

## Sensorial Introspection and its Possible Influence on Anxiety - Towards the Study of its Modalities of Action

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### Abstract

**Objectives:** Sensorial Introspection is a meditative practice which uses perception as a means to access body and mind experiencing. It addresses exteroceptive and interoceptive senses in a gradual and cumulative manner that draws the practitioner's attention to a panoramic stage which tends to loosen cognitive control and develop openness to the present moment as well as to a sense of peace and a different interpretation of reality. We investigate the possible effects of Sensorial Introspection on negative effects, using the results of an exploratory survey as illustration for the purposes of a literature review concerning the place of perception in meditation's mechanisms of action.

**Design and Results:** The survey was designed as a single-group pilot clinical trial. Participants (n = 84) registered at a 2-day workshop (introduction to Sensorial Introspection) completed a small set of self-administered measures (demographic and practice questions, STAI-Y forms) before and after the very first introspection of the workshop on a voluntary basis. State anxiety was revealed to have significantly decreased after the intervention ( $t = -7.566$   $p < 0.001$ ) and trait anxiety was inversely correlated to self-practice intensity ( $r = -0.32$   $p < 0.01$ ) and not so much to seniority of practice.

**Discussion and Conclusion:** These preliminary results open a debate on the link between body, perception and psyche and the articulation between perception and awareness in meditative practice. We wish to contribute to further exploring the non-cognitive mechanisms of action of meditation practice on people's wellbeing. The promising results of our survey call for randomized clinical trials to validate "sensorial introspection" as an effective intervention for stress and anxiety relief in the general population.

**Keywords:** Sensorial Introspection; Meditation; Full Presence; Anxiety; Somatic-Psychoeducation; Perception; Interoception; Mindfulness

### Short glossary of terms concerning meditation practices

**Compassion meditation (CM):** Focuses on relieving the suffering of self and others.

**Concentrative or focused attention practices:** "Method of attentional training in which the meditator practices maintaining focus on a meditative object such as the breath" [1, p. 2932-2933 (Kindle place)].

**Decentering:** Refers to the process of distancing by which meditators become witnesses of their own thoughts and experiences.

**Full Presence:** State that represents the outcome of sensorial introspection or Full Presence Meditation®. It “touches the body in a place that lies below the affect, emotions and controlled thought and gives access to the sensitive chord of the human part of the body that carries well-being, plenitude, joy and human warmth” [2]. Close to the concept of Mindfulness with a major role played by the sensorial and sensible body which silently mobilizes attention towards a expanding sense of wholeness.

**Mindfulness meditation:** Aims to develop a state of awareness of the now moment of experience without judging it. Mindfulness is as much a method as a state representing the outcome of the method, and as a stable trait [1, p. 2879 (Kindle place)].

**Mindfulness based stress reduction (MBSR):** Stress reduction method developed by Kaba-zinn based in 1979 [3,4] on Group format program, using Mindfulness meditation, Yoga and relaxation exercises, and focus groups.

**Loving-kindness (LK):** Also called meditation of the Buddha, it aims to develop a kind attention towards the well-being of self and others.

**Open monitoring or mindfulness practices:** Form of non-discriminative awareness in which the meditator allows each experience to arise and dissipate in consciousness without either averting from or over-identifying with any one thought, feeling, or sensation and without maintaining any specific attentional focus. It is considered the hallmark practice of mindfulness because of its non-reactive attention to present-moment experience [Ibid., p. 2933-2935 (Kindle place)].

**Transcendental Meditation (TM):** Practice based on focusing attention on a single stimulus (such as a mantra).

**The Work:** Meditative technique that enables the identification and investigation of thoughts that cause an individual stress and suffering. Its core is comprised of four questions and turnarounds that enable the participant to experience a different interpretation of reality [5].

**Yoga Cyclic Meditation:** A yoga practice involving cycles of yoga postures and supine rest.

### Acronyms

MBSR: Mindfulness Based Stress Reduction; LK: Loving-Kindness; SI: Sensorial Introspection; State 1: Pre-intervention Anxiety State (Baseline); State 2: Post-intervention Anxiety State; S2-S1: Difference Between Scores of Anxiety State S2 and S1; T2-T1: Difference Between Scores of Anxiety Trait Pre- and Post-Intervention; FEPAPP: Fédération des Professionnels de l'Accompagnement en Pédagogie Perceptive

### Introduction

*We perceive ourselves, internally, deeply. Bergson, 1941*

Meditative practices have been studied since the 1960s within the field of medical and cognitive sciences and have been integrated into care pathways. Their many beneficial effects have been evidenced in the treatment and regulation of many psychological difficulties, in particular stress and anxiety [6,7]. Such positive results in therapeutic contexts have contributed to expand their use in preventive care and personnel development [8]. In the particular field of application to healthy people, more and more studies are being conducted on the impacts of meditative practices which, although insufficient in numbers, tend to confirm the effectiveness of meditation on the regulation of non-pathogenic stress and anxiety [9,10] with a particular focus on its benefits for stress reduction. Materials and methods: A literature search was conducted using MEDLINE (PubMed).

Most meta-analyses conclude that there is little reflection on the mechanisms of action at play, due to a lack of theoretical background compensated by an excessive development of dependent-variable measures leading to study causality links and not proof [7,11]. The results we gathered from of a one-shot exploratory assessment using a particular type of meditation (Sensorial Introspection) opened a reflection we wish to share, on the place of bodily perception and sensoriality in meditation's ways of action, when the focus is commonly placed on cognitive and emotional dimensions. In particular, we believe it may affect in a combined manner both cognitive attention to physical symptoms and somatosensory amplification, which are the seeds of anxiety. This reflection should lead to further field investigation and we hope this conceptual contribution will help the setup of appropriate designs.

We will start with a short literature review of meditation and its major effects on anxiety and will continue with an overview of the ongoing hypotheses on the processes at play which shed some light on meditation theories in progress. Results of our exploratory survey are briefly summarized in the text along with the meditation protocol we used, before debating possible new hypotheses on the mechanisms of action and how they could be investigated. More detailed information on our survey is available as an appendix to this article.

Beforehand, we wish to emphasize on the particular interest of anxiety here, besides its societal importance. In anxiety there is an inherent interaction between mental and physical disorders. Indeed, in a sort of vicious circle, psychological reactions (fear, panic, irritability, hyperactivity, resignation) lead to physical ailments that in turn amplify mental distress. This process and its amplification are all the more important when they affect vital functions, for example arrhythmia or vagal disorders (such as vertigo, febrility and visceral unease), as these disorders create more anxiety because they are perceived as uncontrollable. All this being exacerbated by the somatosensory amplification which invades all the physical, psychological and cognitive sectors. This clearly shows that there is a way of the body and a way of the mind in the process of anxiety. It is therefore important to have a combined action on cognitive control and on the control of the somatosensory amplification. Meditation practices are known to offer such controls, or tools for control, and most studies focus on the cognitive dimensions of their action. We take anxiety here as a model and a marker of the person's responses in terms of negative effects.

