REAPPRAISING REAPPRAISAL

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ABSTRACT

What psychological mechanisms enable people to reappraise a situation to change its emotional impact? We propose that reappraisal works by shifting appraisal outcomes – abstract representations of how a situational construal compares to goals – either by changing the construal (reconstrual) or by changing the goal set (repurposing). Instances of reappraisal can therefore be characterized as change vectors in appraisal dimensional space. Affordances for reappraisal arise from the range of mental models that could explain a situation (construal malleability) and the range of goals that the situation could serve (goal set malleability). This framework helps to expand our conception of reappraisal, assess and classify different instances of reappraisal, predict their relative effectiveness, understand their brain mechanisms, and relate them to individual differences.

Keywords: appraisal, reappraisal, cognitive change, emotion regulation

If you are distressed by anything external, the pain is not due to the thing itself, but to your estimate of it.

Marcus Aurelius

Finding the elevator out of order en route to a top-floor meeting can feel frustrating. On second thought, however, the situation can be reconstrued as a minor setback and repurposed as an opportunity to get some exercise by taking the stairs. This is how an emotional response to a situation can be changed by thinking differently about the situation – a phenomenon known as reappraisal (Buhle et al., 2013; Gross, 1998; Lazarus, 1966; McRae, 2016). In this paper, we propose an integrative framework for understanding reappraisal. We start with a brief overview of the history and the current state of reappraisal research. Next, we sketch a working model of appraisal and use it to reveal the basic psychological mechanisms of reappraisal. We then introduce the core

propositions of our framework. First, reappraisal can involve changing how a situation is construed as well as changing which goals this construal is compared to. Second, reappraisal can be characterized in terms of the appraisal shifts it produces along appraisal dimensions. Third, reappraisal depends on how malleable the situational construal and the current goals are. We end by considering several broader implications of this framework.

REAPPRAISAL: THE STATE OF THE ART

The phenomenon of reappraisal that we seek to explain encompasses a range of different behaviors that amount to intentional changes to appraisal aimed at changing emotion. These changes are intentional in the sense that they are directed at a goal to alter the emotion trajectory. For instance, reappraisal can be triggered by a goal to reduce negative emotions as well as to increase positive

emotions, and vice versa (Tamir, 2015). Our framework applies to reappraisal irrespective of which kind of emotion goal it serves (although down-regulation of negative emotion will be over-represented in this paper much as it is in everyday life). Our framework also applies to reappraisal irrespective of its automaticity. Even though we view reappraisal as an intentional process (Gross, Sheppes, & Urry, 2011), it may or may not also be controllable, conscious, and efficient (Melnikoff & Bargh, 2018). For instance, an emotion goal can be activated inside as well as outside awareness, and reappraisal can then proceed similarly inside as well as outside awareness (Braunstein, Gross, & Ochsner, 2017). Thus, we will not systematically explore differences between implicit and explicit reappraisal, although doing so would be valuable in the future. Finally, in addition to the intrapersonal level, reappraisal can also occur on interpersonal level, such as when people seek and offer alternative interpretations for distressing events in social interactions (Zaki & Williams, 2013). The present framework focuses exclusively on intrapersonal reappraisal, although we believe that it could prove useful for future efforts to understand interpersonal reappraisal as well.

A Brief History of Reappraisal Research

Attempts to reinterpret a situation to change its emotional impact have long been of interest in psychology, resulting in a rich, but increasingly complex, set of findings and ideas. Systematic study of reappraisal can be traced back to the idea of ego-defenses that psychoanalysts associated with the management of negative emotions (Freud, 1926/1959). Lists of identified ego-defenses included reappraisal-like constructs such as intellectualization and rationalization. Even as clinical psychology has witnessed major paradigm shifts, constructs related to interpretation of situations have remained

important for understanding as well as alleviating mental ailments. For instance, etiologies of mental illnesses such as depression and anxiety implicate negative interpretation biases (Everaert, Podina, & Koster, 2017), and/or the attenuation of positive interpretation biases (Mezulis, Abramson, Hyde, & Hankin, 2004; Snyder, 1989). Interventions designed to alleviate mental illness therefore often target interpretation biases. For instance, cognitive therapists teach patients how to identify and challenge specific kinds of interpretation patterns such as overgeneralization or exaggeration (Williams & Garland, 2002). Improved reappraisal skills are among the desired outcomes of many effective therapeutic systems such as rational emotive behavior therapy (Ellis, 1957; Ellis & MacLaren, 1998) and cognitive behavioral therapy (Beck, 1963, 1964; Beck & Dozois, 2011).

A second major source of inspiration for modern reappraisal research is the study of psychological stress and coping, spearheaded by Richard Lazarus (Lazarus, 1966; Smith & Kirby, 2011). Seminal experiments in the 1960s suggested that stress responses depend on the way people cognitively construe, or appraise (Arnold, 1960), stressful situations (Lazarus & Alfert, 1964; Speisman, Lazarus, Mordkoff, & Davison, 1964). The term “reappraisal” was introduced to denote updates to the initial appraisal that could occur as the situation and its interpretation continually unfold (Lazarus, 1968). This early meaning of “reappraisal” was broader than the meaning of this term in the context of emotion regulation and this paper. For Lazarus, reappraisal could be intentional as well as unintentional, and could reflect overt changes to the situation as well as covert changes to the interpretation. By contrast, as an emotion regulation strategy, reappraisal usually encompasses only intentional changes to the covert interpretation, falling within the

subspace of reappraisal that Lazarus called emotion-focused coping (intentional changes to overt situations would meanwhile fall within problem-focused coping). A key contribution of the stress and coping literature to reappraisal research is the realization that reappraisal works through appraisal change. However, beyond this broad insight, the literatures on appraisal and reappraisal have drifted apart over the years, creating a chasm that we hope to help bridge (Smith & Kirby, 2011; Yih, Uusberg, Taxer, & Gross, 2019).

Reappraisal in Modern Emotion Regulation Research

Much of modern reappraisal research has been conducted in the context of the broader project of understanding the many ways people attempt to regulate their emotions. Emotion regulation encompasses all overt or covert behaviors that change one or more aspects of emotion (Gross, 1998, 1999, 2015; Koole, 2009; Larsen, 2000; Webb, Schweiger Gallo, Miles, Gollwitzer, & Sheeran, 2012). According to the process model (Gross, 1998, 2015), emotion regulation follows when an emotion, either experienced or imagined, is identified to be helpful or harmful to some end, such as to experience pleasure or to perform well on a task (Gross et al., 2011; Tamir, 2015). Identification activates an emotion goal to experience a certain emotion, which can in turn trigger selecting, implementing, and monitoring different strategies to accomplish this goal (Gross, 2015). These emotion regulation strategies bias the unfolding of emotion by intervening at different stages in emotion generation (Gross, 1998). A strategy can seek to change the situation that triggers the emotion; the way attention is deployed within the situation; the appraisal of the situation; or the emotional response to the situation. For instance, to avoid being saddened by a movie, a person could pick (or

switch to) a comedy instead of a drama (using strategies from the situation selection and modification family); fiddle with a smartphone during intense portions of the drama (attentional deployment); construe the drama as irrelevant because it is fictional (reappraisal); or hold back tears (response modulation).

