

The Mindfulness-to-Meaning Theory: Extensions, Applications, and Challenges at the Attention-
Appraisal-Emotion Interface

Eric L. Garland

University of Utah

Norman A. Farb

University of Toronto

Philippe R. Goldin

University of California - Davis

Barbara L. Fredrickson

University of North Carolina at Chapel Hill

in press at *Psychological Inquiry*

Corresponding author: Eric Garland, College of Social Work and Huntsman Cancer Institute,
395 South, 1500 East, University of Utah, Salt Lake City, UT 84112

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Over the past several decades, a corpus of research has emerged detailing the therapeutic outcomes and processes of mindfulness. The emergence of the field of contemplative science has given rise to increasingly sophisticated neurophenomenological taxonomies of meditative practices (Dahl, Lutz, & Davidson, 2015; Tang, Hölzel, & Posner, 2015). Nonetheless, descriptive taxonomy, no matter how detailed, does not necessarily yield causal explanations of the phenomena under study. With notable exceptions (e.g., Vago & Silbersweig, 2012), the field lacks empirically-tractable, causal models that specify the therapeutic mechanisms of mindfulness and their downstream effects leading towards the cessation of suffering and the promotion of well-being. To fill this gap, the target article (Garland, Farb, Goldin, & Fredrickson, this issue) proposed the Mindfulness-to-Meaning Theory (MMT) for a specific and discrete aim: to provide a causal account for how mindfulness might promote the sense of eudaimonic meaning in the face of adversity. In brief, the MMT asserts that mindfulness allows one to decenter from stress appraisals into a metacognitive state of awareness, resulting in broadened attention to novel information which accommodates a reappraisal of life circumstances. This reappraisal is then enriched when one savors positive features of the socioenvironmental context, subsequently motivating values-driven behavior and ultimately engendering eudaimonic meaning in life.

We were encouraged to receive an array of thoughtful commentaries on the target article provided by experts from a wide range of fields, including affective science, clinical psychology, cognitive neuroscience, social psychology, consciousness studies, and addiction science, among others. Across these commentaries, there was general agreement regarding the need for a generative theoretical description of how mindfulness might stimulate positive psychological processes and lead to the sense of meaning in life. Given the widely accepted importance of this

question, here we expand on the MMT, broadening its scope of applications to address commentators' questions, and detailing the boundary conditions of the theory. While no theory can be complete, it is our hope that this expanded treatment of the MMT will elaborate on domains in the target article that require further development, and suggest future directions to be pursued towards the establishment of a more comprehensive contemplative science.

Origins of the MMT and the Need for a Specific Causal Model

The MMT represents an evolution of the Mindful Coping Model (Garland, Gaylord, & Park, 2009) and Upward Spiral Model of Flourishing (Garland, Fredrickson, et al., 2010), which were derived in part from an earlier second-order cybernetic model of mindfulness, stress, and coping (E.L. Garland, 2007) that attempted to integrate mindfulness into Lazarus & Folkman's transactional model (Lazarus & Folkman, 1984) through the lens of systems theory, cybernetics, and constructivism (Bateson, 1972; Maturana & Varela, 1987). These three models of mindfulness, as precursors to the MMT, attempted to explicate how mindfulness facilitates stress coping by facilitating reappraisal, thereby promoting fluid adaptation and re-construction of one's views of self and world. The MMT expands upon these earlier iterations by going beyond coping to connect mindfulness to eudaimonic meaning via the dual mechanisms of reappraisal and savoring. The MMT encompasses two key hypotheses: a) mindfulness generates meaning by promoting reappraisal (*the mindful reappraisal hypothesis*); and b) mindfulness generates meaning by promoting savoring (*the mindful savoring hypothesis*). These postulates are further specified by a range of mechanistic sub-hypotheses, such as the idea that metacognitive awareness supports meaning discovery by broadening attention to include previously unattended contextual data.

Reflecting on prior psychological models of mindfulness in her commentary, Carlson (this issue) asserts that the MMT describes a therapeutic process that has long been apparent to both theoreticians and clinicians who teach mindfulness skills to patients in a variety of settings. Though we agree with this assessment, we felt that extant theoretical and clinical frameworks were too granular and static to afford precise causal modeling, and thus a temporally-dynamic, detailed causal model was needed by the field to operationalize the mechanisms by which mindfulness engenders personal growth through adverse life contexts.

At the same time, a new causal model was needed to undo the conflation of mindfulness with reappraisal and savoring of which we have been inaccurately accused as purporting. Yet, several of our commentators make strong cases for why one should lump mindfulness with reappraisal and savoring, despite the apparent antithesis of appraisal within a nonjudgmental attentional stance. Echoes of this “lumping” (c.f., Kashdan, this issue) are evident among the commentaries to the target article. Pagnoni and Langer (this issue) assert that reappraisal is a subtype of mindfulness. In parallel, Bryant and Smith (this issue) assert that savoring necessarily involves mindfulness. While we appreciate and understand these views, in light of our aim to establish a causal model by which mindfulness promotes positive emotion regulation and eudaimonic meaning, we think it is vital not to conflate the practice and consequent state of mindfulness with its downstream consequences (e.g., reappraisal and savoring). In our opinion, to advance an empirically-tractable model, it is critical to parse these factors apart. Doing so will enable future experiments to carefully assess the temporally dynamic, causal relations among these variables.

