

Temperature perception in dreams: Analysis of a long dream series

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Summary. The present study analyzed the frequency of temperature perception in a long dream series (N = 10,535 dreams) reported by a single participant. Overall, about 0.67% of the dreams of the series included references to temperature with cold sensations outweighing sensations of warmth. The data suggest that the temperature perceptions are not the product of external stimuli but might relate to waking life, e.g., in this case to worries about one's health. It would be very interesting to study dreamers in different climates and investigate whether extreme hot or cold temperatures experienced in waking affect dream content.

Keywords: Dream series, temperature perception, continuity hypothesis

1. Introduction

The conceptualization of dreaming as a simulation of the waking world (Revonsuo, Tuominen, & Valli, 2015) or virtual reality (Hobson, Hong, & Friston, 2014) can be debated (e.g., Schredl, 2012) but clearly reflects the notion that the dreamer experiences the dream world in a way similar to the waking world, including perceptions, emotions, thoughts etc., even though bizarre elements like flying without proper equipment can occur (Schredl & Piel, 2007).

Regarding perceptions, several studies (McCarley & Hoffman, 1981; Snyder, 1970; Zadra, Nielsen, & Donderi, 1998) showed that visual perception is present in every dream (in persons with intact vision) and that auditory perception is also very prominent (53% to 76% of dream reports). In contrast, gustatory, olfactory, tactile and pain perceptions are very rare in dreams, i.e., in about 1% or fewer dream reports (Knoth & Schredl, 2011; Schredl, 2011; Zadra, Nielsen, & Donderi, 1998; Zadra, Nielsen, Germain, Lavigne, & Donderi, 1998). One study (McCarley & Hoffman, 1981) found 8% of dreams include kinesthetic perception (for example in flying dreams) and 3.85% of 104 laboratory dreams include some form of temperature perception. But, so far, no other study has looked at the frequency of temperature perceptions in dreams. Calkins (1893) reported that one of her 166 dreams (0.66%) included a clear perception of temperature; the "dream of a sleigh-ride on an intensely cold day ... was evidently occasioned by a stiff breeze blowing in at the window (p. 320)". Similarly, Weygandt (1893) reported dreams with temperature perceptions, presumably caused by external stimulation. One example, translated into English, can be found in Schredl (2010, p. 96):

Dream: "I was travelling by train up a mountain to a lonely hotel named "Sommerfrische". I felt that it was getting

colder and colder. Eventually, there was so much snow that one could not go outside. Snow flurries were hammering at the windows and I was very cold."

Comment: "When I woke up, I realized that my bedspread had fallen off of me and a cold breeze had blown into the room."

These two examples illustrate the common view from that time period that external stimuli strongly effect dream content, even generate dream images (Weygandt, 1893). Interestingly, one laboratory study (Ziegler, 1973) elicited dreams while experimentally changing room temperature (three conditions: 12°C, 17°C, 22°C). Unfortunately, explicit temperature perception was not studied but the intensity of positive emotions was higher in the dreams reported while sleeping in the warmer room whereas the intensity of negative emotions was higher in the dreams reported in the coldest condition (Ziegler, 1973). This pilot study supports the view that temperature of the environment may affect dream content.

The present study was undertaken to study how often temperature perceptions are present in dreams. And if so, the phenomenology of these dreams, e.g., setting, perceiving cold or hot, was determined. As the dreams were recorded over a long period of time, it was also tested whether dreams recorded in the winter months included more "cold" perceptions than dreams recorded in the summer.

2. Method

2.1. Participant and dream diary

The male participant kept an unstructured dream diary from the age of 22, beginning in September, 1984 through December 2012. The dreamer is German speaking and his occupation is research psychologist. For the present analysis, all 10,535 dreams from that period were included. The mean dream length was 132.22 ± 84.23 words.

2.2. Participant and procedure

The dream reports were originally hand-written and were typed and entered into a database, Alchera 3.72, created by Harry Bosma (www.mythwell.com) by the dreamer himself.

