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A cognitive perspective on mindfulness

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Mindfulness, the core teaching of the Buddhist tradition, has been receiving serious attention from the West in recent decades as evidence of the efficacy of mindfulness-based interventions for emotional distress have become available. Although traditional Buddhist texts have described the mechanisms of mindfulness and the way to cultivate it in great detail, much is still not known from the perspective of Western science. In particular, there is no general agreement on the conceptualization and operationalization of mindfulness. Several conceptual models of mindfulness (referred to as “state” or “trait”) have been put forward to elucidate different aspects of this phenomenon, but none has gained sufficient empirical validation. This article proposes a new cognitive model of mindfulness. It has been our goal to describe and interrelate a relatively comprehensive group of determinants of a state of mindfulness, the consequences of its regular practicing, the mechanisms responsible for its beneficial effects, and the feedback mechanisms operating between the various constituents of the model. Within this model, the primary emphasis has been placed on understanding the cognitive processes shaping a state of mindfulness (i.e., the links between consciousness, meta-awareness and the unconscious), and on their determinants (i.e., the executive functions of attention and the components of working memory). A metacognitive system promoting mindfulness, as well as the general capability of the central executive system, is suggested as a factor explaining individual differences in mindfulness, whereas decentering, self-compassion, and reduction of self-focused attention are proposed as mechanisms mediating beneficial changes. We hope that the model presented will encourage further discussion and orient future studies in the area of mindfulness.

Keywords: Mindfulness; Attention; Executive functions; Metacognition; Decentering.

La pleine conscience, principal enseignement de la tradition Bouddhiste, a suscité l’attention de l’Occident dans les dernières décennies alors que l’efficacité des interventions basées sur ce concept pour la détresse émotionnelle est devenue évidente. Bien que les textes de la tradition Bouddhiste décrivent de façon détaillée les mécanismes de la pleine conscience et la manière de la cultiver, la science Occidentale y connaît peu de choses. Plus précisément, il n’y a pas d’accord concernant la conceptualisation et l’opérationnalisation de la pleine conscience. Quelques modèles conceptuels de la pleine conscience (considérée comme un état ou un trait) ont été mis de l’avant pour élucider différents aspects du phénomène, mais aucun n’a obtenu de validation empirique suffisante. Cet article propose donc un nouveau modèle cognitif de la pleine conscience. Notre but est de décrire et relier un ensemble relativement complet de déterminants de l’état de pleine conscience, les conséquences d’une pratique régulière, les mécanismes responsables des effets bénéfiques et les mécanismes de rétroaction agissant sur les composantes du modèle. Dans ce modèle, l’accent est mis sur la compréhension des processus cognitifs produisant un état de pleine conscience (i.e., les liens entre la conscience, la métacognition et l’inconscience) et aussi sur leurs déterminants (i.e., les fonctions exécutives de l’attention et les composantes de la mémoire de travail). Un système de métacognition favorisant la pleine conscience ainsi que la capacité générale du système exécutif central sont postulés comme facteurs expliquant les différences individuelles dans la pleine conscience, alors que la décentration, la compassion pour soi et la réduction de l’attention centrée sur soi sont proposés comme des mécanismes médiateurs de changements bénéfiques. Nous espérons que ce modèle encouragera la discussion et orientera les études dans le domaine de la pleine conscience.

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La conciencia plena (mindfulness), la enseñanza central de la tradición budista, ha estado recibiendo una importante atención de Occidente en las últimas décadas como evidencia de la eficacia de las intervenciones del distrés emocional disponibles que se basan en la conciencia plena. Aunque los textos tradicionales budistas han descrito con gran detalle los mecanismos de la conciencia plena y la manera de cultivarla, aún no se sabe mucho desde la perspectiva de la ciencia occidental. Más específicamente, aún no existe un consenso general relativo a la conceptualización y operacionalización de la conciencia plena. Se han propuesto distintos modelos conceptuales de la conciencia plena (considerada como estado o rasgo) para dilucidar los distintos aspectos de este fenómeno, pero ninguno ha obtenido la suficiente validación empírica. Esto deja lugar a un esfuerzo adicional. Este trabajo propone un nuevo modelo cognitivo de la conciencia plena. Nuestra meta fue describir e interrelacionar un grupo relativamente comprensivo de factores determinantes del estado de conciencia plena, las consecuencias de su práctica regular, los mecanismos responsables de sus efectos benéficos y los mecanismos de retroalimentación que operan entre los distintos componentes del modelo. Dentro de este modelo, el énfasis principal se ha puesto en la comprensión de los procesos cognitivos que dan forma al estado de conciencia plena (por ej., los vínculos entre conciencia, meta-conciencia e inconciencia) y en sus determinantes (por ej., las funciones ejecutivas de la atención y los componentes de la memoria de trabajo). Se sugiere un sistema de promoción de la conciencia plena, como así también la capacidad general del sistema ejecutivo central, como factores que explican las diferencias individuales en la conciencia plena, mientras que la descentralización, la autocompasión y la reducción de la atención autofocalizada se proponen como mecanismos de mediación de los cambios beneficiosos. Tenemos la esperanza que el modelo presentado fomente diálogos adicionales y oriente futuros estudios en el área de la conciencia plena.