Moreover, de-reification of constructs may be necessary to advance the field of contemplative science. Indeed, a sophisticated deconstructive conceptual framework posited that

mindfulness meditation is comprised of a network of cognitive processes, including set formation, working memory, sustained attention, metacognitive monitoring, attentional re-orienting, and response inhibition, among others (Vago & Silbersweig, 2012). Reappraisal and savoring might similarly be deconstructed into similar networks of subcomponent processes, many of which would be overlapping with those implicated in mindfulness.

The contemplative science field will best advance when it steps away from preconceived notions of constructs that have become increasingly reified and monolithic over time. It may be fruitful, for instance, to consider that there may be no actual entity called “mindfulness”, but rather, a network of interacting cognitive and affective processes (instantiated at least in part by specific yet widespread neural circuits) that we, for scholarly convenience, label “mindfulness.” Indeed, this view would be consistent with some traditional Buddhist conceptualizations that identify this English word with three separate but related Sanskrit constructs (*manasikara* – i.e., orienting attention; *smṛti* – retention of mental contents in working memory; and *samprajanya* – metacognitive awareness; see Lutz, Dunne, & Davidson, 2007). If we were to adopt this micro-dynamic view, drilling down to a temporal scope on the order of several hundred milliseconds, might we observe sequences of attentional orienting to the stressor → appraisal → autonomic response → interoception, followed by re-orienting of attention to respiration → decentering → attentional broadening → detection of unattended stimuli → restructuring and accommodating configurations in working memory → appraisal → autonomic response, etcetera? It is at this level of detail that precise operationalizations and causal hypotheses can be made and tested. We fear that claiming an ontological identity between mindfulness, reappraisal, and savoring without unpacking and specifying the causal links that instantiate these constructs will only serve to

further mystify the field, preventing much needed work of finding a way to optimally fit these sub-mechanisms to individual practitioners' idiosyncratic needs.

Thus, we reaffirm our position that the MMT is both novel and important because it formally directs the scope of inquiry beyond the isolated study of mindful attention while also resisting the inclination to lump together related constructs in deference to their complex inter-relatedness. The MMT represents a middle way between such extremes that will hopefully guide new researchers and practitioners alike to appreciate the complexity of mindfulness-based transformation, while providing tractable hypotheses for refining our understanding of this complexity.

Mindfulness and the Reconfiguration of Cognitive Structures within Working Memory

Several commentators (Lindsay & Creswell, this issue; Nakamura & Ho, this issue; Chambers & Hassed, this issue) questioned whether mindfulness necessarily promotes positive reappraisal and whether this mechanism is the only pathway from mindfulness to meaning. We appreciate this important question. Although the target article focused on positive reappraisal, we want to emphasize that positive reappraisal is one manifestation of the deeper cognitive processes linking mindfulness to meaning. Indeed, we believe that the deep structure of the MMT can account for a broad range of cognitive consequences of mindfulness. According to the MMT, mindfulness meditation can be used to disengage from extant schema into a metacognitive state of awareness in which attention expands to encompass previously unattended data from which new cognitive structures can be constructed. A positive reappraisal is but one of the many types of cognitive structures that may be engendered by mindfulness practice. In that regard, classically, mindfulness meditation was used to gain insight into the nature of existence,

leading to such ontological or metaphysical reappraisals as *everything is impermanent, life is suffering, and the self is empty of independent existence*. Such insights might lead to a transient state of fear or unease by radically reframing of the ontology of the self, thereby producing anxiety in the short-term, and in the long-term more profound meaning and freedom. When applied to the domain of addiction (see McConnell & Froeliger, this issue), mindfulness might facilitate a different form of cognitive reconstruction, i.e., interrupting cognitive schema that subserve automatic drug use habits (Tiffany, 1990), which can then be consciously reconfigured in working memory to build a novel association between drug-related stimuli and the aversive consequences of drug use. Examples aside, we hypothesize that mindfulness disrupts current configurations within working memory, allowing for flexible reorganization of information into new appraisals and schemas to coordinate adaptive function and effective goal pursuit.

Transforming a negative situational appraisal into a positive reappraisal is but one example of the types of cognitive change facilitated by mindfulness meditation (see Figure 1), albeit one that we felt deserved a detailed theoretical treatment in the target article. Nakamura and Ho (this issue) rightly raised the question of meaning from a biosemiotics perspective. To this question, we respond: at a fundamental level, meaning pertains to the way in which patterns of information are organized and embodied within the global workspace of consciousness. We believe that the contemplative science field will advance through systematic investigation of how mindfulness meditation results in a re-organization or transformation of embodied cognitive patterns within both working memory and long-term memory.