The process model of emotion regulation, and the systematic research it has inspired, has made significant conceptual as well as empirical contributions to our understanding of reappraisal. Conceptually, the process model distinguishes reappraisal from two related but distinct forms of emotion regulation. On the one hand, it suggests that although attentional deployment and reappraisal strategies are similarly cognitive, they target different components of emotion generation (Ochsner & Gross, 2005). Whereas reappraisal biases emotion by changing appraisals, attentional deployment biases emotion by interfering with the stream of information that appraisals rely on. On the other hand, the process model also distinguishes reappraisal from situation selection and modification strategies. Both sets of strategies end up changing appraisals, but situation selection and modification do so by changing the overt situation while reappraisal does so by changing the covert interpretation of the situation (Yih et al., 2019).

Empirical emotion regulation research has complemented this conceptual picture with insights about the antecedents and consequences of reappraisal. Studies of reappraisal antecedents have highlighted the role of motives that make different emotions desirable (Tamir, 2015), the role of beliefs about the effects and controllability of emotions (Ford & Gross, 2018), and the role of decisions to use different regulation strategies (Sheppes, 2014). Studies of emotion regulation consequences suggest that reappraisal is often an effective means for achieving emotion goals

without significant side effects. In laboratory studies, reappraisal has been found to change the experiential, expressive, and physiological components of emotion, often with only moderate mental effort, and in a sustained manner (Buhle et al., 2013; Morawetz, Bode, Derntl, & Heekeren, 2017; Webb, Miles, & Sheeran, 2012). Day-to-day reappraisal use meanwhile has been found to correlate with higher levels of well-being (Gross & John, 2003; John & Eng, 2014) and fewer mental health issues (Aldao, Nolen-Hoeksema, & Schweitzer, 2010; Garnefski, Kraaij, & Spinhoven, 2001; Troy, Wilhelm, Shallcross, & Mauss, 2010).

The Need for a Novel Integrative Framework

The existing body of research paints an informative picture of reappraisal as a strategy that involves intentional changes to appraisal and that can alter the course of thinking, feeling, and behaving in generally desirable directions. However, this picture also contains blurred areas, some of which could be brought to focus by further clarifying the psychological mechanisms that reappraisal relies on. To illustrate some of the blurred areas, we briefly consider three open questions in the current reappraisal literature. What kinds of regulation strategies should be considered reappraisal? How might one characterize different instances of reappraisal? How can one predict when reappraisal will be more or less effective?

One unresolved question concerns the range of emotion regulation strategies that should be identified as reappraisal. Prototypical examples of reappraisal include reinterpreting the meaning of a situation and reconsidering one's ability to cope with it (Gross, 2015). However, several other regulation strategies are sometimes considered reappraisal and sometimes not. Examples include arousal reappraisal, which involves reconstruing

emotional arousal as helpful for performance (Jamieson, Hangen, Lee, & Yeager, 2017; c.f. Tamir, 2017), and mindful acceptance, which involves attending nonjudgmentally to one's emotional reactions (Naragon-Gainey, McMahon, & Chacko, 2017; c.f. Chambers, Gullone, & Allen, 2009). There may also be phenomena that have yet to be called reappraisal even though they should be. For instance, the link between achievement goals and achievement emotions (Pekrun, Elliot, & Maier, 2009) suggests that replacing performance goals with mastery goals in order to feel better may be a form of reappraisal. The framework proposed here helps resolve debates about what counts as reappraisal by identifying the psychological mechanisms of reappraisal which can be used as criteria for recognizing different versions of reappraisal.

A second and related open question concerns the best ways to classify individual emotion regulation instances that fall within the broad class of reappraisal. People are known to implement reappraisal in many different ways. For instance, participants reappraising their responses to unpleasant photographs were found to normalize and re-interpret the depicted events; to imagine different future outcomes and interfering agents; to rationally analyze the events; to challenge their reality; and to distance themselves from the photographs (McRae, Ciesielski, & Gross, 2012). Other taxonomies of reappraisal can be found within the factor structures of relevant questionnaires. For instance, the Ways of Coping Checklist identifies three emotion-focused coping strategies wishful thinking, self-blame, and avoidance (Vitaliano, Russo, Carr, Maiuro, & Becker, 1985). The Cognitive Emotion Regulation Questionnaire identifies nine strategies self-blame, other-blame, acceptance, rumination, positive refocusing, positive reappraisal, refocus on planning, putting things into perspective, and

catastrophizing (Garnefski et al., 2001). However, the limited overlap and scope of these and other taxonomies suggests that a universal map of the full territory of reappraisal has yet to be drawn. The framework proposed here can be a step towards such a map by providing a theory-driven way to characterize different instances of reappraisal.

A third open question concerns moderating mechanisms that determine how effective reappraisal is in the short and long term. For instance, the short-term effectiveness of reappraisal is reduced by less abstract content of a threatening stimulus (McRae, Misra, Prasad, Pereira, & Gross, 2012; Suri et al., 2018) and high intensity of concurrent affective state (Raio, Oederu, Palazzolo, Shurick, & Phelps, 2013). Though these findings have feasible individual explanations, they have not yet been explained by a single framework. The same holds for moderators that influence the long-term effects of reappraisal, such as the controllability of situations. Successful reappraisal of distress can reduce the motivation to improve the conditions that give rise to the distress (Ford, Feinberg, Lam, Mauss, & John, 2018). Reappraisal tends therefore to be adaptive over the long run only when used in uncontrollable situations but not in controllable situations (Haines et al., 2016; Troy, Shallcross, & Mauss, 2013). Both short-term and long-term moderating effects need to be considered when drawing prescriptive conclusions from reappraisal research. The framework presented here can aid these efforts by providing an account that predicts these as well as other, as yet unknown, moderating effects.

AN APPRAISAL FRAMEWORK FOR UNDERSTANDING REAPPRAISAL

In search for conceptual building blocks for a framework of psychological mechanisms of reappraisal, we return to Lazarus' insight that reappraisal can be understood through the lens of appraisal theory (Smith & Kirby, 2011; Yih et al., 2019). Appraisal theory views emotion as a multicomponential response that is generated and shaped by the appraisal, or extraction of the motivational meaning, of a situation (Arnold, 1960; Lazarus, 1966; Moors, Ellsworth, Scherer, & Frijda, 2013; Scherer, Schorr, & Johnstone, 2001). In line with this model, appraisals have been found to influence components of emotion, including subjective feelings (Kuppens, Van Mechelen, & Rijmen, 2008; Roseman & Evdokas, 2004; Smith & Ellsworth, 1985; Tong, 2015), vocal and facial expressions (Kaiser & Wehrle, 2001; Laukka & Elfenbein, 2012), physiological states (Kreibig, Gendolla, & Scherer, 2012; Pecchinenda & Smith, 1996; Smith, 1989), and action tendencies on the behavioral (Frijda, 2010; Roseman, 2013) and cognitive level (Schimmack, 2005; Uusberg, Naar, Tamm, Kreegipuu, & Gross, 2018). Even though appraisal is not the sole cause of dynamic and distributed emotions (LeDoux & Brown, 2017; Lindquist, Siegel, Quigley, & Barrett, 2013; Pessoa, 2017), we assume – like most modern appraisal theorists -- that appraisals play a central role in generating and shaping emotions (Moors, 2009; Mulligan & Scherer, 2012; Sander, Grandjean, & Scherer, 2018).

