

Interoception: A Measure of Embodiment or Attention?**Nitasha Buldeo, MS, MSc****University of Northampton, Department of Psychology**

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Abstract

Interoception provides a link for the affective and cognitive mechanisms of embodiment. fMRI studies suggest that brain areas known to mediate selective attention, are also relevant for interoceptive awareness (IA). Yet the relationship between attention, embodiment and interoception is poorly understood. This study attempts to understand this relationship by considering whether IA is possible when attention is compromised. Using two versions of an IA task, the standard mental tracking task (MMT) and a modified version of the same task, the IA of 20 healthy participants (9 female, 11 male) was measured. A significant difference in mean IA was shown between the tasks with the modified mental tracking task (MMTT) showing greater sensitivity. These findings suggest that IA is possible even when attention is compromised which supports somatic theories such as the somatic marker hypothesis. Most importantly this implies that IA may be a good measure of somatic awareness and may be useful as a measure in body psychotherapy research and clinical practice.

Keywords: Interoception, attention, embodied cognition, measures of embodiment, somatic awareness

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Everything we know begins from feelings”
 - Leonardo da Vinci 1452–1519 (Nardini, 1999)

We can all perceive feelings from our body related to its internal and external state and this provides a sense of our physical and physiological condition. These feelings generate the intuitive notion that bodily sensations are intrinsically tied to life, represent relevant signals for survival and well-being, and underlie mood, emotional state, and fundamental cognitive processes (Herbert & Pollatos, 2012).

The perception of feelings in bodily systems, including joints, muscles, skin and viscera is commonly referred to as interoception (Dunn et al., 2010). As a general concept “interoception” includes two forms of perception: proprioception (signals from skin and the musculoskeletal apparatus) and viscerosception (signals from the inner organs) (Herbert & Pollatos, 2012). In a more detailed definition, interoception is described as the collection of processes by which physiological signals in the body are transmitted back to the brain, allowing the organism to regulate the internal state homeostatically and which may also give

rise to awareness of bodily feelings (e.g. pain, touch, temperature) (Cameron, 2001; Verdejo-Garcia, Clark, & Dunn, 2012).

The origin of the term interoception cannot be precisely specified. However the description of the concept of the milieu interieur by Claude Bernard approximately 150 years ago may be a good place to start. Bernard's idea was that there was an identifiable set of physiological parameters that defined the normal internal state of the organism. Although it is now known that most, if not all, of these physiological parameters are not normally static, the theory that there are optimal physiological conditions that vary across organismic circumstances is correct (Cameron, 2001). Implied in Bernard's theory was the idea that the body would seek to maintain these optimal parameters (Gross, 1998). Several decades later, Walter Cannon called this maintenance process – homeostasis (Cannon, 1953). Both milieu interieur and homeostasis imply the existence in the body of mechanisms by which the organism can track the moment-to-moment fluctuations of these physiological parameters. Afferent information travelling from the body to the central nervous system enables the body to holistically control or maintain this homeostatic milieu interieur. The afferent pathways that carry sensory information from the body to the brain facilitates the homeostatic regulation of purely physiological reflexes like breathing and blood pressure. However these afferent pathways may also transfer sources of information about the state and function of the body that could influence higher mental functions (cognition) and behaviour (Cameron, 2001).

In keeping with the above idea, evidence suggests that primates have a distinct cortical image of homeostatic afferent activity that reflects all components of the physiological conditions of all tissues of the body. According to this view, all sensations from the body are represented in the lamina-1-spino-thalamocortical pathway, a phylogenetically new system found in the dorsal horn of the spinal cord, that evolved from the afferent limb of the evolutionarily ancient, hierarchical homeostatic system that maintains the integrity of the body (Craig, 2003, 2009). This view opens up a wider conceptualization of “interoception”, which is: an overall representation of the internal state within the context of on-going activities that is closely associated with conscious or motivated action to homeostatically regulate the internal state (Craig, 2008; Herbert & Pollatos, 2012; Verdejo-Garcia et al., 2012). This highlights the role of homeostasis in what we think of as conscious, deliberate or motivated action. Furthermore interoception implies an ability to distinguish more than the usual exteroceptive perception via the sense organs, as a variety of environmental stimuli such as chemical, barometric or electrical have an effect on the body.

Interoception as a basis of embodied processes

William James (1884) proposed that subjective feelings – the meaning that is attributed to objects and events in the world – arise from the sensory feedback of the visceral responses that are elicited by those objects and events (Reimann & Bechara, 2010). A model of emotion similar to, although more limited than James', was independently proposed by Danish physiologist Carl Lange in the same era (Lange, 1885/1912). The two models are often collectively labelled the 'James-Lange theory of emotion', which supports the premise that physiological responses are causal in emotional experience (i.e., 'feelings'), (Friedman, 2010). Early challenges to the James-Lange position, rested on beliefs that autonomic outflow was insufficiently differentiated to enable emotion-specific response patterns (Cannon, 1931).

Demonstration that both sympathetic (Janig, 2008; Morrison, 2001) and parasympathetic (Porges, 2007) nervous systems possess exquisite organ-specific regulation has countered this argument and contributed to a revival of somatic theories (Damasio, 1994; Harrison, Gray, Gianaros, & Critchley, 2010).

