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The nightmare protection hypothesis: An experimental inquiry

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Summary. Using the ideas generated in Revonsuo and Valli's Threat Simulation model of the function of dreaming, previous research looked at how military personal's dreams were associated with video game play. A nightmare protection effect was found and replicated using an undergraduate student population. Based on the previous findings, in this study an experimental manipulation was conducted where male participants engaged in one of three computer tasks, including gaming and search. All participants also viewed a frightening movie clip. Following the laboratory session respondents were asked to report a dream. The Threat Simulation method of coding dreams was used to assess threat in participant's dreams. The major hypothesis was that playing a combat centric game would be more likely to result in behaviors in the dream which were less nightmarish after seeing the frightening movie clip, relative to playing a creative video game or doing a computer search task. The results support the thesis for high end male gamers playing combat centric video games close in time to being exposed to a frightening film clip. These young men are either not perceiving the same danger in their follow-up dream as threatening or that the content is not as scary as those without a recent experience of combat centric gaming.

Keywords: threat simulation; nightmare protection; combat centric; dreams; video games

1. Introduction

Of increasing concern in society is the use of video games for health, of which there are an ever increasing pool. Video games are being used to aid in visualization tasks. For instance, those suffering from diabetes, asthma, heart disease and cancer would play a game called Re-mission to help them manage and try to fight back against their conditions. Games such as the Wii- Habilitation can actually be used in virtual or physical rehabilitation sessions. Video games can also offer invaluable resources for improvement of health education and life style changes in all ages with game such as Wii Fit Plus for physical activity using games and Fit Brains from Luminosity for Mental health improvements (Digitome, 2011).

Another health problem, which is the focus of the present inquiry, is nightmares. Nightmares, while fascinating humans for centuries, still plague us with horrific experiences and visions. They occur commonly in the population with three to five percent of the population reporting that they suffer from nightmares (Schredl, Landgraf, & Zeiler, 2003). The purpose of dreams and nightmares is still under debate however Revonsuo and Valli (2000) proposed that a function of dreams from an evolutionary perspective.

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Their threat simulation theory postulated that dreams were artificial simulations where humans could safely engage while practicing well learned defensive manoeuvers to certain dangerous situations or experiences. These defensive manoeuvers would then transfer over to the waking world and prove to be evolutionarily beneficial to our survival as a species. Nightmares, however, are the failure of this threat simulation system, in that the point of the simulation is for the brain to regulate negative emotions and as a consequence at times, while in these threatening situations to foster the learning of defensive tactics. In the case of a nightmare, this threat regulator breaks down and is unable to deal with the total influx of negative emotions and so a wake up event usually follows. Levin and Nielson (2009) summarized research into nightmares, they concluded that emotional reactivity and past history of traumas, can increase a person's likelihood of experiencing a nightmare.

In the case of emotional reactivity, a person's individual level of affect disstress, which is their level of reaction to events with high levels of negative emotional reactivity, impacts the likelihood of a dream being so stressful that the dreamer awakens. As well, past history of trauma can create a susceptibility in a person to experience nightmares. The best example is post-traumatic stress disorder which can be characterized by extremely vivid nightmares that may actually re-traumatize a person's suffering from them. This would be more likely in individuals with a history of trauma or high emotional reactivity. Thus controlling for these pre-existing conditions is important in any study examining the effects of an activity on night time dreams.

The effects of video game play on dreams and nightmares has been initially explored. Some research has examined how video game play effects the nightmare experienced by gamers (Gackenbach, Kuruvilla, Dopko, & Le, 2010, 127-

136). They found through dream content analysis that male gamers behaved less often aggressively, but when they did it was more intense. It was a combination of this intense infrequent aggression, with a reduced likelihood of experiencing misfortune in the dream that seems to lead to these gamers experiencing a sense of empowerment rather than fear from the threatening dreams. This finding was supported in a follow up study which looked at threat elements in the dreams of those with varying frequency of gaming (Gackenbach & Kuruvilla, 2008).

They concluded that the major hypothesis that gamers have developed adaptive dream strategies for processing violent game play was broadly supported. In fact, all threat factors, did show a decrease in all types of threats in terms of intensity and outcomes. This led researchers to postulate that video game play may act as a form of nightmare protection. Defensive rehearsals that take place through combat-centric video game play, when done over a long period of time would result in well-learned defensive responses (Gackenbach, Ellerman, & Hall, 2011; Gackenbach, Darlington, Ferguson, & Boyes, 2013). This process is very similar to the imagery rehearsal technique for treating nightmares, which shows how these learned responses can generalize to other altered realities, in this case dreams (Krakow & Zadra, 2006).

A strong support for this thesis was a study conducted by Gackenbach, Ellerman and Hall (2011). Military gamers participating in the study evidenced less of some forms of dream threat in their military dreams. This is evidence of the numbing toward violence associated with serious combat-centric game play (Barlett, Anderson, & Swing, 2009). Pointing to the work of Luther and colleagues who argue that exposure to complex visual-spatial motor tasks up to six hours after a traumatic event, can reduce later flashbacks, which are often seen in nightmares (Luther, Andrew, Matthew, & Alexander, 2015). A replication and extension of the Gackenbach et al. (2011) study by Gackenbach, Darlington, Ferguson and Boyes (2013) used undergraduate participants sing the same inventories they replicated the earlier study with men. A recent replication was done trying to show the nightmare protection effect in another lab (Blagrove, Samson, McMurtie & Carter, 2013), did not find the nightmare protection effect, however the key piece that they were missing was controlling for emotional reactivity and history of trauma.

In the current study we sought to confirm the nightmare protection effect by using an experimental manipulation instead of correlational techniques, which has been the method used previously. Participants were asked to view a frightening movie clip and to engage in one of three computer tasks, including game play, and then to report a follow-up dream. It was expected that video game play of the combat centric variety would protect against nightmarish imagery resulting from a high fear producing movie clip, when nightmare prediction variables are controlled. Specifically, we expected less self-report fear and nightmares in the combat centric game play condition than in the other two conditions. In terms of dream content analysis by independent judges, we expected less dream threat indicators in the combat centric condition than in the other two conditions.

2. Method

2.1. Participants

Students enrolled in introductory psychology courses at a western Canadian university served as the research participants. A total of 146 students were involved in the study. Of this a total 134 provided sufficient information for data analysis. These were all male of which all but two had been married while the rest were single. Ethnicity was split into Caucasian and non-Caucasian. Nineteen did not report this information. Of the rest, 81 said they were Caucasian and 34 indicated other non-Caucasian ethnic origins. Having been drawn from the Introductory Psychology pool their ages were on average between 18 and 20 years.In the final stages of the study a total of 76 participants reported some form of dream that would allow for content analysis.

2.2. Measures

The following questionnaires were administered in the online survey in the order below.

Pre-screened Questionnaire. We asked the participants three key details as far as pre-screen criterion, dream recall frequency, video game play frequency and gender. Males had to be on the high end of dream recall being at least four times a week. This criteria was used in order to increase the likelihood that these participants would have a dream to report after their participation in the study. Video game play frequency was either high or low. Additional criteria for being included were being at least eighteen years of age, being male, not having trauma in the past six months that may lead to mental turmoil.

Demographic Questions. The following five items were sought to obtain general demographic information; sex, age, education, marital status, and race or ethnicity. Chronbach Alpha's were computed on all the remaining scales and can be found in Table 1.

Video Game Play History Questionnaire. The Video Game Play History Questionnaire is an 18-item instrument adapted from Gackenbach in 2006. This was used to further refine the video game groups. That is beyond the frequency question asked at prescreening, in this survey further information thought to substantiate gaming groups was included. Questions inquired into participants' life history of playing video games. The types of questions included frequency of play, length of play, number of games played, age when the participant began to play, age of peak play, and genres preferred at various times in the life span. These questions were followed by others seeking details on the game(s) played immediately prior to filling out the questionnaires. Questions were also asked about physical game apparatus used as well as social elements of play. Past research with these items have shown adequate chronbach alphas (Gackenbach & Rosie, 2011).

The other items asked about in this questionnaire included favorite game genre, history with playing Farcry 3, Minecraft and using google scholar and the university article search software. Had they been playing a game in the 12 hours prior to reporting to the laboratory was also asked about, as was action versus non-action genre preference, social media use and cell phone texting frequencies. All 134 answered the favorite genre question with 32% saying first person shooters followed by 19 percent preferring real time strategy games. Another 14% preferred sports games and

Table 1. Chronbach Alpha's, Number of Items and Number of Respondents for each Self-Report Measure.

Scale	Number of items	Number of respondents	Chronbach's Alpha
Video Game Play History	4	134	0.649
Emotional Reactivity Scale	17	134	0.804
Trauma Inventory	9	134*	0.625
Movie emotional reactions	11	134*	0.772
Media Presence Scale	14	134*	0.806
Activities day before dream	13	76**	0.747
Dream Types (lucid, control, & observer)	3	59**	0.524
Dream Types (bad dreams & nightmares)	2	60**	0.387
Dream self-reported emotions	15	38**	0.76

Note. *zero's were put into blank responses; **only those reporting a dream reported this information

12% checked adventure games. The rest of the genre categories each had less than 10% preferences indicated. A large majority never played Farcry 3 (75%) while only 57% never played Minecraft. Of those who reported google scholar use slightly over half had not used it (55%) while the universities library search engine was widely reported as used (82%). Sixty-six percent said they had not been gaming in the 12 hours prior to reporting to the laboratory. Of those who reported action vs non-action genre preferences (42 of 134), 16 preferred action games. All 134 used social media with 87% indicated it was at least once a day or more frequency. Likewise all were daily text messenger users with 84% reporting from 11 to 200 messages a day. None of these were used to select the research participants but they offer some insight into their digital lives.

Emotional Reactivity Scale. In the previous studies The Emotional Reactivity and Numbing Scale (ERNS), which is a 62-item scale developed by Orsillo, Theodore-Oklota, Luterek, and Plumb (2007), was used as it was normed on U.S. military veterans, and thus it was most directly relevant to the earlier study (Gackenbach et al., 2011).However a shortened similar scale was found for the current study to help eliminate test fatigue within the laboratory portion of the study. This 17-item scale was designed to measure the tendency to become emotionally aroused under a variety of circumstances (Melamed, 1987). Here is a sample item: "Whenever I think of an unpleasant event that once happened to me, I get upset about it all over again". Respondents answer in terms of how characteristic the statement is of them along a 6 point likert scale. Cronbach's alpha was 0.89.

Trauma Inventory. The Trauma Inventory was adapted from the original by Eng, Kuiken, Temme and Sharma (2005) for the current study. This shortened version of the original was used to help reduce test fatigue. The part used in our study inquired about the incidence and intensity of nine types of trauma including: physical assault, recurrent physical assault, recurrent emotional abuse, criminal victimization, negligent injury, civil, domestic, or industrial disaster, natural disasters, and other trauma. Each trauma was briefly defined and in the original it was followed by a yes/no question as to whether it had been experienced and, if so, at what age. Two additional questions asked about the intensity of the effects of the traumatic experience were also in the scale used in the previous study as were questions about had they experienced any nightmares that may have occurred after the experience. In this inquiry each type of trauma was asked about in terms of the frequency that they had experienced it. At the end of these nine trauma type questions was one question asking if they had ever experienced nightmares associated with any of these traumas. Nightmares were defined in this question. Responses for all of these questions were never, once, twice, three or more times. While details gathered in the original study were not asked about herein, it was thought justified because we were only interested in any history of trauma generically, and if said history was associated with nightmares. We were not interested in the specifics of any one type of trauma.

Post Movie Feedback Scale. Following the movie clip, participants were directed to fill out a "Post Movie Questionnaire". Included in the questions was whether the participant had viewed the entire clip, had they seen the clip before, what was the intensity of their emotional arousal during the viewing of the clip and to rate ten emotional clusters they had felt during the viewing. Both were rated along a seven point likert scale ranging from not at all to very much. The rationale for the use of these questions was to assess if this part of the experimental manipulation differed across groups. It was expected to not differ.

Media Presence Scale. This 14 items scale was adapted from previous scales asking about felt sense of being there in a media experience. Each item was rated along a seven point likert type scale ranging from not at all to very much. A sample item is "To what extent did you feel mentally immersed in the experience?" Gackenbach and Rosie (2011) have shown that presence in virtual world experiences is as strong as in dreams. Gackenbach, Rosie, Bown and Sample (2011) also demonstrated that fidelity and interactivity of a media experience affected presense. This scale was thus included as a verification of the impact of the three types of computer experiences. It was expected that the action video game would have the highest felt sense of presence followed by the creative video game and finally by the search activity. Thus higher presence should predict more likelihood of subsequent incorporation into a later dream.

Dream Recall Survey. The dream recall survey asked participants to write down a dream they remembered from the week following the laboratory session. The questionnaire took the following approach:

Please describe a dream from the week after the lab session. During the lab session you saw a movie and played a video game/worked on a computer. Record the dream as exactly and as fully as you can remember it. Try to tell the dream story, from beginning to end, as if it were happening again (and without any interpretation or explanation). Your report should contain, if possible, a description of:

- *All the objects, places, characters, and events in your dream;*
- *The entire sequence of actions and events, from the beginning to the end of your dream;*
- *Your moment-to-moment thoughts and feelings, from the beginning to the end of your dream, that occurred in the dream; and*
- *Any unusual, incongruous, or implausible dream thoughts, feelings, objects, places, characters, or events.*

If you had more than one dream use the dream which seemed to be most related to the lab session activities you engaged in. Be sure to report only one dream.

In addition, respondents were asked when the dream occurred and what activities the dreamer engaged in the previous day. There were 13 activities asked about including various computer ones as well as more generic ones like reading, driving, talking, etc. Also participants were asked to categorize the dream such as being, lucid dream, control, nightmare, bad, bizarre, observer or electronic media. A definition for each was provided. Finally, respondents were asked about their emotions experienced in the dream along a five point intensity rating. These emotions included both negative (i.e. anxiety, guilt, fear, etc) as well as positive (i.e. awe, happiness, ecstasy, etc). Fifteen emotions were listed.

2.3. Materials

The materials used in this study consisted of three Dell computer stations including monitors, keyboards, headphones and mice. Each computer was configured with a copy of the game Far Cry 3, published by Ubisoft in 2012 and a copy of the game Minecraft, published by Mojang and 4J studios in 2009, as well as a preconfigured web browser set to search sites.

2.4. Procedure

Student's participation was elicited through the mass testing efforts of the psychology department at a university in western Canada. The students were told in their introductory psychology courses that they could receive up to a bonus of six percent credit towards their final course grade if they participated in a number of research initiatives. The credit received for this study was in two parts, the first was two percent bonus for the laboratory portion of the study, and another two percent was awarded for completing the dream recall survey taken in the week following the laboratory part. Once students moved past the research system, SONA, intake software, they would receive their course credit. Their participation was entirely confidential. Drop out or discontinuation was not penalized. All participants were aware of this procedure before starting.

The layout of the laboratory consisted of two rooms with a two way mirror and door separating them. In the outer room the three computer stations were set up with dividers between them to limit cross participant exposure. The second room was for the use of the researcher in order to view the participants and issue instructions through a speaker.

After completing the informed consent, students in the laboratory engaged, in a counter balanced order, one of two conditions; a fearful movie stimulus, or engage in one of three computer conditions. The fearful movie stimulus was a ten minute clip taken from the movie Misery by Steven King. In it the victim's ankles are broken or "hobbled". This film was chosen from a study looking at the different emotions stimulated the most by different movies, in this case Misery was the highest for fear and discomfort (Schaefer, Nils, Sanchez & Philippot 2010). For the computer tasks participants were randomly assigned but maintained counter balancing among the three tasks, the three included a creative, non-combat video game, a combat centric game and a non-video game computer control task. Each task was also 10 minutes in length. For the creative game we used the video game Minecraft where players can build anything in a virtual environment similar to Lego block construction. For the combat centric game we used Far Cry 3, a first person shooter themed in a tropical island with pirates and dangerous wild animals to contend with. The control condition consisted of a scholarly search task using any research database on the computer. As much as possible at any one sitting all three computers were used with each running a different task. Respondent wore headphones and there were dividers between the stations thus interaction between participants was not allowed.

If a student decided to end his participation, a debriefing statement would have been sent out to them. None chose this option. This concluded the laboratory side of the study, from here participants went go home and in the following week filled out the dream recall survey once. They were asked to do this as soon as possible after a nights sleep after the laboratory session and submit it to receive their final bonus credit. Following filling out the dream recall form they received the debriefing statement. This study passed the ethics review board at this university.

3. Results

146 undergraduates were run in this study of which 134 people provided sufficient information for data analysis and of these, 76 people reported some sort of dream that could be content analyzed. Groups were based on a median split of video game factor scores which loaded frequency of play, length of play, number of games played and age begun playing. The number of participants in each video game groups ended up being 23 in the high end gamer Far Cry condition with 24 in the low, 23 in the high Minecraft condition and 14 low and finally 20 in the high Article search condition and 30 in the low. A chi square analysis on these numbers was done and was found to be not significant, thus showing that the distribution of research participants was sufficiently balanced across conditions and groups. The game groups were counterbalanced first on whether they experienced the computer condition or the movie condition initially. Secondly they were counterbalanced randomly to either the Far Cry, combat centric game; Minecraft, creative game; or the article search task. However, it should be noted that the three conditions were not equally responded to in terms of

self-reported sense of presence or enjoyment of the experience. Specifically, a gamer group by condition ANOVA on the sum of the presence questions resulted in a main effect for condition, $F(2,85)=12.17$, $p<.0001$, $eta_p^2=.223$. The Far Cry computer experience was reported as resulting in the highest levels of felt sense of being there (e.g., presence) ($M=54.20$, $SE=2.39$) followed by the search task ($M=40.34$, $SE=2.42$) and then Minecraft ($M=36.49$, $SE=3.53$). Likewise the question about did the participant enjoy the media experience, also resulted in a main effect for condition, $F(2, 123)=11.83$, $p<.0001$, $eta_p^2=.161$). But this time while Far Cry was enjoyed the most on a seven point Likert scale ($M= 4.87$, $SE=.264$), it was Minecraft which was enjoyed the second most ($M=3.67$, $SE=.312$) followed by the computer search task ($M=3.07$, $SE=.269$).

Movie. For the movie clip Misery, 26 out of the 133 who had answered this question had seen it before, and all but one person watched the whole clip. Again the Chi square done was found to be not significant, as well an ANOVA done on Emotional Intensity self-ratings in reaction to the film clip was not significant. Specific emotional reactions to the film were factor analyzed using a varimax rotation with .5 cut off for interpretation. All the emotion responses loaded onto three factors: angry/sad, fear/anxiety and amused. An ANOVA was done on condition by gaming group by emotional reaction to the film factor score as the within subject variable. No difference as a function of condition or game or within subject for movie emotional factor scores was found, showing that all those participating that viewed the movie clip had the same emotional reaction.

Video Game Group Definition. The video game group definitions were based on median split factor scores of the four gaming questions (frequency of play, length of play session, age began playing, and number of games played) for those who reported a dream. The groups contained 11 participants in the game condition Far Cry who were also high end gamers and 15 in the low end gaming group. Fifteen participants who were high end gamers were in the Minecraft condition and 7 from the low end, 12 participants in the article search condition were in the high end and 16 in low end. The low number in the Minecraft low condition is concerning but a chi square on these group by condition assignments was non-significant. An ANOVA on when did the dream occur, as well as on sum of media use the day before, were both non-significant. This is important to show that there was no group or condition bias in memory or in media use the day before the reported dream.

Covariate Determinations. Several factors were thought a priori to potentially confound any examination of gaming effects on nightmares. These were specifically examined in this sample to determine if there were confounds and if statistically shown, then that variable was included as a covariate in subsequent dream analysis. We began with the degree to which these young men had a history playing the games in the study. We examined gamer group by condition ANOVA's on history with Far Cry, Minecraft and google scholar. Only on Minecraft history, which is displayed in Figure 1, did we find any between subject differences.

Thus the justification for using Minecraft as covariate in subsequent analysis was based on this significant interaction between gaming groups and condition, $F(2,70)=5.20$,$p=.008$, $eta_p^2=.129$). It can be seen that Minecraft history was higher for the low relative to the high end gamers who were assigned to the Minecraft condition and vice versa for those assigned to the Far Cry (combat game) condition. There was no gamer group difference in history of doing that activity for the scholarly search.

For Emotional reactivity, the scale was scored by the sum of relevant items. In the condition by gamer group ANOVA, a main effect for gamer group was found, $F(1,128)=7.36$, $p=.008$, $eta_p^2=.054$). The Emotional Reactivity sums for gamer groups was found to be 29.57 ($SE=1.33$) in the Highs and 34.76 ($SE=1.38$) in the lows. This indicates that emotional reactivity was differentially distributed as a function of game play history and so it too was entered into subsequent analysis as a covariate.

In a similar analysis the sum of past traumas was not significant as a function of gamer group or condition. Therefore it was not entered as a covariate. However, the history of nightmares associated with past trauma showed that those in the Far Cry condition reported more nightmares associated with past trauma than the other two conditions, $F(2,93)=3.09$, $p=.050$, $eta_p^2=.062$. Because of this, history of nightmares was also used as a covariate.

Based upon these analysis three covariate were entered in the dream analyses; Minecraft history, sum of emotional reactivity and nightmare history associated with past traumas.

Dream Self Reports: Types. Self-labeled lucid, control and observer dream types were all shown to be non-sig-

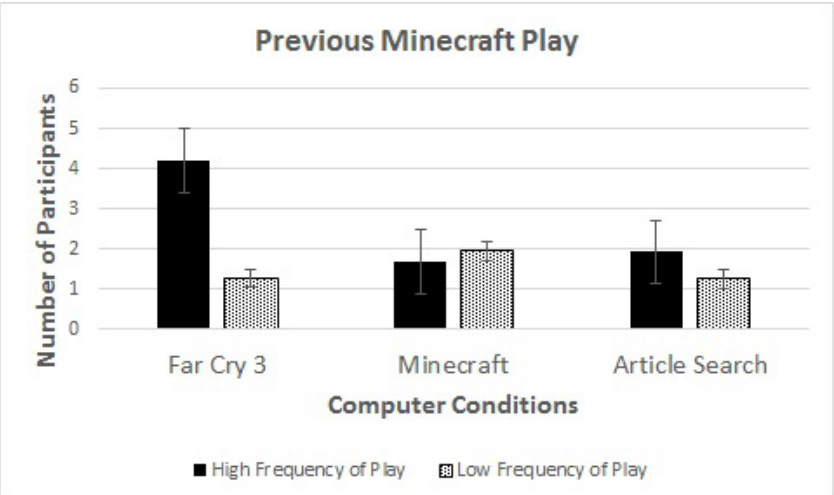

Figure 1. Group by Condition ANOVA's on Self-Reported Previous History with Far Cry, Minecraft and Google Scholar.

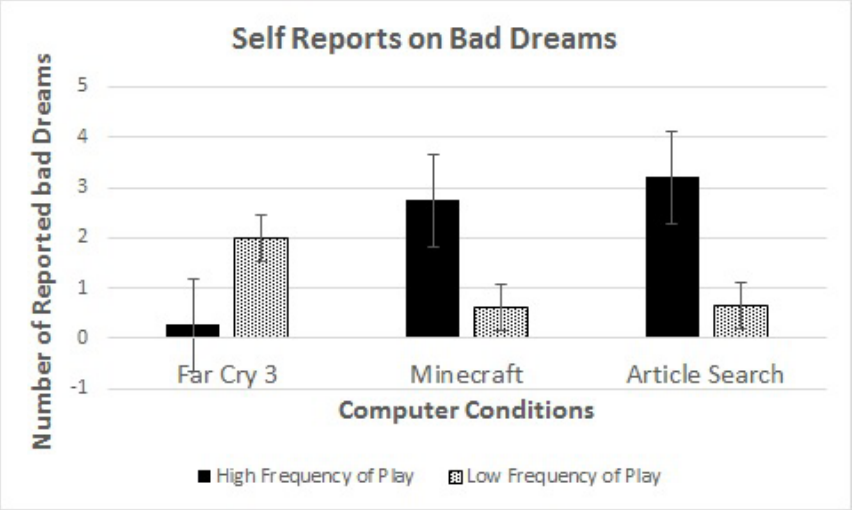

Figure 2. Gaming Group by Condition ANCOVA for Self-Evaluations of Reported Dream as a Bad Dreams.

nificant in a condition by gamer group ANCOVA's controlling for the three covariates. However, nightmare identifications evidenced a significant main effect for gaming groups, $F(1,47)=5.14$, $p=.028$, $eta_p^2=.099$. Participants in the low end game group reported more nightmares ($M=1.919$, $SE=.446$) than those in the high end group ($M=.593$, $SE=.372$). An interaction was found for the gaming group by condition ANCOVA for the self-reports of bad dreams, $F(2,48)=5.37$, $p=.008$, $eta_p^2=.183$).

This is portrayed in Figure 2. The high end gamers reported the opposite from the lows. Specifically, the high's reported fewer bad dreams in the Far Cry condition relative to the other two computer tasks, Minecraft and search, while the lows reported more bad dreams after playing Far Cry than after playing either Minecraft or searching.

Self-reported bizarreness of reported dreams were evaluated by an ANCOVA on gamer group by condition. There was one main effect for condition, $F(2,50)=4.75$, $p=.013$, $eta_p^2=1.60$, and one which approached traditional levels of significance for gamer group, $F(1,50)=3.38$, $p=0.072$, $eta_p^2=.063$. Minecraft condition participants ($M=4.008$, $SE=.567$) reported more dream bizarreness than individuals assigned to the other two conditions (Search $M=2.859$, $SE=.468$; Far Cry $M= 1.722$, $SE=.481$). The marginal gamer group difference favored low end gamers (low $M=3.389$, $SE=.422$; high $M=2.337$, $SE=.385$).

Finally, there was a marginal main effect for the gamer group by condition ANCOVA on seeing their dream as related to electronic media, $F(2,42)=2.91$, $p=.065$, $eta_p^2=.122$. Those playing Far Cry were most likely to report this type of dream ($M=3.134$, $SE=.628$) while second was those doing the search task ($M=2.690$, $SE=.651$) with Minecraft players being much less likely to so report this dream type ($M=.825$, $SE=.767$).

Dream Self Reports: Emotions. Respondents were also asked to evaluate their dream in terms of the emotions they felt during the dream. Since 15 emotions were inquired about, a varimax rotated factor analysis was computed saving the factor scores. This is shown in Table 2.

In gamer group by condition ANCOVA's on each factor score none were significant. However, given the findings of self-reported dream types it was thought advisable to examine specific emotions associated with nightmares and bad dreams, anxiety, fear and terror. An interaction was significant for fear, $F(2,40)=3.54$, $p=.039$, $eta_p^2=.150$.

This is portrayed in Figure 3. It can be seen that the interaction is accounted for by the high end gamer group having different fear emotions in their dreams after the laboratory experience than the other two groups. Specifically, and as predicted, high end gamers playing the combat

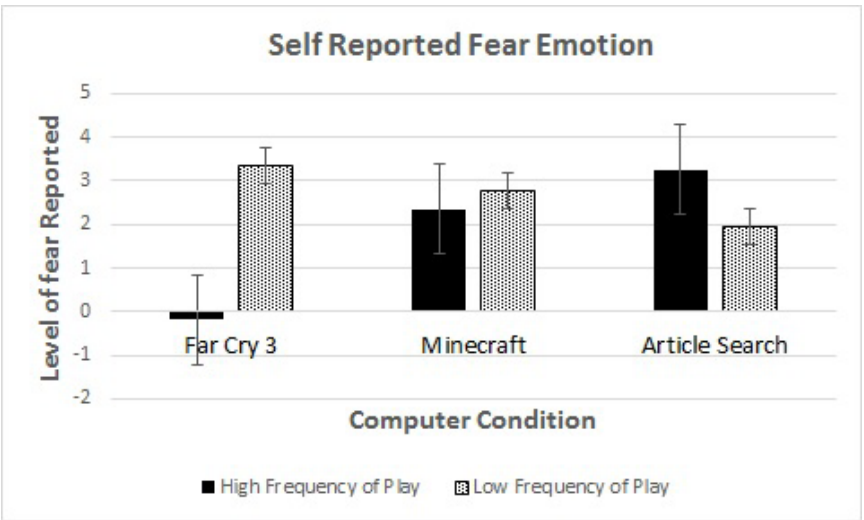

Figure 3. Gamer Group by Condition ANCOVA on Self-Evaluation of Fear in Reported Dream.

Table 2. Factor Loadings for the Varimax Rotated Factor Analysis on 15 Self-Evaluations of Emotions for Self-Reported Dream.

Dream Emotions	Fear/Sad	Anger	Happy/Sex	Awe	Hate/Terror
Anger	0.127	0.802	-0.064	-0.239	0.139
Awe	0.18	0.057	-0.068	0.94	0.07
Arousal	0.028	-0.078	0.762	-0.257	-0.024
Anxiety	0.691	0.442	-0.169	0.019	0.042
Fear	0.857	0.087	0.141	0.111	0.229
Guilt	0.81	0.097	0.293	0.035	-0.235
Frustration	0.186	0.775	-0.184	0.043	0.164
Sadness	0.88	0.047	0.147	-0.003	0.024
Hatred	0.004	0.411	-0.043	0.003	0.646
Happiness	-0.182	-0.365	0.607	0.445	-0.185
Jealousy	0.274	0.208	0.763	0.055	-0.069
Embarrassment	0.106	0.71	0.276	0.285	-0.143
Ecstasy	0.099	-0.283	0.522	0.292	0.381
Downhearted	0.596	0.396	-0.089	0.154	-0.466
Terror	0.681	0.015	-0.254	0.189	0.577

centric game reported less fear than other types of gamers and then in for high end gamers playing either the creative game, Minecraft, or doing the search task.

Threat Simulation Coding by Judges. Revonsuo and Valli's threat simulation dream coding technique includes several variables. Herein, we examine the results of only the ones that could be placed along a continuum; presence of threat (objective = 3; subjective=2; no threat=1), nature of threat (aggressive harm=3; nonaggressive harm=2; no harm=1), sum of the targets of threat, and severity of threat (life threating=4; social/psychological=3; trivial=2; none=1). Two of these four judges' estimates of threat in the dream had marginal interactions. Because they are in the same direction and may be due to small cell sizes and are consistent with the self-reports of the dreamers about their dreams they are reported herein.

The interaction on presence of threat ANCOVA on the same independent variables and covariates as used with the self-report dream variables, was marginally significant, $F(2,48)=2.50$, $p=.092$, $eta_p^2=.094$. It had the same pattern as that for the self-reported bad dreams and fear in the dream. The second scale to show some effect was severity of threat. As before there were no significant main effects but a marginally significant interaction, $F(2,33)=2.89$,$p=.070$, $eta_p^2=.149$. This is portrayed in Figure 4 While the dream impact of the two gaming conditions was the same as in the previous interactions for both gaming groups, the effect of threat severity evidenced no difference as a function of gaming group for the scholarly search condition.

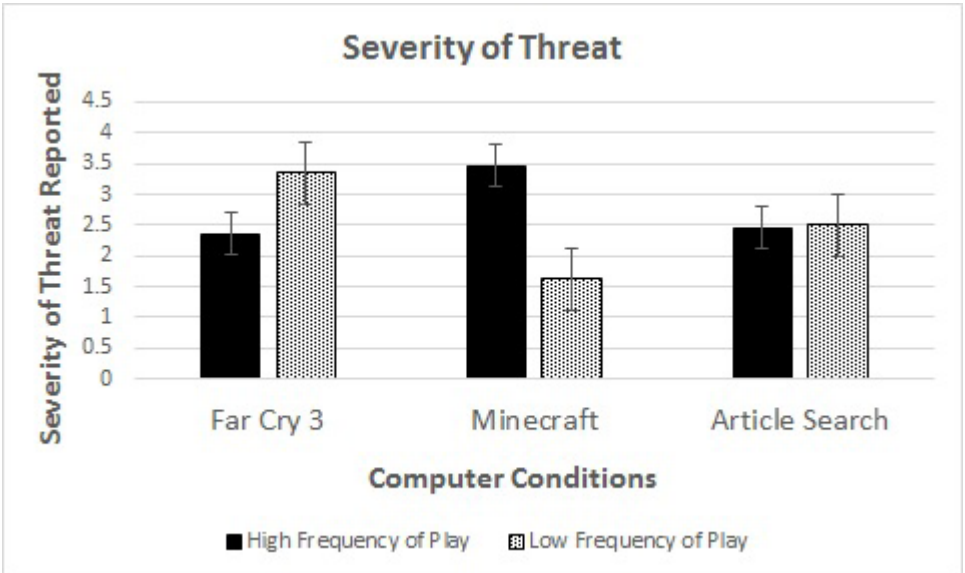

Figure 4. Gamer Group by Condition ANCOVA on Severity of Threat Judges Coding of Reported Dream...

