



## Review

## Metacognitive model of mindfulness

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## ABSTRACT

Mindfulness training has proven to be an efficacious therapeutic tool for a variety of clinical and nonclinical health problems and a booster of well-being. In this paper we propose a multi-level metacognitive model of mindfulness. We postulate and discuss following hypothesis: (1) mindfulness is related to the highest level of metacognition; (2) mindfulness depends on dynamic cooperation of three main components of the metacognition (metacognitive knowledge, metacognitive experiences and metacognitive skills); (3) a mindful meta-level is always conscious while the other meta-cognitive processes can occur implicitly; (4) intentionally practiced mindfulness decreases dissociations between awareness and meta-awareness; (5) components of mindful meta-level develop and change during continuous practice. The current model is discussed in the light of empirical data and other theoretical approaches to mindfulness concept. We believe that presented model provides some helpful avenues for future research and theoretical investigations into mindfulness and the mechanisms of its actions.

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## 1. Introduction

Mindfulness is a phenomenon which has drawn the attention of many scientists and clinicians over the last decade. The reason for the great interest in mindfulness lays in numerous benefits that come from practicing it. These positive effects have been found in various areas of human functionality: emotional, cognitive, behavioral and interpersonal (Brown, Ryan, & Creswell, 2007). The important role mindfulness plays in health and well-being gives rise to the question: how does it work?

The substantial growth of scientific investigations on mindfulness has been observed from several decades, but as a psychological or spiritual phenomenon it has been well-known and practiced for more than two thousand years, particularly in Eastern cultures. Mindfulness is one of the pillars of the Buddhist tradition and its philosophical and religious interpretation is vast (Kuan, 2008). The abundance of meanings related originally to the term ‘mindfulness’ makes its psychological definition very difficult to pin down. Up until now, there are two main approaches which have suggested a slightly different understanding of mindfulness: the clinical psychology approach (see Baer, 2003 as an example) and the self-determination theory approach (SDT, see Brown & Ryan, 2003 as an example).

The first trial to define core aspects of mindfulness without referring to a religious context was run by Jon Kabat-Zinn (1982), and it is the most popular and prominent of the existing definitions. Kabat-Zinn introduced mindfulness to clinical practice and defined it as “the 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). In SDT, mindfulness is defined as “open or receptive awareness and attention (...) which may be reflected in a more regular or sustained consciousness of ongoing events and experiences” (Brown & Ryan, 2003). Although both descriptions of mindfulness have a superficial similarity, operationalizations of the concept are different. The way mindfulness is induced or measured in both contexts suggests differences in ways they are understood on a deeper level. Tradition originated in Kabat-Zinn’s work emphasizes the intentional character of the mindful state. In other words, it assumes that mindfulness is not a natural state of mind and needs to be consciously induced and practiced. In turn, the SDT approach put the emphasis on individual differences in the frequency of mindful states in an everyday life among people with or without any meditational experience. As such, SDT does not exclude, but it also does not require intentional effort to evoke mindfulness – under favorable conditions (e.g. curiosity, intrinsic motivation) one can become mindful spontaneously. While it was Kabat-Zinn’s definition that was the base for the present model of mindfulness, in the next sections we describe this conceptualization in broader frames of metacognition. We believe that this meta-cognitive perspective has potential to create a bridge between two mentioned approaches to mindfulness.

The main purpose of this article is to present a meta-cognitive model of mindfulness and its implications for understanding the processes and mechanisms involved in mindfulness. Therefore, firstly, we discuss the links between mindfulness and meta-cognition based on the existing theories and neuroscientific research. Then, we describe a proposed meta-cognitive model of mindfulness and discuss the five main hypotheses which emerge from it. To conclude, we present some of the model’s implications for future investigations.

## 2. Mindfulness as a metacognitive phenomenon

Reference to metacognition has implicitly appeared in the classical definition of mindfulness (Kabat-Zinn, 2003), which describes it as a state of consciousness that results from being aware of continuous changes in the content of consciousness: perceptions, emotions, images and thoughts. In our opinion it imposes at least two levels of cognition: (1) the lower level which refers to the *qualia* (basic qualities of experience such as perceptions) occurring in the present, and (2) the higher level constituted by awareness of the flowing *qualia*. In other words this definition assumes dissociation between object and meta-level of cognition described by Schooler (2002) (see also further sections of this article). Relating mindfulness to conscious, intentional regulation of attention implicates executive functions (e.g. inhibition, switching attention) as an important element of the construct (Bishop et al., 2004; Holas & Jankowski, 2013; Shapiro, Carlson, Astin, & Freedman, 2006). As Fernandez-Duque, Baird, and Posner (2000) argued, conscious regulation of cognition (i.e. deliberate use of various executive functions that control attention as it occurs during mindfulness) directly refers to metacognitive skills. Other popular explanations of mindfulness also lead to the metacognitive model of this phenomenon. For example Teasdale, Segal, and Williams (1995) (see also Teasdale, 1999a,b) proposed the term ‘metacognitive insight’ to describe a (meta)experience of one’s thoughts, emotions, and sensations perceived as “events in the mind, rather than as direct readouts on reality” (Teasdale, 1999a, p. 147). Metacognitive insight (called in later works a metacognitive awareness or decentration; see Fresco et al., 2007) is facilitated by mindfulness training and significantly reduces a risk of depression relapses (Teasdale et al., 2002; Watkins, Teasdale, & Williams, 2000). In the Metacognitive Model of Psychological Disorder proposed by Wells (2000, 2009) the basic feature of mindfulness is meta-awareness – objective awareness of flowing internal events, primarily

thoughts. As such, mindfulness induces a metacognitive mode of information processing that leads to beneficial changes in patients (Wells, 2002). In Shapiro's et al. (2006) proposal, the basic mechanism responsible for the beneficial effects of mindfulness – reperceiving – refers to a shift in perspective of the current content of the experience. Reperceiving is therefore also a kind of metacognitive mechanism as it allows an individual to witness a current experience without being entirely immersed in it. Practicing mindfulness leads to “the observing self” – a higher order metacognitive phenomenon often described in literature on mindfulness.

This brief review of various theories suggests that mindfulness can be conceptualized in terms of metacognition, and that many of its effects may be understood better if seen through lenses of this broader concept. In the next paragraph, neuroscientific findings suggesting common brain structures and functions associated both with mindfulness and metacognition would be presented.

### 3. Metacognition, mindfulness and neuroscience

The concept of metacognition implicates a top-down regulation of information (Flavell, 1979; Nelson & Narens, 1994). A number of neurobehavioral studies indicate the prefrontal cortex (PFC) as one of the brain regions which plays a central role in the top-down control of information processing (see Fernandez-Duque et al., 2000; Shimamura, 2000a). Although PFC is a large and multifaceted region of the brain that serves various functions, there seems to be substantial empirical evidence pointing at its recruitments in meta-cognition. Some researchers make direct links between PFC functions and metacognitive processes (Fernandez-Duque et al., 2000; Pannu & Kaszniak, 2005; Stuss, Gallup, & Alexander, 2001). Shimamura (2000b) in his dynamic filtering theory postulates a metacognitive neural mechanism, in which PFC implements metacognitive control through the selection of the appropriate signals, and the suppression of inappropriate signals, coming from posterior cortical circuits. In other words the PFC regulates processors distributed in the posterior brain by gating or filtering information, which in turn leads to the amplification of neural activity and the reduction of extraneous noise. Studies have shown that a segregation of prefrontal-posterior cortex projections exists, therefore the metacognitive controller is not a homunculus-like single unit but a set of controllers. These prefrontal-posterior cortex feedback loops orchestrate cognitive processes. It is particularly important for metacognitive processes to introduce inhibitory control over conflicts among lower-level processors. Such a situation requires making decisions to suppress some activities and allow others to progress. This mechanism is crucial in single object meditation, the prerequisite of learning mindfulness meditation when distracting external or internal events conflict with goals of paying attention to the target object. The anterior cingulate cortex (ACC) is the main structure responsible for monitoring conflicts and executive attention (van Veen & Carter, 2002). ACC in line with the fronto-insular cortex facilitates cognitive control by being involved in switching between the activation of different brain networks (Sridharan, Levitin, & Menon, 2008). Furthermore, PFC modulates structures involved in the processing of emotion, such as the amygdala (Ochsner & Gross, 2005).

