

## INVITED REVIEW

### Cognition and Emotion Lecture at the 2010 SPSP Emotion Preconference

#### Emotion generation and emotion regulation: A distinction we should make (carefully)

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One of the most fundamental distinctions in the field of emotion is the distinction between emotion generation and emotion regulation. This distinction fits comfortably with folk theories, which view emotions as passions that arise unbidden and then must be controlled. But is it really helpful to distinguish between emotion generation and emotion regulation? In this article, we begin by offering working definitions of emotion generation and emotion regulation. We argue that in some circumstances, the distinction between emotion generation and emotion regulation is indeed useful. We point both to citation patterns, which indicate that researchers from across a number of sub-areas within psychology are making this distinction, and to empirical studies, which indicate the utility of this distinction in many different research contexts. We then consider five ways in which the distinction between emotion generation and emotion regulation can be problematic. We suggest that it is time to move beyond debates about *whether* this distinction is useful to a more specific consideration of *when* and *in what ways* this distinction is useful, and in this spirit, we offer recommendations for future research.

**Keywords:** Emotion Generation; Emotion Regulation; Review.

From a lay perspective, it seems obvious that one set of psychological processes governs whether and how emotions arise, and another set of psychological processes governs whether and

how we are able to manage these emotions. Thus, when we are insulted, we feel angry, and then may either allow or restrain the impulse to strike. When we hear a funny joke, we feel

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amused, and then may either permit or deny our laughter. When we receive bad news, we feel sad, and then may either allow or hold back our tears of sorrow. In each of these cases, and many others like them, emotions arise and then are (or are not) regulated in some way.

This intuitive account accords nicely with the canonical distinction between emotion generation and emotion regulation that has figured prominently in emotion theory and research. The more one looks at this distinction, however, the harder it seems to draw a bright line between emotion generation and emotion regulation (Campos, Frankel, & Camras, 2004). This is because emotion-generative and emotion-regulatory processes not only are conjoined in nearly every instance, but also appear to engage overlapping brain systems (Ochsner et al., 2009). Indeed, the two sets of processes are so tightly intertwined that some have argued that no clear distinction can be drawn between the two (Kappas, 2011; Thompson, 2011). This leads us to ask: Is it really useful to distinguish between emotion generation and regulation?

In this article, we begin by laying out several general features of emotion, describing a process perspective on emotion regulation, and then considering how emotion generation might be distinguished from emotion regulation. Next, we consider two kinds of evidence for the utility of this distinction. We then examine situations in which this distinction can be problematic. We conclude by making suggestions for how to move beyond debates about *whether* this distinction is useful, to a more specific consideration of *when* and *in what ways* this distinction is useful.

## EMOTION GENERATION AND EMOTION REGULATION

Before we can assess the value of distinguishing emotion generation from emotion regulation, we need a provisional understanding of each. In the following sections, we first consider emotion generation, then emotion regulation, and finally consider the factors that determine whether one

can (or can't) confidently invoke the operation of emotion-regulatory processes.

### Emotion generation

Emotions are generated when a person–situation transaction compels attention, has a valenced meaning to an individual, and gives rise to a coordinated yet malleable multi-system response to the ongoing person–situation transaction. In Figure 1, we present in schematic form this situation–attention–appraisal–response sequence that constitutes an emotional episode. As the arrow from the responses back to the situation suggests, the emotional response that has been evoked often changes the situation that gave rise to the emotion in the first place. For example, when we're feeling happy, we dole out more scarce resources to others than we do when feeling sad (Tan & Forgas, 2010). When someone we're interacting with appears angry during a negotiation, we make fewer demands than when our partner appears happy (Pietroni, Van Kleef, De Dreu, & Pagliaro, 2008).

One of the reasons this definition of emotion generation is so abstract is that emotions form such a heterogeneous category that it is difficult to make generalisations that apply to all emotions. At times, emotions are so mild as to be scarcely detectable; at other times, emotions are extraordinarily intense. In some contexts, emotions are cognitively simple. In other contexts, emotions require a high level of cognitive processing. Emotions also vary considerably in their duration. Sometimes emotions are brief, but at other times emotions can be prolonged. Thus, passing admiration of a well-written paragraph, intense awe at the sight of a lingering sunset, mild irritation

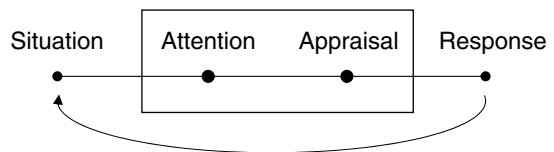


Figure 1. A schematic of the emotion-generative process (from Gross & Thompson, 2007).

over a misplaced set of keys, blow-your-top rage about an insult to one's heritage, slight apprehension about an upcoming dental appointment, and abject horror upon witnessing loss of life on a battlefield all count as emotions. Despite these differences among emotion episodes, we find it useful to distinguish three common features.