### Meditation practices and their impact on anxiety

Currently, meditation refers to a spiritual mental practice that focuses attention on an object of thought or on oneself. The modern vision of meditation sees the act of meditation as being engaged in contemplation or reflection. Walsh and Shapiro [8] propose a definition which is relatively commonly accepted within the scientific world: "The term meditation refers to a family of self-regulation practices that focus on training attention and awareness in order to bring mental processes under greater voluntary control and thereby foster general mental well-being and development and/or specific capacities such as calm, clarity, and concentration" [12, p. 228-229]. This definition clearly focuses on will and mental discipline as the way and condition to personal development. Before entering this debate, let's further clarify what it is pragmatically.

Meditation practice encompasses a variety of mental exercises ranging from relaxation techniques to exercises aiming to achieve, for example, a deep sense of well-being. Two major forms of meditation can be identified: those using the focus on an object (observing light, listening to sound, body scanning, holding a posture, following the breath) and those without any focus (being present, remaining aware, being available to the growing of silence and the unfolding of thoughts and body states). They are sometimes referred to as "focused attention" and "open monitoring" practices [13].

Among these techniques, the most studied and analysed at the present time are: Mindfulness meditation, which aims to develop a state of awareness of the now moment of experience without judging it; Transcendental meditation, which is based on focusing attention on a single stimulus (such as a mantra); Compassion meditation, which focuses on relieving the suffering of self and others; Loving-kindness meditation or meditation of the Buddha, which aims to develop a kind attention towards the well-being of self and others [14,15] complementary and alternative medicine (CAM).

### The effects of meditative practices on anxiety in non-clinical populations

Psychological and physiological effects of meditative practices have long been studied, ever since oriental practices of meditation became popular in the Western world. Today several thousand studies exist that have attempted to quantify their effects on health, pain, well-being, quality of life, as well as on emotional issues such as anxiety, stress or depression [4,6-8,12,15-20]. Most of those were performed using clinical settings on patients with medical conditions (such as cancer pain or anxiety, post-traumatic depression, nervous breakdown or emotional distress). Studies on nonclinical populations have advanced more recently, with the growth of preventative healthcare and the personal development sector [21]. Such populations are often referred to as healthy, meaning "people who apparently do not suffer from disorders requiring medical or psychological care, but who seek personal fulfilment or self-realization or who encounter difficulties seen as momentaneous and specific" [21, p. 67-68].

Anxiety is one of the most commonly surveyed psychical parameters in particular when considering negative effects. Its assessment is most often conducted using psychometric scales, especially self-reporting ones (STAI, DASS-21, BAI). STAI allows differentiation between anxiety state and trait which vary differently to context and are of primary concern in our exploratory study. One can assess the change in anxiety state after one-off experiment [22-24], and the change in anxiety trait after mid to long term experiments [25-27], as the first

is context-dependent and the latter is general-trend-dependent [28-31]. Meta-analyses [7,32] indicate that meditation has its strongest effects ( $d > 0.3$ ) on measures relating to emotions (interpersonal, anxiety-state, negative emotions and anxiety-trait), and the lowest ( $d < 0.21$ ) on measures relating to more cognitive or mental criteria (memory, learning, negative traits of personality and regulation of emotions). Effect size however, varies depending on the studies and no affirmative conclusion can yet be drawn due to low calculated effect levels [7,9,11,16,33,34]. Late neuroscience discoveries have shown that meditation would induce visible and perennial cerebral structure changes [13,35-39] which are associated with behavioural or trait changes such as increased prosocial behaviour or improved attention, perceptual discrimination or emotional regulation such as anxiety trait [1,31,36,39-41]. However small, the effect seems robust and anxiety trait appears amongst the 5 variables considered as good estimates of the population responses (intelligence, negative personality measures, cognition, attention, emotion regulation, and trait anxiety) [32]. Explaining this remains a question and proof is yet considered insufficient. Eberth [33] and Sedlmeier [7] both think this is mostly due to a lack of theoretical background leading to an excessive development of dependent measures which produce causality links but reveal nothing on the mechanisms of action. It is also due to methodologies as they most often lack precision in isolating “pure” meditation from a combination of activities (lectures, yoga, focus groups or actual meditation) [7].

### **Hypotheses on meditation’s mechanisms of action**

Most authors of published reviews and meta-analyses believe that there is not enough development of a sufficiently conceptual and theoretical reflection prior to the definition of the studies, which doesn’t help to overcome the statistical causality link [10,42]. In an attempt to develop some premise to a meditation theory, Sedlmeier [42] proposes a three-pronged approach, that takes into consideration Western scientific understandings and their mostly quantifying methods, Eastern theories and philosophies offering a more holistic and cultural understanding of the processes at play, and finally the investigation of people’s experience on a first-person basis.

With regards to the Western scientific understandings, we have found three major concepts in the literature, and they are mostly focused on what neuroscience and neuropsychology study best, attention and cognition. The first is the concept of self-determination underlies the mechanisms of the cognitive action of meditation [43]. It postulates that an open awareness favours behavioural choices adapted to needs and values, leading to improved well-being and less emotional and cognitive disorders.

The second concept is more of an emerging one. It was named “reperceiving” [44], but also “decentering”, “cognitive defusion”, “deautomatization” or “disidentification” depending on the author [7]. It refers to the process of distancing by which meditators become witnesses of their own thoughts and experiences. It allows us to understand how the meditator moves from a mode of immediate reactivity to a mode of availability to every instant, developing in this way the capacity to re-assess automatic behaviours.

The third concept refers to the relationship between body and mind and its place in the meditative process. It is gaining ground in meditation studies [45-48] and has mostly been investigated in three interconnected directions [48-51]: body awareness, interoception and embodiment, all of them increasing with meditative practice. They are considered promising for the understanding of the role of the body in the meditative process [50,52] as they open to new descriptive parameters such as the lived immediate experience, the sense of presence to the present moment, the openness to the unexpected and the ability to regulate and adjust without voluntary control.

### **Introspective sensorial mobilization, a key perceptual modality of meditative practice**

Our research aims to discuss the perceptual modalities of the introspective process used in most meditative practices, though their role or function is rarely highlighted. It is based on the Sensorial Introspection developed by D. Bois [53,54].