We can find data in the literature which demonstrate effects of mindfulness practice on the PFC. For example, Farb et al. (2007) showed increased activity in the ventrolateral PFC after 8 weeks of Mindfulness-Based Stress Reduction course (MBSR). Results of a few neuroimaging studies suggest that mindfulness meditation improves prefrontal control over amygdala responses. Creswell, Way, Eisenberger, and Lieberman (2007) found that mindfulness is associated with increased MPFC/LPFC activation and reduced amygdala activation during affect labeling, whereas Brefczynski-Lewis, Lutz, Schaefer, Levinson, and Davidson (2007) reported a negative correlation between the number of hours in meditation practice and the activation of the right amygdala during concentrated group meditation with experienced meditators while processing negative emotional sounds. In line with these studies, Goldin and Gross (2010) documented a quicker decrease of activation in the amygdala in social anxiety patients presented with negative self-beliefs after completing 8 weeks of MBSR.

Neuroimaging studies also showed the effects of meditation practice on ACC activity (Hölzel et al., 2007; Tang et al., 2009). Grant, Courtemanche, Duerden, Duncan, and Rainville (2010) in an analysis of brain gray matter, demonstrated a greater cortical thickness in experienced meditators, in the dorsal ACC, and Tang et al. (2010) found that 11 h of a program containing mindfulness practice led to an increase in white matter integrity in the ACC. Finally, an increased frontal midline theta rhythm, which presumably reflects ACC and medial prefrontal cortex activity (Asada, Fukuda, Tsunoda, Yamaguchi, & Tonoike, 1999), was found during meditation (Aftanas & Golocheikine, 2002; Kubota et al., 2001).

To conclude, both neuropsychological results and theoretical conceptualizations of mindfulness seem to indicate meta-cognitive formulation of the phenomenon.

### 4. Metacognitive model of mindfulness

The presented model of mindfulness (Fig. 1) is based on the broader model of metacognition proposed by Efklides (2008). We adapted her conception to frame cognitive and metacognitive processes engaged in the mindful processing of information. Our model describes the state of mindfulness as it is understood and defined in the tradition initiated by Jon Kabat-Zinn. Therefore it helps to understand what happens in the mind of the person who has intentionally evoked a state of mindfulness.

As in the classical view of metacognition, our model distinguishes between meta and object levels (Nelson, 1996; Nelson & Narens, 1994). At least two hierarchical metacognitive levels are proposed. The central element of the highest

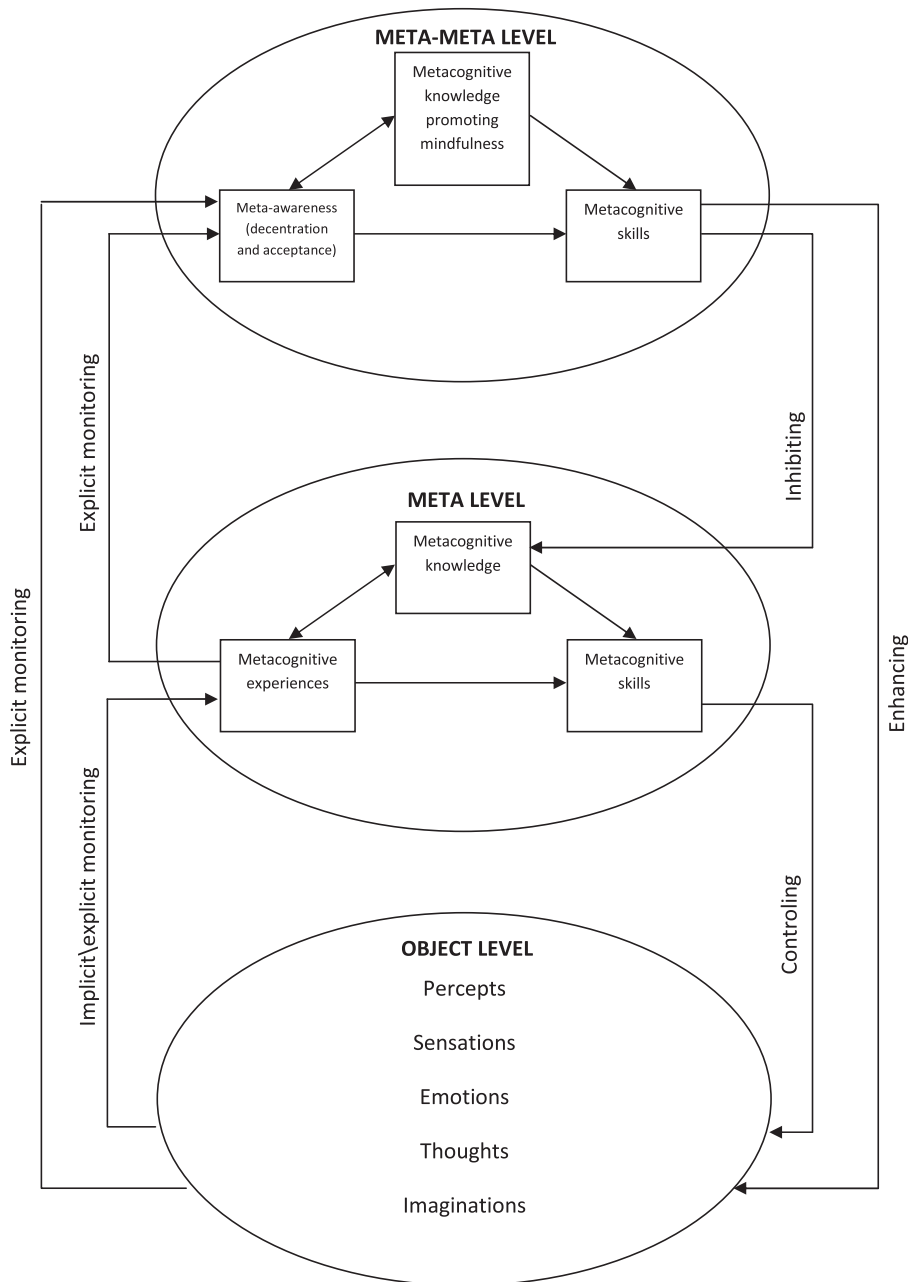


Fig. 1. Metacognitive model of mindfulness.

metacognitive level, which enables one to be mindful, is meta-knowledge which promotes a state of mindfulness (MMK – mindfulness meta-knowledge) (Holas & Jankowski, 2013). It consists of beliefs about relations between a subject and an object of cognition as well as goals and strategies that have to be applied if mindfulness is to be maintained. Information coming from the explicit monitoring of the lower levels is interpreted in the context of MMK and leads to meta-experiences specific to mindfulness (MME – mindfulness meta-experiences) – metacognitive insight, warmth and compassion, newness and freshness as well as interest and curiosity. MME trigger meta-skills (like intrinsic alertness, sustaining attention, inhibiting irrelevant processes as well as task-switching) that allow, in turn, for evoking and refreshing of mindfulness.

The proposed model implicates various processes engaged in mindfulness and posits its developmental nature. As being mindful – in the meaning proposed by Kabat-Zinn – is not a natural state of mind, it has to be trained and practiced to become routine (Kabat-Zinn, 2003). The model suggests an explanation how inner dynamics included in a mindful state change as the practice becomes more advanced.

The metacognitive model of mindfulness is based on several assumptions underlying human cognition and involves five main hypotheses: (1) metacognitive, multilevel information processing is inherent in a mindfulness state, (2) mindful meta-level is always conscious while the other meta-levels of cognition may occur implicitly, (3) mindfulness practiced intentionally leads to reduction of dissociations between meta and object levels of cognition, (4) specificity of the mindful meta-level is due to cooperation between its three components: meta-knowledge promoting a state of mindfulness, meta-experiences accompanying mindfulness and meta-skills initiating and maintaining the mindfulness state and (5) all components of mindful meta-level of cognition develop and change during regular practice. In the following paragraphs we shortly present the basic assumptions of this model and our detailed explanation of each of the hypotheses.

#### 4.1. Hypothesis 1: Metacognitive, multilevel processing of information is inherent to a mindfulness state

Metacognition is possible when at least two levels of information processing exist in hierarchical relation to each other. The higher (meta) level monitors and controls cognitive processing on the lower (object) level, never the other way around (Flavell, 1979; Nelson & Narens, 1994). However, the content of the object level is not clearly defined. It is probable that the lowest conscious level is related to the phenomenon called 'basic consciousness' (Schooler, 2002) and consists of *qualia* – basic qualities of experience like perceptions, feelings and non-reflective cognitions (an analog of sense impression or mental event in Buddhism psychology; see for further reading: Grabovac, Lau, & Willet, 2011). *Qualia* are related to the implicit neuronal-cognitive processes that are activated on a very basic level during contact with external or internal stimuli (Buck, 1993).