Despite advances in knowledge with regard to the benefits of mindfulness-based interventions and the virtually exponential growth of the number of articles with the word *mindfulness* in their title, it seems that we still have a limited understanding of the essence of this phenomenon and of its psychological and neuronal causal mechanisms. This state of affairs is well illustrated by the fact that at least a dozen different definitions of mindfulness appear in the literature (Cardaciotto, 2005), while a generally accepted operational definition is still missing. There exist very detailed descriptions of mindfulness in core Buddhist traditional texts; however, these are not well known in the West. Whereas there have recently been attempts to delineate the Buddhist psychological model of mindfulness (Grabovac, Lau, & Willet, 2011; Grossman, 2010), several conceptual models of mindfulness have also been proposed. Some of these are precise but limited to a very narrow aspect of mindfulness (for example, “decentering” in Teasdale’s model of metacognitive insight; Teasdale, 1999), while others seem too general (e.g., models by Shapiro and colleagues or by Bishop and collaborators that have found little empirical support recently: see Anderson, Lau, Segal & Bishop, 2007; Bishop et al., 2004; Shapiro, Carlson, Astin, & Freedman, 2006).

Possibly one of the most frequently cited definitions of mindfulness expresses it as “awareness that emerges through paying attention on purpose, in the present moment, and non-judgmentally to the unfolding of experience moment by moment” (Kabat-Zinn, 2003, p. 145).

Such a concept of mindfulness includes a number of significant elements (see Shapiro et al., 2006). Firstly, mindfulness is linked with intentional processes—the attention is being directed in a deliberate manner. Secondly, in a state of mindfulness, the object of attention, whatever it is, occurs in consciousness in the present moment. Such a state, therefore, includes an orientation toward the present. Thirdly, an important element of mindfulness is an attitude of acceptance toward what is currently being experienced. Irrespective of the emotional, motivational, or cognitive meaning, in a state of mindfulness an experience is explored with an attitude of openness and curiosity (Brown & Ryan, 2003). Although most researchers explicitly or implicitly agree that mindfulness is fundamentally a quality of awareness, there are differences in the way they frame and define it, for example as a metacognitive skill (Bishop et al., 2004), as a self-regulatory capacity (Brown & Ryan, 2003), or as an acceptance skill (Linehan, 1994). There is a need for agreement on the operationalization of mindfulness and the basic mechanisms involved in it, without which it will remain difficult to find a common language and the basis for further research in this field.

The aim of this article is to delineate the cognitive aspects of mindfulness and to propose a new model of the mindfulness state. We characterize the model as cognitive on the grounds that the main processes leading to a mindfulness state are cognitive. It should be noted, however, that cognitive processes do not constitute the only possible characteristic of mindfulness. In the Buddhist view, mindfulness

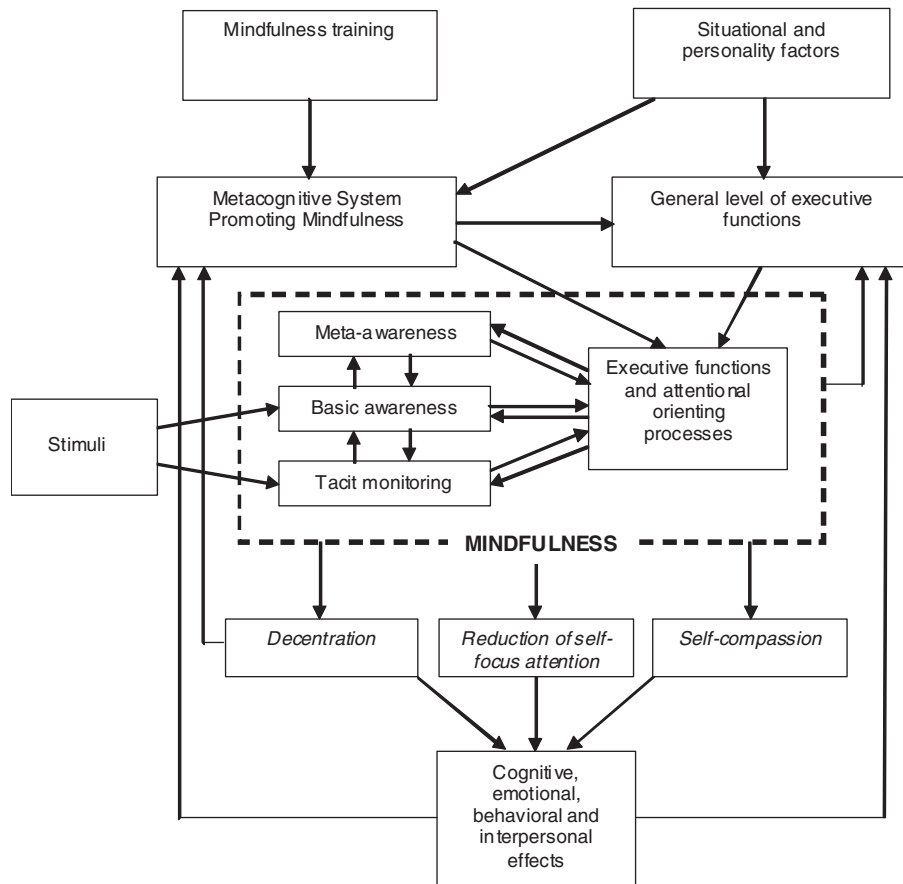


Figure 1. A cognitive model of mindfulness state (broken line) together with its determinants, as well as direct and indirect effects.

encompasses an array of cognitive, ethical, and emotional dimensions (Grossman, 2010). The model that we introduce below (Figure 1) describes the cognitive and metacognitive processes governing the arising of a state of mindfulness. It also indicates its principal determinants, and the mechanisms that are responsible for beneficial changes as well as for feedback.