There has, however, been considerable debate about the extent to which feelings and cognitions are in fact embodied. Much of this debate has focused on emotional experience and decision-making. For example, the James-Lange theory was modified to argue that emotional experience is a product of the cognitive appraisal of bodily arousal (Schachter & Singer, 1962). While in the somatic marker hypothesis (SMH) (Damasio, 1996; Damasio, Tranel, & Damasio, 1991); Damasio (1994) argues that the sensory mapping of visceral responses not only contributes to feelings, but that this mapping is also important for the execution of highly complex, goal-oriented behaviours. In this view, visceral responses function to “mark” potential choices as being advantageous or disadvantageous. This process aids in decision-making in which there is a need to weigh positive and negative outcomes that may not be predicted decisively through “cold” rationality alone. Both the James-Lange view and the SMH hold that the brain must contain a system that translates the sensory properties of external stimuli into changes in the visceral state that reflect their biological relevance. The SMH argues that this is the essential function of the ventromedial prefrontal cortex—a function that ties control of the visceral state to decision-making and affect (Reimann & Bechara, 2010). These models still remain controversial though, with critics arguing that bodily responses occur relatively late in the information-processing chain, and are therefore best viewed as a consequence, rather than the cause of cognitive-affective activity (Dunn et al., 2010; Moors, 2009).

However, recent neuroanatomic evidence of an “interoceptive neural network” in the brain comprising the somatosensory and somatomotor cortices, the insular cortex, cingulate cortex (ACC), and prefrontal cortices (ventromedial prefrontal cortex, dorsolateral prefrontal cortex) show support for somatic theories. These structures are relevant for monitoring the internal emotional and viscerosensory state (Critchley, Corfield, Chandler, Mathais, and Dolan, 2000) for emotion processing and reactivity (Phan, 2002), for the feeling of self-generated and externally induced emotions (Anders, 2004), and the self-regulation of feelings and behavior (Beauregard, 2001; Bechara, 2004).

Within the interoceptive network the insula represents a convergence site of viscerosensory input from different modalities of the body. It is suggested that different portions of the insula are involved in different and successive steps of neural processing. Hence the insula is central to the sequential integration of the body’s primary homeostatic condition with behavioral, cognitive and sensory processes. Raw interoceptive signals such as those coming from visceral changes, first project to the posterior insula, and become progressively integrated with contextual motivational and pleasure producing information as they progress toward the anterior insula. The neural constructs of the distinct, individually mapped sensations in the posterior insular cortex are then re-represented in the mid-insula that integrates the homeostatic re-representations with activity associated with emotionally salient environmental stimuli of many sensory modalities from different parts of the brain (Herbert & Pollatos, 2012).

This results in a “global emotional moment” in the anterior insula that represents the ultimate representation of all one’s feelings, thereby constituting the “sentient self”, in the immediate present moment (Herbert & Pollatos, 2012). This may also define the embodied

experience. The anterior insula cortex provides a unique neural substrate that instantiates all subjective feelings from the body and feelings of emotion at a certain moment in time (Craig, 2009). This supports the proposition that both subjective awareness and embodied cognition is built on homeostasis. Therefore the neuroanatomic basis of interoception (which may be considered as the awareness of homeostasis) provides a link for the “body’s role in creating the mind” as well as the affective and cognitive mechanisms of embodiment (Herbert & Pollatos, 2012). This process may provide the physiological correlate of what has been defined as a “felt sense” (Gendlin, 2003) in body psychotherapy practice.

Interoceptive Awareness (IA)

The term “interoceptive awareness” (IA) is used to define the conscious awareness of interoception (H. D. Critchley, Wiens, Rotshtein, Ohman, & Dolan, 2004). Tests to measure individual IA require participants to focus, or selectively attend to, a particular physiological sensation and either count (mentally track), or discriminate the sensation from other stimuli. IA may therefore be a primary component of body psychotherapy practice as it may enable the therapist to determine the client’s level of body awareness as described by both Aposhyan and Gendlin (Aposhyan, 2004; Gendlin, 2003).

Heart Beat Perception (HBP)

Heart beat perception (HBP) is the most frequently used IA measure (Dunn et al., 2010). HBP relies on individual sensitivity for cardiac signals (“cardiac awareness”) (Jones, 1994; Wildmann, 1982). There are two main HBP methods (Dunn et al., 2010) “tone detection procedures” (TDP), a discrimination task (J. Brener, Liu, X., Ring, C., 1993; Whitehead, 1981) and the “mental tracking task” (MTT), a tracking or counting task (Schandry, 1981). In both these tasks participants are instructed to focus on or selectively attend to their own heartbeats without feeling for their pulse. These tests allow the calculation of individual heartbeat perception scores that characterize the deviation of the subjectively felt cardiac signal from the objective, “true” cardiac signal obtained from a physiological heart rate monitoring device. In TDP participants have to attend to their heartbeats and discriminate their heartbeat from an exogenously presented auditory tone. While in the MTT participants are required to attend to, and count their heartbeats (subjective measure) for a random time interval, with their heart rate also being monitored electronically (objective measure) (Schandry, 1981).