When a person starts monitoring their basic consciousness, a higher meta-level is activated. On the meta-level, *qualia* are re-represented in the context of related meta-knowledge and form meta-experiences that can trigger executive control (Schooler, 2002; Smallwood, McSpadden, & Schooler, 2008). What is the most interesting however, is the assumption that there is no limit to subsequent levels of meta-cognition (Nelson, 1996; Nelson & Narens, 1994). A person who monitors the way he/she controls the content of basic consciousness, does it from the higher meta-perspective, and then he/she either changes or prolongs the first-order meta-processes. So it is proper to speak about the multi-level structure of meta-cognition, where each of the levels is both meta-level for the previous and an object level for the next one.

In the proposed model we try to translate definition of mindfulness proposed by Kabat-Zinn (2003) into metacognitive terms and therefore we refer it to the highest level of meta-cognition. Thus mindful meta-level monitors and controls all the lower levels of cognition which in fact means that mindful awareness includes all consciously accessible processes and phenomena. For example, mindful meta-level may refer to basic consciousness when a person pays attention to their perceptions and body sensations. Some elements of mindfulness training, such as "the raisin exercise", breathing techniques or body scanning, emphasize the direct, mindful awareness of sensations coming from various sensory modalities. However mindfulness, as it refers to the top level of the hierarchical structure of cognition, may monitor and control not only basic consciousness but also other (lower) levels of meta-cognition. An example of a lower meta-level of cognition is the process of self-evaluation (Petty, Briñol, & Wegener, 2004). During self-evaluation, people try to compare their current state to some standard (e.g. "desired self" or "ought self"). The frequent result of such comparisons is an awareness of self-discrepancy that may initiate various self-regulation strategies (see Scholer & Higgins, 2010). There are various meta-cognitions that "tell" people what to do when they observe self-discrepancy. Some of them are maladaptive and are related to such mental diseases as depression or general anxiety disorders (see Wells, 2000) and some of them not. The person that evoked the state of mindfulness is able to consciously access not only self-evaluation processes ("I am aware that I accusing myself for making a mistake") but also can apply more adaptive coping strategies promoting acceptance stance to whatever experience emerge, including self-evaluative or critical thoughts ("I am also aware that I feel anxious and that I've started to ruminate"). Therefore, in mindfulness state, the influence of tacit processes on self-regulation is reduced (Holas & Jankowski, 2013), the claim supported with increasing number of research showing reduction of ruminative and worrying processes following mindfulness-based therapy (MBT) (e.g. Ramel, Goldin, Carmona, & McQuaid, 2004).

If we assume that human cognition may proceed on many levels in a hierarchical order, than the well-known paradox of infinite regress appears (Ryle, 2002). However, as Nelson and Narens (1994) suggest, the paradox can be easily overcome when we put metacognition in a pragmatic context and draw a parallel with the structure of a legal system: like a trial court can be put on an object level in comparison with an appellate court on the meta-level, so the latter can be consider on the object level compared with the higher, supreme court on the meta-level. We hypothesize that the number of possible metacognitive levels is related to the working memory capacity and effectiveness of the central executive.

#### 4.2. Hypothesis 2: Specificity of the mindful meta-level is due to the dynamic cooperation between its three components: meta-knowledge promoting a state of mindfulness, meta-experiences accompanying mindfulness and meta-skills initiating and maintaining the state of mindfulness

There is common agreement that metacognition is not a homogeneous phenomenon but consists of at least three components: metacognitive knowledge, metacognitive experiences and metacognitive skills (Efklides, 2008). Metacognitive knowledge includes information stored in the long-term memory which refers to various domains: the self, others, tasks, strategies but also relations between the self and others, the self and context, relations between various tasks and the ways task could/should be processed. More generally, metacognitive knowledge encompasses various models of information

processing and scripts for their use in particular contexts (see for example [Efklides & Vlachopoulos, 2012](#)). Metacognitive experiences are the second important component of metacognition. They emerge when the person is aware of the results of explicit as well as implicit cognitive processes that operate on an object level. Metacognitive experiences can take the form of some simple emotions connected to a task or more analytical and complex judgments ([Efklides, 2006](#)). The third element of metacognition – metacognitive skills, relates to executive functions operating in order to control processes on the lower level. Executive control includes both basic processes connected to attention and working memory (sustaining, switching, inhibiting, updating) ([Miyake et al., 2000](#); [Shimamura, 2000a](#)) and more complex mental activities related to problem solving (e.g. orienting or planning strategies) ([Efklides, 2009](#)). Metacognitive skills are an important part of the self-regulatory loop, and their main purpose is to lessen discrepancy between an actual and a desired state or to increase discrepancy between an actual and an undesired state ([Carver & Scheier, 2002](#)).

Metacognitive knowledge, experiences and skills influence dynamically each other. The relation between meta-knowledge and meta-experiences is mutual: feelings related to cognition or task proceeding may trigger some elements of knowledge; meta-knowledge in turn can influence the way information from the object level are to be interpreted and experienced. Both meta-experiences and meta-knowledge impact executive control: the former play a motivational role and the later provides a proper script for the control processes ([Efklides, 2008](#)). In the metacognitive model of mindfulness it is assumed that the specificity of the highest meta-level lies, first of all, in the content of meta-knowledge. Mindfulness-specific meta-knowledge influences the quality of metacognitive experiences, and the functioning of metacognitive skills. In the next paragraphs we will describe all of these three elements which form a mindful level of cognition in more details.

#### 4.2.1. Metacognitive knowledge promoting mindfulness (MMK)

The function of metacognition is dependent on the content of metacognitive knowledge. When the specific meta-knowledge which consisted of goals, beliefs and strategies changes, the way meta-level influences lower levels of cognition changes too ([Jost, Kruglanski, & Nelson, 1998](#)). Mindfulness is a state which seems different from the predominant mode of everyday functioning which is based on a self-regulative feedback loop. The main object of mindful practice is to establish deep contact with any kind of ongoing, current experience without trying to change it. In other words, a person being mindful gives up immediate activity aimed to control the size of the discrepancy between his/her current state and ideal standards (see [Teasdale, 1999b](#)). In this sense mindfulness state is based on the paradox: “do nothing” or “act without acting”. To reach such a goal, metacognitive knowledge has to consist of specific content which is different from metacognitive knowledge activating avoidance or approaching. The specific set of beliefs and strategies we have called metacognitive knowledge promoting mindfulness (MMK, [Holas & Jankowski, 2013](#)).

MMK includes beliefs with regard to the nature of the self and the relation between the self (observer) and the content of experience. The first, basic set of beliefs refers to the dual nature of the human experience of the self. As William [James \(1890/1950\)](#) noticed, the self has two aspects: passive (the self as the known – ‘Me’) and active (self as the knower – ‘I’). Mindfulness training enables a shift in the center of gravity within identity. Identification with the content of self-concept (which is expressed in such a belief as for example “I am an anxious man”) loosens and the process of continuous knowing becomes the base for identity (what is expressed in the belief, for example “I am one who observes anxiety within myself”). This shift has important consequences for the feeling of safety. Because ‘being a person of some kind’ (“anxious”, “joyful” or “ruminating”, etc.) refers to malleable and changeable aspects of the self-experience, it could not be the foundation for a stable identity. On the other hand, being “someone who observes” and “who is a mere witness” of the ongoing experience, encompasses both aspects of the self and facilitates sense of the continuity and stability across the entire variety of conscious content (see [Hayes, Strosahl, & Wilson, 1999](#), pp. 180–203). Important beliefs constituting MMK relate to the context-related, temporary, mutable and alterable nature of internal events (i.e. sensations, emotions, thoughts, memories and images). A mindful person no longer treats the content of experience as objective facts and as a direct read-out of reality. Instead, one believes that every experience is a transient event that appears in the mind, often automatically, and is determined both by a personal history and a current context. Observation of the ceaseless flow of various internal events allows one to see the restless nature of the human mind which continuously and automatically produces a broad spectrum of mental events. Although some of these events are partially controllable, an attempt to take full control over the work of the mind seems to be hopeless. Identifying with the bare awareness means however, that such hopelessness has a more creative rather than depressive character ([Hayes et al., 1999](#), pp. 87–114). The belief concerning mental events as temporary and non-threatening exempts a person from a need for experiential control and avoidance; at the same time it facilitates the idea that the content of experience is worth contemplating just as are manifestations of the continuous activity of the mind. In consequence, belief that observed events can be valuable in themselves – not only with reference to some positive or negative standard – makes room for the attitude of acceptance – the core element of mindfulness.