THE PROPOSED COGNITIVE MODEL OF MINDFULNESS—GENERAL DESCRIPTION

We describe mindfulness as a two-facet construct including (1) an intentional state of meta-awareness (awareness of being aware of something), and (2) an open and receptive attitude to content of experience, which occurs most commonly during practice of the *vipassana* (open monitoring) type of meditation. Thus mindfulness can be conceptualized as a unique state of meta-awareness that is evoked and maintained by cooperation between some of the executive functions and attentional processes, a state that is marked by an open and

accepting stance toward the present moment experience. Although mindfulness on the general level is described as a kind of meta-awareness state, we recognize the importance of attitude components in mindfulness (acceptance, welcoming openness to experience), which, as we will argue later in the text, reduce the influence of tacit evaluative processes, thus potentially enabling meta-awareness of all elements of experience.

Such a definition implies that executive functions and attentional processes are fundamental in initiating and maintaining a mindfulness state. The model (Figure 1) also includes other elements, such as a general level of executive functions and a metacognitive system promoting mindfulness (MSPM) that do not constitute a mindfulness state themselves, but are implied in a dispositional quality of mindfulness creating necessary conditions that enable its evoking. Individual differences in dispositional quality of mindfulness are assumed to be developed by a complex interaction between explicit mindfulness training and a genetic predisposition as well as environmental circumstances shaping a personality (see Brown, Ryan, & Creswell, 2007, p. 229).

According to our view, a regular meditation practice, fundamental for the development of the ability to evoke mindfulness states, allows the formation of mindfulness-promoting elements contained in metacognitive knowledge in the MSPM. It delineates appropriate rules and action programs for the executive functions and attentional processes, and, indirectly, metacognitive information processing. It is worth noting that congruently with this view, research provides evidence of connections between metacognition and executive functions (see Fernandez-Duque, Baird, & Posner, 2000), and prefrontal brain areas (Shimamura, 2000). With the gradual deepening of mindfulness practice, usually gained through regular meditation exercises (mindfulness training, MT), a range of positive, cognitive, emotional, behavioral and interpersonal effects emerge (see Brown et al., 2007 for a review). It is postulated that these effects are mediated through several processes, in which particular emphasis is laid on decentering, decreasing the self-focus of attention, and developing a self-compassionate stance. In this way, the model presented postulates distinguishing the mindfulness state *per se* from the mechanisms that mediate its positive effects. The positive effects of MT reciprocally strengthen the MSPM and the central executive efficiency (Baddeley & Hitch, 1974). This process leads over time to the facilitation of the mindfulness activation process, and to an increasing ability to remain in this state during everyday activities.

One important point should be made. Both in classical Buddhist meditation texts and in modern literature there is a distinction between the two different meditation categories: *samatha* or focused attention and *vipassana* or open monitoring (Lutz, Slagter, Dunne, and Davidson, 2008). However, in some meditative traditions, such as *vipassana*, although meditation is specified to initially accentuate the focusing faculty of the mind (*smriti*) by deployment of focused attention on breath sensations, this meditation becomes a method of developing a meta-awareness (*sampajanya*) in a more advanced stage of practice (Guanaratana, 2002). In the modern literature, MT is usually referred to as open monitoring training, and it usually incorporates focused attention training in the early stage. Furthermore, in our view, both opening monitoring (i.e., the nonreactive monitoring of the content of experience from moment to moment) and focused attention (i.e., the voluntary focusing of attention on a chosen object in a sustained fashion) are exemplified in the present model of a mindfulness state. Differences between these two activities lie in partially dissimilar

patterns of executive functions and activation of neural systems in the brain.

According to Lutz et al.'s (2007, 2008) model, focused attention (FA) meditation requires development of the following faculties: engaging and sustaining attention to the intended object, detecting mind wandering (monitoring faculty) and disengaging attention from the source of distraction. We think FA also requires the ability to switch attention. As open monitoring (OM) meditation does not involve explicit attentional focus, it requires not only the development of more nonattentional executive function capacities, including information updating and monitoring and response inhibition, but also the switching of attention and its disengaging from stimuli that divert attention away from the ongoing present-moment experience.

THE PROPOSED METACOGNITIVE FRAMEWORK OF THE MINDFULNESS STATE

In our view, the meta-awareness inherent in mindfulness is related to metacognitive processes that enable monitoring of both the object of cognition and the cognition process itself. In order to describe how the mindfulness mode is constructed, we refer to Schooler's (2002a) model of consciousness, in which relationships between conscious, unconscious, and metaconscious cognitive processes are described.

