

Lucid dreaming: discontinuity or continuity in consciousness?

Commentary on “The continuity and discontinuity between waking and dreaming: A Dialogue between Michael Schredl and Allan Hobson concerning the adequacy and completeness of these notions”

Tadas Stumbrys

Heidelberg University, Germany

Summary. The notions of continuity and discontinuity are discussed in relation to the phenomenon of lucid dreaming (awareness of dreaming while dreaming). Lucid dreams seem to be more dreamlike than non-lucid dreams, both in terms of their content and REM sleep physiology, and are thus more discontinuous with our waking experience. They also seem to represent some “crack” – discontinuity – in the ordinary autocreative process of dreaming or in the state of protoconsciousness as suggested by Hobson. However, it is argued here that the notion of lucidity in dreams, which is comparable to the notion of mindfulness in wakefulness, presents a possible continuity in self-reflective awareness or consciousness across the whole sleep-wake cycle.

Keywords: lucid dreams; continuity; discontinuity; protoconsciousness; consciousness

In the previous issue of this journal, J. Allan Hobson and Michael Schredl (2011) had an interesting and wide ranging discussion about the notions of continuity and discontinuity between dreaming and waking lives. While the discussion was broad enough to cover a number of various topics, one important issue was left untouched – the question of lucid dreaming. In lucid dreams, the dreamer is aware of the fact that he or she is dreaming and can consciously influence dream content (LaBerge, 1985). A state in which a person is conscious yet physically asleep presents an oddity, which sometimes is not easy to put in a box according to a particular theory or hypothesis. In this commentary I will try to highlight some of the issues lucid dreaming presents to the notions of continuity, discontinuity and protoconsciousness, and propose that the continuity that lucid dreaming advances is continuity in consciousness.

1. Continuity and lucid dreams

The continuity hypothesis suggests that waking experiences are reflected (incorporated) in dreams and several factors have been established that influence this incorporation, such as the time interval between the experience and the dream, emotional involvement, the type of the waking experience, personality traits and the time of night (Schredl, 2003). This principle of continuity between waking and dreaming has been successfully applied in lucid dream research as the basis for some lucid dream induction techniques. For example, Tholey's (1983) reflection technique involves the development of a critical-reflective attitude towards the present state of consciousness in the waking state (by regularly

asking oneself if he or she is dreaming or not), which is subsequently transferred to the dream state and serves as a trigger for becoming lucid. However, once the dreamer becomes lucid, he or she can deliberately influence the content and change the course of the dream; hence lucid dreaming itself might be considered as a discontinuity of the ordinarily passive, autocreative process of dreaming. On the other hand, the question of continuity between wakefulness and lucid dreams can be seen as tautological per se: Waking memories – at least to some extent – are available in lucid dreams (cf. Erlacher, 2009), so to ask whether there is a continuity between waking and lucid dreaming is merely the same as to ask whether there is a continuity in wakefulness from one day to another.

The other approach for assessing the continuity hypothesis within the context of lucid dreams is to look at the content of lucid dreams. Gackenbach (1988) did an extensive review in which she compared the psychological content of lucid dreams vs. non-lucid dreams and observed that lucid dreams and non-lucid dreams are much more alike than different. The continuity that is observable in non-lucid dreams seems to be present in lucid dreams as well. For example, in one of our studies (Stumbrys, Erlacher, & Schmidt, 2011), where proficient lucid dreamers asked their dream characters to solve arithmetic tasks within their lucid dreams, gender differences emerged: Male dream characters in male participants' dreams were more successful with mental arithmetic than female dream characters in male participants' dreams or both male and female dream characters in female participants' dreams. The stereotype that women have weaker mathematical abilities seems to be tenacious in dreams as well!