MMK also contains goals and intentions related to the beliefs listed above. The paradoxical goal of mindfulness practice – “to act without acting” – can be expressed in several other ways: (1) to keep a decentrated attitude toward contents of experience, (2) to be in contact with an ongoing experience and (3) to accept the experience whatever it is. During mindfulness training these generic aims are translated into more specific intentions that have an implicational structure. The typical frame of any implicational intention has a conditional feature and consists of two parts: “if. . .” and “then. . .” (“If something happens, then I will do something”) ([Gollwitzer, 1999](#); [Gollwitzer & Schaal, 1998](#)). In MMK many implicational intentions are stored that can be activated and provide a way to realize the basic goals of mindfulness. For example: “If I notice a thought, then I will treat it as merely an event of my mind”, “If I become aware of a feeling, then I can accept it and let it be”, etc.

Implicational intentions could be even more detailed and could refer to specific thoughts, emotions and other aspects of experience (e.g. thoughts about a past meeting or a feeling of fear). There are also implicational intentions redirecting attention when it is captured by irrelevant tasks, for example ruminating (e.g. “If I notice that my mind is wandering, then I will accept this fact and gently redirect my attention toward breathing”). The use of implicational intentions helps to regulate the executive functions in order to attain and maintain a state of mindfulness for the whole time of practice.

#### 4.2.2. *Meta-experiences related to mindfulness (MME)*

Metacognitive experiences could manifest themselves in several different forms: (1) as vague, transient and elusive meta-feelings (e.g. the “tip of the tongue” phenomenon; see Norman, Price, & Duff, 2010), (2) meta-emotions – secondary emotional reactions to emotions experienced earlier (see Mitmansgruber, Beck, Höfer, & Schüßler, 2009) or (3) self-related emotions that have as an object the self as a whole (see Tracy & Robins, 2007). They appear when the content of experience is monitored and interpreted on the basis of beliefs stored in meta-cognitive knowledge. For example, meta-angry experienced as an emotional reaction to fear may come up when the primary emotion (fear) is evaluated as undesirable and interfering.

The presented model posits that in a mindful state both an enhanced monitoring of the ongoing experience and operation of mindfulness specific metacognitive beliefs occur. In a similar vein, metacognitive experiences specific to mindfulness are postulated. Many phenomenological descriptions of mindfulness have listed several experiences specific to this phenomenon (e.g. Shapiro & Schwartz, 2000). Among the most often mentioned are metacognitive insight, warmth and compassion toward the self, the novelty and freshness of ongoing experiences, as well as interest and curiosity about all aspects of the conscious content.

Metacognitive insight (see Teasdale, 1999a) in contrast to other meta-experiences has a more cognitive than emotional character. It appears when a person not only thinks about the content of experience as events in the mind, but when he/she sees them as such – for example he/she directly experiences thoughts as thoughts. To better understand the difference between “knowing” and “experiencing” we can use a traditional instructive story quoted from Teasdale: “Unwais was asked ‘How do you feel?’. He replied ‘Like one who has risen in the morning and does not know whether he will be dead in the evening’. His questioner responded ‘But this is the situation of all men’. Unwais replied ‘Yes, but how many of them feel it?’” (Teasdale, 1999a, p. 146). The experience Unwais described in the story is a kind of “hot” and committed knowledge in contrast to a “cold” and objective knowledge that may have little effect on people’s functioning. The meta-cognitive insight differs from general, and context irrelevant, abstract knowledge and is described by different authors as experience of decentration (Fresco et al., 2007) or cognitive defusion (Herzberg et al., 2012). It may be reached when a person activates (e.g. during practice session) beliefs about the temporary, mutable and alterable nature of internal events in the context of a currently observed experience (see Teasdale, 1999b and Blackledge, 2007 for deepened explanations).

The other important meta-experiences connected to mindfulness are warmth and compassion towards the self. Self-warmth and self-compassion may appear in two forms: as a contextualized meta-emotion and as a generalized self-attitude. The former forms of compassionate care are simple situational reactions to emotions which are experienced on the object level during a state of mindfulness (Mitmansgruber et al., 2009). They emerge when the person mindfully observes some emotions like anxiety or anger and approaches them in the context of some beliefs and instructions included in MMK. These beliefs refer to (1) the attitude of acceptance and kindness toward current experiences (e.g. “Be kind and full of acceptance toward the self when you experience some difficult emotions”), (2) treating our own experiences as a part of the larger whole – common human experience (e.g. “I’m aware that the feeling of anxiety I’m experiencing now is the kind of feeling shared by everyone in their life”) and (3) a decentrated perspective of the ongoing experience (e.g. “I can observe as my feeling of anxiety rises and passes away on its own”) (see Neff, 2003a). The latter form of self-compassion resembles other generalized self-attitudes, as self-esteem for example. They all refer to the self as a whole, and people differ on the level of such generalized attitudes (Neff, 2003b; Neff & Vonk, 2009). Cultivating a state of mindfulness and situational self-compassion leads to an increase in the level of a generalized attitude of compassionate care toward the self. For example, Birnie, Speca, and Carlson (2010) have showed that after 8-week mindfulness training course (Mindfulness-Based Stress Reduction – MBSR) the level of dispositional self-compassion increased comparison to participants in the control group. Moreover, changes in self-compassion were predicted by changes in dispositional mindfulness (as measured before and after MBSR). Similar results were obtained by Shapiro, Astin, Bishop, and Cordova (2005) and Moore (2008), and several other studies have consistently revealed positive and significant relations between mindfulness and self-compassion (e.g. Baer, Lykins, & Peters, 2012; Hollis-Walker & Colosimo, 2011; van Dam, Sheppard, Forsyth, & Earleywine, 2011).

The feeling of novelty connected with perception of inner or outer events, as theorists and practitioners emphasize, is a meta-experience frequently met in a state of mindfulness. In the eastern traditions such meta-experience is the core component of the phenomenon called “the beginner’s mind” (see Suzuki, 2011). The meta-experience of novelty characteristic to mindfulness can be explained by effects connected with different levels of perceptual processing. “Being here and now” – a characteristic feature of mindfulness – puts us in touch with our current experience deeply, closely and directly, what decreases our psychological distance and activates local perceptual processing (Trope & Liberman, 2010). Local perceptual processing facilitates in turn detection of differences between consecutive events and reduces effects of habituation. Decreased activation of the abstract constructs inhibits expectations referring to perceived stimuli and increases the probability of experiencing incoming events as novel (Förster, Marguc, & Gillebaart, 2010). It is worth saying, that a meta-experience of novelty creates a clear crossroad for two different and independent perspectives of mindfulness: one considered in the clinical context (represented for example by Kabat-Zinn) and the other developed by Langer in

social-cognitive psychology context (Langer, 1989; Langer & Moldoveanu, 2000). Many of the experimental manipulations of mindfulness conducted in the spirit of Langer's theory implicitly or explicitly induce local perceptual processing and the search for differences (e.g. Djikic, Langer, & Stapleton, 2008).

During a state of mindfulness people often feel curious about their own experiences, so we treat such self-directed interest as another kind of meta-experience. Both researchers studying mindfulness and psychologists exploring curiosity associate these two phenomena (Bishop et al., 2004; Kashdan et al., 2009). Curiosity about one's own experience is one of the subscales of the Toronto Mindfulness Scale (Davis, Lau, & Cairns, 2009), and the results of several studies have shown increased outcomes in this factor after participating in a mindfulness exercise (e.g. Lau et al., 2006). A long tradition of research indicates novelty as one of the basic factors which influence people's curiosity about a particular event (Kashdan, 2009; Silvia, 2006). As Turner and Silvia (2006) emphasize, a feeling of curiosity is unrelated to the valence of the event. Curiosity increases whether or not the particular event is pleasant, if only it is perceived as novel. As we noticed in the previous paragraph, mindful awareness leads to meta-experience of novelty and this relationship gives a simple explanation of observed increase in curiosity during a state of mindfulness. The relationship between these two meta-experiences is probably enhanced by a belief about the value of each aspect of the experience, the attitude of acceptance and the feeling of safety present during mindfulness.

