Out of Body, out of Mind? An Examination of Out-of-body Experiences and Dissociative Disorders.

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In our typical daily lives, we have a constant coherent sense of being an embodied *'self'*, - that our thoughts, feelings, and actions are unified at a single point in space, over time, and that 'we' are firmly located in our physical moorings. This sense of embodiment is a fundamental process underlying the concept of being a conscious *'self'* and the feeling of *'presence'* (being in the here and now). This phenomenally perceived stability betrays the legion of neurocognitive processes that support it. Self-consciousness is not concrete or fixed, but based on the dynamic integration of multiple sources of sensory information whose interpretation is in constant need of revision as the sensory information from the environment and body is in a continued state of flux.

Growing evidence now suggests that the neurocognitive processes underlying stable self-awareness can breakdown, leading to striking distortions in the sense of self, embodiment, and in the sense of *presence*. The aberrant conscious experiences that result from this breakdown in multisensory integration nearly always lead to a state of dissociation and associated positive symptoms (i.e., perceptual distortions, hallucinations, delusions). Typically these aberrations have been associated with neurological conditions and/or psychiatric disorders such as: schizophrenia, psychosis, schizotypy, depersonalization, anxiety, and depression. Importantly such instances are now also known to occur in non-clinical groups in the apparent absence of all these factors.

Consequently, dissociative symptoms and disorders of consciousness are not necessarily indicative of, or restricted to, an underlying psychopathology. In fact, it appears more accurate to view a predisposition to aberrations in self-consciousness more as a continuum of symptomatology / resilience along which we can all be placed. Importantly, these striking experiences are now seen as providing crucial insights not only into the nature of aberrant experience per-se or those who experience them, but into the more fundamental aspects of human self-consciousness. Therefore, exploring the neurocognitive biases that

contribute to such experiences can, in turn, help to build psychological models of how stable embodiment emerges from the legion of sensory processing, thus illuminating fundamental aspects of human consciousness that apply to all of us.

In this sense, research on additional positive symptoms can be seen as complementary to the more typical 'deficits' approach (from cognitive neuropsychology) that has proved invaluable in the study of brain-damaged patients. In the former case, the presence of dissociative positive symptoms can be seen as additional factors emerging due to the breakdown in multisensory integration. In contrast, the lack or absence of cognitive functioning, for certain processes (the spared / impaired ratio), characterises the deficits approach. Both approaches seek to build theoretical models for the mechanisms underlying such instances as well as helping to build a more explicit theory of brain function and organisation. In the context of the present Special Issue, examining cases of dissociation, disembodiment, and aberrations in self-awareness provides crucial insight on how stable embodiment and awareness takes place.

Dissociative experiences come in many variants. They can occur in neurological, psychopathological, and clinical groups, as well as in sub-clinical populations. One of these variants is the Out-of-Body experience. ***Klaus Kessler and Jason Braithwaite*** provide an extensive and novel literature review of contemporary research findings on visuo-spatial perspective-taking (VPT) and dissociative out-of-body experiences (OBEs). OBEs are hallucinations that involve a salient shift in the subjectively experienced location of the perceiving self – implying that a 'perspective-taking' component could be crucial for OBE perceptions. Indeed, deliberate forms of "disembodiment" enable humans to imagine another's visuo-spatial perspective which is important for spatial reasoning, navigation, and social processes. These researchers explore the notion that a strong relationship between deliberate and spontaneous forms of disembodiment might exist. If so, then the OBE could

be seen as an unintended consequence of superior VPT processes in certain individuals. The review discusses behavioural, neuroimaging and brain-stimulation work and explores important methodological and theoretical aspects of OBE and VPT research. In addition these authors also note that although the scientific literature is awash with legions of papers on embodiment and how the respective findings may have 'implications' for OBEs, very few of these studies actually screen and directly test OBEers. This is becoming increasingly problematic in light of the recent findings suggesting that dissociative experiences are relatively common in the general population and that there are many variants of these experiences, reflecting a diverse underlying neurocognition that may impact on the findings but go completely unquantified. As such, the aforementioned 'implications' appear to be, at the very least, undermined.