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This database allows assigning key words to the dreams, also a task carried out by the dreamer himself. Each dream was coded by the dreamer himself for the occurrence of explicit temperature perception of the dream ego. In addition, pain perception, olfactory and gustatory perceptions were also coded. In a second step, all “temperature” dreams were categorized according to the type of temperature perception (hot, cold), the setting (indoor, outdoor), the subjective quality of the temperature perception (pleasant, unpleasant), and actions caused by the temperature perception. The dream examples given in the results section will illustrate what kinds of topics were coded.

The Alchera software also provides a word count for each dream report. Dream reports did not include redundancies and non-dream experience related words. The analysis unit was a single dream report. The data were exported into an Excel spreadsheet (Microsoft) and data analysis was carried out using the SAS 9.4 software package for Windows.

3. Results

Overall, 0.67% (71 out of 10,535 dreams) of the dreams included some reference to temperature perception (see Figure 1), i.e., temperature perception was more prominent than olfactory or gustatory perceptions but less frequent than pain perception. Interestingly, the percentage of dreams with temperature perceptions was much lower in the first half of the dream series (September 1986 to April 1995) than in the second half (April 1995 to December 2012): 0.21% (11/5267 dreams) vs. 1.14% (60/5268 dreams), $\chi^2 = 34.0$, $p < .0001$.

Most of the “temperature” dreams ($N = 43$) included the sensation of cool/cold, whereas only within 19 did the dreamer feel warm/hot. This difference is statistically significant (Sign test: $M = -12$, $p = .0032$). In an additional six dreams, there was a change in perception from cold to warm, and in three dreams a temperature perception change from warm to cold. During summer (2753 recorded dreams) three dreams included sensations of warmth and 10 dreams included “cold” sensations, whereas in dreams recorded during the winter (2756 recorded dreams) there were also three dreams with warmth sensations but and 7 with sensations of cold ($\chi^2 = 0.1$, $p = .7078$).

Of the 71 dreams with temperature perception, 60.56% of the settings were outdoors and 39.44% indoors. The weather within the dream was responsible for the temperature perception in 64.79% of the cases; other sources were cold lips, hot stones, cold water etc. In 7 dreams, a positive subjective quality of the temperature perception was mentioned explicitly, whereas only one dream included a negative quality of the temperature perception. In 30 dreams, some action was undertaken to do something about the temperature perception, most often putting on warmer clothes or using a blanket ($N = 13$ dreams). Closing a window was mentioned in three dreams, other actions like checking the heating, withdrawing the hand, affecting the temperature by will (in a lucid dream) were only mentioned once.

Examples of temperature in dreams

E1: “Holiday. A guy is talking about a technical topic. First, I want to write it down but it is a very familiar and easy subject and, thus, not necessary to make a note of it. The conversation takes place in a street. I return to

him his booklet which he left outside yesterday. During the conversation the upper part of my body gets cold, I am half-naked. I walk into a shop in which our rooms are located in the back. My black sweater is already in the foyer. I put it on and go back outside...”

E2: “... While walking home, I notice a fast driving Porsche that overturns and goes up in flames. Even several hundred meters away, I can feel the warmth clearly. ...”

E3: “...The girl walking in front of me turns around and wants to be kissed. She is quite lean and her hair is blond and of medium-length. I give her a brief kiss. My lips are ice-cold, hers pleasantly warm. She smiles at me and we kiss again. My lips got a little warmer. “Better”, she says and guides me to a school building on the outskirts of the village.”

E4: “Early in the morning, I am jogging along a farm track. I ate a few hours ago and I am astonished how fit I am. The air is still very cool, my clothes are light so that I have to move around constantly, otherwise I would get cold. However, I also feel some very warm beams of sunlight.

E5: “In a large room, I am attending a performance with music. One of the musicians on stage rolls a sitar to the wall and catches it when it returns. There is quite a lot of action. A man starting to study social work talks to me about his worries as to whether he will keep up with the standards. I myself take it easy, planning to study in addition to working at my part-time job – even though it might be stressful. Then I am sitting next to a familiar woman and I am freezing because my right shoulder is cold. I wake up and cover up the shoulder with my blanket. I am thinking that the cold shoulder has affected the dream.”

4. Discussion

The present findings indicate that temperature perceptions in dreams are rare but can nevertheless be found in dreams – the frequency seems to be comparable to that of olfactory, gustatory, and pain perceptions (Knoth & Schredl, 2011; McCarley & Hoffman, 1981; Zadra, Nielsen, & Donderi, 1998; Zadra, Nielsen, Germain, et al., 1998).