One common feature is that emotions arise when a situation is construed as being relevant to one or more of an individual's active goals (Scherer, Schorr, & Johnstone, 2001). Some of these goals may be biologically based (e.g., avoiding bodily injury). Others may be culturally derived (e.g., scoring a goal in soccer). Some of these goals may be social (e.g., procuring an apology from your spouse in the midst of an argument). Others may be self-focused (e.g., wanting to meet a major deadline). Because many goals are usually active at any one time, there is competition among active goals, and the result of this competition among currently active goals will dictate which emotion—if any—will be activated, and to what degree that emotion will be activated. 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 goals or the individual's construal of the situation change, so too will the emotion.

A second common feature is that emotions are multi-faceted, embodied phenomena that involve loosely coupled changes in the domains of subjective experience, behaviour, and peripheral physiology (Mauss, Levenson, McCarter, Wilhelm, & Gross, 2005). The experiential component of emotion is what it feels like from a first-person perspective as an emotion unfolds (Barrett, Gendron, & Huang, 2009). The behavioural 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 the likelihood of approaching or withdrawing from something in the environment (Frijda, 1986). The peripheral physiological component of emotion includes the autonomic and neuroendocrine re-

sponses that putatively provide metabolic support for anticipated and actual behavioural 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 be imperative, possessing what Frijda (1986) called "control precedence". For example, walking down the street, your dominant goal may be to arrive at work on time. But if a car comes out of nowhere and nearly runs you over, your dominant goal quickly becomes to survive, and fear takes over. In this case, the emotion-related goal (survival) has overridden the non-emotion-related goal (getting to work). However, emotions do not always trump other goal-driven processes (i.e., processes related to meeting active goals like arriving at work on time in the example above that are 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 processes that influence which emotions we have, when we have them, and how we experience or express these emotions (Gross, 1998). Emotion regulation is 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.

Whether we consult our own experiences, or the empirical literature, which has begun to describe how people regulate their emotions, 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 hard not to appear upset. An example of the second type of emotion-regulation episode—which we refer to as *extrinsic emotion regulation*—is when a parent seeks to calm an angry child. A second point of difference across emotion-regulation episodes is whether the motivation to engage in emotion regulation is *hedonic* (to feel less negative or more positive in the near term) or *instrumental* (to achieve one's long-term goals; Tamir, 2009). A third point of difference across emotion-regulation episodes is whether the emotion-regulatory goal is *explicit* or *implicit* (Bargh & Williams, 2007; Mauss, Bunge, & Gross, 2007). Sometimes, this goal is explicit. That is, the goal is deliberate and consciously perceived, such as when an individual decides to try to look happier than he actually feels at a party. At other times, this goal is implicit. That is, the goal is activated outside of an individual's awareness, such as when an individual tones down emotional responses when entering a library or place of worship without knowing he is trying to do so. The activation of the implicit goal to modify one's emotional responses—like other implicit and explicit goals—is made evident via a pattern of “vigorous acting toward goal attainment, persistence in the face of obstacles, and resumption after disruption” (Bargh, Gollwitzer, Lee-Chai, Barndollar, & Trötschel, 2001, p. 1018; see also Mauss et al., 2007; Williams, Bargh, Nocera, & Gray, 2009; and the 2011 special issue of *Cognition and Emotion* on implicit emotion-regulation processes).

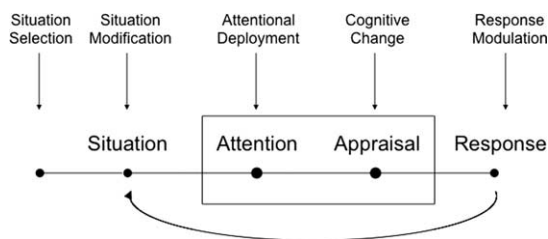
To create a framework for analysing emotion-regulation processes, we have found it useful to consider which parts of the emotion-generative process are primary targets of an active goal to influence emotion. What we're trying to capture is the observation that sometimes people try to shape their emotional responses by altering earlier steps in the emotion-generative process, as when they shift their attention to avoid becoming emotional. At other times, people wait until their emotions are fully engaged before trying to regulate them, as when they try not to look disgusted by a dish they have been served at a dinner party. To examine this dimension of

variation, we take the model depicted in Figure 1 as a starting point. Emotion-regulatory acts are, from this perspective, seen as having their primary impact on different stages of the emotion generative process (Gross, 2001). In Figure 2, we have redrawn the model in a way that highlights 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 an individual makes to influence the situation he will encounter, with a view to increasing (or decreasing) the likelihood that certain emotions will arise. Situation modification refers to attempting to change the external features of a situation in a way that will alter one's emotional response to that situation. 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 one or more of the experiential, behavioural, or physiological components of an activated emotion response for change.