A Working Model of Appraisal

The process model of emotion regulation holds that a good way to understand a regulatory phenomenon, such as emotion regulation, is to use a simplified model of the phenomenon that is being regulated, in this case emotion (Gross, 1998). Translating this insight into the present

context suggests that a good way to understand reappraisal is to use a simplified model of appraisal, which we lay out in the next few paragraphs. Our appraisal model integrates major themes from different appraisal theories while remaining agnostic about many specific issues such as the kinds of representations (e.g., associations vs propositions) and processes (e.g., automatic vs controlled) that are involved in appraisal as well as their neural implementations (Scherer et al., 2001).

According to appraisal theory, emotions are caused not by a situation *per se*, but by what the situation means with respect to various motivational concerns. We therefore view appraisal as a comparison process that takes two inputs and produces an output that represents the relationship between the inputs (see Figure 1a; Chang & Jolly, 2018; Moors, 2010; Reisenzein, 2009). Consider for instance how a driver who is stuck behind a slow vehicle may become angry. One input to his appraisal process is the goal set, i.e. currently active representations of how he desires the world to be. We define goals broadly to include any representation, conscious or otherwise, of a desired end state, including needs, motives, values, and norms (Elliot & Fryer, 2008). In the example, the angry driver may be motivated by a goal to arrive on time to an important meeting. However, an active goal in itself is not sufficient for either appraisal or emotion. The goal needs to be related to another input to the appraisal process – the construal of a situation, i.e. a representation of how the world is. We define situational construal as a set of mental models that are activated to stand in for the current situation (Clark, 2013). For instance, the angry driver may construe the slow speed of the vehicle in front of him as a deliberate norm violation by another driver. Given a goal set and a construal, the appraisal process produces an appraisal outcome, i.e. a summary representation of the relationship between the

construed situation and the goal set. It is this appraisal outcome that goes on to shape emotion. Given the goal to arrive at a meeting and the construal of a deliberately slow driver impeding one's progress, the person in our example appraises the situation as an external obstruction of an important goal and is likely to experience anger.

Another central tenet of appraisal theory reflected in our working model is the idea that appraisal outcomes can be thought of as values on a relatively small number of abstract appraisal dimensions. Appraisal functions as a data reduction procedure that extracts a lower-dimensional meaning representation from higher-dimensional input representations of the situation and goals. Each appraisal dimension captures some relatively abstract aspect of the motivational essence of a situation, such as the desirability of the situation, accountability for its origins, and expectancies for its future. The sets of dimensions proposed by different appraisal models largely overlap (Moors et al., 2013), suggesting that different models may parse the same phenomenon using somewhat different clustering rules and labeling conventions. In our working model, relatively concrete appraisal dimensions are clustered hierarchically into increasingly abstract dimensions up to three meta-dimensions of desirability, attribution, and expectancy on top. The desirability meta-dimension asks, "How good or bad is this situation?" It integrates the more specific dimensions of goal congruence ("Does the situation help or hurt me...") and goal relevance ("... and by how much?"). The second meta-dimension of attribution asks, "How did I get here?" It integrates the internal accountability dimension ("How much responsibility for this situation belongs to me...") with external accountability ("... and how much to someone or something else?"). The third meta-dimension of expectancy asks, "What should I

do about it?" It integrates the outcome expectancy dimension ("How will this situation evolve...") with the coping potential dimension ("... and what could I do about it?"). Responses to these questions can have variable degrees of certainty depending on how clear the person is about the desirability, attribution, and expectancies of the situation.

Finally, our working model of appraisal includes two broad antecedents of appraisal: situations and knowledge (Smith & Lazarus, 1990). Situations refer to particular configurations of the internal and external environment, such as being hungry at a restaurant (c.f. Yang, Read, & Miller, 2009). Situations therefore encompass the state outside of the body, such as a restaurant, as well as the state inside of the body, such as being low on blood glucose and feeling hungry. Situations can be currently ongoing, giving rise to direct experiences. Situations can also be simulated versions of past or future events, giving rise to recollections and expectations, respectively (Hesslow, 2012). Knowledge refers to the mental models that people construct or draw from memory to make sense of ongoing situations as well as to simulate recalled or expected situations (Binder, 2016; Radvansky & Zacks, 2011). Knowledge can encompass relatively simple mental models such as the concept of being hungry as well as relatively complex mental models such as the scenario of dining at a restaurant. Even though the material nature of what we mean by situation is very different for experienced events (conditions in physical environments) and simulated events (conditions in simulated environments), in both cases there is a similar relationship between a situation as the thing being signified and knowledge as the signifier.

Situations and knowledge are relevant for appraisal because they combine to influence both how a situation is construed and which

goals belong to the goal set. Situational construal involves selecting a mental model to make sense of the information available about the situation (Clark, 2013). For instance, arrival of one's meal at a restaurant can be construed as "on time" or "late" based on the time it took (element of the situation) and the time it should take according to the restaurant scenario (element of knowledge). The goal set is similarly sensitive to both actual threats and opportunities as well as the knowledge needed to perceive and evaluate them. For instance, the goal of having Chinese food is more likely to enter the goal set when someone is hungry and at a restaurant (elements of the situation) and is also aware that the restaurant offers Chinese food (element of knowledge).

From Appraisal to Reappraisal

Armed with a working model of appraisal (Figure 1a), we can now turn to the psychological mechanisms that enable reappraisal (Figure 1b). We define reappraisal as an intentional attempt to shift the appraisal outcome along appraisal dimensions with the aim of changing emotion. A key insight of our framework is that shifting the appraisal outcome generally involves changing the goal set, the construal, or both. This is because appraisal outcomes are an output of a comparison process, and are therefore difficult to change directly. For instance, someone feeling disappointed by running late for a movie may find it difficult to simply convince herself that being late is actually congruent with the goal of being on time. It is less difficult, however, to change one of the inputs to the appraisal process. She could, for instance, reconstrue the situation from a personal failure to arrive on time to a misfortune caused by unexpectedly slow traffic. This change in construal is likely to reduce the internal accountability appraisal and thereby alleviate disappointment. Alternatively, she could

repurpose the situation by demoting her original goal of being on time and promoting the alternative goal of seeing the whole movie. Because the screening will begin with commercials, arriving a little late can be perfectly congruent with the goal of seeing the whole movie, even if it is incongruent with the initial goal to arrive on time. This change in the goal set is likely to improve the goal congruence appraisal and thereby alleviate the negative emotion.

