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How does it feel to lack a sense of boundaries? A case study of a long-term mindfulness meditator [☆]

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ABSTRACT

This paper discusses the phenomenological nature of the sense of boundaries (SB), based on the case of S, who has practiced mindfulness in the Satipathana and Theravada Vipassana traditions for about 40 years and accumulated around 20,000 h of meditative practice. S's unique abilities enable him to describe his inner lived experience with great precision and clarity. S was asked to shift between three different stages: (a) the default state, (b) the dissolving of the SB, and (c) the disappearance of the SB. Based on his descriptions, we identified seven categories (with some overlap) that alter during the shifts between these stages, including the senses of: (1) internal versus external, (2) time, (3) location, (4) self, (5) agency (control), (6) ownership, and (7) center (first-person-egocentric-bodily perspective). Two other categories, the touching/touched structure and one's bodily feelings, do not fade away completely even when the sense-of-boundaries disappears.

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1. Introduction

A recent study examined the sense of boundaries (SB) among a unique group of twenty seven long-term (>10,000 h) contemplative practitioners of the Buddhist Theravadan tradition (Ataria, 2014a). Based on the phenomenological accounts provided by the participants in this study, it argues that (a) the SB is not equivalent to the boundaries of the physical-body (body as object) and (b) that the SB should be defined in terms of flexibility, rather than in terms of location.

In essence, to argue that the SB is flexible is to define it as a dynamic experience that exists on a wide spectrum ranging from rigid and closed to flexible and open (for a wider discussion see Blaser, 2014; Blaser, Zlabinger, Hautzinger, & Hinterberger, 2014). Yet, much empirical work is required in order to describe the experience of a greater vs. a lesser, open vs. closed, flexible vs. rigid SB. This paper takes a step in that direction by presenting an in-depth phenomenological account.

A recent theoretical study focused on the involuntary shift from the regular daily experience to a sense of rigid and closed SB during trauma (Ataria, 2014b, 2015a). In contrast, this paper focuses on the other end of the same continuum: the shift between the (so-called) regular state and a voluntary lack of, or flexible and open, SB. In so doing, it seeks to tackle the

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question of *how it feels, phenomenologically, to exist without an SB* or, in other words, to define the *nature of the SB experience when the SB is completely flexible*. As such, it does not deal with physical boundaries (see Ataria, 2014a) but rather with the sense of boundaries (SB) or, more precisely, its absence.

Tackling this question requires the study of an individual who is able (a) to remain stable in a conscious state lacking an SB, (b) to move of her own volition between the *different stages* (between the “normal, default state” and the lack of an SB experience) and (c) to describe this experience in real time and in detail. However, given that the experience of a lack of SB is very difficult to produce, let alone maintain or describe in detail, these requirements present a serious methodological challenge.

S, who has accumulated approximately 20,000 h of Vipassana meditation practice, met all these requirements (for more details see Section 2, below). S's unique ability to alter and maintain a lack of SB at will, as well as his capability of describing this experience in detail, enabled us to shed light on the subtle experience of a lack of SB from a phenomenological perspective. Yet despite S's abilities, it is important to remember that this paper is based on a case study of one individual. In accordance, both the results and the discussion must be treated with requisite caution. Having said that, we are nevertheless convinced that in presenting a very rich description of SB, this paper is not only innovative but also advances the much wider project of in depth phenomenological study which, in turn, may serve as the basis for a wider and richer theory of the human experience. In this sense, the paper has significant methodological and research ramifications.

While this paper concentrates only on the phenomenological aspects of the experience, it is part of a wider neuro-phenomenological study which seeks to generate a fruitful dialogue between first and third person data (Varela, 1996). Thus magnetoencephalogram (MEG) recordings of S's brain activity were made during the experiences studied (this data will be published in a separate paper). This affected not only the experimental setup (see Section 2) but also the study's goal of analyzing neural information.

2. Methods

2.1. The participant

2.1.1. Introspective abilities

S, a male aged 64, is a long-term practitioner of mindfulness according to the Satipathana and Theravada Vipassana traditions (he has practiced for about 40 years, and accumulated over 20,000 h). S was chosen for the present study for two reasons: (1) his proven skill in both producing – on demand – unique states of consciousness and (2) providing detailed and articulate descriptions of his experiences in real time (see Sections 2.1.2 and 2.3). He was able to accomplish these feats under experimental conditions (see Sections 2.1.3, 2.1.4, 2.1.5), which introduce a set of constraints and pressures including limitations on time, body position, movement (since the subject is connected to machines), and privacy (being constantly observed by a number of people). These constraints can make it difficult even for experienced practitioners to perform as they would in normal conditions.

2.1.2. The choice of S – Phenomenological considerations

S is the most senior practitioner among a group of twenty seven long-term practitioners of Vipassana meditation interviewed in a previous phenomenological study (Ataria, 2014a). In addition, a total of five interviews conducted with S yielded descriptions of his inner lived experience that were exceptionally rich, articulate, and (relatively) accurate compared to those of the other participants. Since it is recognized that “well-trained subjects can provide accurate and useful introspective reports” (Fox, Zakarauskas, Dixon, Ellamil, & Thompson, 2012), and S is undoubtedly very-well trained in giving non-judgmental reports, this is not surprising. Indeed, S possesses a number of unique qualities that make him an outstanding interviewee, including his abilities to recreate the same experience repeatedly, of his own volition and describe in rich detail the bodily experience as it occurs.

S has trained in the Buddhist traditions over a long period. It is well established that these traditions “have accumulated a vast amount of expertise in training the mind and cultivating its ability for reflection and introspection” (Varela & Shear, 1999, p. 8) and with this in mind scholars have argued that “it would be a great mistake of western chauvinism to deny such observations as data and their potential validity” (Varela & Shear, 1999, p. 8). Likewise, as Depraz, Varela, and Vermersch (2003) established, well-trained meditators have the ability to introspect upon their own experience while it is happening, with minimal interference, and are thus able to provide a more objective assessment of their own experience and greater introspective accuracy compared to other subjects (Lutz, Slagter, Dunne, & Davidson, 2008). Others have supported this notion: “Expert meditators showed significantly *better introspective accuracy than novices*; overall meditation experience also significantly predicted individual introspective accuracy. These results suggest that long-term meditators provide *more accurate* introspective reports than novices” (Fox et al., 2012, our emphasis).

In sum, even though introspection, in its most naïve form, can be considered at least partly unreliable, expertise in it can be acquired (Petitmengin, Remillieux, Cahour, & Carter-Thomas, 2013). In particular, the practice of mindfulness allows the subject to become an expert in the introspective technique (Depraz et al., 2003; Fox et al., 2012).

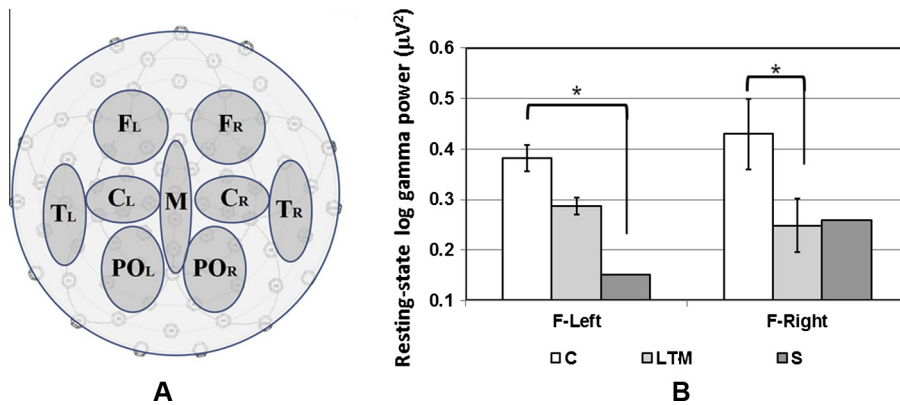


Fig. 1. A. Topographic presentation of the regions of interest, including right and left frontal (F-R and F-L, respectively); B. Log gamma power ($M \pm SEM$), for the frontal left and right regions of interest during the resting-state condition. C – control group; S – participant in our case study; LTM – long-term meditation group, including S; * $p < .05$, uncorrected.