We also claim that some meta-experiences non-specific to mindfulness, that refer to "transitive, fleeting, and inarticulate content of conscious experiences" (i.e. 'fringe consciousness' experiences; Norman et al., 2010, p. 64), become more accessible and conscious for a mindful person. There is at least one study that supports this postulate. Brown and Ryan (2003, study 3) have observed that dispositional mindfulness moderates the relation between explicit and implicit measures of emotional states. People high in mindfulness revealed a closer relationship between both kinds of emotional measures compared to participants low in mindfulness. Authors interpreted these results as an example of a connection between mindfulness sensitivity and subtle experiences. Results from other studies conducted within the paradigm of subliminal priming support our claim indirectly. For example, in Radel, Sarrazin, Legrain, and Gobancé (2009), participants high in dispositional mindfulness showed to be immune to the subliminal priming of motivational orientation in an educational context. Similarly, Levesque and Brown (2007) have obtained results suggesting that mindfulness may reduce the impact of implicit autonomy orientation on explicit motivation. Because the reduction of the priming effects often happens in the situation when the person is aware of the subliminal manipulation (Bargh & Chartrand, 2000), the results of the aforementioned studies might suggest that mindful people become more aware of implicit processes these manipulations are based on.

#### 4.2.3. Metacognitive skills operating during mindfulness state

A kind of metacognitive skill that is engaged in a particular situation and the way the person uses it is dependent on two factors: the content of metacognitive knowledge activated in the moment and metacognitive experiences. The former defines the frames for executive functions, and the latter trigger cognitive processes and are the source of motivation (Efklides, 2008; Efklides, 2011). As we described above, mindfulness involves specific metacognitive beliefs, goals and intentions as well as specific metacognitive experiences. As a result, they both influence executive functions engaged to evoke and maintain a state of mindfulness.

From a cognitive perspective, mindfulness obviously seems to be related to attentional processes. To understand the specificity of this relationship, it would be useful to remind briefly the traditional classification of the attentional process. According to many influential theories, two main aspects of attention can be listed: its intensity and selectivity (Posner & Boies, 1971). Both of them can be subdivided into more specific domains: intensity into alertness and sustained attention, and selectivity into focused and divided attention (Sturm & Willmes, 2001). The main aspects of intensity and selectivity seem to be functionally related, and it is plausible to say that the efficiency of attentional selectiveness is partly conditioned by intensity of attention (Sturm, Klaus, & Orgass, 1997). Basing on these assumptions we hypothesize that meta-cognitions and meta-experiences specific to mindfulness influence both mentioned aspects of attention.

Increased alertness seems to be the most characteristic feature of attention in a state of mindfulness. The level of alertness is influenced by three factors: (1) changes depending on tonic arousal (i.e. general wakefulness related to circadian variation), (2) the presence of external cues increasing response readiness (phasic alertness) and (3) the self-initiated vigilance (intrinsic alertness) (Sturm & Willmes, 2001). We suggest that mindfulness is connected mainly with the last source of alertness. Intrinsic alertness is regulated endogenously (top-down) when a person intentionally increases their level using self-directed instructions. Such self-instructions are formulated explicitly (e.g. "Stay gently alert" or "I am going to pay attention to the present, ongoing experience") or implicitly (e.g. "If I notice that my mind is wandering I will focus my attention on my breathing") and are included in MMK. The other source of increased alertness can be associated with meta-experiences which are specific to mindfulness. Feelings of novelty and curiosity emerging during mindfulness may increase the level of intrinsic motivation (Brown & Ryan, 2003, study 4) and indirectly influence the level of attention intensity (phasic alertness; Sturm & Willmes, 2001). This process has a reciprocal nature because increased alertness facilitates orienting and detecting new stimuli (Anderson, Lau, Segal, & Bishop, 2007; Fernandez-Duque & Posner, 1997) that may result in the aforementioned meta-experiences. While the first, "top-down" source of increased alertness is in our opinion specific feature of mindful practice, the second, "bottom-up" source is more frequent in "natural", unintentional states of mindfulness, described in the context of the self-determination theory.

In everyday life short periods of increased alertness are not unusual, however during a state of mindfulness, intense attention is required over longer periods of time. Therefore the second cognitive process inherent in a state of mindfulness



is sustaining attention – the ability to stay vigilant over a prolonged period of time (Posner & Petersen, 1990; Sarter, Givens, & Bruno, 2001). As intrinsic alertness, this kind of meta-skill is related to the self-directed instructions and beliefs stored in MMK and is activated during mindfulness state (e.g. “Pay continuous attention to all kinds of incoming experiences” or “Every period of my practice time is equally important and deserves attention”). Due to this fact, that sustaining attention is a process requiring effort, the intrinsic motivation that comes from meta-experiences of curiosity might also be an important factor in improving the efficiency of the sustaining attention.

Relation between mindfulness and selective attention is not so intuitive as in the case of alertness and sustained attention. In mindfulness – otherwise than in a concentrated kind of meditation – there is no *a priori* defined object of attention one has to focus on. In other words, everything that is experienced ‘here and now’, has a chance to become the object of attention. Thus, the quality of a state of mindfulness is supposed to be dependent on the cooperation of two different attentional mechanisms: stimulus-driven orienting and endogenous control of attention (Posner, 1980). Our hypothesis is in accordance with Corbetta and Shulman’s (2002) view of the interaction between ventral (bottom-up) and dorsal (top-down) systems. As the authors stated, stimulus-driven orienting is activated by the detection of unattended, novel events of low-frequency, however it “is not equipped with high resolution spatial sensors” (Corbetta & Shulman, 2002, p. 211). Thus, in a state of mindfulness, the main function of a bottom-up orienting system is to provide a signal to take a break from the ongoing task and intentionally switch one’s attention to the relevant (i.e. new) event. As the stimulus-driven orienting is automatic and needs no intention to be activated, switching attention is supported by such instructions as “pay attention to the present experience” and “let the content of consciousness pass and make room for the incoming one”.

To support the attentional processes engaged in evoking and maintaining a state of mindfulness, several other meta-skills need to be temporarily involved. Inhibition and task-switching – the crucial executive functions (Miyake et al., 2000) – seem to be particularly important. While inhibition is essential to dampen competing metacognitions that activate processes like mind-wandering, ruminating or worrying, switching tasks allows for a return to the basic aim of mindfulness practice – paying receptive and open awareness to the present. For example, becoming aware that one’s mind is wandering, does not necessarily lead to suppressing the mind’s activity. Instead, due to such meta-awareness, one can inhibit engaging in further processing of irrelevant content and switch one’s attention to the ongoing events and experiences as they come up. Both inhibition and switching attention work together and determine the flexibility of cognitive processes involved in a state of mindfulness.

A review of the results from studies relating mindfulness to various aspects of attention and executive functions largely proves our claims about cognitive processes as they are involved in a state of mindfulness. Mindfulness training improves unfocused, sustained and particularly selective attention. Some executive functions, like inhibition measured mainly by the Stoop task also appeared to be better in people after mindfulness training or with higher levels of mindfulness disposition (for a review see Chiesa, Calati, & Serretti, 2011). However, the results are far from being clear and consistent. There are several studies in which there were observed no effects related to mindfulness (e.g. Anderson et al., 2007; Polak, 2009) or not all of the hypothesized effects (e.g. Tang et al., 2007). Therefore, in the context of the proposed model, we suggest distinguishing between studies in which the effects of mindfulness on cognitive processes are investigated from studies where cognitive processes involved in a state of mindfulness are the direct object of investigation. The former studies may deliver inconsistent results, mainly due to various moderators (e.g. the kind of intervention, the engagement of participants in meditation practices, the applied methods of measurement, etc.) that may have an influence on whether mindfulness training improves cognitive functioning or not (see Chiesa et al., 2011). Research of the second type – aimed at detecting processes activated during a state of mindfulness should verify or falsify our model. Unfortunately, we have found only few studies of this kind, all employing neuro-imaging methodology. In the first study (Ives-Deliperi, Solms, & Meintjes, 2011), 10 participants with at least four-years experience in mindfulness practice were told to perform 12 min of meditation (experimental condition) and 4 min of a random number generation task (control condition) during a functional scanning session. The only significant signal increase during mindfulness condition was observed in the right posterior cingulate cortex, what was interpreted by authors as an increased neuronal inhibition related to autobiographical memory recall (improving the focus on the present moment). However, other attentional processes and executive functions that can be involved in mindfulness were difficult to detect due to the control task that was also engaging similar processes. In the other study (Hölzel et al., 2007) meditators were contrasted with non-meditators during two within-group conditions: mindfulness of breath and an arithmetic task. Compared to the controls, meditators showed stronger activations in the anterior cingulate cortex (ACC) during the mindfulness exercise, which authors interpreted as an indicator of increased monitoring of conflict between relevant and irrelevant tasks and stimuli. Similar results have been obtained also by Brefczynski-Lewis et al. (2007) who have found that participants experienced in meditation had increased ACC activity during a task involving concentration on breathing. The most convincing support for our proposal is provided by Dickenson’s et al. recent investigation (Dickenson, Berkman, Arch, & Lieberman, 2013). The investigators were observing brain activity at participants accomplishing two different tasks: mindfulness meditation (focus on breathing) and mind-wandering. Comparison of fMRI effects between groups showed several interesting results: at the mindfulness condition relative to controls there was observed increased activity of (1) the right temporal-parietal junction, (2) the dorsal portion of the ACC, and (3) the insula. The authors suggest that increased activity in these regions is related to several cognitive processes involved during mindfulness state, respectively: (1) re-shifting attention back to a target following distractions, (2) resolving the conflict between attention to breath and to distractions, and (3) awareness of physical sensations (Dickenson et al., 2013).