Both of these methods are susceptible to numerous confounds as reported by many who have used them. The TDP method is not a particularly sensitive measure of individual differences (Dunn et al., 2010). A large proportion of participants using this method perform at chance levels, with relatively low rates (40-50% classified as perceivers) of detection (Eichler, 1994; Knapp-Kline, 2005). The MTT method, first described by Schandry (Schandry, 1981) is the most frequently used HBP test. This is because the MTT has a higher effect size and greater sensitivity. However this may be due to the use of cognitive strategies. Participants may complete the task by counting time and using this to estimate a plausible number of heartbeats based on their underlying beliefs about how fast the heart works (Brener, Knapp, and Ring, 1995). Also, because participants are asked to attend to their heartbeats, individual attentional abilities also have an effect on heart beat perception. This combination of attentional and cognitive processes may confound IA as determined by the MTT. To overcome the confounding effects of cognitive processes, randomised time intervals

and repeated measures are used with practice trials interspersed between actual trials in each set of MTT tasks. However the confounding effect of attentional ability is more difficult to overcome. Furthermore, neuroimaging studies suggest a strong correlation in cortical areas found to underlie both IA (awareness of internal body states) and selective attention (SA) (the act of focusing on a particular object while ignoring other irrelevant stimuli). Critchley et al., (2004) and Matthias, Schandry, Duschek, & Pollatos, (2009), also found significantly better performance in SA and divided attention (DA) tasks for participants with high IA (measured using MTT).

It is difficult to determine if good attention processing facilitates better IA, or if IA is unhampered by attention, as the causal relationship between attention and interoception is poorly understood. To better understand this relationship, this study aimed to answer the question, “is IA possible when selective attention is compromised?” This has implications for somatic psychotherapy both clinically and theoretically, as it is important to determine if body awareness of unconscious stimuli is possible even when a person is fully engaged in another task.

Method

Participants

An opportunity sample of 20 right-handed individuals between the ages of 18 to 60 (9 female, 11 male) completed this study, however 8 (4 female, 4 male) participants were excluded from analysis. Outliers were excluded to maintain homogeneity of the data. Individuals with learning, communication or uncorrected visual difficulties as well as individuals with a diagnosis of diabetes mellitus, tachycardia, hypertension or peripheral vascular disease were excluded from participation. Full details of the procedure are available in Appendix 1.

Interoceptive Awareness (IA)

Research on both the cardiovascular system (Critchley et al., 2004; Herbert, Pollatos, & Schandry, 2007; Schandry, 1981) and the gastrointestinal system (Stephan et al., 2003) highlights significant inter-individual differences in IA (Herbert & Pollatos, 2012). To remove these individual or between-participants differences as a potential extraneous variable, this study used a repeated measures (within-group) experimental design.

IA (the dependent variable (DV) was measured using two versions of a heartbeat perception (HBP) task, the standard Mental Tracking Task (MTT) (experimental condition 1) as described by Schandry (1981) vs. a modified version of the same test i.e. MMTT (experimental condition 2). In order to counterbalance the effects of fatigue, the order of the two independent variables (MMT and MMTT) were reversed in half of the participants.

MTT

The mental tracking task (MTT), which was first described by Schandry (Schandry, 1981) is a well-validated heartbeat detection task and was found to be more sensitive to individual differences than tone detection alternatives (Dunn et al., 2010; Ehlers & Breuer, 1992; Knoll & Hodapp, 1992).

In this study the MTT was tested using three time intervals of 25, 35, 40 seconds. All counting periods followed standard resting periods (20 s). There were three blocks of four trials each making up 12 trials and four practice trials (two before the first block and one each before the second and third block). The time intervals were pseudo-randomized in all four blocks. During all trials ECG was recorded using the Biopac version 2.7.2 as described above. Prior to commencing with the MTT participants were given the following instructions (Figure 1).

Figure 1: Instructions for MTT and MMTT

In the following set of tasks you will be required to count your heartbeats. You would need to pay attention to your body and count your heartbeats.
You **CAN NOT TAKE YOUR PULSE**.

Please sit in a comfortable position with your right wrist placed on the white block below the keypad. This will facilitate easy access to the keys and mouse so you may enter your responses.

All instructions for this task will be displayed on the screen. Following this instruction screen there will be 4 screens.

The first of these 4 will require you to ready yourself. As soon as you are ready to commence, please click Enter to start the task.

Once started there will be a brief pause, followed by a GO screen.

When you see this screen you need to start counting your heartbeats as specified above. You will stop counting as soon as you see the STOP screen.