2.1.3. The choice of S – Physiological considerations

In addition to his involvement in the phenomenological interviews, over the past 10 years S has collaborated with neuroscientists in cognitive and neuro-imaging studies. These include, chronologically, cognitive tasks (Berkovich-Ohana, Glicksohn, & Goldstein, 2011), EEG studies (Berkovich-Ohana, Glicksohn, & Goldstein, 2012; Berkovich-Ohana, Dor-Ziderman, Glicksohn, & Goldstein, 2013), MEG studies (Berkovich-Ohana, Dor-Ziderman, Glicksohn, & Goldstein, 2013; Dor-Ziderman, Berkovich-Ohana, Glicksohn, & Goldstein, 2013), as well as fMRI and MRI studies. These previous collaborations established that: (1) S's baseline, resting-state neural activity was significantly different than those of control participants; and (2) S was able, volitionally, to produce subtle states of consciousness under experimental conditions, showing marked alterations in neural activity compared to his peers. These two points are discussed in further detail below.

2.1.4. Alterations in baseline neural activity

When not engaged in an external task that demands attention, one's brain spontaneously engages in resting-state activity. This spontaneous resting-state condition has been related to the activation of a set of cortical regions which are designated as the 'Default Mode Network' (DMN) (Raichle et al., 2001). The DMN – which includes the medial prefrontal cortex, the medial temporal lobe, posterior lateral cortices, anterior and posterior cingulate cortex, and precuneus – was shown to be active when individuals are engaged in internal processing, including mind-wandering, autobiographic self-related processing, memorizing the past and planning the future, and at rest when attention shifts toward external stimuli (task-on conditions) (Buckner, Andrews-Hanna, & Schacter, 2008). The idea that various types of meditation training, including Vipassana, alter DMN activity has been supported by several recent fMRI studies (Brewer et al., 2011; Farb et al., 2007; Pagnoni, 2012).

While the DMN is commonly studied by means of fMRI, in two previous studies we were able to show that the DMN is also reflected in EEG oscillatory activity and exhibits decreased activity with Vipassana practice. Specifically, we employed a unique sample of Vipassana practitioners, with three varying levels of expertise, and a suitable control group (Berkovich-Ohana et al., 2012). Two major findings were reported: the first was the manifestation of DMN activity as reduced gamma (25–45 Hz) power within frontal-midline regions during a time-production task (task-on condition) compared with resting-state (task-off). The second was that mindfulness meditation practitioners generally exhibited reduced resting-state bilateral frontal gamma power as compared to controls, suggesting a reduction in DMN activity during the resting-state.

Here we compare between the frontal (Fig. 1A) gamma power results obtained from S; his peers – the long-term Vipassana meditation practitioners (LTM, $n = 12$ including S, age 45.5 ± 10.6 , mean expertise of 3670 ± 4040 h, 9.7 ± 6.5 years); and a control group (C, $n = 12$, age 41.0 ± 12.5) (Fig. 1B). F-right was significantly reduced in the LTM vs. C group [independent sample, unequal variance t -test, $t = -2.04$, $p < .05$]. While there was no significant group difference for F-right, there was a significant difference between S and the C group in this region [converting S' results to z -score, following (Crawford & Howell, 1998), $t = -1.14$, $p < .05$]. These results demonstrate that S's baseline bilateral frontal gamma cortical activity is significantly altered compared to a control group, interpreted as a trait decrease in spontaneous DMN activity.

2.1.5. Marked alterations in self-related neural activity compared to peers

S had previously participated in two MEG studies, which are of particular relevance here since they were conducted in neurophenomenological conditions. In both of these MEG studies, S was one of a small group of participants whose phenomenological descriptions, as well as accompanying brain activity, evidenced stronger voluntary alterations in the sense of self (Dor-Ziderman, Berkovich-Ohana, Glicksohn, & Goldstein, 2013) and in the sense of time and space (Berkovich-Ohana et al., 2013). The descriptions provided by S are available in the respective papers (sub 12 in Table 1 in both papers). S's descriptions of strong alterations in experience, within the studied frameworks, were coupled with stronger deactivations

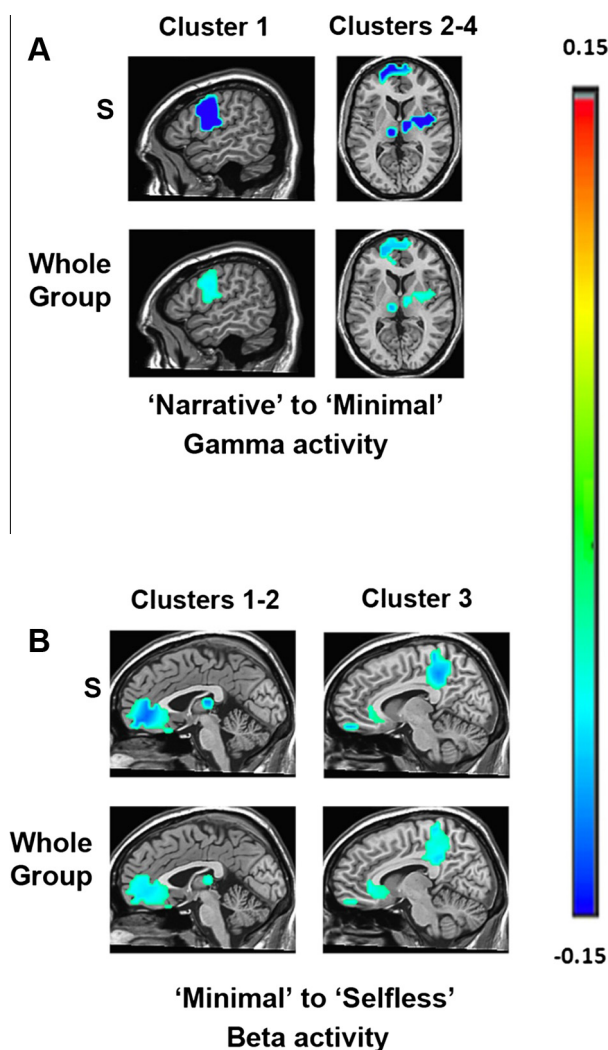


Fig. 2. Beamforming source estimates of statistically significant regions. The color bar indicates percent signal change (PSC). A. Decreased gamma band (60–80 Hz) activity when transitioning from 'Narrative' to 'Minimal' mode of awareness. PSC of S (top), compared to the group mean ($n = 12$; bottom). Left – sagittal view ($x = 52$; TLRC, LPI) of inferior middle frontal (1) cluster; right – axial view ($z = 8$; TLRC, LPI) of anterior prefrontal, thalamic and right insular (2–4) clusters. B. Decreased beta band (13–25 Hz) activity when transitioning from 'Minimal' to 'Selfless' mode of awareness. PSC of S (top) are compared to the group mean ($n = 12$; bottom). Left – mid-sagittal view ($x = -3$; TLRC, LPI) of left a ventral prefrontal anterior (1) cluster, and a more posterior thalamic (2) cluster; right – mid-sagittal view ($x = 8$; TLRC, LPI) of a right posterior cingulate/precuneus (3) cluster. (For interpretation of the references to color in this figure legend, the reader is referred to the web version of this article.)

in brain activity compared to the group mean (the group results are presented in the original papers). For illustration purposes, we compared S's functional contrasts to the group ($n = 12$ long-term Vipassana meditators, with an average of over 16 years and 11,000 h of practice). Participants were requested to produce voluntary alterations in the sense of self.¹ The color-coded images present the degree of power change in percentages (percent signal change, ranging from +15% to –15%), blue indicating a decrease. The darker blue in S's images (Fig. 2A and B, top) relative to the group average (Fig. 1A and B, bottom), reflects a stronger qualitative functional contrast between the different modes of self-awareness under investigation.

