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Understanding Contemplative Practices from the Perspective of Dual-Process Theories

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Abstract

After briefly reviewing the history of dual-process theories in cognitive and social psychology, this chapter explores implications of the dual-process perspective for Buddhist contemplative practices, including mindfulness. On the one hand, the impulsive and habitual processes in dual-process theories offer a natural account of the phenomena that contemplative practices address (e.g., craving, negative emotion, self-interest, mind wandering). On the other hand, the regulatory and reflective processes in dual-process theories offer insightful perspective into how contemplative practices modulate these phenomena. Additionally, dual-process theories offer useful accounts of the constant interplay between habitual and regulatory processing in everyday life, and how contemplative practices establish healthy new cognitive, affective, and behavioral habits that replace less healthy well-entrenched ones. In turn, contemplative practices—especially the collection of Buddhist practices known as the Eight-Fold Path—provide insight into the nature of habitual processing, and offer provocative ideas for developing interventions to change it.

Dual-Process Theories

From the dual-process perspective, psychological phenomena typically include: (1) Impulsive and habitual processes that are relatively involuntary, implicit, and unconscious, often associated with hedonic short-term goals, requiring few executive resources; (2) Regulatory and reflective processes that are relatively voluntary, explicit, and conscious, often associated with rational long-term goals, requiring significant use of executive resources. For any given psychological phenomenon, the basic idea is that initial processing results from the first type of process, with the second type of process available optionally to regulate it.

Dual-process theories have played central roles in explaining cognitive, social, affective, and

appetitive phenomena for decades. At least since James (1890/1950), cognitive psychologists have incorporated the dual-process framework extensively into their theory and research (e.g., Evans, 1984; Posner and Snyder, 1975; Schneider & Shiffrin, 1977; Sloman, 1996). Social psychologists have similarly incorporated the dual-process framework extensively into their work (e.g., Chaiken & Trope, 1999; Metcalfe & Mischel, 1999; Sherman, Garwonski, & Trope, 2014; Strack & Deutsch, 2004). In a major review of dual-process theories, Stanovich and West (2000) dubbed the two processes of dual-process theories “System 1” and “System 2.” Given the ubiquity of these two kinds of processes across human behavior, they are likely to be important in contemplative practices as well.

A fundamental assumption of many dual-process theories is that System 1 causes the lion's share of behavior, emotion, and thought. From this perspective, daily experience in the world conditions the associative structures in memory that produce actions, bodily states, and cognitive processing. Furthermore, System 2 has relatively little control over behavior, emotion, and thought (e.g., Goschke, 2013), while creating intuitive theories about oneself and the world via language, social interaction, and culture that are at often limited and incorrect (e.g., Wilson, 2004).

Significant implications for measurement follow from dual-process assumptions about behavioral causes and intuitive theories (e.g., Gawronski & Payne, 2011; Greenwald & Banaji, 1995). In psychological research, it has become widely accepted that explicit self-report measures are unlikely to measure the causal mechanisms of interest in System 1 accurately. Because people typically have little conscious access to the System 1 mechanisms that cause their behavior, emotion, and thought, they have little ability to know and describe these mechanisms accurately. Instead, self-report measures are much more likely to capture people's intuitive theories about these causes in System 2. To accurately measure the mechanisms in System 1 requires the use of implicit measures that target System 1 mechanisms indirectly without people's awareness.

Thus, from the dual-process perspective, System 1 constitutes a huge system of conditioned mechanisms that operate largely unconsciously, often producing behavior, emotion, and thought outside deliberate control, in relatively automatic and habitual manners. Because it often feels as if an out-of-control beast occupies our brain and runs our life, System 1 is sometimes referred to metaphorically as a *10,000 pound gorilla*. Nevertheless System 2 offers significant resources for regulating System 1's activity. Once System 1 begins to produce an action, for example, System 2 can inhibit it or replace it with another action. In humans, the executive system underlies the ability to self-regulate, capitalizing on significantly expanded frontal and associative systems in the brain (e.g., Berger, 2011; Buckner & Krienen, 2013; Goschke, 2013; Hofmann, Schmeichel, & Baddeley, 2012; Mischel et al., 2011). Besides regulating behavior, emotion, and thought in the current moment, regulatory processes can attempt to implement long-term changes well into the future (e.g., Stanovich, West, & Toplak, 2014; Wilson, 2011).

Challenges to Dual-Process Theories

Much theory and research make it clear that reifying Systems 1 and 2 into two distinct systems is unjustified (e.g., Moors & De Houwer, 2006; Sharma, Markon, & Clark, 2014; Stahl et al., 2014; also see relevant chapters in Sherman et al., 2014). One problem is that processes associated with System 1 are highly diverse, as are processes associated with System 2, suggesting that neither kind of process originates in a fixed system. Conversely, processes associated with System 1 often share properties with processes associated with System 2, further suggesting that the two kinds of processes don't originate in different rigid systems.