### Distinguishing emotion generation from emotion regulation

The distinction between emotion generation and emotion regulation is a distinction between the processes that generate an emotion in a particular situation (emotion-generative processes; called



**Figure 2.** A process model of emotion regulation that highlights five families of emotion regulation strategies (from Gross & Thompson, 2007).

constitutive processes by Campos et al., 2004) and the processes that are engaged to modify these emotion-generative processes (emotion-regulatory processes).

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 (e.g., hiding one's pride at winning an award). 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 (e.g., actually winning that award). Therefore, the target of an emotion-generation goal is the internal or external environment. As we will 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 in ourselves or others 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 was 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 were operative to cases where there is little ground for thinking that emotion-regulation processes were operative.

At one end of this continuum, there are clear signs that a stable, dominant emotion-regulation goal (whether explicit or implicit) was 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 was activated or that the emotion-response trajectory was altered (e.g., the individual behaved in a way that is similar to his behaviour when freely expressing a certain emotion). In this case, it seems most parsimonious to invoke only emotion-generative (and not emotion-regulatory) processes.

Where things are most interesting, perhaps, are cases in which (a) there are clear indications that an emotion-regulation goal was activated, and yet we cannot detect any change in the emotion trajectory, or (b) there is no clear sign that an emotion-regulation goal was activated, and 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 and 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.

## IN WHAT WAYS IS THE DISTINCTION HELPFUL?

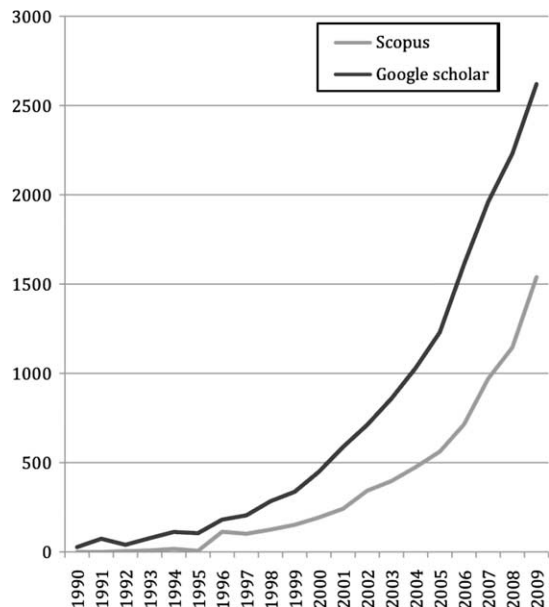
In the preceding section, we drew a distinction between emotion-generative and emotion-regulatory processes, and considered factors that determine how confidently one might assert that emotion-regulation processes were active in any particular context. In this section, we provide two types of evidence that bear on whether the distinction between emotion generation and emotion regulation matters. We first examine how frequently this distinction is currently employed in the field. We then selectively review empirical evidence that bears on the incremental validity of emotion regulation over and above emotion generation.

### Has the distinction been broadly adopted?

One important criterion for the utility of any distinction is whether people are in fact using that distinction. Historically, a concern with the ways that emotions are regulated has been a central focus in psychology since its earliest days, with particular attention being given to the topic in the context of the study of psychological defences (Freud, 1926/1959), stress and coping (Lazarus, 1966), attachment (Bowlby, 1969), and self-regulation (Mischel, 1996).

In the past two decades, there has been a dramatic increase in attention to this topic (Gross, 2007, 2010). Until the early 1990s, few publications contained the phrase “emotion regulation”. For example, in 1989, Scopus indicates that there were two citations containing the phrase “emotion regulation”. Since this time, there has been an astonishing increase in citations. In 2009, for example, the Scopus citation count was 1,539. In Figure 3, we provide citation plots for this 20-year period for both Scopus and Google Scholar. As may be seen, Google Scholar returns a higher number of citations for each year, but in each case, what is striking is the steepness of the citation curves, particularly over the past decade or so.

Citation counts are admittedly an imperfect metric of the value of a construct. However, the 700-fold plus increase in citations over this 20-



**Figure 3.** Citation frequency for publications containing the exact phrase “emotion regulation” for the 20-year period from 1990–2009. For SCOPUS, we performed a search for English-language publications containing the exact phrase “emotion regulation” in social science and medical journals. For GOOGLE SCHOLAR, we performed a search for all publications containing the exact phrase “emotion regulation”.

year period clearly reflects the impressive growth of work in this area. These citation data suggest that many researchers are finding the construct of emotion regulation useful in conducting and/or framing their work. As one commentator noted, “the tremendous increase in research volume has rendered the study of emotion regulation one of the most vibrant areas in contemporary psychology” (Koole, 2009, p. 5). An examination of research trends in a number of the sub-areas within psychology suggests that researchers in neuroscience, cognitive, developmental, social, personality, and clinical sub-areas are all finding value in the distinction between emotion generation and emotion regulation.