¹ Participants were requested to produce, volitionally, three modes of awareness for 30 s, three times for each state. The first mode was "narrative", defined as a mode of self-awareness weaving episodic memory, future planning and self-evaluation together into a coherent self-narrative and identity; the second was "minimal", a more basic mode of self-awareness focused on present momentary experience and closely tied to the sense of agency and ownership (Gallagher, 2000); and the third was "selfless", a mode of awareness defined by and practiced within Buddhist contemplative traditions, in which identification with a static self is replaced by identification with the phenomenon of experiencing itself (Dalai Lama, 1997). Throughout this volitional shifting of the sense of self, MEG readings were recorded. Immediately after producing the "selfless" mode of awareness, participants provided first-person descriptions of their experiences. The main findings in the study were that while the "narrative" mode was mediated within the high-gamma (60–80 Hz) band in primarily left-hemisphere-dominated frontal (Fig. 1A, left bottom) and prefrontal (Fig. 1A, right bottom) regions, in accordance with the bulk of related neural studies. The "minimal" mode was mediated within the beta (13–25 Hz) band in ventral medial prefrontal (Fig. 1B, right bottom) and right posterior parietal regions (Fig. 1B, left bottom). For the interpretation of these results, and for the methodological details of the study, please refer to the paper (Dor-Ziderman et al., 2013).

These results demonstrate S's skill in producing on demand and under experimental conditions clearly differentiated – both experientially and neurally – conscious states of different modes of self-awareness.

2.2. Procedure

After receiving the necessary approval from the ethical committee at Bar-Ilan University, a few pilot sessions were conducted with S. Three distinct levels of flexibility in the SB were detected in these sessions (among some other – less distinct – states): the first stage was named the *default state*, the second was named the *dissolving* of the SB, and the third the *disappearance* of the SB (see Table 1). Based on the pilot sessions, we were able to confirm that these three stages were: (a) replicable, (b) differentiated, and (c) stable. In addition, S demonstrated a significant ability to describe his experience during these three stages.

In order to describe (Results) and characterize/categorize (Discussion – Table 1) the flexibility of the SB, we focused on these three distinct stages. Undoubtedly, by restricting S to three stages, some of the experiences' complexity was lost. For example, although the *disappearance* stage itself could have been located on a continuum, it was crucial to limit it in order to (1) define different stages between which S could shift repeatedly, (2) define stages which are presumably not exclusive to S, for the sake of further possible empirical studies, and (3) simplify the study into a minimum number of sufficiently differentiated stages which would yield dissociable brain activity detectable by neuro-imaging techniques. This last consideration was important since, as was already mentioned, this study is part of a wider neurophenomenological MEG study.

2.3. Interviews

2.3.1. The phenomenological approach (general lines)

The interviews (see Appendix) were conducted according to the phenomenological approach (Depraz et al., 2003). Phenomenology focuses on the study of experience from the individual's perspective: taken-for-granted-assumptions are “bracketed out” (Epoché), thus “according to the Phenomenological way of thinking, in ordinary life we are caught up in the world and our various belief-constructs and theories about it. Phenomenologists call this unreflective stance the ‘natural attitude’. The epoché aims to ‘bracket’ these assumptions and belief-constructs and thereby induce an open phenomenological attitude towards direct experience” (Lutz & Thompson, p. 38). In this way, pure phenomenological research seeks to describe the pre-reflective experience which unfolds beneath the threshold of consciousness (as discussed in detail in Section 2.3.2) rather than to explain and, as such, begins *without hypotheses or preconceptions*. In accordance, “subjects are not asked to adopt predetermined descriptive categories but to develop their own descriptions” (Gallagher & Sørensen, 2006, p. 122). By adopting the phenomenological approach, we follow the principle that one must stop asking “why” and start asking “how” and in so doing seek to reveal the pre-reflective experience (Petitmengin, 2006).

2.3.2. The pre-reflective experience

It appears that the simplest way to define the pre-reflective experience is as in contrast to the reflective self-consciousness experience; during the latter consciousness itself (e.g., one's mental experience) becomes the object of the reflective process. This process occurs when it is intentionality directed toward the act of consciousness itself (Schwitzgebe, 2014). Essentially, while one's report of an experience on the level of reflective self-consciousness is explicit and involves second-order cognition, the description of an experience on the pre-reflective consciousness level, in contrast, is implicit and does not involve second-order cognition (Gallagher & Zahavi, 2015). Thus pre-reflective consciousness indicates our awareness “before we do any reflecting on our experience” (Gallagher & Zahavi, 2015); in fact, the reflective self-consciousness “presupposes the existence of a prior non-objectifying, pre-reflective self-consciousness” (Gallagher & Zahavi, 2015).

The elicitation interview method was initially developed by Vermersch (2009) in order to guide the individual in the process of “retrospective introspection” (p. 23) and by so doing was intended to allow the “interviewer to collect a very fine-grained description of a given past experience” (Petitmengin, 2014, p. 196). The elicitation interview method allows us to reveal the pre-reflective consciousness experience.

The method adopted in this study was deeply inspired by that of the elicitation interview. Similarly, the interview technique employed was intended to help the subjects to leave behind their old beliefs and, in turn, allow them to become more aware of the way they really carry “out a given cognitive process, and describe it with precision” (Petitmengin et al., 2013, p. 655).

Thus, essentially, the technique adopted in this study is deeply inspired both by the elicitation interview method yet no less importantly by mindfulness practice (Samatha-Vipassana), which helps to reveal the lived experience. In turn, given that S had accumulated approximately 20,000 h of meditative practice, it is possible to say that he is an expert in describing his inner-lived experience.

Inspired by the *elicitation interview method*, a strong indication that the *interview technique* was successful is S's feeling that it allowed him to become aware of some experiences of which previously he had not been aware: “It helped me to bring some precision to the experience instead of a more general fluid sense of boundariness. It helped me to define and describe to myself and to others various dimensions of self-less awareness that I had not paid attention to before, such as the

distinctions between agency and ownership. In addition it helped me to explore the 'pixels', the magical landscape, of the experience of location and non-location".

2.3.3. Technical issues

In order to prepare S for the MEG setup, and to maximize his concentration, the interview was conducted in the isolated MEG room (the EEG/MEG Unit, Bar-Ilan University) which is free from external auditory stimuli. In addition, unlike the previous study (Ataria, 2014a), in which participants were asked to meditate for five minutes prior to the interview, this study applied a different approach.

In the current study, S described his experience *after* meditating as well as his inner experience *during* the meditation itself. This was S's idea: while meditating, he decided to talk, spontaneously announcing during the first session that "I'll talk both now and afterwards". Interestingly, at some point S himself was amazed by his ability to talk during meditation: "but it's fascinating that I can still talk, I don't know where that's coming from, the talking, it's amazing really, I didn't think about it".

Finally, and significantly, S is a native English speaker and his verbal report was given entirely in English. Hence, the quotations herein are his exact words and no problems of translation/interpretation were encountered in the writing of this paper.

2.4. Analysis

The interviews with S were analyzed according to the grounded theory approach (Glaser & Strauss, 1967; Strauss & Corbin, 1990, 1994) which is rooted in a pragmatist philosophical method (Charmaz, 1995) and helps researchers to increase the analytical power of their work. According to this method, no hypotheses or categories are fixed at the outset. Rather, the researcher remains as close as possible to the field of research (data), both in the presentation of the results and in their discussion (Shkedi, 2003). Categories (those categories arising from the interviews are indicated in the results section using italics) arise from the data itself (Charmaz, 1995). For instance, the category of *internal* versus *external* arose from the following report (or reports) by S: "there is a very clear separation between inside and outside".