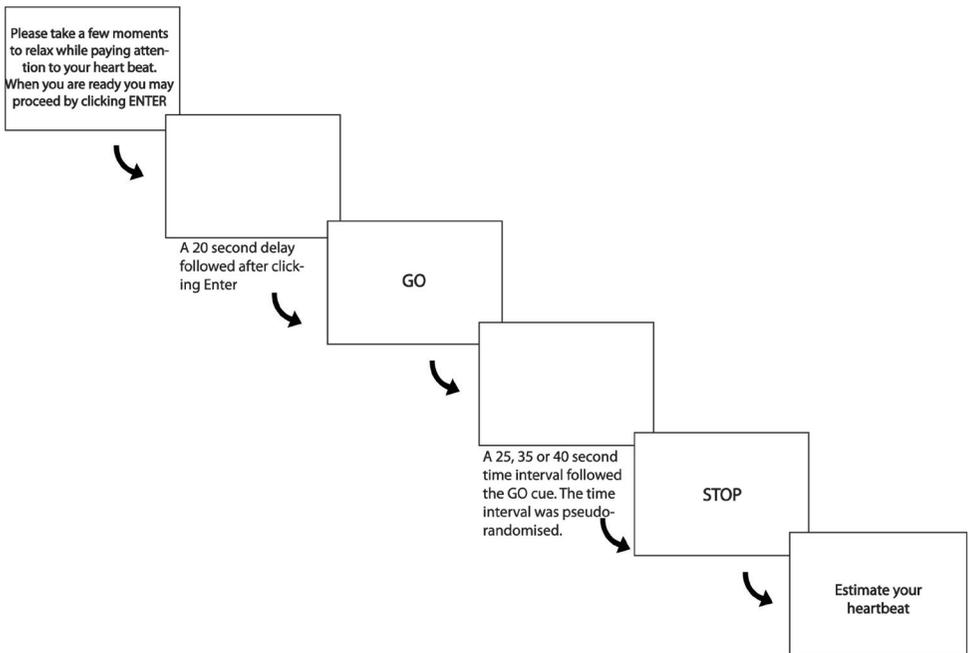
You will then be asked to enter the number of heartbeats that you counted/estimated using the numerical keys.

After you have entered this, you will commence the next task in this sequence. You need to follow the same procedure for all the tasks in this part of the experiment.

You will have a practice run first.

Please press the ENTER key to the right of the keypad when you are ready to proceed.

Figure 2: Mental Tracking Task (MTT) Flow Diagram

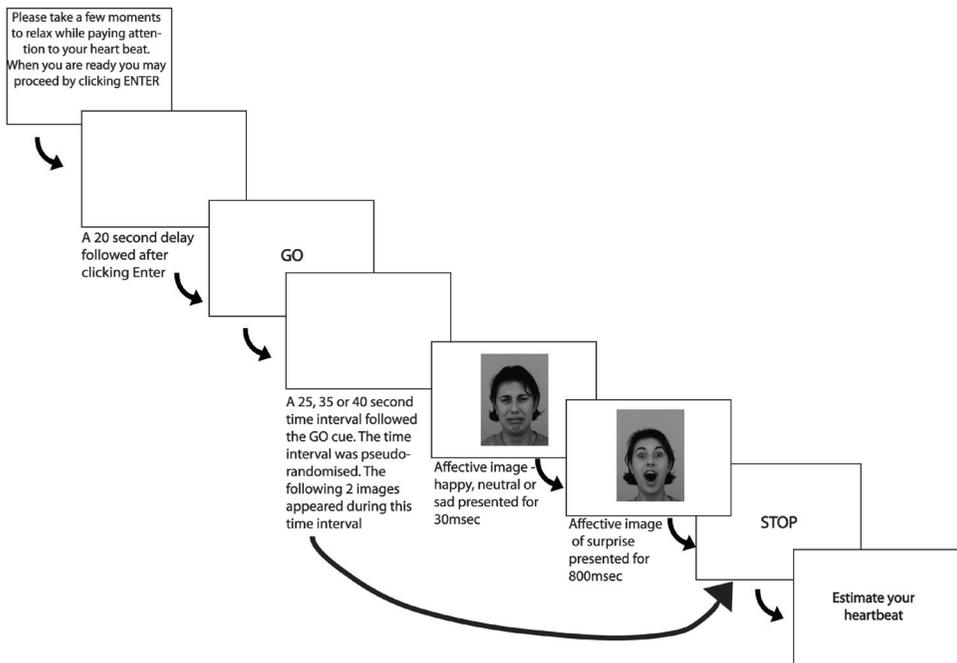


As depicted in Figure 2 above, participants were asked to press enter when ready and then to count their own heartbeats on seeing a “go” cue and to stop counting on seeing a “stop” cue, both presented on the monitor. Participants were not permitted to take their pulse or to attempt any other manipulations that could facilitate the detection of heartbeats. Following the stop signals, participants had to enter the number of heartbeats counted using numerical keys via the keypad. If the “go” or “stop” cue was missed or the participant was unable to count heartbeats for any reason, 00 could be entered. This denoted a false trial during analysis. Participants were not informed about the length of the counting phase nor about the quality of their performance at any time during the procedure.

Modified MTT (MMTT)

MMTT was similar in all respects to the MTT above, including the instructions (Figure 3), time intervals, and procedure. The only difference was the addition of affective images as depicted in Figure 3.