### **Contextualization of Sensorial Introspection**

This practice is in line with the various currents of secular meditation, and in particular with mindfulness [3,55,56] or full presence [57-59] by its integration of a sensory dimension. The association of the terms introspection and sensoriality can be seen as an oxymoron, as they may appear at the antipodes of one another. On the one hand it is about a reflective activity, “turned towards interiority”, and on the other hand about a perceptual activity grasping “immediate” information about the experience, without the mediation of thought. In fact, perception becomes introspective when it associates itself with a mobilization of awareness in order to grasp, process and regulate in real time of the experience the internal information arising, be it thoughts, sensations, feelings and more generally inner-body states. In addition to the usual contemplative process of meditation, the introspective sensoriality-focused dynamic engages an active dimension

that enables access to new understandings and self-knowledge. This dynamic is based on the relationship that meditators establish with themselves internally, through their sensorial perception.

The terms “sensory” or “sensorial” usually refer to the exteroceptive senses. In Sensorial Introspection it refers to a form of inner-body intimacy that can be perceived. It is about observing both one’s mental states and one’s internal physiological states. This observation is sense-felt before being mental [53]. In this perspective, the perceptual dimension of the body complements the cognitive acts usually mobilized in all forms of introspection, such as attention, intention, discrimination, categorization and integration. The states of consciousness no longer belong to the mental or psychical sphere only. They are also truly corporeal phenomena, intimately linked to the quality of the relationship that one maintains with one’s interiority [53, p. 109].

In tangible terms, Sensorial Introspection has become integrated within the practical framework of support and mentoring professions, particularly within Perceptual Psychoeducation and/or Somatic-Psychoeducation [53,54,57]. This practical framework aims to standardize the conditions of access to the bodily experiencing related to the particular experience of self offered by this form of meditation, in order to facilitate how cognitive, emotional and affective benefits can be derived from it. It is designed to direct the person’s attention to both the sensorial experience and the resulting reflective process [53]. The introspective quality involved stimulates the attentional and cognitive resources usually mobilized in meditation, but also and especially the perceptual resources of the individual. The auditory sense and particularly the quality of listening, the inner visual sense, the observation of the inner world in the moment and the sense of temporality are stimulated to enable meditators to develop their capacity to make meaningful connections between their bodily subjectivity and the context of their lives.

### The body-perception-mind link

Sensoriality is, as previously mentioned, frequently limited to the exteroceptive faculties of the five primary senses and the sixth sense of proprioception. These senses are engaged in the meditation, for example audition through listening to silence, the vision through colourful atmospheres and proprioception through the posture of the body. We wish to study sensoriality in a broader dimension and in particular in its connection with consciousness and the cognitive activity and body feeling states that unfold in the meditation. These have been referred to in the past decade as body awareness, interoception or embodiment. We envisage sensoriality as a cross cutting pattern that encompasses the three.

Research on meditation has shown that consciousness is the chosen way to explore such connection. Perception remains absent, and when it is mentioned, it is from the point of view of consciousness, as a kind of self-evidence that connects consciousness and perception closely in a confusing manner. Such conceptual porosity gives rise to expressions like “conscience perceptive”<sup>i</sup> [60] or “perception consciente”<sup>ii</sup> [61]. Breaking with this fusional vision, Merleau-Ponty claims the primacy of perception over consciousness. For him, perception precedes all discourse and judgment. And the perception of the world is inseparable from the perception of the body [62]. The body is capable of “turning on itself” and “becoming both the source and the finality” of its exploration and gnostic processes [63, p. 311] which differs from “body awareness” as defined by Mehling and colleagues [51] as an attentional focus on bodily sensations placing consciousness prior to perception, as the discriminating reference.

In studies on the effects of meditation on anxiety, perception is almost non-existent as a contributing factor to understanding or describing the processes at work. Even today, probably as a result of Descartes’ legacy, perception is often linked to an idea of confusion, vagueness and instability that can hinder the development of logical reasoning. However, neurosciences now acknowledge the fundamental place of perception in the understanding of the world and of oneself [60,64-68].

Perception is the act of perceiving sensory information, both external and internal. Everything that flows from the senses participates in all the other cognitive activities. This function enables discrimination, categorization, association, analogies and comparisons, ahead of reflection and in real-time of the experience [69]. Merleau-Ponty even considers that perception “précède les recoupements qui la vérifient”<sup>iii</sup>, that it is even “la condition de l’association”<sup>iv</sup> and that it founds and initiates immediate knowing, before any judgment [62, p. 48]. With the notion of immediate internal apperception of the body developed by Maine de Biran, the “sentir”<sup>v</sup> as a mode of existence and the body as a mode of access to oneself form together the basis on which awareness can emerge: There is no self-awareness without inner sensing and a lively coexistence with the body [70, p. 175]. For W James [69,70], the notion of a perceived and sensing body is essential

<sup>i</sup>Perceptual consciousness

<sup>ii</sup>Conscious Perception

<sup>iii</sup>Precedes the overlaps that substantiate it, it precedes itself

<sup>iv</sup>The condition for the association

<sup>v</sup>Feel



in order to access the awareness of our inner states. For him, “organic” changes from the “deep tissue” of the affects, in such a way that in the absence of bodily sensitivity, it is the whole “sensitivity of the soul” and feelings that would disappear, leading the person to “drag an existence of pure spirit that would only think and know” [70, p. 505].

Sensoriality also includes the ability to perceive oneself perceiving, thereby establishing a form of distance from one’s own experience. Sensoriality refers not only to “I feel” but also to “I feel that I feel” according to Maine de Biran’s ‘cogito’. This ability, which he has documented and named “intimate sense”, enables us to grasp information on the inner states of the body before consciousness and reflection intervene. This extension of the fields of perception and sensoriality opens up important perspectives for the study and understanding of meditation and of the internal phenomena arising to an open consciousness. Overcoming the concept of self-determination earlier mentioned leading to adequate choices and well-being, or the concept of ‘decentering’ by which one becomes the witness of one’s own thoughts, it suggests an organic and psychophysiological foundation to the process of Shapiro’s “reperceiving” [44] and emphasizes the place of perception and of the relationship to the body, in the mechanisms of action on behaviours that are the result of a regular and prolonged practice of meditation.

Neurosciences have also shown that reflexivity is based on the somatic markers of experience and that feelings are perceptions which appear in neuronal charts and relate to different parts or states of the body [48,66,72]. From a more peripheral perspective, proprioception is also shown to be a major factor in self-knowledge and in the sense of corporality. Roll [73] sees it as the “source of the feeling of embodiment”, and beyond its function of interface with the environment, of fundamental grounding of identity, as the support of elaborate cognitive functions [73, p. 70].

Another aspect of sensoriality is that of interoception, whose function is to convey internal information about the physiological states of the body such as pain and well-being, through a direct neurological pathway to the insula for regulation. This sensory function contributes to the awareness of the biological states of well-being and discomfort and participates in what Damasio [68,74] calls “the neurobiology of the self”, the constant sense of being oneself and the ability to feel oneself knowing [45,49]. Also recently defined as the perception of physical sensations associated with emotions [48,51] it is a major focus of meditative practices that engage the body’s experience, such as breathing in the mindfulness practice. Because it also allows the access to a more subtle world of bodily perception nuances, interoceptive awareness seems to now be considered evolutionary depending on contemplative practice [48]. This is the closest idea found in the literature, to our belief that sensorial potentialities can be improved, in particular by use of bodily oriented contemplative practices [75].