4. Discussion

The major reason for conducting this study was to see if we could show experimental verification for the nightmare protection thesis using young men playing combat centric video games. To do this we frightened the participants and had them play one of three computer tasks, one of two games or a control task. They filled out various surveys which allowed us to determine if there were potential confounds between the two groups of gamers assigned randomly to the three computer conditions. When confounds appeared the variable was statistically controlled for in the dream analyses. A clear pattern of results emerged supporting the research hypothesis.

Specifically, low end gamers reported that the dream they experienced was a nightmare. The evaluations of their dream as a "bad dream" evidenced an interaction between group and condition in the direction expected for nightmare protection hypothesis. Among high end gamers, they did not see their dream as a bad dream if they played Far Cry, but did if they played Minecraft or did the search task. The opposite pattern was shown for bad dreams among low end gamers, if not as extreme in differences between the two categories of computer use. Interestingly high end gamers also reported their dreams as marginally less bizarre than their compatriots. Also supporting the nightmare protection finding for high end gamers playing combat centric games, is the interaction between condition and gamer group on self-reported fear. Specifically, the high end gamers playing Far Cry reported less dreamt fear, than in the other two conditions and in the Far Cry condition when played by low end gamers.

Marginal support for this confluence of self-reports about dream experiences is the judges assessments of threat in the dreams. Of the four threat variables examined two were marginally significant and reported herein, because they were in line with the self-reported dream effects. As above when high end gamer respondents played Far Cry they were judged to have less threat and less severe threat in their dreams than when low end gamers played the same game. The opposite was the case for the other two computer tasks. Here are two illustrates of dreams:

High End Gamer who played Far Cry: In my dream I was a marine sniper, I had to crawl towards a target behind enemy lines, I had to crawl through a field wearing a gillie suit, I had to crawl towards my target, toward the end of the dream I was able to shoot my target but an enemy helicopter spotted me. I woke up before I could see if I got away or not.

Low End Gamer who played Far Cry: I was driving to my friend's house one afternoon to study for an upcoming exam, I was stopped at a red light and impatiently waiting for it to turn green. The light turned green I hit the accelerator but the last thing I saw was an SUV driving into the diver side door of my mini-van. This was the point where I woke up.

These findings suggest that combat centric gaming by those who game a lot, may act as a type of imagery rehearsal for threat in subsequent dreams as per Krakow and Zadra (2006). However, the suggestion by Luther et al. (2015) that any imagery task would interfere with subsequent neuronal imprinting of traumatic memories seems not to be supported. If that were the case then the Minecraft manipulation would be expected to have also resulted in nightmare protection. However, the researcher observed that players who were of the higher play frequency, or perhaps had past experience with Minecraft, would occasionally exhibit different play styles within the game than those of the lower frequency. The Minecraft task was played in creative mode where in players had access to unlimited building supplies. All story and combat elements are turned off. However, items still exist in the game, such as some weapons. Although creatures will not die, players could still engage in some form of aggression, if stunted. Participants in this task then might differ in their play style depending on these two factors. So while the usual list of actions involved building or exploring, occasionally these would turn into building a lava trap and filling it with animals or running around hitting things to no effect.

However, the higher presence and enjoyment associated with Far Cry, relative to Minecraft and the computer search task, might in part be why that game was more successful in nightmare protection. These were condition main effects, thus the individual difference found between conditions for nightmare protection variables would argue against this interpretation.

4.1. Limitations

There are various limitations to this study. First is the small cell sizes which may have contributed to the marginal statistical values. However, they were reported because the direction of the findings was consistent. The study was run only on university student males who typically do not have distinct sleep patterns. Rather they vary widely depending on the demands of their life. Previous research done by Ditner, Gackenbach, & Hakopdjanian (2014) we have found that nightmare protection was more elusive with female high end gamers. We only found it when we selected female high end gamers who played combat centric games and identified themselves as relatively masculine. The movie clip while rated as the most frightening in the norms (Schaefer, Nils, Sanchez & Philippot 2010; 1153-1172), is not as graphic in violence, nor possibly as frightening, as the movies and television shows that are popular among today college students. The fear was about the emotional buildup to the final moment. It may be that participants of any gaming history were still relatively numbed to such violence through contemporary entertainment.

Another limitation is in terms of any history of trauma that might have been triggered due to watching the film. Although we controlled for history of trauma in the last six months, we could not say if earlier trauma responses were evident. As noted this did go through university ethics approval and we did provide information to all participants regarding university counseling services if they found that experience uncomfortable. They were also of course free to withdraw with no credit penalty.

4.2. Conclusion and Clinical Implications

While there was some support for the Nightmare Protection Hypothesis in this experimental manipulation, it was a qualified finding. That is for young university men, with a history of gaming who played a combat centric game close to the frightening movie exposure. Thus application to a clinical situation should not be made too hastily. While there was no

difference between groups in history of trauma, there were differences in emotional reactivity and nightmares associated with trauma. It may be that those most susceptible to nightmares are attracted to combat centric gaming as a type of relief. Blagrove et al's (2013) finding of a statistically positive association between a General Health Questionnaire and nightmare frequency for male high end gamers would support this interpretation. The reason nightmare predictors were controlled for in this study was to focus on the effects of gaming, historically and in the manipulation, on subsequent nightmares. Without such controls it's not surprising that an association might be found between waking stress and gaming history. However, in our data the emotional reactivity measure, which can be argued is a type of stress reaction, was higher for the low end gamers than the highs. There was no individual difference for history of trauma or nightmare history. It will be recalled that nightmare history was associated with condition, not gamer group. These findings argue against the Blagrove et al.(2013) findings and support the idea that combat centric gaming can help in dealing with waking stresses.

Author Notes

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The difference of modern lucid dreamers

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Summary. The article examines the phenomenon of lucid dreaming within a broader framework of other states of higher awareness, popularized mostly (but not only) within Hindu-Buddhist tradition. The author assumes that lucid dreaming may have more in common with Gurdjieff's remembering oneself and mindfulness than with the normal waking state. Based on the survey of modern western lucid dreamers and previous researchers done in this field the author comes to the conclusion that we can talk about an autonomous face of a modern lucid dreamer who is not much connected with Hindu and Buddhist concepts. Lucid dreaming, as practiced by modern lucid dreamers in the West, does not seem to have a goal of transcending one's ego and achieving non-dual awareness, but it does have that general goal for some practitioners of Hindu and Buddhist philosophies. Many modern secular lucid dreamers in the West and other regions of the globalized world which have close cultural ties with the West do not practice any Hindu or Buddhist practices of witnessing and non-attachment in lucid dreams, and often see lucid dreaming as a fun activity for personal enjoyment and creativity.

Keywords: lucid dreaming, awareness, mindfulness, Dzogchen, dream yoga, Buddhism, Gurdjieff

1. Introduction

The article will examine the phenomenon of lucid dreaming within a broader framework of other states of higher awareness, popularized mostly within Hindu-Buddhist tradition. Some of these states, such as lucid dreaming, are now widely discussed in the scientific world and others are mostly referred to by meditation practitioners and spiritual teachers. Experiencing altered states of mind has been inspiring for mankind throughout time. Myths, mystical explanations, and exaggerations of their significance and even declarations about their achievement being the ultimate purpose of human evolution (e.g. moksha, nirvana, self-remembering, et c.) have been built around these altered states.

The phenomenon of lucid dreaming can surely be referred to as a state of higher awareness, which I will explain later in this article. It has been given great attention by the scientific community, new age practitioners, and common lucid dreamers during the last decades.

The term 'lucid dream', which refers to the dream in which the dreamer is aware of the fact that he or she is dreaming was introduced by a Dutch psychiatrist Frederik van Eeden in his 1913 article 'A Study of Dreams' (Eeden,1913). The phenomenon was known already by Aristotle in the 4th century BC and mentioned by St. Augustine, and later by an English physician Sir Thomas Browne, (Browne, 1613), English M.P. Samuel Pepys (Pepys, 1665) and many others. In Hindu tradition practical ways to achieve a similar state (but not identical) were elaborated by yoga nidra practitioners. In Tibetan Buddhism, dream yoga has the goal to attain awareness in a dream state, and has been practiced for centuries. Practices for developing the ability of lucid dreaming can be found not only in oriental cultures. One of the prominent examples is Carlos Castaneda's book 'The Art of Dreaming' (Castaneda, 1993) which popularizes the approaches to the lucid dreaming specific to the Toltec culture.

Lucid dreaming techniques, once being a practice in deeply esoteric doctrines, are now widely practiced by people who have limited interest in religion or spiritual issues. They may be developing lucid dreaming skills just out of sheer desire to have some fun (Schädlich & Erlacher, 2012). Many are motivated by the possibility to have lucid dream sex (Stumbrys et al, 2014), which would be very difficult to imagine if the practice of lucid dreaming remained accessible only to religious practitioners. Robert L. Rider supports this view by claiming that the growing interest in lucid dreaming may be caused by the fact lucid dreamers can utilize their own private, sensory-realistic environment that is not subject to societal or physical limitations (Rider, 2012).

Thomas J. Snyder in his research 'Individual Differences Associated with Lucid Dreaming' (Snyder & Gackenbach, 1988) concluded that 57.5 % of the population has experienced a lucid dream at least once in their life. The proportion depends little on race, education, average income, sex, religion or political views; although fewer older people report they have lucid dreams (Hurd & Bulkeley, 2014). So lucid dreaming has really become a widespread phenomenon.

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2. Method

In my research, I asked five questions to people with lucid dreaming experience. One hundred people from Russia, US, UK, Denmark, Ukraine, Estonia and Belarus were surveyed. The gender break down includes 56 females and 44 males. Their ages varied from 16 to 42. The respondents were asked questions through social networks – Facebook and a Russian popular network VKontakte from January 20, 2016 till February 25, 2016. Only people who answered positively in the groups devoted to lucid dreaming that they had a lucid dreaming experience were asked to answer the questions. The following questions were asked:

- Do you experience even greater degree of awareness and think clearer in your lucid dreams than in a normal waking state?
- What views are closer to you - Western values of individualism and diversity or Hindu and Buddhist idea of the absence and insignificance of individual ego?
- Do you enjoy video games and/or cinema?
- Do you enjoy lucid dreaming mostly because you may have some fun or because of the possibility of spiritual growth?
- Do you find the idea of just witnessing without judgment in a lucid dream absurd?

The questions were supposed to support or refute the following theses:

- Modern lucid dreamers may often experience greater degree of awareness in lucid dreams as they have more in common with mindfulness, self-remembering and other states of higher awareness than with the normal waking state.
- Modern lucid dreamers prioritize Western concepts of individualism and diversity more over Hindu-Buddhist idea of the insignificance of individual ego.
- Modern lucid dreamers enjoy modern visual art.
- Modern lucid dreamers do not practice lucid dreaming only for spiritual purpose, but also entertain themselves through lucid dreaming.
- The idea of witnessing without judgment may be difficult to understand for modern lucid dreamers.

3. Results and Discussion

3.1. Experiencing waking state in a dream or something more?

Some researchers of the phenomenon of lucid dreaming tend to compare the lucid dreaming state to a waking state that combines cognitive elements of waking consciousness with the hallucinatory quality of dreaming (Voss et al, 2009), representing a unique blend of waking and dreaming consciousness (Hearne, 1978; LaBerge, 1980). However many of them do mention the fact that the quality of perception during a lucid dream may actually be higher than in the regular waking state (Gackenbach & LaBerge,1988). The descriptions of the lucid dreaming experience often outline a greater degree of awareness in a lucid dream than in the normal waking state: “Never had I experienced such clarity and perception” (LaBerge & Rheingold, 1990, pp. 1-2), “Never had I felt so absolutely well, so clear-brained, so inexpressibly ‘free’” (Fox, 1962, pp. 32–33).

In my questionnaire, I asked “Do you experience even greater degree of awareness and think clearer in your lucid dreams than in the normal waking state?”

The responses varied: 23 % answered – “Yes, always”, 54 % answered - “sometimes” while only 20 % answered - “I’m usually more aware in my waking state”. Lastly, 3 % couldn’t give an answer. So, a vast majority (77 %) experienced greater awareness in a lucid dream than in the normal waking state. Does lucid dreaming combine the dreaming state with the normal waking state? Or does it have characteristics of some other state of higher awareness that one may enjoy in the normal waking state? Actually Hunt suggested that lucid dreaming can be considered as a spontaneous meditative state one is trying to attain through meditation (Hunt, 1989). Robert Waggoner in his book ‘Lucid Dreaming: A Gateway to the Inner Self’ agrees that the awareness needed for meditation seems analogous to what lucid dreamers seek to develop (Waggoner, 2009). Gackenbach suggests that the lucid dream state is one of preliminary indicators of the development of higher states of consciousness (Gackenbach, 2006).

Moreover, the lucid dreaming experience cannot be narrowed just to higher awareness and one’s recognition of himself in the dream state. Many lucid dreamers report feeling a natural desire to fly in this state and dream euphoria, which is obviously unnatural for the normal waking state.

There are numerous examples in philosophical teachings, when the waking state is rather compared with the sleeping state and is characterized by the lack of awareness and thus opposed to higher states of awareness. One of the prominent example is Georgy Gurdjieff’s and his followers’ description of the usual state of people in their waking life as a ‘waking sleep’. The essence of his teaching can be described as becoming ‘lucid’ in the waking state, which he calls ‘remembering oneself’ (Gurdjieff, 1981). His follower, Petr Ouspensky, quoted his words - “a modern man lives in sleep, in sleep he is born and in sleep he dies” (Ouspensky, 1977, pg.66). He writes that “our science and philosophy have overlooked the fact that we do not possess this state (self-remembering or self-consciousness) of consciousness” (Ouspensky, 1977, pp.141-142).

Gurdjieff describes self-remembering in the following way: “There are moments when you become aware not only of what you are doing but also of yourself doing it. You see both ‘I’ and the ‘here’ of ‘I am here’- both the anger and the ‘I’ that is angry. Call this self-remembering if you like.” (Gurdjieff, 1922. pg.79-80)

Ouspensky, the student of Gurdjieff claims that moments of consciousness are very short and are separated by long intervals of completely unconscious, mechanical working of the machine. You will then see that you can think, feel, act, speak, work, without being conscious of it. (Ouspensky, 1977, pg. 116-117) and quotes his teacher, Gurdjieff – “Your principal mistake consists in thinking that you always have consciousness, and in general, either that consciousness is always present or that it is never present. In reality consciousness is a property which is continually changing. Now it is present, now it is not present. And there are different degrees and different levels of consciousness” (Ouspensky, 1977, pg. 117).

Doesn’t this description seem similar to the one from a recent paper by Tadas Stumbrys et al? They suggest that during wakefulness, people are often not explicitly and fully

aware of the present state of awareness; in particular during mind-wandering, affective emotional states or automatic behaviors people lack explicit recognition of their present experience and suggest that dreaming may even be considered as an intensified form of mind-wandering. (Stumbrys et al., 2015, pg.416).

Like Gurdjieff Jon Kabat-Zinn too compares the normal waking state with a dream (Kabat-Zinn, 1994). However, the concepts of being non-judgmental and acceptance differs mindfulness from remembering oneself. According to him, "Mindfulness is awareness that arises through paying attention, on purpose, in the present moment, non-judgmentally" (Kabat-Zinn, 2016).

Lucid dreaming as practiced by modern lucid dreamers and remembering oneself do not presuppose any absence of "I", which makes them very distinct from the states of higher awareness described within the Hindu-Buddhist tradition. So lucid dreaming may seem closer to this concept as it does not automatically presuppose acceptance and any transpersonal experience. On the other hand, the concept of self-remembering does not include any euphoria, feeling of happiness, etc., that are often characteristic of lucid dreaming. In this way, lucid dreaming is closer to mindfulness and meditation experience peculiar for the Hindu-Buddhist tradition.

In 2012, Robert L. Rider wrote a thesis 'Exploring the relationship between mindfulness in waking and lucidity in dreams'. He bases his research on the continuity theory of dreaming which presupposes that waking and dreaming rely on a shared set of brain-mind processes. He came to the conclusion of significant relationships between waking mindfulness and lucid dreaming. He hypothesizes that high levels of attention, reflection, self-awareness, volition, and control related to lucidity are continuous with waking mindfulness and found that better performances on two neuropsychological measures (sustained attention and behavioral self-monitoring) were moderately correlated with dream mindfulness (Rider, 2012).

According to the research conducted by Stumbrys, T, et al lucid dream frequency is more strongly associated with mindful presence rather than acceptance (Stumbrys, 2015), which supports the idea that transcending one's ego and achieving non-dual awareness are not necessary elements of lucid dreaming practice.

In 2010, a group of researchers from Finland, Switzerland and Germany in their research 'A new perspectives for the study of lucid dreaming: from brain stimulation to philosophical theories of self-consciousness' (Noreika, et al, 2010) suggested that the failure of nonlucid dreamers to realize that they are currently dreaming is closely related to the fact that the first-person perspective is highly unstable in nonlucid dreams, so they lack "stable first-person perspective that would allow them to cognitively grasp their relation to the dream world and thus become lucid" (Noreika, et al, 2010, pg.42).

Describing one's awareness in a lucid dream Stephen LaBerge and Howard Rheingold also point out "your world always includes you" (LaBerge & Rheingold, 1990, p.8). "You are not what you see, hear, think, or feel; you have these experiences. You are always at the center of your multidimensional universe of experience…" (LaBerge & Rheingold, 1990, p.8).

The practice described by Carlos Castaneda of finding one's hands in a dream can surely be interpreted as a way of better feeling of one's ego (Castaneda, 1993).
For modern lucid dreamers obtaining greater awareness in a dream state normally does not go with the idea of transcending one's ego. Just the opposite, I-presence plays a crucial role for experiencing a lucid dream.

3.2. The importance of "I" for western lucid dreamers

There is a significant difference between what modern, mostly western lucid dreamers aspire to and the ideas found in Hindu-Buddhist tradition, more precisely - to transcend one's ego or I-presence in a lucid dream. Tenzin Wangyal Rinpoche in his book 'The Tibetan Yogas of Dream and Sleep' tells that the goal of the dream yoga practice is to achieve 'clear light dreams' which are "not defined by the content of the dream, but is a clear light dream because there is no subjective dreamer or dream ego, nor self in a dualistic relationship with the dream or the dream content" (Wangyal, 1998, pg.52).

Hindu-Buddhist tradition is well-known for showing the same negative attitude to one's ego not only in the dream yoga practice.

For example, Krishnamurti, describing his 'enlightened' experience writes: "I touched this body - nothing - I didn't feel there was anything there except the touch, you see, the point of contact" (Arms, 1982. pg. 24). Another prominent teacher of Hindu tradition, Osho writes "The ego cannot be sacrificed because the ego exists not. The ego is just all idea: it has no substance in it. It is not something – it is just pure nothing". (Osho, 1980, pg.168) and 'the moment you know yourself, no ego is found' (Osho, 1980, pg. 168).

My second question to Western lucid dreamer was, "What views are closer to you - Western values of individualism and diversity or Hindu and Buddhist idea of the absence and insignificance of individual ego?" A very large proportion - 42% could not give an answer. Such great number of those who could not answer shows they have never asked that question to themselves, and it is not widely discussed. Many modern lucid dreamers have no definite attitude to this question. Thirty percent answered "Western values of individualism and diversity", and about the same amount - 28 % answered – "Hindu and Buddhist idea of the absence and insignificance of individual ego." Given the fact that the idea of 'transcending one's ego' is widely popularizes by new-age movements and spiritual teachers of different sorts, the conscious choice for the western idea of individualism is quite high, and at least is not lower than the idea of the absence of individual "I."

My other question was "Do you enjoy video games and/or cinema?" 26% answered – "Yes, a lot," 56 % answered - "Play or watch good films from time to time," and only 17 % answered – "No." One percent could not answer.

Links between computer games and lucid dreams have been demonstrated in numerous studies by Gackenbach and her colleagues (Gackenbach, 2006; Gackenbach, 2009). She found that frequent video game players report experiencing more lucid dreams than infrequent ones.

Although computer games and movies are of course two quite different things to be considered together. My question was not aimed however at finding out the interdependence between the proportion of lucid dreamers among video game players. I tried to find out how appealing modern lucid dreamers find modern visual culture, their eagerness

to absorb it, the interest for experiencing emotions from 'the art of illusion' in contrast to Hindu-Buddhist concept of non-attachment and negative attitude to strong emotions. In this context, I consider quite appropriate asking about lucid dreamers about their attitude to visual arts.

3.3. Source of spiritual growth or fun?

Another very important aspect which makes Western idea of lucid dreaming different from the dream yoga practice is what they are actually lucid dreaming about.

Robert Waggoner in his book 'Lucid Dreaming: Gateway to the Inner Self' writes about his experience of a lucid dream - "I'd experience a rush of exhilaration, joy, and energy. As I took in the dream surroundings, my feelings of joy rose…" (Waggoner, 2009, pg. 9). In the book 'Exploring the World of Lucid Dreaming' by Stephen LaBerge and Howard Rheingold the following description of lucid dreaming experience are given "There are no words to describe the JOY I felt," "The dream, the joy I experienced, was kind of a reward, or so I felt," "The euphoria lasted several days; the memory, forever" (LaBerge & Rheingold, 1990, pg.4). The case of the lucid dream euphoria is frequent for Western lucid dreamers. Western lucid dreamers surely value the idea of getting some fun out of the dream state, enjoy it, experiment, use as a source of inspiration for art, et c. Mikhail Raduga, an author of several books on lucid dreaming in Russian underlines that for many young people lucid dreaming is a kind of very high quality virtual reality where they can have fun and make all their desires come true (Raduga, 2015).

The approach in the Hindu-Buddhist tradition is quite different. Namkhai Norbu, a prominent Dzogchen teacher, even points out "there is also the danger that by becoming skilled at transformation of the dream images one may become attached. The attachment must be overcome" (Norbu, 1992, pg.30). A contemporary Western lucid dreamer would probably find his advice just the opposite from what he or she expects from a lucid dream – "First, during the day, do not dwell upon the dreams you have had. Second, while actually dreaming, watch without judging, without pleasure or fear, regardless of whether the visions seem positive or negative and thus might provoke joy or unhappiness—that is, attachment. Third, while dreaming and then afterwards, do not "clarify" what is "subject" from what is "object"—that is, do not consider which of the images that appear are real" (Norbu, 1992, pg.30).

To my question "Do you enjoy lucid dreaming mostly because you may have some fun or because of the possibility of spiritual growth?" Twenty percent answered – "to have fun", only 12 % - for spiritual growth, 65 % answered "both" and 3 % could not give the answer. That shows that the majority of modern lucid dreamers while having an aim of spiritual growth also highly appreciate the idea of entertainment. It is worthwhile mentioning however that one of the first stages in Tibetan dream yoga is developing flexibility of the mind, which involves many of the things that we could call as having fun (Wangyal, 1998, pp. 119-126). Western lucid dreamers also most often start with having fun and gradually move to deeper realizations (Waggoner, 2009, p. 101-106).

The last question concerning their attitude to the aim of the dream yoga was – "Do you find the idea of just witnessing without judgment in a lucid dream absurd?" Quite a high percentage could not answer – 40 %, just like with question 2, concerning western ideas of individualism and oriental concept of transcending one's ego. 46 % answered "Yes, why lucid dream then?" and only 14 % answered "That's what we should aspire to."

- The research generally supported the following thesis: Modern lucid dreamers may often experience greater degree of awareness in lucid dreams as they have more in common with mindfulness, self-remembering and other states of higher awareness than with the normal waking state.
- The research did not show however that modern lucid dreamers prioritize Western concepts of individualism and diversity more over Hindu-Buddhist idea of the insignificance of individual ego. It rather showed they are quite ambiguous about these ideas.
- Many modern lucid dreamers enjoy modern visual art. This may let us suggest they enjoy experiencing emotions in virtual reality and enjoy the plot of a film or a game.
- Modern lucid dreamers do not practice lucid dreaming only for spiritual purpose, but also entertain themselves through lucid dreaming.
- The idea of witnessing without judgment may seem strange for modern lucid dreamers. Many lucid dreamers find it difficult to answer whether they find the idea positive or negative.

So, we can talk about an autonomous face of a modern lucid dreamer who is not much connected with Hindu and Buddhist ideas. For him, obtaining greater awareness in a lucid dream does not mean transcending one's ego. Awareness and I-presence are two separate dimensions. They may or may not go together. Transcending one's separateness from the outer world is an ideological and culturally predetermined choice within Hindu-Buddhist tradition.

A person's cognitive perspective will normally determine their initial approach to the phenomenon of lucid dreaming. A scientist will take a scientific approach and investigate issues of scientific interest. A shaman will take a shamanic approach, and use lucid dreaming to seek personal power, harm enemies, transform into animals, etc. A Tibetan Buddhist in the Dzogchen tradition will use lucid dreaming as a means to see through the illusion of form, and discover inherent emptiness. And a person who practices lucid dreaming without any particular cognitive or spiritual perspective will normally use lucid dreaming as a means to have fun, avoid pain and nightmares, etc.

However it may be the case that as a Western lucid dreamer has more and more lucid dreams, then their viewpoint and understanding of lucid dreaming will change (the point being that lucid dreaming has been practiced in the East for thousands of years, and therefore they may have a viewpoint based on long experience). As a modern day example, Robert Waggoner (Waggoner, 2009) describes that after twenty years of lucid dreaming, he sought to let go of beliefs, expectations and other attachments to see if there was a source reality behind lucid dreaming. Basically, he realized that he had to let go of ego identification. On the other hand, one may also suppose that as a Western lucid dreamer has more lucid dreams, he becomes interested in oriental teachings, becomes influenced by them and tends to absorb Hindu and Buddhist ideas.

Anyway, the values of Western civilization that have probably already become the values of the global modern civi-

lization radically differ from the approach typical of Hindu-Buddhist tradition. Most of us do enjoy different forms of illusion - video games, cinema and others; and the more we associate ourselves with the main character, the better the product is. The value of individualism in the western civilization can hardly be overestimated. We would rather value the person because he or she is different, and not because he or she 'has the same Buddha nature.' This tendency is very well illustrated by the analysis of the attitudes of Western lucid dreamers. Western attitude to lucid dreaming shows that attaining higher states of awareness are possible without decreasing one's I-presence. Natural reaction of contemporary lucid dreamers to actively participate in lucid dreams and unwillingness to simply witness the dream plot indicates cultural preference to behave actively while in a higher state of awareness.

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An investigation of a dual-processing hypothesis of lucid dreaming

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Summary. Neuroimaging research has isolated the dorsolateral prefrontal cortex (DLPFC) as a brain structure associated with lucid dreaming, indicating that higher-order executive functions are involved in the onset of lucid dreaming. The DLPFC has also been implicated in the onset of type 2 thinking. As such, a hypothetical link exists between type 2 thinking and lucid dreaming, moderated by DLPFC activity. The present study investigated this potential link, hypothesising that lucid dreaming frequency would be related to type 2 thinking. In study 1, participants (N=103) reported their lucid dream frequency (LDF) retrospectively, and completed the Cognitive Reflections Test (CRT), which measures type 2 thinking, as well as several other measures that have previously been found to correlate with LDF. Since retrospective estimates may be prone to memory errors and biases, a second study investigating LDF using prospective measures was conducted. In study 2, participants (N=30) retrospectively estimated their LDF and also prospectively reported their LDF using dream diaries for 1 month; these participants also completed the CRT, a syllogisms test, and several other measures that have previously been found to correlate with LDF. No evidence was found for a dual-processing hypothesis of lucid dreaming: In study 1, CRT scores did not correlate with retrospective LDF, and in study 2, neither prospective nor retrospective LDF correlated with either CRT or syllogisms test scores. Significant relationships were found, however, between previously identified correlates of LDF: dream recall frequency, the personality trait "openness to experience", and internal locus of control. It was additionally found that retrospective and prospective estimates of LDF correlated very highly, indicating that the retrospective estimate of LDF is a valid measure.

Keywords: lucid dreams, dream recall, locus of control, openness to experience, dual-processing theory, Cognitive Reflections Test, syllogisms, Type 2 thinking

1. Introduction

Lucid dreaming is characterised by the awareness that one is dreaming, and may be followed by the capacity to consciously influence the content of the dream (LaBerge, 1980). Thus, the lucid dreamer may be able to make conscious decisions and even change the dream narrative (Tholey, 1989). In a student population, the percentage of people who have experienced this phenomenon at least once in their lifetime is as high as 82% (Schredl & Erlacher, 2004), while people who are considered spontaneous lucid dreamers varies between 19% (Erlacher, Schredl, Watanabe, Yamana, & Gantzert, 2008) and 37% (Schredl & Erlacher, 2004). A recent meta-analysis found that for the general population, the percentage is 23% (Saunders, Roe, Smith & Gregg, 2016). Studies successfully verified the existence of lucid dreams in laboratories in the late 1970s (LaBerge, 1990). Recent fMRI data have associated lucid dreaming with a reactivation of the dorsolateral prefrontal cortex (DLPFC), which is usually deactivated during REM sleep, thus potentially explaining the return of the reflective cognitive abilities (Johnson, 2002; Dresler, Wehrle, Spoormaker, Koch, Holsboer, Steiger, Obrig, Samann & Czisch, 2012; Stumbrys, Erlacher & Schredl, 2013), although such a conclusion is preliminary as the studies rely on small sample sizes.

The ability to experience lucid dreams is related to particular cognitive strengths from waking life, as well as to certain personality traits, and other factors. For instance, dream recall frequency has been found to correlate with lucid dream frequency (Blackmore, 1982; Watson, 2003; Schredl & Erlacher, 2004; Schredl & Erlacher, 2011). In terms of personality traits, small significant correlations between openness to experience and lucid dream frequency have been found by several studies (Schredl & Erlacher, 2004; Schredl, Henley-Einion & Blagrove, 2016; Hess, Schredl & Goritz, 2016). Similarly, studies have been conducted found that lucid dreamers have an internal locus of control, scored on Levenson's (1973) internal locus of control as well as on Rotter's (1966) locus of control (Blagrove & Hartnell, 2000; Blagrove & Tucker, 1994). Additionally, frequent gamers experience a higher frequency of lucid dreams than individuals who do not play games at all (Gackenbach, 2006, 2009).

The further development in our understanding of lucid dreaming requires that new factors are analysed against lucid dreaming frequency. In the search for factors that predict this capacity to distinguish dream from waking reality, little to no attention has yet been paid to reflective reasoning abilities in the context of the dual-processing theory of reasoning (see Evans, 2010, for an overview of the theory). Since ancient times, many authors from various fields have attested the existence of two types of cognition, implicit

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and explicit (Evans & Stanovich, 2013). The two processing mechanisms have many different properties, with the first type characterised as fast, non-logical, automatic, unconscious and high capacity while the second type is slow, logical, controlled, conscious and low capacity (Evans, 2003). The type 2 processing mechanism is believed to be uniquely human as it allows sophisticated reasoning capacities different from those seen in animals (Stanovich, 1999). Furthermore, it is thought to require decontextualized processing which tends to reject knowledge or belief-based biases.

When confronted with a problem, some people may come up with quick and plausible judgement, while others may discard the immediate response and engage in further reflection (Frederick, 2005). One proposed explanation suggests that people tend to neglect information in their thinking, mostly because the type 1 processing mechanism is used by default due to its low computational expense (Evans, 2008). This strong bias to default to the least expensive computational mechanism results in humans being less than rational (Toplak, West & Stanovich, 2014). Individuals who rely on their type 1 processing mechanism and neglect relevant information are considered cognitive misers (Baumeister and Bushman, 2008).

The fMRI studies available provide support for the qualitative distinction between belief- and reason-based response, with activation in different regions of the brain for the two instances (De Neys, Vartanian, & Goel, 2008; Goel & Dolan, 2003; Tsujii & Watanabee, 2009). In addition, Greene, Nystrom, Engell, Darley and Cohen (2004) found neuroimaging evidence of type 2 processing system overwriting the type 1 processing system that was coming from the emotion centres, thus concluding that the main area responsible for overwriting an emotional response is the dorsolateral prefrontal cortex. The sudden insight that one experiences at the beginning of a lucid dream could be attributed to the activation of the rational type 2 processing system that overwrites the dominant emotional type 1 system.

The dorsolateral prefrontal cortex, which is normally deactivated during REM sleep (Miller & Cummings, 1999), shows activation during lucid dreaming (Voss et al., 2009). The same area is thought to be involved mainly in linking the information stored in our short-term memory to the organisation of forthcoming actions (Fuster, 1997). Thus, this particular area of the brain that activates during lucid dreams loads heavily on working memory while supporting theoretical thinking which is necessary for the planning of future events. These attributes have been found as defining features of the type 2 processing system (Evans & Stanovich, 2013). Moreover, the evolution of this rational second system can be seen as a precursor and requirement for the manifestation of lucid dreams because they require conscious rationality. There seem to be a connection between the workings of the second system and lucid dreaming mediated by the activity in the dorsolateral prefrontal cortex. Thus, it is worth investigating the dual-processing theory of reasoning as a possible explanation for the emergence of lucid dreams.