A much more plausible approach is to simply assume that brain architecture in humans has evolved to produce what I will call *Involuntary Initial Responses* (IRs) and *Optional Regulatory Responses* (RRs).¹ IRs reflect the basic neural architecture of ascending pathways in modality-specific systems. As a stimulus is perceived (e.g., in vision, audition, taste), its sensory and perceptual features are processed early in these pathways, followed by conceptual processing later. During conceptual processing, multimodal patterns may be accessed that produce inferences about the stimulus, including its value for the perceiver and actions that the perceiver could perform on it. Because most stimuli have become conditioned in this manner, perceiving just about anything in the environment is likely to produce some kind of IR.²

Conversely, RRs reflect the ability to regulate IRs using diverse meta-cognitive and regulatory abilities. Because the human brain has been endowed with large association areas and frontal lobes, humans can regulate their responses to stimuli in a flexible manner. Although IRs occur constantly, humans have the ability to monitor these responses, evaluate them, and then inhibit, change, or protect them.

Implications of Dual-Process Theories for Contemplative Practices

The dual-process perspective fits naturally with contemplative approaches. Given how broadly the dual-process perspective applies to cognitive and social phenomena, it's not surprising that it applies to contemplative approaches, too. Here, I focus on Buddhism, because mindfulness—the focus of this edited volume—plays such a central role in it. I also focus on Buddhism because it's the only contemplative approach that I know anything about (in particular, Tibetan Buddhism). Because I'm *far* from an expert, however, my discussions of

Buddhism should be viewed as simply attempting to offer a general and relatively superficial account of how the dual-process perspective can be brought to bear on contemplative practices.

First consider The Four Noble Truths that lie at the core of Buddhism (e.g., Gethin, 2010), described here from the Western perspective. According to the First Noble Truth, life contains considerable suffering, which not only includes physical suffering, such as hardship, disease, and loss, but also extensive psychological suffering, related to grasping and aversion (e.g., stress, negative emotion, dissatisfaction). According to the Second Noble Truth, one important source of psychological suffering is the conditioning of a person's cognitive system, which produces constant grasping and aversion. For example, frequently craving sweets, eating too many, and feeling guilty about consuming them results from years of conditioning that produce appetitive desires for sweets in general, inability to regulate their consumption, and dysfunctional emotional sequelae. According to the Third Noble Truth, reducing the psychological suffering that one experiences is possible. By changing the conditioning that causes suffering, a happier and healthier life can result. According to the Fourth Noble Truth, various practices and strategies exist for changing one's conditioning, which take advantage of the inherent flexibility and potential for change in human nature. Intentionally becoming mindful of impulses to consume sweets, for example, and learning to watch these impulses dissipate without acting on them can lead to improvements in physical and psychological well being.

From the dual-process perspective, the First and Second Noble Truths bear on the conditioning responsible for behavior, emotion, and thought, whereas the Third and Fourth Noble Truths bear on the potential for acquiring strategies that regulate and change this conditioning. As we will see later, the Fourth Noble Truth is associated with the Eight-Fold Path, which is a sophisticated collection of regulatory strategies capable of transforming every aspect of a person's life, including their cognition, affect, ethics, actions, self, and subjective experience.

The fundamental principle of karma in Buddhism offers a related example. According to this principle, a person's intentions and actions condition their character, habits, and subjective experience (e.g., Gethin, 2010). Because karma reflects all the conditioning that a person has accumulated over a life time (and over previous life times if one accepts reincarnation), it is the 10,000 pound gorilla that

dominates behavior, emotion, and thought via IRs. The construct of karma fits quite comfortably with the dual-process assumption that conditioning governs people's existence. Within this conditioning, a wide variety of RRs may also be available, such as adopting contemplative (and other regulatory) practices that change one's conditioning for the better.

IRs in Contemplative Practices

As we just saw, the Four Noble Truths state that a person's conditioning is responsible for their suffering. Buddhism offers many further proposals on the nature of suffering, describing in some detail the conditioning that makes people unhappy. In general, people suffer because they live in samsara, the psychological world of illusion and dissatisfaction. As they experience entities and events in their daily activities, they react to them cognitively and emotionally in ways that throw them off balance, such that they do not experience happiness (e.g., Ricard, 2007).

From the dual-process perspective, these non-optimal reactions can be viewed as the consequences of IRs. As entities and events are encountered in the world, they activate IRs via past conditioning that produce imbalance and unhappiness, often in relatively subtle ways. Although IRs serve a wide variety of useful goals in daily life, they may not necessarily lead to balance and happiness. On seeing a tasty food, for example, the IRs that cause people to approach and consume it ensure that they won't starve. The downside, though, is that these IRs also cause desire and craving, which make people dissatisfied, wanting things they don't currently have. Furthermore, these desires and craving, if acted on inappropriately, can eventually lead to outcomes that make people unhappy and unhealthy, such as becoming overweight or diabetic.

