



A template model of embodiment while dreaming: Proposal of a mini-me



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ABSTRACT

Dreams are usually centered around a dream self capable of tasks generally impossible in waking, e.g. flying or walking through walls. Moreover, the bodily dream self appears relatively stable and insensitive to changes of the embodied wake self, raising the question of whether and to what extent the dream self is embodied. To further explore its determinants, we tested whether the dream self would be affected by either pre-sleep focused attention to a body part or by its experimental alteration during the day. Choosing a repeated-measures design, we analyzed how often key words reflecting the experimental manipulations appeared in the dream reports. Results suggest that the dream self is not affected by these manipulations, strengthening the hypothesis that, in the majority of dreams, the dream self is only weakly embodied, utilizing a standard template of embodiment akin to a prototype of self operating independently from the physical waking self.

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1. Introduction

“Dreams have fascinated humans since the dawn of time” (Nir & Tononi, 2010, p. 88) and became a frequent research target (or instrument) to elucidate human consciousness (Hobson, Pace-Schott, & Stickgold, 2000; Metzinger, 2013; Voss et al., 2014). Every night we experience a whole world in vivid images that are centered around the dream self (Revonsuo, 2005; Revonsuo, Tuominen, & Valli, 2015). The question of whether the characteristics of this dream self at least partially reflect the awake self has been addressed in many studies aiming at identifying elements of continuity or discontinuity of the waking and the dreaming world. *Continuity*, in this context, stands for the dream representing the waking reality (including the dreamer as a person), and *discontinuity* describes the dream as a virtual world (Hobson & Schredl, 2011) in which bizarre dream images are the result of desynchronized neuronal firing during rapid eye-movement (REM) sleep (Hobson et al., 2000). In this conceptualization, “virtual” should not be viewed as synonymous with bizarre, as the dream world can, of course, also contain realistic avatars (Revonsuo et al., 2015). Rather, it is meant to denote a relative independence of the waking world. Further, the dream itself is in large parts believed to be unrelated to waking reality, as it includes elements that the dreamer has never experienced in waking life, e.g. flying, running in congenitally paraplegic persons etc. (Hobson & Schredl, 2011). Regarding the phenomenal embodiment of this dream self, be it the actual or imagined sensory experience of one’s own body (Windt, 2015), studies in favor of both continuity and discontinuity, exist. The present research

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project was inspired by those studies suggesting a striking robustness of the dream self's body against changes of the awake self's body. This resistance was found even in case of severe or fundamental bodily changes of the wake self (like amputation, paraplegia, or pregnancy) as described in detail later.

The aim of our study was the investigation of the dream self's robustness to change by means of its susceptibility to pre-sleep autosuggestion and experimental aberration of a specific body part. Both conditions were carefully implemented in a within study design over a period of at least four weeks, including repeated baseline measures which served as control condition. In the following, we will first briefly present the different theoretical perspectives on the dream self, specifically the embodiment while dreaming since this aspect of the dream self is of main interest for the present study. We will then relate these theories to empirical evidence regarding the susceptibility of the dream self to changes of the waking body and, finally, introduce the hypotheses underlying the present study.

1.1. The body image of the self while dreaming

First, we need to define what we mean by “dream self” and its “body image”. In agreement with [Revonsuo \(2005\)](#), we conceive the dream self as the “character” that represents the dreamer in an ongoing dream experience. In the terminology of [Thompson \(2015\)](#) who makes a more fine-grained distinction, the dream self would refer to the dream ego as opposed to the dreaming self. According to Thompson, the dreaming self describes the self-as-dreamer and the dream ego refers to the self-within-the-dream. Regarding the body image – at least for the awake individual, we make reference to [Gallagher \(2009\)](#) who defines body image as “characterized as a system of inconstant perceptions, feelings, and beliefs where the object of such intentional states is one's own body” (p. 118). In the context of dreaming, we simplify this definition and use the term “body image” to describe the visual appearance of the dream character's own body while dreaming. Although in the present conceptualization, body image represents only one aspect of the embodiment while dreaming, we consider this aspect to be the most important one since dreams frequently consist of vivid visual imagery ([Hobson, 2009](#)). According to [Revonsuo \(2005\)](#), dream self and body image are related in that the dreamer is embodied inside the dream self's body with an “own-eyes perspective” (p. 210) on the dream action. This characterization of the dream self represents a variant of the bodily duplicate hypothesis, assuming that dreaming replicates a standard (bodily) waking self-experience ([Windt, 2015](#)).