The data of this study, however, did not support the hypothesis that temperature perception is a direct result of temperature changes in the sleeping environment. First, the temperature perception was rarely at the end of the dream and also changed over the course of the dream (presumably with no body movements during REM sleep and temperature changes in the environment). Second, even dream example 5, in which there was an attempt to cover up the ‘cold’ shoulder, only reflects the dreamer’s attitude towards the sensation because it was a false awakening within the dream and the “real” shoulder wasn’t cold. Third, the temperature perception dreams did not show a significant seasonal change, i.e., during the summer months one can assume that the bed room is much warmer than during the winter but this had no effect on the frequency of “warm” and “cold” sensations. Fourth, the frequency of dreams with temperature perception dramatically changed over the course of the dream series. Based on the information provided by the dreamer that he suffered more often from colds when he grew older, one might speculate that worries about one’s health might play a role – supported by the most prominent actions in the temperature dreams, i.e.,

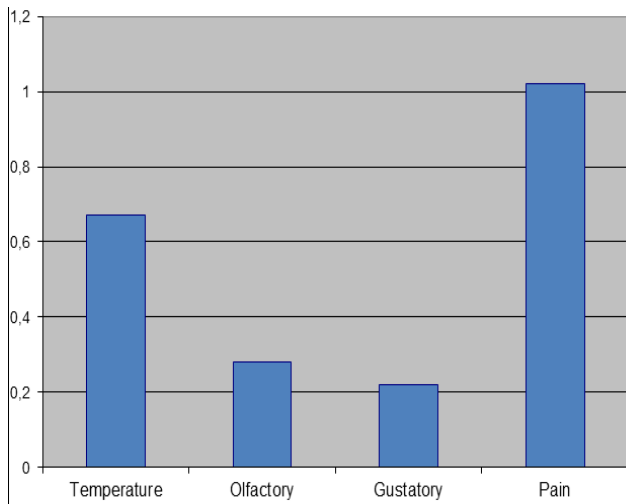


Figure 1. Percentage of dreams with different types of perceptions (N = 10,535 dreams)

putting on warm clothes. Even though these arguments are plausible, the possibility of external temperature stimuli on dream content cannot be ruled out as there was no specific data recorded on the room temperature or the position of the blanket (e.g., not covering the sleeper fully).

If temperature sensations are not caused by external stimuli during sleep for this particular dreamer, the question is why do we dream about these sensations?; are they a reflection of waking-life experiences? This possibility would be in line with the continuity hypothesis of dreaming (Schredl, 2003). As the frequency of temperature perceptions does not change with changing in season (different temperature in the waking state), there seems no clear and simple continuity between waking and dreaming regarding this sensory modality. In this series of a dreamer living in Germany, the cold sensations clearly outweighed the warm sensations; it would therefore be interesting to study dreams of persons living in different climates, e.g., tropical areas with high temperatures all year long. One would predict a much smaller percentage of cold sensations.

An interesting link between dreams with temperature perceptions and the typical dreams theme of being nude or inappropriately dressed in public showed up in some of the dreams in this series. These typical dream themes are reported by many persons (Nielsen et al., 2003; Schredl, Ciric, Götz, & Wittmann, 2004; Yu, 2008) but normally the focus is on the feeling of being embarrassed and not on the perception of feeling cold without proper clothing. Nevertheless, it would be very interesting to study whether in a cold dream environment, e.g., outside in the winter, and being nude or inappropriately dressed also include some sensation of cold.

To summarize, temperature perceptions can be found in dreams and research looking into correlates of these dreams is necessary. In the present study, it seems likely that the dreamed temperature perceptions are not linked to temperature stimuli experienced during sleep. One suggestion derived from this study might be that temperature perception dreams, especially dreaming about the sensation of cold, might be related to worries about one's health. One

line of research could elicit measures of temperature sensation during waking life and correlate that with dream content, e.g., by using home diaries. Another line could follow up the experimental findings of Ziegler (1973) in the field, i.e., include specific questions in the dream diary about room temperature and position of the blanket after waking.

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