The principal components of Schooler's (2002a) model include basic consciousness (sensations, emotions, nonreflective thinking processes), tacit monitoring processes (one function of which is to detect the undesired content of consciousness), and metaconsciousness. According to Schooler, both basic consciousness and tacit monitoring are continuous, whereas metaconsciousness is intermittent. The main function of metaconsciousness is to provide a secondary reflection of the contents of consciousness (Schooler, 2002a).

Smallwood and Schooler (2006) mention two types of dissociation between basic consciousness and metaconsciousness. The first type is temporal, and takes place when someone becomes aware of an experience that previously occurred in the absence of explicit awareness. Catching wandering thoughts, while reading for example, is a good illustration of this type of dissociation. The second type of dissociation is called translational, and it occurs if the re-representation process misrepresents the original experience in the metaconsciousness. This kind of dissociation often occurs while

one is attempting to verbally describe an experience that is nonverbal, ambivalent, or so subtle that it creates an opportunity for error (Schooler, 2002b).

Here we consider how, in a state of mindfulness, meta-awareness (we use this term instead of “metaconsciousness”) and tacit processes are associated with basic awareness (consciousness). We hypothesize that a mindful state of awareness is characterized by: (1) a reduced number of dissociations (both temporal and translational) between basic awareness and meta-awareness, (2) the increased clarity of basic awareness, (3) and a reduction in the influence of tacit evaluative processes activating higher-order cognitive elaboration (e.g., rumination). In the next paragraphs we briefly explain these propositions.

A characteristic feature of a mindfulness state is the frequent activation of meta-awareness processes. Mindful people rarely experience dissociation states: wandering thoughts or immersion in fantasy (Baer, Smith, Hopkins, Krietemeyer, & Toney, 2006); they are also better than less mindful people at detecting—if they occur—thoughts unrelated to task (Goodman, 2007). This is achieved through the deliberate, conscious monitoring of the contents of one’s own experiences. In a state of mindfulness, meta-awareness (which is by its nature noncontinuous) is activated more frequently than in the “normal,” nonmindful mode of information processing.

The translational type of dissociation also rarely occurs in a state of mindfulness. Due to the deliberate sustaining of the attentional focus on current experience, mindful people can name and describe the content of their own experience more accurately than is the case with nonmindful individuals (Brown & Ryan, 2003).

Mindful people experience sensations, emotions and thoughts in a way that is clearer and more distinct (Feldman, Hayes, Kumar, Greeson, & Laurenceau, 2007). Mindfulness enhances and changes the quality and the content of consciousness. The awareness of what is occurring covers not only the central elements of the experience, forming a “figure” (gestalt) at the time in question, but also the “background” elements, which thus become more accessible and noticeable (Anderson et al., 2007).

COGNITIVE PROCESSES INVOLVED IN MINDFULNESS

Similar to the lack of a generally accepted definition of mindfulness, there is no general

consensus on how cognitive processes should be properly classified. Some of the core executive functions, such as response inhibition (inhibitory control) and shifting (cognitive flexibility), partially overlap with attention models, whereas others, such as information updating and monitoring, correspond to executive components of working memory models (for more on attention models see Posner & Rothbart, 2007; for more on executive functions see Miyake et al., 2000, and Baddeley & Hitch, 1974). According to the present model, executive functions, both attentional and nonattentional as listed above, play a crucial role in evoking a mindfulness state. Let us focus briefly on how they contribute to this activation.

One determinant of a state of mindfulness seems to be the ability to inhibit irrelevant processes, representations, and behaviors (inhibitory control), which increases in a state of mindfulness. In the FA type of practice, this inhibition is more obvious, as it involves switching attention away from distracting stimuli. In the OM type of meditation, the process is more subtle, as it involves switching from being lost in, fused with, or identified with thoughts, to objectifying thoughts as another object of awareness.

In particular, we propose that in the state of intentionally evoked mindfulness, the influence of tacit processes on self-regulation is reduced. For example, in the cybernetic theory of self-regulation (Carver & Scheier, 1999) two basic kinds of feedback loop are listed: a discrepancy-reducing loop (approach) and a discrepancy-enlarging loop (avoidance). Both of them activate when a discrepancy between the actual and desired (or undesired) state is detected. In the dual-processes theory, self-regulation could proceed both consciously and unconsciously (see Gollwitzer & Bargh, 2005). Therefore, all the elements of the feedback loops (i.e., discrepancy detection, activation of a relevant goal, and goal realization) may occur in an automatic and tacit way. When a person tries to stay in a mindful state, he or she experiences a flow of many events (sensations, emotions, thoughts, etc.). Because of the pervasive nature of the “doing” mode of mind (based on the process of reducing or enlarging the detected discrepancy; Teasdale, 1999), some of the events may activate self-regulation in an automatic way. We propose that some beliefs in MSPM (e.g. “Every aspect of experience that I perceive is acceptable”) may interrupt these processes by deactivation of the standard (e.g. cognitive representation of desired or “normative” state of the self) the real state is referred to. If the experience is to be accepted in the way it appears, all a priori

standards for comparison have to be suspended. Thus a metacognitive accurate representation of the current experience may be formed. As a result, because there is no discrepancy between experience and its representation, there is also no need to avoid or prolong the experience. Alternatively, when the process of comparison has already been activated, beliefs in MSPM do not need to deactivate the standards for comparison: They guide meta-awareness. Thus both the sensate experience and the evaluating thoughts become objects of meta-awareness, a consequence that is related to reducing the affective charge caused by the discrepancy.