However, some differences between the content of lucid and non-lucid dreams can also be observed. While lucid dreams are more perceptual and more cognitive than non-lucid dreams (cf. Gackenbach & Schillig, 1983), they tend also to be more emotional (cf. Gackenbach & Schillig, 1983), more bizarre (cf. McCarley & Hoffman, 1981) and closely

Corresponding address:

Tadas Stumbrys, M.S., Heidelberg University, Institute of Sports and Sports Science, Im Neuenheimer Feld 700, 69120 Heidelberg, Germany
E-mail: tadas.stumbrys@issw.uni-heidelberg.de

linked with non-ordinary experiences of out-of-body and flying (cf. Barrett, 1991; Blackmore, 1982, 1984; Irwin, 1985; Levitan, LaBerge, DeGracia, & Zimbardo, 1999). Thus, as Schredl (2010) asserts, lucid dreams are even more dreamlike in some ways than non-lucid dreams. While a lucid dreamer retains a continuity in the sense of “I” and self-reflective awareness in lucid dreams, the experience of lucid dreaming itself seems to be less congruent with the waking experience than ordinary non-lucid dreaming, i.e. it represents a discontinuity rather than a continuity in experience.

2. Discontinuity, protoconsciousness, and lucid dreams

The notion of discontinuity – that dreams and waking experiences are not interrelated – is slightly ambiguous in the light of Hobson’s theories. While the idea of discontinuity was rather clear in the early activation-synthesis hypothesis (Hobson & McCarley, 1977), according to which all dream content is merely a nonsensical story made up of random noisy signals, it becomes much more vague in Hobson’s (2009) recent theory of protoconsciousness, where dreams are seen more as a learning space for high-order brain functions and consciousness. Leaving the earlier activation-synthesis hypothesis aside, here I will focus on more recent developments of Hobson’s thought – the AIM model and protoconsciousness theory.

The three-dimensional AIM model (Hobson, Pace-Schott, & Stickgold, 2000) is the core feature of Hobson’s theory, which provides a classification of different states of consciousness across the sleep-wake cycle – NREM sleep, REM sleep and waking – according to three factors: activation (A), input/output gating (I), and modulation (M). While the classification of wakefulness (high A, high I, high M) and non-lucid REM sleep (high A, low I, low M) according to the model seems to be quite straightforward, lucid dreaming becomes a peculiarity that Hobson’s theory does not easily deal with. Initially, lucid dreaming, which to a large extent occurs in REM sleep (LaBerge, 1990), seems to be classified in a way similar to non-lucid REM sleep (high A, low I, low M) (Hobson et al., 2000). However, Hobson subsequently makes an *a priori* assumption that lucid dreaming is a dissociative state and a hybrid mixture of waking and REM sleep (Voss, Holzmann, Tuin, & Hobson, 2009; also see LaBerge, 2010 for a critique) and therefore places it in the middle between waking and REM sleep (high A, medium I, medium M) (Hobson, 2009). While this helps Hobson maintain consistency between the model and his ideas regarding the phenomenon of lucid dreaming, this assumption is not supported by empirical evidence. For example, Brylowski, Levitan, and LaBerge (1989) demonstrated in a sleep laboratory study that H-reflex suppression in REM lucid dreams is even higher than in non-lucid dreams, which suggests that the I factor in lucid dreams should perhaps be at least as low as in REM non-lucid dreams. Furthermore, there are some speculations and some tentative preliminary evidence that elevated levels of Acetylcholine (ACh) increase the frequency of lucid dreams (LaBerge, 2004; Yuschak, 2006), which also hints that the M factor in lucid dreams should perhaps be at least as low as in non-lucid REM sleep. Therefore, it seems plausible to classify REM lucid dreaming in the AIM model in the same vein and in the same place as non-lucid REM sleep. In fact, this evidence even suggests that lucid dreams are even more dreamlike, not only in terms of their

content, but also in terms of REM sleep physiology.

In the theory of protoconsciousness, Hobson (2009) proposes an interesting idea that REM sleep might present a protoconscious state in which the brain is preparing itself for its integrative functions, including consciousness. Hobson suggests that the developing REM-sleeping brain has built-in predictions of external time and space, which are later adjusted according to the experiences of the outside world. REM sleep thus provides a virtual world model, in which waking consciousness emerges, develops and is maintained. This state is mainly characterised by primary consciousness (perception and emotion) and lacks secondary consciousness (e.g. self-reflection, insight, judgment, abstract thought), with the exception of lucid dreaming (Hobson, 2009). Lucid dreaming, therefore, can be considered as some sort of “crack” in the protoconscious state, which turns on the secondary consciousness and perhaps disrupts the regular learning and preparatory processes of the brain for the development of higher order brain functions. Or it could be looked at the other way around, that lucid dreaming is an “advanced” protoconscious state, where the dreamer can directly utilize this inner virtual model of reality and deliberately use it for his or her own development.