Acceptance and Attention as Mechanisms to Facilitate Savoring

In this issue, Lindsay and Creswell emphasized the centrality of acceptance in understanding the effects of mindfulness on positive emotion regulation. Lindsay and Creswell also emphasize the importance of the role of attention monitoring, echoing Nakamura and Ho's (this issue) question as to the role of concentration in emotion regulation. These emphases find parallels in Nico Frijda's concept of acceptance wriggles (2007) – the evolutionarily conserved behaviors that mammals exhibit to enhance hedonic experience by prolonging and magnifying contact with the rewarding stimulus, such as curling one's tongue to savor a tasty morsel in the mouth or caressing the skin of a loved one. This concept implies that acceptance of the stimulus affords greater attention to its qualities, which then allow for an expanded emotional experience.

The concept of acceptance wriggles may provide a useful heuristic to bridge mindfulness and savoring. To savor something involves acceptance of the initial stimulus and the emotional response arising from that experience. Perceptions of the stimulus context and attendant appraisals are gated into working memory via attention, and then associated with novel embodied associations and meanings from past stimulus contexts and future simulated ones (e.g., goal states). Through a process of iterative permutation, the original sensorial experience is modified on the basis of this influx of new contextual data, and is thereby elaborated upon and re-contextualized. Thus, savoring may involve acceptance wriggles focused on the perceptions of the stimulus as well as on the cognitive and emotive responses occasioned by the stimulus. These acceptance wriggles result in the sense of meaningfulness that reciprocally enhances the pleasantness of the event. For example, being stroked can be perceived as being caressed, and being caressed can be interpreted as a sign of affection, and affection can be a sign of enduring

love that shapes future appraisals of physical contact. This infusion of meaning into the sensory event magnifies the positive emotional experience derived from this event.

Mindfulness as a Domain General Resource for Promoting Emotion Regulation Flexibility

In their critique of the MMT (and mindfulness research, in general), Kashdan and colleagues (this issue) rightfully ask the question as to whether and when mindfulness is an optimally adaptive strategy. We are grateful for this question because it provides an opportunity for an important elaboration on a fundamental assumption underlying the MMT that allows for theoretical expansion. In light of a robust body of research on the neurocognitive effects and mechanisms of mindfulness (recently reviewed in Tang, Holzel, & Posner, 2015), we take the following position: the practice of mindfulness is a cognitive amplifier that enhances domain-general cognitive resources for restructuring phenomenological experience and boosting the flexibility of attention allocation to align one's goals with behavior. This assumption is supported by the insightful commentary by McConnell & Froeliger (this issue), who clearly detail plausible neural mechanisms by which mindfulness might serve as an amplifier of top-down processing. This notion of mindfulness as a domain general cognitive amplifier was not lost to classical Buddhist traditions; indeed, as Nakamura and Ho (this issue) point out, *Vipassana* and other analytical meditations utilize the attention stabilizing practices of mindfulness meditation to facilitate investigation of the mind, leading to cognitive insights.

Mindfulness, by virtue of the attentional enhancement, interoceptive awareness, and psychological flexibility it may engender, can facilitate a range of downstream emotion regulation strategies (including, but not limited to, reappraisal and savoring), as well as the ability to flexibly select amongst them (emotion regulation switching, see Gross, 2015). We

appreciate Kashdan et al.'s introduction of term equifinality into this discussion – in that other mechanisms, even those that are largely intuitive or automatic, may promote similar regulatory effects. What may be unique about mindfulness is that it injects flexibility into the construction of positive meaning, which allows an individual to choose between regulatory options rather than being bound by automatic, intuitive, or other ‘fast’ and seemingly uncontrollable processes. Through skillful selection among alternative meaning-making processes, mindfulness allows for the possibility of optimizing behavior to match one’s values and perceived needs. If mindfulness practice strengthens the capacity for top-down cognitive control instantiated in prefrontal networks, once cultivated, these prefrontal resources can then be applied to increase flexible selection and efficient implementation of subsequent regulatory strategies. We agree with Kashdan et al. (this issue) that mindfulness may not be the best strategy in all situations; particularly when prepotent tendencies are already adaptively tuned to meet situational demands, automatic regulatory habits that may be fruitfully evoked with less effort and top-down cognitive control.

It is precisely this notion that motivated the development of the MMT. The model posits that mindfulness may foster other salutary cognitive emotion regulation strategies (e.g., reappraisal and savoring), and that these strategies, which include evaluative thinking, intuitive insights, and appreciation of pleasure, may confer therapeutic benefits beyond those provided by the act of mindfulness meditation. As a clinician with more than a decade of experience working with patients in a variety of treatment settings, one of us (Garland) has observed the clinical utility of a range of therapeutic strategies, including mindfulness, reappraisal (i.e., cognitive restructuring), and savoring, among others. As such, noting the early sentiment in the contemplative clinical science field against the emphasis of traditional CBT on changing thought

content, we were reluctant to throw out the proverbial “baby with the bathwater”, given the hundreds of well-controlled, rigorous RCTs demonstrating the efficacy of CBT and our own clinical observation of how a majority patients benefit from the process of restructuring negative cognitions. Furthermore, one of us has extensively studied constructive forms of meditation like lovingkindness (*metta*) practice (Fredrickson, Cohn, Coffey, Pek, & Finkel, 2008; Kok et al., 2013), which contain elements of mindfulness practice, often as a precursor to the imaginal and well-wishing stages of the technique. These techniques often begin with mindfulness because the practice of decentering from habitual schemas and scripts into the mode of metacognitive awareness allows for the generation of an intense form of sustained attention to be concentrated on the images and positive sentiments generated during the meditation.