According to Buddhism, several important types of IRs underlie dissatisfaction and unhappiness: grasping and aversion, the illusion of self, negative emotion, and mind wandering. The following subsections address each in turn. A final subsection further notes that RRs have the potential to exacerbate the problems that IRs initiate (before turning in the final section to how RRs can instead ameliorate these problems).

Grasping and aversion. Many traditions of Buddhism assume that several *root causes* underlie people's dissatisfaction and unhappiness, permeating the conditioning that controls their behavior (e.g., Bodhi, 2005; Gethin, 2010). Two of these root causes are grasping and aversion. Whereas grasping is the desire to possess

something, aversion is the desire to avoid something. In each case, a desire emerges for something other than the current state-of-affairs. Most importantly, the current moment is viewed as lacking in some way, creating an imbalance that leads to dissatisfaction and unhappiness (e.g., Gethin, 2010; Loy, 2002). The extensive suffering and samsara that people experience, as noted in the Four Noble Truths, results from this lack and imbalance that they experience constantly in their lives. As people continually grasp at some things and attempt to avoid others, they create a perpetual sense of unease and are never truly happy.

From the dual-process perspective, the constant grasping and aversion that people experience can be viewed as resulting from the constant activation of IRs. As entities and events are encountered in the world (or imagined in thought), they trigger IRs that produce tendencies to approach them (grasping) or to avoid them (aversion). In the terms of Western science, grasping leads to approach behavior associated with positive valence, whereas aversion leads to avoidance behavior associated with negative valence. In this way, the Buddhist constructs of grasping and aversion map naturally onto the central scientific constructs of approach and avoidance, and also onto those for positive and negative valence (cf. Barrett & Bliss-Moreau, 2009).

Extensive scientific research demonstrates that entities and events generally activate a wide variety of valenced responses. The evaluative priming task in social psychology, for example, demonstrates that words and pictures often produce evaluative responses as IRs, some positive and some negative (for a review, see Herring et al., 2013). Typically, evaluative priming research focuses on words and pictures that produce strong evaluative responses (e.g., baby, robbery). Arguably, however, there is no such thing as a completely neutral response to anything (e.g., sparrow, television; Lebrecht, Bar, Barrett, & Tarr, 2012). In general, these widespread evaluative responses can be viewed as tendencies to approach and avoid the respective stimuli, or in Buddhist terms, as tendencies for grasping and aversion.

Increasing neuroscience research similarly demonstrates that perceiving stimuli activates brain areas quickly that produce evaluations, especially the orbital-frontal cortex (OFC). When viewing visual objects briefly, for example, not only does visual processing of the object occur, so does rapid evaluative processing (e.g., Chaumon, Kveraga, Barrett, & Bar, 2014; Lebrecht et al., 2012; Shenhav, Barrett, & Bar, 2012). Within much less than a second of viewing an object, the brain

produces an evaluation of it, often unconsciously (e.g., Hermans, De Houwer, & Eelen, 2001; Winkielman, Berridge, & Wilbarger, 2005). As large literatures show, evaluative responses are produced to just about everything, with different domains of evaluative responses residing in domain-specific areas of OFC (Rudebeck & Murray, 2014; Wilson, Takahashi, Schoenbaum, & Niv, 2014).

Thus, the Buddhist proposal that grasping and avoidance lie at the heart of human conditioning finds strong support from both behavioral and neuroscience research. One of the most basic things that people do is to evaluate whether the entities and events they encounter are good or bad, and whether they should approach or avoid them.

Finally, the strong impulses and desires that people often experience can be highly disruptive to mental, physical, and social well-being. Because these particular IRs are especially intense and compelling, they may often have the most potent motivational effects on ensuing behavior (e.g., Papiés & Barsalou, 2015; Papiés, Pronk, Keesman, & Barsalou, 2015). For this reason, developing good regulatory strategies, such as mindfulness, may be especially important for managing impulses and desires. To the extent that intense IRs can arise and dissipate without affecting behavior, they become less likely to produce problems, such that greater control and choice emerge.

The illusion of self. As described in the previous section, Buddhism assumes that several root causes lie at the heart of people's conditioning, with two of these being grasping and aversion. The most important root cause, however, is *the illusion of self* (e.g., Bodhi, 2005; Gethin, 2010). As Buddhists often note, people experience a self inside them. Not only does this self seem to be who they are, it is also the self who makes things happen, to whom things happen, who evaluates things, and so forth. As Buddhists further note, this self is really just a cognitive construction that doesn't exist anywhere other than in people's minds. Western scientists who study self often agree (e.g., Baumeister, 1998; Northoff et al., 2006).

According to Buddhism, this illusory sense of self constitutes the most central aspect of human conditioning, lying at the heart of people's dissatisfaction and unhappiness. It is the most basic root of samsara, ultimately responsible for the constant grasping and aversion that people exhibit over the course of daily activity. Because people are so invested in promoting and protecting their sense of self, they constantly grasp at things that

they believe will promote it, and constantly avoid things they believe will harm it. Every entity and event encountered becomes evaluated with respect to one's self interests, with grasping and aversion being the outcomes of these evaluations.