Before moving ahead into the results section, it must be emphasized that this is a single case study of merely one subject and, as such, the analysis proposed in this paper should be treated with appropriate caution. This is especially true of the discussion. Clearly, this paper calls for further empirical work – we are far from naively suggesting a full blown theory of one's sense boundaries. Rather this paper should be treated as part of a larger project which encompasses phenomenological and neural aspects.

3. Results

3.1. Stage one: SB default state

S's long-term meditative practice renders what was defined by S as "a default state" very different from the *ordinary state* of non-practicing individuals: "I think that after years of meditation, to be honest, my normal consciousness [*default state*] is no longer automatic about boundaries. ... I have a small uncertainty around the boundaries anyway in normal consciousness".² Essentially, S's *default state* serves as a reference point (Punctum Archimedes); his experiences during the second and third stages are compared to his experience during the first stage (see Table 1).

In the default state, S has a *sense of location*, that is, a sense of "floating inside the body's boundaries". Furthermore, in this situation, the *touching–touched structure* is maintained, that is to say that S has the experience of being both subject (touching) and object (being touched) at once. Indeed, as S notes, in this stage "I feel sensory input and it's quite clear that my hands are touching each other". It should be noted that S's experience of being a subject (touching) and an object (being touched) at the same time is not merely theoretical or abstract, but rather physical and practical: S feels his right hand as it touches his left hand and his left hand as it is being touched. This notion is critical because it reveals the primordial structure which is defined as *the touching–touched structure* (from now on: TTS).

In addition, S does not only feel his own body independently and separately from the world – "I have feelings of muscles in the neck that adjust the head, feelings in the tummy which has got content, stomach content inside it" – but also in relation to the world: "I feel where the touch of the ground or the cushion on my legs is". Notably, two different kinds of sensations are revealed here: the ability to sense oneself from within, independently of the world, and the ability to sense oneself in relation to the actual world. The latter is rooted within the TTS, thus S feels where he is touching (and being touched by) the world – not a general feeling, but rather local and specific. S senses the point at which his body ends and

² Indeed, one could ask how S can compare his state to that of others? In order to tackle this issue, we posed this question at the conclusion of the experiment. He replied: "I think it's a good question actually, because I think through meditation practice my sense of attachment to the normal mental structure is looser. The normal mental structure includes the whole lot: identity, location, agency, boundaries and protection. And they just get looser because of becoming comfortable with a much wider space of being. ... I don't need to be in this automat anymore of protection and boundary and so on. So the meditation practice creates non-attachment. ... Non-attachment is mainly non-attachment to normal mental structures based on protection. ... I know with myself and with others that people are just not like that."

the world begins. Essentially, in this regard two forms of basic experience can be defined: the body from within and the body in relation to the outside world.

The default stage is also characterized by possession of an intentional structure – “there is a knowing experience along with something that is known”. S describes this intentional structure in terms of knowing – there is a knower and something that needs to/can be known.

During this first stage, S's SB between *the internal and the external* is clear cut: “there is a very clear separation between inside and outside”. Moreover, S has the ability to locate objects in his sensory field in relation to his-own location, for instance in the feeling of distant versus closer voices: “I can very clearly experience sound far away”. Thus it is possible to define the space in which S is located in the first stage as a bodily and embodied kind of space. This experience is accompanied by the feeling of being *within* the body: “there is a general sense of being here within a kind of location. . .within the body”. Thus, phenomenologically, in this stage S experiences the SB as a *sense of location* within the body; a minimal *sense of first-person bodily perspective* (from within) upon the world which, according to S, can be defined as “the way I look at the world”. Fundamentally, in the default stage S's body constitutes a zero point in relation to the outside world and S possesses a bodily, *first-person, egocentric perspective* upon the world. The experience of one's *body as a zero point* along with *first-personal perspective* upon the world stands at the very core of the *sense of self* – these experiences constitute the minimal self (Zahavi, 2006).

Interestingly, although S testifies that he lacks a very distinguishable body shape – “I don't get a shape exactly clearly of the body” – he nevertheless reports that he is located within the body – or better said, within A BODY. In essence, the experience of perceiving the world *from within* (bodily-egocentric perspective) is equivalent to possessing a minimal sense of self which can be explained in terms of the pre-reflective sense of mineness, that is “the experience is given (at least tacitly) as my experience, as an experience I am undergoing or living through” (Zahavi, 2006, p. 16). In essence, a sense of mineness can be defined as a thin/weak *sense of ownership* and this “sense of ownership can be further explicated in terms of mineness” (de Haan & de Bruin, 2010, p. 375). According to S, perceiving the world from within is to possess the pre-reflective feeling that it is ME who decides how to act and it is ME that undergoes this experience: “first person bodily perspective is more like the sense that it is me that undergo the experience it is my body and my intentions to move my body. . . . It's the way things happen to me”.

We should further note that S feels himself to be within the body-as-object, not the so-called lived body: “it is being inside an object”. However, although S's *sense of ownership* decreases during the default stage, he does not become detached from his own body (on this issue see Ataria, 2015a); he retains an “internal sense of touch and of proprioception” which can be defined as *bodily feelings*. Moreover, S has the experience of “knowing that this leg is mine; these sensations, they are mine”. S retains a *sense of location*: “everything feels in location. It's not exact but it's in location, I have a feeling of where I am. . . I can, more or less, tell where my arms are”.

A *sense of location* is, among other things, our ability to locate other objects in space in relation to our own position as a *center of reference* (zero point). Indeed, *sense of location* can be defined as the ability to transform one's surroundings into embodied space; bodily space. Thus essentially we all live in a bodily space (Husserl, 1989, pp. 165–7; Merleau-Ponty, 2002, pp. 115–6), or even an inter-subjective kind of space: “when you talk, I know where you are. . . I know I'm sitting here”. It thus appears that the intensity (volume) of the *sense of location* is generated by the level of sensory activity: “when I use my senses everything gets clearer. . . . If I open my eyes then obviously the eyes have a huge amount of information and I know my boundaries exactly”. Basically, the *sense of location* depends on the level of sensory stimulation – “If I close my eyes then things get a little more uncertain”, says S. Therefore we may suggest that there is a link between the amount of sensory information and the *sense of location*: “The more senses that I use, the more exact are the boundaries”. Since location is, as was already noted, object-oriented, it is possible to hypothesize that any kind of object processing (in the broader sense) would demand more cognitive resources (in comparison to non object-oriented processing). Through this process, so we suggest, the *subject-object structure* becomes stronger and, in turn, the SB becomes less flexible and more defined. As a result, the *sense of location* becomes clearer. Indeed, the *subject-object structure*, by definition, implies that there is a subject on the one hand and an object on the other (even if they are only separated very weakly); as this experience becomes more salient so the sense of separation between ME and NOT-ME becomes clearer and as this sense of separation intensifies, one's ability to locate oneself in relation to the world increases, enhancing the *sense of location*.

In addition, S possesses a *sense of agency*, the ability to control the body (Gallagher, 2000): “I can *theoretically* move my hands if I want to”. S defines this *sense of agency* in terms of the *potential to act* – the sense that he has the *ability* or the *theoretical option* to control his own body, to move his limbs. Essentially, S feels that while “sense of ownership doesn't need decision, it's just the way things are, it doesn't need any agency. . . . Ownership doesn't need intention; it's a state. A continuous state”. The *sense of ownership* and the *sense of agency*, so it seems according to S's testimony, are fundamentally different: while the SA can be felt *without* body movements, the *sense of ownership* requires an actual movement: “If I move my hands it immediately *confirms* my sense of ownership”.