Ultimately, what is generally attributed to consciousness proceeds partly from sensoriality in all its aspects. Without it, consciousness would be poorer, quality of presence to self-diminished, and recognition of inner body states absent. Thus sensoriality participates actively in neuronal plasticity. The plasticity such as it is highlighted in medical imaging research on meditation cannot therefore be attributed to the activity of thought alone or to mental processes.

In the end, sensorial perception, in all its aspects, appears as foundational of self-awareness, body awareness, and the felt sense of embodiment. This finding is now strengthened by the results of recent studies [76] that extend the anatomo-physiological substratum of proprioception and interoception to all the connective tissues present throughout the body.

### Indications of impact of Sensorial Introspection on anxiety

Several studies have been conducted on Sensorial Introspection. We selected three of them from three different universities: Bois [53] from Seville, Cencig [77] from Fernando Pessoa University in Porto, and Rapin [78] from UQAR<sup>vi</sup>. Based on qualitative protocols used for a total of 32 people, these authors identify a set of impacts related to self-esteem, well-being, assertiveness and trust, all these being items investigated in anxiety assessment. More precisely, a number of indicators appeared that justified this research project. Indeed, the self-reports collected showed that Sensorial Introspection brought states of calm, serenity and peace [53,77], more peaceful thoughts [77] and had conscious positive effects on negative thoughts [53]. It is even sometimes considered helpful in controlling fear [78]. All reported a sense of protection or refuge, a sense of stability and a sense of presence [53,77,78]. Some mentioned a particular quality of relating to the body that can be accompanied by a feeling of inhabiting one’s body [77,78], or even a feeling of existing [53]. With the exception of those referring to the body and to the feeling of embodiment, it is easy to recognize in these descriptions the positive or negative affects used in the scales of self-assessment of anxiety and stress.

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Beyond these three studies, all the research carried out on Sensorial Introspection mentions the importance of a regular practice to absorb the positive states and transformations noticed. This shows that a learning process is ongoing [79,80] and is in conformity with information collected in our literature review concerning long term practices and their possible impacts on psychological or personality traits.

### Sensorial introspection in practice

The practice primarily engages sensory modalities, and verbal guidance purposefully avoids any instructions that might activate the control of thought and mental processes, so as not to interfere with the inner phenomena arising. Indeed, in the hypothesis of an inherent efficacy of sensoriality, it is important that the habitual mental and cognitive functions be reduced as much as possible. The instructions stimulate the senses as follows:

- The proprioceptive sense through the adoption of a consciously still posture held with a relaxed tone, the spatial perception of the body, its alignment and contours and the perception of the body position, its supports, areas of tensions and of release to name a few;
- The auditory sense through listening to the ambient soundscape including that of the group as well as of the participants' quality of listening to the silence;
- The visual sense through closed eyelids, in order to perceive the atmosphere of colour emerging in the phenomenal field;
- The interoceptive sense through the perception of inner-body states, such as pleasant or unpleasant sensations, feelings and emotions;
- The inner tact, which is the observer perception of "I feel that I feel", "I perceive myself perceiving, I perceive myself thinking, I perceive myself in action";
- Perceptual discrimination, which takes account of the phenomena arising in real time, allowing them to be grasped, processed and integrated before any judgment is made.

### Exploratory survey using psychometric scales

Considering the literature review we carried out, we were inclined to hope for positive immediate effect of sensorial introspection on anxiety state. Some studies consider that the greatest beneficial effects on anxiety is to be expected from the level of compliance with the intervention program [10,25,81,82], but even more, from a regular practice [83] and the pursuit of a personal practice [27]. And seniority in the practice of meditation seems to have a positive effect on the measured parameters (any parameter) [7]. Therefore we also expected possible links between anxiety trait and expertise or seniority in the practice of Sensorial Introspection, which could then be hypothesized as specific effects for further investigation. We decided to explore this on a real life population.

Our objectives are here primarily exploratory. The study firstly aims to test the practical feasibility of assessing Sensorial Introspection's effects on the psychological dimensions of our population using psychometric scales, and second, to understand how our participants react to such evaluation and what their answers allow us to assess in reference to the full understanding of this practice. Ultimately, the expected outcomes are to bring out the potential utility of the intervention on anxiety and to know more about our population's specificities. To maximize this pre-post behavioural exploratory assessment, our participants were taken as a single group acting as their own control. This will help define the conditions for appropriate control in further studies.

Our study is a pre-post assessment of a one-off intervention. The participants and the researchers all know what the intervention is about (a single Sensorial Introspection session) and the issue is basically behavioural (assessing the impacts on anxiety). Therefore the design can be considered an open-label single group clinical pilot trial, in which the self-reference results will be compared to literature results on equivalent studies (single and short intervention, self-control studies) [5,22,84].

The intervention was conducted at the very beginning of a 2-day workshop, without any external influence other than that of arriving from long distance journeys and one's possibly stressful life. The practice was guided by D. Bois using a standard protocol [57] (see detailed protocol in appendix). The intervention lasted 20 minutes and can be considered a "pure" meditation protocol, if we refer to Eberth's classification [33] which opposes practices that associate several tools and contexts. Pre-intervention self-assessed variables are: age, gender, seniority, practice, STAI-Y State, STAI-Y Trait. Post-intervention self-assessed measure is: STAI-Y State. We used the French

version of the Spielberger's STAI-Y form [85] for anxiety assessment because it has been translated and validated on several thousand people all around the world thus demonstrating its intercultural robustness, and because of its dual measure of the state (situational) and of the trait (structural and behavioural) of anxiety.

|                           | Sample size | Population                                  | % female | Age (range or SD) | Anxiety State (SD) | Anxiety Trait (SD) |
|---------------------------|-------------|---|----------|-------------------|--------------------|--------------------|
| Bruchon-Schweitzer (1993) | 200         | General                                     | 44%      |                   | 37.9 (10.33)       | 43.3 (10.3)        |
| Gauthier (1993)           | 1080        | General                                     | 68.2%    | 24 (16-55)        | 37.65 (9.67)       | 40.59 (9.5)        |
| Bouchard (1998)           | 188         | Elderly people                              | 75.5%    | 75.5 (7)          | 37.7 (11.1)        | 42.5 (12.0)        |
| Wattier (2011)            | 1404        | General                                     | 50.2%    | 53.2 (15)         | 38.45 (13.61)      | 38.9 (12.12)       |
| Servant (2013)            | 30          | General (control group of a clinical study) | 70%      | 41 (11)           | 23.8 (4.7)         |                    |
| Balsamo (2013)            | 877         | Non-clinical population                     | 59.9%    | 24.3 (17-74)      |                    | 41.43 (11.06)      |
| Our sample                | 84          | Workshop participants                       | 79%      | 54.2 (9)          | 33.21 (9.8)        | 40.05 (9.4)        |