The prime measure for rational reflection that is a property of type 2 processing system is the Cognitive Reflection Test (Frederick, 2005) which was constructed to measure an individual's ability to override an intuitive, spontaneous response to a problem and engage in further reflection which might lead to the correct answer (Frederick, 2005). The Cognitive Reflection Test (CRT) differs from well-known insight problems where individuals have to spend a lot of time and cognitive resources and still fail to answer because no viable solution comes to mind. The questions used in the CRT trigger an attractive alternative response, thus it is a measure of rational thought, rather than a measure of an underlying ability that supports rational thought (Toplak, West & Stanovich, 2014). In a dream state, individuals who overwrite their first instinctive assumption about reality become aware of the fact that they are dreaming thus enabling control over the dream through rationality. Although rationality seems to occur even in non-lucid dreams, the "rational thought" bar is set higher in lucid dreams where individuals see through the illusion of the dream and further thought operates from this premise (Hurd & Belkeley, 2014).

Another measure for the type 2 processing system can be derived from syllogistic reasoning tasks (Evans, 2008). Syllogisms are arguments that apply deductive reasoning, which is a property of type 2 processing system, to reach a conclusion based on two propositions that are assumed to be true. Furthermore, deductive reasoning can be seen as a fundamental cognitive skill as well as one of the cornerstones of logical thought. Generally, individuals use this type of reasoning in their daily lives in order to reach a conclusion from a set of information. An essential component of good deductive reasoning skills is the ability to reason only with relevant information and ignore beliefs. Instead, there is a tendency of individuals to allow for prior beliefs and knowledge to cloud their judgement and reach a wrong conclusion. This common fallacy is called a belief bias and it is more likely for people to judge a conclusion as valid when it is believable (Evans, Barston & Pollard, 1983; Thompson, 1996; Evans & Over, 2004).

It can be hypothesised, then, that individuals who activate the type 2 processing system during REM sleep might show cognitive strengths while awake, particularly those related to rationality by overcoming belief bias and rational reflection which are properties of the type 2 processing system. A lateral/dorsolateral prefrontal cortex modulation caused by syllogism content was noticed in a study conducted by Brunetti et al (2014) when looking at the influence of emotions on reasoning abilities. This is the area that is deactivated during REM sleep, but active during lucid dreaming; thus providing more evidence of the connection between dual-processing theory and lucid dreaming, more precisely the activation of type 2 processing system that corresponds to the sudden realisation that one is dreaming. As far as causality is concerned, it makes sense to assume that the activation of type 2 processing system coincides with the onset of a lucid dream.

The aim of this study, then, was to test the dual-processing hypothesis of lucid dreaming, as well as attempt to replicate previous lucid dreaming correlate findings, for the purpose of furthering our understanding of the mechanisms involved in lucid dreaming as well as understand why some people experience this phenomenon more than others. By linking the existing body of knowledge on lucid dreaming with two measures of dual-processing theory, the cognitive reflective test and a syllogistic reasoning task, we expect to gain new insights into the workings of the human mind, i.e. how waking life rational and reflective rationalities are related to the rationality experienced during REM sleep by lucid dreamers.

A secondary purpose of the study was to investigate whether prospective and retrospective measures of lucid

dreaming frequency are correlated. Response biases and memory failures may emerge when retrospective measures of dream frequency are used (Beaulieu-Prevost & Zadra, 2005). One study comparing nightmare and bad dream frequency data acquired using prospective and retrospective estimates found that retrospective measures underestimate nightmare and bad dream frequency (Robert & Zadra, 2008). As such, we conducted two studies, one in which retrospective estimates were taken, and a second in which both retrospective and prospective measures were taken for comparison.

For study 1, it was hypothesised that there would be a positive correlation between retrospective measures of lucid dream frequency and internal locus of control, dream recall frequency, openness to experience, video game play, and Cognitive Reflection Test scores. For study 2, it was also hypothesised that high frequency lucid dreamers (measured both retrospectively and prospectively) would score higher on the CRT, syllogisms test, internal locus of control, dream recall frequency, and openness to experience. Finally, it was hypothesised that there would be a positive correlation between retrospective and prospective measures of lucid dream frequency.

2. Study 1 Method

2.1. Participants

One hundred and three participants (52 males and 51 females), with ages ranging from 16 to 65 (M = 24.39, SD = 6.97), were recruited using convenience sampling via posters and fliers from the University of Bedfordshire. Psychology students were asked not to participate because they were familiar with the Cognitive ReflectionsTest and this would have compromised the results.

2.2. Materials

The questionnaire, which was hosted online on Qualtrics, consisted of the following:

Levenson's (1973) internal Locus of Control scale, measuring the extent to which individuals believe that they control events affecting them, which included 7 items (α=.51) responded to on a 6-point Likert scale (-3 = strongly disagree to +3 = strongly agree), e.g. "I am usually able to protect my personal interests.".

Schredl and Erlacher's (2004) Lucid Dreaming Frequency scale which contains 2 items measured on an eight-point rating scale (0 = never, 7 = several times a week), e.g. "How often do you experience so-called lucid dreams?" and "How often do you remember your dreams?". In order to eliminate confusion regarding Lucid Dream Frequency, a definition was formulated and given to the participants: "Lucid dreams are dreams in which the dreaming individual becomes aware of being in a dream and intentionally changes certain elements". A re-test reliability r = .89 (p < .001) for the lucid dream frequency scale supports its consistency (Schredl & Erlacher, 2004).

Schredl and Erlacher's (2004) Dream Recall Frequency scale measured by a 7-point rating scale (0 – never; 1 - less than once a month; 2 - about once a month; 3 – twice or three times a month; 4 - about once a week; 5 – several times a week; 6 – almost every morning).

A Video Game Play measure consisting of 2 items measuring the frequency of gaming activities as well as the frequency of immersive gaming activities on an 8-point rating scale (0 – never, 1 – less than once a year, 2- less than once a month, 3- once a month, 5 – 2-3 times a month, 5- once a week, 6 – 2-3 times a week, 7 – daily); e.g. "How often do you play video games?" and "How often do you play immersive video games?"; also, immersive video games were defined to the participants in order to eliminate confusion: "An artificial, interactive, computer created scene or 'world' within which a user feels involved." A single score for game playing was calculated from the mean of the two items.

John and Srivastava's (1999) Openness to Experience measure from the Big Five Factors of Personality (Goldberg, 1993) which measures an individual's active imagination, preference for variety, intellectual curiosity, aesthetic sensitivity and attentiveness to inner feelings; it contains 8 items (α=0.45) measured on a 5-point Likert scale (1 = strongly disagree to 5 = strongly agree), e.g. "I see myself as someone who is inventive"

An expanded version of the Cognitive Reflection Test developed by Toplak, West and Stanovich (2014) which measures the reflective reasoning abilities and contains 7 questions (α=0.72) designed to measure one's ability to overwrite an initial instinctive answer using rational thought, e.g.: "A bat and a ball cost 1.10$ in total. The bat costs 1.00$ more than the ball. How much does the ball cost?". Participants received a score out of seven, with each point denoting a correct answer.

2.3. Procedure

The study received ethical approval from the University of Bedfordshire prior to the collection of data. Participants were recruited from the University of Bedfordshire via posters and fliers. The study was internet-based and required that participants give their consent in order to start the questionnaire. Participants were informed about the nature of the study prior to the completion of the questionnaire and were also asked not to consult any outside source of information while completing the questionnaire. The study was conducted on Qualtrics. The study consisted of three questionnaires (Dream Lucidity Questionnaire, Video Game Play Frequency and Lucid Dreaming Frequency/Dream Recall Frequency Questionnaire), two scales (Internal Locus of Control Scale and Openness to Experience Scale) and an extended version of the Cognitive Reflection Test taken from Toplak, West and Stanovich (2014); completed by every participant in this order. Every questionnaire was on a different page. After the completion of the questionnaires, participants were directed to a page where they were thanked for their time, debriefed, and given an email address in case they wanted to leave any comments regarding the study.

3. Study 1 Results and Discussion

Correlations were conducted between retrospective Lucid Dream Frequency and dream recall frequency, openness to experience, locus of control, video game play, and CRT scores. Table 1 displays the descriptive statistics for these variables.

Of the 103 participants, 12 reported no lucid dreams (marked 0=never on Schredl and Erlacher's (2004) Lucid Dreaming Frequency and Dream Recall Frequency scale), 71 reported occasional lucid dreams (marked 1=less than once a year, 2=about once a year, 3=about two or four times

Table 1. Descriptive statistics for Study 1 variables

Variable	Mean (SD)
Lucid Dream Frequency	3.89 (1.83)
Openness to Experience	3.67 (0.47)
Locus of Control	4.43 (0.60)
Video Game Play	4.04 (2.18)
CRT scores	3.58 (1.83)
Dream Recall Frequency	5.65 (1.63)

Table 2. Percentages of lucid dreamers

Variable	Number of participants	Percentage
Non-lucid dreamers	12	11.65%
Occasional lucid dreamers	71	68.93%
Frequent lucid dreamers	20	19.42%

a year) and 20 reported having frequent lucid dreams, frequency equal to or higher than once per month (marked 4=about once a month, 5=about two to four times a month, 6=about once a week, 7=several times a week). Percentages are displayed in Table 2.

Alpha level was reduced to .01 to account for the inflated Type 1 error when conducting multiple correlations. There was a significant positive correlation found between Internal Locus of Control and LDF $r = .23$, $p = .01$, 1-tailed, and between Dream Recall and Lucid Dream Frequency $r = .33$, $p < .001$, 1-tailed. The correlation between Openness to Experience scores and LDF; approached significance $r = .18$, $p = .03$, 1-tailed. No significant correlations were found between Video Game Play and LDF or CRT scores and LDF (see Table 3).

Thus the first study supported previous research in finding a relationship between lucid dream frequency and dream recall frequency, and lucid dream frequency and internal locus of control. However, it did not support previous findings pertaining to openness to experience, nor video game play. Further, it did not find evidence for a relationship between lucid dream frequency and scores on the Cognitive Reflections Test, thereby not supporting a dual process hypothesis of lucid dreaming.

A methodological issue with utilising retrospective estimates of lucid dream frequency is that memory biases and expectations may influence these estimates, and result in inaccuracies. Because of this possibility, Study 2 was conducted, using both retrospective estimates and prospective recordings, as follows.

4. Study 2 Method

4.1. Participants

Thirty participants (15 male and 15 female), with ages ranging from 20 to 51 ($M = 25.47$, $SD = 6.59$), were recruited using convenience sampling via posters and fliers from the University of Bedfordshire (N=9), as well as from dreaming related Facebook forums and communities (N=21). Individuals who participated in the first study and were familiar with the Cognitive Reflective Test were not eligible to take part in the study.

4.2. Materials

The questionnaire included Levenson's (1973) Internal Locus of Control scale, two open-ended questions regarding dream recall and frequency of lucid dreams e.g. "How many dreams do you remember on average per week?" and "In a typical month, how many lucid dreams do you have?", John and Srivastava's (1999) Openness to Experience measure from the Big Five Factors of Personality (Goldberg, 1993), and the expanded version of the Cognitive Reflection Test developed by Toplak, West and Stanovich (2014), as detailed the method for Study 1. In addition, a syllogisms test was included, containing 4 categorical syllogisms e.g. "No books are novels. Some magazines are novels. Therefore, some books are not magazines" and 4 conditional syllogisms e.g. "If a person is a guitarist, then he is a professor. If a person is a professor, then he is a musician".

The dream diary consisted of 30 tables (one per day for the duration of the study), each table containing five boxes that participants could tick if they had had one of the following dreams: a lucid dream, a dream with a logical pattern, a dream with negative content, a dream with positive content,

Table 3. Correlation Coefficient

	Dream Recall	CRT scores	Openness to Experience	Locus of Control	Game Play frequency
LDF	.34*	-.02	.18	.23*	.14
Dream Recall	---	.05	.12	.001	-.13
CRT scores		---	.11	.21*	.29*
Openness to Experience			---	.29*	.20*
Locus of Control				---	.12
Game Play Frequency					---

* Correlation is significant at the $p < .01$ level.

Table 4. Frequency of lucid dreams in prospective and retrospective measures

Prospective measure								
No. of participants	7 (23.3%)	3 (10%)	6 (20%)	6 (20%)	3 (10%)	3 (10%)	1 (3.3%)	1 (3.3%)
No. of lucid dreams reported	0	1	2	3	4	5	6	23
Retrospective measure								
No. of participants	6 (20%)	6 (20%)	8 (26.7%)	5 (16.7%)	1 (3.3%)	3 (10%)	1 (3.3%)	
No. of lucid dreams reported	0	1	2	3	4	5	20	

and/or a recurrent dream). Explanations of lucid dream, logical pattern and recurring dream were provided on the first page of the dream diary. Analyses were not conducted on the frequency of logical, negative, positive, or recurrent dreams; these questions were asked rather to disguise the purpose of the study.

4.3. Procedure

The study received ethical approval from the University of Bedfordshire prior to the collection of data. Participants were recruited from the University of Bedfordshire as well as from the internet. The study consisted of two open ended questions (dream recall/lucid dream frequency), two scales (Internal Locus of Control Scale and Openness to Experience Scale), an extended version of the Cognitive Reflection Test taken from Toplak, West and Stanovich (2014), and a Syllogisms Test; completed by every participant in this order. Every questionnaire was on a different page. After the completion of the questionnaires, participants were directed to a page where they were shown the correct answers to the test questions, thanked for their time, debriefed, and given an email address in case they wanted to leave any comments regarding the study or withdrawn from the study. The dream diary was given after the completion of the online questionnaire. Participants were instructed to fill in one table every morning for a month; this consisted of circling the number of dreams that they remembered and ticking the appropriate boxes for each of the dreams. The last page of the diary consisted of participants being thanked for their time and reminded to return the diary after one month.

Table 5. Descriptive statistics for Study 2 variables

Variable	Mean (SD)
Prospective LDF	2.96 (4.17)
Retrospective LDF	2.53 (3.62)
Locus of Control	4.31 (1.09)
Openness to Experience	3.30 (0.71)
CRT scores	4.10 (2.02)
Syllogisms Test scores	5.56 (1.13)

5. Study 2 Results

The prospective measure of lucid dreams revealed that 7 individuals (23.3%) reported no lucid dreams with the rest of the 23 participants reporting at least one lucid dream during the month of the study. From the retrospective measure of lucid dreams, 6 (20%) reported no lucid dreams and 24 reported at least one lucid dream (see Table 4). Descriptive statistics for the variables are displayed in Table 5.

Spearman's correlations were conducted to assess the relationship between Openness to Experience, Locus of Control, Dream Recall, CRT scores, Syllogisms test scores, and prospective and retrospective measures of LDF. Alpha level was reduced to .01 to account for the inflated Type 1 error when conducting multiple correlations. There was a very high significant positive correlation found between Internal Locus of Control and prospective/retrospective measures of LDF, $r = .80$, $p < .001$ $r = .80$, $p < .001$ between high Openness to Experience and prospective/retrospective LDF, $r = .85$, $p < .001$ / $r = .80$, $p < .001$. The correlation between high Dream Recall and prospective/retrospective measures of LDF approached significance, $r = .23$, $p = .02$. No significant correlations were found between either CRT scores or syllogisms test scores and prospective/retrospective measures of LDF. A very high significant correlation was found between prospective and retrospective measures of lucid dream frequency, $r = .91$, $p < .001$.

Using prospective measures, then, relationships were found between LDF and openness, and LDF and locus of control. However, no relationship was found between LDF and CRT scores using either the retrospective or the prospective measure of LDF; likewise, no relationship was found between LDF and syllogisms scores using either retrospective or prospective method. Thus, the second study confirmed the findings of Study 1 in failing to support a dual processing hypothesis of lucid dreaming.

6. General Discussion

Overall, the findings of the present paper indicate that there are relationships between prospective and retrospective measures of lucid dream frequency (LDF) and openness to experience, locus of control, and dream recall frequency. However, the dual processing hypothesis of lucid dreaming was not supported: no relationship between LDF and Cognitive Reflective Test scores, nor with scores on a syllogisms test, was found, neither with retrospective nor prospective estimates of LDF. In addition there was no relationship found between LDF and video game play.

Table 6. Correlation Coefficients for all variables

	rLDF	Locus of Control	Openness to Experience	CRT scores	Syllogisms scores	Dream Recall
pLDF	.91**	.80**	.85**	.18	.23	.16
rLDF	---	.91**	.80**	.26	.24	.23
Locus of Control		---	.75**	.37	.17	.25
Openness to Experience			---	.34	.17	.37
CRT scores				---	.12	.47**
Syllogisms scores					---	.06

* Correlation is significant at the $p < .01$ level.

There was a very high correlation between prospective and retrospective measures of LDF; thus participants correctly estimated their frequency of lucid dreams in a month prior to having them recorded in a dream journal. Diary measures have been shown to correlate with scientifically verified lucid dreaming measured in the laboratory (Kueny, 1985). Thus, when it comes to estimating the frequency of lucid dreams in questionnaires, participants can provide reliable data. In the first study, roughly 87% of the sample was classified as lucid dreamers, whereas in the second study, 80% were detected using prospective measures. By measuring their frequency using a retrospective approach, the sample from the second study had 76% lucid dreamers. This finding agrees with previous findings that student samples contained 82% lucid dreamers (Schredl & Erlacher, 2004). However, the current study defined lucid dreaming in terms of awareness of the dream state and also the ability to control it; future research should investigate lucid dream frequency comparing frequency for awareness of the dream state alone, and frequency for awareness of the dream state and control. The data from both studies revealed that there was a relationship between locus of control and LDF, suggesting that lucid dreamers have a more internal locus of control than non-lucid dreamers. This finding is in accordance with previous studies assessing the relationship between locus of control and LDF (Blagrove & Hartnell, 2000; Blagrove & Tucker, 1994). Patrick and Durndell (2004) argue that internal locus of control positively correlates with waking life attempts to control the environment and control is central to maintaining a lucid dream; thus individuals with an internal locus of control would exhibit more control over the dream environment.

LDF also correlated with openness to experience in both studies. This finding is in agreement with previous studies that have found significant correlations between the openness to experience factor and LDF (Schredl & Erlacher, 2004; Watson, 2003). Correlations were unusually high in the second study for LDF and locus of control and openness to experience. This may be due to the sample; the participants are likely to have had a special interest in dreams since they volunteered to do research that was unusually involved but without incentive, and many of whom were recruited from dream-related groups online. Therefore, the findings of the second study would benefit from replication with a more representative sample. In addition, the locus of control and openness scores were self-report measures, whereas the CRT and syllogisms relied on the participant getting the right answer; so the high correlations may perhaps reflect participants' perception of a potential link between lucid dreaming and internal locus of control / openness, as these measures are vulnerable to expectation biases.

The analysis further revealed that there was a relationship between dream recall and LDF; thus, individuals who have a higher rate of dream recall also have a higher rate of LDF. The correlation between the two measures had been previously reported in studies (Blackmore, 1982; Watson, 2001; Schredl & Erlacher, 2004; Schredl & Erlacher, 2011). It makes sense that individuals who recall more dreams in general, also report more lucid dreams.

There was no relationship found between videogame play and lucid dream frequency. This finding did not support previous research. It may be that the scale used was not reliably able to measure game playing; future research should implement other methods of measuring gameplay to further investigate this.

There was no relationship found between both prospective and retrospective LDF and CRT scores, nor between prospective/retrospective LDF and syllogisms test scores. As these were employed as measures of reflective cognitive ability, it would be reasonable to conclude that there is no relationship between the frequency of dream accounts of reflective reasoning manifested in the form of lucid dreams and waking life reflective ability measured with the cognitive reflective test and with performance on syllogisms tests. However, it may be that different measures would provide us with different results; the tests employed in the present study might not measure the same type of reflective ability as that manifested in lucid dreams. Dream reflection does imply an awareness of the conditions within the dream, thus reflective awareness of the environment and oneself could be measured instead of reflective reasoning abilities. However, these prove to be hard to measure and require an in depth understanding of awareness as a feature of consciousness, which is poorly understood. Furthermore, the correlation between CRT scores and Syllogism test scores in the present study was weak, which indicates that the two tests did not measure the same kind of thinking style. Further research could implement other measures of reflective reasoning abilities or focus on measuring reflective awareness of the environment and of oneself.

On the other hand, this was not the first study to fail to find a relationship between lucid dreaming and a task known to require dorsolateral prefrontal cortex activation. In Neider et al.'s (2010) study, participants who were more

lucid in their dreams than others performed better at the Iowa Gambling Task, which is known to activate the ventromedial prefrontal cortex, but not at the Wisconsin Card Sort task, which is known to activate the dorsolateral prefrontal cortex. In addition to this, the effect of transcranial direct current stimulation (tDCS) on the dorsolateral prefrontal cortex only enhanced lucidity in dreams in participants who already were experiencing lucid dreams frequently, but not in those who experienced lucid dreams infrequently or never (Stumbrys, Erlacher, & Schredl, 2013). These findings coupled with those of the present study query the degree of involvement of the dorsolateral prefrontal cortex in lucid dreaming. It is likely that lucid dream onset is more complicated than a simple reactivation of the dorsolateral prefrontal cortex; as suggested by Mota-Rolim et al. (2010), it may be that different neural substrates are implicated in different kinds of lucid dreaming, since lucid dreaming is not a unitary phenomenon.

Although humans spend one third of their life sleeping, most models of human cognition are structured based upon evidence derived from waking-life cognition. The development of a 24 hour model of cognition is necessary for the further understanding of consciousness. The existence of lucid dreaming reveals higher-order cognitive skills present during sleep; skills that previously have been assumed to be characteristic only of waking life. The question remains whether there is any relationship between the manifestation of higher-order cognitive skills in dreams and their manifestation in waking life. The uniquely human ability to reflect upon ourselves, think about past and plan the future could help illuminate the human condition.

6.1. Conclusion

There was no relationship found between rational reflective abilities measured with the Cognitive Reflective Test nor the syllogisms test and lucid dream frequency, whether measured retrospectively or prospectively, therefore providing no evidence for a dual-processing account of lucid dreaming. However, internal locus of control, dream recall frequency, and openness to experience were correlated with lucid dream frequency, supporting previous research. Further studies could implement other measures of reflective reasoning abilities or reflective awareness in order to assess if REM sleep accounts of reflection (i.e. lucid dreaming) correlate with different waking life reflective abilities.

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IJODR

An investigation of a dual-processing hypothesis of lucid dreaming

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Summary. Neuroimaging research has isolated the dorsolateral prefrontal cortex (DLPFC) as a brain structure associated with lucid dreaming, indicating that higher-order executive functions are involved in the onset of lucid dreaming. The DLPFC has also been implicated in the onset of Type 2 thinking. As such, a hypothetical link exists between Type 2 thinking and lucid dreaming, moderated by DLPFC activity. The present study investigated this potential link, hypothesising that lucid dreaming frequency would be related to Type 2 thinking. In study 1, participants (N=103) reported their lucid dream frequency (LDF) retrospectively, and completed the Cognitive Reflections Test (CRT), which measures Type 2 thinking, as well as several other measures that have previously been found to correlate with LDF. Since retrospective estimates may be prone to memory errors and biases, a second study investigating LDF using prospective measures was conducted. In study 2, participants (N=30) retrospectively estimated their LDF and also prospectively reported their LDF using dream diaries for 1 month; these participants also completed the CRT, a syllogisms test, and several other measures that have previously been found to correlate with LDF. No evidence was found for a dual-processing hypothesis of lucid dreaming: In study 1, CRT scores did not correlate with retrospective LDF, and in study 2, neither prospective nor retrospective LDF correlated with either CRT or syllogisms test scores. Significant relationships were found, however, between previously identified correlates of LDF: dream recall frequency, the personality trait "openness to experience", and internal locus of control. It was additionally found that retrospective and prospective estimates of LDF correlated very highly, indicating the retrospective estimate of LDF is a valid measure.

Keywords: lucid dreams, dream recall, locus of control, openness to experience, dual-processing theory, Cognitive Reflections Test, syllogisms, Type 2 thinking

1. Introduction

Lucid dreaming is characterised by the awareness that one is dreaming, and may be followed by the capacity to consciously influence the content of the dream (LaBerge, 1980). Thus, the lucid dreamer may be able to make conscious decisions and even change the dream narrative (Tholey, 1989). In a student population, the percentage of people who have experienced this phenomenon at least once in their lifetime is as high as 82% (Schredl & Erlacher, 2004), while people who are considered spontaneous lucid dreamers varies between 19% (Erlacher, Schredl, Watanabe, Yamana, & Gantzert, 2008) and 37% (Schredl & Erlacher, 2004). A recent meta-analysis found that for the general population, the percentage is 23% (Saunders, Roe, Smith & Gregg, 2016). Studies successfully verified the existence of lucid dreams in laboratories in the late 1970s (LaBerge, 1990). Recent fMRI data have associated lucid dreaming with a reactivation of the dorsolateral prefrontal cortex (DLPFC), which is usually deactivated during REM sleep, thus potentially explaining the return of the reflective cognitive abilities (Johnson, 2002; Dresler, Wehrle, Spoormaker, Koch, Holsboer, Steiger, Obrig, Samann & Czisch, 2012; Stumbrys, Erlacher &Schredl, 2013), although such a conclusion is preliminary as the studies rely on small sample sizes.

The ability to experience lucid dreams is related to particular cognitive strengths from waking life, as well as to certain personality traits, and other factors. For instance, dream recall frequency has been found to correlate with lucid dream frequency (Blackmore, 1982; Watson, 2003; Schredl & Erlacher, 2004; Schredl & Erlacher, 2011). In terms of personality traits, small significant correlations between openness to experience and lucid dream frequency have been found by several studies (Schredl & Erlacher, 2004; Schredl, Henley-Einion & Blagrove, 2016; Hess, Schredl & Goritz, 2016). Similarly, studies have been conducted finding that lucid dreamers have a more internal locus of control, scored on the Levenson's (1973) internal locus of control as well as on Rotter's (1966) locus of control (Blagrove & Hartnell, 2000; Blagrove & Tucker, 1994). Additionally, frequent gamers experience a higher frequency of lucid dreams than individuals who do not play games at all (Gackenbach, 2006, 2009).

The further development in our understanding of lucid dreaming requires that new factors are analysed against lucid dreaming frequency. In the search for factors that predict this capacity to distinguish dream from waking reality, little to no attention has yet been paid to reflective reasoning abilities in the context of the dual-processing theory of reasoning (see Evans, 2010, for an overview of the theory). Since ancient times, many authors from various fields have attested the existence of two types of cognition, implicit

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and explicit (Evans & Stanovich, 2013). The two processing mechanisms have many different properties, with the first type characterised as fast, non-logical, automatic, unconscious and high capacity while the second type is slow, logical, controlled, conscious and low capacity (Evans, 2003). The type 2 processing mechanism is believed to be uniquely human as it allows sophisticated reasoning capacities different from those seen in animals (Stanovich, 1999). Furthermore, it is thought to require decontextualized processing which tends to reject knowledge or belief-based biases.

When confronted with a problem, some people may come up with quick and plausible judgement, while others may discard the immediate response and engage in further reflection (Frederick, 2005). One proposed explanation suggests that people tend to neglect information in their thinking, mostly because the type 1 processing mechanism is used by default due to its low computational expense (Evans, 2008). This strong bias to default to the least expensive computational mechanism results in humans being less than rational (Toplak, West & Stanovich, 2014). Individuals who rely on their type 1 processing mechanism and neglect relevant information are considered cognitive misers (Baumeister and Bushman, 2008).

The fMRI studies available provide support for the qualitative distinction between belief- and reason-based response, with activation in different regions of the brain for the two instances (De Neys, Vartanian, & Goel, 2008; Goel & Dolan, 2003; Tsujii & Watanabee, 2009). In addition, Greene, Nystrom, Engell, Darley and Cohen (2004) found neuroimaging evidence of type 2 processing system overwriting the type 1 processing system that was coming from the emotion centres, thus concluding that the main area responsible for overwriting an emotional response is the dorsolateral prefrontal cortex. The sudden insight that one experiences at the beginning of a lucid dream could be attributed to the activation of the rational type 2 processing system that overwrites the dominant emotional type 1 system.

The dorsolateral prefrontal cortex, which is normally deactivated during REM sleep (Miller & Cummings, 1999), shows activation during lucid dreaming (Voss et al., 2009). The same area is thought to be involved mainly in linking the information stored in our short-term memory to the organisation of forthcoming actions (Fuster, 1997). Thus, this particular area of the brain that activates during lucid dreams loads heavily on working memory while supporting theoretical thinking which is necessary for the planning of future events. These attributes have been found as defining features of the type 2 processing system (Evans & Stanovich, 2013). Moreover, the evolution of this rational second system can be seen as a precursor and requirement for the manifestation of lucid dreams because they require conscious rationality. There seem to be a connection between the workings of the second system and lucid dreaming mediated by the activity in the dorsolateral prefrontal cortex. Thus, it is worth investigating the dual-processing theory of reasoning as a possible explanation for the emergence of lucid dreams.

The prime measure for rational reflection that is a property of type 2 processing system is the Cognitive Reflection Test (Frederick, 2005) which was constructed to measure an individual's ability to override an intuitive, spontaneous response to a problem and engage in further reflection which might lead to the correct answer (Frederick, 2005). The Cognitive Reflection Test (CRT) differs from well-known insight problems where individuals have to spend a lot of time and cognitive resources and still fail to answer because no viable solution comes to mind. The questions used in the CRT trigger an attractive alternative response, thus it is a measure of rational thought, rather than a measure of an underlying ability that supports rational thought (Toplak, West & Stanovich, 2014). In a dream state, individuals who overwrite their first instinctive assumption about reality become aware of the fact that they are dreaming thus enabling control over the dream through rationality. Although rationality seems to occur even in non-lucid dreams, the "rational thought" bar is set higher in lucid dreams where individuals see through the illusion of the dream and further thought operates from this premise (Hurd & Belkeley, 2014).

Another measure for the type 2 processing system can be derived from syllogistic reasoning tasks (Evans, 2008). Syllogisms are arguments that apply deductive reasoning, which is a property of type 2 processing system, to reach a conclusion based on two propositions that are assumed to be true. Furthermore, deductive reasoning can be seen as a fundamental cognitive skill as well as one of the cornerstones of logical thought. Generally, individuals use this type of reasoning in their daily lives in order to reach a conclusion from a set of information. An essential component of good deductive reasoning skills is the ability to reason only with relevant information and ignore beliefs. Instead, there is a tendency of individuals to allow for prior beliefs and knowledge to cloud their judgement and reach a wrong conclusion. This common fallacy is called a belief bias and it is more likely for people to judge a conclusion as valid when it is believable (Evans, Barston & Pollard, 1983; Thompson, 1996; Evans & Over, 2004).

It can be hypothesised, then, that individuals who activate the type 2 processing system during REM sleep might show cognitive strengths while awake, particularly those related to rationality by overcoming belief bias and rational reflection which are properties of the type 2 processing system. A lateral/dorsolateral prefrontal cortex modulation caused by syllogism content was noticed in a study conducted by Brunetti et al (2014) when looking at the influence of emotions on reasoning abilities. This is the area that is deactivated during REM sleep, but active during lucid dreaming; thus providing more evidence of the connection between dual-processing theory and lucid dreaming, more precisely the activation of type 2 processing system that corresponds to the sudden realisation that one is dreaming. As far as causality is concerned, it makes sense to assume that the activation of type 2 processing system coincides with the onset of a lucid dream.

The aim of this study, then, was to test the dual-processing hypothesis of lucid dreaming, as well as attempt to replicate previous lucid dreaming correlate findings, for the purpose of furthering our understanding of the mechanisms involved in lucid dreaming as well as understand why some people experience this phenomenon more than others. By linking the existing body of knowledge on lucid dreaming with two measures of dual-processing theory, the cognitive reflective test and a syllogistic reasoning task, we expect to gain new insights into the workings of the human mind, i.e. how waking life rational and reflective rationalities are related to the rationality experienced during REM sleep by lucid dreamers.

A secondary purpose of the study was to investigate whether prospective and retrospective measures of lucid

dreaming frequency are correlated. Response biases and memory failures may emerge when retrospective measures of dream frequency are used (Beaulieu-Prevost & Zadra, 2005). One study comparing nightmare and bad dream frequency data acquired using prospective and retrospective estimates found that retrospective measures underestimate nightmare and bad dream frequency (Robert & Zadra, 2008). As such, we conducted two studies, one in which retrospective estimates were taken, and a second in which both retrospective and prospective measures were taken for comparison.

For study 1, it was hypothesised that there would be a positive correlation between retrospective measures of lucid dream frequency and internal locus of control, dream recall frequency, openness to experience, video game play, and Cognitive Reflection Test scores. For study 2, it was also hypothesised that high frequency lucid dreamers (measured both retrospectively and prospectively) would score higher on the CRT, syllogisms test, internal locus of control, dream recall frequency, and openness to experience. Finally, it was hypothesised that there would be a positive correlation between retrospective and prospective measures of lucid dream frequency.