The constant sense of self that people experience can be viewed as resulting from IRs. Based on a life time of conditioning, people develop a huge amount of knowledge about who they believe they are, with aspects of this knowledge becoming active dynamically in a context-dependent manner when relevant (e.g., Markus & Wurf, 1987). As people encounter entities and events, the conditioned IRs that result can include senses of self, thereby carrying information about one's self interests in an implicit manner. Not only do IRs represent an evaluation of an entity or event, they represent how it bears on one's self interests. These senses of self can reflect diverse sources of self-related information, including one's goals, values, and traits, together with the in-groups to which one belongs and their associated norms (e.g., Baumeister, 1998; Frable, 1997; Markus & Wurf, 1987).

Much evidence in neuroscience demonstrates that a large distributed network along the cortical midline, from ventral and dorsal prefrontal areas to the posterior cingulate, becomes active to process self relevance (e.g., Northoff et al., 2006). As people view a wide variety of self-relevant stimuli (e.g., traits, faces, scenes), this network becomes active to process them. Interestingly, these same areas become active to process other individuals besides oneself, suggesting that processing the self-related interests of others is not only important, but draws on the same general system that processes information about oneself. Sui, Humphreys, and their colleagues have recently provided a large body of especially compelling evidence for the significant power of self relevance (e.g., Sui & Humphreys, 2015a, 2015b; Sui, Liu, Mevorach, & Humphreys, 2015; Sui, Rotshtein, & Humphreys, 2013). Simply associating a random shape with oneself, for example, makes the shape much more salient and relevant than usual. Not only does the shape become more important conceptually, it becomes easier to process perceptually. In summary, all of these neural and behavioral findings make it clear that self-related processing constitutes a central part of cognition, as Buddhist assumptions about the root causes of conditioning anticipate.

Notably, however, Western science doesn't view self-related processing with the same antipathy as does Buddhism. To the contrary, self-related

processing is often viewed much more positively in Western traditions, such that Western science is less oriented to examining how self-related processing produces dissatisfaction and unhappiness. Thus, an important issue for future research is reconciling this tension regarding the positive vs. negative effects of self.

Destructive emotions. As we have seen, bottom-up processing continually produces IRs to entities and events encountered during daily activity. Not surprisingly, the initial evaluations and self-assessments in these IRs can lead to increasingly complex, powerful, and temporally-extended emotions. As the implications of an important entity or event become clear, a strong emotional response is likely to signal this importance and to motivate relevant actions for some time thereafter. Rather than simply experiencing the entity or event with equanimity and letting it pass, people often experience it with extended emotion that reflects self-interested grasping and/or aversion, perpetuated through rumination. Not only does such emotion throw people out of balance, it may also lead to actions that are dysfunctional or destructive. When a friend disapproves of your clothing, for example, the self-interested aversion that results may produce anger, followed by a desire for revenge that leads to reciprocal disapproval.

The construct of destructive emotion plays central roles in Buddhism, being contrasted with constructive emotion (e.g., Dreyfus, 2008; Goleman, 2003). Destructive emotion is the natural consequence of self-interest, grasping, and aversion; it plays salient and central roles in the dissatisfaction and unhappiness that constitutes *samsara*; it can lead to destructive intentions and actions. In Western science, the closely related construct of *neuroticism* is typically associated with experiencing extensive amounts of negative emotion. As much research shows, increasing neuroticism is strongly associated with increased health problems, increased social problems, decreased psychological well-being, and lower longevity (e.g., Lahey, 2009).

Again, both Buddhism and Western science converge. To the extent that destructive/negative emotion results from IRs to entities and events in the world, quality of life decreases. Again, however, important differences exist. Westerners, for example, view pride as a positive emotion that reflects a strong self, whereas Buddhists view it as a negative emotion that destroys equanimity (i.e., by grasping at the things that motivate feeling proud).

Mind wandering. As IRs produce evaluations, self-related responses, and emotions, they can further launch thought into mental time travel, taking people out of the current moment as they imagine being in some other situation. Rather than focusing on the task at hand, people become pre-occupied with their thoughts. Seeing a friend, for example, might produce an IR related to their recent disapproval, which first causes reenactment of the previous situation, followed by planning further revenge in the near future. In the process, awareness of the present situation fades, as has any equanimity that might have existed. Instead, grasping and aversion at past and future events take over, motivated by self-interest.