### Has the distinction given us empirical purchase?

A second important criterion for the utility of any distinction is whether the associated constructs

provide greater empirical purchase than other available constructs (in this case, focusing on “emotion” as one large integrative construct). In this section, we highlight some of the ways in which the distinction has been productive, focusing on whether emotion regulation explains unique variance in measures of interest over and above variance explained by emotion generation. Because our aim is to show the broad value of this distinction, we selectively review various sub-areas within psychology rather than providing an exhaustive review of the field.

In the *neuroscience area*, dozens of studies have examined the neural bases of emotion generation versus emotion regulation (see Ochsner & Gross, 2008, for a review). In these laboratory studies, the comparisons of interest examine whether explicit instructions to regulate (e.g., to reappraise the meaning of emotion-generating stimuli) have an effect over and above spontaneously responding to emotion-generating stimuli. These laboratory studies suggest that explicit instructions to regulate emotion lead to activations in a network of brain regions associated with cognitive control (such as the dorsolateral prefrontal cortex). Instructions to regulate emotion are also associated with instruction-congruent changes in a network of brain regions associated with emotion generation (such as the insula and amygdala).

Further support for the distinction between emotion generation and emotion regulation comes from recent neuroscience work which indicates that specific medial prefrontal regions (i.e., dorsal medial prefrontal cortex and dorsal cingulate gyrus) track the cognitive demands associated with cognitive reappraisal while the amygdala tracks emotional arousal. In fact, these medial prefrontal regions have their instruction-congruent impact on emotional arousal (as measured using skin conductance) at least in part by virtue of functional connections with the amygdala (Urry, van Reekum, Johnstone, & Davidson, 2009). Moreover, there is evidence that the effect of some forms of emotion regulation depends on the manner in which emotion is generated. Specifically, cognitive reappraisal has a bigger down-regulating effect on the amygdala when

negative emotion is generated via top-down processes than when negative emotion is generated via bottom-up processes (McRae, Misra, Prasad, Pereira, & Gross, in press).

In the *cognitive area*, emotion generation and emotion regulation are playing an increasingly prominent role in studies ranging from attention to memory to decision making. To take one example, studies by Heilman and colleagues (Heilman, Crisan, Houser, Miclea, & Miu, 2010) suggest that emotion-regulation processes modulate the effects of emotion on risk. Specifically, these authors found that, relative to expressive suppression, use of cognitive reappraisal diminishes the impact of negative emotions on risk aversion. In a related vein, a recent study has shown that, among young adults, effortfully regulating disgust impairs working-memory performance over and above experiencing disgust (Scheibe & Blanchard-Fields, 2009).

In the *developmental area*, the distinction between emotion generation and emotion regulation has been useful to researchers interested in infancy and childhood through later adulthood. For example, in childhood, emotion regulation figures prominently in Eisenberg and colleagues’ research on reactive versus effortful control as determinants of subsequent childhood adjustment (Eisenberg, 2000). Similarly, in Nigg’s (2010) influential model of attention deficit hyperactivity disorder (ADHD), emotion regulation and emotion generation predict different types of symptoms. Specifically, top-down regulatory control uniquely predicts inattention symptoms whereas bottom-up emotional reactivity uniquely predicts hyperactivity symptoms. In later adulthood, a growing body of research suggests that, despite the fact that older adults suffer losses in many valued life domains, their affective functioning is surprisingly preserved. Specifically, in the study by Scheibe and Blanchard-Fields (2009) described above it was shown that contrary to the effects of effortful regulation on working-memory performance among younger adults, older adults did not show an emotion-regulation-induced reduction in working memory. One potential explanation for this remarkable preservation of a relatively positive

affective balance is that older adults become more skilful with particular types of emotion regulation over and above changes in emotion generation (Urry & Gross, 2010).

In the *social area*, prominent models of self-regulation rely on dual-process accounts that differentiate between impulsive reactions (that correspond to emotion-generative processes) and reflective regulatory reactions (e.g., Hofman, Friese, & Strack, 2009). Convincing evidence for the separation of generation and regulation in self-regulation models was obtained using a process dissociation procedure (Govorun & Payne, 2006). When automatic, emotion-generative processes were mathematically isolated from controlled, emotion-regulatory processes, exerting self-control reduced the regulatory component but not the automatic component. In addition, central models of stereotype threat show that regulatory strategies such as expressive suppression explain unique variance in intellectual performance above and beyond emotion-generative stress responses (Schmader, Johns, & Forbes, 2008). Furthermore, a recent influential model of various forms of interpersonal rejection argues that people's immediate emotional reactions to rejection are quite similar, however later regulatory construals (or reappraisals) predict whether the final response to rejection is prosocial, antisocial, or characterised by withdrawal (Smart Richman, & Leary, 2009). In the occupational domain, there is growing interest in the role of emotion regulation in organisational contexts. For example, Cote (2005) has documented how both emotion-generative and emotion-regulatory processes appear to shape job performance and satisfaction in a variety of different employment contexts.

