

The passing of time in dreams - A study using Lucid Dreams

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The following is a study used lucid dreamers to determine the subjective measurement of time in dreams - by Daniel Erlacher and Michael Schredl from Germany.

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Summary

The present study investigated the relationship between the required time for specific tasks (counting and performing squats) in lucid dreams and in the waking state. Five proficient lucid dreamers (26-34 years old, $M = 29.8$, $SD = 3.0$; one woman and four men) participated in this study. The results showed that the time needed for counting in a lucid dream is comparable to the time needed for counting in wakefulness, but motor activities required more time in lucid dreams than in the waking state.

Introduction

The relationship between subjectively estimated time in dreams and real time has intrigued scientists for centuries (cf. Hall, 1981). Maury (1861) reported a long and intense dream about the French revolution which ended with the dreamer in the guillotine and the sleeper waking up with a piece of his wooden bed top having fallen on his neck. Because of the logical line of dream action, Maury (1861) hypothesized that the dream was generated backwards by the arousing stimulus. Nowadays, the hypothesis is widely accepted that the subjectively experienced time in dreams corresponds with the actual time (overview: Schredl, 2000). This relationship was first experimentally demonstrated by Dement and Kleitman (1957). In this study, the participants were awakened in a random order either after 5 or 15 minutes of REM sleep. After awakening, participants were asked to estimate whether the elapsed sleep interval was 5 or 15 minutes. From 111 awakenings, 83 % judgments were correct. Furthermore, the elapsed time of the REM period correlated with the length of the dream report (from $r = .40$ to $r = .71$). The latter findings were replicated by Glaubman and Lewin (1977), as well as by Hobson and Stickgold (1995). Rosenlicht, Maloney, and Freiberg (1994) found only small differences between time of REM sleep and the reported length of dreams. Overall, these studies support the idea that dreams take the same amount of time the actions would take in waking.

Lucid dreams might be particularly applicable to study time intervals in dreams, because lucid dreamers are able of executing prearranged tasks in their lucid dreams and mark the beginning and the end of the task with eye signals that can be measured objectively by electrooculogram (EOG) recording (cf. Erlacher, Schredl, & LaBerge, 2003). The term "lucid dream" designates a dream in which the dreamer, while dreaming, is aware that she or he is dreaming and she or he can consciously influence the action in the dream (Tholey & Utecht, 1997; LaBerge, 1985). In a pilot study, LaBerge (1985) showed that time intervals for counting from one to ten in lucid dreams (by counting from one-thousand-and-one to one-thousand-and-ten) are close to the time intervals for counting during wakefulness.

We hypothesized, that there is no difference between the time needed for counting or performing a motor activity in a lucid dream and the time needed for the same activities performed in the waking state.

more after the jump

Methods

The participants were five lucid dreamers (26-34 years old, $M = 29.8$, $SD = 3.0$; one woman and four men). The four men participated in previous studies and the woman was recruited by an internet page (<http://klartraum.de>) about lucid dreaming provided by the first author. All participants had lucid dreams for many years ranging from 30 to 1,000 lucid dreams a year and were familiar with the method of signaling out of lucid dreams by means of characteristic, predetermined eye movements.

The experimental protocol for the lucid dream task was as follows: (1) the lucid dreamers had to stand up in their lucid dreams, (2) they had to count from twenty-one to twenty-five, (3) then they had to perform ten squats (deep knee bends),

and (4) finally, they had to count again from twenty-one to twenty-five. The lucid dreamers were instructed to mark the following events by left-right-left-right eye movements: the onset of lucidity, the beginning of each sequence (1-4) and the end of the lucid dream task. After a maximum of two successful tasks in one lucid dream, the participants had to wake themselves by the technique of focusing a fixed spot in the lucid dream described by Tholey (1983) and report a complete and precise dream immediately.

The participants spent two to four nonconsecutive nights in a sleep laboratory. Sleep was recorded by means of the following standard procedures: EEG (C3-A2, C4-A1) Electrooculogram (EOG), submental EMG and ECG. Prior to the lab night, the participants were asked to carry out the lucid dream task in the waking state (including eye signaling measured by EOG recording). Participants were instructed to carry out the task in their lucid dreams exactly in the same way as they performed the task in wakefulness.

In 15 nights, the participants succeeded in 11 lucid dreams to complete the lucid dream task 14 times. The participants completed the lucid dream task in different number of times. In three lucid dreams, the task was accomplished twice. Two intervals of counting and three intervals of performing squats were excluded from further analysis because the dreamer was not able to follow the lucid dream protocol exactly. For the counting and the squatting intervals, the duration between the two left-right-left-right eye movements were determined and mean values for each participant were computed. For statistical analysis, two-sided t-tests for dependent samples were used to compare the durations of the counting and squatting intervals in the lucid dream and in the waking state.

Results

Mean durations and standard deviations for the counting and the squatting intervals are depicted in Table 1. No differences in the durations between counting in lucid dreams and in wakefulness were found for the first counting interval ($d = 0.07$, power = 0.07; $t(4) = .15$; $p = .89$) and the second counting interval ($d = 0.26$, power = 0.11; $t(3) = .53$; $p = .64$). However, a significant difference in the time duration was found for performing squats interval ($d = 1.58$, power = 0.89; $t(4) = 3.54$; $p = .02$).

Discussion

The study replicates the finding of LaBerge's (1985) pilot study, that time intervals for counting were quite similar in lucid dreams and in wakefulness but performing squats required 44.5 % more time in lucid dreams than in the waking state. However, the second counting interval had an effect size $d = .26$, which is considered by Cohen (1988) as a small to medium effect size. Given to the small number of participants the power of the test was too low to detect a statistical significant difference. In contrast, the effect size for the squatting interval was large ($d = 1.58$), demonstrating that there is a difference between the required time needed to perform squats and to count in a lucid dream.

A methodological issue in the present study is that the duration for the motor activity task was longer than for the counting task, therefore it might be possible that, in general, longer tasks cause more of a disproportionate time error than short tasks. To clarify, if longer task yield different durations in lucid dreams and in wakefulness, in further studies, different time intervals (e.g., counting 10 to 60 seconds) should be examined. Furthermore, subsequent studies should investigate what kind of factors causes the different time intervals by using tasks with different complexities (e.g., simple vs. complex movements).

Even though the participants were instructed to carry out the squats in the same way as in the waking state, it is possible that the subjective time for the participants was different. To test this hypothesis in further studies, participants should be asked about the subjectively elapsed time they experienced in their lucid dreams (like Moiseeva, 1975).

To conclude, the present findings, on one hand support the hypothesis of a correspondence between time durations in lucid dreams and in the waking state. On the other hand, the findings also demonstrate that motor activities, like performing squats, require more time in lucid dreams than in wakefulness. In future studies, different time intervals, different activities, and the generalizability of the present results to dreaming in general should be studied.

References

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