In this first (default) stage, *the sense of time* is also present (experienced): “Sense of time is obviously much clearer [. . . yet I] can't describe it really”. Thus it seems that in order to possess a *normal* (usual)³ sense of time, S must open his eyes and

³ We are aware that this term (*normal* sense of time) is at the very least confusing and cannot be very well defined. However, here it is used to refer to our sense of time on a daily basis. Thus we are able to detect (at least in some cases) changes in the sense of time. Since the sense of time does not lie at the heart of this paper (and has been studied in other papers, see Ataria, submitted for publication; Ataria & Neria, 2013; Berkovich-Ohana et al., 2011, 2013), we find this term sufficient in the present context.

return to a normal state of consciousness: “I would need to stop meditating, totally open my eyes and be in totally ordinary consciousness, only then would the sense of time come back fully”.

3.2. Stage two: the SB dissolving

S describes the experience of the SB dissolving as a “general sense of spaciousness such that the boundaries that are usual are not at all clear. . . these boundaries are diffuse, spacious, open, not solid”. Thus when S shifts from the default state to the dissolving state, his experience alters fundamentally: “it’s like as if I’m in a way made of air and airiness extends out”. The sense of sensorial objects located outside is lost: “the voices outside are kind of inside, I include them within the bubble. . . sound is known, but I can’t tell you really what it is, it’s included in the immediate bubble, the sound is inside it somewhere, but I can’t tell you exactly what it is”. In turn things are much less distinguished and thus the very existence becomes blurred: “the sense of existence it’s just so general, the existence, it’s just very diffuse, blurry, uncertain”. This statement indicates that during the second stage, the sense of *internal* versus *external* becomes vague and it is thus possible to suggest that as the SB becomes more flexible the distinction between *the sense of internal* versus *the sense of external* becomes less sharp and more diffuse.

The bubble which S describes is not rigid and solid but rather flexible and airy. Essentially, within this bubble, S does not close himself off to the world, he does not become dissociated from the world but rather contains the world (regarding the inverse of this experience see [Ataria, 2014b](#); [Ataria & Neria, 2013](#); [Ataria & Somer, 2013](#)), at least to some extent: “My boundaries include the voice. It feels just expanded, it feels airy. . . it’s very unclear where the boundary is, I don’t, I can’t say anything exact”. In this situation, sensory objects are no longer located outside, thus the very notion of outside versus inside (*internal* versus *external*) becomes less relevant – as the SB becomes more flexible, the sense of something located outside decreases. By definition, if there is no sense of *outside*, the sense of *inside* also ceases to be relevant. Thus the level of flexibility (of the SB) is reflected by the degree of the *inside/outside* structure.

Essentially, S denies the very notion of describing the SB in terms of *inside* versus *outside*: “there is no interest and experience inside as giving priority. The inside and the outside, the main feeling is of priority, I don’t give it more importance. . . the priority, spaciousness becomes the priority instead of boundary”. According to this depiction, *the sense of boundaries is not (merely) about location, but rather about priority*. Things which are more important (for us) are defined as being *inside*, within the field of ME which, in turn, represents the highest level of the sense of mineness. Directly below the field of ME is that of MINE – a weaker sense of mineness. The gap between ME and MINE is similar to the difference between one’s biological limbs and a prosthesis (for a more detailed discussion of this see [Ataria, 2014a, 2015a](#)). Useful in this regard is the metaphor of exponential decay, during which there is no clear boundary between what is inside and what is outside; rather there is a sense of ME which grows weaker (becoming a prosthesis – MINE) and weaker (later becoming a tool – not MINE, but nevertheless controllable) and so on (see [Murray, 2004](#)).

Throughout this second stage of meditation, S’s sense of orientation in space starts to dissolve: “if I go up or down into the ground below. . . I need to kind of remember, to pay attention up and down and to the back”. Reading this quotation carefully, it is possible to suggest that as the SB weakens, one’s sense of direction in space becomes less clear, that is to say that one’s sense of oneself in relation to one’s surroundings is less bodily/embodied. In this process, one’s body no longer constitutes a fixed zero point in relation to the world and as a result one’s ability to identify up versus down – for instance – decreases (for more on this issue see [Ataria, 2013](#)).

Moreover, in the second stage, the sense of body itself dissolves – “it is very hard to tell if there is a sense of body, it is more in the background. . . a sense of body-ness”. S becomes, at least partially, detached from his own body, yet some general *bodily feelings* nevertheless remain: “there is some sense of body”. The *sense of ownership* weakens considerably – “the sense of ownership, it’s diluted, it’s open, it’s spacious. . . It isn’t ownership in the sense like a strong sense of mine, much lighter than before”. Interestingly, then, the decrease in S’s *sense of ownership* is reflected in a sense of space which is much less bodily – almost a disembodied kind of space. Consequently, S’s ability to locate himself in space – recognizing, for instance, the difference between left and right or up and down – requires effort and allocation of cognitive resources. We previously saw that a *sense of location* requires a relation to objects in the perceptual field. Hence it is clear that when objects dissolve, the *sense of location* also weakens: “location is not clear at all”.

In addition, S’s *sense of agency* also becomes weaker. For S the *sense of agency* relates to the ability to master his body, that is “decision and intention. . . agency tends to be quite clearly connected to a decision and an intention and a need or a desire or an interest”. In the second stage, S feels that “the potential to move is much less coming from a decision that I take” and thus he indeed experiences a decrease in his need to decide: “movement or the agency becomes more and more spontaneous”. More specifically, S feels that things tend to happen “more and more by themselves”. In fact, according to S “all movement happens by itself. All movement is spontaneous. Things are happening because they’re happening. They don’t need an agent. They’re happening by themselves. The right time comes and the leg moves. It’s much more direct, it doesn’t need a kind of agent in the middle to determine movement”. Therefore, as the SB becomes more flexible, S’s sense that there is something that needs to be done decreases. Accordingly the *sense of agency*, which in S’s view is mainly about intention, becomes less relevant: his need for control weakens and a strong *sense of agency* is unnecessary. This description is supported by [Gallagher’s \(2007, 2012\)](#) definition of a weak/thin sense of agency: [Gallagher \(2012\)](#) defines it as a “minimal or first-order sense of agency” and distinguishes this kind of sense of agency “from a higher-order, reflective phenomenon” (p. 18).

While in the first stage *S* was *touching and being touched* simultaneously in a very concrete manner, in the second stage the *TTS* becomes much weaker (yet does not collapse altogether): “It’s just that touching and being touched don’t have importance anymore”. When asked to clarify this notion, *S*’s answer is somewhat surprising: “if I explore the touching I come back to giving priority to the center” and he continues, “So if I really want to look at the way the hands touch each other, then I find myself back inside limited place”. It can be suggested then, that the *TTS* goes hand in hand with a *sense of center*: “if you ask me to observe my ability to touch or be touched, it demands attention and once there is attention there is a *sense of center* as well. . . now for example, my hand is touching something and for this something to be known I need to kind of come back into a state of location a sense of center”. With this in mind it is arguable that in its very essence the process in which something (an object in the broadest sense) is being known requires more attention. In turn, as one’s attention (for *X*) becomes stronger, so the *TTS* that comes together with the *sense of center* is also strengthened. In more inclusive terms it appears that any process which intensifies the gap between subject and object (an increase in attention, for example), between the knower and the known, strengthens the *sense of center*. Thus, unsurprisingly, throughout the second stage, *S*’s *sense of center* weakens: “the center in the first stage is very clear, and now the center is much more diffuse. . . I don’t have a center. . . I don’t have a very strong center”.