Such emotion regulatory flexibility as enhanced by mindfulness may also be crucial to clinical practice, and suggests a need for complex therapeutic interventions that combine various sequences of regulation strategies (Mennin & Fresco, 2015). As Nakamura & Ho (this issue) point out, the MMT provides a central theoretical framework underpinning a novel, multimodal mindfulness-based intervention for addiction, affective disorders, and chronic pain entitled Mindfulness-Oriented Recovery Enhancement (Garland, 2013). Though MORE is informed by other theories (Garland, Froeliger, & Howard, 2013; Koob & Le Moal, 2001; Tiffany, 1990), and is as such concerned with using mindfulness to disrupt and provide top-down regulation of addictive automaticity, the MMT provides rationale for MORE’s tripartite therapeutic approach that integrates mindfulness training with reappraisal skills and savoring practices. For instance, in MORE, clients are taught to actively contemplate the consequences of indulging in and abstaining from the addictive behavior. During this therapeutic technique, mindfulness is used to interrupt automatic drug use schema, decenter from cravings, and then stabilize attention on

affectively-laden mental simulations of potential future consequences. When mind wandering inevitably occurs, the patient refocuses on mental simulations of these consequences, elaborating on them to build a wider network of negative associations with the drug and positive associations with abstinence. In addition, MORE uses mindfulness training to promote savoring by intentionally orienting and sustaining attention on the sensory features of naturally-rewarding objects and events while metacognitively reflecting on any positive emotions or higher-order meaning that arise during this practice. These two interventional techniques represent complex sequences of emotion regulatory strategies, involving iterative admixtures of attentional orienting, appraisal, valuation, acceptance, cognitive broadening, and reappraisal. When these strategies are looped recursively within and across emotion regulatory episodes, novel meanings and behavioral repertoires may be forged and infused with health-enhancing hedonic and eudaimonic tone.

Mindfulness and (Spiritual) Meaning

Mindfulness is not the only pathway to meaning, and MMT does not suggest that it is (cf., Kashdan et al., this issue). Likewise, mindfulness has been associated with other health benefits and facets of well-being besides the sense of meaningfulness in life. Rather than lumping all of the benefits of mindfulness into a wide ranging meta-theory (as Kashdan and colleagues suggest), we opted to develop a specific model designed to probe the mechanisms of one key mindfulness-to-meaning pathway. We believe that the contemplative science field is replete with meta-theoretical models which, due to their “lumping” and breadth, have not served to provide testable mechanistic hypotheses or stimulate the development of novel mindfulness-based techniques that may have greater potency than extant mindfulness practices.

Here, we elaborate a critical dimension of meaning that deserves expansion beyond that provided in the target article. With regard to spiritual meaning, Chambers and Hassed (this issue) raised the provocative challenge that mindfulness is less about reappraisal than about spiritual awakening, a challenge that echoes Nakamura and Ho's (this issue) mention of the importance of wisdom aspects of contemplative traditions and Tang & Tang's (this issue) discussion of self-transcendence and transformation. The original soteriological purpose of mindfulness practice in the Buddhist canon was to facilitate the path to *prajna* (wisdom), ultimately leading to *nirvana* – the extinction and complete cessation of suffering. Whereas Mahayana theoreticians like Nagarjuna would only speak about this soteriology in the negative to avoid conceptual reification (Betty, 1983), Tibetan Buddhist scholars were more willing to make firm ontological statements about the fundamental nature of reality as revealed by nirvanic states, as well as their phenomenological qualities (Namgyal & Lhalungpa, 1993). These scholars describe a state, produced by intensive meditation practice, in which one experiences the unification of space and awareness, or emptiness and luminosity, as the Absolute nature of being and non-being, a non-dual awareness which, as McConnell and Froeliger (this issue) characterize, involves the total cessation of self-referential processing. While the neural signatures of non-dual awareness have just begun to be documented (Josipovic, 2014), the empirical tractability of this state suggests that despite its mystical significance, it has relevance for contemporary contemplative science and for everyday clinical practice (Dunne, Josipovic, Austin, Garland, & Nakamura, 2014).