In the *personality area*, individual differences in emotional reactivity and emotion regulation are widely regarded as highly consequential. John and Gross (2007) have argued that individual differences in the use of emotion-regulation processes—over and above any differences in emotion generation—play a crucial role in Big Five personality traits, dynamic constructs such as coping and avoidance, and social-cognitive constructs such as optimism, emotional intelligence,

and implicit theories about emotion. In a similar vein, Baumann, Kaschel, and Kuhl (2007) have shown that associations between emotion generation (i.e., low sensitivity to positive affect and high sensitivity to negative affect) and criterion measures of symptomatology and well-being are moderated by emotion-regulation abilities. Drabant and colleagues (Drabant, McRae, Manuck, Hariri, & Gross, 2009) also have shown that during emotion processing, even after controlling for differences in emotional reactivity, individual differences in typical reappraisal use predict BOLD responses in brain regions associated with cognitive control (such as the dorsomedial prefrontal cortex) as well as brain regions associated with emotion generation (such as the amygdala).

Finally, in the *clinical area*, it is now widely acknowledged that many of the nearly 200 DSM diagnoses involve emotion dysregulation, and a large number of investigators across the board are finding the distinction between emotion generation and emotion regulation useful, particularly in the context of the mood and anxiety disorders. In Nolen-Hoeksema's (1991) model of rumination in depression, negative cognitions (which are part of the depressive response) are separated from a ruminative regulatory response style that repeatedly focuses attention on negative cognitions. In anxiety, a recent model by Cisler, Olatunji, Feldner, and Forsyth (2010) suggests that emotion regulation can augment or diminish the fear response and that measures of emotion regulation explain unique variance in a variety of anxiety disorders above and beyond emotion generation. In a similar vein, utilising structural equation modelling, Tortella-Feliu, Balle, and Sesé (2010) have shown that measures of negative affectivity and emotion regulation uniquely predict anxiety symptoms. Furthermore, according to vigilance-avoidance theory in anxiety, defensive individuals (repressors) show a unique two-stage profile in responding to threatening information, which includes a rapid engagement towards threat that results in creating an emotion-generation response, followed by a second regulatory avoidance



step away from threat (Derakshan, Eysenck, & Myers, 2007).

Even outside the mood and anxiety disorders, clinicians and researchers alike have found the distinction between emotion generation and emotion regulation useful. In Linehan, Bohus, and Lynch's (2007) model of borderline personality disorder, individuals at risk for developing the disorder exhibit an oversensitive emotional generative system that is manifested in high sensitivity to emotional stimuli, intense response, and slow return to emotional baseline. They also exhibit an impaired emotion-regulation system that is manifested in attentional and physiological modulation impairments. Furthermore, Penney and Moretti (2010) demonstrated through structural equation modelling that emotion regulation and affect generation function as separate risk factors for aggression and antisocial symptoms in adolescents. Similarly, researchers focused on clinical interventions have emphasised the separate roles of emotion generation and emotion regulation (MacLeod & Bucks, 2011). For example, DeRubeis, Siegle, and Hollon (2008) have used this distinction to explain why pharmacological and psychosocial interventions for major depressive disorder seem to have different longer term impacts.

## IN WHAT WAYS IS THIS DISTINCTION PROBLEMATIC?

As we have seen, the distinction between emotion generation and emotion regulation is popular across many different sub-areas of psychology. This distinction also is providing empirical purchase on phenomena of interest in disparate areas of inquiry. However, it is also important to consider ways in which this distinction may be problematic. Below we address five challenges to the distinction between emotion generation and emotion regulation. Although none of these difficulties is unique to this particular distinction, they nonetheless suggest caution when making the distinction between emotion generation and emotion regulation.

## The incitement to essentialism

The use of separate terms to refer to emotion-generative and emotion-regulatory processes suggests the existence of two sets of fundamentally different kinds of processes that operate separately to causally affect outcomes of interest. This distinction—like any other distinction that is lexically marked—encourages a kind of essentialism (Barrett, Mesquita, & Smith, *in press*). Once this distinction (or any other conceptual distinction of this sort) has been made, it is easy to think of each term as necessarily referring to a different entity or natural kind. Indeed, if the use of separate phrases to distinguish between emotion generation and emotion regulation leads one to assume that emotion generation and emotion regulation are each distinct, natural kinds, then the distinction may be problematic. However, it may be that the value of distinguishing between emotion generation and emotion regulation does not derive solely from the fact that it somehow “carves nature at its joints”. We return to this point below, when we consider competing accounts of the scientific enterprise.

## Emotions regulating emotions

Earlier we defined emotion regulation as the motivated recruitment of one or more processes to influence emotion generation. With this definition in mind, how should we think about cases in which one emotion-generative process apparently regulates another emotion-generative process? For example, Winterich and colleagues (Winterich, Han, & Lerner, 2010) argued that one emotion may make another emotion more or less likely to occur. Along those lines, referring to emotions as “auto-regulatory”, Kappas (2011) has argued that the activation of an emotion can lead to a change in the emotion-triggering situation that causes the termination of that emotion. The fact that emotion-generative processes might themselves be viewed as emotion-regulatory processes would seem to call into question the distinction between emotion generation and regulation. However, in our view, neither of these cases meets our criteria for emotion regulation in

that in neither of these cases is an emotion-regulation goal activated.