Speculations are provided in an attempt to reconcile mixed findings from previous investigations which include; (1) more precise screening to ensure OBEers are accurately characterized and distinguished from other forms of distinct dissociative experience (i.e., depersonalization / derealization); and; (2) ensuring that VPT tasks are most likely to be sensitive to realistic PT processes. Finally, these authors review neuroimaging evidence showing overlapping neural substrates between VPT and OBE, providing a strong argument for a relationship between the two processes.

Previous research has shown that patients with schizophrenia show impairments in both working memory and visual spatial processing. However, few have investigated the dynamic interplay between these concepts working in concert. ***Ahmad Abu-Akel, Renate Reniers, and Stephen Wood*** investigated how positive and negative symptom expression, in sub-clinical healthy adults, influenced perceptual processing while they were performing a concurrent visual-spatial working memory (VSWM) task. The participant score on the Community Assessment of Psychic Experiences (CAPE) questionnaire was used to allocate

participants into “High/Low” and “Positive/Negative” groups. The VSWM task included baseline, low, and high cognitive load conditions. These researchers found that overall participants were more efficient as cognitive load increased. This effect was not related to symptom expression. However, an effect did emerge where those with high negative (and low positive) expressions were less accurate in the low cognitive load condition compared to the baseline and high load condition. These findings are discussed more broadly in terms of the “resources limitations hypothesis” and it is also suggested that dual-task aspects of visual spatial processing and working memory may be beneficial to assessing the cognitive phenotype of individuals with high risk for schizophrenia spectrum disorders.

Dissociative experiences like those associated with depersonalization / derealisation revolve around feeling disconnected from one’s body / surroundings, anomalous body experiences, and an emotional numbness. Collectively, this form of dissociation leads to a disorder in the sense of presence (being in the here and now). ***Hayley Dewe, Derrick Watson and Jason Braithwaite*** present new findings from a novel Implied Body-Threat (IBT) task administered to participants who were also measured for their predisposition to depersonalization-type dissociative experience which included anomalous body experiences. These researchers found that individuals scoring high on depersonalization-type dissociative experiences, also displayed a suppressed emotional response (skin conductance responses: SCRs) to a realistic body-threat carried out on the participants own limb. There were no reliable effects between additional measures of finger-temperature and dissociation and no reliable effects with non-threat related SCRs. These findings, exclusively on threat-related SCRs, significantly extend those of previous research in that; (1) this was demonstrated under conditions of a direct and highly realistic threat to one’s own body and not to passively viewing emotive images on a computer screen; (2) using the real body required no illusion induction procedure (i.e., akin to the rubber-hand illusion or virtual reality scenarios); and (3)

occurred even in non-clinical groups. Methodological and analytical advancements also included standardising SCR responses for individual differences (transformed into z-scores) and providing an analysis of the Bayes Factors. The findings are explored in terms of the wider literature and other research from the laboratory on OBE groups. In addition, the findings are discussed as being congruent with both a Dysconnection and Predictive-coding / Interoceptive awareness account of aberrant dissociative experience.

Disorders in multisensory integration are known to be associated with aberrant experiences and dissociative states. However, it is important to examine the role of different sensory processes which may well have differing levels of priority and weighting in the integrative process itself. ***Natasha Ratcliffe and Roger Newport*** examined the potential relationship between somatoform symptom reporting and somatosensory amplification (which pertains to an over amplification of signals relating to bodily sensation). Here, participants were put into conditions of multisensory conflict (via the innovative "MIRAGE" system). The authors were particularly interested in exploring whether people scoring high on the Somatoform Dissociation Questionnaire (SDQ) would also then weight proprioceptive signals more strongly which might lead to higher positional accuracy in reporting the location of their hidden hand (relative to those scoring lower). The results showed that there were no significant differences between high and low SDQ scorers in location accuracy. It was tentatively suggested that over amplification of proprioceptive signals does not appear to contribute to dissociative somatoform symptoms. Methodological limitations and speculations for future research are discussed.

The collective works presented in this Special Issue of Cognitive Neuropsychiatry contain new findings, innovative arguments and provocative ideas towards an understanding of aberrant experiences in self-consciousness. Researchers that champion diverse research methodologies and different theoretical perspectives have come together to produce a

collection of work which provides a foundation for understanding the far reaches of human experience previously confined to the realms of arcane psychopathology and even mysticism but now well grounded in solid methods and cognitive theory.

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