Of course, the mere intention to be mindful and accept every kind of experience is not enough to achieve this goal. Well-elaborated counter-goals can be implicitly activated during a meditation and they can disturb a mindfulness state resulting in mind-wandering (e.g. reflecting, ruminating, worrying). However, many of the instructions provided in mindfulness training that can be internalized in MSPM have features of implicational intentions that specify the behavior one will perform in the concrete situation in order to achieve the intended goal (Sheeran, Webb, & Gollwitzer, 2005). An implicational intention has a conditional structure: “If something happens, then I do something” (Gollwitzer, Wieber, Myers & McCrea, 2010). A typical self-instruction during a mindfulness practice is of the same type; for example: “If I notice I’m mind-wandering (ruminating, reflecting, etc.), then I gently accept it, let it go and pay attention back to my breath” (FA type of practice) or “pay attention back to whatever arises” (OM type). A review of research (Gollwitzer & Bargh, 2005) on implicational intentions shows that they can facilitate self-regulation by inhibiting processes and tasks unrelated to the goal. Moreover, self-regulation based on implicational intentions is efficient and effortless and it requires no further conscious intention when it starts (Gollwitzer & Bargh, 2005). However, in early stages of meditation practice, self-regulation requires both an effort and the conscious intention to evoke and sustain a mindfulness state. It becomes much easier with more advanced stages of practice.

Furthermore, the probability of rebound effects (suppressing unwanted internal events, such as thoughts, paradoxically leads to experiencing them even more) is reduced when a mindfulness state is evoked. The issue of rebound effects can be approached from a perspective suggesting that mental control involves ironic processes (Wegner, 1994). This theory holds that any intention to

control mental phenomena (e.g., suppressing intrusive thoughts) introduces at least two parallel processes that are respectively in charge of operating and monitoring. The first process is mainly conscious and discontinuous, and its task is to make content congruent with the control intention and to focus the attention on it (e.g. focusing our minds on positive thoughts, if we are hoping to improve our mood). The second process, called the “ironic” monitoring, occurs in a tacit and continuous manner, with the purpose of looking for failures in task execution. When unwanted content is detected by this monitoring system, it attains higher levels of activation and breaks through to consciousness. The operating system “copes” with this by redirecting attention back to the target stimuli. However, in a situation of cognitive load, the undesirable content activated by the monitoring fills the field of consciousness, leading to the ironic effect. Not only does the person not achieve what he or she intended, but he or she moves in exactly the opposite direction. A state of mindfulness prevents the emergence of this ironic effect by eliminating its basic precondition: the intention to “change” the experience (approach or avoid it).

The acceptance of the current experience—opening to it with no intention to modify its content—implies relinquishing attempts “to do something” with the experience. Although the meditator has an intent to focus on bringing bare attention (direct awareness without conceptual elaboration) to his or her sensate experiences, the goal of the meditation is not to achieve and sustain a particular kind of experience, but rather to preserve a special kind of relation between the experience (content of consciousness) and the process of becoming aware of it. Consequently, no particular cognitive representation is subject to a disproportionately greater activation than another, and thus smooth switching of attention between objects is not hindered. In the meta-awareness state of mindfulness a person tries not to control the experience itself, but instead remains in a “decentered” relation to it. Thus the ironic effect does not appear. In this sense, the inhibition associated with mindfulness is not an active process based on suppression. Rather than simply suppressing or “letting go of thoughts,” the process involves “letting go into” the present moment (the breath, or other objects) with full attention. As these abilities are based on changes in deployment of attention, instead of suppressing thoughts, attention is allocated to unfolding present-moment experience. More fundamentally, with deepening of the practice, these abilities are

based on gradually developing insight and understanding into how the mind works and how it relates to the objects of its experiences. The sources of this understanding seem to be both noncognitive (experiential) and cognitive (intellectual) in nature. The first source stems from practical experience (an insight), a direct nonconceptual understanding which is gained through the participant-observational awareness of one's own mental phenomena and processes (Grossman, 2010). The second source could be possibly linked to the cognitive process of decentering, and the development of an accepting stance that prevents automatic activation of certain types of elaborative information processing (e.g., rumination). As described previously, the acceptance embodied in mindfulness meditation relinquishes attempts "to do something" with the experience, thus inhibiting motivational processes that drive a ruminative style of thinking.