2. Study 1 Method

2.1. Participants

One hundred and three participants (52 males and 51 females), with ages ranging from 16 to 65 (M = 24.39, SD = 6.97), were recruited using convenience sampling via posters and fliers from the University of Bedfordshire. Psychology students were asked not to participate because they were familiar with the Cognitive ReflectionsTest and this would have compromised the results.

2.2. Materials

The questionnaire, which was hosted online on Qualtrics, consisted of the following:

Levenson's (1973) internal Locus of Control scale, measuring the extent to which individuals believe that they control events affecting them, which included 7 items (α=.51) responded to on a 6-point Likert scale (-3 = strongly disagree to +3 = strongly agree), e.g. "I am usually able to protect my personal interests.".

Schredl and Erlacher's (2004) Lucid Dreaming Frequency scale which contains 2 items measured on an eight-point rating scale (0 = never, 7 = several times a week), e.g. "How often do you experience so-called lucid dreams?" and "How often do you remember your dreams?". In order to eliminate confusion regarding Lucid Dream Frequency, a definition was formulated and given to the participants: "Lucid dreams are dreams in which the dreaming individual becomes aware of being in a dream and intentionally changes certain elements". A re-test reliability r = .89 (p < .001) for the lucid dream frequency scale supports its consistency (Schredl & Erlacher, 2004).

Schredl and Erlacher's (2004) Dream Recall Frequency scale measured by a 7-point rating scale (0 – never; 1 - less than once a month; 2 - about once a month; 3 – twice or three times a month; 4 - about once a week; 5 – several times a week; 6 – almost every morning).

A Video Game Play measure consisting of 2 items measuring the frequency of gaming activities as well as the frequency of immersive gaming activities on an 8-point rating scale (0 – never, 1 – less than once a year, 2- less than once a month, 3- once a month, 5 – 2-3 times a month, 5- once a week, 6 – 2-3 times a week, 7 – daily); e.g. "How often do you play video games?" and "How often do you play immersive video games?"; also, immersive video games were defined to the participants in order to eliminate confusion: "An artificial, interactive, computer created scene or 'world' within which a user feels involved." A single score for game playing was calculated from the mean of the two items.

John and Srivastava's (1999) Openness to Experience measure from the Big Five Factors of Personality (Goldberg, 1993) which measures an individual's active imagination, preference for variety, intellectual curiosity, aesthetic sensitivity and attentiveness to inner feelings; it contains 8 items (α=0.45) measured on a 5-point Likert scale (1 = strongly disagree to 5 = strongly agree), e.g. "I see myself as someone who is inventive"

An expanded version of the Cognitive Reflection Test developed by Toplak, West and Stanovich (2014) which measures the reflective reasoning abilities and contains 7 questions (α=0.72) designed to measure one's ability to overwrite an initial instinctive answer using rational thought, e.g.: "A bat and a ball cost 1.10$ in total. The bat costs 1.00$ more than the ball. How much does the ball cost?". Participants received a score out of seven, with each point denoting a correct answer.

2.3. Procedure

The study received ethical approval from the University of Bedfordshire prior to the collection of data. Participants were recruited from the University of Bedfordshire via posters and fliers. The study was internet-based and required that participants give their consent in order to start the questionnaire. Participants were informed about the nature of the study prior to the completion of the questionnaire and were also asked not to consult any outside source of information while completing the questionnaire. The study was conducted on Qualtrics. The study consisted of three questionnaires (Dream Lucidity Questionnaire, Video Game Play Frequency and Lucid Dreaming Frequency/Dream Recall Frequency Questionnaire), two scales (Internal Locus of Control Scale and Openness to Experience Scale) and an extended version of the Cognitive Reflection Test taken from Toplak, West and Stanovich (2014); completed by every participant in this order. Every questionnaire was on a different page. After the completion of the questionnaires, participants were directed to a page where they were thanked for their time, debriefed, and given an email address in case they wanted to leave any comments regarding the study.

3. Study 1 Results and Discussion

Correlations were conducted between retrospective Lucid Dream Frequency and dream recall frequency, openness to experience, locus of control, video game play, and CRT scores. Table 1 displays the descriptive statistics for these variables.

Of the 103 participants, 12 reported no lucid dreams (marked 0=never on Schredl and Erlacher's (2004) Lucid Dreaming Frequency and Dream Recall Frequency scale), 71 reported occasional lucid dreams (marked 1=less than once a year, 2=about once a year, 3=about two or four times

Table 1. Descriptive statistics for Study 1 variables

Variable	Mean (SD)
Lucid Dream Frequency	3.89 (1.83)
Openness to Experience	3.67 (0.47)
Locus of Control	4.43 (0.60)
Video Game Play	4.04 (2.18)
CRT scores	3.58 (1.83)
Dream Recall Frequency	5.65 (1.63)

a year) and 20 reported having frequent lucid dreams, frequency equal to or higher than once per month (marked 4=about once a month, 5=about two to four times a month, 6=about once a week, 7=several times a week). Percentages are displayed in Table 2.

Alpha level was reduced to .01 to account for the inflated Type 1 error when conducting multiple correlations. There was a significant positive correlation found between Internal Locus of Control and LDF $r = .23$, $p = .01$, 1-tailed, and between Dream Recall and Lucid Dream Frequency $r = .33$, $p < .001$, 1-tailed. The correlation between Openness to Experience scores and LDF; approached significance $r = .18$, $p = .03$, 1-tailed. No significant correlations were found between Video Game Play and LDF or CRT scores and LDF (see Table 3).

Thus the first study supported previous research in finding a relationship between lucid dream frequency and dream recall frequency, and lucid dream frequency and internal locus of control. However, it did not support previous findings pertaining to openness to experience, nor video game play. Further, it did not find evidence for a relationship between lucid dream frequency and scores on the Cognitive Reflections Test, thereby not supporting a dual process hypothesis of lucid dreaming.

A methodological issue with utilising retrospective estimates of lucid dream frequency is that memory biases and expectations may influence these estimates, and result in inaccuracies. Because of this possibility, Study 2 was conducted, using both retrospective estimates and prospective recordings, as follows.

Table 2. Percentages of lucid dreamers

Variable	Number of participants	Percentage
Non-lucid dreamers	12	11.65%
Occasional lucid dreamers	71	68.93%
Frequent lucid dreamers	20	19.42%

4. Study 2 Method

4.1. Participants

Thirty participants (15 male and 15 female), with ages ranging from 20 to 51 ($M = 25.47$, $SD = 6.59$), were recruited using convenience sampling via posters and fliers from the University of Bedfordshire (N=9), as well as from dreaming related Facebook forums and communities (N=21). Individuals who participated in the first study and were familiar with the Cognitive Reflective Ttest were not eligible to take part in the study.

4.2. Materials

The questionnaire included Levenson's (1973) Internal Locus of Control scale, two open-ended questions regarding dream recall and frequency of lucid dreams e.g. "How many dreams do you remember on average per week?" and "In a typical month, how many lucid dreams do you have?", John and Srivastava's (1999) Openness to Experience measure from the Big Five Factors of Personality (Goldberg, 1993), and the expanded version of the Cognitive Reflection Test developed by Toplak, West and Stanovich (2014), as detailed the method for Study 1. In addition, a syllogisms test was included, containing 4 categorical syllogisms e.g. "No books are novels. Some magazines are novels. Therefore, some books are not magazines" and 4 conditional syllogisms e.g. "If a person is a guitarist, then he is a professor. If a person is a professor, then he is a musician" (see Appendix).

The dream diary consisted of 30 tables (one per day for the duration of the study), each table containing five boxes that participants could tick if they had had one of the following dreams: a lucid dream, a dream with a logical pattern, a

Table 3. Correlation Coefficient

	Dream Recall	CRT scores	Openness to Experience	Locus of Control	Game Play frequency
LDF	.34*	-.02	.18	.23*	.14
Dream Recall	---	.05	.12	.001	-.13
CRT scores		---	.11	.21*	.29*
Openness to Experience			---	.29*	.20*
Locus of Control				---	.12
Game Play Frequency					---

* Correlation is significant at the $p < .01$ level.

Table 4. Frequency of lucid dreams in prospective and retrospective measures

Prospective measure							
No. of participants	7 (23.3%)	3 (10%)	6 (20%)	6 (20%)	3 (10%)	3 (10%)	1 (3.3%)	1 (3.3%)
No. of lucid dreams reported	0	1	2	3	4	5	6	23
Retrospective measure							
No. of participants	6 (20%)	6 (20%)	8 (26.7%)	5 (16.7%)	1 (3.3%)	3 (10%)	1 (3.3%)	
No. of lucid dreams reported	0	1	2	3	4	5	20	

dream with negative content, a dream with positive content, and/or a recurrent dream). Explanations of lucid dream, logical pattern and recurring dream were provided on the first page of the dream diary. Analyses were not conducted on the frequency of logical, negative, positive, or recurrent dreams; these questions were asked rather to disguise the purpose of the study.

4.3. Procedure

The study received ethical approval from the University of Bedfordshire prior to the collection of data. Participants were recruited from the University of Bedfordshire as well as from the internet. The study consisted of two open ended questions (dream recall/lucid dream frequency), two scales (Internal Locus of Control Scale and Openness to Experience Scale), an extended version of the Cognitive Reflection Test taken from Toplak, West and Stanovich (2014), and a Syllogisms Test; completed by every participant in this order. Every questionnaire was on a different page. After the completion of the questionnaires, participants were directed to a page where they were shown the correct answers to the test questions, thanked for their time, debriefed, and given an email address in case they wanted to leave any comments regarding the study or withdrawn from the study. The dream diary was given after the completion of the online questionnaire. Participants were instructed to fill in one table every morning for a month; this consisted of circling the number of dreams that they remembered and ticking the appropriate boxes for each of the dreams. The last page of the diary consisted of participants being thanked for their time and reminded to return the diary after one month.

Table 5. Descriptive statistics for Study 2 variables

Variable	Mean (SD)
Prospective LDF	2.96 (4.17)
Retrospective LDF	2.53 (3.62)
Locus of Control	4.31 (1.09)
Openness to Experience	3.30 (0.71)
CRT scores	4.10 (2.02)
Syllogisms Test scores	5.56 (1.13)

5. Study 2 Results

The prospective measure of lucid dreams revealed that 7 individuals (23.3%) reported no lucid dreams with the rest of the 23 participants reporting at least one lucid dream during the month of the study. From the retrospective measure of lucid dreams, 6 (20%) reported no lucid dreams and 24 reported at least one lucid dream (see Table 4). Descriptive statistics for the variables are displayed in Table 5.

Spearman's correlations were conducted to assess the relationship between Openness to Experience, Locus of Control, Dream Recall, CRT scores, Syllogisms test scores, and prospective and retrospective measures of LDF. Alpha level was reduced to .01 to account for the inflated Type 1 error when conducting multiple correlations. There was a very high significant positive correlation found between Internal Locus of Control and prospective/retrospective measures of LDF, $r = .80$, $p < .001$ $r = .80$, $p < .001$ between high Openness to Experience and prospective/retrospective LDF, $r = .85$, $p < .001$ / $r = .80$, $p < .001$. The correlation between high Dream Recall and prospective/retrospective measures of LDF approached significance, $r = .23$, $p = .02$. No significant correlations were found between either CRT scores or syllogisms test scores and prospective/retrospective measures of LDF. A very high significant correlation was found between prospective and retrospective measures of lucid dream frequency, $r = .91$, $p < .001$.

Using prospective measures, then, relationships were found between LDF and openness, and LDF and locus of control. However, no relationship was found between LDF and CRT scores using either the retrospective or the prospective measure of LDF; likewise, no relationship was found between LDF and syllogisms scores using either retrospective or prospective method. Thus, the second study confirmed the findings of Study 1 in failing to support a dual processing hypothesis of lucid dreaming.

6. General Discussion

Overall, the findings of the present paper indicate that there are relationships between prospective andretrospective measures of lucid dream frequency (LDF) and openness to experience, locus of control, and dream recall frequency. However, the dual processing hypothesis of lucid dreaming was not supported: no relationship between LDF and Cognitive Reflective Test scores, nor with scores on a syllogisms test, was found, neither with retrospective nor prospective estimates of LDF. In addition there was no relationship found between LDF and video game play.

Table 6. Correlation Coefficients for all variables

	rLDF	Locus of Control	Openness to Experience	CRT scores	Syllogisms scores	Dream Recall
pLDF	.91**	.80**	.85**	.18	.23	.16
rLDF	---	.91**	.80**	.26	.24	.23
Locus of Control		---	.75**	.37	.17	.25
Openness to Experience			---	.34	.17	.37
CRT scores				---	.12	.47**
Syllogisms scores					---	.06

* Correlation is significant at the p < .01 level.

There was a very high correlation between prospective and retrospective measures of LDF; thus participants correctly estimated their frequency of lucid dreams in a month prior to having them recorded in a dream journal. Diary measures have been shown to correlate with scientifically verified lucid dreaming measured in the laboratory (Kueny, 1985). Thus, when it comes to estimating the frequency of lucid dreams in questionnaires, participants can provide reliable data. In the first study, roughly 87% of the sample was classified as lucid dreamers, whereas in the second study, 80% were detected using prospective measures. By measuring their frequency using a retrospective approach, the sample from the second study had 76% lucid dreamers. This finding agrees with previous findings that student samples contained 82% lucid dreamers (Schredl & Erlacher, 2004). However, the current study defined lucid dreaming in terms of awareness of the dream state and also the ability to control it; future research should investigate lucid dream frequency comparing frequency for awareness of the dream state alone, and frequency for awareness of the dream state and control. The data from both studies revealed that there was a relationship between locus of control and LDF, suggesting that lucid dreamers have a more internal locus of control than non-lucid dreamers. This finding is in accordance with previous studies assessing the relationship between locus of control and LDF (Blagrove & Hartnell, 2000; Blagrove & Tucker, 1994). Patrick and Durndell (2004) argue that internal locus of control positively correlates with waking life attempts to control the environment and control is central to maintaining a lucid dream; thus individuals with an internal locus of control would exhibit more control over the dream environment.

LDF also correlated with openness to experience in both studies. This finding is in agreement with previous studies that have found significant correlations between the openness to experience factor and LDF (Schredl & Erlacher, 2004; Watson, 2003). Correlations were unusually high in the second study for LDF and locus of control and openness to experience. This may be due to the sample; the participants are likely to have had a special interest in dreams since they volunteered to do research that was unusually involved but without incentive, and many of whom were recruited from dream-related groups online. Therefore, the findings of the second study would benefit from replication with a more representative sample. In addition, the locus of control and openness scores were self-report measures, whereas the CRT and syllogisms relied on the participant getting the right answer; so the high correlations may perhaps reflect participants' perception of a potential link between lucid dreaming and internal locus of control / openness, as these measures are vulnerable to expectation biases.

The analysis further revealed that there was a relationship between dream recall and LDF; thus, individuals who have a higher rate of dream recall also have a higher rate of LDF. The correlation between the two measures had been previously reported in studies (Blackmore, 1982; Watson, 2001; Schredl & Erlacher, 2004; Schredl & Erlacher, 2011). It makes sense that individuals who recall more dreams in general, also report more lucid dreams.

There was no relationship found between videogame play and lucid dream frequency. This finding did not support previous research. It may be that the scale used was not reliably able to measure game playing; future research should implement other methods of measuring gameplay to further investigate this.

There was no relationship found between both prospective and retrospective LDF and CRT scores, nor between prospective/retrospective LDF and syllogisms test scores. As these were employed as measures of reflective cognitive ability, it would be reasonable to conclude that there is no relationship between the frequency of dream accounts of reflective reasoning manifested in the form of lucid dreams and waking life reflective ability measured with the cognitive reflective test and with performance on syllogisms tests. However, it may be that different measures would provide us with different results; the tests employed in the present study might not measure the same type of reflective ability as that manifested in lucid dreams. Dream reflection does imply an awareness of the conditions within the dream, thus reflective awareness of the environment and oneself could be measured instead of reflective reasoning abilities. However, these prove to be hard to measure and require an in depth understanding of awareness as a feature of consciousness, which is poorly understood. Furthermore, the correlation between CRT scores and Syllogism test scores in the present study was weak, which indicates that the two tests did not measure the same kind of thinking style. Further research could implement other measures of reflective reasoning abilities or focus on measuring reflective awareness of the environment and of oneself.

On the other hand, this was not the first study to fail to find a relationship between lucid dreaming and a task known to require dorsolateral prefrontal cortex activation. In Neider et al.'s (2010) study, participants who were more

lucid in their dreams than others performed better at the Iowa Gambling Task, which is known to activate the ventromedial prefrontal cortex, but not at the Wisconsin Card Sort task, which is known to activate the dorsolateral prefrontal cortex. In addition to this, the effect of transcranial direct current stimulation (tDCS) on the dorsolateral prefrontal cortex only enhanced lucidity in dreams in participants who already were experiencing lucid dreams frequently, but not in those who experienced lucid dreams infrequently or never (Stumbrys, Erlacher, & Schredl, 2013). These findings coupled with those of the present study query the degree of involvement of the dorsolateral prefrontal cortex in lucid dreaming. It is likely that lucid dream onset is more complicated than a simple reactivation of the dorsolateral prefrontal cortex; as suggested by Mota-Rolim et al. (2010)), it may be that different neural substrates are implicated in different kinds of lucid dreaming, since lucid dreaming is not a unitary phenomenon.

Although humans spend one third of their life sleeping, most models of human cognition are structured based upon evidence derived from waking-life cognition. The development of a 24 hour model of cognition is necessary for the further understanding of consciousness. The existence of lucid dreaming reveals higher-order cognitive skills present during sleep; skills that previously have been assumed to be characteristic only of waking life. The question remains whether there is any relationship between the manifestation of higher-order cognitive skills in dreams and their manifestation in waking life. The uniquely human ability to reflect upon ourselves, think about past and plan the future could help illuminate the human condition.

6.1. Conclusion

There was no relationship found between rational reflective abilities measured with the Cognitive Reflective Test nor the syllogisms test and lucid dream frequency, whether measured retrospectively or prospectively, therefore providing no evidence for a dual-processing account of lucid dreaming. However, internal locus of control, dream recall frequency, and openness to experience were correlated with lucid dream frequency, supporting previous research. Further studies could implement other measures of reflective reasoning abilities or reflective awareness in order to assess if REM sleep accounts of reflection (i.e. lucid dreaming) correlate with different waking life reflective abilities.

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Appendix

Syllogisms used for the second study:

1. No toddlers are elderly.
Some females are elderly.
Therefore, some toddlers are not females.

2. No books are novels.
Some magazines are novels.
Therefore, some books are not magazines.

3. No actresses are men.
Some dancers are men.
Therefore, some dancers are not actresses.

4. No black animals are rodents.
Some cats are rodents.
Therefore, some cats are not black animals.

5. If an animal is cold-blooded, then it is a mouse.
If an animal is a mouse, then it is a reptile.
Therefore, if an animal is a reptile, then it is cold-blooded.

6. If a person is a guitarist, then he is a professor.
If a person is a professor, then he is a musician.
Therefore, if a person is a guitarist, then he is a musician.

7. If an animal is a puppy, then it is cold-blooded.
If an animal is cold-blooded, then it is a canine.
Therefore, if an animal is a puppy, then it is a canine.

8. If a food is candy, then it is meat.
If a food is meat, then it is a lollipop.
Therefore, if a food is a lollipop, then it is candy.

Does eating a fourth meal (siu-yeh) before bedtime affect sleep quality and dream experiences?

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Summary. This study examined the relationship between night eating, sleep quality, and dream experiences. A total of 215 Hong Kong participants completed the Night Eating Questionnaire, the Pittsburgh Sleep Quality Index, and the Dream Intensity Scale and answered some questions about their frequency of food intake between dinner and bedtime, food choice for night eating, and beliefs regarding the effects of night eating and satiety on dreams. The overall results indicate that night eating as a pathological propensity or normal habit is positively related to the phenomenological experience of dream intensity and this relationship is moderated but cannot be fully explained by sleep quality or the beliefs about the effects of night eating and satiety on dreams. Additionally, night eating is extremely common in Hong Kong and is related to poor sleep quality. However, the feeling of satiety before bedtime does not appear to modulate subjective dream intensity.

Keywords: Dream Intensity Scale; night eating; nightmares; satiety; Siu-yeh

1. Introduction

Thus far, there have been only two empirical studies directly investigating eating habits and dream experiences. In their small-scale survey (7 males, 42 females), Kroth, Briggs, Cummings, Rodriguez, and Martin (2007) found that dream recall, recurring dreams, and sex dreams were correlated positively with a preference for organic foods but negatively with a preference for fast foods. A recent study conducted by Nielsen and Powell (2015), which involved a much larger sample of undergraduate students (126 males, 255 females), revealed similar, yet more intricate interactions between eating habits and dream characteristics. Specifically, the report of disturbing dreams was positively correlated with several measures of pathological eating factors, such as binge-eating, less reliance on hunger-satiety cues, emotional eating, the tendency to lose control over eating, and the intention to influence bodyweight and body shape by controlling food intake. On the other hand, the report of vivid dreams was correlated positively with eating healthy foods, longer intervals between meals or without eating, and more reliance on hunger-satiety cues and negatively with eating unhealthy foods and the tendency to lose control over eating. In view of these two patterns of correlations, Nielsen and Powell conjectured that it is visceral sensations and the ability to access those sensations that might forge a connection between eating behaviors and dream experiences.

Besides interoceptive awareness, Nielsen and Powell identified two other important factors that modulate the relationship – that is, folk beliefs and sleep quality. In their sample, 11.5% of participants believed that eating certain foods, especially dairy products, could cause disturbing or bizarre dreams and 9.5% claimed that eating late at night seemed to affect their dreams. Participants who held the belief of food-dependent dreaming reported significantly more disturbing dreams than did the other participants. The effect of attributing dream experiences to eating late at night was robust. When it was factored in, the between-group difference in disturbing dreams was no longer significant. By the same token, Nielsen and Powell found that the relationship between pathological eating factors and disturbing dreams was largely mediated by sleep quality; after the effect of sleep quality was partialled out, most pathological factors were no longer correlated with disturbing dreams, except binge-eating and the tendency to alter body weight and shape by controlling food consumption.

In their study, Nielsen and Powell asked participants to indicate whether they had noticed that eating late at night seemed to affect their dreams or sleep. Nevertheless, they had not assessed participants' actual night eating behavior. If the belief that eating late at night would lead to changes in dreams has an impact on dream experiences, it follows that night eating behavior as well might alter dream experiences. Night eating has been most often studied as a disorder, called night eating syndrome, which according to the Diagnostic and Statistical Manual of Mental Disorders (5th ed.) (DSM-5; American Psychiatric Association, 2013), is an eating disorder signified by excessive food intake after the evening meal or eating after awakening from sleep. The original core criterion proposed by Allison et al.'s (2010) research group is more specific – that is, consumption of at least 25% of daily food intake after the evening meal and/or nocturnal awakenings with ingestions at least twice a week.

The same research group (Allison, Stunkard, & Thier, 2004; Allison et al., 2008) has developed the Night Eating Questionnaire for assessing the severity of night eating syndrome in accordance with their proposed criteria. The severity of night eating syndrome assessed through this questionnaire has been demonstrated by different research groups (e.g., Allison et al., 2008; Cleator, Abbott, Judd, Wilding, & Sut-

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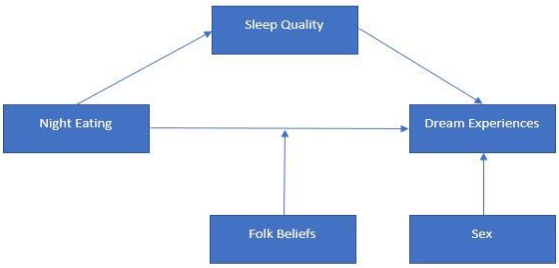
ton, 2013; Kucukgoncu, Tek, Bestepe, Musket, & Guloksuz, 2014; Nolan & Geliebter, 2016; Yoon et al., 2015) to be associated with poor sleep quality. The similar finding has also been reported by studies using other measures of night eating syndrome, such as the Night Eating Diagnostic Questionnaire and Night Eating Syndrome History and Inventory (Nolan & Geliebter, 2012). The relationship between night eating and poor sleep quality does not appear to be mediated by other external variables given that the relationship still sustains even with some key factors being taken into account, such as body mass index and depressive mood (e.g., Kucukgoncu et al., 2014; Yeh & Brown, 2014).

There is ample evidence that poor sleep quality and sleep disturbances augment the overall subjective intensity of dreaming as typically reflected by dream recall and nightmare frequencies (e.g., Lancee, Spoormaker, & Van Den Bout, 2010; Levin, 1994; Schredl, 2001, 2003; Schredl, Erlacher, Reiner, & Woll, 2014; Yu, 2016; Yu & Thompson, 2016; see Schredl, 2009, 2010, for a review) and the incidence of specific dream motifs, such as themes involving vigorously bodily movements, proprioceptive senses, physical inhibition of body movements, and psychological prohibition of certain behaviors (Yu, 2016; Yu & Thompson, 2016). Taken together, sleep quality is likely to act as a mediator bridging night eating and dream experiences.

It is interesting that night eating, while being deemed to be an unhealthy or pathological behavior in the West, is very common in southern China – especially in Hong Kong. Ironically perhaps, night eating is ipso facto regarded as a food culture of Hong Kong; restaurants that provide both dinner and late-night buffets are popular in Hong Kong. In Chinese language, there is a specific word for denoting the night meal between supper and sleep – 消夜 (Cantonese pronunciation: siu-yeh; Chinese pronunciation: xiao-ye). The word siu-yeh can also be used as a verb to describe the behavior of eating to pass the time at night. In contrast to the English term night eating, which can broadly refer to any delayed circadian patterns of ingestions, the Chinese word siu-yeh means more than eating late at night and refers precisely to the meal after dinner. This connotation of siu-yeh is unequivocal for Chinese people. In addition, although siu-yeh can range from snacks to a full-sized meal, it usually implies a meal similar to supper, such as having a late-night buffet at a hotel, a hotpot or Teochew cuisine (潮州打冷; Chiu Chow da lang) at a Chinese restaurant, and noodles, congee, seafood, or stir-fired dishes at a street stall (大排檔; dai pai dong). Indulging oneself in a big meal like these after dinner most probably would not be considered a pathological behavior among Hong Kong people insofar as night eating is so common and just part of everyday life in Hong Kong. According to a secondary analysis (Huang, 2014) of a Hong Kong population-based survey (Hong Kong Student Obesity Surveillance project; N = 24,885 adolescents), 50.2% of adolescents reported night eating and 21.9% had their fourth meal three nights a week.

Nielsen and Powell (2015) studied some pathological characteristics pertaining to eating disorders and the beliefs in the effects of specific foods and eating late on dream experiences. Although they demonstrated that such beliefs would promote disturbing dreams, they had not evaluated participants' night eating behavior as a syndrome or normal habit. Is night eating or having siu-yeh related to dream experiences? If it is the case, would the relationship between night eating and dreaming be mediated by sleep quality or alternatively, by the folk beliefs that night eating would affect dreams? The study presented here was geared toward answering these questions by investigating night eating habits, sleep quality, and dream experiences of Hong Kong Chinese. It was hypothesized that night eating behavior would adversely affect sleep quality and therefore increase dream experiences (see Figure 1). It was further conjectured that beliefs about the effect of night eating on dreams might modulate the triadic relationship. The effect of sex was taken into account in the analyses in view that sex differences in various dream variables are well documented in the literature, for example, women's stronger subjective intensity of dreaming and more vivid sensory experiences during dreaming (Yu, 2008, 2010, 2012).

Figure 1. The Hypothetic Model of the Present Study



2. Method

2.1. Participants

A total of 215 (97 males and 118 females) participants aged between 15 and 24 (M = 18.4, SD = 2.44) were recruited for this study. Most of them (56.3%) were secondary school students and 94 were university students. Their participation was voluntary and without payment.

2.2. Instruments

All participants completed a set of questionnaires, including the Night Eating Questionnaire, a question about food choice for night eating, a single-probe measure of weekly night eating frequency, a Likert scale for assessing subjective satiety before bedtime, the Pittsburgh Sleep Quality Index, the Dream Intensity Scale, and questions about their beliefs regarding the effects of night eating and satiety on dreams.

Night Eating Questionnaire. The Night Eating Questionnaire (NEQ) was designed by Allison et al. (2004, 2008) to measure the severity of night eating syndrome. The 14 items of the NEQ, which tap into cravings and urges to eat after evening meal and waking up at night, control over night eating behavior, and circadian changes in mood, match well with the diagnostic criteria proposed by the same research group (Allison et al., 2010). For instance, Item 5 requires respondents to rate the percentage of their daily food intake being consumed after suppertime but before bedtime on a 5-point scale anchored by 0 = 0% and 4 = 76-100%. Respondents who rate 2 (26-50%) or higher on the scale may meet the criteria of ingesting 25% or more of the total daily calories after supper. The NEQ score was obtained by the sum of the 14 items, except Item 13, which functions as a differential diagnostic question for ruling out the presence of

parasomniac eating disorder. Allison et al. (2004) suggested a cutoff score of 25 or above for identifying people being at risk of night eating syndrome.

Food choice for night eating. Participants were asked to indicate whether they would consume each of the nine food categories after supper but before sleep: 1) alcoholic beverages, 2) non-alcoholic beverages, 3) cereals and cereal products, 4) egg and egg products, 5) milk and dairy products, 6) seafood, 7) vegetables and vegetable products, 8) sugar and sweets, and 9) others. The diversity of food intake for night eating was indicated by the number of food categories chosen by participants.

Night eating frequency. Participants were asked to rate their weekly frequencies of night eating on an eight-point scale ranging from 0 to 7.

Satiety Scale. A scale developed by Holt, Miller, Petocz, and Farmakalidis (1995) was employed to assess participants' subjective sense of fullness before sleep. The levels of satiety were represented by seven points on a line: Extremely hungry, hungry, semi hungry, no particular feeling, semi satisfied, satisfied, and extremely full.

Pittsburgh Sleep Quality Index. The Pittsburgh Sleep Quality Index (PSQI; Buysse, Reynolds, Monk, Berman, & Kupfer, 1989) contains 19 self-rating items, which generate seven components scores, such as subjective sleep quality, habitual sleep efficiency, and daytime dysfunction. The sum of these component scores gives a global score.

Dream Intensity Scale. The Dream Intensity Scale (DIS; Yu, 2012) is a well-validated instrument for assessing the subjective intensity of dreaming that characterizes a person. It evaluates four primary factors: Dream Quantity, Dream Vividness, Diffusion, and Altered Dream Episodes. Each factor can serve as an individual scale. The first factor is composed of five items that measure the quantitative aspect of usual dream activities shared by most people, including the frequencies of dream awareness, recalling the main content of dreams, multiple dreams in a single night, nightmares, and nightmare awakenings. The DIS requires respondents to indicate their frequencies on a standardized 10-point absolute scale (0 = never to 9 = almost every day) for answering these five items. In addition to the total Dream Quantity score, the Regular Dreams and Bad Dreams subscale scores can be generated by adding up respectively the first three item scores and latter two item scores. Only the Dream Quantity factor – the most rudimentary facet of subjective dream intensity – was investigated in this study.

Both the DIS and PSQI have an item for quantifying distressing dreams. In particular, the PSQI Item 5.h asks respondents to indicate their weekly frequencies of bad dreams over the past month by choosing one of the four options (i.e., not during the past month, less than once a week, once or twice a week, and three or more times a week). On the other hand, the DIS Item 3 measures the frequency of nightmares over the past few years (e.g., less than once a year, about once a year, two to six times a year) and the raw scores of items can be converted into monthly frequencies. Details of the development and psychometric properties of the DIS are available in Yu's (2008, 2009, 2010, 2012) previous reports.

Beliefs about the relationship between night eating and dreaming. At the end of the questionnaire set, participants were questioned directly whether they believed that night eating would affect dreaming. A similar question about the effects of satiety before bedtime on dreams was posed. If participants held such beliefs, they were asked to briefly elaborate on their views regarding how night eating or satiety would impact dream experiences.

3. Results

The average frequency of night eating of the current sample was 2.08 per week (SD = 1.749), with 33.5% of participants eating after supper but before sleep three times a week or more often. The most common type of food choice for night eating was sweet products (42.8%), followed by cereal (37.2%) and dairy products (28.4%). The average NEQ score was 16.53 (SD = 4.108), 2.8% of participants reaching the suggested clinical cutoff of 25 or above. As indicated by the NEQ Item 5, 33.5% of participants consumed more than 25% of their daily food intake after supper. Night eating frequency per week was significantly correlated with the NEQ score, $r = .239$, $p < .001$, the diversity of food intake after supper, $r = .305$, $p < .001$, and the PSQI, $r = .184$, $p = .007$. In a similar way, the NEQ score significantly varied with the diversity of food intake after supper, $r = .250$, $p < .001$, the satiety score before sleep, $r = -.137$, $p = .044$, and the PSQI, $r = .370$, $p < .001$. Both night eating frequency ($r = .203$, $p = .003$; $r = .254$, $p < .001$) and the NEQ score ($r = .389$, $p < .001$; $r = .301$, $p < .001$) were most strongly associated with the Components 1 (subjective sleep quality) and 7 (daytime dysfunction) of the PSQI across the seven components.