There are a number of examples showing how this inner virtual model of reality can be successfully used in lucid dreams for various aspects of self development. Lucid dreamers can successfully practice complex sports skills, such as skiing or gymnastics, in their lucid dreams (Tholey, 1981) and improve their motor performance in wakefulness following their practice in lucid dreams (Erlacher & Schredl, 2010). Lucid dreams can be successfully used for creative problem solving (e.g. Stumbrys & Daniels, 2010), to reduce performance anxiety and increase self confidence (e.g. LaBerge & Rheingold, 1990), to overcome nightmares (e.g. Spoormaker & van den Bout, 2006), or for self-integration and healing (e.g. LaBerge & Rheingold, 1990). In the words of Hobson (Hobson & Schredl, 2011), one could say that lucid dreaming is more of a tool for PREPLAY than REPLAY of waking, although the dreamer is also free to choose a REPLAY of some waking experiences in order to integrate them and release associated emotional burdens (cf. LaBerge & Rheingold, 1990). The ability of lucid dreamers to accomplish deliberate actions within lucid dreams allows them to explore not only the influence of waking experiences on dreams, but also the influence of dream experiences on waking life. This other side of the continuity coin is rather neglected in dream research (cf. Schredl, 2000).

3. Continuity in consciousness

As it has been shown, the notions of continuity and discontinuity are quite puzzling in lucid dreams. Lucid dreams are more discontinuous with waking experience – they are more dreamlike both in terms of content and sleep physiology. They also seem to represent some sort of “crack” – discontinuity – in the protoconscious state. On the other hand, lucid dreams present continuity in the sense of “I” and self-reflective awareness, or, in other words, continuity of consciousness.

While some sort of consciousness and self awareness is present in all dreams, non-lucid dreams lack reflective or meta-awareness, i.e. the awareness of the contents of awareness, which is present in lucid dreams (Cicogna & Bosinelli, 2001; Kahan & LaBerge, 1994). This dissociation between the experience and the meta-awareness of this ex-

perience is not only characteristic of nocturnal cognition, but also of the day time experiences of mind-wandering, emotions (affective states) or automatic behaviours (Schooler, 2002). In that sense, cognition in waking and dreaming are not that different (cf. Kahan & LaBerge, 1996) – in wakefulness most people are also often not explicitly aware of the full range of their present experiences and the present state of awareness. Self-reflectiveness in wakefulness and self-reflectiveness in dreams seem to be interrelated (cf. Purcell, Mullington, Moffitt, Hoffmann, & Pigeau, 1986), hence it is no wonder that lucid dreaming is quite a rare skill in our society – available on a regular (monthly) basis only to about one person out of five (Schredl & Erlacher, 2011; Snyder & Gackenbach, 1988).

Over the past few years in the field of clinical psychology there has been a substantial growth of clinical interventions based on mindfulness training, which involves intentionally bringing attention to one's experiences occurring in a present moment (Baer, 2003). In psychology, mindfulness has been adapted from Buddhist traditions and various meditation practices are employed for increasing the capacity for mindfulness. A consensus panel, gathered to establish an operational definition of mindfulness, stated that "the notion of mindfulness as a metacognitive process is implicit in the operational definition that we are proposing since its evocation would require both control of cognitive processes (i.e., attention self-regulation) and monitoring the stream of consciousness" (Bishop et al., 2004, p. 233). Mindfulness meditation training can increase cognitive abilities, such as cognitive flexibility, visio-spatial processing, working memory, executive functioning, and meta-awareness (Hargus, Crane, Barnhofer, & Williams, 2010; Moore & Malinowski, 2009; Zeidan, Johnson, Diamond, David, & Goolkasian, 2010). On the other hand, links between lucid dreams and meditation can also be established (Gackenbach & Bosveld, 1990; Hunt, 1989; Hunt & Ogilvie, 1989). Meditators have more lucid dreams than non-meditators and the longer the meditative practice the more lucid dreams are reported (Gackenbach, Cranson, & Alexander, 1986; Hunt & Ogilvie, 1989). According to Hunt (1989), lucid dreaming itself is a spontaneous meditative state that is sought in meditative practices.