Figure 3: Modified Mental Tracking Task (MMTT) Flow Diagram



The “go” cue was followed by the presentation of two affective facial images (Karolinska Facial Images) on the monitor. The first affective image (happy, sad or neutral) was presented for 30 msec and the second surprised facial image for 800 msec. This was done in order to distract the participants while they were counting their heartbeats.

Interoceptive awareness (IA) was calculated using a formula previously employed by Herbert et.al. (2012). A heartbeat perception score was calculated as the mean score across the three heartbeat perception intervals according to the following transformation:

- $1/n(1-(\text{recorded heartbeats}-\text{counted heartbeats})/\text{recorded heartbeats})$
- n is the number of successfully completed heartbeat perception trials.

A trial was considered successful if the participant entered a number other than 00. Participants had to have completed more than 10 trials successfully to be included in the analysis. The maximum number of trials was 12.

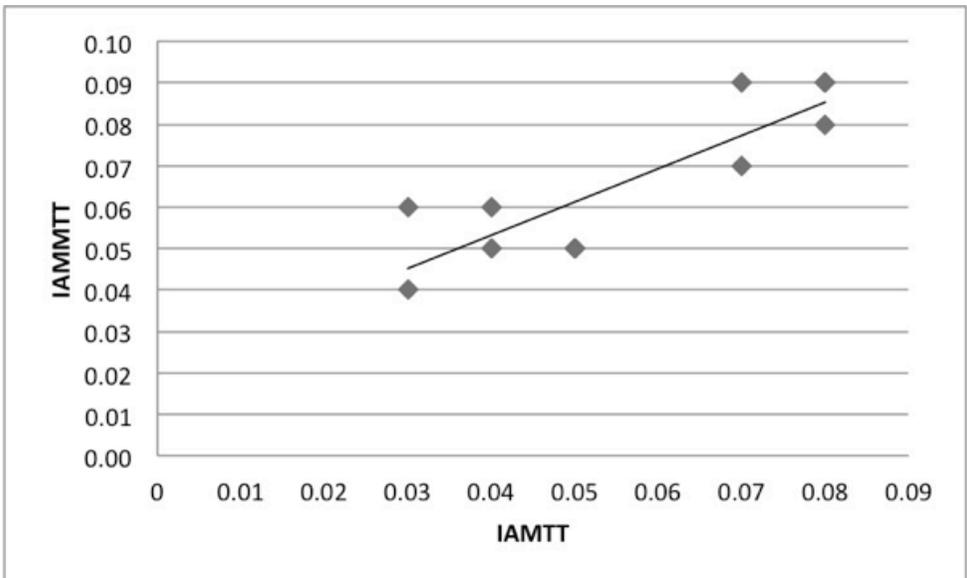
The heartbeat perception score varies between 0 and 1. The maximum score of 1 indicates absolute accuracy of heartbeat perception. IA was estimated as the mean heartbeat perception score (Herbert et al., 2012).

Results

Alpha was set at 0.05 and a paired t-test was used to examine the difference between the mean IA scores measured on MTT and MMTT. Confidence interval was set at 95%. Mean IA measured on MTT ($n=11$) was 0.06 with a standard deviation (SD) of 0.0201 and standard error of mean (SEM) of 0.006. The mean IA on MMTT ($n=11$) was 0.07, with a SD of 0.019 and SEM of 0.006 (Table 2). The paired two-tailed t-test was statistically significant ($\alpha = 0.05$) ($t(11) = 3.3166$, $p < 0.01$ ($p = 0.0078$)), $df = 10$ and standard error of difference = 0.003.

It was also interesting to note that for all participants IA measured using MMTT was either greater than or equal to (\geq) IA measured on MTT. No participant scored lower on MMTT. Table 1 is a scatterplot depicting the relationship between IAMTT and IAMMTT. A strong positive correlation between IAMTT and IAMMTT ($r=0.870$) was found. The 95% confidence interval for this correlation (r) is 0.564 to 0.965. Effect size (Cohen's d) was calculated ($d=0.516$) using the formula suggested by Cummings (Cumming, 2012).

Table 1: Scatterplot: Relationship between IAMTT and IAMMTT



Discussion

This study demonstrates a difference in mean IA measured via the standard mental tracking task (MMT) and the modified mental tracking task (MMTT) with the mean IA on MMTT being higher. This suggests that interoceptive awareness is possible even when attention is compromised. Phenomena such as attention blink (an observed phenomenon that the second of two targets cannot be detected or identified when it appears close in time to the first) and change blindness (a perceptual phenomenon that occurs when a change in a visual stimulus is introduced and the observer does not notice it) imply that we must pay attention to an object in order to visually experience it and that the contents of consciousness are identical to the contents of attention (Dehaene, Changeux, Naccache, Sackur, & Sergent, 2006; Koivisto, Kainulainen, & Revonsuo, 2009). Contrary to this, the data in this study suggests that it may be possible to be conscious of heart rate even if attention is compromised and this study supports Koch and Tsuchiya's theory that attention and consciousness are two distinct brain processes (Koch & Tsuchiya, 2007).