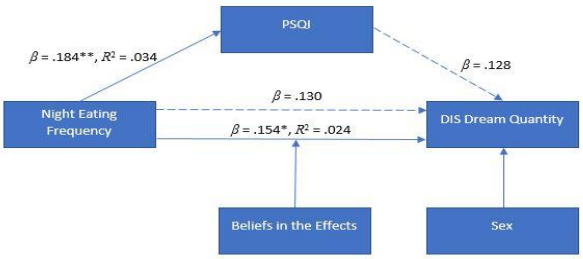
No significant sex difference was found for night eating frequency, the NEQ, and the PSQI (all p values > .05) but the satiety index was larger in females (M = 3.35, SD = .990) than in males (M = 3.03, SD = 1.141), $t = 2.177$, $p = .031$, Cohen's $d = 0.300$. Likewise, female participants (M = 6.55, SD = 3.699) scored significantly higher in the DIS Bad Dreams subscale than did male participants (M = 5.18, SD = 4.342), $t = 2.508$, $p = .013$, Cohen's $d = 0.341$. However, the sex difference for the DIS Dream Quantity scale

Table 1. Regression Models for the DIS Dream Quantity Score

Scales	F	R^2	β	t
Model 1	5.151*	.024		
Night eating frequency			.154	2.270*
Model 2	4.360*	.040		
Night eating frequency			.130	1.899
PSQI			.128	1.873
Model 3	4.360*	.040		
Night eating frequency			.141	2.096*
Beliefs in the effects of night eating or satiety on dreams			.142	2.083*
Sex			3.508	-0.613
Model 4	7.719**	.042		
Night eating frequency			.204	2.778**

Note. * $p < .05$, ** $p < .01$

Figure 2. The PSQI as a Mediator between Night Eating Frequency and the DIS Dream Quantity Scale



(t = 1.701, p = .285) and Regular Dreams subscale (t = 0.744, p = .458) was not significant.

The belief that night eating would have an impact on dreams was uncommon in the present sample – reported by only 8.4% of participants. Similarly, only 12.6% of participants believed that the feeling of satiety would affect dream experiences. Of the 215 participants, 180 (83.7%) did not believe such claims. Participants who held either belief (M = 7.45, SD = 4.408) scored higher on the DIS Bad Dreams subscale than did the non-believers (M = 5.63, SD = 3.922), t = 2.466, p = .014, Cohen's d = 0.437. This effect could be indirectly caused by the greater percentage of females (22%) than males (9.3%) being in the believer group, Pearson Chi-Square = 6.356, p = .012, Phi = .172, p = .012. Despite the rareness of the beliefs among the participants, the DIS dream scores were significantly correlated with the measures of night eating. Specifically, the Dream Quantity scale showed a significant association with night eating frequency, r = .154, p = .024, but not with the NEQ total score, r = .085, p = .217. On the other hand, the Bad Dreams subscale was significantly correlated with the NEQ score, r = .136, p = .046, but not with night eating frequency, r = .098, p = .153. Both the Dream Quantity (r = .116, p = .091) and Bad Dream scores (r = .088, p = .196) did not display a significant association with the satiety score. The Bad Dream score significantly varied with the PSQI, r = .190, p = .005, and its Component 4 (habitual sleep efficiency), r = .153, p = .025, Component 5 (sleep disturbances), r = .277, p < .001, and Component 7 (daytime dysfunction), r = .146, p = .032. It was significantly correlated with six of the nine sleep disturbances listed in the PSQI, with its correlation coefficients with the weekly frequencies of having bad dreams, r = .471, p < .001, waking up in the middle of the night or early morning, r = .291, p < .001, getting up to use the bathroom, r = .283, p < .001, being the largest.

Night eating frequency significantly predicted the PSQI score, F = 7.475, p = .007 (see Figure 2). It also significantly predicted the DIS Dream Quantity score (see Table 1, Model 1) and its standardized beta coefficient, albeit being reduced to .130 (t = 1.899, p = .059) after entering the PSQI (t = 1.873, p = .062) into the model, was still larger than that of the PSQI (Model 2). The Sobel test indicated that the PSQI score was not a significant mediator between night eating frequency and the DIS Dream Quantity score, z = 1.544, p = 0.123. Likewise, the beliefs about the night eating and satiety effects on dreams could not eliminate night eating frequency as a predictor of the DIS Dream Quantity score (Model 3) and merely mildly reduced the beta weight of night eating frequency as compared to Model 1.Sex was

Table 2. Regression Models for the DIS Bad Dreams Score

Scales	F	R^2	β	t
Model 1	4.023*	.019		
NEQ			.136	2.006*
Model 2	4.530*	.041		
NEQ			.076	1.055
PSQI			.161	2.228*
Model 3	5.184**	.047		
NEQ			.137	2.049*
Beliefs in the effects of night eating or satiety on dreams			.168	2.499*
Model 4	5.648*	.031		
NEQ			.175	2.377*
Model 4	7.719**	.042		
Sex			-.195	-2.683**
NEQ			.184	2.533*

Note. * p < .05, ** p < .01

not a significant predictor in the model. A stepwise regression analysis for predicting the DIS Dream Quantity score with the PSQI and night eating frequency was performed on the 180 participants who did not believe in the effects of night eating and satiety on dreams. The resultant model excluded the PSQI (Model 4).

The NEQ score significantly predicted the PSQI (F = 33.851, p < .001, R^2 = .137, β = .370, t = 5.818, p < .001), which in turn significantly predicted the DIS Bad Dreams score (F = 7.943, p = .005, R^2 = .036, β = .190, t = 2.818, p = .005). Although the NEQ score significantly predicted the Bad Dreams score (see Table 2, Model 1), its predicative value dropped below the significance level (t = 1.055, p = .292) when the PSQI was entered into the regression model (Model 2). Accordingly, the PSQI could be a critical mediator between the NEQ score and the Bad Dreams score (see Figure 3). The Sobel test indicated that the PSQI significantly mediated the association between the NEQ

Figure 3. The PSQI as a Mediator between the NEQ and DIS Bad Dreams Subscale

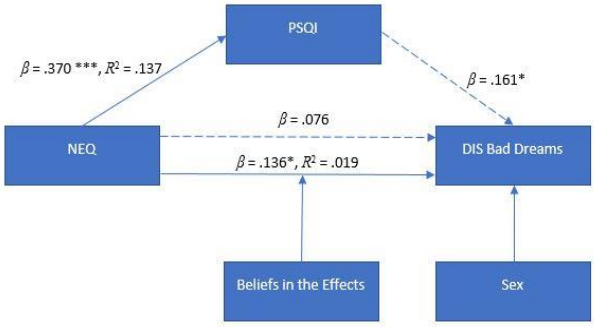
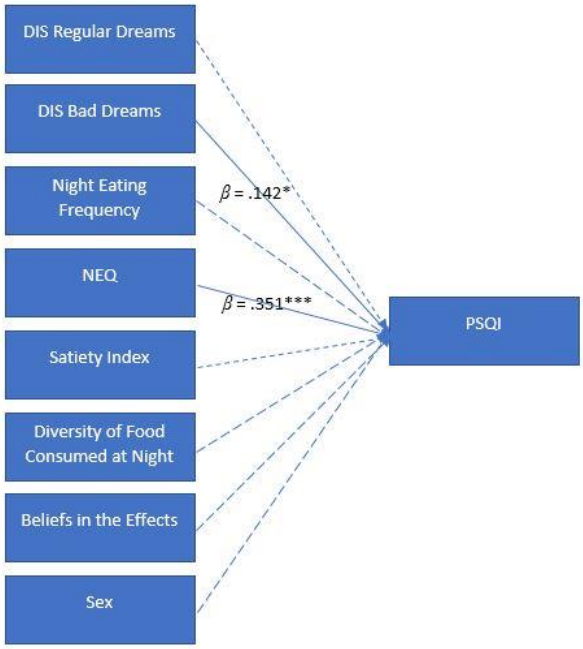


Figure 4. An Alternative Model



score and the Bad Dreams score, z = 2.083, p = 0.037. By contrast, the NEQ was still significantly predictive of the Bad Dream score even when the beliefs in the night eating and satiety effects were taken into consideration (Model 3). A stepwise regression analysis was carried out in the subsample of non-believers to predict the Bad Dreams score with the PSQI and the NEQ score. Similar to the stepwise regression model for the Dream Quantity score, the PSQI was eliminated by the analysis (Model 4). The stepwise regression analysis resulted in a similar model, even with consideration of sex (Model 5). The Sobel tested showed that the PSQI was not a significant mediator between the NEQ and Bad Dreams scores in the subsample of non-believers, z = 1.363, p = 0.173.

The foregoing regression analyses assumed that sleep quality modulated dream experiences. The reverse, however, might also be true (see Figure 4). A stepwise regression analysis was performed to test the extent to which the DIS Regular Dreams and Bad Dreams scores could predict the PSQI, taking into account sex, night eating frequency, the NEQ score, the satiety score, the diversity of foods consumed at night, and the beliefs in the effects of night eating and satiety on dreams. The resultant model was made up of the NEQ (β = .351, t = 5.514, p < .001) and Bad Dream scores (β = .142, t = 2.228, p = .027), with all other factors being removed, F = 19.722, p < .001, R2 = .157. As indicated by the R2, the variance predicted by this regression model was larger than those predicted by the regression models presented in Tables 1 and 2. Lastly, whether participants consumed dairy products at night did not show a significant effect on any DIS and PSQI scores (t values ranged between -1.200 and 0.684, all p values > .05).

4. Discussion

This study investigated the relationship between night eating, sleep quality, and dream experiences. The overall findings suggest that night eating as a syndrome or normal habit is positively related to subjective dream intensity and this relationship is moderated but cannot be fully accounted for by sleep quality or folk beliefs about the effects of night eating and satiety on dreams. Moreover, using dream intensity and night eating to predict variance in sleep quality is more effective than predicting dream intensity with sleep quality and night eating. It appears, therefore, that although sleep quality can be to a large extent explained by night eating and dream intensity, there are some important factors other than night eating and sleep quality that influence dream intensity.

Over 30% of participants consumed food after supper three times a week or more often. Likewise, a third of the sample consumed more than 25% of their daily food intake after supper. Despite this alarming number of participants who potentially met the core criteria of night eating syndrome, only 2.8% of participants reached the NEQ clinical cutoff score. Accordingly, although as expected, night eating is extremely common in Hong Kong, it does not necessarily mean that more people in Hong Kong suffer from night eating syndrome or distress relating to night eating. For that reason, the diagnostic criteria for night eating syndrome should perhaps be refined before they can be pertinently applied to Hong Kong people.

Consistent with the previous evidence, the severity of night eating syndrome measured by the NEQ was found to be directly proportional to poor sleep quality indicated by the PSQI. It was furthermore shown to be positively correlated with weekly night eating frequency and the diversity of food intake after dinner. Both the NEQ and weekly night eating frequency exhibited a similar pattern of associations with the PSQI component scores. These findings corroborate that the NEQ and weekly night eating frequency evaluate two similar, yet distinct constructs. In addition to the positive association between night eating and poor sleep quality, the positive association between poor sleep quality and subjective dream intensity was also replicated in this study. Echoing Yu's (2016) previous evidence and Schredl's (2009) hypothesis, intermittent awakenings during sleep were found to increase with the number of nightmares.

The prevalence rate for the belief about the effect of night eating on dreams was very similar to that documented by Nielsen and Powell. The prevalence rate for the belief about the effect of satiety before bedtime on dreams was higher. Over 80% of participants, nevertheless, rejected both claims. As with Nielsen and Powell's previous findings, participants who embraced either belief experienced more nightmares than did the other participants. Dairy products were most frequently blamed by Nielsen and Powell's participants for causing disturbing and bizarre dreams. In the Chinese sample presented here, however, no significant differences were observed across all dream and sleep quality variables between participants who did and did not consume dairy products at night.

Over and above replicating past evidence, the current study found that although poor sleep quality and folk beliefs played a part in modulating the association of weekly night eating frequency to dream intensity, they could not adequately account for the association. On the other hand, poor sleep quality appeared to mediate the relationship between the severity of night eating syndrome and the intensity of nightmares. Nonetheless, for both the intensities of overall dream experiences and nightmares, the association still existed when only participants who did not hold the be-

liefs about the effects of night eating and satiety on dreams were considered. It was surmised that the visceral feeling of satiety before bedtime might mediate the relationship but both the intensities of overall dream experiences and nightmares did not vary with the satiety score.

The regression model for predicting sleep quality with the severity of night eating syndrome and the intensity of nightmares accounted for more variance than did any regression models assuming dream experiences as dependent variables. This implies that while night eating and dream experiences can constitute a relatively succinct model for explaining poor sleep quality, dream experiences are modulated by a wider range of factors. In a nutshell, folk beliefs, sleep quality, and satiety cannot provide a full explanation to the association between night eating and dream experiences identified by the present study. Future studies might be undertaken to search for other potential mediators and salient dream correlates. There is sizable evidence that depression plays a part in both night eating syndrome (e.g., Geliebter et al., 2016; Kim, Kim, Lee, & Jung, 2016; Oksuz, Orhan, Ekerbicer, Karaaslan, & Findikli, 2013; Thompson & DeBate, 2010) and dream experiences (e.g., Agargun & Cartwright, 2016; Bears, Cartwright, & Mercer, 2000; Miller, DeCicco, Dale, & Murkar, 2015; Yu, 2013a, 2013b, 2014). Accordingly, attempts might be made to test whether it is depressed mood that connects night eating and dreaming.

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Non-lucid dreamers actualize volition as ego executive capacity by engaging in problem solving

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Summary. Within the already-investigated described nocturnal cognitive problem-solving phenomenon (Kozmová, 2008, 2012, 2015), the goal of this exploratory study was to determine the contexts in which non-lucid dreamers engage in problem-solving by voluntary actions and behaviors and to characterize volition and its range in kinetic (motile) and communicative (expressive) modalities. The 979 cross-cultural operationally defined problem-solving dreams were analyzed by the method of grounded theory. The analysis of individual occurrences of problem-solving behaviors and actions as volition-based executive skills (ego executive capacity) in addition to other types of cognitions, yielded a total of exemplary 54 dreams with contexts of self-preservation, intrapersonal situations, and interpersonal relationships. The initial emergent cross-state characterization of volition in non-lucid problem-solving dreams calls for reappraisal of neurophysiological theories that did not yet consider the existence of volition as an executive skill that is sustained or could emerge during non-lucid dreaming.

Keywords: Volition, problem-solving, executive function, executive skills, higher order cognition, ego executive capacities, non-lucid dreaming, grounded theory

1. Introduction

In 1855, the French Académie des Sciences Morales et Politiques posed the following question that focused on the psychology of consciousness within the realm of nocturnal life: "What mental faculties subsist, or stop, or change considerably during sleep?" (df. Hervey de Saint Denys, 1867/1977; cited in Schwartz, 2000, p. 56). Ever since, regarding non-lucid dreaming during which dreamers remain unaware, on a continuum, of the existence of the external world (van Eden, 1913), researchers have already elucidated as subsisting in dreaming several mental phenomena of waking life. These mental capacities include higher order cognition, including self-reference; reflective awareness; self-reflection; speech; reflectiveness; meta-cognition; and various cognitive processes, such as planning and decision-making, and executive skills (e.g., Cicogna, Cavallerro, & Bosinelli, 1991; Kahan, 1994; Kahan & LaBerge, 1996, 2011; Kozmová, 2012; Kozmová & Wolman, 2006; Meier, 1993; Purcell, Mullington, Moffitt, Hoffmann, & Pigeau, 1986; Snyder, 1970; Wolman & Kozmová, 2007).

Other waking-life phenomena with cross-state occurrences, such as emotions (e.g., Schredl & Doll, 1998), have been found in non-lucid dreaming also as continuing (for review, see Nielsen & Carr, 2011). The continuity of experiencing emotions connected or integrated with cognition becomes apparent especially when dreamers encounter particularly vexing situations that require problem-solving (Kozmová, 2015).

Earlier considerations and studies demonstrated the existence of problem-solving in non lucid dreams (e.g., Glucksman, 2007; Glucksman & Kramer, 2004; Greenberg, Katz, Schwartz, & Pearlman, 1992; Greenberg & Pearlman, 1975, 1983). Wolman & Kozmová (2007) conceptualized problem-solving as part of the executive process belonging to rational thought processes in which any time the non-lucid dreamer uses his or her own capacities for mental actions and reaching conclusions, the act of volition is involved (p. 841) and it accompanies these nocturnal mental acts. Volition, in this case, is understood as a mentally "pursuing a self-selected goal" (Kozmová, 2012, p. 58) and it is the also the core of problem-solving during nocturnal non-lucid dreaming. In addition, in the described multilayered nocturnal cognitive problem-solving phenomenon, its three direct modalities (executive thought, using emotions, and behaviors and actions; Kozmová, 2008, p. ii) "represents a variety of dreamers' attempts to resolve the situations in the sense that the dreamer, with his or her own authority (as a person or self in the role of a decision-maker and actor), reacts to the situation" (p. 83). This direct, deliberate problem-solving and strategizing in the cognitive domain—the dreamers' use of any of the eight identified executive thought processes during a dreamer's experiences experience—is considered as "building blocks of volitionally pursuing a self-selected goal" (Kozmová, 2012, p. 58). It is the also the core of problem-solving. This collection of mental actions has been defined and exemplified (as a taxonomy) while accompanied by volition within the immediacy of non-lucid dreams in the form of dreamers' intellectual and cognitive "attempts for resolution of dilemmas within immediacy of their dreams" (Kozmová, 2012, p. 51).

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Yet, despite the richness of the abovementioned research studies that examined higher order cognition's elements of waking consciousness as cross-over mental capacities subsisting in non-lucid dreaming consciousness, the *volition* remains only partially explicated as far as its intellectual and cognitive capacities (Kozmová, 2012). The comprehensive and inclusive research of volition as one of the most important and intriguing experiences, mental capacities, and phenomenological features of consciousness that abounds in waking life (Farthing, 1992) remains enigmatic and almost absent from scientific discourse.

The additional rudimentary beginnings of quantitative consideration of volition in dreaming can be also seen in the concept of "choice" (Kahan & LaBerge, 2011), or in its retrospective occurrence investigated with quantitatively based questionnaires in various states of consciousness (Dresler et al., 2014). Yet, besides the already-mentioned executive ego capacities accompanied by volition (Kozmová, 2012), the additional descriptive consideration of how else and when could volition come about or become actualized in non-lucid problem-solving dreams is missing from the scholarship of consciousness studies. The fact that volition as a richly endowed experience exists, though, is illustrated by the following anecdotal examples that depict the dreamer (both dreams are part of a research archive collected for the previous research studies; Kozmová & Wolman, 2006; Wolman & Kozmová, 2007), the experiences of her volition, and its additional range. This scope of volitional mental activities came into its existence under the strained and curiosity-driven difficulties that the dreamer decided to deal with and problem-solve:

1. Now I saw the bug sitting on top of the open shoebox. The top was facing inside out. I thought the bug escaped. It flew around me, landed on the ground. I stepped on it. I was stepping on it with my tennis shoes, and I was trying to aim a hard step at the bug so I would kill it. It did not want to die. I was applying pressure and it did not do much good; the bug was getting out from underneath my tennis shoe and escaping. After all that stomping, it started to change; it changed twice, from black to brown, larger one, and from that to a bluish round one, sort of like a ball with a diameter of one centimeter. Parts of it were dead, the wings and legs, but the core body remained. I said to someone, I think I said it to a boy, "Bring me a hammer." I thought perhaps if I aimed well, I would be able to kill it. The hand appeared, I don't know whose hand it was, and gave me a long needle. The needle was about 15 centimeters long. I thought that I would not be able to kill it with the needle, I would need to aim right in the middle of it, and that does not seem like a good strategy because the bug could harm me while I am trying to aim. I thought the hammer would have been a better choice.
2. I had a destination in mind where I am going. I knew I had to pass J.'s house. I also knew that on the way either I could pass through the place—the clinic where Dr. P. practiced—or I could avoid it. I decided to go through the place even though I felt a bit of fear. I thought, What will I do if I meet him in the hallway? Nevertheless, I decided to go through the clinic (Kozmová, 2008, pp. 4-5).

Without dialogue with the dreamer, it remains unknown what might be the symbolic, psychological, emotional, or cross-state reaching significance of concerns that could reflect waking life situations represented in the abovementioned dreams (e.g, Domhoff, 1996, 2011; Glucksman, 2007; Hall, 1951). Despite this lack of knowledge, while approaching the contemplation of these illustrative dreams in a *prima facie* manner (first impressions), one might notice that the dreamer reports experiences of some undetermined threats and problems. She makes decisions and thus becomes engaged with problem-solving activities within spontaneously arising, unplanned, and uncalled-for circumstances brought about by the dream. The dreamer actively proceeds to handle ongoing difficulties by using her self-awareness and voluntary variety of self-initiated strategies, actions, and evaluative and appraising thoughts. Even her lack of a critical reflective quality of distinguishing conscious states of waking and dreaming (e.g., Rechtschaffen, 1978) did not seem to prevent her from using initiative, strategizing, and taking charge (Kozmová, 2008) that demonstrates the intactness of her nocturnal mental faculties: The dreamer, in addition to using feelings and thoughts, actively pursued goals, determined the course of events with her capacities for vocal expression and other actions to deal with the situations and thus demonstrated intentionality and volition (Purcell, Moffitt, & Hoffmann, 1993, p. 214).

Because, as seen in two anecdotal illustrations, at least one dreamer expanded her volition beyond its accompaniment of decision-making (Kozmová, 2012), there is an indication that volition might be sustained (Hervey de Saint Denys, 19867/1977) in more than one aspect (Kozmová, 2012) in the non-lucid dreaming state. Prior to stating hypotheses and research questions, it seems fruitful to review propositions and conceptualizations about volition in non lucid dreaming and in the waking states of consciousness.

Conceptualization of Volition in the Psychology of Non-Lucid Dreaming Consciousness

Even though the previously mentioned dreamer, while asleep, became an agent, an originator, a volitional decision-maker, and an initiator with instrumentality of thought and action (Grand, 1982), on phenomenological grounds Hobson (2009a) asserted that "most experienced dream reporters say that they decided nothing at all in their non-lucid dreams. Things just happened to them, spontaneously as it were. They did not have the dream as much as the dream had them!" (p. 81). Thus, the theory about volition in non-lucid dreaming state of consciousness predicts a loss of "agentive control" (Voss, Holzmann, Tuin, & Hobson, 2009, p. 119) and "normally involuntary dream experience" (Hobson, 2009c, p. 41). In other words, the "executive ego" (Hobson, 2007, p. 79) known as a mental faculty of a waking life—the "ego-self" that uses will and volition (Meissner, 2011, p. 1123)—is considered continuously inoperative during non-lucid dreaming (Hobson, 2007, p. 79). Voss et al. (2009) also predicted "loss of volition" (p. 1198) based on state-dependency of the brain (Hobson, 2009a).

In neuropsychological terms, the prevailing state-dependency-based hypothesis of consciousness and its formal features states that volition in a non-lucid dreaming state of consciousness is "weak" based upon "disinhibited subcortical network activation" (Hobson, 1997, p. 391). Because these neural correlates are deemed diminished during non-lucid dreaming (Hobson, Pace-Schott, & Stickgold, 2000), the theorizing follows earlier neuroimaging reports (e.g., Braun et al., 1996) reviewed by Maquet et al. (2005), who re-emphasized that "volitional control is notoriously decreased

in dreams" (p. 223). Under these circumstances, "executive ego functions" (e.g., attention, planning, decision-making, and volition) are considered "deficient" (Hobson, 2007, p. 79) or actually lost (Hobson, 2009a). In other words, under the assumption of isomorphism or one-to-one correspondence between physiology (with investigations aimed to find neural correlates) and psychology (with investigations of phenomenological features within the dream reports), the presumed disengagement of the frontal cortex in non-lucid dreaming (e.g., Hobson, 2002) is equal to its inoperativeness (Hobson, 2007, p. 79). In this formulation, the non-lucid dreamers are stuck, in static suspension, with the lack of "voluntary agency" (Hobson, 2007, p. 75). Voss et al. (2009) also extended their speculation and claimed that only in lucid dreaming volition, as one of the "psychological functions," returns with wake-life reactivation of dorsolateral prefrontal cortex (DLPFC, p. 1198). As Killgore (2010) emphasized regarding waking life executive skills accompanied by volition, for use of executive ego capacities, DLPFC is considered a neural region of interest that supports these mental activities.

Despite the previous predictions about the lack of volition during a non-lucid dreaming state of consciousness, there are, however, several notable theoretical and research exceptions (including data about executive skills accompanied by volition; Kozmová, 2012) upon which further development of interest in investigation of volition could be instantiated.

First, the applicable theoretical position is of Smith et al. (2004), who proposed that non-lucid dreamers could engage in self-initiated "motivated behavior" upon their unsatisfactory experiences, notably, "an experience of a discrepancy between an existing state and a preferred, or more valued state" (p. 504).

Second, Purcell, Moffitt, and Hoffmann (1993) investigated dreamers' degree of developed cognitive behaviors with volition-intentionality as an underlying instrumental phenomenon that influences the transformation of dreamers' change in state of consciousness from being non-lucid to becoming lucid (p. 218). The authors' *Dream Scale Control Categories in Abbreviated Form* contains a range of intentional-volitional actions that include ego styles in terms of involvement, activity, effort, and feeling expressiveness: Progressively, the individual dreamer's presence and activities in the dream range as follows: (a) not being present; (b) being present as an observer but not participating; (c) being present as an observer with some personal opinions or comments about observed dream events; (d) the dreamer being a main actor but when experiencing difficulty; he or she acts incompetently and does not have communicative means available; (e) the dreamer might be using some basic behavior to save himself or herself in a difficult situation; (f) the dreamer might be taking charge of his or her own behavior and using expressiveness (communication) that leads to success; (g) the dreamer is thinking about a solution to a problem and implementing it behaviorally without knowing that there is a world outside one's own dreaming mind; and (h) the dreamer becomes lucid and able to "exert control over dream events or outcomes" (p. 219).

Third, Dresler et al.'s (2014) investigation of volitional components of consciousness with the use of retrospective questionnaires while focusing on the differences in volition's existence between waking, non-lucid dreaming, and lucid dreaming pointed to at least some interest in the topic. In addition, in Kahan and LaBerge's (2011) work with individuals' dream samples from interrupted late-night REM sleep and waking experiences and individuals' responses to the Metacognitive, Affective, Cognitive Experiences (MACE) questionnaire, the the higher-order cognition's element termed *choice* could be considered as a component of volition with its underpinning and accompaniment of executive skill of decision-making (Kozmová, 2012; Wolman & Kozmová, 2007).

Conceptualization of Volition in the Psychology of Waking Consciousness

In the psychology of waking consciousness, will, or volition, as one of the ego executive capacities, is considered to be an "active intrapsychic mechanism" (Rangell, 2009, p. 1159) that is a "central and essential component of human psychic functioning" (Meisner, 2011, p. 1123). The volitional engagement of processes of executive capacities allows individuals to become "involved in the control and coordination of willful action towards future goal states" (Goel, Rao, Durmer, & Dinges, 2009, as paraphrased in Killgore, 2010, pp. 118-119). Thus, volition accompanies a variety of ego executive capacities including specific cognitive processes of planning, judgment, decision-making (Kilgore, 2010); "flexible interactions with environment" including noticing of "novelty values" (Fosse & Domhoff, 2007, p. 52); and internal behavior (Faden & Duchamp, 1986). Ego executive capacities further include attention; noticing, self-reflective awareness; synthesis of new information (Hobson, 2009a); organizing internal experiences; motivating oneself; exercising agency; voluntarily acting in one's behalf; and reflecting upon one's actions (Jenkins, 2001; Rychlak, 1994; Workman et al, 2000). Volition, as the capacity of an executive ego that a person internally autonomously initiates and which then accompanies these processes, is viewed as a "central and essential component of human psychic functioning" (Meisner, 2011, p. 1123).

In experiential terms, Dijksterhuis and Aarts (2010) proposed that people motivate themselves and thus behave volitionally according to their goals. Further, using one's mental capacities for taking part in decisively volitional behavior or in pursuing goal-oriented behavior (in terms of "set, strive for, and attain") brings about the "sense of agency or willfulness in that we experience ourselves as the cause of our own behavior as a result of decisions and actions" (p. 468). Dijksterhuis and Aarts, similarly to Jenkins (2001), Rychlak (1994), and Workman et al. (2000), further asserted that *volition* is also a central organizing principle that people use to define and understand themselves (p. 468).

In addition, the subjective experience of *volition* comes about upon "awareness of one's goal-directed self-reflective 'now'" with simultaneously occurring decision-making (Fisher, 1986, p. 9). *Volition* has been defined as "the act of deciding upon and initiating a course of action. Synonym: will" (English & English, 1958, as cited in Farthing, 1992, p. 38). As Farthing further proposed, a person acting volitionally could do it either through some type of obvious behavior, or the person could pursue acting volitionally in his or her mind. Also, in order for it to be voluntary, this experience ought to be accompanied by a "conscious feeling of volition" or belief that one is acting and thinking deliberately and with personal choices in mind, in other words, taking into consideration possible options (Farthing, 1992, p. 38).

Furthermore, Farthing delineated that acting volitionally with choices in mind (regarding *"what to do, when to do it, or both"*) is accompanied by a "feeling that it could have been otherwise" (p. 38). As Farthing suggested, for inclusion of a *feeling of volition* into elements of consciousness, the person acts intentionally or volitionally and is "consciously aware of the decision to act before the action is initiated." Thus, at a minimum, to act volitionally means "to be aware of a decision and able to report it" (p. 39).

Farthing's (1992) propositions about volition in terms of the awareness of making mental decisions and/or acting voluntarily upon the world (in terms of objects, people, situations, circumstances, problems, etc.) include also using one's own body either in the mental act of imagination (Nielsen, 2011) by itself or in an interaction in the real-world contexts. An additional aspect of acting volitionally means communicating to one's self or others in time and space as initiation, complement, or accomplishment of intended behavior or action. At the same time, voluntary actions and behaviors, whether mental or in the real world, ought to be accompanied or concluded by feelings of alternatives (Farthing, 1992).

Theorists have further asserted that when the act of *volition* is in use during awake time, with support from the frontal lobes (dorsolateral prefrontal cortex, [DLPFC]; during waking, the thought processes of planning and decision making physiologically are believed to occupy the dorsolateral prefrontal cortex and medial parietal regions; Cabezza & Nyberg, 2000; Corbetta & Shulman, 2002; these regions are considered deactivated in REM sleep, Hobson et al., 2000), an awake individual with intact executive ego has "the ability to plan and coordinate *willful* (for emphasis, italicized by the present author) action in the face of alternatives, to monitor and update action as necessary and to suppress distracting material by focusing attention to the task at hand" (Jones & Harrison, 2001, p. 464). Thus, the use of higher order cognition processes of executive ego capacities sustains individuals in their involvement in volitional control and subsequent volitional actions toward future goal states (Killgore, 2010).

Taken together, as Killgore (2010) detailed, for executive processes to be accompanied by volition requires a "complex integration of information" and includes "coordinated interaction of cortical and subcortical networks within the brain"; these operations are held together and supported by the prefrontal cortex (p. 119). In terms of psychological and intellectual functioning, using *voluntarily* the abovementioned collection of executive capacities is considered by some authors as a quintessence of well-being (e.g., Workman et al., 2000).

Background, Rationale, and Research Questions

For the exploratory qualitative work about volition as one of the executive ego capacities with assumed range occurring in non-lucid problem-solving dreams, the researcher followed Fosse and Domhoff's (2007) claim that dream science is in the state of "noteworthy absence of contributions from core processes of executive thought" (p. 50). In addition, Hobson (2009a) asserted that *volition* as an experience and function in non-lucid dreaming belongs to types of mental phenomena that are not yet operationalized even though there is nothing "more crucial or central to our interests" and that "no attention has yet been paid to those crucial functions by scientists interested in consciousness" (p. 80).

The previous appeal for operationalization of volition (Hobson, 2009a) already came to an initial fruition: Kozmová's (2012) research of executive skills in existence during non-lucid problem-solving dreaming established that the eight distinct higher order processes of executive ego are initiated and accompanied by volition. The present author aimed to expand the knowledge about cognitive and intellectual aspects of volition by additional assumed volitional mental acts while taking into consideration Maquet et al.'s (2005) re-evaluation of human sleep.