We propose that appraisal outcome shifts produced by changing situational construal and goal set are the core psychological mechanisms of reappraisal, and that these mechanisms can be recognized across many different instances of reappraisal. Consider, for example, instances of reappraisal that begin at different times relative to emotion generation. During emotion generation, appraisals become elaborated and updated in iterative cycles, both as more information is processed and as the situation changes (Clore & Ortony, 2008; Cunningham & Zelazo, 2007; Gross, 2015; Kuppens, 2013; Moors, 2017; Yih et al., 2019). Depending on when they are launched, we can place instances of reappraisal on a continuum from proactive to reactive reappraisal. Proactive reappraisal occurs when the goal to change an emotion is activated prior to, or during early cycles of, emotion generation. For instance, a student anxious about an upcoming test may engage in reappraisal while preparing for the test or as soon as the test begins. Reactive reappraisal, by contrast, occurs when the goal to change emotion is formed during late cycles of emotion generation, or even only once the emotion has already subsided (Nørby, 2018). For instance, a student may engage in reappraisal when encountering intense anxiety

during test, or when thinking back to the test. We suggest that even though there are important differences between proactive and reactive reappraisal (Sheppes & Meiran, 2007), both flavors rely on the same mechanisms of shifting appraisal outcomes through goal and construal change to bias or update the appraisals involved in emotion generation.

The vignette about a person rushing to see a movie also illustrates three specific propositions that our framework makes about the psychological mechanisms of reappraisal. First, the vignette demonstrates that in order to bring about downstream changes in appraisal outcomes, people can alter how they view the situation as well as what goals they consider when evaluating it. We therefore propose that reappraisal incorporates two co-occurring but distinct strategies: changing the situational construal (i.e. reconstrual) and changing the goal set (i.e., repurposing). Second, the vignette demonstrates that reappraisal can shift the appraisal outcome along distinct appraisal dimensions such as accountability or congruence. We therefore propose that different instances of reappraisal can be characterized as shifts along specific appraisal dimensions (i.e., appraisal change vectors). Third, the vignette demonstrates that changes to appraisal are made possible by the availability of different construals that could explain the same situation as well as the availability of different goals that the same situation could serve. We therefore propose that reappraisal affordances are a function of how malleable the initial goal set and the initial situational construal are. We will elaborate each of these propositions in the next three sections.

(a) Emotion generation via appraisal **(b) Emotion regulation via reappraisal**

Figure 1. From a working model of appraisal (a) to a framework of reappraisal (b). (a) Appraisal involves expressing the relationship between the goal set and situational construal as an appraisal outcome on a set of appraisal dimensions (three are shown here). Appraisal outcome shapes changes in the body and mind that make up an emotional response. The goal set and construal stem from knowledge applied to make sense of a situation. (b) Reappraisal involves changing either the goal set (repurposing) or the situational construal (reconstrual) with the aim of moving the appraisal outcome (appraisal change vector) so as to change emotion. Reappraisal affordances depend on the malleability of the situational construal and the goal set.

TWO REAPPRAISAL STRATEGIES: RECONSTRUAL AND REPURPOSING

Our framework proposes that there are two broad reappraisal strategies, reconstrual -- which involves changing how a situation is construed, and repurposing -- which involves changing which goals the construal is compared to. Starting from reconstrual, how could someone use this strategy to reappraise feelings of despair triggered by losing a job during a recession? One option is to realize that the situation is not that bad, because the job

might be reinstated when the economy improves. Another option is to take solace in the fact that the job loss was caused by external factors and is thus not indicative of personal failure. These instances of reappraisal involve selecting different mental models to replace an initial one to make sense of a complex situation. Compared to the initial model, the new models compare more favorably to the goals that were the basis for the initially negative appraisal. For instance, the initial feeling of despair might have resulted from comparing the job loss to the goal of

maintaining the job. Reconstructing the job loss as possibly temporary reduces the mismatch between the situation and this goal, without changing anything about the goal. Likewise, reconstructing the job loss as not attributable to oneself reduces the mismatch between the situation and a different goal to maintain high self-regard, without changing the goal.

The reconstrual strategy makes use of the constructive nature of perception. Representing a situation is a constructive process in the sense that it relies on applying mental models to the often ambiguous and incomplete information available about situations (Clark, 2013). Many aspects of situations that we readily perceive, such as causes of events, intentions of others, and future developments, cannot be directly detected with any sensory organ. Instead, they need to be inferred from a combination of prior knowledge and information available about the situation. This process can be thought of as selecting a set of mental models to stand in for the situation based on how well the models fit available information (Clark, 2013; Friston, 2010; Huang & Rao, 2011). Often, several models exist that can fit the same information reasonably well. In the example above, the situation of losing a job is equally compatible with a model in which the job loss is permanent and with another model in which the job loss is temporary. Opportunities to reappraise through reconstrual are therefore a consequence of a system applying mental models to explain perceptual evidence.

An alternative strategy for reappraising a job loss is to repurpose the situation by changing something about the currently active goals. For instance, the laid off person could realize that being unemployed is an opportunity to pursue a different career. He could also focus on the purchases he can make with the generous severance package he will soon receive. In

these instances of reappraisal, the situational construal remains intact, but its initially unfavorable comparison with the goal set is improved by changing something about the goals. By activating the hitherto dormant goals of pursuing a different career and making desired purchases, the set of currently active goals is expanded. The original goals of maintaining employment and self-worth may also be simultaneously demoted. When the construed situation is compared to the modified set of goals, the two will appear on balance more congruent than before. Even as losing a job continues to be incongruent with the goal of maintaining that particular job, it is now also congruent with the goal of finding a potentially more rewarding job. The net congruence of the situation with the goal set is therefore improved, leading to a reduction in negative emotion.

The repurposing approach to reappraisal makes use of cognitive biasing of competing goals. Behaving adaptively over the short term requires focusing on pursuing one committed goal at a time, whereas behaving adaptively over the long term requires switching among many goals (Shah, Hall, & Leander, 2009). The need to balance exploiting one opportunity and exploring others (Cohen, McClure, & Yu, 2007) suggests that at any given time, there is a set of different goals that a person is at least somewhat committed to (Klinger, 1975; Kruglanski et al., 2002). Reappraisal through repurposing works by cognitively modulating the goals that make up this set as well as their relative positions within the set. In the example above, thinking about alternative career options and imagining what one would purchase with the severance payment promoted the commitment levels of these two goals. Reappraisal through repurposing therefore relies on cognitive influences on goal commitments for emotion regulation purposes.