Just as a person can have a higher or lower degree of mindfulness in wakefulness, one can also have a higher or lower degree of lucidity in dreams, which seems to be not an on-off phenomenon, but rather a continuum (Moss, 1986). Therefore, it seems plausible that the notions of the degree of lucidity in dreams and mindfulness in wakefulness are comparable, although that has yet to be tested empirically. It must be stressed that to be lucid in a dream and mindful in wakefulness is not one and the same (phenomenological, psychological, physiological, etc.). We know that REM sleep and wakefulness are rather different states in terms of brain chemistry and activity (Hobson et al., 2000). Hence, being lucid in a dream can be considered as being mindful but in a different state of the brain. For example, while mental capacities for logical reasoning or arithmetic operations might be slightly impaired in lucid dreams (likely due to relative deactivation of prefrontal brain cortex areas during REM sleep), capacities for associative and more creative processes might conversely be enhanced (Stumbrys & Daniels, 2010; Stumbrys et al., 2011; Tholey, 1989).

Wittmann and Schredl (2004) proposed the idea that perhaps the mind never sleeps and it is not that our con-

sciousness becomes switched off when we sleep, but there are rather failures to recall mental processes during some awakenings. Hence it is possible, following this line of thought, that we can become aware (mindful, lucid) of our mental processes through the whole sleep-wake cycle. We can keep our meta-awareness, or continuity in consciousness, in all stages of sleep. This idea is certainly not new. It has served for hundreds of years as a foundation for Tibetan yogas of dream and sleep (Norbu, 1992; Wangyal, 1998). The ultimate aim of this advanced Tibetan practice is to develop constant non-dual awareness across wakefulness, dreaming, and dreamless sleep. Adepts accomplish special practices, comparable to aforementioned Tholey's (1983) reflection technique, during the day and visualisation exercises during the night. While dream yoga aims to build awareness in dreams, sleep yoga (or a practice of natural light), which is considered to be more difficult to master, is directed toward developing awareness in dreamless sleep (Norbu, 1992; Wangyal, 1998). According to Wangyal (1998), both dream and sleep yogas ultimately lead one into another, i.e., development of awareness in dreams will facilitate the development of awareness in dreamless sleep and vice versa.

Based on this idea of continuity in consciousness, WILD (Wake-Initiated Lucid Dream) techniques were developed for lucid dream induction (LaBerge & Rheingold, 1990; Tholey, 1983). In contrast to DILDs (Dream-Initiated Lucid Dreams), where people become lucid in a dream after having fallen asleep unconsciously, consciousness with the WILD technique is retained while falling asleep (LaBerge & Rheingold, 1990). This is usually achieved by focussing on hypnagogic imagery, deliberate visualisations, counting, body or self image, and so on (LaBerge & Rheingold, 1990; Tholey, 1983). A lucid dreamer aims to pass other stages of sleep consciously and wait until REM sleep or dream images appear.

While most lucid dreams occur during REM sleep, Dane (1984), who used a posthypnotic suggestion as a means for triggering dream lucidity, for example, obtained the majority of his lucid dreams in the NREM2 stage of sleep. General self-reflectivity seems to be higher in REM dreams in comparison with NREM2 or NREM4 dreams (Purcell et al., 1986), which implies that higher efforts might be needed to achieve (or retain) lucidity in NREM sleep, in line with the greater deactivation of the brain during the NREM stages of sleep (Hobson et al., 2000). Although more difficult, NREM lucid dreaming (or perhaps – lucid witnessing) is also achievable, which suggests a possible continuity in meta-awareness (or consciousness) across the whole wake-sleep cycle. To conclude, while lucid dreaming might be considered as somewhat discontinuous in terms of ordinary dreaming experience, it represents a possible continuity in consciousness.

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