Continuing this line of thought, *S* provides a significant new insight: “There’s a light center sometimes, it depends on my attention. If I put my attention out, then the center more or less disappears. I can’t say where the center is”. Yet moreover a *sense of center* requires some kind of attention which, by definition, requires at least a minimal *sense of subject–object* (once again, object in the broadest sense), in *S*’s words: “to make an attention you need an effort. . . for attention you need intention – you need someone. Intention needs a being or a center or a person to intend. . . there is a focus and attention and there is more of a self there”. Thus attention cannot exist without, at the very least, a thin intentional structure, which itself necessitates a *minimal sense of bodily-egocentric perspective* – one cannot pay attention to objects in one’s embodied space when one lacks a sense of first personal bodily-egocentric perspective upon the world, which requires at least a minimal sense of separation from the world.

S’s last series of testimonies is important because it binds the *sense of center* with the sense of knowing, thus revealing a very basic structure: the *TTS* is connected to the *sense of center*. In turn, the *sense of center*, in its most basic form, is in fact the sense of a knower or a knowing subject without any clear need for an object which needs to be known. The *TTS* and the *sense of center* represent the structure of knowing. This idea is of critical importance in the next stage of meditation: the *SB* disappearing.

3.3. Stage 3: the *SB* disappearing

The third stage differs somewhat from the two earlier stages, primarily since *S* finds it difficult to describe this experience: “it’s very difficult to talk from this place”. When asked to be more specific, *S* gives the following answer: “how can I talk while maintaining the boundary, isn’t there a conflict between the two? And I actually don’t think there is. I can maintain the sense of disappearing and allow speech to happen by itself”. This limitation must be kept in mind throughout this section: in *S*’s words, “it is quite hard to put it into language, because I don’t know that we have a language for [it]” (for more on this issue see Ataria, 2014c).

Before moving ahead, an additional clarification is necessary: this paper tries to tackle the question of *what it is like to experience a lack of sense of boundaries* by describing, phenomenologically, the decrease in the *SB*. Therefore, it may seem that this section contradicts itself – if there is no sense of boundaries, how can we describe its lack? Essentially, however, by *disappearing* we are not arguing that one *physical boundary* no longer exists, but rather we are attempting to describe, phenomenologically, the nature of the experience when one lacks a *sense of boundaries*. While without an *SB* one can nevertheless experience “something” and this section attempts to capture this unique experience: “there is a sense of something happening, a sense of body-ness. . . I am not dead, there is a kind of very light sense of body in this experience”.

In the third stage of meditation, *S* describes an experience of *disappearing*: a “sense of dropping, it’s like falling into empty space. . . I dissolve into the world and where you have the boundaries and the self as foreground and the world as background or as ground, here there isn’t a ground, there isn’t a foreground, in a way the background is everything, although not identical to the world, I’m not separate from background”. Interestingly, during the second stage *S* described a situation in which he contains stimuli (*my boundaries include the voice*), yet in this (third) stage *S* no longer contains the world but rather is totally immersed (or very close to being totally immersed) within it – the background is everything. In addition, *S* describes an experience without either a *sense of center* or a *sense of location*: “there is no center. . . there’s really no address. I have no idea where I am in stage three, it’s all background, I’m not there basically, just world, so there’s no real location at all in stage three. . . the body is so spread that it’s very difficult to know where it is and what it is”.

Similarly, throughout this stage, distinctions disappear altogether: “I become absorbed into the background, meaning the whole world without any separate entity. . . dropping distinctions, dropping interest in any boundaries or limits, dropping habit and automatic sensor-reality”. This experience goes hand in hand with the *lack of a first-person bodily egocentric point of view*: “there’s no personal point of view, it’s the world point of view, it’s like the world looking, not ME looking, the world is looking”.

Furthermore, while in the second stage there was a radical alteration in the level of *SB*, in this third stage boundaries simply become irrelevant: “a sense of dissolving. . . and the feeling is that there is *no need* for any boundaries of any kind”. Reading this quotation carefully, we discover that *S* uses the word “need”: “there is no need”. By describing the sense of

Table 1

The categories which underwent change during the three stages described in this study. Key: +++ strong; ++ medium; + weak; 0 non-existent.

	Internal versus external	Sense of time	Location	Sense of self	Sense of agency (controlling)	Sense of ownership	The touching/touched structure	Bodily feelings	Sense of center (first-person-egocentric-bodily perspective)
Default state	+++	++	++	++	++	++	+++	+++	++
Dissolving of the sense of boundaries	+	+	+	+	+	+	++	+	+
Disappearing: Total lack of Sense of boundaries	0	0	0	0	0	0	+	+	0

boundaries in terms of *need*, S offers a deep insight: in a way, the SB is a protective shield. It is for this reason that during trauma one becomes dissociated, closing off one's boundaries as a defense mechanism (Ataria, 2014a, 2014b, 2015a, 2015b, 2015c, 2015d; Ataria & Neria, 2013; Ataria & Somer, 2013; Ataria & Gallagher, 2015). By contrast, when feeling secure there is no *need* for rigid boundaries and, as a result, the SB becomes weaker (stage 2) and may even disappear (stage 3). Essentially, the SB can be described in terms of one's *need* to protect oneself. As one goes deeper into the meditation process, this sense of need for protection grows weaker until "there is no need for boundaries". Thus a lack of SB may be an indication of feelings of comfort and safety within the world, of feeling *at-home*: "I am part of the world so there is no need for protection, there is no need for boundaries". In addition, it seems that when there is no need to protect oneself the sense of priority weakens as well. Indeed, during the third stage there is simply "no sense of priority", which goes hand in hand with "deep relaxation". To be more precise, a sense of priority is the sense that my body, which is in fact me – "I am my body" (Merleau-Ponty, 2002, p. 231) – is more important than what is mine but is not ME (my car, for instance – see Fig. 3). In the third stage, the gap between ME and "NOT-ME" is closing, becoming almost, or even completely, irrelevant. When there is a lack of SB, there is no ME versus NOT-ME kind of experience.

On the basis of this evidence, it is not surprising that during the third stage there is no *sense of location* in space: "I really can't tell you where it is, I don't have any kind of sense of location". Similarly, "time is not relevant anymore". Furthermore, throughout the third stage, S's *sense of ownership* also drops: "sense of ownership here is, there really isn't any... it's a feeling of dissolving... there is no sense of mine there is no sense of me". While in the first stage, S describes a potential sense of control (sense of agency), in the third and final stage, the *sense of agency* fades away completely: "There is no sense of controlling". In addition, while in the second stage S argues that he possesses "a sense of center, the sense of being... agency, being in charge, being in control, so I do feel it, but it's very loose, it's very minimal", none of these phenomena are present in the third stage.

Yet with this in mind, and despite the decrease in SB, S describes the following experience: "There's still a witnessing happening and that witnessing is what's left of me". S's ability to witness reflects a dimension in which S is still somewhat separated from the world, a thin dimension which is more than just *bodily feelings* – there is no doubt that witnessing goes beyond rough *bodily feelings*. Furthermore, if there is a sense of witness, even a very slight one, there is a dimension in which S is not completely immersed within the world. Apparently, it is possible to suggest that this sense of witness can be described as a very thin subject/object kind of feeling, yet according to S this is not what he experiences. Instead he says "it's like knowing it is happening without an object, or without a specific object". Therefore this experience cannot be described in terms of subject and object – or better put, the nature of this experience (through the third stage) remains under the threshold of the *subject/object structure* (there is no sense of object). Thus we can suggest that this is a more basic experience in its nature in which there is no clear sense of subject versus an object.