In addition to the immediate outcomes of reconstrual and repurposing illustrated above, both strategies can have cumulative long-term effects. Using reconstrual repeatedly in similar situations can over time change the default mental models that are initially selected as the most probable explanations of available information. For instance, consider a young professional experiencing anxiety about public speaking. During a single presentation, he may use reconstrual to realize that a yawn of an audience member may signify lack of oxygen in the room instead of boredom with the presentation. As this replacement of mental models is repeated over several encounters with yawning audience members, the person may undergo a sustained shift in beliefs about the likely reasons for yawning during presentations. As a result, he may stop associating yawning audience members with his performance as a public speaker and become less anxious. Likewise, repeated use of repurposing across similar situations can over time change the prioritization and content of goals. For instance, during a single presentation, the young professional may use repurposing to realize that a successful presentation need not excite all of the audience members all of the time. Repeating this repurposing over several presentations, the person may undergo a sustained shift in his goal system whereby he stops striving for total excitement of audience members and thereby becomes less anxious.

The distinction between reconstrual and repurposing aligns with the fundamental distinction between assimilative and accommodative psychological processes. Assimilation involves shaping information from the external world to better integrate it with existing internal structures, whereas accommodation involves shaping the internal structures to better incorporate external information (Block, 1982; Piaget, 1954).

Reconstrual is a more assimilative form of reappraisal because it involves shaping the information about the external world rather than the motivational core of the self. Repurposing, by contrast, is a more accommodative form of reappraisal because it involves shaping internal goals to align with the external world. Interestingly, a related but different distinction can be found in the stress and coping literature between primary control or problem-focused coping, which involves assimilative shaping of the external world by directly acting on it, and secondary control or emotion-focused coping, which involves accommodative shaping of oneself to bend to reality through covert emotion regulation, including reappraisal (Weisz, McCabe, & Dennig, 1994). It is possible to concatenate these two distinctions into a single continuum. The continuum starts from the maximally assimilative strategy of changing the world to fit goals (problem-focused coping), continues to the mixed strategy of changing the construal of the world to fit goals (reconstrual reappraisal portion of emotion-focused coping), and extends to the primarily accommodative strategy of changing the goals to fit to the world (repurposing reappraisal portion of emotion-focused coping).

APPRAISAL CHANGE VECTORS

A second proposition of our framework is that instances of reappraisal can be characterized as appraisal outcome shifts along appraisal dimensions, or appraisal change vectors. In each reappraisal instance, the broad strategies of reconstrual and repurposing are implemented in a particular way that has a particular downstream impact on appraisal outcomes. An important question is how to best capture this variance, both inside and outside the laboratory. Enumerating all conceivable ways in which situational construals and goals can change would quickly

become overwhelming. One solution to this kind of classification problem is to adopt a dimensional system that can characterize many instances with a high degree of precision as well as parsimony. For instance, the color dimensions of redness, greenness, and blueness can be used to characterize thousands of distinct colors. We suggest that appraisal dimensions can perform a similar function for instances of reappraisal.

Specifically, appraisal dimensions can be used to define appraisal change vectors that capture the direction and the distance that appraisal outcomes travel in appraisal dimensional space due to reappraisal. The idea of a vector reflects our views of appraisal outcomes as values on a set of appraisal dimensions. If we arrange appraisal dimensions into a coordinate space, then the appraisal outcome becomes a point within this space characterized by locations on each of the dimensions (Figure 1a). An instance of successful reappraisal moves this appraisal outcome point in appraisal dimensional space in some direction and for some distance (Figure 1b). For instance, consider a student who receives a bad grade, appraises it as goal-incongruent, self-caused, and unchangeable, and thereby feels disappointed. Trying to reappraise the situation, the student may tell himself that “this was the best I could hope for with this lousy professor”. This reappraisal would move the student’s appraisal outcome higher on the goal-congruence dimension (by lowering the performance standard he considers as his goal). It would also move the appraisal outcome lower on the internal accountability dimension (by blaming the professor). These simultaneous appraisal outcome changes can be thought of as a single appraisal change vector which can be visualized as an arrow with some direction and length in appraisal dimensional space. The same information can of course be visually represented in other ways, such as a profile of

movements along separate appraisal dimensions.

Appraisal change vectors provide a flexible way to conceptualize as well as assess reappraisal variance. Conceptually, these vectors can be applied to both reconstrual and repurposing reappraisal. In the previous example, repurposing was used to move the appraisal outcome higher on the goal-congruence dimension (by lowering the performance standard), while reconstrual was used to move the outcome lower on the internal accountability dimension (by shifting blame to the professor). In principle, reconstrual as well as repurposing can yield similar appraisal changes. For instance, coping potential can be increased both by changing the construal – “I’ll get the result I want next time, because I now know how the exam is structured”; as well as by changing the goal – “I’ll get the result I want next time, because I will want a B rather than an A”. However, even if reconstrual and repurposing can in principle produce similar appraisal changes, there may be statistical regularities whereby one strategy is more likely to change some dimensions over others. These regularities may further differ between types of situations and emotions. Novel empirical work is needed to map the relationships between reconstrual and repurposing on the one hand and appraisal change vectors on the other hand.

Appraisal change vectors are also useful for assessment purposes. They are equally sensitive to instances of reappraisal that target a single appraisal dimension as well as to those that target multiple dimensions. In addition to capturing experienced appraisal changes, appraisal change vectors can also be used to assess imagined or intended appraisal changes. For instance, participants could be asked to indicate different changes to appraisals they would attempt in different situations. These

data could be used to assess the reappraisal affordances that different situations offer (Suri et al., 2018) as well as the reappraisal inventiveness (Weber, Assunção, Martin, Westmeyer, & Geisler, 2014) and reappraisal self-efficacy (Ford & Gross, 2018) that different individuals display. Appraisal change vectors can be further processed to derive novel metrics. For instance, the use of different appraisal change vectors within and between different situations could be used as a metric of reappraisal flexibility (Aldao, Sheppes, & Gross, 2015).

Our hope is that appraisal change vectors may become a common standardized coordinate space for comparing and integrating findings from different studies. As an illustration of the potential of this approach, consider how the different ways participants were found to reappraise responses to unpleasant photographs (McRae, Ciesielski, et al., 2012) map onto the three meta-dimensions of desirability, attribution, and expectancy. The desirability meta-dimension may have changed through the goal relevance component when participants distanced themselves from the images, rationally analyzed them, and challenged their reality. The attribution meta-dimension may have changed when participants normalized and re-interpreted the depicted events. Finally, the expectancy metadimension may have changed when participants imagined different outcomes and interfering agents. Note that although this illustration relies on three meta-dimensions, the notion of appraisal change vectors can be operationalized using any appraisal dimensional system. This makes appraisal change vectors attractive for not only integrating results across different reappraisal studies, but also empirically bridging the divide between emotion regulation and appraisal literatures (Smith & Kirby, 2011; Yih et al., 2019).

REAPPRAISAL AFFORDANCES FROM CONSTRUAL AND GOAL SET MALLEABILITY

A third proposition of our framework is that the availability of affordances for effective reappraisal depend on the malleability of situational construals and goal sets. Reappraisal affordance refers to the potential to reinterpret a situation in a particular way (Suri et al., 2018). In terms of our framework, a reappraisal affordance constitutes a potential appraisal change vector that a given person identifies in a given situation. Some situations offer more potential appraisal change vectors than others (Suri et al., 2018), whereas some people are able to detect more vectors in the same situation than others (Weber et al., 2014). A higher number of reappraisal affordances is generally conducive to attempting to as well as succeeding in using reappraisal to regulate emotion. Given how central affordances are, it is important to understand how they become available. Our framework suggests that a useful way to address this question is to focus on how malleable the situational construal as well as the goal set are.