Regarding executive processes occurring during nightly sleep, Maquet et al. (2005) asserted that volitional motor actions (illustrated earlier in this article) are examples of executive skills:

> Executive processes coordinate external information, thoughts, and emotions and organize actions in relation to internal goals. The [person's] selection of motor actions may directly rely on external stimuli, but in other cases it is based on the perceptual context or whole temporal episode during which the individual is acting. (p. 221)

Thus, when considering awareness of internal *goal cues* (Klinger, 2013, p. 1) in the landscape of endogenous random or self-created perceptual dream contexts, the non-lucid dreamer might find cues for volitionally attaining goals in various situations that require problem-solving upon encountering overt or covert problems. Based upon Maquet et al.'s (2005) assertion of executive skills including "selection of motor actions" (p. 221), it seemed reasonable to focus purposefully on two additional aspects of volition: (a) mental motile behaviors and actions strategies; and (b) as indicated earlier by Purcell et al. (1993) in their intention-volition scale, dreamers' communications as verbally expressed behaviors both in the service of problem-solving. For this reason, with the larger goal of investigating whether volition as mental capacity could be sustained (df. Hervey de Saint Denys, 1867/1977, as cited in Schwartz, 2000, p. 56) in non-lucid problem-solving dreams, the goal of the present study was to capture hypothesized kinetic (mental physical motion or motile action) and *communicative* (expressiveness in a form of verbal speech) properties of volition that dreamers might use for their problem-solving efforts in the pursuit of the solutions or satisfaction of curiosity.

The rationale for mapping out problem-solving volitional *kinetic* and *communicative* actions and behaviors is supported by the following theories and investigations: Dreams with physical movement are considered "typical" (Freud, 1900/1966, p. 241), and physical motion is "employed whenever is needed" (p. 237). Dream motion, as part of dreamers' psychology, is a salient pervasive experiential feature (Porte & Hobson, 1996). For example, in Hall's (1951) study of 10,000 dreams, the dreamers performed actions "as a change in bodily position" (p. 62) in 34% of them. In Snyder's (1970) study, in close to one third of 635 REM sleep laboratory dream reports, dreamers performed "active exertions" (p. 144). Strauch and Meier (1996) mentioned that in just one dream 16 motor activities and movements occurred (p. 41). Fosse, Stickgold, and Hobson (2004) considered "sensations in any sensorimotor modality," including "kinesthetic sensations . . . realistic, akin to perceptions" (p. 299), a dominant part of dreamers' experiences. Recently, Kahan and LaBerge (2011) investigated, through a phenom-

enological lens, dreamers' own behaviors in dreams as an ongoing cognitive activity, and Kahan and Claudatos (2016), in their extended study of the phenomenological features of dreams, listed self-movement as one of the sensory and structural categories of dreams (pp. 167-168). In addition, the motility as a possible part of dreamers' problem-solving repertoires has not yet been investigated in dream science.

Furthermore, focusing on communication as an expression of volition within executive skills during dreamers' problem-solving efforts is warranted by the following notions: The interactions in dreams include "verbal as well as motor activities" (Strauch & Meier, 1996, p. 118), and speech is deemed as "the principal means of social interaction in dreams" (Meier, 1993, p. 67). In dreams, speech, as one of the higher order cognitive skills, is considered "productive cognitive activity" (Kilroe, 2016, p. 13) and a "motor breakthrough" (Wolchover, 2012, para. 3). In addition, Hobson (2009a) proposed that "dream speech is in need of much more careful study" (p. 18); Kilroe (2016) echoed this sentiment by highlighting that speech is an "understudied area of dream research" (p. 14). Moreover, it is also not yet known whether dreamers even use speech—as an action or behavior—for problem-solving.

At the same time, more complex characterization (based in data of narratives) of *volition* as a psychological feature and part of mental life phenomena (Hobson, Pace-Schott, & Stickgold, 2003) in waking and non-lucid dreaming states of consciousness that either initiates or accompanies problem-solving goal-oriented subjective experiences of conscious states is so far missing from the science of consciousness.

The present author hypothesized that volition, based on anecdotal examples and research that previously identified it as accompanying executive thought processes in non-lucid dreaming (Kozmová, 2012; Wolman & Kozmová, 2007) could subsist in additional varieties "considerably during sleep" (df. Hervey de Saint Denys, 1867/1977, as cited in Schwartz, 2000, p. 56). For this reason, the investigator assumed that volition could be researched and described. Also, in the view of Hobson et al. (2003) suggestion, its characterization in its initial cross-state form as one of "psychological features" (p. 221) could be initiated. With appealing to "more detailed attention to phenomenology" (Hobson, 2009b, p. 812), the "emergent theory" (Henwood & Pidgeon, 2003, p. 136) of expanded concept of volition could be offered

Additionally, the investigated phenomena (including dreaming phenomena; Kozmová, 2015) occur in contexts (Charmaz, 2008; for the exception of experiencing developmentally based static images without contexts, see Domhoff, 2003). For this reason, the part of the research of volition needed to focus on delineating contexts in which individual dreamers use it to problem-solve with an overt or covert goal in mind. Then, the range of volitional motoric and communicative expressions dreamers used during problem-solving could be explicated.

In summary, the current research focuses on studying the landscape of endogenous random- or self-created dreaming contexts within which individual dreamers are behaving, acting, and communicating when encountering challenges or curiosities while volitionally making "attempts for resolution of dilemmas within immediacy of their dreams" (Kozmová, 2012, p. 51). The study constitutes a smaller part of the previous larger exploratory research that has been guided by the question, "What is the scope of cognitive problem-solving strategies that dreamers are capable of employing for resolving situations encountered during dreaming?" (Kozmová, 2008, p. ii). From this research emerged a complex description of the *phenomenon of nocturnal cognitive problem-solving strategies* (Kozmová, 2008) with several core variables (Kozmová, 2012, 2015), and volition in the form of behaviors and actions is understood as a core variable of direct problem-solving modality (Kozmová, 2008).

To reiterate, in the framework of non-lucid problem-solving dreams occurring in the dreaming minds, *volition* as part of executive processes is not yet fully understood in theory, nor has it been sufficiently investigated by research and subsequently offered in initial cross-state characterization. As I explained previously (Kozmová, 2008, p. 35), on the most rudimentary level, the dreaming brain and the dreaming mind could be distinguished in terms of the subjective experience during sleep. The brain as an organ regulates the need for sleep and could be considered an inherent instigator of involuntary existing sleep stages, which are not consciously regulated by individuals (Monaco & Cavanna, 2007). The dreaming mind, on the other hand, could be defined in terms of mental activities or "sum-total of mental operations" (Goldberg, 1980, p. 7) active during dreaming that contribute to the rise of subjective experiences in dreams. The contribution of the study rests in offering findings about dreamers' contexts which serve for deliberate (volitional) actions and behaviors in problem-solving dreams (Kozmová, 2008). This extended research of dreamers' volitional cognitive kinetic and communicative behaviors and actions has not yet been disseminated through article publication.

The present exploratory study with its focus on dreamers' use of volition was guided by the following research questions: "In which contexts are some non-lucid dreamers able to use their motile and communicative volitional capacities"? and "What types of non-lucid dreamers' behaviors and actions (in a variety of discernible strategies) demonstrate dreamers' capacities for using cognitive kinetic and communicative volition in non-lucid problem-solving dreams?"

2. Method and Materials

2.1. Assumptions and Operational Definitions

Assumptions. Explications of assumptions and philosophical foundations that guide particular research generally assist in reducing investigative biases in the use of methods and discussion of results (Gantt & Melling, 2009). Several suppositions disclosed below informed the present study:

1. The collection of archival dreams used in the current research consists of dreams recalled spontaneously at home without any preceding arrangements with dreamers. The dreams are deemed to be from the latter Rapid Eye Movement (REM) sleep period, which is, with its physiological arousals and psychological and emotional activities, the closest to the waking state of consciousness (Strauch & Meier, 1996). Thus, upon awakening, without any external prompts, dreamers have the nearest direct recollecting access to their REM-sleep subjective experiences (p. 60).
2. Dream reports are deemed to be a legitimate source of subjective data appropriate for scientific inquiries conducted by systematic investigations (Domhoff, 2003; see also dream science works in three volumes edited by Barrett & McNamara, 2007).

3. Dream narratives as the "first-person accounts of subjective experiences" contain data about "psychological features" of the person's mind; this information about dreamers' mental lives can be characterized and categorized (Hobson et al., 2003, p. 231).
4. The investigations of phenomena are irreducibly linked to contexts in which these are occurring (Charmaz, 2008) including mental phenomena related to the dreaming life and occurring in dreaming life (Kozmová, 2015).
5. Non-lucid dreamers retain parts of their working memory and have some access to memories acquired during waking life. For example, dreamers notice dream environments and remember their skills and abilities including skill of labeling experienced feelings, using thinking and knowing, and specifying their subjective preferences including personal values. These particulars might also serve as vantage points for dreamers making choices during non-lucid dreams (e.g., Kozmová & Wolman, 2006; Wolman & Kozmová, 2007).
6. During sleeping and dreaming, dreamers are immersed in their dream worlds and are, for the most part, disengaged from sensory contact with individuals or other external realities that could be helpful in problem-solving. The dreamers are problem-solving on their own and are using their individual mental abilities to handle the situations that arise (Kozmová, 2012).
7. Even though in some dreams the characters could become actively engaged in helping dreamers resolve difficult situations, preventing them to solve, or actually making situations worse for the individual dreamers (Kozmová, 2008, 2017), the focus of the present study is on dreamers' own motile and communicative volitional faculties and capacities. The characters' doings (behaviors and actions) as part of the internal idiosyncratic dynamics of the dreamer's nocturnal life, are excluded from the present study.
8. The dreams of dreamers from the same culture could elucidate some contexts and volitional strategizing that comprise problem-solving. The dreams of many different dreamers from several different cultures would allow for a creation of a composite, richer picture (initial cross-state characterization) of the problem-solving contexts, dreamers' attempts, and use of volitional capacities.

Operationalized definitions. For the current study, the author developed and advanced several definitions designated for research with dreams.

Consciousness. The present author defined the concept of consciousness based on several suitable sources (Farthing, 1992; Kozmová, 2008; Kozmová & Wolman, 2006; Purves et al., 2008; W. James, 1890) as subjective awareness of oneself as an experient, actor (also includes the role of participant; Kozmová & Wolman, 2006), observer, and thinker distinct from other experients, actors, observers, and thinkers regardless and including of recognition and acknowledgment of separateness between waking, dreaming, or altered states—which could be momentary or longer than a few minutes—of conscious existence. Consciousness further includes noticing and awareness of sensations, perceptions, emotions, thoughts, and memories registered in the primary and in reflective mode of experiencing. The term reflective has been defined by the present author as a concept that belongs to identifiable rational or secondary thought processes that exist within higher order skills in non-lucid dreaming (e. g., Wolman & Kozmová, 2007; see also Kahan, 1994). Consciousness denotes an ability to recall and describe internal experiences. These recalled descriptions (offered orally to self or others or shared in a written or pictorial form) could include non-salient, salient, and surprising elements of subjective experience which may remain experienced, stored in memory, developed further in imagination, or could be volitionally acted upon—internally or externally—by internal or external prompts to action. (Kozmová, 2012, p. 51)

Dream. Pagel et al. (2001) documented that groups of authors working in various disciplines define the concept of dream differently. Based upon previous research, for the present study the author delineated the dream as

> a subjective experience that occurred during sleep. When awake, the experient spontaneously recalled it, and described it, to oneself in an oral or in a written form, in a story-like fashion. In this narrative, which could closely follow one segment or several sequential scenes of the dream, the awake dreamer might depict some or all of the following features of subjective experience that occurred while being in the role of a dreamer: The images seen, the action performed or participated in, the solitary or shared engagements, the situations observed, the perceptions noticed, feelings felt, and thoughts thought. (Kozmová, 2012, pp. 52-53)

Because dreams can be divided into many different types, and not in every dream the dreamer might participate in a problem-solving way in the ensuing situation, it seemed practical to separate dreams into two different categories: (a) narratives of descriptive dreams that contain "the descriptions of scenery, the situations, the actions of the dreamer or other characters, and his or her observations or experiences within that dream" (Kozmová, 2008, p. 72); and (b) narratives of *problem-solving dreams* in which an independent reader would be able to discern that the dreamer was propelled or prompted to make an active choice in the presence of a situation or event, one which he or she might have recognized, defined, or identified, and explicitly described within the dream. Alternatively, in the report it could be observable that during the dream the dreamer might have implicitly hinted at and not describe, yet acted upon, some precipitating event. The "precipitating event" is not always stated in a dream report. Knowledge of this fact is the result of a pilot study conducted prior to the current research: The dreamers sometimes only indicate or implicitly hint about the problems they are solving (Kozmová, 2007). The discernible active choices as responses to internally generated, perceived, and later described situations or images could be visible and construed as reactions to an emotionally realistic immediacy of the dream or to some other unidentifiable cause. The overt or covert events, to which dreamers reacted, could be characterized by an independent reader as realistic or imagined vicissitudes of life in general (e.g., ambiguities, puzzlements, distresses, dilemmas, conflicts, concerns, difficulties, worries, threats, or dangers). (Kozmová, 2008, pp. 72-73)

The examples of descriptive and problem-solving dreams with covertly and overtly stated problems can be seen in Table 1.

Non-lucid dreaming. In a non-lucid dreaming state of consciousness, dreamers periodically live in and are immersed in "a convincing simulation of waking reality experience" (Nielsen, 2011, p. 596). In this state, the dreamers are "captured and held" within the context of immediate

non-lucid dream situations: Dreamers remain without direct connection to their known waking world, and their critical capacity to reflect upon the waking world existing outside of dreaming is, for the most part, not available (Rechtschaffen, 1978). In this position, they are singularly engaging their own internal capacities that come to life in this altered state of consciousness.

Problem-solving. The mental activity of problem-solving was operationalized as a process that encompasses individual dreamers' distinctive ways of strategizing efforts, including "attempts for resolution of dilemmas within immediacy of their dreams" (Kozmová, 2012, p. 51).

Kinetic (motile) activities. Fisher (1986) understood consciousness as "intentional, goal-directed movements" and as "a domain of internalized motion" with mental activities compared to "muscular acts" (Fisher, 1986, p. 3). For the author, consciousness involves accord between having information ("what") and using it ("how," Konorski, 1962) which implies movement. In non-lucid dreams, motile behavior has been termed "fictive movement" (Porte & Hobson, 1986) and "kinesthetic fantasy" (Nielsen, 1993). In the present study, in the mental environment of dream that simulates waking life (Nielsen, 2011), all conscious motile movements of the dreamers' bodies or their parts—self-movements— in dream space are conceptualized as a dreamer's own cognitive activity (Kahan & LaBerge, 2011).

Communicative activities. As a speech, for the present study, the author considered mental activity of the individual dreamer (not the other characters in the dream) that involved articulating words. This verbal expressiveness of ideas, feelings, comments, or asking questions could be "directed at no one in particular" (Kilroe, 2016, p. 142); to oneself; or to other characters in dreams in order to solve problems or satisfy curiosity.

Volition. The present author tentatively as occurring when dreamer in the immediacy of a situations is "pursuing a self-selected goal" (Kozmová, 2012, p. 58).

2.2. Participants and Procedure

As I previously described the sample of participants (Kozmová, 2012, 2015), the current research consisted of using 1,298 archival dreams. The dream narratives were gathered retrospectively during the years 1990 to 2004 from 100 males and 100 females who self-selected a dream and participated in dream seminars conducted in six different countries (Argentina, Brazil, England, Japan, and two republics of the former Soviet Union—Russia and Ukraine). In addition, in the United States, each of 32 women and 66 men donated one self-selected dream; this specific dream collection remained incomplete due to permanent loss through computer failure.

While participating in dream seminars, all dream workers were protected under the approval of the Saybrook Institutional Review Board (SIRB). For the concision of the sample size of each group (N = 100), some friends and relatives of participants each contributed one dream.

The participants, ages 20 to 70 years, with a few younger or older exceptions (median age was about 40 years), were from middle- and upper-middle-class socioeconomic groups; they came with motivation to learn more about themselves through working with their self-selected dreams. Later, the donated dreams were professionally translated into English, and some groups of those were used for quantitative content analyses (e.g., Krippner, Winker, Rochler, & Yashar, 1998; Krippner & Weinhold, 2001).

As described earlier (Kozmová, 2012, 2015), 10 lucid dreams were not part of the current research. From the remaining 1,288 cross-cultural non-lucid dreams, with the operationalized definition of a problem-solving dream, 979 (67%) dreams, as a working sample, were selected for primary analysis. The national origin of problem-solving dreams is as follows: Argentina (M = 76, F = 71); Brazil (M = 69, F = 72); England (M = 74, F = 66); Japan (M = 81, F = 77); Russia (M = 75, F = 75); Ukraine (M = 90; F = 78); the United States (M = 25; F = 50).

Primary analysis led to the emergence of the complex multilayered description of the nocturnal cognitive problem-solving phenomenon with direct, self-monitoring, and indirect modalities (Kozmová, 2008). The secondary analysis of volitional executive processes is already published (Kozmová, 2012); the contexts (Charmaz, 2008) and volitional kinetic and communicative problem-solving efforts needed for categorization based on collection of individual saturated instances (Glaser & Strauss, 1967) consisted of using 54 exemplary dreams in which dreamers, as a strategy, used at least one type of action and behavior within the context of a covert or overt problem or a feeling of curiosity (Kozmová, 2008). These dreams than collectively represent a variety or range of individual instances of the non-lucid dreamers' *volitional kinetic* and *communicative* activities and behaviors.

Table 1. Examples of Descriptive and Problem-Solving Dreams

Type of Dream, Gender, Country, Year	Dream Narrative
Descriptive dream, male, England, 1996	*I am in an old historic building, in the only room that had been preserved with its original décor. The walls had an intricate raised pattern, which I ran my hand over, feeling the relief with my fingertips. The pattern was a light reddish-brown on an off-white background.*
Problem-solving dream, female, Ukraine, 1995	*All that happens is very simple. My task is to keep a very small thing, somewhat like a needle, in my hands and not let it fall down or out of my hands. As I am trying to do this, very big things are falling down on me from above as if to interfere with my task. I try to get away from them. All these events make me feel very bad.*
Problem-solving dream, implicitly (overtly) stated problem, male, Argentina, 1992	*A woman puts a finger into my watch bracelet. Immediately, I start to beat her. Nobody can stop me.*
Problem-solving dream, explicitly (overtly) stated problem, female, USA, 1996	*I was putting on my makeup. My mother took it away from me. She also took away my jewelry and the other things I used to make myself beautiful. I could not get them back, and I was very sad.*

Previously, the *volition* noticeably represented by dreamers' use of their mental faculties during sleep became one of the six core variables of the nocturnal cognitive problem-solving phenomenon; the partial and complete description of the emerged phenomenon is not part of the current research and is presented elsewhere (Kozmová, 2008, 2012, 2015). Because the phenomenon is a multilayered characterization of conscious activities, the categorized individual processes that represent dreamers' active use of mental capacities might overlap.

2.3. Grounded Theory Method

As I described elsewhere (Kozmová, 2012, 2015), the selected grounded theory method considers contexts with which phenomena are linked (Charmaz, 2008). From data observed in the contexts, the often intuitive and "theoretically sensitive" researcher (Glaser, 1978) generates a description of the investigation's object—the phenomenon under consideration also known as *core variable* (Glaser & Strauss, 1967, p. 46). As Glaser (1992) asserted, the variable could be found in the narratives of individuals' responses, habits, actions, behaviors, reactions, or experiences within contexts and environment. To define the variable, the researcher uses questions explicitly designed for specific research. The questions are applied with intention to specify sameness, similarities, and contrasts of individual occurrences of the phenomenon. The goal of this method is to form, from narratives, abstract concepts of a phenomenon by delineating and capturing its emerging elements to create the phenomenon's structure (Suddaby, 2006). At the same time, the researcher develops, from data analysis, an emerging theory by coding categories and their dimensions, modalities, properties, processes, and other distinctive markers (including outliers type), often described in " in vivo language" (in the language of participants) and documented in memos.

According to Glaser (1992) and Henwood and Pidgeon (2003), the main objective of this research segment is to attain saturation of the phenomenon's elements that create its structure. Saturation is completed upon finding in sampling and analysis quantity and sameness but no new variety. With accomplished saturation of categories and developed complex description of the phenomenon, the researcher is ready to posit a substantive theory (Glaser & Straus, 1967; Kozmová, 2015). In this phase, with disclosure of theoretical assumptions and detachment from favored hypotheses, the researcher might decrease his or her own preconceived notions and biases (Henwood & Pidgeon, 2003) in order to capture emergent theory.

At the beginning of research of a phenomenon, the investigator might first focus on an exploratory or an *a posteriori* approach while using inductive and inferential reasoning. The conclusions that the individual researchers arrive at with observed and already analyzed facts then could inform *a priori* (deducted from data-based propositions) formulation of hypotheses that could also include previously published findings or theories. The new findings are then possible to quantify by using experimental designs with logico-deductive (Glaser & Strauss, 1967) or with hypothetico-deductive (Willig, 2001) approaches.

The exploratory nature of work with the method of constant comparative analysis between instances of phenomena leaves out validity of constructs; focus on a narrow sample (e.g., particular demographics); or comparisons between homogeneous samples and the control groups (e.g., Cozby, 1997). One of the developers of the method, Glaser (1992), solidified the flexible work with the method by explaining that the research starts with analyzing and comparing anywhere within a limited or open sample. The analyzing work continues until the point of saturation (no novel variants are found, only increasing amount of repetitiveness in investigated elements, modalities, processes, etc., are occurring). Thus, using the method promotes data-focused instead of hypothesis-focused research (the latter might follow after the phenomenon is described).

As I explicated elsewhere the detailed description of grounded theory method and exactly how to work with it within analysis of emotional component (core variable) of problem-solving dreams in mind (Kozmová, 2015), the present research continued to be qualitative by analysis of dream narratives. It was also subjective (by acknowledging the author's prior knowledge that included testing grounded method theory in a pilot study, Kozmová, 2007). In addition, it clarified the author's specific theoretical preconceptions, notions, and knowledge (e.g., their explications could be found in "Introduction," and "Assumptions and Operationalized Definitions").

As I further explained (Kozmová, 2015), while investigating the invisible yet intuited phenomenon that occurs in the minds of sleeping individuals, the present researcher worked in agreement with the principles of grounded method theory (Glaser, 1992; Henwood & Pidgeon, 2003, see Appendix A). The investigator carried out, by working with diversity of data (Charmaz, 2008) the actual analytical comparative work by reliance on her own mental faculties, intellect, psychology of being, emotional maturity, and rigorousness of scientific approach—all used in the service of categorizing and offering an initial cross-state characterization of kinetic and communicative aspects of volition found in non-lucid problem-solving dreams.

The authors who previously have researched dream narratives using limited or complete tenets of grounded theory include English (2002); Gilbert (2004); Hill (1998); Kozmová (2007, 2008, 2012, 2015); Matheny (2001); and Sungy (2001). In addition, Glaser's (1993) collection of research demonstrated that the method has been successfully applied in the social sciences, nursing, and medicine. The current research of problem-solving non-lucid dreams analyzed by the grounded theory method constitutes an original contribution by defining the contexts and characterizing the volitional executive kinetic and communicative abilities within the dreamers' problem-solving efforts.

Brief Description of Working with the Method of Grounded Theory

A complete description of working with first-person accounts and the grounded theory method was offered in a previous article by Kozmová (2015). For the purposes of the present study, the investigator first focused on the following aspects of method of grounded theory as explicated by Henwood and Pidgeon (2003): (a) "to capture the detail, variation, and complexity of the basic qualitative material" and (b) "constantly comparing data instances, case, and categories for conceptual similarities and differences (the method of constant comparison)" (p. 131) With the method, the researcher focused on two goals: The first goal was to find contexts in which non-lucid dreamers use kinetic and

Table 2. Contexts and Types of Volitional Actions and Behaviors Dreamers Use for Problem-Solving During Threats and Losses Prompting to Self-Preservation Efforts or Struggles

Contexts and Types of Volitional Action or Behavior (Kinetic and Communicative Cognitive Strategies; Evaluative Thought)	Examples
A. Threat to dreamer's life	
By environment	
Using one's own body for escape from place of harm	*Then I come to know that the house caught fire because of the salute. My sister and I jump out the window, and run away with mom and my boyfriend to survive.*
Using one's own body for compliance by lying down	*I see an application for a vaccine against AIDS. It is not the conventional form of vaccine. You have to fill it out while lying down. So I lie down to get the „outside sustenance" that the vaccine promises.*
Using one's own voice for communication in a form of asking and shouting; evaluative thought	*I am on a small airplane being flown by my friend. It is a damaged airplane. We go, without secure conditions. We begin to make turns and somersaults, and he keeps flying faster without my assent. I ask my friend to stop. I shout. The situation is desperate.*
By characaters-people	
Using hands with weapon for self-defense	*There is a very malevolent man there, a fakir from India. He looks into my eyes and explains his intention. He wants to harm me in some way. I find a sword and I cut off his head.*
Using one's own voice for directing other characters toward rescue efforts	*I undergo an operation. The surgeon is a man, dressed in black, but not like a doctor. He says, „We will lay her open to the bone and extract what is needless." He cuts my arm below the elbow from the external side, but there is no blood there. The blood starts spurting from the back of the hand. I shout: "Let's go to the hospital, then! Let them sew me up and repair me!"*
Using one's own body to protect valuable object	*While they are punching me in the groin, I am protecting my automobile against the aggression.*
By birds and animals	
Using one's own body to hide and using speech to save oneself	*My family and I are in a cabin with a family friend. The five of us, my mother, my father, my sister, and a gay male friend who works with my father are sitting in the living room. It has large picture windows on the opposite wall. An eagle crashes through the window. I hide under a chair. The bird moves the chair, picks me up, and takes me with it. I explain that my father will not allow me to fly.*
Escaping by running and jumping; evaluative thought	*I am being pursued by a snake. It moves as if flying on the air. I feel anxious. I escape. I meet my friend and sit in his car. The snake keeps pursuing us. I jump out of the car and see the snake's head falling off its body. I feel frightened. My heart beats heavily.*
Finding object (presumably by using one's body to get to it)	*Then I see a lion. I am filled with fear. But I find an enormous watch, and this diverts the lion. Then the lion becomes calm.*
By entities	
Using hands with weapon for retaliation and using legs to run away	*Then I saw darts in the dragon's paws. The dragon threw darts at me but missed. In response, I mortally wounded the dragon with my sword and galloped away.*
In potential loss of self, using voice to call upon higher entity for help; evaluative thought	*I dream of seeing the devil. I am frightened so I call upon my angel. My lips are dry. I am alone but I know my angel will protect me. There is nothing else that I can do.*
Running to save oneself; evaluative thought	*A white, floating thing is chasing me. I'm running away with a friend who is a boy. Still it chases me. Soon I see the gate of my house. I am the only one who could go in the gate because it is my house. I run inside. I'm saved, but my friend is still running away. I am full of guilt feelings that I didn't let him in my house.*

Table 2 to be continued

communicative volition. The second goal was to collect examples that would create a typology (range) of dreamers' cognitive kinetic and communicative behaviors and actions (strategies) that would demonstrate that in specific problem-solving situations the mental faculty of *volition* (in addition to is cognitive variety [Kozmová, 2012]) , might subsist during sleep (Hervey de Saint Denys, 1987/1977) and can be characterized (Hobson et al., 2003) at least in its initial cross-state understanding. Based upon the results of both objectives, the author was then lead to posit substantive grounded theory—characterization of volition—within the problem-solving phenomenon (Kozmová, 2008) that includes its cross-state actualization. To extend the emergent theory (Henwood & Pidgeon, 2003) based on data of dream narratives with the goal of characterization of volition in its range (in addition to its previously explicated cognitive va-

Table 2. Contexts and Types of Volitional Actions and Behaviors Dreamers Use for Problem-Solving During Threats and Losses Prompting to Self-Preservation Efforts or Struggles (continued)

Contexts and Types of Volitional Action or Behavior (Kinetic and Communicative Cognitive Strategies; Evaluative Thought)	Examples
B. Threat to bodily integrity	
Experience of finding damaged part of body-skin	
Using one's eyes and body (walking) for confirmation of body integrity	*I was sitting on the edge of a lake and suddenly saw, in the reflection of the water, my head with spots on my face. I did not get frightened but tried to see myself again to be sure it was my face reflecting in the clean water of the lake. I went inside the water to observe myself, as if I was the reflection in the water that I had been seeing. When I did this, the spots on my face were no longer there.*
C. Threat to psychological integrity, equilibrium, self-esteem, or loss of external support	
Absence of communicatin skills	
Finding a novel solution by using hands to move objects	*I am sitting in a room with my husband. Because I have lost my power of speech, he has to guess what my thoughts are. It is a frustrating and time-consuming task. Eventually he gives up and I am left trying to make a conversation using "Scrabble" game letter pieces.*
Unreasonable demands and intrusions by characters and enteties	
Refusing (most likely vocally)	*The man in black appears again. This time he demands my soul be sold to him. I refuse to do that. The man's head vanishes.*
Resisting and refusing (most likely vocally and kinetically)	*I was incorporating entities. I was resisting them, but they entered me anyway. One female entity wanted very much to enter me, but I was firm and refused to let her do it.*
Loss of power animal-loss of internal/ external support	
Involving others by screaming for help	*I dreamed about a large jungle cat, apparently a jaguar. It has a very human face. It is my power animal. It is being crushed by a huge python snake. The snake is a positive earth energy symbol. I am very upset and I scream „Help! This is terrifying! I am horrified! Help!"*
Experiencing loss of identity	
Using screaming to reaffirm one's religious identity	*I volunteer next. But she hands me a bottle of red wine, not tubes. I spin the bottle on my head until there are 20 glasses of red wine on my head. Then the wine spills over my body. There is silence in the room. Then I scream. I realize that the red wine is Christ's blood, but I am a Jew. I scream „I am a Jewess!"*
Encountering unsupportive environment at work and school	
Speaking to non-collaborative environment and subsequent loss of memory and hope, followed by resignation—evaluative thought	*At my work place, where I do hard work, things do not seem to be going like they are supposed to go. The lectures that I usually give off the top of my head at the training sessions are difficult. I have a loss of memory and become unable to give the lectures. The participants do not follow my instructions, and my assistants do not do what I tell them. Everything I do is in vain.*
Upon experiencing loss and loneliness, using self-destructive behavior (cutting) and walking to place to die; evaluative thought	*Suddenly, I am at college, carrying a huge folio of art. I am with a classmate. She is a year below me. I am on my own, not knowing what class I am supposed to be in because I have lost my timetable. I feel lost and lonely, so I cut my wrists. I am sitting on a wall. I want people to see me, to understand my pain. But the cuts are only scratches and so nobody takes notice. I decide to look for someplace to die. I go to the toilets, but I feel that I don't want to die there because I might not be found. I realize that I want to be found before I die. Suddenly, the blood starts gushing from my wounds.*

riety; Kozmová, 2012), the present author used "sampling new data and case on theoretical grounds" (adding previous theoretical knowledge to the results of current data analysis; Henwood & Pidgeon, 2003, p. 136). To accomplish these phases of research, the investigator became immersed in three concurrently running parts of research: (a) selection of problem-solving dreams; (b) systematic in-depth analysis of data; and (c) concurrent memo-writing (Glaser, 1978, 1992). For illustrative purposes of working with grounded theory method, the chosen dreams can be found in Tables 2-4.

Selection of problem-solving dreams. Previously, the present author described the multilayered nocturnal cognitive problem-solving phenomenon for which, with the operationalized definition of a problem-solving dream, the researcher selected from 1,288 cross-cultural non-lucid dreams 979 problem-solving dreams available for the pri-

mary analysis (Kozmová, 2008, 2012, 2015). The analysis resulted in 54 working sample dreams (with saturated deliberate action and behavioral elements) that created the third direct modality of the phenomenon (the first two are represented by dreamers' use of executive skills and emotions for problem-solving). The group of 54 dreams was then used by the researcher for secondary analysis of contexts in which dreamers use motile and communicative means to problem-solve. The researcher goal was then to arrive at initial cross-state emergent characterization of volition.

Immersion in the investigated contexts of volition. With the first research question in mind, "In which contexts are some non-lucid dreamers able to use their motile and communicative volitional capacities"?, the researcher intended, by constant comparative analysis of problem-solving instances, "to capture, by coding, the detail, variation, and complexity of the basic qualitative material" (Henwood & Pidgeon, 2003, p. 136). Then, the investigator used, for solidifying the contexts, the analyzing question, "Why is this dreamer problem-solving?" by applying methodical focus and comparing instances of problem-solving. For an illustration of this process, in the following segment of a longer dream (Table 2, example 1) it became obvious that the dreamer experienced a threat to her own life: *Then I come to know that the house caught fire because of the salute.* The researcher named these contextual reasons for a dreamer being engaged in dealing with this type of situation "threat to life" and "self-preservation."

