptual face (choosing an angry face over a sad face) that appear below the target face. In this context, emotional modulation is observed via the recruitment of control-related brain regions, without participants' awareness of such an effect (Lieberman, Inagaki, Tabibnia, & Crockett, 2011). Here, too, it is not clear whether an emotion regulatory goal was activated, although there are clear manifestations of emotional generation and modulation via the recruitment of regulatory brain processes.

The emerging study of associative emotion regulation has increased in volume in recent years and attracted a great deal of interest. The growing consensus is that all families of emotion regulation strategies that constitute the process model of emotion regulation (Gross, 1998a, see Figure 32.2 have associative as well as deliberate forms (for reviews, see Gross & Thompson, 2007; Mauss et al., 2007; Todd, Cunningham, Anderson, & Thompson, 2012). Nevertheless, and despite the promising potential, several definitional issues remain unclear at present. One major issue revolves around the core underlying features of the different forms of associative emotion regulation. For example, while some forms of associative regulation, such as emotional conflict adaptation and affect labeling, appear to be unconscious, studies on implementation intentions typically involve forming conscious emotion regula-

tion if-then rules. At the same time, while implementation intentions and affect labeling require minimal cognitive effort to operate, emotional conflict adaptation engages effortful cognitive control mechanisms, and even unconscious goal pursuit appears to utilize executive control resources for its attainment (see Marien, Custers, Hassin, & Aarts, 2012).

In moving forward, the field of emotion regulation will need to find new ways to define the differences between associative and deliberate forms of emotion regulation. One important venue involves clearer empirical evaluation of the two forms of regulation. Currently, studies typically involve evaluating deliberate and associative processes using different tasks (see Hofmann et al., 2009, for a review). While informative, the use of different tasks makes it hard to separate process from measure. One promising approach that overcomes this obstacle is the quadruple-process model that provides distinct quantitative estimates of associative and deliberate processes in a single task (see Sherman et al., 2008, for a review). Insights about associative and deliberate processes in the neighboring field of self-regulation have already been utilized (e.g., Govorun & Payne, 2006; Stewart & Payne, 2008; for reviews, see Payne, 2008; Sherman et al., 2008). Therefore, their adoption in the field of emotion regulation is urgently needed.

In this chapter, we have revisited a central question in affective science that relates to whether emotion generation processes can be separated from emotion regulation processes. According to our perspective, a central consideration that justifies a separation is whether one can assume that a goal to change the emotion generation trajectory was activated. Congruent with these cases that justify a separation, conceptual models of emotion regulation have been proposed. These models have been framed in classic dual-process terms whereby emotion generation is executed via associative processes and emotion regulation via reflective processes. In this chapter, we have challenged this classic categorization by discussing the conditions that justify the existence of an additional associative emotion regulation system (in addition to the classic reflective emotion regulation system) that is separate from an associative emotion generation system.

AUTHORS' NOTE

This chapter draws upon and updates previous reviews by Gross (1998a, 2001, 2002); Gross and Thompson (2007); Gross et al. (2011a); and Sheppes and Gross (2011, 2012).

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