Construal malleability is high when an individual can choose from several mental models that would explain the situation comparably well. Often, this is because only limited information is available about the situation. For instance, a situation where a friend has not shown up to an agreed-upon meeting can be consistent with several models such as “the friend forgot” and “something urgent came up”. As both explanations are equally probable, the construal of this situation is malleable and emotions elicited in it can be reappraised through reconstrual. For instance, the stood-up person may reduce his initial frustration by assuming that his friend most probably was held up by something urgent. Towards the other end of the construal

malleability spectrum lie situations that implicate a single dominant explanation, such as a friend admitting he forgot about the meeting. Such a situation with low construal malleability offers few affordances to regulate emotions using reconstrual. In addition to the availability of information about a situation, construal malleability also depends on the knowledge that people bring to situations. For instance, people from cultures with lax punctuality norms may have an additional affordance to think that the friend who has not shown up on agreed time is simply late.

Goal set malleability is high when people are equally committed to several goals, often because they are not overly committed to any of them. For instance, if an agreed-upon meeting is cancelled early enough, a person can use repurposing to manage his disappointment by valuing other things he could do during the time reserved for the meeting. By contrast, recommitting to an alternative goal is harder when the commitment to the original goal dominates alternative goals making the goal set less malleable. For instance, when the person has already taken a long commute to meet his friend, he might find it harder to reappraise his disappointment elicited by the cancellation through repurposing. In addition to the features of a situation, goal set malleability also depends on the features of the knowledge structures of the individual. For instance, people with high trait extraversion might place higher value on social contacts and therefore have less malleability to replace a goal to meet a friend with a non-social alternative activity.

The construal and goal set malleability constructs help explain why reappraisal is more effective in some circumstances than others. For instance, reappraisal is less helpful for regulating responses to emotional events that are defined by their observable features (e.g., a

smelly toilet) rather than unobserved features (e.g., a verbal insult; McRae, Misra, et al., 2012; Suri et al., 2018). Within our framework, this pattern can be explained by assuming that less observable events have a higher construal malleability than more observable events. As making sense of a less observable event such as an insult requires more complex mental models with a larger number of elements than making sense of a smelly toilet, it also offers more targets for reconstrual. For instance, a verbal insult can be attributed to different intentions. Our framework thus suggests that the extent to which an event requires inferences that go beyond sensory input facilitates reappraisal effectiveness by increasing the malleability of situational construal.

In another example of a moderating relationship, reappraisal effectiveness can depend on affective intensity. For instance, people tend to spurn reappraisal for regulating responses to pictures with high compared to low negative intensity (Sheppes, 2014; Sheppes et al., 2014). They are also less successful in using reappraisal under high compared to low stress (Raio et al., 2013). Within our framework, these findings can be explained by assuming that high affective intensity reduces goal set malleability. Intense affective experiences are characterized by control precedence, or prioritization of affect-relevant mental processes (Frijda, 2009). In terms of our framework, control precedence corresponds to prioritization of affect-related goals in the goal set at the expense of other goals, thereby reducing the malleability of the overall goal set. For instance, highly unpleasant stimuli probably prioritize the goal to disengage from these stimuli while high levels of stress prioritize the goal to avoid threats. Likewise, highly pleasant stimuli probably prioritize the goal to approach relevant rewards. As these affect-relevant goals become more dominant in the goal set, it becomes more difficult to

cognitively demote them and promote alternative goals. Our framework thus suggests that affective intensity may reduce reappraisal effectiveness by reducing the malleability of the goal set.

Further nuances of reappraisal effectiveness can be explained by considering how the knowledge and situation components of the present framework impact reappraisal through changing the malleability of construals and goal sets. As an example of a nuanced impact of knowledge on reappraisal, consider the somewhat puzzling finding that the use (John & Gross, 2004) and effectiveness (Shiota & Levenson, 2009) of reappraisal increases throughout adulthood into older age even while executive control capacities involved in emotion regulation decline (Urry & Gross, 2010). This paradox may in part stem from older individuals relying on the rich knowledge they have accumulated through a longer life to compensate for any decline in executive functions. Our framework suggests that richer knowledge delivers a wider selection of mental models which can increase both construal malleability and goal set malleability. Construal malleability benefits from knowledge when a larger selection of mental models helps the person to find an alternative explanation to a situation to replace the initial emotionally undesirable explanation. Goal set malleability benefits from knowledge when a larger selection of mental models helps the person to find more ways in which the situation can be beneficial for alternative goals.

As an example of the nuanced impact of a situation on reappraisal, consider how members of oppressed groups facing discrimination may benefit less from reappraisal than members of non-oppressed groups (Perez & Soto, 2011). This paradox can be explained by the availability of affordances to reconstrue the situation that provide only

limited relief from negative emotion. For instance, when a member of an oppressed group is fired, she may detect an affordance to re-attribute this event from a personal failure to an extrinsic cause, much like a non-oppressed individual would. However, if the most likely extrinsic cause is systemic racism, then the new construal is equally distressing and will therefore fail to produce the desired improvement in emotion. In another situation-related paradox, reappraisal can be suboptimal in distressing situations that could actually be changed for the better (Ford et al., 2018; Haines et al., 2016; Troy et al., 2013). This is because the relief from negative affect that reappraisal provides can prevent negative affect from motivating overt action that would improve the situation. In terms of our framework, this pattern can be explained by the availability of reappraisal affordances that are overvalued relative to affordances for changing this situation.

IMPLICATIONS AND FUTURE DIRECTIONS

A core contribution of our appraisal framework for understanding reappraisal involves the three propositions we have just laid out. Specifically, we have suggested that people use repurposing and reconstrual to produce appraisal change vectors that are either facilitated or inhibited by the relative malleability of the goal set and/or the situational construal. In this section, we consider a number of further implications of this framework.

Expanding the Focus of Reappraisal Research

Our framework calls for direct empirical comparisons of the reconstrual and repurposing strategies. As this distinction hasn't been made in past studies, it is hard to

assess the extent to which available findings involve one or the other strategy (or both). We suspect, however, that existing work is biased towards the reconstrual strategy. For instance, most laboratory studies have operationalized reappraisal with instructions such as “change the meaning of the situation or your emotional response” (Webb, Miles, et al., 2012), which resembles reconstrual more than repurposing. Such instructions may fail to elicit reappraisal via repurposing that, anecdotally, seems to be very common. For instance, people think of failures as learning experiences, search for silver linings in dark clouds, and tell themselves that they did not really want the things they cannot have. Future research is therefore needed to map the prevalence of repurposing and reconstrual as well as to document their similarities and differences.