Additional analyzing questions for finding a variety of contexts were, "What kind of internal or external situation is the dreamer facing?" and "In what kind of difficulty or problem did the dreamer find himself or herself in?" As an illustration, in Table 4, example 4, the dreamer faces her own moral dilemma: *My cousin is in the middle of a river. It looks as if she is drowning.* And by using the contextual question, "Who or what is present in an individual dreamer's problematic or curiosity-evoking situation?" the researcher discovered that the dreamer could be alone (Table 3, example 4) with his own curiosity-provoking situation regarding how to accomplish a personal task: *I'm in Australia, surrounded by green vegetation. I'm about to paint a white wall the color I want it to be.* In Table 4, example 2, the dreamer is with other characters: *. . . but that girl swam surprisingly well. But suddenly she began to sink, and a lot of people gathered around the pool. . . .*

Concurrent memo-writing. In memos, the researcher made notes of what types of concrete situations (in vivo approach) could serve for terming the contexts depending on where the problem is located, what type of problem the dreamer is grappling with, or who else is present with the dreamer. In the first example, the problem presented a threat that ensued self-preservation (Table 2); the second example was interpersonal (Table 4); the third example represents personal significance (Table 3); and in the fourth example the dreamer is with other characters, which makes the situation also interpersonal (Table 4). Altogether, the researcher used the above mentioned questions to arrive at labeling persistently occurring three saturated specific types of contexts and their further distinctions.

Immersion in collecting examples (range) of strategies for categorization (typology or data for emergent grounded theory) of volitional behaviors and actions. The categorization of volitional behavioral and action-oriented strategies started with the overarching question, "What types of non lucid dreamers' cognitive kinetic and communicative behaviors and actions (strategies) demonstrate dreamers' capacities for using volition in non-lucid problem-solving dreams?" For illustrative purposes, all four previous examples demonstrating a variety of contexts also serve as illustrations for finding abstract concepts (Suddaby, 2006) for strategies that dreamers used. These strategies then served as instances of behavior- and action-based-emerged variable *volition* coming to existence within the phenomenon of nocturnal cognitive problem-solving.

The constant comparative analysis between instances in which dreamers use behaviors and actions to problem-solve started with the following questions: (a) *How does this problem-solving activity of the dreamer differ from the problem-solving activity of a different dreamer?* (b) *How does the dreamer proceed to deal with this situation?* (c) *How does the dreamer react?* (Kozmová, 2008, p. 75). For example, in illustrative dream 1, the dreamer used her own body for escape from a place of harm: *My sister and I jump out the window, and run away with mom and my boyfriend to survive.* In dream 2, the dreamer faces endangerment of life of an extended family member; she displays a lack of activity in the face of moral dilemma and is able to evaluate her own behavior and the complexity of the situation while covertly "knowing" that some type of help is needed: *I want to help her out but I have not done anything yet. My sister is standing beside me. The time to help our cousin is running out. But neither of us does anything to help our cousin.* In this case, apparent lack of behavior and its evaluation constitutes a mental behavior (decision-making while knowing it could be otherwise) of its own. In dream 3, the dreamer methodically proceeds to fulfill his goal by appropriate actions: *I have checked that house from all directions, then have prepared to re-paint it. I put two stable ladders in place, put one board in between them, and sit on it to paint.* In dream 4, the dreamer is rushing to help the character in need and to save her life: *But suddenly she began to sink, and a lot of people gathered around the pool and I rushed to save her.* As Glaser (1992) pointed out, and Suddaby (2006) emphasized as well, in this phase of research the researcher starts to draw the concepts from the raw data. In other words, the investigator forms abstract concepts of a phenomenon by delineating and capturing its emerging elements to create the phenomenon's structure. In this case, deliberate strategies (behaviors and actions) create the core variable—volition. For the work of analysis, often most suitable abstraction rests in using *in vivo* language (the language of actual experience), as it is demonstrated in dream 4 (motility in form of rushing means using one's own body to perform specific behavior).

As I explained elsewhere (Kozmová, 2015), because I analyzed narratives of directly experienced dreams, I selected to articulate dreamers' direct immediacy of subjective experiences and dreamers' mental activities within problem-solving dreams in the vivid narrative present tense. This expression captures and exemplifies the active process of the dreamer's experiences (e.g., *I saw, I did*) transposed into dreamer-centered language (e.g., *dreamers behave, act*, etc.). This type of description is in contrast to reports of results that are generally presented in the past tense (American Psychological Association, [APA], 2010, p. 78).

Table 3. Contexts and Types of Volitional Actions and Behaviors Dreamers Use for Problem-Solving with Personal Significance or Meaning

Contexts and Types of Volitional Action or Behavior (Kinetic and Communicative Cognitive Strategies; Evaluative Thought)	Examples
A. Experiencing physcial sensations	
Noticing one's own physical sensations, using behavior based on one's own physical state (hands, eyes, and legs)	*There are many college students around, walking and laughing. I feel too warm. I take my jacket off and look for an empty locker to put it in, but the locker room is full of dirty sport shirts and garbage. No empty lockers were available, so I put my jacket on my arm and start to walk away.*
B. Distrubing feelings and thoughts	
Emotion regulation by climbing and leaving; evaluative thought	*I overcome my fear and leave by the window, which is now a door, and climb without weapons downstairs, leaving the residence because there is nothing there for me.*
Calming down disturbing feelings and persistent thoughts about relationships by walking	*I walk quickly, and can't calm down and get rid of the thought, „Why did I meet them in Moscow? Why were they not together? Why are there lots of them?"*
C. Pursuit of one's own goals	
Using goal-oriented behavior (eyes, hands, legs)	*I am driving down a curvy hill in a small pickup truck. I am going over the edge and the truck is teetering. A stranger grabs the edge of the truck and balances it. I drive the truck to safety and get it to a repair station. The repairman fixes the truck and I go on my way.*
Using intentional behavior in order to reach a goal (head movement)	*I was in a kitchen area in the back, helping a couple of men and women prepare for the break time. I was eager to hear the lecture so frequently stuck my ear out the serving window.*
Using goal-oriented action following the plan (legs, hands, whole body)	*I'm in Australia, surrounded by green vegetation. I'm about to paint a white wall the color I want it to be. It's a fine day. I have checked that house from all directions, then have prepared to re-paint it. I put two stable ladders in place, put one board in between them, and sit on it to paint.*
Seeking equilibrium by action (using legs); evaluation of situation	*I run and sob, because I left my teddy bear in the house. I come back there, enter the house, and see my mom has extinguished the fire by water. The fire disappears. Everything is fine. My teddy bear sits safe and sound.*
Experiencing motile behavior, seeking friendly interaction-running to get it	*I fall through and go deep into the ocean, down, down, down, so deep. Then I pop up fast and am back on the ship. I run through the halls looking for friends to tell.*
Using hands to accomplish goal	*I'm standing outside a prison and try to open the door. It will not open and I am frustrated. I get a prying bar and open the door.*
Using hands and walking around to accomplish the goal	*I decide to plant them just where I am loosening the soil. I start doing it, but the sand in the hole crumbles, and standing sprouts of onion fall down. I begin looking for another place for planting, and go around my friend's cottage and see many houses with many stories.*
Accomplishing goal by writing and asking	*I am taking a written test in a gymnasium. Most people are seated at their desks, but I am sitting on the floor with some of the others. The first subjects are Japanese and English, both of which I know. The next subject is fractions. I want to use a rule and write the answer neatly. I ask the teacher and she says, „This time it's all right." The questions are elementary but require patience and I get confused.*
D. Experience of ambivalence upon encounting obstacles	
Removing obstacle by hands, then experiencing lack of internal control and turning impulse into destructive behavior (using hands for different purpose); evaluative thought	*It is afternoon. I arrive in my automobile at the gate of my newly built lower garage. I observe an obstruction to the entrance of the automobile and I push it with my hands. At the same time, in front of my automobile, a small truck parks. I cannot resist the impulse to push my automobile into the truck. This action shatters the side of my automobile.*

3. Results

3.1. Discovered Contexts and Volitional Kinetic and Communicative Actions and Behaviors (Range of Cognitive Strategies)

The action- and behavior-based strategies for managing or resolving situations dreamers encountered while dreaming problem-solving dreams did not ensue in a vacuum or without context. Instead, the variety of tactics applied by dreamers were directly connected within the following three differing circumstances: (a) threats to self and variety of impending losses (Table 2); (b) problematic situations with specific personal relevance in mind (Table 3); and (c) problematic interpersonal relationships with strangers, family members, or people at work (Table 4). In each of these con-

Table 4. Contexts and Types of Volitional Actions and Behaviors Dreamers Use for Problem-Solving within Interpersonal Relationships

Contexts and Types of Volitional Action or Behavior (Kinetic and Communicative Cognitive Strategies; Evaluative Thought)	Examples
A. Facing uncomfortable, disappointing, or novel situations	
Preventing possible problem by taking action-holding the person; reasoning	*Three suspicious-looking men enter. The most corpulent of them comes near us. Brian laughs at him, and I take hold of Brian so that he will not offend the fat man any further.*
Preventing possible problem by screaming; reasoning	*He has one group make sounds of the forest, and the other group sounds of a grasshopper. I start to make grasshopper sounds but he tells me to make forest sounds instead. I tell him I will make the noises I want to make.*
Exerting cooperative-diplomatic behavior - walking and speaking; evaluative thought	*I am at a party being held by a friend of mine, Brian, who has been elected president of the organization for which I also am working. I go over and congratulate him, and know that I will be more successful now that he is president of the organization.*
Influencing others by example and action by working hurriedly and using one's voice	*I am trying to finish a task in the building where I work. Many men are around me, all co-workers who I know. I have to do my job in a hurry and I hope that my example I will inspire them to do the same. I even start giving orders, "Hurry up and get the work done.*
Pursuing a goal by walking despite an objection from characters	*I am in my high school for a meeting. It says "enter here" on the door. But the exit door is blocked. The men and women there are strangers, and so I want to go. They are in my way, standing in front of the exit door, eating and drinking and talking. So I go out the entrance door. They object, but I go through it anyway.*
Pretending and bribing-using hands to give a bribe-to regain internal equilibrium	*I am trying to pretend that I am okay, but I am really overwhelmed and confused. Then I find some chocolate and pretend that it is very nice. I give it to people thinking they will not be so angry with me.*
Avoiding-escaping by running	*My husband (who I married two months ago in waking life) stands on the threshold. He has stumps instead of a right arm and a right leg. I escape in tears into the other room. And he follows me. And he keeps saying, "Well, now. There, I am such a man. Just bear it."*
Using aggressive behavior-beating; evaluative thought	*A woman puts a finger into my watch bracelet. Immediately, I start to beat her. Nobody can stop me.*
Using aggressive behavior based on interpretation resulting in punching; evaluating	*Class starts and the teacher makes an insulting comment about me. He tries to humiliate me by asking me difficult questions. I am so angry I start to punch him. I keep punching him. I have never punched anyone so hard.*
Experiencing rage, gaining relief by throwing object, beating, punching; analyzing	*When my father comes, he is smiling. But I am irritated with his looseness. I throw my traveling bag at my father. I rage against him and beat him. I punch his body for a long time. I'm scared. Why did I beat my father whom I respect?*
B. Friendly or curiosity-evoked interactions	
Satisfying curiosity-asking questions	*I was travelling to another part of the country and I saw Stanley Krippner. I asked him what he was doing there, and he said that he had the same question for me.*
Advice seeking-asking, future goal-orientation	*I asked him what to do in order to learn from my dreams and put the knowledge to use when I am awake.*
Making requests of others; evaluative and reasoning thought	*I see myself lying in a coffin on a stone stove. I stay and watch, and my corpse lies in the coffin at the same time. I turn to my relative and say, "Uncle Grisha, bury me. Some places already have run out of coffins. So how much more time can I lie here?"*
Evaluative thought; making suggestions	*My friend and I are at a technical school. It is going to be a semester of concentrated work on Ukrainian, but I write dictation badly. I joke with my friend, saying let's go and miss this work.*
Being aware of body state	*I'm watching and finding that I have picked up his rhythms.*
Internally comparing; imitating-dancing with goal of mastering	*Then I finally get to the top of the drum and I am standing on the edge, I walk across the drum and I see a tall handsome dark man—obviously one of the natives. He is naked from the waist up and he is holding a tall spear. With a nod of his head, I realize that he means for me to dance with him. A voice within me calls my name. This is not ballet. It's not modern. It's not like any dance I've ever done, so I just follow him.*

Table 4 to be continued

Table 4. Contexts and Types of Volitional Actions and Behaviors Dreamers Use for Problem-Solving within Interpersonal Relationships (continued)

Contexts and Types of Volitional Action or Behavior (Kinetic and Communicative Cognitive Strategies; Evaluative Thought)	Examples
C. Characters experiencing potential loss of life or endangerment and dreams subsequent behaviors or lack of behaviors	
Behaving altruistically-rescuing family member by using hands; evaluative and interpretative thought	*I am with my daughter in a strange woman's house. It is on two levels. My daughter is in a crib, even though she is now grown. I see a red stretch of fire out of the window. This seems to be a radioactive wall and it is coming closer to the house. I snatch my daughter from the crib but there is no place to take her. I feel that it is Armageddon, and I am terrified.*
Running to help	*It so happened that my car had caught somebody who was on the road. I ran to help the victim, and I saw the face of my mother with a stain of blood.*
Rushing to save character's life by swimming	*I am afraid of water a little bit but only in the sea; in the pool it is okay. So I decided to swim in a pool. A little girl swam besides me. In this dream I swam badly, but that girl swam surprisingly well. But suddenly she began to sink, and a lot of people gathered around the pool and I rushed to save her.*
Using hands and projecting future use of one's knowledge; interpretative thought	*I see a holy book and open it up. As I read the pages, my hands start glowing. I think I now have the power in my hands to heal my lady friend.*
Experiencing moral dilemma and ensuing lack of activity, preventing oneself from moving toward family member need	*My cousin is in the middle of a river. It looks as if she is drowning. I want to help her out but I have not done of anything yet. My sister is standing beside me. The time to help our cousin is running out. But neither of us does anything to help our cousin.*

texts, dreamers volitionally proceeded to use strategies that can be named and categorized. In this section, the author reports contexts and range of kinesthetic (motile) and communicative mental volitional acts.

3.2. Encountering Threats and Losses

Contexts. Dreamers who exhibit self-preserving volitional mental (cognitive) acts and behaviors find themselves in life-threatening or harmful circumstances initiated by environments, characters/people, birds and animals, and entities. Similarly, dreamers experience losses to bodily and psychological integrity, equilibrium, and self-esteem. They also face unreasonable demands and intrusions by both characters and entities, encounter unsupportive external environment, and become aware of feeling the loss of support.

Range of volitional strategies. In the context of one's life being threatened and when being motivated by its preservation including protecting the self and keeping bodily and psychological integrity intact, dreamers constructively use the following means for problem-solving: (a) movement of the body by running, jumping, lying down, using the hands, positioning one's body, hiding, escaping, finding things, walking, cutting, going; and (b) communication in a form of asking, shouting, directing, explaining, calling for help, refusing, resisting, screaming, and speaking. In addition to behaviors and actions, dreamers use evaluative thought.

3.3. Intrapersonal Situations

Contexts. With evoked personal meanings, dreamers find themselves in the internal (endogenous and intrinsic) problem-solving contexts of experiencing physical sensations and disturbing feelings and thoughts about others, and pursuing personally determined goals within physical, emotional, intellectual, and practical contexts. In addition, dreamers experience ambivalent states upon finding obstacles that get in the way of obtaining goals.

Range of volitional strategies. Within the contexts of internal experiences with personal significance, in constructive terms, dreamers are able to take care of themselves by relieving themselves of noticed physical sensations and distressing feelings and thoughts by using their hands and by walking. Dreamers also pursue their own goals by using their eyes, hands, and legs, head movement, emerging from water, running, walking, writing, pushing, and communicating. In negative terms, they follow the impulse and use their hands to act destructively while protecting valuable objects. They are also able to evaluate problem-solving situation.

3.4. Interpersonal Relationships

Contexts. In interpersonal relationships, regarding problem-solving circumstances, with family, strangers, friends, at training or work, dreamers contend with uncomfortable and disappointing situations; they experience friendly or curious interactions; or they notice that characters experience potential loss of life or are in other types of endangerment.

Range of volitional strategies. In their strategizing efforts, dreamers use both body movement and verbal communication as a way of preventing possible escalation of an already problematic situation. They display cooperative behavior and influence others, they assert their will, they seek advice, they make requests and offer suggestions, or

they imitate others' body behaviors When dreamers find themselves in the position of noticing that either unknown or known characters are facing potential loss of life, dreamers use their bodies to come to the rescue (by snatching, running, swimming) or, in isolated cases, dreamers are thinking of a how to use their knowledge for future benefit of others. Alternatively, a dreamer can experience a moral dilemma: She realizes what the correct course of behavior should be when the character is endangered, yet she is not using herself or prompting others to do something altruistically proactive. In this case, mental behavior of proposing what could be done otherwise and noticing the lack of one's behavior (albeit generally not valued in the real world) represents an evaluative executive skill. In addition, some dreamers use analytical, interpretative, and reasoning thought.

3.5. Inclusion of Theoretical Input into the Emergent Characterization of Volition in Problem-Solving Dreams During the Non-Lucid Dreaming State

Volition as an experience and function in non-lucid dreaming belongs to the types of mental phenomena that remain not yet explicated (Hobson, 2009a, p. 80). Thus, as a third step inherent in the description of working with the method of grounded theory, Henwood and Pidgeon (2003) suggested, after capturing the details and variations (in current study, contexts) and constant comparative analysis of instances (in current study, range of strategies), focusing on "theoretical sampling to extend the emergent theory by checking out emerging ideas, extending richness and scope" (p. 136; see Appendix A). Because the current work was guided by hypothesis that volition might "subsist" in the non-lucid dreaming state, it seemed reasonable to "sample" or integrated the data with theoretical knowledge in psychology of dreaming and waking relevant to volition. Paying attention to ideas about functionality, developmental processes, and practicality for the dreamer had the goal of formulating the initial cross-state emergent characterization of volition pertaining to its "subsistence" in the non-lucid dreaming state as an ego executive capacity with proposed implications for waking states of consciousness.

Functionality of volition. As Hobson (2009a) indicated, paying attention to the function of the mental phenomenon remains crucial for scientists (p. 80) and, by extension, for clinicians as well (e.g., Glucksman, 2007). In view of this assertion, the characterization of volition in non-lucid problem-solving dreams could start with the range of motility and communication. It could be proposed that both aspects, when utilized during problem-solving, serve the rehearsal function of one's own subjectivity: In the moments of problem-solving, when the dreamer is able to access a working knowledge of himself or herself and his or her own expectations and values, and is able to make proficient use of elements of working and autobiographical memory, the dreamer's self is in existence. This rehearsal function with access to knowledge about "personal history, characteristics, [knowledge of one's own] appearance, beliefs, needs and desires, skills, and goals" (content of "subjective" thought process, Wolman & Kozmová, 2007, p. 845) becomes paramount in contrast to experiences of losing oneself as individuals diagnosed with disorders of self (e.g., Goldberg, 1980) or diseases of loss of self (e.g., dementia, Small, Geldart, Gutman, & Clarke Scott, 1998). In this sense, the characterization of volition as a "sustained" cross-state phenomenon serves the function of experiencing oneself as a an "independent center of initiative" (Kohut & Wolf, 1978, p. 414) and "cause of . . . own behavior as a result of decisions and actions" (Dijksterhuis & Aarts, 2010, p. 468). As explicated earlier, the study excluded focus on characters' contribution (Kozmová, 2008) to the success or adversity regarding problem-solving. The reports of these volitional activities and behaviors indicate that the dreamer has an intact autonomous ego executive capacity, continuously rehearsed upon encountering inconsistencies (Smith et al., 2004) while being disengaged from the awake world.

Developmental aspect of volitional processes. Additional aspect of characterizing volition in non-lucid dreaming pertains to individual dreamer's developmental progress. As Purcell et al. (1993) indicated, when individual dreamers are able to take charge of their own behaviors and to use expressiveness as a problem-solving means or as an evaluative communication about one's own progress, it seems essential to see these mental capacities as an intact executive ego with applicable skills practiced in already-known or novel contexts. The importance of both becomes pertinent in the treatment of nightmares in which dreamers might become paralyzed in their actions. In these circumstances, when a dreamer experiences nightmares, the deliberate volitional efforts in a form of actions, behaviors, and communication could be discerned as psychological achievements in the form of intellectual and emotional knowledge of one's own psychological *agency*. This achievement is defined as the "capacity to recognize contingencies in human interactions and to participate in exchange with others through action" (Zimmer, Bookstein, Kenny, & Kraeber, 2005, p. 547) and pertains, in terms of volition, in non-lucid problem-solving dreams for self-preservation, especially during nightmares. The non-lucid dreamer's face-to-face encounter (known from waking life as interpersonal understanding of a situation [Schutz, 1967, p. 162]) facilitated by the dreamer's evaluation and motoric and communicative expressions represents, in these specific dreams, transposition of volition into "flexible interaction" with the environment (Domhoff & Fosse, 2007, p. 52). This skill of volitional interaction then becomes functionally sustained during non-lucid dreaming.

Additionally, the waking psychology's *sense of agency*, defined as "experiences that confirm one's capacities to bring about desired results" (Zimmer et al., 2005, p. 547), is also represented in problem-solving dreams by volitional use of motor and communicative behaviors in order to change the problematic situations, whether within the contexts of oneself, within interpersonal relationships, or in the environment. By both modes of problem-solving, the dreamer attempts to construct a new reality based on previously known subjective preferences (Wolman & Kozmová, 2007) in already known or novel contexts. In this case, the initial emerging characterization of volition as a developmentally based capacity could be considered identical to that of waking life because in these situations voluntary movement serves to maintain consciousness (Fisher, 1986, pp. 3, 9; Hobson, 2009a, p. 76): When a dreamer experiences nightmares, the deliberate volitional efforts in a form of actions, behaviors, and communication could be discerned as psychological achievements of intellectual and emotional knowledge in the service of one's own psychological *agency*. This achievement is defined as the "capacity to recognize contingencies in human interactions and to

participate in exchange with others through action" (Zimmer et al., 2005, p. 547). The non-lucid dreamers' face-to-face encounter (known from waking life as interpersonal understanding of a situation [Schutz, 1967, p. 162]) facilitated by the dreamers' evaluation and motoric and communicative expressions represents, in these specific dreams, transposition of volition into "flexible interaction" with the environment (Domhoff & Fosse, 2007, p. 52). This skill of volitional interaction becomes, when needed, functionally sustained during non-lucid dreaming.

Furthermore, the waking psychology's *sense of agency* defined as "experiences that confirm one's capacities to bring about desired results" (Zimmer et al., 2005, p. 547) is also represented in problem-solving dreams by volitional use of motor and communicative behaviors to change the problematic situations whether it is within the contexts of oneself, within interpersonal relationships, or in the environment. By both modes of problem-solving, the dreamer attempts to construct a new reality based on previously known subjective preferences (Wolman & Kozmová, 2007). In this case, characterization of volition as a developmentally-based capacity could be considered identical to that of waking life because in these situations, voluntary movement serves to maintain consciousness (Fisher, 1986, pp. 3, 9; Hobson, 2009a, p. 76).

Practicality for the dreamer. Lastly, the emergent initial cross-state characterization of volition in non-lucid problem-solving dreams concludes with experiences of contingencies of waking life during which the individuals could become temporarily incapacitated, inhibited, or prohibited to solve encountered difficulties. When unable to plan and contribute to potentially new internal and external realities, they could experience loss of hope (Erikson, 1964) and depression (Rotenberg, 1993). Because waking life concerns are often times expressed in dreams (Domhoff, 1996; Hall & Nordby, 1972), it could be proposed that the preclusion to problem-solving in general could be transferred into non-lucid dreaming: The dreamer might experience perturbing dreams with experiences of feeling passivity and inactiveness accompanied by fear and with it self- or other imposed restriction on kinetic, communicative, and cognitive abilities. In terms of characterization of volition, the dreamer, through encountering problems and solving those during non-lucid dreaming, actually might re-initiate the waking life "search activity," defined as "activity to change the situation or . . . attitude to it in the absence of a definite forecast of the results of such activity" (Rotenberg, 1993, p. 262). In this case, with the use of motoric or communicative acts of volition the recovery of lost hope and with it activation toward one's goals might be possible and could be conceptualized as "inherent strength" (Erikson, 1964, p. 111) or the "active quality" (p. 113). Thus when dreamers use their own idiosyncratic range of motoric and communicative volitional activities, they rise above a hypothesized "inability to direct either . . . thoughts or actions in dreaming" (Kahn & Hobson, 1994, p. 2) and the ability toto actively approach (Rotenberg, 1993) volitionally the encountered problems, difficulties, or curiosities could contribute to one's overall health (e.g., Cartwright, 1996).

Thus when dreamers use their own idiosyncratic range of motoric and communicative volitional activities, they rise above a hypothesized "inability to direct either . . . thoughts or actions in dreaming" (Kahn & Hobson, 1994, p. 2) and the ability to actively approach (Rotenberg, 1993) volitionally the encountered problems, difficulties, or curiosities could contribute to one's overall health (e.g., Cartwright, 1996).

In concluding of this discussion of cross-state initial emergent characterization of volition, in addition to its cognitive aspect (Kozmová, 2012) and range of currently known kinetic and communicative capacities it needs to be emphasized that similarly to the phenomenon of problem-solving, volition in non-lucid problem-solving dreams seems to be a multifaceted phenomenon. When dreamers engage deliberately in problem-solving, they are "volitionally pursuing a self-selected goal" (Kozmová, 2012, p. 58). The engagement seems to occur in motoric and communicative manner akin to volition's waking life conceptualizations (e.g., Farthing, 1992). Hence any dreamer who problem-solves and strategizes might be capable of employing in one dream a range of volitional problem-solving strategies that include action and behaviors, thought processes, and emotions (Kozmová, 2008, 2012, 2015). Thus, the scope of executive skills (dreaming ego capacities) that is based in volition and is observable in dream reports through the dreamers' abilities to problem-solve could be considered individuals' cross-state capacity and resource and thus part of developed or developing consciousness.

4. Discussion

When working with the method of grounded theory, one of the final steps is to posit a substantive grounded theory of the phenomenon (Glaser, 1987, 1992) that might include, in its emergent phase, "linking" the data to the existing literature (Henwood & Pidgeon, 2003, p. 136). In preparation for this future phase of the work, and because the leading theories of volition in a non-lucid dreaming state of consciousness are not phenomenologically, but physiologically based, for the most part, the discussion will link the results to neurophysiological assumptions.

4.1. General Assumptions about Cognitive Phenomena in Non-Lucid Dreaming

Even though Snyder (1970), with phenomenological data, pointed out "clear evidence at times of feelings of volition" (p. 134), theorists of higher order cognition (including volition, e. g., Maquet et al., 2005; Voss et al., 2009) continued to engage in "indispensable" reduction along with "isomorphic subtraction … preformed at the psychological level (Hobson et al., 2003, p. 231). In this tradition, as Kahan and Claudatos (2016) pointed out, the individual researcher "assumes that dreaming is deficient or lacking in higher-order cognitive processes" (p. 161; see alos Hobson, 1988). In fact, Hobson (2009b) termed the "sense of volitional agency to be as much an illusion as our wake-state sense of conscious will" (p. 808). Of course, if volition in both states of consciousness is understood as "illusion," this assumption would preclude any investigation. The consideration of the earlier work by Dresler et al. (2014), in which the authors retrospectively investigated volition would disagree with this illusory conceptualization. Thus the inspiration to offer a "more attractive and concise alternative" (Hobson, 2007, p. 77) to the "illusory" nature of volition seems to be pertinent especially in view of the assertion that "loss of volition . . . is *typical* (Italicized for emphasis by the present author) of normal [non-lucid] dreaming" (Voss et al., 2009, p. 1198).

4.2. Reappraisal of Non-Lucid Dreamers' Capacities for Kinetic and Communicative Volition as Ego Executive Capacity DuringDreamers' Immersion in Nocturnal Problem-Solving

Previously, Maquet et al. (2005) proposed that dreamers are without a "well-identified internal goal" (p. 223). In the current study, the non-lucid dreamers' intelligent and predominantly constructive and occasionally destructive volitional mental behaviors and actions of the kinetic and communicative variety exquisitely fits the contexts in which dreamers find themselves. Dreamers simply pursue the goals that they became aware of in the contexts of their respective dream environments (see Tables 2-4). In fact, dreamers' volitional efforts are related to noticing goals-related "cues" in their dream environment (Klinger, 2013, p. 1). Because problem-solving by itself is a goal-oriented activity, for example, the dreamer who notices the fire escapes from the place of harm to preserve her life. Or, the dreamer who wanted the AIDS vaccine followed the goal-oriented "cue" and laid down to receive it (Table 2). Or, the dreamer who was confronted by fakir with harmful intentions found the sword and defended herself by cutting his head off. In these activities, the dreamers acted volitionally, with well-defined goals in mind, to preserve their lives (Table 2). Maquet et al.'s (2005) additional prediction that the "dreamer would fail to organize his mental representation" (p. 223), especially in terms of "perceptual contexts" during which the individual engages in some form of behavior (p. 221), does not seem to be supported by current research: When dreamers noticed and became aware of the presence of a clearly identified problem (e.g., when being left without speech, one dreamer reported: *I am left trying to make a conversation using "Scrabble" game letter pieces*; Table 2), or even indistinctly perceived implicit yet suggestive (sub-textual) threat (e.g., *A woman puts a finger into my watch bracelet. Immediately, I start to beat her*; Table 4), dreamers were able to organize their perceptions and impressions about particular idiosyncratic internal priorities. In addition, individual dreamer's personal significances include achievement of the goal of safety, noticing his or her own physical state that contradicts known and expected physical equilibrium, or performing altruistic behavior in unexpectedly arising situation (see Tables 2 through 4). It could be proposed that precisely these imports and personal meanings serve as organizers of non-lucid dreamers' internal experiences.

Thus, in non-lucid problem-solving dreams, at least some dreamers continue to notice a contextual and personal "discrepancy between an existing state and a preferred, or more valued state" of affairs (Smith et al., 2004, p. 509) and volitionally work their way through those inconsistencies. It seems that when the contradictions exceed or fall below individual dreamers' expectations, values, and beliefs (in terms of personal significance and meaningfulness), then the dreamers behave or act in a fashion that is fitting with their internal values-based goals.

Subsistence of volition. When theorists predicted that "volitional control is notoriously decreased in dreams" and that only during wakefulness an individual's "behavior would be usually adapted to the objects and locations internally perceived" (Maquet et al., 2005, p. 223), the evidence demonstrates straightforward contrast: If we consider adaptation as a waking individual's impact on the external environment along with regulating one's own internal experiences (Hartmann, 1939/1958), then the dreamers, in adaptive mental manners that fit within their dreamt contexts, are able to change their behaviors—according to their internal perceptions—by problem-solving. The example of this behavioral adaptation to internal objects and locations can be seen in the dreamer's hostile environment: *Fakir . . . He looks into my eyes and explains his intention. He wants to harm me in some way. I find a sword and I cut off his head* (Table 2). In an aggressive environment, when the dreamer reports, *The dragon threw darts at me but missed*, the dreamer uses the object: In response, *I mortally wounded the dragon with my sword and galloped away* (Table 2). In these situations, the dreamers make a direct (in their own behalf) impact on the experienced environment and adapt their behaviors to their perceptions: The dreamers act volitionally even though they remain disengaged from the external world.

Volitional Control and Search Activity. Maquet et al, (2005) also proposed that "volitional control is notoriously decreased in dreams" (p. 223). Based on the evidence in Tables 2-4, it could be proposed that when non-lucid dreamers' problem-solving activities include volition in its cognitive (Kozmová, 2012); kinetic; and communicative forms, these dreamers deliberate efforts might reflect the stage of "search activity" in its healthy form (Rotenberg, 1993). Consequently, the awareness of nocturnal problem-solving might be transferable to waking life. It could be thus proposed that subsistence of volition in non-lucid dreaming precludes Maquet et al.'s proposition about its decrease. The assertion of volition's subsistence and activated search activity are examples in which dreamers are willing to mediate voluntarily (or notice the lack of their own intervening) in various circumstances with the aim of making things better for themselves and also for others who are involved in various misfortunes and hardships (e.g., when the character is drowning, Table 3). Alternatively, dreamers evaluate their lack of involvement, which is also a mental action in service of search activity (Rotenberg, 1993; for evaluative thought process as an executive skill, see Kozmová, 2012). One could postulate that as long as the dreamer is acting on one's behalf even in an inhospitable environment, Rotenberg's (1993) search activity becomes volitional act, and however idiosyncratic it might be, is demonstrated and could contribute to one's well-being.

4.3. Reconsidering Assumed Isomorphism Between Phenomenology and Retrospective Neuroimaging Findings

In dream science, *isomorphism* generally refers to the assumption that nocturnal mental events that might indicate dreamers' psychology in terms of phenomenology (including higher order cognition; Kahan, 1994; Wolman & Kozmová, 2007) have a one-to-one correlation with physiology in the investigative framework of neural correlates. The basic theoretical integrative efforts between scientific domains of phenomenology and neuroscience (e.g., Nir & Tononi, 2010) are a testament to this hypothesis.