The OM form of mindfulness practice is characterized by its basic goal; that is, the continuous tracking of fluidly changing events and experiences. However, an often appearing state during meditation is that of mind-wandering, in which a person engages in the content of automatically activated, task-unrelated thoughts such as analyses, ruminations, or worries. Although these events may also be continuously observed in practice, they become problematic when the meditator becomes engaged in their content and loses sight of the intention to observe the arising and passing away of mental events and physical sensations. Therefore, the next important feature connected with mindfulness is the ability to disengage from distracting mental processes. When a person realizes that the mind wanders, switching of attention is needed to refocus on the present experience, whatever it is. Efficiency in this capability enables flexibility and freedom in "keeping up" with continuously changing external and internal events.

Attention-switching is separable from the ability to update working memory. While the switching refers to the change between different mindsets, goals, or tasks, updating working memory includes replacing old information with new, more goal-relevant data (see Miyake et al., 2000, p. 57). The basic goal of mindfulness meditation is to keep the mind focused on what is going on in the present and updating allows one to replace the representation of the past experience by that of the actual experience. We suggest that frequent and effective updating (especially its monitoring component) supports meta-awareness processes and facilitates re-representing the elements of experience in

working memory. Thus, the more effective the updating, the more frequently the content of experience is reflected at the metaconscious level.

Sustaining attention—the ability to focus on selected aspects of the experience—while not being the primary purpose of mindfulness, is important in the initial stage of meditation training in its concentrative form. An ability to maintain the focus of attention on specific objects, such as breath, helps beginners in finding an "anchor" for their usually restless minds. Although most meditative traditions agree that some degree of concentration is required, they disagree about exactly how much is necessary.

The present paper is not intended to provide an overview on empirical evidence of MT effects on cognitive abilities (for recent reviews see Chiesa, Calati, & Serreti, 2010; Lutz et al., 2007, 2008). Generally, MT is associated with improvements in selective and executive attention abilities, as well as enhancement of working memory capacities and of some executive functions. However, it must be stressed that an unambiguous testing of the hypotheses put forward here is hindered by inconsistencies across research findings and methodological limitations in some of the studies available.

The next question that our model attempts to answer concerns the conditions that must be met in order for executive processes to be capable of inducing and maintaining a state of mindfulness. In our opinion, two factors should be given primary importance in that respect. They are the MSPM and the individual differences influencing the efficiency of the executive functions.

METACOGNITIVE SYSTEM PROMOTING MINDFULNESS

The MSPM is responsible for the monitoring and selection of strategies that manage the cognitive processes involved and the actions being taken. This set of rules and action programs, constituting tactical knowledge, is stored in the long-term memory. Although there is no direct verbal access to it (see Wells, 2000, p. 9), its content is reflected in metacognitive beliefs about thinking styles, coping, goals, etc. MSPM consists of a series of beliefs about how to organize, manage, and process the information necessary for a state of mindfulness to arise and be sustained. Therefore, MSPM contains rules governing cognitive processes, including attentional processes (by determining where attention is to be directed), thoughts and emotional processes (by determining

TABLE 1
Examples of beliefs typical for a metacognitive system promoting mindfulness

<i>Meta-beliefs promoting a temporal orientation towards the present</i>	<i>Meta-beliefs promoting an attitude of acceptance towards various aspects of experience</i>
Only the present moment holds meaning.	Whatever appears in my experience is all right, just as it is; I can allow it to simply be.
The present is more important than the past or the future.	It's important to be aware of—but not to “bury myself” or get lost in—my thoughts and feelings.
What really counts is being “here and now.”	Whatever appears in the field of experience, also then passes away.

attitudes to emerging thoughts and other internal events; e.g., images, bodily sensations, memories).

The contents of mindfulness-promoting meta-beliefs primarily regulate such phenomena as remaining focused on the current experience, and the attitude to one's own thoughts and other internal events. It seems that the crucial rules are the ones supporting the maintenance of a stance of acceptance, curiosity, and compassion in relation to whatever is arising in the field of awareness. At the same time, maintaining the ability to inhibit further processing enables dispassionate and non-evaluating awareness of mental events. Table 1 reports examples of such metabeliefs.

An interesting and unresolved issue is that of which metabeliefs are prerequisites for a state of mindfulness, and, conversely, which of them are simply consequences of the regular practice of mindfulness meditation.

In any case, the human inner capacity for being mindful may be fostered by special regular meditative training, such as mindfulness based stress reduction (MBSR). Formally conducted, MT is probably the best established and most effective way of forming MSPM. It provides specific cognitive content and the skills required to induce a state of mindfulness.

MINDFULNESS TRAINING

Typical mindfulness training, such as MBSR and other mindfulness-based interventions that originated from it, takes the form of an eight-week course during which, apart from weekly group meetings with the instructor, the participants independently practice formal mediation exercises on several days of the week. Significantly, in terms

of our considerations, mindfulness exercises are in a guided-meditation format. During the meetings, the exercises are led by the trainer, who subsequently (through a process termed “inquiry”) helps the participants in bringing their experiences to consciousness and naming them (at home, recordings are used). The guided meditations contain an introduction to each exercise, as well as direct instructions and metaphors enabling those qualities constituting the basis of mindfulness (such as nonjudgment, acceptance, compassion, nonstriving) to be internalized and directly introduced into the individual's current experience. We believe that guided meditation, which is typical of MBSR and other MT originating from it, effectively influences the development of MSPM, and thereby the ability to attain a state of mindfulness.