The *touching–touched structure*, as will be discussed below in detail (Section 4.3), allows us to illustrate extremely primitive relationships between the organism and the world – "though we are of the world, we are nevertheless not the world" (Merleau-Ponty, 1968, p. 127). Thus it is possible to describe the *touching–touched structure* in terms of touching (and being touched by) the whole world and not a specific object. With this in mind, we can describe the experience of knowing without a clear object (knowing it is happening without an object, or without a specific object) as a thin *touching–touched structure* in which one feels immersed within, yet at the same time also somewhat separate from, the world (Ataria, 2014a). While touching the world itself (and not a specific object), this *sense of touching/being-touched* becomes so diffuse that it does not generate an SB, yet nevertheless a very thin *sense of touching/being-touched* continues to exist.

4. Discussion

4.1. The levels of flexibility of the sense of boundaries

In attempting to describe the different levels of flexibility of the sense of boundaries (SB), it becomes clear that this is a complex dynamic experience with several components. Yet it is possible to identify a number of phenomena that undergo change during the three different stages produced by S (see Table 1). Any alteration in the strength (less/more flexible/rigid) of the SB is reflected in categories 1–9 (some of which clearly overlap):

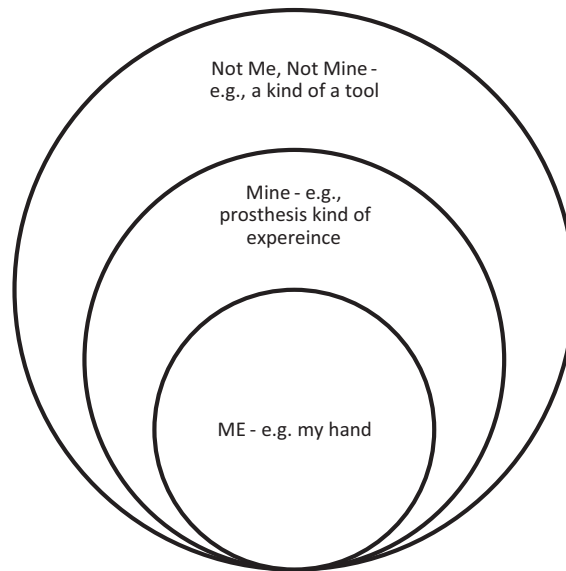


Fig. 3. The priority structure.

- (1) Internal versus External: as the SB becomes more flexible, it is much less clear what is “inside” and what is “outside”; the experience of *in* versus *out* fades away. Intuitively, when thinking about boundaries the first thing to come to mind is the limit between what is *inside* and what is *outside*. In Damásio’s words, “One key to understanding living organisms, from those that are made up of one cell to those that are made up of billions of cells, is the definition of their boundary, the separation between what is in and what is out” (1999, p. 150). Yet, from the perspective of the SB, the concept of *in* versus *out* can be defined in terms of *priority*. There is no strict line between *inside* and *outside*, instead there is a continuum: something more important is “closer” and as things become less important, they grow increasingly distant.
- (2) Sense of Time: as the SB becomes more flexible, the sense of time weakens and, in the third stage, eventually disappears. It seems that the sense of time is a kind of “mirror reflection” of the SB. Thus any alteration in the level of flexibility is reflected by a proportional adjustment in the sense of time.
If we examine this phenomenon more broadly, we may say that the sense of self and the sense of time go hand in hand: “It is of the essence of time to be not only actual time, or time which flows, but also time which is aware of itself, for the explosion or dehiscence of the present toward a future is the *archetype of the relationship of self to self*, and it traces out an inferiority or ipseity” (Merleau-Ponty, 2002, pp. 495, our emphasis). Thus, we may say that any alteration in the sense of self is reflected in our sense of time or, to be more specific, the structure of our inner time-consciousness⁴ and the structure of sense of self are strongly tied together (Zahavi, 1999, 2006). Likewise, a previous study has demonstrated that the SB and the sense of self are intimately connected (Ataria, 2014a). Interestingly, former prisoners of war have described a similar phenomenon, experienced during captivity (Ataria & Neria, 2013). With this in mind, it is possible to suggest that analyzing our inner time-consciousness can reveal fundamental aspects of our experience, including the SB.
- (3) Sense of Location: as the SB becomes more flexible, one’s ability to locate oneself in space deteriorates. Essentially, one’s sense of location is not independent of the perceptual field; it is always relative to something else – to objects in space. Yet when the SB becomes more flexible, the intentional structure weakens and, in turn, objects become less distinguishable. The ability to locate oneself dwindles gradually: at first (stage 2) the ability to differentiate between left/right and up/down decreases and, subsequently (stage 3), one loses the sense of orientation in space altogether. It is possible to describe this process in terms of bodily space: as the SB becomes weaker, space become less bodily.
- (4) Sense of Self: as the SB becomes more flexible, the sense of self dissolves, thus becoming weaker. This process begins by expanding the sense of self (stage 2) and, thereafter (stage 3), as the SB disappears the sense of self disappears altogether.
- (5) Sense of Agency (control): with an increase in the flexibility of the SB, the *need* for control declines. While in the second stage (dissolving) the potential to act still exists, hence some sense of agency remains, in the third stage it disappears completely.

⁴ There are three technical terms which describe this temporal form of consciousness: past (*retention*); present (*primal impression*); and future (*protention*).

- (6) Sense of Ownership: as the SB becomes increasingly flexible, the sense of ownership becomes weaker. In the second stage a very thin sense of ownership remains, while in the third stage the sense of ownership disappears completely.
- (7) Sense of Center (first-person-egocentric-bodily perspective): as the flexibility of the SB increases, the sense of being at the center (with one's body as a reference point) decreases until eventually, in the third stage, the body ceases to act as a reference point in relation to the outside world.
- (8) Bodily Feelings: as the SB becomes increasingly flexible, bodily feelings, including proprioception and kinesthesia, become weaker. Yet even when the SB disappears, a minimal level of dynamic proprioception continues to exist: there remains a sense that there is a body without any experience of an SB.
- (9) The touching/being-touched structure: when touching an object, the boundary between subject and object is at its clearest. Essentially, the TTS stands at the core of the intentional structure. As the SB becomes increasingly flexible, the touching–touched structure weakens, yet *it does not disappear altogether*. Thus even when lacking an SB, the touching–touched structure remains and one can undergo a very fluid touching/being-touched kind of experience without generating an SB.

In order to understand this notion, the touching–touched structure should not be described in terms of touching a particular object but rather on the level of the entire body touching (and being touched by) the world (for more on this issue see Ratcliffe, 2008, 2012). When floating in warm saltwater with closed eyes, boundaries become more open and flexible and, at times, even disappear. Yet, in this situation the *whole body* is nevertheless touching and being-touched without possessing any sense of boundaries whatsoever (Ataria, 2014a).

4.2. Sense of ownership versus sense of agency: clarifications

We know that the sense of agency is defined “as first-order experience linked to bodily movement” (Gallagher, 2007, p. 355), yet with this in mind it has been suggested that the SA is not restricted to bodily movements but also includes the ability to control one's thoughts (Frith, Blakemore, & Wolpert, 2000; Gallagher, 2000). Furthermore, the sense of agency can be defined on the intentional level: in Gallagher's (2007) words, “In some cases the sense of agency is construed in terms of bodily movement or motor control, in others it is linked to the intentional aspect of action” (p. 347). Thus it is possible to suggest that S's experience of the potential to act represents, very thinly, the intentional aspect of sense of agency and, to use Gallagher's words once again, the sense of agency “could be simply a matter of a very thin phenomenal awareness, and in most cases it is just that” (Gallagher, 2007, p. 347). However, this can be taken a step further. The sense of agency is usually understood as being directly tied to motor control (e.g., efference signals) and hence it is only natural to study this phenomenon with regard to movement. Yet if we accept S's testimony as it stands (accepting its limitations), a new possibility arises: on a thinner level, sense of agency concerns the *potential to act*. One knows on a pre-reflective level that if one so desires, one can voluntarily move one's hand (etc.) and hence, phenomenologically, one possesses a thin sense of agency. This suggestion fits with the model proposed by Frith et al. (2000), according to which the sense of agency requires the ability to predict the result of an action, yet “only the occurrence of the predicted state and the result of its comparison with the intended state are available to awareness” (De Vignemont & Fournieret, 2004, p. 13).