The dysfunctional roles of mind wandering have been noted widely both in contemplative traditions (e.g., Dreyfus, 2011; Dunne, 2011; Fronsdal, 2001; Kabat-Zinn, 1994) and in Western science (e.g., Hofmann, Baumeister, Förster, & Vohs, 2012; Kane & McVay, 2012; Killingsworth & Gilbert, 2010; Lutz, Jha, Dunne, & Saron, 2015; Mrazek et al., 2012). Certainly mind wandering can be productive when people are planning future events, solving problems, and so forth (e.g., Baird, Smallwood, & Schooler, 2011; Gerlach, Spreng, Madore, & Schacter, 2014). Nevertheless, mind wandering can also produce distractions that lead to performance errors in external tasks, psychopathology through rumination, and so forth. Regardless, mind wandering, at least to some extent, can again be viewed as the sequelae of IRs.

Finally, the brain areas that produce mind wandering in the default mode network overlap extensively with the brain areas that process self-relevance (e.g., Kucyi & Davis, 2014; Mittner et al., 2014; Qin & Northoff, 2011; Sheline et al., 2009). Such findings strongly suggest that mind wandering often focuses on self-related interests, consistent with self-absorption being the root cause of dissatisfaction and unhappiness in Buddhism.

Exacerbating IRs with RRs. At some point as an IR evolves from evaluation to mind wandering, regulatory processing may take over. As we will see in the next section, regulatory processing could attempt to down regulate an IR via inhibition, reappraisal, mindfulness, and so forth. On some occasions, however, regulatory processing might instead exacerbate the problems that an IR initiates by up-regulating the evaluation, self-related processing, and emotion that occurs. When encountering an appetitive stimulus, such as a food or a drug, an initial IR might produce an approach tendency toward it. Rather than down-regulating the IR, however, a subsequent RR could

up-regulate it into a full-blown craving, creating a temporally-extended obsession to consume the appetitive object (e.g., Kavanagh, Andrade, & May, 2005). In this manner, RRs have the potential to significantly increase the evaluations, self-relevance, and emotion associated with processing an entity or event, thereby increasing the problems that regulatory processing in contemplative practices aims to address.

RRs in Contemplative Practices

Contemplative practices, such as Buddhism, typically recognize that they have a 10,000 pound gorilla on their hands, and then set out to do something about it. As we have seen, Buddhism first analyzes the problem, focusing on the nature of the underlying causal system that produces the problematic behavior, emotion, and thought. By understanding the problem, it becomes possible to formulate a solution that effectively targets the critical mechanisms. In Buddhism, the solution can be viewed as an attempt to implement RRs that, first, manage problematic IRs and their root causes, and second, replace them with a causal system that produces healthier IRs.

Consistent with dual-process theories, Buddhism implements short-term RRs that manage problematic IRs in the moment, together with long-term RRs that produce significant long-term change in behavior, emotion, and thought (e.g., Stanovich et al., 2014). Together, these RRs attempt to tame self-interest, grasping, aversion, destructive emotion, and mind wandering, and to replace them with a positive set of qualities, such as selflessness, kindness, generosity, and compassion. Should a practitioner be successful, their experience of life shifts increasingly from samsara to equanimity and happiness.

In the next subsections, we will consider various RRs in Buddhism that attempt to: (1) manage problematic IRs in the moment (concentration and mindfulness practices), (2) replace problematic IRs with new IRs over the long-term (conduct practices), (3) fundamentally restructure one's subjective experience of mind (wisdom practices). Together, these three kinds of contemplative practices constitute the Eight-Fold Path in Buddhism, an impressive collection of regulatory strategies that aim to transform a person's mindfulness, ethical conduct, and wisdom, respectively (e.g., Gethin, 2010). From the dual-process perspective, these contemplative practices establish a wide variety of RRs, some that manage IRs in the moment, and others that attempt long-term change. For a review of these three types of

contemplative practice from the perspective of Western science and clinical practice, see Dahl, Lutz, and Davidson (2015). Here, the focus is on how the dual-process approach produces insight into these practices.

Assembling RRs. Initially, when a new contemplative practice is acquired (e.g., mindfulness, compassion), RRs are required to learn and implement it. Because the practice hasn't been encoded into IRs, it can't yet run implicitly in the background, but instead requires deliberate control. With regular practice, however, IRs develop to implement the practice more implicitly, such that it increasingly runs in the background, without the use of regulatory resources.

Importantly, however, people don't learn contemplative practices completely from scratch. Instead, their cognitive systems already possess many of the basic abilities relevant to performing these strategies, such that initially learning a contemplative practice primarily involves assembling existing abilities into new RRs (e.g., Bishop et al., 2006; Lebois et al., 2015). One source of evidence for this hypothesis is the finding that non-meditators can be taught simple beginning contemplative skills in as little as 10-15 minutes. Specifically, participants can quickly begin to acquire concentration skills associated with mindfulness (e.g., Dickenson, Berkman, Arch, & Lieberman, 2013), as well as decentering skills (e.g., Lebois et al., 2015; Papiés, Barsalou, & Custers, 2012; Papiés et al., 2015; Tincher, Lebois, & Barsalou, 2015). Initial albeit superficial learning of these skills can occur quickly because they draw on existing cognitive processes, such as strategic attention and perspective shifting. Thus, learning a contemplative practice is not a mysterious esoteric practice, but a natural and relatively transparent assembly of existing abilities, at least initially.