'On-line' investigations of cognitive processes ongoing during a state of mindfulness are still in an early stage of development. Therefore to verify the validity of our conception we can formulate some model-based predictions and check if available empirical findings support them. The first prediction seems intuitive and refers to individual differences: the higher dispositional level of executive functions, the easier it is for the person to evoke and prolong the state of mindfulness. Some studies suggest and indirectly support such a claim (Kane et al., 2007; Shapiro, Brown, Thoresen, & Plante, 2011). We have also recently conducted research that indicates significant correlations between the frequency of states of mindfulness in everyday life (Brown & Ryan, 2003) and self-reported attentional control (Derryberry & Reed, 2002):  $r = 0.23$ ,  $p < 0.001$ ,  $N = 207$  (Jankowski, 2013; see also Brown, Goodman, & Inzlicht, 2013).

The second prediction is that practicing mindfulness before performing some cognitive task may have a positive influence on its outcome due to a previous inhibition of the irrelevant mental processes unrelated to the task or related to test anxiety (see Eysenck, Derakshan, Santos, & Calvo, 2007). Mind-wandering, especially containing worry and rumination engage executive processes and consume cognitive resources (see Smallwood & Schooler, 2006; Watkins & Brown, 2002). When they are reduced, the resources are released and can be used in relevant tasks. This effect should be particularly observed under stress conditions or in the case of persons with a high chronic level of mental absorption (Eysenck et al., 2007). Results of several studies suggest reduced mind-wandering related to mindfulness. In two of them (Brewer et al., 2011; Taylor et al., 2013), participants with meditational experience (relative to novices), showed decreased activity of the default mode network related to spontaneous mind-wandering (Christoff, Gordon, Smallwood, Smith, & Schooler, 2009). In two other studies Mrazek with colleagues found significant relation between dispositional mindfulness and four different measures of mind-wandering (Mrazek, Smallwood, & Schooler, 2012). Results showed that reduced mind-wandering mediated relation between two-weeks mindfulness training and improvements in cognitive performance. The preliminary results of our recent study are also congruent with this hypothesis: people under stressful conditions (watching a short aversive film) improved their performance of task-switching after having induction of mindfulness state when comparing with people who had induction of worrying (the results were also higher, although not significantly, from a control group instructed to rest; Jankowski & Holas, 2013).

The third expectation is that systematic mindfulness practice should improve the general level of cognitive functioning. In this way mindfulness practice may be treated as an attentional training similar to others, developed for example by Wells (2009) or Sturm, Klaus and Orgass (1997). Although much more work should be done to draw a clear conclusion, the review made by Chiesa et al. (2011) shows that mindfulness indeed increases the level of executive function.

#### 4.3. Hypothesis 3: Mindful meta-level is always conscious while the other meta-levels of cognition can occur implicitly

The strong relation between metacognition and consciousness is obvious. Monitoring and related meta-experiences are usually treated as explicit processes and states, meta-knowledge consists of elements that could be deliberately reported and meta-skills refer to voluntary actions based on executive functions. However, contemporary literature on automatic processes compels us to consider the implicit nature of metacognition as well (Koriat & Levy-Sadot, 2000). The first sources of evidence supporting this assumption about the dual character of metacognition are some studies on metacognitive feelings, particularly on the phenomenon of the feeling of knowing (often related to the 'tip of the tongue' state). Metacognitive feelings are usually considered to be the result of implicit monitoring and judging processes that have a metacognitive character (Koriat, 2007). Some authors, like Spehn and Reder (2000) claim that people can be unconscious not only of the monitoring processes but also of the metacognitive feelings related to them. These assumptions are consistent with Wegner's theory of ironic processes, which states that the implicit monitoring of mental content is potentially disturbing for reaching a desired goal (Wegner, 1994; Wenzlaff & Wegner, 2000). The second source of evidence comes from the Bargh and his colleagues' work on a role of automaticity in human functioning. The results of studies conducted by them suggest that control processes – traditionally regarded as conscious – often run unconsciously (Bargh & Chartrand, 1999). Particularly, in the area of motivation – studies show that goal activation proceeds without conscious intention and people often behave according to the goals they are not aware (Bargh, 2003; Bargh & Morsella, 2010). This empirical evidence suggests that metacognition, which includes monitoring and control may be at least partially unconscious. However, in our view, the higher the level of metacognition, the more conscious processes are involved.

Important implication of putting mindfulness on the highest level of meta-cognition is that mindful state is always conscious. It means that person – when mindful – is aware of being aware, and is able to report not only a content of current consciousness but also the metacognitive knowledge and metacognitive experiences related to mindfulness. Thus, practicing mindfulness means cultivating conscious attitude toward all kinds of experiences and currently activated mental processes. This postulate put mindfulness directly in the core of the debate on the meaning of consciousness in human life. While some authors treat consciousness as an epiphenomenon that has no functional meaning in behavior regulation (e.g. Wegner, 2003), others approve consciousness as a factor that change quality of self-regulated behavior (e.g. Baumeister, Mele, & Vohs, 2010). Although we are far from neglecting research that indicates an enormous impact of automaticity on human behavior, nevertheless we state that being mindful is related to many effects traditionally link to consciousness. Three of them are particularly important: an integrative role assigned to consciousness, an ability to inhibit and override irrelevant automatic responses and a feeling of freedom accompanied by consciousness (Baumeister, Masicampo, & Vohs, 2011). An integrative function of mindfulness is not only theoretically postulated (Brown & Holt, 2011; Hodgins & Knee, 2002; Siegel, 2007) but it has also gaining some empirical support. For example Jankowski (2008) has found that a disposition

to be mindful in everyday life is significantly correlated to several indexes of self-concept integrity. Several studies, especially from the area of addiction therapy, have shown that being mindful can improve self-regulation and constructive coping with impulses and craving (e.g. [Westbrook et al., 2013](#)). Moreover, states of mindfulness as they occur in everyday life are often accompanied by a feeling of personal choice and autonomy which means acting in concordance with values and interest ([Brown & Ryan, 2003](#), study 4; [Levesque & Brown, 2007](#)). Of course, these effects do not answer the questions about how free will plays into it, but prove the hypothesis that consciousness has a real impact on human functioning and increases its flexibility.

#### 4.4. Hypothesis 4: Intentionally practiced mindfulness leads to decreases in dissociations between meta and object levels

The important assumption about metacognition states is that at least two kinds of dissociations between object and meta-level can occur. These dissociations refer to temporal and translation problems bound up with metacognition ([Schooler, 2002](#); [Winkielman & Schooler, 2011](#)). In this paragraph we will briefly discuss both kinds of dissociations and we will substantiate the hypothesis that mindfulness decreases their occurrence (see also [Holas & Jankowski, 2013](#)).

The first kind of dissociation means temporal lack of meta-awareness relevant to ongoing experience. It can partly reveal the more basic fact of limited resources that have to be shared between different levels of information processing ([Cowan, 2001](#)). It means that attentional processes can be allocated either on the object level or meta-level at a particular moment. In fact, states without conscious metacognition seem to occur often. Probably the best example is the phenomenon of daydreaming or mind-wandering. Schooler and his colleagues showed that people often catch themselves mind-wandering during some target task. Also, in experiments applying the probe paradigm disclosure, participants often were mind-wandering during a task and they were completely unaware of this fact (for review see [Smallwood & Schooler, 2006](#)). There are many other examples in which temporal dissociation between object and meta-level can be observed (e.g. nocturnal cognition, automaticity, hypnosis, flow states, etc.; [Schooler, 2002](#)).