Interestingly however, especially with regard to the current study, is his observation that although “the dream self was present in the vast majority of the dreams” ([Revonsuo, 2005, p. 211](#)), there was “almost no further information about the dream self or its features” given (p. 211), with only 3% of the dream content referring to the self ([Revonsuo & Salmivalli, 1995](#)). This suggests that, even though we experience the dream from a 1st person self-perspective ([Blanke & Metzinger, 2009](#); [D'Agostino, Castelnovo, & Scarone, 2013](#); [Revonsuo, 2005, 2006](#); [Revonsuo & Salmivalli, 1995](#); [Windt, 2010, 2015](#)), and even though we have a sense of belonging to the dream scene in the majority of our dreams ([Cicogna & Bosinelli, 2001](#)), we do not become consciously aware of the bodily appearance of our dream self.

This was also concluded by [Windt \(2010\)](#) in her Immersive Spatiotemporal Hallucination Model of Dreaming: “Though mentioned in a majority of dream reports, the presence [...] of an actively participating dream self does not necessarily indicate that this was also a phenomenally embodied dream self in the sense of giving rise to a detailed and integrated experience of the whole body including body parts” (p. 301). This reflects an at least partially embodied body image and can be summarized as the experience of a “minimal self” while dreaming ([D'Agostino et al., 2013](#)). [Windt \(2015\)](#) evolves her model by proposing the “weak-phenomenal-embodiment-hypothesis” for the majority of our dreams. She proposes that the bodily self in dreams can range between phenomenal indeterminacy (no awareness of embodiment but experience of a self) to strong phenomenal embodiment (a wake-like representation of the body). Strong phenomenal embodiment is especially present in a subgroup of dreams, namely in lucid dreams ([Windt, 2015](#)), i.e. dreams in which the dreamer is aware of the fact that he/she is dreaming while the dream continues ([Voss, Holzmann, Tuin, & Hobson, 2009](#)). [Windt \(2015\)](#) claims that in most dreams, the self is phenomenally embodied in a weak sense: it may be associated with movements or it may be very reductionist, only representing a special body part instead of a whole-body representation.

Other theories of dreaming only briefly or indirectly touch the topic of body image while dreaming. Hobson's protoconsciousness theory, for example, assumes that REM sleep (as the neural correlate of dreaming) contributes to the development and maintenance of waking consciousness ([Hobson, 2009](#)). One aspect of this theory is that some dream features and contents might not reflect previous waking experiences but are instead inborn ([Hobson, 2009](#); [Hobson & Schredl, 2011](#)). This could explain dream features that have never been experienced in waking (like walking in congenital paraplegics). Another theory of dreaming also does not refer to the body image of the dream self: the cognitive theory of dreaming ([Domhoff, 1999](#); [Hall, 1953](#)). This theory assumes dreaming to be a cognitive achievement that gradually develops from childhood to adulthood ([Domhoff, 1999](#)) in which body image is not of importance or explicitly discussed, perhaps because dreams are seen as embodied thoughts ([Hall, 1953](#)) and thoughts might not necessarily comprise the body image of the thinking person.

Altogether, we can conclude that although dreams are usually experienced from a 1st person perspective with a strong feeling of self-presence during the ongoing dream, the dream self and its characteristics do not become what [Thompson \(2015\)](#) calls an “object of awareness” (p. 133) and the self as object (me) is rarely considered. In the following, we will give a brief overview of the many divergent empirical findings on the presence or absence of continuity between the waking and dreaming self which lead us to propose that neither continuity nor discontinuity can sufficiently explain embodiment in dreams.

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