The implications of these results are valuable for the fields of embodied cognition and somatic psychotherapy for two reasons. Firstly, cognitive scientists tend to use data obtained in visual awareness studies to make assumptions about consciousness and this study gives us reason to question this supposition. While in the case of visual processing, the contents of attention may be identical to the contents of consciousness, this may not be so for other somatic processes. Awareness of sensorial and contrasting emotional experience may be present simultaneously in a patient undergoing somatic psychotherapy.

Secondly this study supports somatic theories such as SMH and others describing intuition or intuitive decision-making. Intuitions are described as "affectively-charged judgments that arise through rapid, non-conscious, and holistic associations." The premise that intuitions are "affectively-charged" is underscored by research suggesting that intuitive processes and judgments are tied to neuro-physiological systems associated with emotion (Damasio, 1994, 2000; Dunn et al., 2010). Intuition may be linked to interoceptive awareness (Dunn et al., 2010) and as suggested by this study may occur by processing visceral information that one is not consciously attending to. This supports the conjecture from body psychotherapy theory that unconscious information may be held in the body and processed within a body psychotherapy setting (Rothschild, 2000).

However a weakness of this study was that participants' divided attention (DA) ability was not established. DA enables a participant to split their attentional resources, and participants may have been able to do this while the distracting images were being presented. In this study all the participant's IA scores on MMTT were either higher than or equal to IA measured on MMT with no participant scoring lower on MMTT. This would suggest that either DA is not involved or that all the participants in this study had good DA ability. As this was a small sample, it is difficult to determine. In future studies the inclusion of a DA task is recommended.

The affective nature of the images could be responsible for mean IA being higher on MMTT. This is because IA accessed by cardiac awareness is related to greater sensitivity to emotional response and cardiovascular autonomic reactivity in different situations evoking autonomic changes (Herbert et al., 2012; Pollatos, Herbert, Matthias, & Schandry, 2007). Affective images are known to evoke emotional responses and autonomic changes, which may explain the effect size of the MMTT. It would therefore be interesting to test MMTT using non-affective distractor images (neutral symbols or numbers).

General Discussion

This study suggests that there is a significant difference in IA measured on the standard MTT and modified version of the test (MMTT) with the modified version appearing to be the more sensitive measure (mean IA on MMTT was higher than mean IA on MTT). As IA is becoming a popular area of study a more sensitive measure would be useful. This is also important for embodiment studies as it would seem that the more accurately individuals can perceive bodily activity, the stronger the relationship between such bodily changes and cognitive-affective processing (Dunn et al., 2010). Hence IA may be a useful objective measure for somatic awareness and to evaluate somatic interventions in research and clinical body psychotherapy practice, as IA may be an objective measure of how somatically aware an individual is.

BIOGRAPHY

Fascinated by the mind-body connection since childhood, Nitasha Buldeo completed a Masters in Health Sciences at the University of Johannesburg, RSA and an MSc. In Transpersonal Psychology and Consciousness Studies at the University of Northampton, UK. She also trained in Hypnotherapy, NLP, Nutrition and dry needling. Her passion for understanding the mind-body has inspired her on-going research.

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APPENDIX 1

The study was conducted in a darkened acoustic isolation room with the only sources of light being the monitor and backlit keyboard. The apparatus set up is described below and in Figure 1. A10009-100 disposable ECG Medical Sensors (1 3/8 inch vinyl disc with 10% Chloride wet gel) were attached to the inner side of both left and right ankles, above the medial malleolus as well as on the inner right wrist at the wrist crease as shown in Figure 2. ECG leads were attached to these as follows: white (VIN-) lead to the right wrist, red (VIN+) lead to the left ankle and black (ground) lead to the right ankle. These were attached to a Biopac MP150, version 2.7.2. system using the ECG 100 module. The corresponding software (AcqKnowledge, version 4.2Biopac (2.4.3) recorded ECG (Electrocardiogram) to determine heartbeats objectively as well as GSR (Galvanic Skin Response), which was not further analysed for this study. Signals were sampled at 500 Hz – settings on Biopac. The ECG 100 is factory set and does not require calibration. Settings on the ECG 100 were as follows: Gain - 500, Output Selection – R Wave Detector Function, Low Pass Filter - 0.5 Hz.

The experiment started with a 10-minute recording period, which enabled the baseline ECG (heart rate) to be assessed. During this period participants were asked to answer a brief questionnaire to determine their level of participation in meditation techniques or sport. Practitioners of either of these may be trained to be more aware of their heart rates and this could result in higher IA scores (Khalsa et al., 2008). The questionnaire took approximately 3 minutes to complete. Once the baseline-recording period was complete, the chair position was adjusted so that the participant's face was approximately 140 cm away from a generic PnP monitor (Resolution 1366 x 768, Landscape, 60 Hz screen refresh

rate, 32 bit True Colour). All instructions and stimuli were presented on the monitor using white serif typeface (Georgia) (font size 16 to 20) on a black background. All images presented were also black and white. No colour was used as this could distract or divert attention (Constantine & Lockwood, 1999; Noiwan & Norcio, 2006). All instructions and stimuli for all parts of the study, were presented on this monitor using Superlab software (Version 4.5).