Interestingly, while repurposing has been under-represented in emotion regulation research, some of the effects of this strategy may have been inadvertently documented elsewhere. For instance, research on motivation has revealed how changes in goals can lead to changes in emotion. The goals people set in achievement contexts differ in terms of their orientation towards positive or negative outcomes defined in relation to the task, to competitors, or to an internal standard (Elliot, Murayama, & Pekrun, 2011). Such differences in goal orientations have been associated with different emotional responses (Higgins, 1997; Pekrun, 2006). These findings support the idea that emotions are sensitive not only to variance in situational construal but also to variance in goal sets. Furthermore, interventions designed to change goal orientations (Pekrun et al., 2009) as well as goal values (Hulleman, Godes, Hendricks, & Harackiewicz, 2010) have been shown to change emotions. Even though emotion regulation has not been the objective of these interventions, they demonstrate that goal

change can lead to emotion change, and thereby amount to preliminary evidence for the efficacy of reappraisal via repurposing. Emotion regulation research on repurposing could derive valuable insights from the existing literature on the relationship between goals and emotion.

Once reconstrual and repurposing can be studied on an equal footing, it will become possible to directly compare their antecedents as well as their consequences. Regarding antecedents, one hypothesis suggested by our framework is that reconstrual should be preferred when construal malleability is high, whereas repurposing should be preferred when goal set malleability is high. Regarding consequences of reconstrual and repurposing, it will be important to chart the effects these strategies have on appraisal change vectors, on emotional experiences as well as on long-term coping and striving. Understanding the antecedents and consequences of reconstrual and repurposing can pave the way for understanding when each strategy is most adaptive. For instance, reconstrual may be mandated when an unwanted emotion arises from biased interpretation of a situation. However, when an unwanted emotion arises from quite veridical interpretations of a situation, it might be more adaptive to reappraise via repurposing.

Reappraisal of External and Internal Situations

The present framework points to similarities between regulation strategies targeting appraisals of the external situation (e.g., situational reappraisal) and strategies targeting appraisals of the internal situation (e.g., arousal reappraisal). On the level of emotion generation, the external and internal aspects of a situation appear to be processed in largely similar ways (Barrett, 2017; Dixon, Thiruchselvam, Todd, & Christoff, 2017). On the

level of emotion regulation, however, researchers disagree whether the reappraisal construct is helpful for characterizing strategies such as arousal reappraisal (Jamieson et al., 2017; c.f. Tamir, 2017) and mindful acceptance (Naragon-Gainey et al., 2017; c.f. Chambers et al., 2009) that focus primarily on the internal aspects of situations such as feelings and bodily sensations.

It should be noted that complex regulation strategies can have many underlying mechanisms and therefore need not fall neatly into a single class. With this mind, however, our framework suggests that many strategies that target internal situations exhibit the core psychological mechanisms of reappraisal – goal-directed changes in appraisal outcomes produced through reconstrual or repurposing. For instance, arousal reappraisal can be initiated by an emotion goal (e.g., feel less anxious during a stressful event) and can produce shifts in appraisal outcomes (e.g., bodily arousal is actually congruent with a performance goal).

Likewise, we argue that mindful acceptance involves intentional shifts in appraisals of internal states. This may seem odd as the stated aim of most mindful acceptance techniques is to refrain from changing emotion (Chambers et al., 2009; Farb, Anderson, Irving, & Segal, 2014). However, a goal of absence should not be equated with an absence of a goal. The mindful imperative to let emotions unfold without interference is a desired end state, i.e. a goal. The mindful goal can differ from spontaneous emotion goals that people activate, often implicitly, to reduce unpleasant and increase pleasant emotions (Koole, Webb, & Sheeran, 2015; Mauss, Bunge, & Gross, 2007). Pursuing the mindful goal of unchanged emotion is thus often an active process that requires changing the way emotion generation would otherwise unfold, similar to how other

forms of reappraisal interfere with emotion generation. Mindful acceptance further resembles reappraisal insofar as it produces shifts in how the internal aspects of situations are appraised. For instance, a mindful person may appraise bodily sensations of anxiety as non-threatening, not one's fault, and temporary. We therefore conclude that on the level of psychological mechanisms, strategies such as arousal reappraisal and mindful acceptance are highly similar to more prototypical forms of reappraisal.

An interesting implication of this conclusion is that the three propositions that flow from our framework may be applicable to strategies that target internal situations. For instance, the effects of mindful acceptance may be analyzed through the lens of reconstrual and repurposing. As an example of mindful reconstrual, viewing one's feelings as clouds passing in the sky can be thought of as applying a particular mental model to make sense of interceptive information. As an example of mindful repurposing, mindfulness often involves promoting non-spontaneous goals such as understanding emotions and using them for personal growth. Following the second proposition of our framework, reappraisal of internal situations could be characterized as appraisal change vectors. For instance, viewing feelings as clouds in the sky will probably lower the self-accountability appraisal of these feelings. Finally, it may be helpful to consider the malleability of construals and goals that relate to internal situations. For instance, low malleability of internal situational construal may lead someone to consider dizziness as a harbinger of fainting, whereas high malleability of internal situational construal helps the person to reconsider dizziness as a normal sign of anxiety.

Mapping Brain Mechanisms

Our framework can be used to better link the observed neural correlates of reappraisal to the mechanisms and computations they reflect. Reappraisal in service of the goal to down-regulate emotion tends to reduce emotional responses in sensory cortices and affective areas such as the amygdala and anterior insula and increase activity in several control regions in the prefrontal, cingulate, parietal, and temporal cortices (Buhle et al., 2013; Hajcak, MacNamara, & Olvet, 2010; Kalisch, 2009; Ochsner & Gross, 2008). Our framework suggests that this pattern may encompass two overlapping but distinct brain networks supporting reconstrual and repurposing. Assuming that both strategies require some executive control, the shared portion of these two networks may contain the executive control areas consistently implicated in neuroimaging studies of reappraisal such as the dorsal prefrontal and posterior parietal cortex (Buhle et al., 2013; Ochsner & Gross, 2008). The non-shared portion of the brain substrate of reconstrual may include frontal and temporal regions associated with top-down influences on perception (Chanes & Barrett, 2016; Lamme & Roelfsema, 2000). In contrast, the non-shared portion of the brain substrate of repurposing may involve regions in the orbital and lateral prefrontal cortex associated with setting and pursuing goals (Berkman & Lieberman, 2009) and a broader parieto-frontal network associated with adjudicating between different goals (Rueter, Abram, MacDonald, Rustichini, & DeYoung, 2018).