**Table 1:** Average STAI-Y scores on general populations [28,29,85,87-89] and baseline values of our sample.

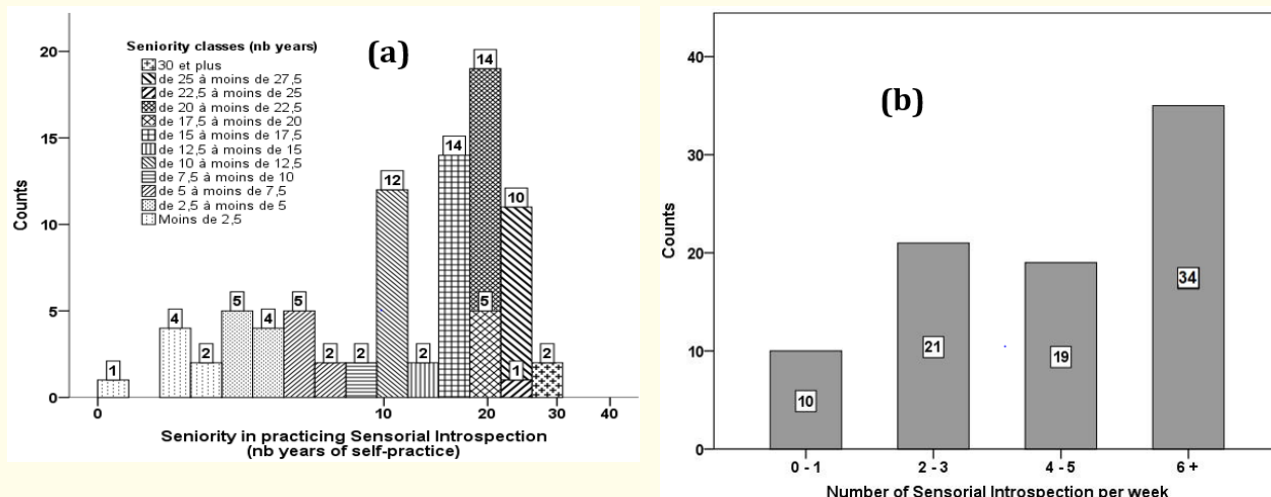
|                     | Intervention (duration)      | Sample size | Population            | % female | Age (range or SD) | Control group | State 1 (SD)  | State 2 (SD)  | S2-S1 (% decrease) | Trait (SD)    |
|---------------------|------------------------------|-------------|-----------------------|----------|-------------------|---------------|---------------|---------------|--------------------|---------------|
| Shapiro (1998)**    | MBSR (8w)                    | 73          | Medical Students      | 56%      |                   | X (Wait list) | 40 (9.4)      | 37 (12.4)     | -3 (7.5%)          | 40,8 (8,9)    |
| Netz (2003)**       | Yoga (14w)                   | 31          | Teachers              | 100%     | 39 (10)           | X (computer)  | 33.5          | 26.77         | -6.8* (20.3%)      | 35.36 (10)    |
|                     | Feldenkrais (14w)            | 37          |                       |          |                   |               | 35.2          | 28.35         | -7.2* (20.5%)      | 36.22 (8.58)  |
| Subramanya (2009)** | Yoga Cyclic Medit (22.5 min) | 57          | Yoga Practitioners    | 0%       | 26.6 (4.5)        | X (rest)      | 38.3          | 29.7          | -8.6* (22.4%)      |               |
| Bergen-Cico (2014)  | MBSR (12w)                   | 108         | Students              | 73%      | 23 (6)            | X (lecture)   |               |               |                    | 40,14 (8,99)  |
| Smernoff (2015)     | The Work (9d)                | 196         | Workshop participants | 68.4%    | 47.8 (10)         | -             | 40.29 (13.05) | 27.69 (11.28) | -12.6* (31.3%)     | 42.22 (11.67) |
| Weibel (2017)       | Loving-Kindness (4w)         | 34          | Undergrad Students    | 77%      |                   | X (wait list) |               |               |                    | 41.53 (11,6)  |
| Dos Santos (2016)   | MBSR+LK (6w)                 | 13          | Nurses                | 92%      | 47 (8)            | -             | 45.08 (2.36)  | 41.38 (3.91)  | -3.7 (8.2%)        | 48.92 (2.67)  |
| Our sample          | SI (20 min)                  | 84          | Workshop participants | 79%      | 54.2 (9)          | -             | 33.21 (9.8)   | 26.5 (6.4)    | -6.71* (20.2%)     | 40.05 (9.4)   |

**Table 2:** Average STAI-Y scores and rough results from pre-post-intervention studies on meditative practices [5,22,26,27,81,86,90] and comparison to our exploratory sample.

MBSR: Mindfulness based stress reduction; LK: Loving-Kindness; SI: Sensorial Introspection; State 1: Pre-intervention State Anxiety (Baseline); State 2: Post-intervention State anxiety; S2-S1: Difference between State scores S2 and S1; T2-T1: Difference between Trait anxiety scores pre- and post-intervention. (\* significant difference; \*\* graphically computed).



In order to identify the probable mother population of our sample, we compared our data to literature references (see table 1 and table 2). Reference scores generally lie between 37 and 40 for Anxiety State, and between 40 and 42 for Anxiety Trait (Table 1), which are ranked as low levels [85]. It doesn't seem to vary with age, and gender is often pooled. On pre-post-intervention studies (Table 2), baseline measures are roughly the same as those from table 1, except for Yoga and Feldenkrais practitioners [26] which have lower state (33-35) and trait (35-36) scores, and for nurses [86] which have higher state (45) and trait (49) scores.

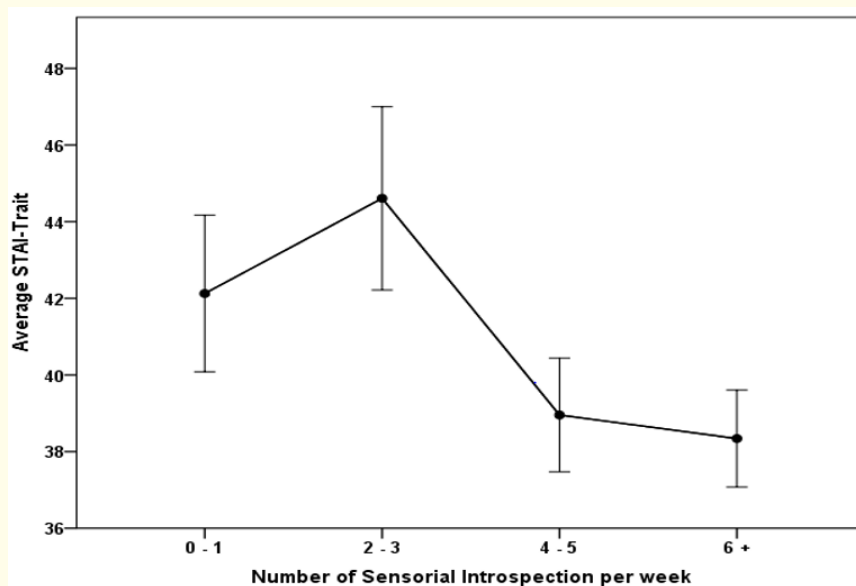


Graph 1: Frequency distribution of Seniority in practicing Sensorial Introspection (a), and self-practice intensity grouped in four classes (b). Graph (a) features a power X-scale revealing the four groups of seniority.