### The homunculus problem

If we want to argue that emotions are sometimes regulated, it seems reasonable to wonder who exactly is doing the regulating, and how this regulator knows how and when to regulate. This implied “hidden driver” might thus call into question the distinction between emotion generation and regulation since there is no evidence for its existence. From our perspective, however, this is just one instance of a problem that has long bedevilled psychology. Like other instances of the homunculus problem, this one can be handled by appreciating that there is no regulator, only sets of interacting processes. Some of these processes (which we refer to as emotion generative) give rise to emotion. Other processes (which we refer to as emotion regulatory) are recruited to influence these emotion-generative processes. It is the operation of the latter set of processes on the former—in a particular context—that constitutes emotion regulation. There is no need for an external regulating agent, just a set of functional relations among processes.

### The reverse inference problem

An impressive body of research now documents the neural systems that are implicated in emotion generation and emotion regulation. These neurobiological data are very helpful in shaping our growing understanding of the interplay between emotion-generative and emotion-regulatory processes. However, these data also tempt us into thinking we can use brain data to objectively identify when emotion generation is happening separate from emotion regulation. This occurs by virtue of a common logical error, namely the error of reverse inference (or affirmation of the consequent; Poldrack, 2006). Reverse inference is in play when one infers from activation of brain area X (such as the anterior insula) that the individual is currently responding emotionally because brain area X is typically active in studies that manipulate

emotion generation. Reverse inference also is in play when one infers from activation of brain area Y (such as the dorsolateral prefrontal cortex) that the individual is currently regulating emotion because brain area Y is typically active in studies that manipulate emotion regulation (Lewis, Zinbarg, & Durbin, 2010). Biological data can, of course, serve a very important role in understanding the mechanisms underlying emotion generation and emotion regulation. However, because reverse inference involves faulty reasoning, it would be problematic if reverse inference alone were used to justify the distinction between emotion and emotion regulation. Here, as elsewhere, we believe that vigilance regarding the inferences one can draw from the data one is interpreting is crucial, and a necessary shield against unwarranted inferences.

### The timing problem

Any time one makes a distinction between psychological processes, it is tempting to presume that the processes in question unfold in a particular temporal sequence. When it comes to the distinction between emotion generation and emotion regulation, it is often assumed that emotion generation unfolds prior to emotion regulation. This is the sequence that best matches the lay perspective, as described in the opening paragraph of this paper. This is also the sequence that has formally been adopted in several theoretical models, including Derakshan et al.’s (2007) vigilance-avoidance theory of repression, Joormann and Gotlib’s (2010) theory of depression, and Williams and Zadro’s (2005) model of ostracism.

However, while a sequence in which emotion generation precedes emotion regulation can and does occur, and we have tried to capture this sequence in the laboratory in our own work, emotion-regulatory processes may operate on any of four major emotion-generative processes. From our perspective, then, emotion-regulatory processes may sometimes be co-active with emotion-generative processes, thus suggesting the possibility of parallel processes. For example, an individual may tell his or her child as they enter

the dentist's office about the ice cream she or he will have after their visit in an attempt to distract her or him. Here, the emotion-regulatory manoeuvre (distraction) is concurrent with the anxiety induction (entering the dentist's office).

Emotion-regulatory processes may even *precede* emotion-generative processes at times. For example, before going to work, one may make plans to take one's children to the park after work, knowing that this will help to relieve work-related stress. In this example, the emotion-regulatory manoeuvre (situation selection) is set in motion before the relevant emotion has even been generated (by work-place stressors). Indeed, if one is successful at one's emotion-regulatory efforts that occur well in advance of emotion, the emotion in question (which otherwise would have arisen) might never be generated. It should be noted, however, that Niedenthal, Winkielman, Mondillon, and Vermeulen (2009) have argued that the activation of an emotion concept (as would occur when one forecasts later emotional responses in advance of a particular situation) necessarily produces a simulated emotional response. In that case, the apparent serial sequence (emotion regulation prior to emotion generation) may actually represent a set of parallel processes. To the extent that distinguishing between emotion generation and emotion regulation limits our focus to a particular serial sequence, this distinction may be problematic.

## MOVING FORWARD

The field of emotion is one of the more contentious fields within psychology, and nearly every finding and proposition is subject to debate and controversy (including, but not limited to, the value of examining discrete emotions; the universality of emotion displays; the specificity of the autonomic responses associated with emotion; the separateness of emotion and cognition; the importance of situational versus individual determinants of emotion; etc.). It is therefore not surprising that as the rapidly growing subfield of emotion regulation has gained prominence, the

same critical apparatus deployed in the larger field is also applied to emotion regulation.

