



ELSEVIER

Contents lists available at ScienceDirect

Psychiatry Research

journal homepage: www.elsevier.com/locate/psychres

Temperament and psychopathological syndromes specific susceptibility for rubber hand illusion

János Kállai^{a,*}, Gábor Hegedüs^a, Ádám Feldmann^a, Sándor Rózsa^b, Gergely Darnai^c,
Róbert Herold^d, Krisztina Dorn^e, Péter Kincses^a, Árpád Csathó^a, Tibor Szolcsányi^a^a Institute of Behavioral Sciences, Medical Faculty University of Pécs, 7624-H Hungary^b Department of Neurology, Medical Faculty, University of Pécs, 7624-H Hungary^c Institute of Psychology, Eötvös Loránd University, Budapest, 1064-H Hungary^d Department of Psychiatry and Psychotherapy, Medical Faculty, University of Pécs, 7624-H Hungary^e Pediatric Clinic, Clinical Center, University of Pécs, 7623-H Hungary

ARTICLE INFO

Article history:

Received 10 June 2014

Received in revised form

20 May 2015

Accepted 23 May 2015

Available online 27 June 2015

Keywords:

Body schema

Interpersonal sensitivity

Multimodal integration

Peripersonal space

Schizotypy

Self-integration

ABSTRACT

The aim of this study is to explore individual capacity for self-integration, susceptibility to the Rubber Hand Illusion (RHI) and the role of temperament factors in the emergence of body schema and body image dissociation. The RHI factors, proprioceptive drift, body ownership and body disownership were assessed in 48 university students. Personality and psychiatric vulnerability were measured by the Temperament and Character Inventory (TCI-R) and the Symptom Checklist-90-R (SCL-90-R). Our study pointed to the fact that the extent of behaviourally defined proprioceptive drift was associated with temperament factors, especially with Novelty Seeking and Harm Avoidance. Further, the ownership was associated with Symptom Checklist factors, especially with elevated Interpersonal Sensitivity and vulnerability to Schizotypy and Paranoid Ideation and elevated disownership score was found in the case of elevated Schizotypy, including a depersonalisation feeling when the RHI was induced. The RHI may be considered as a conflicting situation, in which a way to cope with incongruent multimodal, visual, haptic and proprioceptive stimulation provides an opportunity to test body integration and embodiment processes in healthy participants and patients without disadvantageous outcomes. The results support and replenish the two opposite processing models of the RHI with a third, temperament-based procedural mechanism.

© 2015 Elsevier Ireland Ltd. All rights reserved.

1. Introduction

Humans make sense of their bodily experiences by constructing an internal representation of exteroceptive and interoceptive stimuli, and they also tend to use concepts on the body. Body image, body schema and the conceptual description of the body are the result of a multimodal integration process that receives input from proprioceptive, spatial, visual, tactile and other stimuli, that occasionally conflict (Paillard, 2005). Body image contains a set of beliefs, attitudes and concepts about the body and

* Correspondence to: Institute of Behavioral Sciences, University of Pécs, 7624 Szigeti Street 12, Hungary. Fax: +36 72 536257.

E-mail addresses: janos.kallai@aok.pte.hu (J. Kállai),

gabor.hegedus@aok.pte.hu (G. Hegedüs),

adam.feldmann@aok.pte.hu (Á. Feldmann), darnaigergely@gmail.com (S. Rózsa),

rozsaqqq@gmail.com (G. Darnai), robert.herold@aok.pte.hu (R. Herold),

dornkriszta@gmail.com (K. Dorn), peter.z.kincses@aok.pte.hu (P. Kincses),

tibor.szolcsanyi@aok.pte.hu (T. Szolcsányi).

perceptions, dominated by the visual modality. It differs from the body schema, which is a system of the represented motor control, haptic, vestibular and somatosensory stimuli, where proprioception is the dominating modality. The body image is predominantly conscious, while the body schema is primarily unconscious, and both systems are relatively malleable and are repeatedly recalibrated by feedback moment to moment from current actions. Thus it is a challenge for multimodal integration to construct a coherent cognitive reference system named as 'the body' (Gallagher and Cole, 1995; De Vignemont, 2010). However conflict arises when the concurrently received modalities prove incongruent, the image of the body and the felt body are different. A good example of this conflict is when a person looks into a mirror but it reflects another person's image. Who is standing in front of the mirror? Which modality will be the dominant one, and what experiences are embodied in this conflicting situation? These questions inspired a number of investigations in the research domains of anxiety, schizophrenia, eating disorders, vulnerability to psychiatric

disorders, and also healthy persons, to comprehend the mechanisms of efficient human adaptation in a manipulated or incongruent multimodal environment (Sass and Parnas, 2003; Graham et al., 2014).

The degree of ownership over the body is the outcome of a successful multimodal integration that fluctuates, depending on task demand and the allocation of attention to the peripersonal or intrapersonal aspects of the body (De Vignemont, 2010). The first phase in the development of the self is the ability to discriminate it from others, through the innate and bottom-up process of multimodal integration (Meltzoff and Decenty, 2003). A limited capacity to integrate conflicting information from the peripersonal space and the inadequate perception of hands, legs, head movements and posture is one of the central issues in the aetiology of psychopathological symptoms.

A large body of evidence suggests that the multisensory integration induced by synchronous visuotactile stimulation modifies social perception and creates a sense of self-other or self-object similarity (Paladino et al., 2010; Tajadura-Jiménez and Tsakiris, 2014). A paradigmatic example of this effect is the RHI, in which the participant feels illusory ownership of a visible rubber hand, while their real hand is separated from their visual field and the rubber hand and their real hand are simultaneously stimulated with a brush. Previous studies have shown that the RHI is sensitive to the synchronous temporal and spatial aspects of visual and tactile stimulation (Botvinick and Cohen, 1998; Costantini and Haggard, 2007) and demands the multimodal integration of several components of the body schema and body image (Tsakiris and Haggard, 2005). Utilising other body parts, the illusion can be induced on the whole body (Petkova et al., 2011), on the face (Sforza et al., 2010), on the trunk, or other parts of the human body (Blanke and Metzinger, 2009).