Preliminary support for this dual network account can be found in differences observed in neuroimaging studies that have induced reappraisal through reinterpretation or perspective-taking. Reinterpretation, induced by instructions such as “change the meaning of the situation or your emotional response,”

resembles reconstrual more than repurposing. Perspective-taking, induced by instructions such as “analyze the situation objectively, from a detached observer’s perspective,” is a complex strategy with some resemblance to repurposing. Specifically, by invoking a third-person perspective (Kross & Ayduk, 2011), it should demote the egocentric goals to pursue the action tendencies inherent in the emotional response and promote different goals such as understanding the broader causes and consequences of the situation. In the brain, reinterpretation-related processes are distributed across medial as well as lateral prefrontal regions, whereas perspective-taking is relatively more constrained to lateral regions (Ochsner & Gross, 2008). The distribution of reinterpretation and perspective-taking across the lateral-medial axis of the prefrontal cortex aligns with a recent suggestion that lateral prefrontal regions process more abstract goals than medial regions (Dixon et al., 2017). This may be consistent with the role of shifting abstract goals, such as the goal to analyze the situation, in repurposing via perspective-taking. More research using novel manipulations is needed to test the neural predictions of our framework.

Understanding Individual Differences

Our framework has implications for understanding individual differences in appraisal and reappraisal. In particular, it illustrates how stable knowledge structures such as beliefs can influence the dynamic processes of appraisal as well as reappraisal. For instance, a person who believes human abilities to be mostly innate and fixed rather than learned and malleable is likely to construe a failure at a task as an instance of a mismatch between talent and task (Dweck, Chiu, & Hong, 1995). Given this knowledge and this construal, this person is likely to not only appraise the failure as low on goal congruence but also

himself as low on coping potential. After all, if ability level is fixed, there is little that could improve in similar future situations. The same belief constrains this person's affordances to use reappraisal to change these appraisals (Ford & Gross, 2018). Our framework thus explains how a stable knowledge structure such as a belief can bias dynamic behavior so that it obtains the trait-like property of exhibiting similar characteristics across many different situations. This is in line with theorizing in the fields of appraisal styles (Ellsworth & Scherer, 2003), development (Dweck, 2017), and personality (Baumert et al., 2017).

More broadly, the role of knowledge in reappraisal suggests a pathway through which culture, as a major source of mental models (Tulviste, 1991), can impact emotion regulation. This pathway could be used in future research to consider how different cultures impact reappraisal by constraining or facilitating construal as well as goal set malleability. For instance, people from cultures characterized by high uncertainty avoidance (Hofstede, 1980) may experience situations on average as having lower construal malleability, because they are motivated to find a single mental model to explain situations and have had extensive practice in doing this. Culturally informed reappraisal research is also needed as a counterweight to the current overrepresentation of work conducted within the Western hemisphere (Henrich, Heine, & Norenzayan, 2010). We hope that the general nature of the present framework makes it a useful scaffold for future cross-cultural reappraisal research.

In addition to analyzing how knowledge structures influence reappraisal, our framework can also be used to consider the causal pathway running in the other direction – how repeated patterns of reappraisal can contribute to more durable change in knowledge structures such as

beliefs, goals, and identity. Many emotions that people seek to regulate are recurring, elicited by similar triggers repeatedly over weeks, months, and years (Voelkle, Ebner, Lindenberger, & Riediger, 2013). A potent source of recurrent emotion are major life events such as a chronic illness or loss of a loved one (Stroebe & Schut, 2001). When faced with strong recurrent emotions, the process of emotion regulation, which operates on the level of a single emotional episode, relates to the process of coping with the underlying change, which operates across many emotional episodes. Coping with major life events takes time and involves relatively permanent changes to knowledge structures such as beliefs, personal goals, and identity. Among the different psychological mechanisms involved in coping may be the cumulative impact of reconstrual as well as repurposing. Intentional changes to construals and goals within a single emotional episode that are effective in changing emotion can lead, through mechanisms such as reinforcement learning, to sustained shifts in the construals and goals that are activated spontaneously, without intentional reappraisal. Therefore, the cumulative effects of the psychological mechanisms involved in a single instance of reappraisal can also help explain longer-term coping processes.

Assessment and Intervention

The idea that instances of reappraisal can be characterized as change vectors in appraisal dimensional space could spur the development of reappraisal assessment tools. Relying on existing appraisal research, self-report items can be constructed to assess a suitable selection of appraisal dimensions. These items could then be used to measure the appraisal profile before and after participants engage in various reappraisal tasks, or to ask people to directly rate which appraisal dimensions they

changed as they engaged in reappraisal. Once the reliability and validity of these measures are established, this approach could become an important part of a standardized toolkit of reappraisal research. Developing more standardized measures could catalyze research efforts by allowing us to quantitatively integrate findings from different studies and research groups as well as across different situations, emotions, and populations.

Appraisal change vectors may also be useful for identifying reappraisal tactics. An emotion regulation tactic is simply a context-specific implementation of a broader regulation strategy. In terms of our framework, tactics operate on a level of description that lies between the broad distinction between reconstrual and repurposing and the detailed mapping of appraisal change vectors. One way to derive reappraisal tactics would be to use unsupervised machine learning algorithms to identify clusters among observed appraisal change vectors. This approach relies on the assumption that the appraisal change vectors that people employ are unlikely to be distributed randomly across the appraisal dimensional space owing to the clustering of emotions in that space (Ellsworth & Scherer, 2003). Alternatively, theory-driven taxonomies of reappraisal tactics could be devised based on the present framework. For instance, it might be useful to distinguish six reappraisal tactics: repurposing for desirability change, reconstrual for desirability change, repurposing for attribution change, reconstrual for attribution change, repurposing for expectancy change, and reconstrual for expectancy change. Each tactic may be further divided into a version operating primarily on external versus internal situations.

Finally, the present framework could aid in the design of intervention programs targeting children as well as adults, and those with

mental illnesses as well as those without. Key learning objectives in many interventions include improved emotional awareness and reappraisal skill development. Both objectives may benefit from teaching participants how to analyze and influence their own appraisals using appraisal dimensions. Learning appraisal dimensions can be a useful tool for increasing emotional awareness. Appraisal dimensions may also provide a simple and powerful “checklist” for exploring reappraisal affordances in challenging situations. People might practice going through a list of appraisal dimensions, identifying which ones are open for change, and coming up with alternative construals and goal set modifications. A suitably selected appraisal dimension nomenclature would be concise enough to remember and flexible enough to be applicable in a wide range of situations. This method may help lower the executive function demands of reappraisal. It can also compensate for appraisal biases by making it less likely that people overlook useful reappraisal affordances. Over the long run, such intervention techniques could produce sustained increases in goal set and construal malleability.

CONCLUDING COMMENT

Reappraisal is in many ways the poster child of emotion regulation. It has a long research history, strong efficacy evidence, and numerous applications. Even though the active ingredient of reappraisal is known to involve appraisal change, there is much to learn about what this in fact entails. We have sought to contribute to answering this question by presenting an appraisal framework of the psychological mechanisms involved in reappraisal. We modelled appraisal as a comparison between a situational construal and goal set expressed as an appraisal outcome within the appraisal-dimensional space. This approach led to three propositions. Reappraisal

involves 1) some combination of reconstrual and repurposing that 2) results in an appraisal change vector which 3) has been afforded by the malleability of the situational construal and/or the goal set. We identified several directions for future research. We hope that the present framework helps to consolidate existing knowledge and to spur new research, opening the way for similarly detailed accounts of other families of emotion regulation strategies.

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