**Defining our population:** Our sample is predominantly female as in most studies, and presents no gender differences on any of the measured variable so data were pooled. STAI-Y scores rate lower than average on anxiety baseline state (close to Netz [26] Yoga and Feldenkrais practitioners), but trait level is the same as in all studies. Our sample is composed of mature adults averaging 13.8 years' experience in practicing Sensorial Introspection (SI) as shown on graph 1a: one person is a true beginner, 18 participants (21%) have 1 to 5 years of regular practice (average 4 practices/week) and the rest have 16.4 years of seniority on average, averaging 4.8 practices/week. 63% of our sample practices 4 to 7 times a week (see graph 1b). No relationship between seniority and practice intensity was found.

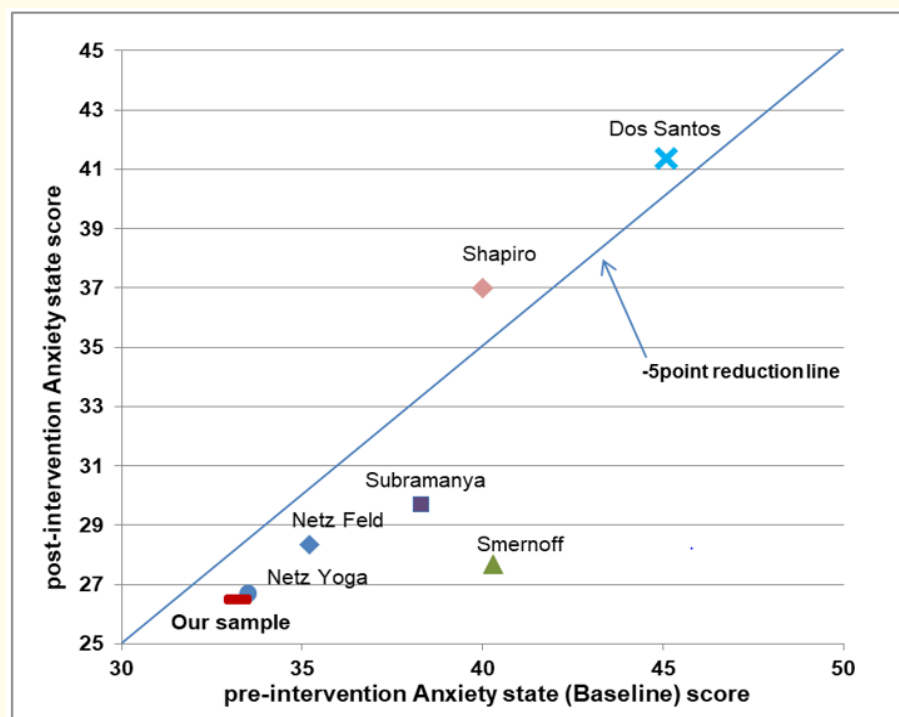
Results

Data computation and statistical analyses were conducted using Excel 2010, SPSS v.23 and Modalisa v.7.0. With a strong decrease of -6.7 points of state anxiety ( $t = -7.566$   $p < 0.001$ ), our result is comparable to reviewed studies (-6 to -7 points and 20 to 22% decrease) [5,22,26] including those reporting strong effects with reference to control groups [22,26,81]. Using ascending regression analyses, anxiety state decrease appears to depend firstly on its initial value ( $r = -0.76$ ,  $F = 21.798$   $p = 0.001$ ), then on anxiety trait level ( $r = -0.334$   $F = 3.201$   $p = 0.017$ ). Using a one-factor Multiple Analysis of Variance, Self-practice intensity appears to significantly impact anxiety trait ( $F = 2.914$ ,  $p = 0.038$ ), and Anxiety State Baseline ( $F = 3.336$ ,  $p = 0.022$ ), both with a moderate effect size (respectively  $\eta^2 = 0.08$  and  $\eta^2 = 0.09$ ). As illustrated on graph 2, anxiety trait scores are roughly 4 to 5 points lower when weekly self-practice is of at least 4 times a week. There doesn't seem to be a difference of impact on anxiety between practicing or not when self-practice is less than 4 times a week. The same pattern is observed on baseline state anxiety. No effect of seniority was noticed.



Graph 2: Average STAI-Y2 (Trait) scores according to weekly practice of sensorial introspection.

**This leads us to four hypotheses:** 1) Due to its level of seniority and average self-practice, our sample must be viewed as an expert group, probably as much as those of Netz Yoga and Feldenkrais practitioners [26] considering their similarly low anxiety state levels (Graph 3); we therefore assume our mother population to be obviously non-clinical and most probably seeking wellness through meditation practice. 2) Considering the very low initial state level prior to the intervention, the actual effect of Sensorial Introspection on anxiety state is probably very strong, at least as much as other assessed practices. 3) Beneficial effect on anxiety state is greater on more anxious individuals, i.e. those having a high trait level or a high initial state level. 4) Self-practice could induce a decrease of anxiety state baseline acting as a regulation of anxious moods in daily life, whilst everyday practice influences the anxious trait without much seniority being necessary. This would mean that the effects on anxious trait should be felt and manifest themselves long before any seniority is established. It would then be the regularity of the practice over the length of time (assiduity) that influences the anxious profile.



**Graph 3:** Pre-post Anxiety State reduction analysis (comparing our sample results and literature data from table 1 [5,22,26,27,81,86,90]). The “-5point reduction line” features the significant difference threshold recommended in literature. Points to the left have less than 5 point decrease. Points to the right are greater. Our sample has the lowest anxiety state scores pre and post intervention and yet presents a reduction rate above threshold.

### Discussion and Conclusion

Many studies claim that meditation is effective, but many meta-analyses highlight the weakness of such findings, in particular because protocols often combine (as is the case with mindfulness with MBSR and MBC) several activities that cannot be isolated from the meditation it-self to identify its active elements [8,16,33,43,82].