In the classical paradigm of the RHI, the participant sees that brush strokes are applied to an artificial rubber hand, while the participant's real hand, which is hidden from view, is also touched by a paintbrush. The congruence between the visual and tactile stimuli from the synchronised strokes leads to an illusory sense of ownership over the rubber hand and to feelings of depersonalisation of the unseen real hand. The illusion also modifies the capacity to localise the real hand, resulting in the so-called proprioceptive drift, when the participant perceives the position of the hidden hand to be closer to the rubber hand than it physically is. The illusion decreases when, instead of a realistic looking rubber hand, a neutral object is used (Lewis and Lloyd, 2010), when the posture of the rubber and real hand is incongruent (Folegatti et al., 2012), or when asynchronous stroking is applied (Botvinick and Cohen, 1998). The intensity of the RHI is stronger for the left hand than for the right hand (Ocklenburg et al., 2012).

The three measures commonly used to describe RHI intensity are proprioceptive drift, ownership of the rubber hand, and disownership of the real hand (Longo et al., 2008). While proprioceptive drift is a behavioural measure of a pointing error between the spatial locations of the real hand and the rubber one, ownership and disownership are assessed by self-reported scales. The vividness of the ownership and disownership scores show a strong correlation with each other, while the proprioceptive drift shows a relatively lower rate of association with the experience of the illusion. Studies on the neural basis of the RHI found that the transcranial magnetic stimulation on the parietal lobe during RHI induction the correlation between proprioceptive drift and embodiment scores were eliminated, but the subjective intensity of ownership and disownership remained invariant (Jesselsteijn et al., 2006; Kammers et al., 2009). These examinations indicate that the low correlation between the embodiment and behaviourally measured outcome scores of RHI probably originates from the engaged different neural organisations.

The integration of body schema and body image and their separation from extra-personal objects are key elements in psychopathologic syndromes, such as interpersonal over-involvement, schizophrenia and depersonalisation disorders (Sass and Parnas, 2003; Graham et al., 2014). Schizophrenic patients with positive symptoms manifest more sensitivity to the RHI than healthy controls do (Peled et al., 2000), and show elevated depersonalisation (disownership) and diminished agency over their real hand (Graham et al., 2014). However, schizophrenic patients treated with high doses of neuroleptics do not show sensitivity to the RHI (Ferri et al., 2014). On the other hand, schizophrenic patients with higher scores on schizotypy in personality questionnaires show a stronger sensitivity to the RHI (Thakkar et al., 2011). Similarly, a sub-group of healthy participants with a high score on positive schizotypy and interpersonal reactivity scales, especially empathy scales, could demonstrate the same elevated RHI sensitivity, proprioceptive drift and ownership scores when asked to give a subjective account of their feelings (Asai et al., 2011). Germiné et al. (2013) found psychosis, such as characteristics involving referential thinking, magical ideation, cognitive distortion and perceptual aberration, linked to the RHI but, in this study, the proprioceptive drift scores remained independent from a positive propensity to psychosis. Studies with groups of eating disorder patients revealed an association between the RHI and the scores for bingeing and purging behaviours, and frequent usage of chemical supplements (Mussap and Salton, 2006). Eshkevari et al. (2011) detected higher ownership and proprioceptive drift scores in patients with elevated scores on the body dissatisfaction, emotional dysregulation and drive for thinness scales. The examination of patients with autism spectrum disorder resulted in a lower responsiveness to RHI induction, with a less general proprioceptive drift towards the rubber hand (Paton et al., 2012). The proprioceptive effect to the RHI induction showed a systematic delay, indicating atypical multisensory temporal integration in children with autism (Cascio et al., 2012). In conclusion, the RHI seems to be an adequate method to assess the stability of body boundaries and individual capacity to incorporate artificial objects. Considering the current RHI scoring methods and the data from the different groups of participants mentioned above, we have only a limited amount of data regarding the broader frame of personality predispositions which are associated with the intensity of the RHI induced self-reported experiences, and it points to the potential psychopathological traits that are associated with RHI ownership and disownership experiences.

Considering the above mentioned empathy, magical ideations and schizotypy traits that play an essential role in RHI-related personality predispositions, we drew the conclusion that participants or patients with high sensitivity to the RHI have increased plasticity of the bodily self, or have a permeability in body integrity, which provides a high chance of constructing an empathic relationship to level the boundaries between the psychological and bodily sensations of one's own and others' experiences. The RHI is thought to be a manipulated multimodal task to examine participants' body integration processes without disadvantageous outcomes. This study aims to determine healthy participants' personality predispositions in a standard RHI test situation. The main question is that what kind personality traits and psychiatric syndrome specific factors associate with different kind of outcome variables of RHI? To explore RHI vividness dependant traits, the TCI-R (Cloninger et al., 1993) provides the opportunity of depicting neurotransmitter-specific temperament factors that may play a role in the response intensity to the RHI, such as novel and strange experiences. Albrecht et al. (2011) in a seminal study on the neurotransmitter bases of RHI examining healthy participants increased the dopamine transmission when RHI was induced and found elevated ownership associated with ownership scores. It is

Download English Version:

<https://daneshyari.com/en/article/6814204>

Download Persian Version:

<https://daneshyari.com/article/6814204>

[Daneshyari.com](https://daneshyari.com)