We speculate that during the mindful reappraisal process, described in the MMT, a practitioner may achieve a momentary “taste” of this non-dual state, which transiently extinguishes conditioned cognitive, affective, and behavioral responses to stressors, and facilitates the cognitive set-shifting function that allows for a restructuring of interpretive

contexts that can produce radical transformations in meaning. Classical Buddhist examples of this awakening process include realizing that: a) the self is impermanent; b) entities are ultimately interdependent and empty of a separate, unchanging identity; and c) pursuit of and attachment to desires entails suffering. From a social psychological perspective, these awakenings may be considered reappraisals, in that an initial appraisal (e.g., the self is permanent) is transformed into another appraisal (e.g., the self is impermanent). We propose that the “awakenings” experienced by modern, Western mindfulness practitioners, perhaps especially those with clinical disorders who come from lower socioeconomic strata, may not be as lofty or abstract but rather be marked by highly personal, culturally-influenced meanings such as *facing this difficulty has made me a better person; I’m lucky to be alive; the thing that matters most is the love of my family; and No matter my shortcomings, I have something to contribute to this world*. We, like Carlson (this issue), have observed numerous patients attain these types of realizations during the process of mindfulness training, which are profoundly meaningful and therapeutic for those who achieve them.

As such insights develop along the path towards self-transformation, a deeper form of equanimity may develop in which the practitioner no longer makes sharp conceptual distinctions between positive and negative, “good for me” and “bad for me” - this process of self-transformation might be undergirded by neuroplastic consolidation of state mindfulness into mindful dispositionality (Tang & Tang, this issue), a hypothesis that we also proposed five years ago (Garland, Fredrickson, et al., 2010). Plausibly, long-term cultivation of mindful reappraisal, or “seeing the good in the bad,” might ultimately collapse such distinctions of stimulus valence, leading to the equanimous world view upheld in Buddhist practices like *duk ngal lam du drub pa* (described in the target article, page X). We encourage contemplative clinical scientists to begin

to document the prevalence, correlates, and characteristics of these “sacred and profane” experiences (Eliade, 1959), and to study the neurophenomenology of moments of insight arising from both formal and informal mindfulness practices.

Clinical Applications

Over the past decade, one of us (Garland) has taught mindfulness to many hundreds of patients suffering from a wide array of psychiatric and substance use disorders, as well as chronic pain syndromes and the sequelae of cancer. In these clinical encounters, reappraisal and savoring often arise as spontaneous insights and benefits of mindfulness training. It has only been in the last several years that we have begun to intentionally teach mindfulness in tandem with reappraisal and savoring techniques (as in Mindfulness-Oriented Recovery Enhancement) as a means to foster these positive psychological processes through the cognitive flexibility afforded by state mindfulness. We appreciate Carlson’s (this issue) assessment that the MMT is not at odds with the prevailing view of mindfulness in contemplative clinical science. In that regard, we sense that many clinicians trained within cognitive-behavioral perspectives practice by integrating mindfulness with reappraisal techniques, though perhaps without a formal, unified conceptual framework to guide their work. We advanced the MMT precisely to fill this lacuna and provide a map for the future clinical science of mindfulness.

As one example of potential clinical applications, McConnell & Froeliger (this issue) point to the applicability of the MMT to the treatment of substance use disorders. We concur with their assessment, and indeed, the first author (Garland) designed MORE, based on the principles outlined in the MMT, to address drug and alcohol addiction. A growing body of randomized controlled trials indicate that MORE produces significant therapeutic benefits prior

to (Garland, Manusov, et al., 2014) and during quit attempts (E.L. Garland, Gaylord, Boettiger, & Howard, 2010). In support of the *mindful reappraisal hypothesis*, concurrent training in mindfulness and reappraisal through MORE led to significant increases in the use of positive reappraisal as a coping strategy (Garland, Manusov, et al., 2014). Moreover, mindful savoring training through MORE appears to reduce drug craving by increasing autonomic and neurophysiological indices of reward processing (Garland, Froeliger, & Howard, 2015, 2014), and pilot data suggest that MORE may reduce drug intake by enhancing ventrolateral PFC activation during savoring (Eichberg et al., 2015). These discoveries provide compelling neuroscientific evidence to support the *mindful savoring hypothesis* of the MMT. Further mechanistic studies of MORE are needed to ascertain the clinical significance of enhancing mindfulness, reappraisal, and savoring among persons suffering from addiction and other clinical disorders. Beyond its therapeutic potential, research on MORE provides a probe of processes outlined in the MMT, in that the intervention may potentially modulate key mechanisms in the upward spiral from mindfulness to meaning.

A second key area of clinical application of the MMT is the treatment of trauma and the promotion of post-traumatic growth, as articulated by Tedeschi and Blevins (this issue). Insofar as trauma leads to a shattering of assumptive worlds (Janoff-Bulman, 2004), coping with trauma involves rebuilding assumptive worlds via personally meaningful cognitive reappraisals that can accommodate the traumatic event into one's schemas and life narrative. Reflective rumination can facilitate a reconstruction of novel assumptive worlds via a process of transmuting the intrusive ruminations that emerge out the initial attempt to make sense of one's changing life circumstances in the aftermath of trauma. We agree that metacognitive awareness can facilitate the set shifting function that transforms intrusive rumination into reflective rumination. Tedeschi