As we saw, S has a unique ability to report, at least to some extent, his pre-reflective experiences and hence his experience of *potential to act* could in fact generate at least a minimal/thin sense of agency which does not depend solely on sensory feedback. As in other cases, this issue requires further empirical investigation (for a theoretical discussion see De Vignemont & Fournieret, 2004). However, at the same time we accept that the nature of the sense of agency on this level of *potential to act* may be quite different “without the feeling of the embodied nature of action our sense of agency would be very different” (Gallagher, 2007, p. 355).

Research has suggested that the sense of agency and sense of ownership do not use the same mechanism (Tsakiris, Longo, & Haggard, 2010) and hence a distinction should be made between them (Gallagher, 2000): they “may be partly independent and have different processes by which each of them is constructed” (Sato & Yasuda, 2005, p. 253). While S describes his sense of agency in terms of the *potential to act* (*if I want to – I can*), his bodily sense of ownership (the sense of this being my body) cannot be generated solely by the ability to act, but rather requires actual action/movement. According to S's descriptions, movements and sense of ownership are closely connected (*If I move my hands it immediately confirms my sense of ownership*). Thus we may suggest that the sense of ownership is rooted in bodily movement. This notion may arouse some objection, since traditionally it is argued that voluntary actions are not required for one to experience a sense of ownership; rather passive movements are sufficient. Moreover, “the sense of body-ownership can be induced by afferent sensory signals alone” (Tsakiris et al., 2010, p. 2740). Acknowledging this issue, we would like to focus on S's use of the word “confirm” in this regard. If indeed bodily movements have the ability to confirm the sense of ownership, something must exist in the first place which can be confirmed: a weak and thin sense of ownership (as has been developed phenomenologically elsewhere, see Ataria, 2015a). This elaborates on a fundamental issue: we are constantly engaged with our surroundings, our environment (Thompson, 2007; Varela, Thompson, & Rosch, 1991); in fact, in a fundamental way even when sitting still one needs to breathe and this activity demands some kind of, albeit very limited, bodily movement. This ongoing interaction is responsible for a weak sense of ownership, yet as the level of activity rises,⁵ the sense of ownership becomes stronger.

⁵ At least to some extent, since during a trance state (which involves high levels of activity and stimuli), one's sense of ownership may also drop (Ataria, 2014c).

Thus S's testimony appears to shed light on the process by which the sense of ownership becomes stronger and is confirmed. While the most basic form of the sense of ownership results from the ongoing interaction between the organism and the world, when moving our body the sense of ownership is repeatedly confirmed.

Although there is still a long way to go, it seems that phenomenologically the sense of agency and the sense of ownership can be clearly distinguished.

4.3. What is it like to lack a sense of boundaries?

The first section of the discussion presented nine categories and argued that even when lacking a sense of boundary, some basic bodily feelings and a very liquid touching/being-touched structure continue to exist. Yet, the fundamental question arising is *what is it like to experience a lack of SB?*

In his book *The Visible and the Invisible*, Merleau-Ponty (1968) presents the notion of Chiasm. This concept is rooted within the “paradoxical fact that though we are of the world, we are nevertheless not the world” (Merleau-Ponty, 1968, p. 127). Indeed, he argues, we are both objects among objects like any other object in the world, yet at the same time we are subjects: “my body is at once phenomenal body and objective body” (Merleau-Ponty, 1968, p. 136). This structure of subject-object, touching/being-touched reveals the twofold dimensions of reversible flesh.

Merleau-Ponty uses the notion of flesh to describe our being-in-the-world in a less polarized manner (subject versus object), that is as an integral part of the world. We are interwoven with the world: the boundary between the body and world, so suggests Merleau-Ponty, is vague and hazy. It is important to emphasize that this does not negate the existence of a subject or make the subject an entity lacking any subjective dimension, but rather defines the boundary between this subject and the world as fluid: we invade the world and the world invades us (as, for instance, food, which was once an alien object, becomes part of us).

Merleau-Ponty thus draws a strong link between the bodily subject and the world, and in so doing develops the concept of flesh: the perceiving subject is completely absorbed in the corporeal reality which envelops him and invades him in the same way that he investigates, gropes at and invades it. The idea which is most significant to the topic of this paper is that the primary experience of being-in-the-world without an SB is related to our existence as subject and object at the same time: I can touch my right hand with my left hand and in so doing can feel one hand touching or, alternatively, the other hand being touched. The hand which is touching is the subject, while that being touched is the object (Husserl, 1989; Merleau-Ponty, 2002). Yet both hands are part of one whole which is able to touch itself and thus to function as subject and object at once (Merleau-Ponty, 1968). This example clarifies the mechanism that allows us to treat the individual as both subject and object; thus we can never lack either the subjective or the objective dimension (for exceptions see Ataria, 2015b, 2015c, 2015d; Ataria & Gallagher, 2015). In this sense, the primary and basic structure of touching/being-touched is first and foremost a result of man's unique, twofold nature, twofold structure (Thompson, 2007).

It appears that Merleau-Ponty's approach can shed light on S's experience when lacking an SB. In this situation the subject and the world return to exist on the same level – they are both constituted by the same flesh. Thus, this notion may explain why S emphasizes that during the third stage he feels at home. It seems that this kind of initial experience of being almost *non-distinguishable yet somewhat distinguishable* from the world stands at the basis of S's lack of SB. In this way, Merleau-Ponty helps us to place S's experience within a wider theoretical framework.

In sum, the phenomenological experience of being-in-the-world without an SB reveals the most primary link between the subject and the world. This connection is fluid – it is not possible to separate the subject from the world in which he is absorbed. Yet in this situation it is nevertheless possible to describe the primary experience of being-in-the-world because even while being almost totally absorbed within the world some rough bodily feelings remain. Likewise, in this situation the basic touching/being-touched structure does not completely disappear, even if it is substantially weakened.

5. Study limitations and concluding remarks

It should be noted that this study has several limitations: (a) it is limited to one subject, (b) it is restricted to first-person data, (c) the subject studied (S) possesses unique abilities and it may be difficult, although not impossible with the right training, to replicate the results or draw from them conclusions regarding the general population, and (d) in the extreme state (the SB disappearing) even S has difficulty describing his inner experience.

However, at the same time the results presented herein are clearly novel due to the collaboration with a unique participant: S's singular introspective and descriptive abilities enable us to study primary experience, generally considered to be pre-reflective, and to shed light on one of the basic structures of human experience.

Based on the data analysis presented herein, we may conclude that:

1. The sense of boundaries is flexible and exists on a continuum ranging from a “normal” SB to a lack of SB.
2. Several categories (phenomena) can be identified as attached to the SB: these change according to their position on the SB continuum.
3. Phenomenologically, when the SB disappears initial bodily feelings nevertheless remain. In addition, a weak touching/touched structure exists.

The next phase of this research will apply combined phenomenological and neurobiological understandings of the SB. In this process, S's phenomenological investigation will guide the analysis of the MEG recordings collected while S experienced the three different states. This will enable us to address, from both a first-person phenomenological and a third-person brain activity perspective, the question posed at the outset of this paper: "What is the nature of the sense of boundaries?". This endeavor is aligned with Varela's proposition to develop a dialogue between science and the contemplative traditions, in order to study the subtle dimensions of human awareness.

Appendix A. Supplementary material

Supplementary data associated with this article can be found, in the online version, at <http://dx.doi.org/10.1016/j.concog.2015.09.002>.

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