The first part of the hypothesis claims that mindfulness reduces temporal dissociation between object and meta-level. There are theoretical arguments as well as empirical results that support this postulate. Meta-awareness observed in everyday life is regarded as a rather rare phenomenon and a chance for its occurrence increases when (1) one experiences an internal state with clarity and intensity, (2) an experience is strengthened by the focus of attention on it, (3) external (e.g. a probe or a question from another person) or internal (e.g. too big of a discrepancy between the current and desired state) stimuli come out ([Schooler, 2002](#)). Several studies have shown that mindfulness is positively related to each of the mentioned factors. For example, [Coffey, Hartman, and Fredrickson \(2010\)](#) have revealed results confirming a positive relationship between mindfulness and clarity of emotional experience. Similarly, in a study by [Jensen, Vangkilde, Frokjaer, and Hasselbalch \(2012\)](#), participants after mindfulness training have shown an improved threshold for conscious visual perception. These findings are in line with data suggesting an increased alertness for people in a state of mindfulness ([Anderson et al., 2007](#); [Jha, Krompinger, & Baime, 2007](#)). Intensity of experiences may be additionally amplified by a top-down regulation of attention that is present during a state of mindfulness. In other words, the hypothesis about reduction in temporal dissociation between object and meta-levels of cognition stems directly from the very nature of a state of mindfulness. This claim has some implications that can be verified empirically. If this hypothesis is true, people high in mindfulness should engage in mind-wandering less frequently – they should be focused more on their current experiences than daydream. Several studies took on this problem and their results seem to prove the hypothesis. [Mrazek et al. \(2012\)](#) have shown that a disposition to being mindful in everyday life is negatively related to both self-reported and indirect measures of mind-wandering. They have also observed that the brief mindfulness induction reduces behavioral indexes of mind-wandering ([Mrazek et al., 2012](#)) as well as that a two-week mindfulness training course decreases mind-wandering and both improve cognitive performance ([Mrazek, Franklin, Phillips, Baird, & Schooler, 2013](#)).

The second kind of dissociation between object and meta-level of cognition refers to a translational problem. Monitoring (gathering information from an object level) and activated metacognitive knowledge allow one to re-represent elements of experience and to build its model. The recoding process can be interfered with noise and it creates a risk of lack and/or distortion of the data gained from the object level. As a result, the translation dissociation can occur between object and meta-level ([Schooler, 2002](#)). The likelihood of it is increased by one of three conditions: (1) when inherently nonverbal experiences are verbally reflected (e.g. verbal overshadowing phenomenon), (2) when there is a motivation to misrepresent the experience (e.g. defensive mechanisms) and (3) when activated meta-knowledge is inconsistent with an actual experience and leads to its false interpretation (e.g. stereotyping) ([Winkielman & Schooler, 2008, 2011](#)). The translation dissociation may result not only in memory problems (e.g. [Dodson, Johnson, & Schooler, 1997](#)) but also in maladaptive self-regulation (for example when an experienced craving for alcohol is mistakenly recognized as anger, than attributed to the wrong environmental causes and ineffectively coped with, leading to alcohol relapse).

We suggest that the recoding process in a state of mindfulness reduces the information distortion from the object level. This hypothesis springs from several arguments and empirical data that refer to the relationship between mindfulness and factors increasing the risk of this kind of dissociation.

Firstly, although according to our knowledge there are no studies directly relating mindfulness to verbal overshadowing, it is very probable that mindfulness reduces the latter phenomenon. This claim comes out of the fact that mindfulness is more experiential and perceptual than analytical and verbal in nature. It means that people engaged in mindfulness just try to observe whatever becomes of the content of experience, inhibiting at the same time verbal elaboration and an

evaluation of the experience. Several empirical findings can indirectly support a reverse connection between mindfulness and verbal overshadowing. For example, there are consistent results indicating that mindfulness is more strongly related to the experiential awareness of an internal state than to analytical self-reflection (Brown & Ryan, 2003; Farb et al., 2007), especially if the self-consciousness is motivated by negative emotions, and takes the form of rumination or worrying (Paul, Stanton, Greeson, Smoski, & Wang, 2013; Sugiura, 2004). The less frequency of self-talk, the less risk of verbal overshadowing effects in everyday life. However, it is worth noting, that the reduction of internal verbal activity does not necessarily mean the inhibition of information processing. In fact, people – when they process information on the mindful meta-level – may still preserve the ability to make useful cognitive distinctions without the necessity of engagement in verbal self-talking that can be the source of noise (see Barner, Li, & Snedeker, 2010 on the distinction between linguistic and non-linguistic cognition).

Secondly, mindfulness is related with less motivation to misrepresent experience. The growing literature on the quiet ego phenomenon has shown that there are several important factors that can reduce self-defensiveness, and mindfulness is one of the most important among them (Wayment & Bauer, 2008). There are several studies that prove this claim. For example, Niemic et al. (2010) have investigated mindfulness in the context of terror management theory. They conducted seven experiments that have consistently shown fewer defense mechanisms in people high in mindfulness disposition. In another study, Creswell, Eisenberger, and Lieberman (2005) have found that high-mindful people react to social exclusion with significantly less negative affect than low-mindful participants, and this effect is partly due to a reduced evaluative reactivity to social threats on a neuronal level. In line with this study, Jankowski (2007) has shown that mindful people react to negative feedback in a less negative way (both emotionally and cognitively) and moreover, in contrast to less mindful people, the valence of the feedback (positive vs. negative) has no impact on their implicit attitude towards the source of the feedback. Mindfulness is also related with greater authenticity, and what is especially important here – with an unbiased processing of self-relevant information (Kernis & Goldman, 2006). All these results strongly suggest that mindfulness facilitates an open, non-defensive attitude to ongoing experience.

We have also found no published study on the relation between mindfulness and a tendency to stereotype. However there are at least two mechanisms connected to mindfulness that in our opinion can reduce stereotyping. The first of them refers to active categorization and the ability to derive novel distinctions described by Langer (1989), Langer and Moldoveanu (2000). Referring to a seminal study by Bargh, Chen, and Burrows (1996), Djikic et al. (2008) have shown that people that were engaged in the active categorization of a set of photographs representing the elderly were not influenced by these primes, contrary to people which were not engaged in active categorization. Because mindfulness and active categorization are positively related (Brown & Ryan, 2003), it is probable that the former may trigger drawing novel distinctions and thereby inhibit a tendency to stereotype. The second mechanism refers to the phenomenon called cognitive fusion. Considered in the context of Relational Frame Theory (Hayes, Barnes-Holmes, & Roche, 2001), cognitive fusion means “the tendency to buy into the literal meaning of thoughts, feelings, and bodily sensations” (Herzberg et al., 2012) which means the lack of an ability to recognize the difference between the content of thoughts and reality itself. Cognitive fusion may be an important factor that enhances the distortion of information because it means that an experience is perceived not as novel and context dependent, but in the light of learned schema and stereotypes. The relationship between mindfulness and cognitive defusion – the phenomenon opposite to the just described cognitive fusion – is significant as the recent study by Herzberg et al. (2012) has revealed. It, once again, suggests a reduced susceptibility to stereotyping connected with mindfulness.

The arguments presented above, in our opinion, justify a hypothesis that mindfulness reduces not only temporal but also transactional dissociation between object and meta-level of cognition.

#### 4.5. Hypothesis 5: Components of mindful meta-level of cognition develop and change during continuous practice

The primary assumption of Kabat-Zinn's approach to mindfulness originating in the Buddhist tradition is that being mindful is not a usual state occurring in everyday life. As such, it requires practice to develop and become routine. The presented model includes the developmental feature of mindfulness. We think, that during practice, as the content of metacognitive knowledge promoting mindfulness evolves, the quality of metacognitive experiences changes as well as the activity of executive functions. To reach a stable and clear state of mindfulness, which is identified as “bare attention”, some transitory stages of practice are needed.

Usually, the mindfulness training begins with simple instructions regarding focusing attention on specific kinds of experience, for example sensations connected with breath (Kabat-Zinn, 1990). The instructions are encoded in the memory of the practitioner forming the foundations for MMK. As the training continues, the new beliefs regarding for example “self as the witness”, are introduced and can be confronted with experience, which may result in the development of MME, like meta-cognitive insight. Both components of the mindful meta-level interact and gradually enhance each other. For example, the simply accepted belief that thoughts are transitory events in the mind, in combination with attention focused on the current stream of thoughts makes occurrence of the metacognitive insight more probable. The very experience of thoughts as events in the observer's mind makes the relevant belief, in turn, more reliable.