Our results derive from a one-off test made during one meditation session. Considering this practice is focused on perceptual and sensorial abilities we are moving towards the hypothesis that sensoriality is actually at play within the mechanisms of action of meditative practice. Because we refer to the responses of a single group of experts, our proposition is to suggest the existence of a pattern which is now ready for further investigation: 1) Sensorial Introspection seems to have an immediate beneficial effect on the state of anxiety. We can deduce from this that an introspective practice turned towards perceptual and sensory modalities has at least the same effectiveness

as those involving will, the mind and control as means of access. 2) The effectiveness of the intervention is particularly high in highly anxious and stressed people (high anxiety state) as well as in those who are highly vulnerable to stress and anxiety (high anxiety trait). 3) Constancy of a fairly frequent practice of Sensorial Introspection over time tends to lower baseline anxiety state and thus to stabilize moods. This is opposite to somatosensory amplification and as such we agree with Mehling [51] considering that meditation with the use of interoception awareness and sensitivity does appease anxiety. 4) It is the weekly frequency of the practice, more than seniority or regularity, that seems to have the strongest influence on the trait of anxiety. This is converging with previous results [11,43,90]. The authors first posit that regularity of a meditative practice is the main cause of improvement of the trait anxiety. But they all emphasize that conforming to the protocol is what really influences the trait of anxiety. And their intervention reference is MBSR protocol which requires participants to engage in daily personal practice outside the weekly collective sessions. So what really seems to act as beneficial on anxiety trait is the actual high-frequency practice.

These exploratory results offer some interesting perspectives on meditation's ways of action. From our previous literature review, we understand that sensorial introspection practice mobilizes attentional resources as a tool to perceive and to a far lesser degree as a talent of the mind and control. Meditative practices use two natures of attention, one that "turns towards" the thing and one where the thing "comes towards". This second attentional modality is called "open presence" in the practice of mindfulness, and "attentionality" in Sensorial Introspection. The latter was used in the intervention studied here.

In fact, sensorial modalities are constantly stimulated in all forms of meditation, but rarely studied as a constitutive function of any act of consciousness. Sensoriality and its multiple aspects (e.g. auditory, visual, proprioceptive and interoceptive) participate in all states of consciousness. Our exploratory study and the reflection that follows bring a different light to the still vague notions of conscious perception and perceptual awareness, awareness becoming an attribute of perception and perception a way to access self-awareness. Sensoriality leads to awareness, awareness of self, of one's movement and of one's bodily interiority. It is consciousness perceiving itself in the process of perceiving. And reciprocally, consciousness allows presence to sensoriality and to perceptions at the very moment of their emergence. It is this immediate reciprocity between consciousness and perception which appears to us to be the base of the act of consciousness and the foundation of the action of Sensorial Introspection, and therefore of all meditative practices, on the somatosensory modalities of behaviour.

We have proposed a first definition of Sensorial Introspection: Perception becomes introspective when it is associated with an act of conscious discrimination of the phenomena experienced within the body. Sensoriality is not limited to perceiving, feeling and knowing. When an introspective dynamic is associated with it, it acquires a function of observer: "I feel that I feel", "I perceive myself perceiving", "I perceive myself thinking". It gives rise to the emergence of a "consciousness witnessing the experience and self within the experience"<sup>vii</sup> [91]. It is from this observing posture that abilities to discriminate and make decisions in real time of the experience develop. It seems that this proposition is relevant to the study of the efficacy of introspective practice on anxiety. It converges with and expands the philosophical and physiological bases of the emerging concept of "reperceiving" mentioned above, by adding to the model of distancing that of the conscious and immanent sensorial relation to self in the mechanism of regulation of reactional behaviours. This makes it possible to conceive that the effects of meditation are based on a reciprocal and simultaneous interaction of a presence that is both engaged and a posture of observer.

The results of our study illustrate the fact that taking into consideration both the dimensions of the body and of perception is relevant to the appeasement of the psyche. Perception is inseparable from consciousness, but it is also inseparable from the bodily dimension. With this first attempt we wish to open the debate around the interconnection between body, perception and psyche to better understand the processes and skills of self-appeasement of the individual.

### Limitations and Recommendations for Further Study

Our aim was to bring light on the existence of an impact of Sensorial Introspection on anxiety and therefore the existence of a perceptual way in the meditative process. Further studies could usefully confirm our promising results if they could identify the parts in the measured effects due to the surrounding factors, the relationship to the facilitator, or maybe the intentions and expectations of the participants. One should also reflect on self-assessment modalities, in particular of self-practice which seems to be a strong explanatory factor.

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<sup>vii</sup>Conscience témoin de l'expérience et de soi dans l'expérience

Cross-cutting those reflections with recent updates on meditation impact assessment [32] and with respect to recent conceptual attempts on meditation's mechanisms of action [42], we suggest some conditions for further study of this meditative practice. Ideally, the research protocol should use a mid-term longitudinal controlled-trial design and a sitting-in-silence control group of practitioners with a wide range of expertise, possibly matching the intervention group. A larger set of dependent variables should be studied, particularly those allowing further exploration of the theoretical field of meditation's ways of action and our sensoriality and interoception perspective. We believe that priority should be given to variables that can assess 1) the states of mind and awareness encountered (mindful attention and awareness scale for example) or developed (as mindfulness skills for example), and 2) the changes in the relationships to others and to self, as much on interpersonal level as on positive or negative affects (self-esteem or anxiety). We also suggest a qualitative and phenomenological first-person documentation of the lived immediate experience and the longitudinal learning process.

### Hypotheses and Perspectives

Notwithstanding these recommendations, our results concern a practice that belongs to insight meditations which have been described as presenting the strongest effects [32]. They were obtained under comparable conditions to what is reported in most studies on healthy practitioners, and our figures match their results whether or not they have a control group. Therefore we propose as a hypothesis that a long-term practice of Sensorial Introspection most probably has strong specific effects of on anxiety trait and state. This allows us to open the debate on the place of sensoriality and inner perception in the mechanisms of action of meditation on anxiety and more broadly on the psyche.

Conscience témoin de l'expérience et de soi dans l'expérienceThe second focus concerns the close link between consciousness and perception. Mindfulness meditation has extended its field of investigation and has become very popular, including in the field of health. This approach advocates work on consciousness as a pathway and a return to a state of mental health and well-being. We wish to extend the concept of consciousness by highlighting the sensory modality which participates clearly in all acts of consciousness. Generally, one attributes what results from perceptual abilities to consciousness only. We have discussed the importance of sensorial modalities in the bodily perceptions at play. Our illustrated reflection opens the way to better apprehend the simultaneous bottom-up and top-down bodily information flow mentioned in recent studies on interoception [48]. The "from" and "to" simultaneous intentional process of full-presence experiencing is explained by complementarity concepts such as active neutrality or proximity distance of Bois [53]. We also believe that there is a development of perceptual acuity through Sensorial Introspection's regular practice, such as described by Farb [48] as an enhanced granularity of the interoceptive experience. And as Farb emphasizes, this improvement is beneficial to all adaptive actions, thus relationship to self, others and the world, empathy and well-being. These hypotheses can reach their full dimension along with Sensorial Introspection's principles when they are understood as fitting with the current of thought that claims the primacy of perception over consciousness earlier described. We hopefully contributed here to give perception and sensoriality a legitimate place within meditation theories and practices.