Superlab software interacted with Biopac via a StimTracker™ device. This enabled the exact presentation time of various stimuli to be recorded by Biopac and the Acknowledge software, and assisted with the analysis of data.

Participants were asked to place their right wrist on a white rectangle (14.8 cm high x 21 cm wide). This was positioned just below the wired numerical keypad (Mad Catz V.5, Backlight Technology by Illuminations Inc.) and a wired mouse (Mikomi, AM-M259) that were used by the participant for data entry. Placing the wrist on the white rectangle ensured that participants moved their hand only to enter data, thereby reducing noise on the ECG. Participants were shown the numerical keys, the enter key and the mouse and it was explained that all instructions would be presented on the monitor. Lights were switched off and the door shut, but participants were aware that the experimenter was outside and that they had to call out if anything was required. The first HBP task then followed. After the four replications of the first HBP task, participants were questioned about cognitive strategies used in the MTT or if they were aware of the distractions in the modified mental tracking task (MMTT). A rest period was then allocated and this was followed by the second HBP task. After the four replications of the second HBP task, participants were asked the second relevant question. A rest period was allocated and this was followed by part two of the study, the cued and un-cued subliminal affective priming task. Once part two was completed participants were asked to alert the experimenter. The Biopac recording device was then switched off. All data was subject to the Data Protection Act (1998). SPSS version 20 for MAC was used to analyse the data.

Figure 1: Apparatus Set-up

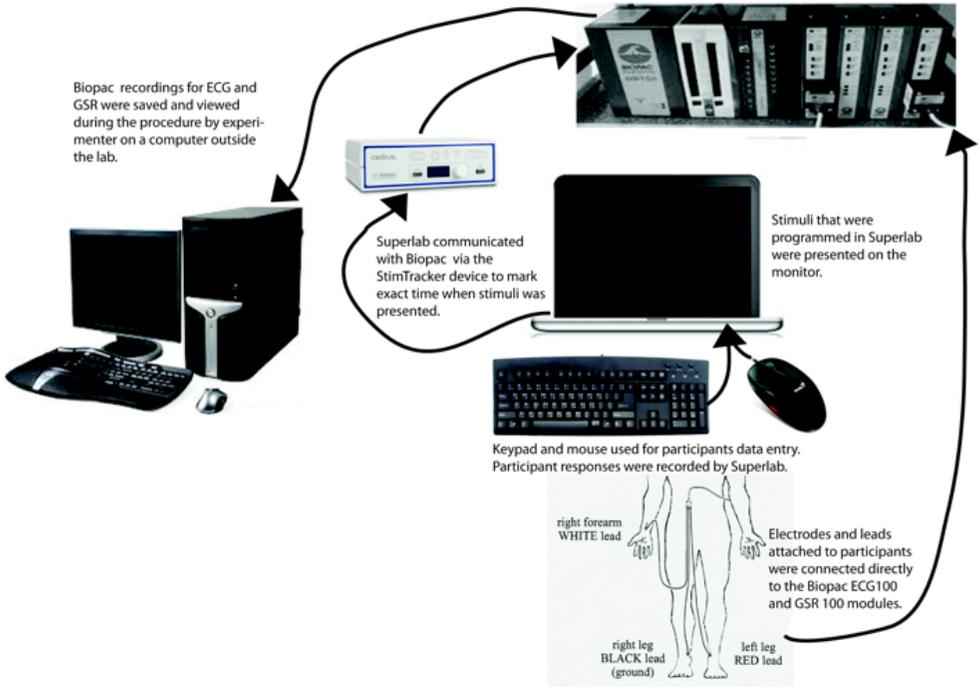
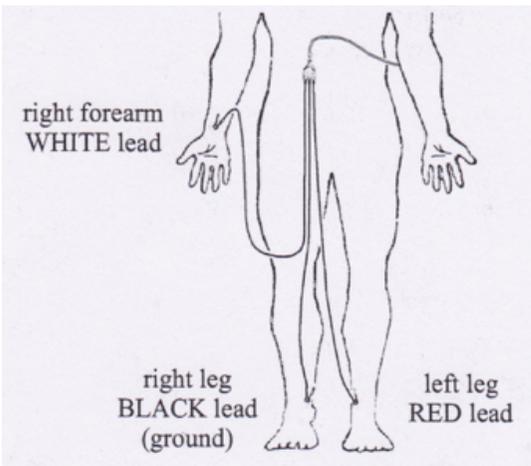


Figure 2: Placement of ECG Electrodes and Leads



WRITING ABOUT BODY PSYCHOTHERAPY

An invitation to write for us, with us, with support along the way. Your writing can contribute to and enrich the 'body' of critical and reflective content, as well as to the clinical expertise, in the 'field' of body psychotherapy.

Whom can you write for?

We suggest that – for a professional article – you consider:

The EABP/USABP peer-reviewed **International Body Psychotherapy Journal** (for original work only): www.ibpj.org

The peer-reviewed journal of Body, Movement and Dance in Psychotherapy (for original work only): www.tandfonline.com/toc/tbmd20/current#.VBfpFS6wJRU

Or: (for German language authors) **körper – tanz – bewegung**; Zeitschrift für Körperpsychotherapie und Kreativtherapie: www.reinhardt-verlag.de/de/zeitschrift/51830

(You will find the necessary “instructions for authors” on their various websites.)