and Blevins rightly emphasize that this process of schema reconstruction necessarily involves exposure to trauma-related cognitions, images, memories, emotions, and body sensations – a notion that parallels Lindsay & Creswell’s (this issue) emphasis on attention monitoring and acceptance as key mechanisms of mindfulness. Indeed, as Lindsay and Creswell indicate, acceptance reduces avoidant coping, and attention monitoring of the stressor context allows for alternative perspectives to emerge. Thus, mindful reappraisal is not a form of denial; to the contrary, mindful reappraisal, which involves acceptance and attention monitoring (as well as cognitive change), occasions sustained contact with and active cognitive processing of one’s psychological responses to a traumatic life event. This process appears necessary not only for extinction of the conditioned fear response associated with traumatogenic stimuli, but also for the reconstruction of one’s personal narrative that is crucial to post-traumatic growth. In light of emerging studies that indicate the potential efficacy of mindfulness as a treatment for trauma (e.g., Kelly & Garland, in press), we encourage future researchers to test the MMT in clinical studies of mindfulness-based interventions for traumatized populations and to examine positive reappraisal and post-traumatic growth as potential mediating mechanisms.

Boundary Conditions of the MMT

A number of commentators pointed to domains unaddressed by the MMT. How does mindfulness promote positive emotions outside of adverse contexts (Bryant & Smith, this issue)? What is the role of mindfulness in promoting spiritual awakening (Chambers & Hased, this issue)? Which neuro-genomic profiles, learning histories, and cognitive capacities are necessary and sufficient for one to successfully engage in mindfulness, reappraisal, and savoring (McConnell & Froeliger, this issue)? What dose of mindfulness is required to evoke the

neuroanatomical processes undergirding trait-level changes in automatic and controlled emotion regulation capacity (Tang & Tang, this issue)? What is meaning itself, and how does it relate to the nature of embodiment and consciousness (Nakamura & Ho, this issue)? Even with such understanding, are there situations where standard mindfulness practice is contraindicated or in need of modification, as in the case of post-traumatic stress disorder (Tedeschi & Blevins, this issue)? These crucial domains of inquiry butt up against the boundaries of the MMT in the undiscovered country that lies just beyond its limits.

Given its bounded scope, the MMT might be best construed as a mid-level theory, rather than a grand theory of mindfulness. Mid-level theories are necessarily circumscribed, so as to provide maximal applicability to a targeted problem or domain of interest. Thus, the MMT is not intended to provide an exhaustive description of the manifold therapeutic mechanisms and limits of mindfulness, but rather, to specify how mindfulness promotes positive emotion regulation in stressful life contexts. Yet, the aforementioned domains are of great relevance to the evolution of contemplative science, and because they co-determine the boundary conditions of the MMT, we would like to use the remainder of this article to comment on two of these issues.

Bryant & Smith (this issue) offer a useful expansion of the MMT by broadening the scope of the theory beyond the domain of coping. Although the MMT was developed to explain how individuals flourish and self-generate positive emotional experience in the face of daily life hassles or serious adversity, we agree with Bryant and Smith that mindfulness may also enhance eudaimonic meaning and positive affectivity irrespective of its effects on coping processes. That said, from the lifespan-developmental perspective that Bryant and Smith espouse, eudaimonic well-being and the search for meaning do not occur in a vacuum. Rather, these processes situated within lives inevitably punctuated by periods of loss, threat, and challenge. Nonetheless, from a

microdynamic (as opposed to a longitudinal) perspective, mindfulness practice may enhance savoring directly, without the intervening mechanism of positive reappraisal. Indeed, as Bryant and Smith explain, savoring and mindfulness are closely related, in that each involves focused attention united with a meta-cognitive awareness of one's own affective response to the savored event. Even so, evidence also suggests that savoring and mindfulness are distinct constructs, each synergistically enhancing the benefits of the other (Kiken, Lundberg & Fredrickson, 2015). More generally, although the MMT addresses heretofore underspecified linkages between mindfulness and positive psychological processes, it is not intended to be an exhaustive account of the downstream effects of mindfulness practice.

Another boundary to the MMT lies in defining situations where mindfulness must be modified or adapted to generate salutary benefits, as raised by Tedeschi & Blevins (this issue) in their discussion of mindfulness in trauma recovery. We respectfully suggest that the MMT still holds in this particular context; in fact, the reappraisal of powerlessness, victimization, and personal destabilization as a potential growth experience may be as important following overt trauma as in other life stressors. Yet, trauma may impede one's ability to access and stabilize mindful attention, particularly when the physical sensations that anchor attention in mindfulness practice have become conditioned stimuli for traumatic re-experiencing. In such cases, the need for mindful reappraisal is still paramount, but the means by which mindfulness is introduced to trauma memories and triggers may require titration through modified mindfulness practices to limit the established association between sensory attention and trauma flooding (Price, McBride, Hyerle, & Kivlahan, 2007). Through such titrated experience, mindful attention can be stabilized while attenuating traumatic flashbacks or dissociation, thereby allowing for reappraisal of the traumatic experience. The boundary condition revealed in this example (as in the example of

addiction treatment, see McConnell & Froeliger, this issue) is that the mindful emotion regulatory process outlined in the MMT functions optimally in situations where mindful attention can be stabilized, which may require skillful support or adjunctive practices before it can be fruitfully applied. With a stable attentional base once established, it would seem that the ensuing temporal dynamics of moving from present-centered, nonjudgmental attention to deeper appraisal processes still meshes well with the clinical trajectory of recovery.