No doubt, extensive practice that transforms RRs into IRs is essential for realizing the full potential of contemplative practices, or to even begin experiencing a significant fraction of their potential. Furthermore, extensive practice is likely to create new cognitive skills that didn't exist previously. Nevertheless, early practice appears to build upon and benefit significantly from pre-existing processing resources that can be assembled into new RRs.

Concentration and mindfulness practices.

A basic (often preliminary) contemplative practice on the Eight Fold Path simply involves improving the abilities to concentrate and be mindful. One common technique is to practice holding attention on something continually, such as on the breath or an external object (e.g., Kornbloom, 2008;

Salzberg, 2011). Over time, properly performed practice increases the duration of how long concentration can be maintained. Because concentrating on a variety of instructions, texts, mental states, and so forth is essential for properly performing later contemplative practices on the Eight-Fold Path, developing the ability to concentrate is an important first step. For an account of the neural networks assembled to perform this practice, see Hasenkamp, Wilson-Mendenhall, Duncan, and Barsalou (2012).

As concentration strengthens, mindfulness typically increases (e.g., Kabat-Zinn, 1994; Kornbloom, 2008; Salzberg, 2011). While attempting to concentrate on an object, attention invariably drifts away, as the practitioner's mind wanders. Learning to understand and handle mind wandering is arguably the crux of concentration and mindfulness practices. The first step in developing mindfulness is to realize that attention has wandered away from the focal object. The second step is to recognize the nature of the distraction without evaluating it or reacting in some way (remaining non-evaluative and non-reactive; Kabat-Zinn, 1994). The third step is returning attention to the object of concentration. For related but different forms of mindfulness practice, see Dreyfus (2011) and Dunne (2011, 2015).

Together, the RRs assembled to implement concentration and mindfulness practices begin to disable problematic IRs. By developing RRs that increase concentration, it becomes possible to simply observe IRs as they arise, such that they are less likely to control cognition, emotion, and action unconsciously. As a result, the practitioner begins to better see the grasping, aversion, self-processing, and emotion that IRs produce. By developing RRs that enforce non-evaluation and non-reactivity, the practitioner learns to experience IRs without evaluating and acting on them. Rather than producing extended emotion and action, IRs simply arise and dissipate. In this manner, mindfulness begins to break the karmic cycle. Not engaging with an IR stops the normal process of perpetuating it as a habit and entrenching it further as a causal mechanism in a bottom-up pathway. Instead, the IR becomes increasingly ineffective every time it is experienced mindfully, thereby decreasing its future likelihood of becoming active and affecting behavior, emotion, and thought.

With increasing practice, mindfulness has the potential to alter a wide variety of IRs associated with grasping, aversion, and self-relevance. To the extent that these IRs no longer govern mental experience, dissatisfaction with the current state of the world becomes less likely. Once the world no

longer appears lacking in some way, increasingly extended states of equanimity follow, leading to happiness (e.g., Ricard, 2007).

A frequent misunderstanding about mindfulness is that the equanimity it produces causes people to withdraw from the world. To the contrary, mindfulness leads to freedom from the problematic IRs that normally control cognition, emotion, and action. When problematic IRs no longer dominate consciousness, greater choice in how to act becomes possible. Indeed, some mindfulness practices stress the importance of engaging in ethical evaluation of mind wandering states for the purpose of evaluating the character of one's intentions and potential actions (e.g., Dreyfus, 2011; Dunne, 2011, 2015). From this perspective, it is necessary to evaluate the ethical implications of one's distracting thoughts for the purpose of personal growth. Thus, mindfulness isn't simply a tool for achieving the peace of equanimity—although that is certainly a benefit—it can also play central roles in making the practitioner a better person and a positive force in the world through wiser decisions and actions. Indeed, many Western mindfulness practitioners become increasingly engaged in addressing social problems (e.g., *socially engaged Buddhism*; King, 2009).

Finally, the dual-process perspective offers a potentially useful framework for understanding the regulatory processes that underlie concentration and mindfulness practices. The large theoretical and empirical literatures associated with self-regulation offer explanatory systems for understanding how these practices are learned initially and begin to produce positive effects. Specifically, these practices can be viewed as drawing heavily on classic attention mechanisms for focusing, shifting, disengagement, and vigilance (cf. Chun, Golomb, & Turk-Browne, 2011; Thompson, Besner, & Smilek, 2015). Additionally, these practices draw heavily on the executive system and its ability to regulate cognition, emotion, and action through goal setting, plan execution, goal protection, inhibition, and so forth (e.g., Berger, 2011; Goschke, 2013; Hofmann, et al., 2012; Mischel et al., 2011).