This has led to a vigorous discussion and debate both inside and outside the field—as evidenced by the present special section, as well by similar sections or issues on emotion regulation in journals including *Journal of Abnormal Psychology*, *Motivation and Emotion*, *Journal of Happiness Studies*, *Journal of Child Psychology and Psychiatry*, *Developmental Neuropsychology*, *Journal of Psychopathology and Behavioural Assessment*, *Nature Neuroscience*, and *Emotion Review*. One of the key points in this ongoing debate is one of the most basic questions that can be asked with respect to emotion regulation, namely whether it can be meaningfully distinguished from emotion generation.

In this article, we have provided evidence for the utility of this distinction, but we have also acknowledged several ways in which this distinction can “go wrong”. Moving forward, we believe that what is needed is to transcend debates about *whether* this distinction is useful to a more specific consideration of *when* and *in what ways* this distinction is useful and from what philosophical vantage point. In the following sections, we consider some of the factors that govern the usefulness of distinguishing between emotion generation and emotion regulation.

## Theoretical considerations: The role of differing theoretical perspectives

Answering the question as to whether a distinction between emotion generation and emotion regulation is useful is not simple because how you answer this question depends on your (probably unspoken, perhaps even unconsidered) assumptions about the larger goal of the scientific enterprise. Assumptions about the goal of science tend to fit into one of two camps, scientific realism or scientific instrumentalism (Cacioppo, Semin, & Berntson, 2004).

*Scientific realists* believe that the goal of science is to discover truth. From this perspective, scientists develop theories about unobservable entities because they believe they actually exist in

the real world and want to discover their true nature. Realists view their role in science as analogous to that of a detective embroiled in a whodunit murder mystery. Someone got killed; the detective's goal is to arrive at the indisputable truth about who did the killing. There is only one, immutable solution. By contrast, *scientific instrumentalists* believe that the goal of science is to generate frameworks that are productive. From this perspective, scientists develop theories about unobservable entities because they want to make accurate predictions, answer questions, and/or solve problems. Instrumentalists view their role in science as analogous to that of a stock broker. There is money to be made; the broker's job to arrive at a set of investments that will allow her or his clients to rack up a nice nest egg. There may be more than one way to achieve this goal, and the best-fit solution may change over time.

In the domain of emotion, we have already emphasised the heterogeneity of emotion. Due in part to this heterogeneity, and also to differences in basic assumptions about the nature of the scientific enterprise, a wide range of theoretical perspectives (e.g., basic emotion, appraisal, and psychological construction models) have currency in the field of emotion. We believe these differing perspectives may help to explain differences in judgements about the value of distinguishing emotion generation from emotion regulation (Gross & Barrett, 2011).

*Basic emotion models* hold that there are phylogenetically highly conserved neurobiological mechanisms that are unique in form and function, and cannot be further decomposed psychologically. Each of these mechanisms, which we refer to with labels such as fear, anger, and sadness, is thought to be caused by a dedicated brain mechanism, and it is this mechanism that gives rise to the behavioural and physiological changes we associate with emotion. From this vantage point, the distinction between emotion generation and emotion regulation is often very clear. This is because we can specify one set of processes that give rise to emotion, and distinguish these processes from others which alter the emotion trajectory.

*Appraisal models* share some features with basic emotion models, and emotion terms are thought to distinguish psychobiological processes that are unique in form and function. However, the emphasis in appraisal models is on the cognitive processes that initiate and sustain the emotion-generative process, and there is neither the assumption that each emotion is distinct from each other emotion, nor that each emotion is instantiated by a dedicated brain mechanism. From this vantage point, which is perhaps closest to our perspective, it still makes sense to distinguish between emotion generation and emotion regulation, but the distinction is frequently no longer so clear or so complete as it is from a basic emotion perspective.

*Psychological construction* models further loosen the assumption of the basic emotion models, and here, emotions are no longer held to be special mental states. Instead, emotions are seen as the result of ongoing evaluative and elaborative processing that is context sensitive, and in no way uniquely associated with discrete brain systems. From this vantage point, it is usually difficult to distinguish emotion generation from emotion regulation. This is because emotions (like all mental events) are viewed as being continually constructed. From this vantage point, the segmentation of emotion "generative" from emotion "regulatory" processes is always provisional. Psychological ingredients, combining in various ways, are thought to be represented in the brain as distributed networks with cortical and subcortical contributions (Kober et al., 2008). Information from the body is interpreted based on context, and whether or not it makes sense to distinguish emotion generation from emotion regulation hinges on whether emotions are more than the simple sum of their parts. If so—and only if so—there is a sense in which emotions can be modified or regulated by other psychological processes.

Given the diversity of views about both the nature of emotion and the nature of the scientific enterprise itself, in moving forward, we believe that it will be helpful for authors to be explicit about their philosophical and theoretical commitments as well as their targets of inquiry. Unless

this is done, it will frequently be the case that reader and writer have quite different things in mind as they consider empirical and/or theoretical aspects of emotion and other affective phenomena. Our own view is that the scientific enterprise is most successful when one iteratively moves between scientific realist and scientific instrumentalist positions, a view that accords well with the perspective offered by Cacioppo and colleagues (2004).