Over the deepening of mindfulness practice, according to traditional Buddhist texts, further disidentification with any lasting and separate entity that could be called ‘self’ is taking place (non-self, Thera, 2010). Non-self (anatta), impermanence (anicca) of any phenomena and suffering (Dukha), stemming from habitual reaction with aversion or attachment to the

sensate creates three fundamental attributes of human existence in Buddhism psychology (Olendzky, 2013 p. 310). Traditionally, the insight into these three characteristics is gained through mindfulness meditation practice (vipassana or open monitoring) in contrary to concentration practice (samata or focused attention) in which the aim of practice is simply to keep attention focused on the object of meditation (Grabovac et al., 2011). Both forms of meditation practice differ in regards to neural basis and executive functions operating (for the discussion of differences between these two forms of meditation see Holas & Jankowski, 2013; Lutz, Slagter, Dunne, & Davidson, 2008). We think that both forms of meditation create at least some different MMK (i.e. “nothing is permanent” in open-monitoring practice) and that along with the advancement of meditative practice new MMK are formed that extend and substitute former meta-knowledge. As we have emphasized before, the hierarchical and interrelated meta-cognitive view on mindfulness enables to comprehend the dynamic and non-linear nature of its new elements creation (new specific mindfulness related meta-knowledge, meta-experiences and meta-skills) that might dramatically change the practitioner’s view on self and life. What seems important, the building blocks of mindfulness related meta-knowledge cannot stem from conscious reflection, but rather come from direct, non-conceptual understanding (insight), which might be only enhanced via reflection during enquiry following meditative practice in some traditional and contemporary mindfulness training.

In Buddhist literature, several metaphors have been used to describe advancement in meditation. For example: “If one wants to see the murals on the wall of a dark cave, one must use a lamp that is both well-shielded and bright. If the lamp is not well-shielded, then its flame will flicker or even become extinguished, and if the flame is not sufficiently bright (intense), the attempt to see the murals would fail” (Tsongkhapa, 2002). This metaphor describes the qualities that are necessary for the development of mindfulness: the stability which is trained in focused attention meditation, and phenomenal or the subjective intensity of experience which is more characteristic of open-monitoring practices. The more advanced the practitioner, the more both the qualities are balanced. However, in the case of a novice, they may work somewhat at odds with each other, for example when the stability of a meditative state is achieved out of intensity. Concentrated meditation is often used as a method which allows one to maintain a basic level of concentration which is required for more advanced forms of mindfulness practice, namely open-monitoring with meta-awareness playing a critical role.

From the perspective of the present meta-cognitive model of mindfulness, it is proposed that novice practitioners through practices based on focused attention develop a greater ability to concentrate on *qualia*, with a concomitant decrease in susceptibility of being perturbed out of a concentrated state. Over the process of deepening one’s practice, the increase of intensity in attention emerges along with its stability. That is, the higher meta-levels are activated easier and the faculty of meta-awareness increases. As it progresses, the subject-object relation starts to play an important part in the meditative experience. In this mindful state, various phenomena occur, like a reduced number of dissociations between basic awareness and meta-awareness, increased clarity of basic awareness, and a reduction of the influence of tacit evaluative processes activating a higher-order cognitive elaboration (such as rumination).

Traditional Buddhist literature typically describes nine ascending stages of meditation (Tsongkhapa, 2002). As we pointed out earlier, similarly we think there are many levels of meta-cognition. The more advanced practitioner the higher the level of meta-cognition (meta-awareness), novel meta-knowledge and more intensive and novel meta-experiences. After many years of mindfulness training, particularly open monitoring (OM) types of practice, one becomes able to avoid paying attention to the particularities of objects and of himself (subject). An experienced meditator, in contrast to a novice, is less entangled in the accidental features of experience, such as the shape of objects or his emotional state. Instead one becomes aware of the fact of ‘knowing’ itself. Mindfulness must occur with an object, but the possibility of objects being presented in experience is itself rooted in a more fundamental reflexivity. The person who has achieved this higher level of meditation starts to become aware of Clarity (fundamental Awareness) – the fundamental form of reflexivity that makes all types of cognition possible and which form the basic structure of consciousness itself (Lutz et al., 2008). It must be stressed, however, that this state is a very advanced one, and therefore available only for the more dedicated advanced practitioner.

## 5. Implications of the meta-cognitive model for integration of various mindfulness conceptualizations

Current debate on mindfulness regards the question of how it should be conceptualized, operationalized and investigated on. While the problem is important, there has been no common agreement up to now. Some authors, like Grossman (2011, 2013), argued that understanding and operationalizing of mindfulness present in the western psychology (e.g. as a part of the self-determination theory) often deteriorate its original meaning cultivated in the Buddhist tradition and continued in clinical approach originated by Jon Kabat-Zinn’s Mindfulness-Based Stress Reduction Program (MBSR). Clinical model assumes that the mindful state is intentional, not everyday mode of awareness, which encompasses some important qualities such as kindness, patience and compassion. Proponents of other approaches, who pursue investigations on mindfulness in the wider context, do not assume the necessity of meditation practice for mindfulness development (e.g. Brown, Ryan, Loverich, Biegel, & West, 2011). Instead, they proposed the simplified way of understanding mindfulness as a natural state of open and receptive awareness, that might be experienced by untrained individuals. Clearly, those two approaches differ. We think however, that they are not ‘near-enemies’ (superficially close but actually completely different phenomena) as Grossman proposed, but we believe that both approaches can be integrated within the meta-cognitive model of mindfulness.

We begin with an assumption, that both clinical and SDT conceptualizations of mindfulness can be explained in terms of metacognitive processes. As we postulated earlier, the structure of metacognition has multilevel character: there are many

possible meta-levels – each of them becomes the ‘object’ level for the level which is higher in hierarchy. We think that the main difference between clinical and SDT understandings of mindfulness lies in the number of involved meta-levels; we mean that SDT approach is lacking of the highest meta-level of cognition. Being aware of the present moment (e.g. experiencing emotions or perceiving elements of participated environment) does not necessarily mean being aware of such awareness (which is possible on the highest meta-level). In another words, while one can be mindful of various inner or outer events (one ‘knows’ what one experiences and can accept it), one may be not aware of having such mind-set. While the ‘lower’ level of mindfulness can occur without any conscious intention, the ‘higher’ level needs to be induced deliberately and for people without any meditational experience it is hardly possible.

We propose that mindfulness as it is understood in the SDT approach, can be put on the same level of cognition as other phenomena, for example mind-wandering, ruminating or worrying. As we argued earlier, although they all can be considered as metacognitive (e.g. Wells, 2000, 2009), they can also occur automatically, without conscious intention and without conscious access to scripts and meta-experiences that are related to them. Therefore, mindful mind-set, as it is considered in SDT, may be a result of an implicit process which in turn may be conditioned by various factors, e.g. personality traits (Brown & Ryan, 2003; Feltman, Robinson, & Ode, 2009), basic needs satisfaction (Brown & Ryan, 2003; Hodgins & Knee, 2002), quality of parent–child relationship (Jankowski, 2010), attachment style (Shaver, Lavy, Saron, & Mikulincer, 2007), attentional control (Brown et al., 2013; Caldwell & Shaver, 2013) and others. Such factors shape content of meta-cognitive knowledge, metacognitive experiences and metacognitive skills on the lower meta-level and thereby facilitate various type of mind-sets, including mindfulness, meant here as open, receptive awareness. We think, however, that full comprehension of mindfulness requires an additional prerequisite: an intention – a conscious commitment to be aware of whatever is to be aware in the present moment. This conscious act makes difference and it creates fundamentals for the highest level of meta-cognition.

## 6. Summary

With a growing interest in clinical approaches based on mindfulness, a concomitant development in the conceptual and operational aspects of mindfulness is needed. The intent of this article was to reconstruct the concept of mindfulness within a meta-cognitive framework. We believe that the presented meta-cognitive model along with its implications might provide an insight into the mechanisms and processes involved in mindfulness. We hope that it will also allow to find common ground between different approaches to mindfulness. Thus, it aspires to response to a challenge formulated by Brown et al. (2007) to develop empirically grounded and theoretical model integrating current knowledge about mindfulness. Of course each model, including ours, is only a simplification of the reality. Therefore further basic research and theoretical inquires are needed to investigate fundamental questions regarding this exciting phenomenon, for example its role in positive affect and mechanisms of action in various mental disorders.

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