Conduct practices. As we just saw, developing concentration and mindfulness creates space for new attitudes, intentions, and behaviors to develop. The second major set of practices on the Eight-Fold-Path—conduct practices—take advantage of this space, aiming to restructure the bottom-up pathways that initially control behavior, emotion, and thought through IRs. As this restructuring occurs, it increasingly changes how

the practitioner experiences the world and acts in it. As a consequence of performing conduct practices, the practitioner becomes less selfish, more oriented towards others, and more ethical. Not only do these changes in perspective increase one's social contributions, they also makes one happier (e.g., Dunne, 2015; Ricard, 2007). Happiness cannot occur without these changes—equanimity is not enough.

Lojong in Tibetan Buddhism constitutes one classic form of conduct practice, often referred to as *mind training* (e.g., Jinpa, 2006). The core material of Lojong is transmitted through a variety of texts that include slogans, aphorisms, and verse. As practitioners study and learn from these texts, they become acquainted with new attitudes and values, new ways of thinking about oneself, new ways of thinking about others, and new possibilities for acting in the world. Once practitioners absorb these possibilities, they begin to develop intentions for implementing them in everyday experience, and to develop specific plans for executing them.

Other Buddhist traditions change conduct through Metta practices (e.g., Kornbloom, 2008; Salzberg, 2011). During these practices, meditators generate constructive emotions, such as loving kindness and compassion, towards a diverse collection other people, including individuals for whom they might normally experience intense negative emotion. By generating these emotions towards others on a regular basis, practitioners establish these new mental habits in memory that change their perceptions of people and their actions toward them. In important ways, Lojong and Metta practices are much like Cognitive Behavioral Therapies that aim to develop new knowledge structures, automatic responses, and behaviors (e.g., Beck & Dozois, 2011; Hayes, 2004).

From the dual-process perspective, Lojong and Metta practices present guidelines, instructions, and examples to practitioners that implement long-term behavioral change via a wide variety of regulatory activities. Initially, RRs absorb and implement the teachings. Ultimately, however, these RRs establish new IRs that come to dominate thought, emotion, and action (as increasingly demonstrated by empirical research; e.g., Hofmann, Grossman, & Hinton, 2011). Again, the dual-process perspective offers a useful framework for understanding the regulatory processes that initiate and eventually produce these long-term changes. The large theoretical and empirical literatures on creating meaning, developing new narratives, and redirecting goals offer useful perspectives on how conduct practices operate (e.g., Pennebaker, 1997; Stanovich

et al., 2014; Wilson, 2011). Conversely, conduct practices are likely to offer new insights into similar Western interventions.

To the extent that conduct practices are successful, they lead to positive social qualities such as the *Brahmaviharas*, which include loving kindness, compassion, sympathetic joy, and equanimity (e.g., Wallace, 1999). Because conduct practices also diminish self-absorption, the related processes of destructive emotion and mind wandering become less likely, as do grasping and aversion. As self-related thought become less prevalent, equanimity follows, as does becoming more present in the world. When actions are performed, they are less likely to be self-serving and more likely to serve the general good and the needs of others.

Wisdom practices. Once mindfulness, equanimity, and ethical conduct have been established, some of the more advanced Buddhist practices become possible (e.g., Namgyal, 2001; Norbu, 1983; Schmidt, 2004; Thrangu, 2004). The aims of these practices include understanding the nature of mind and becoming increasingly liberated from *samsara*.

Once the ability to focus attention has become free from mind wandering and other self-absorbed distractions, it is focused on conscious experience, both introspective and perceptual. As various aspects of consciousness receive attention, they are examined to better understand their nature. For example, each aspect of consciousness is assessed for whether it is real or simply a construction of the mind. Ultimately, the goal is to see that every aspect of consciousness is an impermanent conditioned construction that arises and dissipates. Although this is obvious for dreams and illusions, it is less obvious for thoughts and perceptions, which typically seem real. Also targeted by this practice is the idea that perceived entities and events have essences, reflecting some kind of true nature in reality. Again, the goal is to see that these essences don't actually exist and are simply constructions of mind.

Although all aspects of consciousness are examined in this manner, conscious experiences of the self and the external world are of particular importance. To increasingly decrease the grasping and aversion associated with pursuing self-interest, wisdom practices help see the self as a conditioned construction, whose forms arise and dissipate in experience. Once this realization occurs, the force of self on thought, emotion, and action decreases. Analogously, to understand the nature of perception, wisdom practices help see through the compelling (and important) illusion that perceived states exist externally (e.g., as in vision). Instead,

perceptions are internal constructions that don't really exist outside the person as they appear, but belong to a general field of consciousness within the mind. Once the true natures of self-perception and external perception are perceived, they no longer carry the significance they once did. As their psychological natures become increasingly understood, they decreasingly initiate the constant grasping and aversion that underlie *samsara*.