Meaning at the Attention-Appraisal-Emotion Interface

The final issue we wish to discuss is one of definition, namely whether the construct of meaning is itself sufficiently specified in the MMT. Nakamura and Ho (this issue) raise the fundamental problem of how meaning is constructed by the human mind and brain, and question how the mind is capable of generating alternative meanings. While such a deep epistemological inquiry is beyond our current scope, we submit that the MMT takes the human drive to generate meaning as one of its most basic axioms. Here we attempt to briefly situate within a broader theoretical context the assumption that meaning-making lies at the heart of human cognition.

Nakamura and Ho assert that all perceptual and cognitive processes are multi-stable, or as we have previously stated, “Life is an ambiguous stimulus” (Garland & Fredrickson, 2013). For example, does survival of a heart attack indicate that death is near, or that one has been given a second chance at living? Does falling in love suggest a lifelong partnership, or is it just the first sign of an inevitable heartbreak? Through self-reflection, the ambiguity of life becomes evident: circumstances, relationships, and even one’s own identity remain in constant flux. Because living requires adaptation to irregularities and unforeseen perturbations from the environment, self-reflection reveals the fundamental indeterminacy of human experience. Yet, adapting to

ambiguous situations evokes stress (Monat, Averill, & Lazarus, 1972) and loss of control (Folkman, 1984). In response to uncertainty, we are compelled to make sense of our experience by constructing a coherent network of relations between the events of our lives (Olivares, 2010). The impulse to make meaning is evident when perceived control is undermined, which promotes pattern perception in ambiguous contexts (Whitson & Galinsky, 2008). Hence, people attempt to reduce uncertainty and regain control by constructing meaningful patterns in the chaos of their lives (King & Hicks, 2009).

In this sense, meaning is central to human existence (Frankl, 1959; Singer, 2004) – and indeed biosemiotics would assert that meaning making is also fundamental feature of all living systems (Hoffmeyer, 2010). Although we experience the same primordial drives towards approach and avoidance as do all invertebrates, and the same basic emotional states of joy, contentment, love, disgust, anger, and fear as our mammalian ancestors (Ekman, 1971; Plutchik, 1980), the human capacity for constructing experiential meaning through cognitive appraisal creates a multifarious and ever-shifting palette of moods and affect. We derive our uniquely human emotional experience from the basic emotions through the processes of cognitive appraisal (Ellsworth & Scherer, 2002; Lazarus, 1991), whose conceptual contents form the bases of personal narratives that we use to make sense of our place in the world.

Contrary to popular views of mindfulness as a process of “seeing things as they are” (Kabat-Zinn, 1994, p. 6), the human perceptual apparatus does not have immaculate access to some *ding an sich* (trans. Thing-in-Itself, Kant, 1781) but rather, in the words of Maturana and Varela “the nervous system functions as a closed network of changes in relations of activity between its components” (1987, p. 164). At the same time, we do not exist in a solipsistic vacuum; our embodiment entails a recursive mutuality and transaction with the world (Maturana

and Varela, 1987). As a result of this ontological complementarity, the human mind is not merely a passive receptor of sensory information that reacts in an input-output fashion, but rather, an active agent that selects and appraises information for its contextual meaning or value. Together, attention, appraisal, and emotion are linked in a reciprocal process of co-construction (Barrett, 2013), and this attention-appraisal-emotion interface is the psychological substratum that makes adaptation possible. Yet, Bateson (1972) asserted that ordinary awareness often fails to capture the rich, interconnected complexity of the systemic circuits linking self and environment because “conscious sampling of data will not disclose whole circuits but only arcs of circuits cut off from their matrix by selective attention” (p. 444). In other words, attention creates a ‘spotlight’ (Yantis, 1988), bringing certain experiential relations into focus by inhibiting the representation of others. As a result of this process, depending on how individuals attend to the components of their experience, different phenomenological realities are constructed; the way we punctuate and organize the influx of information constitutes our lived experience of reality (Keeney, 1983). From this perspective, there is no inherent meaning in the details of experience outside of the contexts in which they are observed, and therefore, meaning is malleable and subject to contextual change induced via attention – an active and intentional process of consciousness “making sense of the world by acting on it” (Nakamura & Ho, this issue, p. 14).

And thus we come full circle to the MMT: mindfulness facilitates flexible attentional selection of previously unattended contextual information, promoting the ability to see alternate perspectives and thereby fluidly reconstruct meaning from the encounter with life. Such considerations give rise to a simple hypothesis: mindfulness should facilitate perspective-shifting and attentional stabilization on alternative views of multi-stable figures, and indeed, research indicates that this is the case (Carter et al., 2005; Hodgins & Adair, 2010; Sauer et al., 2012).