### **Empirical considerations: Moving beyond whether to, when and in what ways**

As the field of emotion regulation matures, we believe that it will be possible to move beyond debates about *whether* to distinguish between emotion generation and emotion regulation to a much more interesting set of questions about *when* and *in what ways* it is useful to distinguish between emotion generation and emotion regulation. In a similar vein, we believe it will be possible (and desirable) to move beyond the determination that emotion-regulation processes were (or were not) operative in a given situation to a determination of which emotion-regulatory processes were operative. Our process conception of emotion regulation emphasises the many different processes that may be engaged to regulate emotions. A growing literature suggests that different forms of emotion regulation have different consequences for valued psychological and physical health outcomes (Gross, 2007; Sheppes & Gross, in press). These findings are just a beginning, and we believe that a better understanding of the differential consequences of various emotion-regulation strategies will lay the foundation for new and more targeted approaches that encourage adaptive, context-appropriate use of emotion-regulation processes.

The difficulty we face in these empirical endeavours is that, because of the diversity of theoretical opinion emphasised above, it is both possible and likely that different researchers, when looking at the same manipulation or individual-difference measure, will come to quite different conclusions about what was manipulated or

measured, and what the findings mean. Some may feel that both measures were really assessing emotion generation; others that both were really assessing emotion regulation. Others will conclude that one was assessing emotion generation, and the other was assessing emotion regulation, but that the distinction is not helpful in this case. Others still will see the distinction, and find it useful for their purposes.

These differing viewpoints can be best handled when they are made explicit. This is why we think it is so important for researchers to be explicit about how they're conceptualising (and measuring) emotion-generative and emotion-regulatory processes and, more broadly (as we did above), what assumptions they hold about the goal of science. In the end, however, it is an empirical question whether any particular way of distinguishing among related processes is useful for the purposes of understanding, predicting, and/or controlling or modifying whatever behaviours or mental processes are of interest. Our view, as we hope we've made clear, is that there will be some contexts in which this distinction will prove useful, and other contexts in which this distinction will not prove useful and may, in fact, prove downright problematic.

### **CONCLUDING COMMENT**

In the past two decades, the field of emotion regulation has come into being (Gross, 1998) and begun to mature (Tamir, 2011). In this article, we have argued that the distinction between emotion generation and emotion regulation is like many other high-level distinctions in psychology (such as "cognition" versus "emotion"; see Pessoa, 2008) in that its value can be assessed from each of several competing perspectives.

We have argued that the distinction between emotion generation and emotion regulation is a useful guide that has value to the extent that scientists are using this distinction in creative, productive, and generative ways. From our perspective, the distinction between emotion generation and emotion regulation is clearly an

important and useful one in that there is substantial and broad-based interest in emotion regulation, as evidenced by the explosion of research examining emotion regulation. Furthermore, the distinction between emotion generation and emotion regulation is useful inasmuch as emotion-regulation processes are empirically separable from emotion-generative processes, and assessing emotion-regulatory processes leads to better purchase on underlying processes than assessing emotion-generative processes alone. As we have shown, there is some clear evidence that the distinction between emotion generation and emotion regulation is a useful one, although the evidentiary base is at this point requires more support.

Although we are convinced that this is a distinction that matters, we have also stressed that this distinction can obfuscate as well as illuminate, and we have described five of the ways we believe this distinction can be problematic if it is not thoughtfully applied. Most importantly, the clarity and utility of this distinction is not constant across situations and analytic purposes, but instead very much depends upon the nature of the emotional context, and one's goals in drawing this distinction. This more nuanced perspective welcomes the complexity of interacting and recursive processes, a reality that may be missed if we are beguiled into thinking that the distinction between emotion generation and emotion regulation is more than a tool, one that will be more or less useful depending on the particulars of the context in which it is made. We wouldn't, for example, claim that a hammer is always useful. A hammer is a useful tool in some contexts (pounding a nail) but not in others (serving up a plate of spaghetti). We therefore are in agreement with Campos and colleagues, who have argued that "analytically and conceptually, there can be differences between emotion and emotion regulation" even though it is clear that "such a conceptual distinction does not imply ontological distinctiveness" (2004, p. 379).

Our thesis is that the value of distinguishing between emotion-generative and emotion-regulatory processes cannot be determined once and for

all in a context-free fashion, without referring both to the particular emotional situation in question and one's goal in making (or not making) this distinction. Given that emotion regulation often co-occurs with emotion, and that emotion regulation engages some (and perhaps many) of the same biological systems that are implicated in emotion generation, we must proceed cautiously. As yet, we have only a limited understanding of both emotion-generative and emotion-regulatory processes. We are optimistic, however, that continued theoretical and empirical work on these processes will pay handsome dividends and yield increased clarity about a distinction that matters.

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