INDIVIDUAL DIFFERENCES IN CENTRAL EXECUTIVE SYSTEM EFFICIENCY

Together with other factors, MSPM influences the general efficiency of the central executive system; that is, the relationship between the quality of the task performance and the effort needed to accomplish it (Eysenck, Derakshan, Santos, R., & Calvo, 2007). In relation to this system, researchers studying executive processes emphasize the existence of individual differences in both healthy and clinical groups (Derryberry & Reed, 2002). For example, different individuals show different levels of cognitive control (understood as a relatively constant intra-individual feature), which in a given situation can determine the extent of fluctuations in executive processes' efficiency (Derryberry & Reed, 2002).

The general efficiency of the central executive system is connected with differences in the organization and functioning of the prefrontal cortex (Miyake et al., 2000). Apart from genetic factors, it is influenced by aging and a range of pathological processes (Engle, Sędek, von Hecker, & McIntosh, 2005). In our view, the frequency and quality of mindfulness states aroused in a given individual depend on the dispositional efficiency of the central executive system.

PERSONAL AND SITUATIONAL FACTORS INFLUENCING STATES OF MINDFULNESS

Accessibility of the elements included in the mindfulness state depends on a broader context

involving both personal and situational factors and the interactions between them. Certain psychological theories provide a context within which to examine the association between personality and the disposition towards mindfulness, namely trait theory, particularly the “Big Five” theory (McCrae & Costa, 2003), and attachment theory.

Openness to experience—one of the traits of McCrae and Costa’s (2003) five-factor personality model—is linked with interest in new experiences in their various aspects: emotional (feelings), cognitive (ideas), and behavioral (actions). Therefore, we think that a high level of openness should facilitate the forming of MSPM. Research data from Brown and Ryan (2003) correspond to this hypothesis: Readiness to be open in everyday life correlates positively with openness to experience, as measured by various methods (e.g., Revised NEO Personality Inventory and NEO Five Factor Inventory) and in various populations. Neuroticism—another trait of Big Five theory—can lower mindfulness levels in everyday life, through avoidance tendencies as well as by exerting a negative influence on executive functions. Proneness to negative emotions, such as anxiety or sadness, is connected with a decrease of the efficiency of control processes (Eysenck et al., 2007). In this way, it may be more difficult for people prone to chronic negative emotions to initiate and maintain a state of mindfulness. The metacognitive systems of individuals with high levels of neuroticism may be dominated by beliefs, aims and strategies hindering the acceptance of experience as well. As mentioned earlier, Brown and Ryan (2003) have reported results confirming these suppositions: Mindfulness and neuroticism are negatively correlated.

Not only the traits mentioned above, the strong genetic basis of which has been confirmed by numerous evidence, but also the personality features gained throughout life can have a major impact on forming MSPM. A sense of security deriving from early childhood can be of particular significance (Mikulincer & Shaver, 2007). Attachment theory accords special importance to the style of parent–child relationships. After Shaver, Lavy, Saron, & Mikulincer (2007) we think that warm, soothing, and supportive relationships between a child and his or her attachment figures (e.g., parent) may facilitate forming positive beliefs about self, other people and the world. As a consequence these relationships may lead to unconditional acceptance of life experiences.

Positive effects of practicing mindfulness

The initial interest in mindfulness, focusing on its therapeutic utility in alleviating suffering from mental and physical illnesses, has resulted in a large number of studies. Their results indicate some fairly consistent beneficial effects of MT. A recent meta-analysis of mindfulness-based therapies for anxiety and depression has revealed that this type of strategy is a promising intervention for treating anxiety and mood problems in clinical populations (Hofmann, Sawyer, Witt, & Oh, 2010). Several studies have also shown improvements in various health-outcome measures (e.g., Davidson et al., 2003), and have demonstrated numerous correlations between the mindfulness trait and variables regarded as indicators of wellbeing (e.g. Brown & Ryan, 2003). An extensive description of these is beyond the scope of this paper (see Brown et al., 2007 for a review).

Mechanisms mediating mindfulness with its positive effects

The link between mindfulness and its benefits listed above is probably mediated by a range of mechanisms of which, in our opinion, the most important are: (1) changes in perception of the nature of internal experiences (decentering; Fresco et al., 2007; see also re-perceiving in Shapiro et al., 2006), (2) a reduction in self-focused attention (a decrease in the negative influence of ego-related processes on self-regulation; see Leary, Adams, & Tate, 2006), and (3) a caring and kind stance toward oneself, an attitude that might be described as “self-compassion” (Neff, 2003).

MT leads to changes in the way individuals relate to their experience and how they understand the nature of mind and its contents. A person practicing MT begins to perceive more clearly that one does not need to identify with the content of one’s experiences, and therefore, does not need to remain immersed in the thoughts that appear, in the emotions that they are experiencing, etc. Instead, the identity begins to be associated with the mere process of being conscious and then the self can be experienced as a “witness” of external and internal events. This experience enables observing (in an impartial and non-evaluative manner) moment-to-moment changes occurring in psychological facts; that is, perceptions, thoughts, and emotions. In addition to the gradually developed insight described earlier, the relational frame theory

(Hayes, Barnes-Holmes, & Roche, 2001) might serve as a possible conceptual base for such kind of experiences. This theory explains how the regulative functions of language contribute to the process of identifying the self with the mental representations, and how the changes in functions of language can facilitate changes in experiencing the self.