Those two areas of reflection are grounded in the exploratory study we have conducted on a practice that is turned towards perceptual and sensorial elements by knowingly lessening the stimulation of voluntary mental processes. We have outlined the influence that the perceptual and sensory modalities seem to have on the effects of meditative practice on anxiety. With respect to our goals, the validity of our results is satisfactory even though it could have been reinforced by adding up a control group. Yet, Sensorial Introspection can as of now be considered as one of the practices that cultivate interoceptive awareness. And it should be seen as a good way to assist in the regulation of anxiety in healthy or non-clinical individuals.

### Acknowledgement

We wish to thank Dr Bernard Payrau and Dr Hélène Bourhis who largely contributed to setting up the survey and data collection. We also are profoundly grateful to Helene Pennel for her assistance in the translation of the original manuscript to English. Without all these contributions, this reflection paper would not have been achieved.

### Conflicts of Interest

There is no conflict of interest from the authors in the conduct of the survey. It was self-funded and a small grant was received from FEPAPP (Fédération des Professionnels de l'Accompagnement en Pédagogie Perceptive) for data analysis and translation expenses. We certify having no liability to anyone that could influence or affect our results.

## Appendix: Exploratory survey detailed methodology

### Sample

Our study was conducted with all the participants of a two-day Sensorial Introspection workshop, given in February 2014 by D. Bois. The sample is made up of 84 people who fully completed all the submitted questionnaires (18 men and 66 women). Aged 54 on average, the participants have approximately 13.7 years' experience ( $\pm 8$  years) in the practice of Sensorial Introspection. We chose such sampling out of our concern to remain grounded in the conditions of real life of a non-clinical population "normally" seeking wellness.

All the participants volunteered and signed an informed consent prior to the start of the investigation. The survey took place right at the beginning of the workshop, just as the participants arrived, in order to confer to the intervention the slight condition of stress recommended by Spielberger [92]: participants often arrived directly from far away homes, in a tired state, some came for the first time and the size of the workshop was purposefully not revealed (it was a large group). This allows us to anticipate a rather high initial level of anxiety and a trait that should in principle be normal [23].

### Data collection

The participants completed a questionnaire and four context questions, before and after the intervention. The Spielberger STAI scale [92] is a self-assessment questionnaire using two grids of 20 items each, called STAI-State and STAI-Trait, which respectively assess the state of anxiety and stress and the vulnerability to stress and anxiety. We used the translated and validated French version of Bruchon-Schweitzer and Paulhan [93]. The four contextual questions are seniority (number of years of practice), frequency of practice (number of sessions per month), age and gender. The data collected before the intervention consists of the STAI-State and STAI-Trait questionnaires and the four context questions. The data collected after the intervention comes from the STAI-State questionnaire.

### Survey procedure

The survey was conducted on the very first meditation of the workshop. This meditation started just after the arrival of the trainees, before any verbal, cognitive or gestural instructions or stimulations of any sort. There was no soft music inducing an atmosphere of relaxation.

On arrival, people sat freely in the room; at the official starting time of the workshop, the doors were closed to latecomers; participants were given the informed consent form, in which the project was described without naming anxiety in order to respect the STAI application procedure; the consent text was read out to draw attention; the survey sheets were then distributed; the participants completed them quietly (15 minutes) and put their initials on all the sheets; the leaflets were then collected.

The meditation protocol began immediately after the collection of the leaflets; the Sensorial Introspection was guided by D. Bois, who took care that his prosody remained as neutral as possible.

Immediately after the meditation, the STAI-State questionnaire sheets were distributed again, then collected after 10 minutes without comment. No questions were ever answered.

Later, the sheets were sorted, anonymized and digitized using Excel, for further statistical treatment with Modalisa and SPSS. Missing data regarding STAI items were supplemented using rule of three if no more than 2 were missing per questionnaire. Beyond 2, the participant was removed from the sample. The participants who did not complete the context data were also removed. From the 120 attendees, 84 people fully completed the questionnaires and were therefore included in the survey.

The statistical analyses were conducted using SPSS 22.0 and Modalisa 7.0, descriptive statistics, mean comparisons, one-way analyses of variance and rolling multiple regressions (using  $\alpha = 5\%$ ).

### The intervention itself: Sensorial Introspection protocol

The guiding instructions' chronological sequence can be summarized as follows:

1. Settle into a still posture in a seated position of one's choice and relax into the posture;
2. Establish the conditions of silence and close the eyes;
3. Listen to the silence, to the ambient sound atmosphere - therefore of the room and then of the group -, silence then becomes a presence as the qualitative dimension of the collective silence begins to colour the sound atmosphere;

4. Turn inwards and perceive one's spatial position within the group and in relation to the facilitator's position: in the centre, to the right, to the left, in front, in the middle, at the back;
5. Then connect to the posture of the body, by observing its physical position and its tonic state;
6. Evaluate body states: perceive areas of tension and how they relax, maintain the muscular release;
7. Draw attention to the progression since the beginning of the session, starting from the physical to the psychological: perceiving oneself relaxed or tight, calm or tense, tranquil or anxious, serene or preoccupied. The participants are asked to evaluate their state by contrast with the beginning of the practice;
8. Through the eyelids, perception or not of a coloured atmosphere (black, nothing or what colours) and its possible animation;
9. Take notice of the presence or not of a thought that emerges. Evaluate whether this thought is related to what is being experienced or not. The probing follows a sensorial progression: to perceive oneself or not in the process of thinking, and if yes evaluate what nature of thought this is, for example whether it is connected or not with the unfolding experience;
10. Identify the effects on the heart, alterity and openness to others, states such as softness, happiness and joy;
11. End with a breathing exercise to come back to daily life, in conjunction with a physical movement of the spine on inhalation and exhalation (slight extension of the spine on inhale and then slight flexion on exhale). Return to the neutral position and observe the end state.

This sequence is called a "standard protocol", as it is the kind of protocol used with beginners or at the beginning of a workshop. The instructions are neither suggestive nor inductive. When meditators are invited to observe their perceptions without judgment, it is always done by offering alternatives. For example: for the sound atmosphere, "is it noisy or silent?"; for the visual sense, "does the luminosity appear outside or inside the body?"; for the proprioceptive sense, "is the posture tense or relaxed?" These instructions are there to help the meditators discriminate their perceptions in real time, without the intervention of voluntary mental processes.

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