Or: for something a bit more conversational: **Somatic Psychotherapy Today**:

<https://www.SomaticPsychotherapyToday.com>

Or: Something for a newsletter of your particular professional association, modality association, or national association in psychotherapy;

Or: A comment or a thread in one of the **Somatic Perspectives LinkedIn** group discussions, facilitated by Serge Prengel: www.linkedin.com/somaticperspectives.com

Or: Possibly, a chapter for an edited book, on a particular theme, possibly like one of the series being published by Body Psychotherapy Publications (**BPP**):

www.bodypsychotherapypublications.com.

Or: Something to be published somewhere else, at some other time, in a different medium; or for a personal internet blog; or . . . maybe just for your personal journal.

What can you write about?

You can write about attending a recent Congress, or seminar, or about attending a different event; - or about your student thesis; - or your experience of writing your student thesis; - or a special or particularly interesting case history; - or an aspect of your personal therapy; - or about working with a particular client group; - or about a development of theory or practice; or - even about your reflections on the field of Body Psychotherapy.

How to get started writing professionally?

There is an article in the journal of Body, Movement & Dance in Psychotherapy www.tandfonline.com/doi/full/10.1080/17432979.2010.530060#.VBfsNC6wJRU (You can also find a free copy here.)

And there are some recent guidelines about how to write a professional Body Psychotherapy Case Study: www.eabp.org/researchcase-study-guidelines.php. There are also many articles on the Internet (in different languages) about how to write.

If you want any further assistance with where to publish, or with the process of editing, or re-editing, or with the complications of the publication process, the following people may be able to offer you some help.

They are all professional body psychotherapists, editors and writers:

Nancy Eichhorn: Nancy@NancyEichhorn.com

Jacqueline Carleton: jacarletonphd@gmail.com

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Jennifer Tantia: JFTantia@gmail.com

Courtenay Young: courtenay@courtenay-young.com

Sincerely,

EABP Publications Committee

<http://www.eabp.org/publications.php>

Squaring the Circle: Bridging the Gap Between Research and Practice About the EABP Collaborative Practice Research Network (CPRN)

The awareness of the importance of fostering different models of research, particularly those linked more closely to the actual practice of body psychotherapy and those encouraging a two-way communication between researchers and practitioners, has led to the creation of the EABP Collaborative Practice Research Network.

This is an exciting new initiative to provide a forum for dialogue, debate and the development of innovative and creative research methods and projects that assist clinical practice and help body psychotherapy (and/or somatic psychology) to develop an empirical underpinning of its professional practice.

The aim is to broaden knowledge of the field of body psychotherapy through communities of practice and clinical research. It explores how a CPRN can transform perceptions of psychotherapy research and practice, strengthen connections between members, and encourage continuous development and co-creation among participants. This important initiative is an opportunity to make a significant difference within our profession and to develop – together – the foundations of both scientific and clinical practice research.

Specifically, we are planning to explore and develop, at local and international levels, a variety of strategies to support practitioners' research and look at what types of research potentially provide a broadening of our understanding and practice of psychotherapy, and how various types of research advance, improve and extend our knowledge of body psychotherapy. We will do this by bringing together practitioners and researchers from around the world, both online and face-to-face, to discuss ways of bridging the gap between clinical practice and research.

The committee has organized two symposiums in conjunction with the 2012 and 2014 EABP Congresses. The next symposium will be held during the 15th European Congress of Body Psychotherapy in Athens Greece, 13-16th October 2016.

We would like to invite you to join us and become part of this exciting and innovative initiative. If you are interested please contact Sheila Butler and Herbert Grassmann - cprn@eabp.org

EABP Science and Research Committee - Sheila Butler, Herbert Grassmann (chairperson), Frank Röhricht, Maurizio Stupiggia, Joop Valstar, Courtenay Young and Jennifer Tantia www.eabp.org/research-scientific-committee.php

Strengthening links between practitioners and researchers at every stage of the process

News:

The Society for Psychotherapy Research (SPR), an association devoted to the development and dissemination of research on psychotherapy has some exciting upcoming SPR events:

- *The International Annual Meeting in Philadelphia, USA* in June 2015 from 24th to 27th June.
- *The European Conference on Psychotherapy Research* in Klagenfurt, Austria, September 24th to 27th, 2015, and the planned 2016 International Meeting in Jerusalem, Israel in June 2016.

You might also like to browse the Psychotherapy Research Journal pages, especially the Special Issues and the online resources; there is a lot of information on the integration of theoretical, empirical and clinical knowledge in psychotherapy. See <http://www.psychotherapyresearch.org>

INTERNATIONAL BODY PSYCHOTHERAPY JOURNAL

THE ART AND SCIENCE OF SOMATIC PRAXIS

INCORPORATING US ASSOCIATION FOR BODY PSYCHOTHERAPY JOURNAL

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Guest Editor: Jennifer F. Tantia, PhD, BC-DMT

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E U R O P E A N
A S S O C I A T I O N F O R
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