The phenomenon just described, expressed in a variety of ways, forms a part of the majority of mindfulness-based therapeutic systems. In the context of individuals with recurring episodes of depression, Teasdale et al. (2000; see also Fresco et al., 2007) speak of the phenomenon of decentering. Acceptance and commitment therapy makes use of the term “cognitive diffusion” (Luoma & Hayes, 2009) as one of the key mechanisms supporting healing. It has been suggested that decentering is a mechanism which allows for positive reappraisal and, because of this, mindfulness is an intrinsic component of meaning-based coping with stressors (Garland, Gaylord, & Park, 2009). Some preliminary empirical evidence supports that claim. For example, Fresco et al. (2007) found a modest but significant correlation between a measure of decentering and positive reappraisal.

The second important mechanism mediating links between mindfulness and its positive impacts leads to a reduction in the amount of self-focused attention. Excessive self-consciousness, mainly its reflective mode (in contrast to an awareness of one’s own psychological states), is a feature of many psychological disorders (Ingram, 1990). In this context, Leary et al. (2006) have mentioned mindfulness as one of the factors both supporting a reduction in self-directed attention and promoting a hypo-egoic self-regulation (the kind of self-regulation in which deliberate, conscious control over one’s behavior is relinquished). According to their theory, a reduction in self-consciousness allows behaviors of a more natural and spontaneous nature to be evoked, thus increasing the likelihood of achieving the goal, especially in situations where intentional efforts to exert control may prove destructive in terms of the self-regulatory final effect. It is probable that thanks to the experience of decentering and acceptance resulting in sense of security (Brown, Ryan, Creswell, & Niemiec, 2008), mindfulness reduces engagement of the ego-related processes. Through making the ego quiet, mindfulness lessens the intrapersonal and interpersonal costs of excessive self-identification (e.g., Brown et al., 2007).

Aside from the cognitive mechanisms of decentering and reducing self-focused attention,

the relationship between mindfulness and psychological wellbeing may also be mediated by the development of self-compassion. In our view, the gradual development of MSPM leads to establishing rules regarding the attitude a person develops to his or her emerging experiences, whatever their tone (pleasant, unpleasant) or nature (thoughts or other internal events). In this way, in a mindfulness state, a nonjudgmental, open, and accepting stance towards one’s own experiences is maintained. We consider this to be an active rather than a passive process (in contrast with merely observing the contents of awareness in a detached way)—one which involves developing a self-kind and caring attitude.

In MT, special emphasis is placed on an open and trusting exploration of any experience, including pain or negative emotions that usually carry a degree of suffering. Whenever meditators notice it, they are instructed to approach it with interest, kindness, and compassion, to acknowledge it and then to allow it to subside. By cultivating this implicational attitude during the time spent in mindfulness meditation, the practitioners increase their level of self-compassion. Neff (2003) has proposed that self-compassion involves three main components—self-kindness, a sense of common humanity, and mindfulness—that “combine and mutually interact to create a self-compassionate frame of mind.” Although there is a paucity of research exploring the actual relationship between mindfulness and self-compassion, some preliminary studies have revealed that MBSR training increases self-compassion (Shapiro, Brown, & Biegel, 2007). On the other hand, preliminary evidence suggests that training in compassion based on loving-kindness meditation practice leads to the increase of mindfulness (Fredrickson, Cohn, Coffey, Pek, & Finkel, 2008). It is unclear whether people naturally high in self-compassion have a high capacity for mindfulness or whether naturally mindful persons are self-compassionate. Obviously, there is a need for more research exploring these issues.

Feedback mechanisms

The model of mindfulness presented here assumes the existence of a range of feedback mechanisms between its individual elements. We believe that a change in the way in which experience is perceived strengthens preexisting mindfulness-promoting beliefs and introduces new ones into the metacognitive system. As a result, the capability to induce

and maintain a state of mindfulness rises together with practice longevity and intensity.

Some of the consequences resulting from MT, e.g. a reduction in the intensity of worrying and rumination, may give rise to a freeing of central executive system resources that are tied up by such processes. In the same way, a more effective utilization of the specific executive processes connected with attention and working memory becomes possible (see Eysenck et al., 2007).

The practice of mindfulness may lead to enduring improvements in the overall efficiency of executive functions (Lazar et al., 2005). Some results (Schwartz & Begley, 2002) point to the existence of an MT related phenomenon, that of neuroplasticity, as well as to an activity increase in the prefrontal cortex.

CONCLUSION

This paper has outlined the cognitive aspects of mindfulness and put forward a new cognitive model of the mindfulness state. We have described and interrelated the various determinants of the mindfulness state, the results and mechanism of MT, and the feedback loops operating within the model. The main focus was placed on the understanding of the cognitive and metacognitive processes governing the emergence of the mindfulness state. Further research is needed to verify the hypotheses underlying this model. We hope that our proposition will both stimulate discussion and guide future investigation.

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