As wisdom practices make the nature of consciousness increasingly apparent, the normal dualism of experience increasingly dissipates into a non-dual state during contemplative practice (e.g., Dunne, 2015). Rather than normally experiencing fundamental distinctions between the self and the external world, or of the self acting on objects, these distinctions increasingly collapse in consciousness. Practitioners enter the *natural state*, where consciousness exists without a sense of a self evaluating and acting in an external world, without a sense of lack or imbalance (e.g., Namgyal, 2001; Norbu, 1983; Schmidt, 2004; Thrangu, 2004). Consciousness simply exists, less obscured by the conditioning that underlies *samsara*. While in these states, a practitioner may still act, think, and feel emotion, as the causal structures established in conduct practices produce ethical conduct (e.g., Dunne, 2015). There is much less sense, however, of a self acting, thinking, and feeling.

Many practitioners may not perform practices aimed at producing non-dual states, or aspire to experience them. Nevertheless wisdom practices stand as a testament to what's possible with disciplined regulatory processing. Once mindfulness and conduct practices diminish problems associated with IRs, wisdom practices focus on understanding the nature of mind, further dissolving the illusions that contribute to *samsara*. By developing RRs that examine the nature of consciousness, it becomes possible to attain critical insights about how the mind works.

RRs developed during wisdom practices complement other RRs developed during earlier practices along the Eight-Fold Path. Together, all these RRs constitute an extensive regulatory system that not only regulates experience in the moment, but that changes behavior, emotion, and thought in the long term, with newly created IRs fundamentally changing how a person thinks, feels, and acts. From the dual-process perspective, this regulatory system has tamed the 10,000 pound gorilla responsible for the constant barrage of dysfunctional IRs that underlie *samsara*.

Discussion

We began with the observation that dual-process theories have been applied extensively to cognitive and social phenomena for over 100 years. This chapter has similarly attempted to apply dual-process theories to contemplative practices that have existed for thousands of years in Buddhism. As we have seen, a striking rapport exists between them.

Most basically, the two kinds of processes central in dual-process theories—IRs and RRs—are readily apparent throughout Buddhism. On the one hand, IRs underlie the dissatisfaction and unhappiness that Buddhism aims to address, produced by the root causes of self-illusion, grasping, and aversion. On the other hand, an impressive system of RRs constituting the Eight-Fold Path offers a means of transforming dissatisfaction and unhappiness, creating healthier IRs in the process. Because dual-process theories map so well onto Buddhism, the large bodies of theory and research associated with these theories can be brought to bear on informing its basic principles, such as The Four Noble Truths, karma, samsara, and mindfulness.

Conversely, Buddhism offers considerable potential for better understanding dual-process theories. As we saw earlier, the root causes of samsara—grasping, aversion, and self-relevance—provide insights into the causes of the unhappiness, psychopathology, and other dysfunctional aspects of the human condition. Similarly, the integrated approach of the Eight-Fold Path, together with its individual practices, offers ideas for regulatory interventions that could be adapted effectively in Western contexts, and that already have been to a considerable extent (e.g., mindfulness and compassion practices). An intriguing possibility is that integrated collections of interventions could be developed in the Western tradition that are analogous to the Eight Fold Path in Buddhism.

Perhaps the most to be gained will result from integrating the two approaches in areas where doing so is relevant. When developing social and clinical interventions that have a contemplative character, for example, drawing on both explanatory frameworks and integrating their relevant insights may offer the greatest opportunity for success. Whereas the Western framework excels at working with unconscious cognitive and neural mechanisms, the Buddhist framework excels at working with conscious experience and daily practice. Although both have converged on remarkably similar accounts of mind in many ways (as reflected in the common importance of IRs and RRs), they nevertheless offer complementary accounts of the same phenomena, each providing unique insights.

As researchers work increasingly with both frameworks together, a likely outcome is that each explanatory framework will have significant influence on the other, such that hybrids emerge. Based on what we have seen, much potential for mutual influence exists, first, in understanding the causal systems of IRs that dominate behavior, emotion, and thought, and second, in developing sophisticated systems of RRs that manage IRs in the moment and change them in the long term.

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Author Notes

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Footnotes

- ¹ So that the acronyms to follow will be easily decodable, I only use IR for *Initial Responses* and RR for *Regulatory Responses* (instead of IIR for *Involuntary Initial Responses* and ORR for *Optional Regulatory Responses*). Nevertheless, the assumption remains that initial responses tend to be *involuntary*, reflecting the bottom-up activation of modality-specific pathways, whereas regulatory responses tend to be *optional*, primarily occurring when sufficient motivation, capacity, and knowledge exist.
- ² Although I focus on the bottom-up activation of IRs here, it is essential to note that these activations operate in the context of extensive top-down processing (e.g., Barsalou, 2009, in press; Clark, 2013; Friston, 2010; McClelland & Rumelhart, 1981). Background processing typically produces top-down predictions about objects and events likely to be encountered in the current situation, together with extensive top-down inferences about them once they occur.