Final Reflections

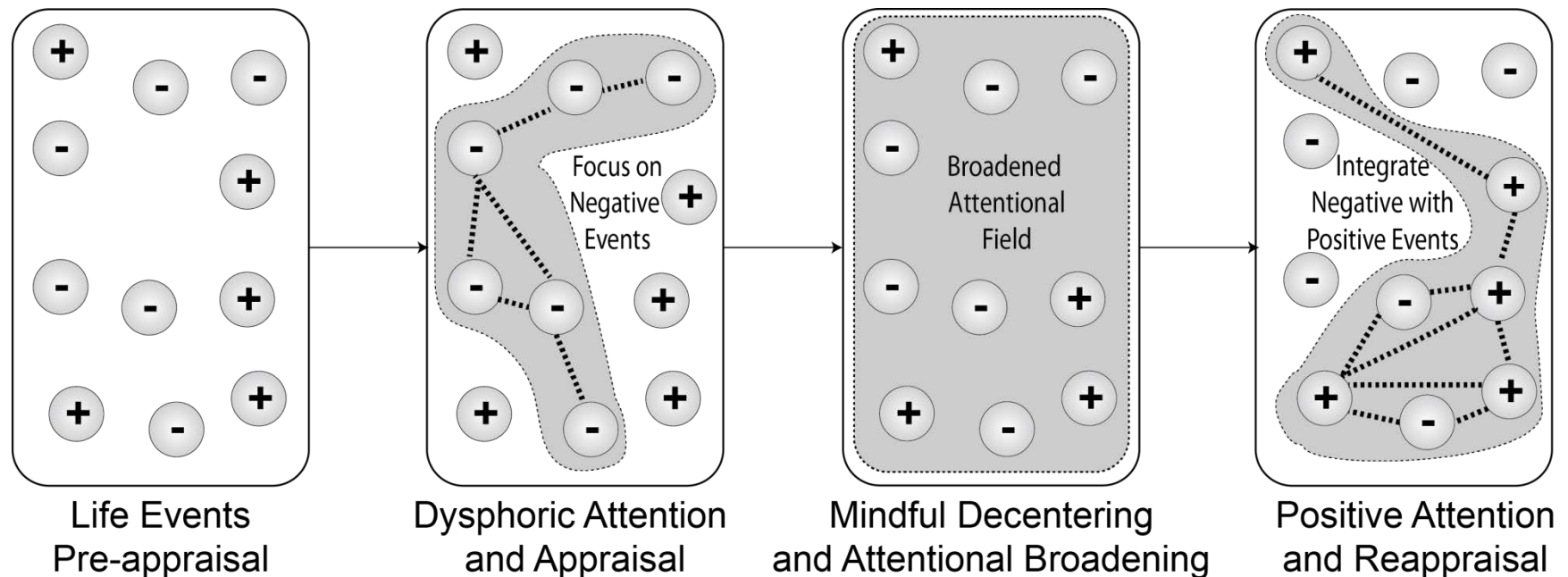
The MMT consists of a number of interrelated working hypotheses that have been refined over the past 8 years (e.g., Garland, 2007; Garland et al., 2009; Garland, Fredrickson, et al., 2010, Garland et al., this issue), and will undoubtedly continue to evolve in the coming decades, as more empirical research is devoted to testing, unpacking, sharpening and perhaps discarding various aspects of the model. It is our sincere hope that research on the MMT will further contemplative science and increase scholarly attention to the downstream effects of mindfulness on other regulatory processes integral to successful adaptation and flourishing in the world.

As we close our response, we are reminded of Korzybski's (1933, pp. 747–761) seminal words, which have simultaneously cautioned and inspired several generations of scholars:

“A map is not the territory it represents, but, if correct, it has a similar structure to the territory, which accounts for its usefulness... If we reflect upon our languages, we find that at best they must be considered only as maps. A word is not the object it represents; and languages exhibit also this peculiar self-reflexiveness, that we can analyze languages by linguistic means... This once understood... must lead to new languages, new doctrines, institutions, and, in fine, may result in a new and saner civilization...”

May our map, as provisional and semantically imperfect as it is, hold some useful meaning to scholars and clinicians striving for a saner civilization.

Figure 1. The set-shifting function of mindfulness reconfigures cognitive structures within working memory. Activation of dysphoric schemas results in an attentional bias towards negative life events. Representations of these events in working memory are consolidated into negative appraisals of self and world by strengthening the semantic network linking these nodal negative events (bold hatched lines). Mindfulness temporarily dissolves these linkages and broadens the attentional field to encompass an expanded set of positive and negative life events. As the individual re-enters the semantic-narrative mode, appraisals of the situational context are reconfigured in working memory via integration of a more balanced set of positive and negative events that have entered consciousness through mindfulness. The reconfiguration process preserves primary appraisals while reconfiguring secondary appraisals - the immediate negative impact of an event is acknowledged, but is often integrated into a broader positive appraisal of how such events can lead to growth or meaning, as opposed to self-recrimination, world-condemnation, avoidance, and withdrawal. As the linkages between nodes grow stronger, the consolidation of this new semantic network into long-term, autobiographical memory fuels eudaimonic well-being. Unfolding over time, this set-shifting process continues to select novel patterns of events for information processing, allowing for flexible reorganization of data into new appraisals and schemas to coordinate adaptive function and effective goal pursuit.



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