Previously, Hobson (2002) claimed that disengagement of the frontal cortex equals its inoperativeness of executive ego function (Hobson, 2007, p. 79) due to the lack of "voluntary agency" (Hobson, 2007, p. 75). This proposition focuses on the subjective experience of volition that does not have its presumed match in neural underpinning in specific regions of interest; therefore, the theorist concluded without sup-

port of particular neural networks it could not subsist during sleep. Yet, the current characterization of volition (Tables 2-4) as a phenomenological feature existing or emerging in non-lucid dreams is in contrast to this deficiency viewpoint (e.g., Voss et al., 2009). It is not yet known whether for dreaming volition could be found neurophysiologically-based "more attractive and concise alternatives" (Hobson, 2007, p. 77) needed for integrative effort of phenomenology and neuroscience (e.g., Kussé et al., 2010; Nir and Tononi, 2010).

Isomorphism between waking and dreaming neural correlates of consciousness. When considering the phenomenological data that the current study offers about volition in its kinetic and communicative varieties, and theories that explain retrospective results from neuroimaging studies, one is bound to address a caveat: Dawson and Conduit (2011) emphasized that the understanding of neuroscientific data requires at every point making explicit "a network of assumptions" including suppositions, explications, and clarifications about neuroimaging methodology (p. 150). For example, not so long ago, Schredl and Erlacher (2011) questioned not only "how direct" but also whether there could even be a one-to-one relationship or correlation between "all dreamed activities" (dream content) and objectively measured brain activation (p. 101). This statement echoes Bulkeley's (2006) proposition that pursuit of a correlation between REM sleep physiology [since most at home recalled dreams are considered from this sleep period] and the basic features of dreams might be a fruitless endeavor because findings might indicate that "brain-mind activities . . . are functionally independent of REM physiology" (p. 215). With these notions in mind, it could be proposed that consciousness of some subjective experiences—such as volition—in its emergent phase might be lacking isomorphic one-to-one neural underpinnings and the assumed neural correlates either need to be developed or might be supporting volition in most unexpected places. Alternatively, firings of neural correlates might not need to be a necessary condition for subjective experiences to occur; awareness and with it some executive skills could emerge, as an organism's emergent malleable property, without isomorphic correspondence to neural activation or even despite neural decreases (e.g., Gusnard & Reichle, 2001). In addition, because non-lucid dreamers' mental faculties, capacities, and abilities in question include volition in a problem-solving mode, which might not even have specific nocturnal neural underpinnings, it remains unclear how to conceptualize, in neuroimaging terms, dreamers' cognitive (including, but not restricted to evaluative, appraising, and decision-making), kinetic, and communicative varieties of volitional problem-solving.

It could also be proposed that without even considering volition and its presumed active neural regions in waking or dreaming *per se*, it remains unknown how to interpret neuroimaging data collected from participants in various states of consciousness, including REM sleep with its dreaming state (e.g., Braun et al., 1997). As Gusnard and Raichle (2001) cautioned regarding functional magnetic resonance imaging (fMRI) conducted during participants' wakeful state, in the absence of knowledge about "baseline or resting state of brain function involving specific set of mental operations," the brain activities documented by the increases and decreases in neural activations in considerations with specific goal-oriented tasks are difficult to interpret (p. 685). The authors emphasized that "the identification of a control or baseline against which the condition of interest can be compared" is an essential scientific aim (p. 685): In wakefulness, during participants' goal-oriented mental actions, there are notable task-independent decreases in brain activation, especially in the areas of posterior cingulate cortex, precuneus, and retrosplenial cortices (p. 690). Gusnard and Raichle proposed that these seemingly inactive regions of the brain act as a brain baseline that is incessantly and without rest involved in a high level of collecting and processing information about the world and "possibly within us" (p. 690)..

Gusnard and Raichle (2001) also pointed out other specific neural regions of interest that are consistently involved in the processing of information, even in their deactivation, during waking goal-oriented tasks. These regions are the posterior medial and lateral cortices, the ventral medial prefrontal cortex, and especially the dorsal medial prefrontal cortex [DMPC]; the latter one is considered to be involved in a "simulation of behavior" or "inner rehearsal" (Ingvar, 1985). As Gusnard and Raichle (2001) further proposed, DMPFC is involved in either unprompted or tasks-relevant "self-referential or introspectively oriented mental activity" (p. 692). How this specific interpretation of neuroscientific findings might prove to be important for neural correlates for volitional problem-solving in non-lucid dreams remains unknown.

For purposes of explaining findings of the current study by linking those with the retrospective neuroimaging data with information from non-lucid dreaming states (e.g., review by Maquet et al., 2005), it is not yet known whether there exists a not-yet-found nocturnal very active brain resting baseline state that would be equivalent to brain regions found through neuroimaging findings that are deactivated, yet active and working in their supposed baseline resting during wakefulness and goal-oriented tasks. Furthermore, as Dawson and Conduit (2011) proposed, there exists an intricate relationship between emotional and cognitive activities, neural activation, and blood flow in sleep captured by fMRI that might not reflect or correspond to activations in specific anatomical regions with their functionality as it is known during the waking state of consciousness (p. 150).

Regarding explanations of neuroimaging data obtained during the state of non-lucid dreaming consciousness, *if* it could be assumed that the brain and the mind actually do not sleep even when the individual person is asleep (Moore, 1847, p. 77), *then* it is interesting to note the various regional deactivations of REM sleep, for example, "dorsolateral prefrontal cortex (DLPF), posterior gyrus, precuneus, and the inferior parietal cortex" currently are explained differently: These deactivated neural regions are deemed as neural underpinnings necessary for executive function (because, currently, their activation during the waking state is considered a "baseline" for comparison to activations and deactivations in the dreaming state), and they are deemed decoupled in dreaming from their waking life function (Dang-Vu, Schabus, Desseilles, Schwartz, & Maquet, 2007, p. 100). In other words, in non-lucid dreaming, deactivated regions of interest are equated with deactivated "executive ego function" with its dreamers' capacity of acting voluntarily (Hobson, 2007, p. 75). This state of affairs could be considered puzzling and in need of data-based explanations especially in view of Gusnard and Raichle's (2001) propositions about incessant mental activities of brain.

Additional predictions about volition that were developed under the assumption of isomorphism, for example, that "the frontal executive cannot compete with disinhibited subcortical network activation" (Hobson, 1997, p. 391) or that "loss of volition . . . is typical of normal [non-lucid] dreaming" (Voss et al., 2009, p. 1198) are, in view of the absence of brain baseline in its resting activity state, in need of reappraisal. For example, Ioannides, Kostopolous, Liu, and Fenwick (2009) found, by using magnetoencephalography, that in REM sleep there is activated left DLPFC. Ioannides et al. (2009) also highlighted the methodological challenges of earlier PET studies conducted, for example, by Braun et al. (1997): The authors asserted that the crucial "dorsal areas, like DMPFC . . . were outside of field of view of early PET scanners" (p. 465). Yet, these early and, according to Ioannides et al,, methodologically insufficient neuroimaging findings that do not reflect the actual state of affairs are predominantly referred to, cited, and considered as the gold standard for theoretical predictions and explanations about executive function and volition in non-lucid dreaming (e.g., Maquet et al., 2005). Thus, without any concrete neuroimaging data that would lend credence to theoretical predictions about volition-based phenomenological data, and with numerous challenges that exist in neuroimaging, such as assumptive or methodological constrains, there seems to be a need for reconsideration of theories connected with non-lucid dreaming, and dreamers' reported problem-solving and use and volition.

In addition, Maquet et al. (2005) concluded in their reappraisal of neuroimaging findings about human cognition that, surprisingly, data show that "the superior frontal gyrus, the medial frontal areas, the intraparietal sulcus, and the superior parietal cortex are not less active in REM sleep than during wakefulness" (p. 226). At the present time, it is not known precisely whether neural activations in these regions of interest could be considered neural underpinnings of REM dreaming, dreamers' volitional problem-solving activities of various kinds, or are representing the dreaming brain in its active baseline mode. Nevertheless, with the current range of volitional activities (cognitive, kinetic, and communicative), it could be postulated that under the assumption of isomorphism, perhaps one or several of these regions of interest might be needed to support, in their inactive or deactivated state, the dreamer's active problem-solving.

4.4. Limitations of the Current Study

The current study represents one arm of the all-encompassing investigation of the nocturnal cognitive problem-solving phenomenon (Kozmová, 2008, 2012, 2015). The explored collection of dreams was gathered from individuals who eagerly wanted to learn about themselves and sought out insight through examination of their own self-selected individual dreams in dream seminars. The present author worked with an integrally biased and motivated sample taken from the archived collection of dreams. At the same time, the diversity of dreamers (males and females from seven different—collectivistic and individualistic—countries) was highly desirable because it allowed for defining a wider range of volitional contexts and strategies.

It is also conceivable that despite using dreams from dreamers of seven different countries, the study might not capture the complete range of all behaviors and actions that demonstrate dreamers' mental capacity for volition.

5. Future Directions

Glaser (1978), in his guidelines for engendering emergent grounded theory of any phenomenon explained that through this process the analyst "generates theory that fits the real world, works in predictions and explanations, is relevant to the people concerned, and is readily modifiable" (p. 144). In view of not having neuroimaging data about neural networks of problem-solving and volition available, it seems inevitable to postpone more complex development of characterization of volition as a goal-oriented activity and offer it in a form of substantive grounded theory. For now, with the current data about kinetic and communicative activities, volition seems to be sustained by processes known from waking consciousness and thus has potentiality for future investigations. It seems that for the rise, awareness, engagement, and applications of executive ego functions, including capacities for volitional behaviors and actions in a kinetic and communicative manner that are similar to waking-life situations, non-lucid dreamers need to face self-created or randomly created (by dream characters or environments) problems, difficulties, threats, or curiosities (Kozmová, 2012, 2015). In these conditions, the abilities for and attempts at problem-solving emerge and have a chance to become manifested or maintained and further practiced (e.g., Revonsuo & Valli, 2000). Therefore, in future studies of any of the executive ego function capacities, including volition, the researchers might need to take into consideration the distinction between descriptive and problem-solving dreams. For any subsequent integrative efforts of data from phenomenology of ego executive functions and neuroscience, the assumptive frameworks would also need to be explicated (Dawson & Conduit, 2003).

Because the current evidence demonstrates that, similarly to waking life, dreamers' volition arises, as executive skill in ego executive capacity, in situations when dreamers are confronted with problems, difficulties, threats, or curiosities, it might be feasible to investigate the not-yet known developmental trajectory of this capacity. Alternatively, for clinical purposes, it might be interesting to find out when the capacity for volition ceased to be sustained in non-lucid problem-solving dreams.

In summary, the initial theoretical framework (Hervey de Saint Denys, 1867/1977, cited in Schwartz, 2000, p. 56) offered the possibility of finding out about the status of the psychological feature of volition in non-lucid dreams. Hervey de Saint Denys presented researchers with three options suitable for hypotheses: The investigated element subsists, stops, or considerably changes (p. 56). With data from the current study, volition in problem-solving situations seems to expand itself exponentially under specific conditions: The evidence, in the form of previous study (Kozmová, 2012) and in the present study concomitantly brought forward the evaluative, appraising, decision-making and other cognitive volitional efforts and in the present study highlights kinetic and communicative problem-solving activities that further solidify that as dreamers' volition becomes actualized, the executive skill in ego executive capacity, in situations when the non-lucid dreamers are confronted with problems, difficulties, threats, or curiosities becomes actualized as well.

6. Conclusion

The current results of the wide range of kinetic and communicative forms of volition as part of the nocturnal cognitive

problem-solving phenomenon (Kozmová, 2008) investigated in non-lucid problem-solving dreams also add evidence to Moore's (1847) prediction that the sleeping "mind is always ready for actions whenever the organization is in a fit state to convey impressions and to be employed" (p. 77). Inarguably, non-lucid dreamers' perceptions of difficulties and incongruities between the current experienced state and the possibly existing state of affairs based on individual dreamer's values (e.g., Smith et al., 2004) seem to prompt dreamers to organize their impressions in the goal-oriented contexts that require problem-solving: This experienced discrepancy seems to be a prerequisite for using executive ego skills and capacities and their engagement within non-lucid dreaming environments. The host of depicted range of volitional behaviors and actions also offers phenomenologically-based alternative to deficiency theories about volition in non-lucid dreaming.

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Appendix A

Henwood and Pidgeon (2003) summarized the following discrete segments of working with the method of grounded theory in the following fashion:

1. Open-coding to capture the detail, variation, and complexity of the basic qualitative material (sometimes also referred to as substantive coding);

2a. Constantly comparing data instances, case, and categories for conceptual similarities and differences (the method of constant comparison);

2b. Sampling new data and case on theoretical grounds as analysis progresses (theoretical sampling to extend the emergent theory by checking out emerging ideas, extending richness and scope, and in particular to add qualitative variety to the core data included within analysis;

2c. Writing theoretical memoranda to explore emerging concepts and links to existing theory;

3a. Engaging in more focused coding (including focused, axial, and theoretical coding) of selected core categories;

3b. Continuing to code, make comparisons, and sample theoretically until the point at which no new relevant insights are being reached (theoretical saturation); and

4. Additional tactics to move analysis from descriptive to more theoretical levels: for example, grouping or reclassifying sets of basic categories; writing definitions of core categories, building conceptual models and data displays, linking to the existing literature; writing extended memos and more formal theory. (p. 136)

Validity and reliability assessment of Persian adaption of Mannheim Dream questionnaire (MADRE)

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Summary. This study aimed to adapt the MADRE to Persian and to examine the validity and reliability of the new scale. For the adaptation, the translation and back-translation method was used and after some variations a shorter version of questionnaire having 26 items was developed from the original MADRE. Validity testing involved a panel consisted of 15 psychologists to fulfill a quantitative assessment by calculating content validity ratio (CVR) and content validity index (CVI). Since the lowest acceptable quantity of CVR in the presence of 15 panelists and CVI is determined 0.49 and 0.79 respectively, all the items of developed instrument enjoyed a proper level of content validity in terms of essentiality, relevance, and clarity with an exception for one item relevance. Reliability of the instrument was assessed by a test–retest method and use of Cronbach's alpha. Persian scale demonstrated good test-retest reliability and Cronbach's alpha coefficient was achieved 0.752 for the overall scale. The findings of current investigation suggest that Persian adaption of MADRE is a valid and reliable instrument which can be tried on target populations in further studies.

Keywords: Mannheim Dream Questionnaire, MADRE, reliability, Persian scale, validity

1. Introduction

It has been stated that about one-third of every human lifetime is spent in sleep mode (Domhoff, 2003). The experience which occurs while sleeping in the inner world of humans is known as dreaming (Schredl, Berres, Klingauf, Schellhaas, & Göritz, 2014). Dreams that often are repeated every 90 minutes (Domhoff, 2003) are only accessible if the dreamer recalls them upon awaking (Schredl et al., 2014). As dreams do not happen in the conscious state, some have considered them useless (Kets-de-Vries, 2014). Although dreaming is known to be an entirely subjective experience (Schredl, 2010a), but differing interpretations about dreams since the dawn of time until today, well represent the importance of research in the area of dream. Use of dreams for predicting weather or future prophecies in the primitive cultures can be a good instance for ancient times. While in the present era on the basis of scientific explorations, various roles have been considered for dreams. For instance, nowadays psychologists have accepted a psychotherapeutic effect for dream (Kets-de-Vries, 2014). Moreover, with respect to the experts' beliefs who worked on the dream, dreams have meanings (Barrett & McNamara, 2012).

In many works conducted in the field of dream, numerous questionnaires have been developed and used (Schredl et al., 2014). Use of questionnaire which is a retrospective measure to assess dream (Bernstein & Belicki, 1996) compared with some of the other paradigms of dream assessment like diaries has achieved superiorities in some aspects of dream such as measuring dream recall frequency, nightmare frequency, and lucid dream frequency (Stumbrys, Erlacher, & Schredl, 2013). For example, use of dream diaries to measure the frequency of dream recall may affect the results because it can lead to more reports of dream recall as it attracts the participant attention directly to the dream (Schredl, 2002).

A questionnaire which deals with various aspects of dream is the Mannheim Dream questionnaire. Items of this scale have been designated to measure the frequency of dream recall and dream telling, nightmares, lucid dreams, attitude towards dream, reading about dreams, effects of dreaming on coming waking life, and emotional intensity (Woznicky, 2015). Aspects of dream included in MADRE have been individually widely explored from various standpoints through quite a number of studies using numerous methods. Assessing the effects of age, sex, and income on dream recall frequency (Chellappa, Munch, Blatter, Knoblauch, &

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Cajochen, 2009), differences between men and women in reading literature for dream interpretation (Schredl, 2010b), or for sharing dreams (Curci & Rimé, 2008), the correlation between personality dimensions and attitude toward dreams (Beaulieu-Prevost & Zadra, 2007), the ability of dreams to solve emotional/non-emotional problems of the dreamer (Van-de-Castle, 1994), and effect of nightmares on daytime mood (Köthe & Pietrowsky, 2001), are some of the examples. Although, MADRE scale or issues provided in its items have been taken into consideration by many of the studies conducted in the dream scope, but a comprehensive review of the literature ensured us that MADRE scale has not been assessed for its content quality by a second user or developer. To draw conclusion about the quality of an instrument, achieving information about the content validity and reliability of the measure has been viewed as a necessity (Polit & Beck, 2006).

The aim of current study was preparing the Persian scale of MADRE questionnaire and later evaluating the validity and reliability of contents of the new instrument.

2. Method

2.1. Participants

The participants were selected according to the convenience method of sampling from students of all universities including governmental and nongovernmental centers studying in Mashhad city, Iran. The questionnaire was filled by 38 students, 76.3% male and 23.7% female. 62.2% of students were married. The mean age of the participants was 32.65 ± 6.56 years (range: 20 to 45 years). Higher academic qualifications had lower proportions amongst students: 39.4% of responders had a diploma, 30.3 % were with an associate degree, 27.3% had a bachelor's degree, and 3% were Ph.D. candidate.

2.2. Research instrument

To develop the Persian version of the questionnaire, the English form of MADRE was translated into Persian by two English language experts. Then the Persian form obtained from translations was translated back into English by two other specialists of English language. The final translated form was compared with the original form and the consistency between them was confirmed by the authors. In the Persian version of MADRE questionnaire, 1 qualitative item was removed and 19 items were retained one of them contained 8 questions. So, a questionnaire containing 26 items was developed in which five point scales were considered. According to various nature of questions, different phrases were assigned to each point in different items. The points were scored as (1) corresponding to one of the: seldom, very negative, more than20, not at all, (2) corresponding to one of the: little, negative, 16-20, not so much, (3) corresponding to one of the: not too much, not-so-positive, 11-15, partly, (4) corresponding to one of the: much, positive, 6-10, sometimes and finally (5) corresponding to one of the: too much, very positive, 1-5, exactly. As an example, for item number 1(How much have you recalled your dreams in the recent several months) points 1 to 5 were seldom, little, not too much, much, and too much respectively. The questionnaire was also comprised of questions regarding demographic variables of age, gender, material status and level of education.

2.3. Procedure

To make the instrument acceptable by respondents it should be attractive in appearance (Nunnally & Bernstein, 1994). So, face validation of Persian MADRE questionnaire was fulfilled using an expert panel consisted of 10 psychologists and they were asked to express their opinions in terms of level of difficulty of items, appropriateness of items with the principal objective of the instrument and possible misunderstanding of the words meanings (Banna, Becerra, Kaiser, & Townsend, 2010). After collecting comments of experts, minor corrections were done on some items.

Content validity of Persian MADRE questionnaire has been evaluated by calculating content validity ratio (CVR) and content validity index (CVI) to yield the most important and correct content of the instrument (Hosseini, Ghorbani, & Ebnahmady, 2015). For this purpose, 15 psychologists received questionnaires and they were asked to decide about a particular item based on the essentiality level set by Lawshe (Lawshe, 1975) as 'essential,' 'useful, but not essential,' or 'not necessary'. The numeric value varies between 1 and -1. Whatever the score be closer to 1 reveals further agreement of panelists on the necessity of items in the scale. CVR of each item is obtained through inserting the total number of panel persons (N) and number of experts who assigned the essential range for an item (N_e) in the formula CVR= (N_e - N/2)/(N/2) (Zamanzadeh et al., 2015). Based on Lawshe table, when the number of experts is 15, the least accepted value of CVR is 0.49.

It has been reported that CVI is the most utilized tool for content validity assessment of a developed instrument (Grant & Davis, 1997). It is said that number of experts has always been determined partly arbitrary to decide on the relatedness and clearness of items, but to decrease the probability of chance agreement of judges' viewpoints on each item, it is better to appoint more number of experts. The relevance and clarity of each of the items was characterized by specialists using a 4-point Likert spectrum (1 [not relevant, not clear], 2 [somewhat relevant, somewhat clear], 3[quite relevant, quite clear], 4 [highly relevant, highly clear]) according to Waltz and Basel approach. (Waltz & Bausell, 1981). CVI is computed according to the following equation: CVI= $N_{3,4}$/ N, where $N_{3,4}$ is the number of respondents assigning a rating 3 or 4 to the relevancy or clarity of each item, and N is the total number of experts (Lynn, 1986). Proportions greater than 0.79 have been known acceptable for CVI while values between 0.7 and 0.79 need revision and items having indexes less than 0.7 must be eliminated from the scale (Abdollahpour, Nejat, Nourozian, & Majdzadeh, 2010).

In the present research, the scale reliability has been evaluated by calculating the internal consistency & applying retest method. To determine the internal correlation of whole scale, α-Cronbach coefficient was utilized (Santos, 1999). To evaluate the external consistency of the instrument, retest method was performed among 10 of the participants using validated questionnaire (Persian adoption) at a three-week interval.

3. Results

Items of final revised scale are shown in Table 1. As it is visible, the arrangement of questions has been changed in the Persian version of MADRE in comparison with the original scale.

Table 1. Final scale

Items	Contents
1	How often have you recalled your dreams recently (in the past several months)?
2	How intense are your dreams emotionally?
3	What is the emotional tone of your dreams on average?
4	How often have you experienced nightmares recently (in the past several months)? Definition: Nightmares are dreams with strong negative emotions that result in awakening from the dreams. The dream plot can be recalled very vividly upon awakening.
5	If you currently experience nightmares, how distressing are they to you?
6	Do you experience recurring nightmares that relate to a situation that you have experienced in your waking life?
7	How much of your nightmares are recurrent one?
8	How often did you experience nightmares during your childhood (from 6 to 12 year of age)?
9	How much do you experience so-called lucid dreams (see definition)? Definition: In a lucid dream, one is aware that one is dreaming during the dream. Thus, it is possible to wake up deliberately, or to influence the action of the dream actively, or to observe the course of the dream passively.
10	If you have experienced lucid dreams, how old were you when they occurred the first time?
11	How often to you tell your dreams to others?
12	How often do you record your dreams?
13	How often do your dreams affect your mood during the day?
14	How often do your dreams give you creative ideas?
15	How often do your dreams help you to identify and solve your problems?
16	How often do you experience Déjà vus (see definition)? Definition: During a déjà vu experience one is convinced one is reliving real-life situation that was already experienced in a dream.
17	Have you ever read something on the topic of dreams? [Books or magazine articles]
18	Did the literature about dreaming / dream interpretation help you to better understand your dreams?
Attitude towards dreams	
19	How much meaning to you attribute to your dreams?
20	How strong is your interest in dreams?
21	I think that dreams are meaningful.
22	I want to know more about dreams.
23	If somebody can recall and interpret his/her dreams, his/her life will be enriched.
24	I think that dreaming is in general a very interesting phenomenon.
25	A person who reflects on her/his dreams is certainly able to learn more about her/himself.
26	Do you have the impression that dreams provide impulses or pointers for your waking life?

According to Table 2, CVR value for all items is greater than 0.49 which signifies the importance and essentiality of questions included in the scale. The complete score of CVR calculated for items 12 & 24 indicates the agreement of all the members of panel on the necessity of the relevant questions in the instrument. Given that an appropriate number of specialists considered rating 3 or 4 for the relevance of 25 items of the instrument, index of content validity was achieved higher than 0.79 indicates on satisfying relevance of all items except item number 11 with the objective of the questionnaire. 12 experts or more confirmed the clarity of whole instrument. All 15 commenters agreed on the relevance of item 26 and clarity of item 15 of the instrument. Despite the importance and clarity of item number 11, it must be eliminated from the scale as it was recognized irrelevant by one third of the experts. The Cronbach's Alpha coefficient of internal consistence of the MADRE was calculated 0.75. For calculation of this index, all the items of the Persian adoption of the MADRE that are shown in table 1 were used. The results obtained from the retest method were satisfactory indicating on repeatability of the responses given to the items of the Persian adoption of MADRE.

Table 2. The results of the content measurement

Items	CVR	N_e	CVI(relevancy)	$N_{3,4}$	CVI(clarity)	$N_{3,4}$	Interpretation
1	0.6	12	0.80	12	0.93	14	Appropriate
2	0.86	14	0.80	12	0.80	12	Appropriate
3	0.6	12	0.80	12	0.86	13	Appropriate
4	0.86	14	0.80	12	0.93	14	Appropriate
5	0.6	12	0.86	13	0.86	13	Appropriate
6	0.73	13	0.93	14	0.86	13	Appropriate
7	0.6	12	0.86	13	0.86	13	Appropriate
8	0.73	13	0.86	13	0.80	12	Appropriate
9	0.6	12	0.86	13	0.80	12	Appropriate
10	0.6	12	0.80	12	0.93	14	Appropriate
11	0.86	14	0.66	10	0.86	13	Rejected
12	1	15	0.86	13	0.86	13	Appropriate
13	0.6	12	0.86	13	0.86	13	Appropriate
14	0.73	13	0.80	12	0.80	12	Appropriate
15	0.6	12	0.80	12	1	15	Appropriate
16	0.86	14	0.86	13	0.80	12	Appropriate
17	0.73	13	0.80	12	0.80	12	Appropriate
18	0.6	12	0.80	12	0.80	12	Appropriate
19	0.86	14	0.8	12	0.86	13	Appropriate
20	0.73	13	0.93	14	0.86	13	Appropriate
21	0.6	12	0.86	13	0.80	12	Appropriate
22	0.6	12	0.86	13	0.80	12	Appropriate
23	0.86	14	0.80	12	0.93	14	Appropriate
24	1	15	0.86	13	0.80	12	Appropriate
25	0.6	12	0.80	12	0.86	13	Appropriate
26	0.6	12	1	15	0.86	13	Appropriate

Note. N_e: Number of experts evaluated the item essential, $N_{3,4}$: Number of judges who considered rating 3 or 4 for showing the relevancy or clarity of each item, CVR = content validity ratio, CVI = content validity index

4. Discussion

This study is the first in Iran which has pioneered to measure the validity and reliability of a Persian version of MADRE. In current study, the face validity was evaluated to improve the items of the developed instrument and it was not considered as a tool for scale judgment. Judgment on the basis of face validity has been discouraged by some researchers. Judging by appearance increases the likelihood of fallibility, can cause to differing perceptions among developers and users, and may lead to counterproductive inferring about the intent of the scale (De-Vellis & Dancer, 1991).

Despite Lawshe's opinion which has considered a minimum of four panelists for content validation, in present research it was decided that more number of experts be included in the panel. In spite of practical difficulties, a maximum of fifteen experts were participated in survey. Involving a greater number of specialists reduces the chance of finding more researchers having such a credentials to challenge the purported content validity of the scale. It can be assumed in interpreting CVR results that when all panelists are fully agreed on an item essentiality they could be either all wrong or all right, but regarding their expertise, it must be concluded that some of them may be right and the item can enjoy of some degree of content validity (Allahyari, Hassanzadeh, Khosravi, & Zayeri, 2011). Actually concluding an instrument as valid or not valid is inaccurate since the validity is the property of inference, not the instrument (Cook & Beckman, 2006).

Measuring reliability is a necessity because the lack of reliable scores prevents achieving valid interpretations for an instrument (De-Vellis & Dancer, 1991). Internal consistency is a way of reliability measurement to show the level of correlation among scores of individual items with each other. Confronting with large variations in scores upon retesting indicates on low reliability of an instrument (Downing, 2004). The reliability of developed Persian form of MADRE was checked through the calculation of Cronbach's Alpha coefficient. It was calculated to determine the internal consistence of Persian MADRE. The reliability coefficient is usually reported as a decimal number ranged between 0 and 1. As the lowest level of Cronbach's Alpha coefficient for indicating on reliability has been determined 0.7 (Downing, 2004), the Cronbach's Alpha coefficient which was found out as

0.75 in current study was implying on proper level of internal consistency of the questionnaire.

Although validation is a lengthy multi-step process consisted of validity and reliability assessments but this research and similar studies show us that how well we can objectify the subjective process of content validity. Moreover, challenging the content of research instruments helps us to better understand, use and criticize them with a more accurate approach.

5. Conclusion

According to the results the existing developed scale enjoys a content fairly valid and reliable. Hence, authors propose other compatriot researchers to take the MADRE in Persian version as an authentic tool to study on dreams.

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There are no conflicts of interest.

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Appendix

English translation of Persian edition of Dream Questionnaire (MADRE)

This questionnaire aims at obtaining a good overview of different aspects of dreaming. It takes about 5 to 10 minutes to complete. Please take your time and answer all questions carefully and completely.
Age: ____ years
Gender: O male O female
Occupation / Study discipline (students): _____

Items	Contents	Very much	Much	Partly	Low	Very low
1	How often have you recalled your dreams recently (in the past several months)?	☐	☐	☐	☐	☐
2	How intense are your dreams emotionally?	☐	☐	☐	☐	☐
3	What is the emotional tone of your dreams on average?	☐	☐	☐	☐	☐
4	How often have you experienced nightmares recently (in the past several months)? Definition: Nightmares are dreams with strong negative emotions that result in awakening from the dreams. The dream plot can be recalled very vividly upon awakening.	☐	☐	☐	☐	☐
5	If you currently experience nightmares, how distressing are they to you?	☐	☐	☐	☐	☐
6	Do you experience recurring nightmares that relate to a situation that you have experienced in your waking life?	☐	☐	☐	☐	☐
7	How much of your nightmares are recurrent one?	☐	☐	☐	☐	☐
8	How often did you experience nightmares during your childhood (from 6 to 12 year of age)?	☐	☐	☐	☐	☐
9	How much do you experience so-called lucid dreams (see definition)? Definition: In a lucid dream, one is aware that one is dreaming during the dream. Thus, it is possible to wake up deliberately, or to influence the action of the dream actively, or to observe the course of the dream passively.	☐	☐	☐	☐	☐
10	If you have experienced lucid dreams, how old were you when they occurred the first time?	☐	☐	☐	☐	☐
11	How often do you record your dreams?	☐	☐	☐	☐	☐
12	How often do your dreams affect your mood during the day?	☐	☐	☐	☐	☐
13	How often do your dreams give you creative ideas?	☐	☐	☐	☐	☐
14	How often do your dreams help you to identify and solve your problems?	☐	☐	☐	☐	☐
15	How often do you experience Déjà vus (see definition)? Definition: During a déjà vu experience one is convinced one is reliving real-life situation that was already experienced in a dream.	☐	☐	☐	☐	☐
16	Have you ever read something on the topic of dreams? [Books or magazine articles]	☐	☐	☐	☐	☐
17	Did the literature about dreaming / dream interpretation help you to better understand your dreams?	☐	☐	☐	☐	☐
18	How much meaning to you attribute to your dreams?	☐	☐	☐	☐	☐
19	How strong is your interest in dreams?	☐	☐	☐	☐	☐
20	I think that dreams are meaningful.	☐	☐	☐	☐	☐
21	I want to know more about dreams.	☐	☐	☐	☐	☐
22	If somebody can recall and interpret his/her dreams, his/her life will be enriched.	☐	☐	☐	☐	☐
23	I think that dreaming is in general a very interesting phenomenon.	☐	☐	☐	☐	☐
24	A person who reflects on her/his dreams is certainly able to learn more about her/himself.	☐	☐	☐	☐	☐
25	Do you have the impression that dreams provide impulses or pointers for your waking life?	☐	☐	☐	☐	☐

Colors in dreams and the introduction of color TV in Germany: An online study

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Summary. Visual elements are important ingredients of dreams, so dream objects should be – based on the continuity hypothesis of dreaming – as colorful as the waking world. However, the percentages of recalled colored versus black and white dreams as estimated by the participants varied considerably across studies. In the present online study, 2701 persons completed a question about recalling colors in their dreams with three options: percentage of black and white dreams, percentage of colored dreams, and percentage of dreams with no memory of colors. The older participants who most likely had watched black and white TV reported higher recall of black and white dreams than younger persons while the younger group with access to colored TV estimated that their dreams include more often colors compared to the older group. Since the attitude towards dreams and dream recall frequency were positively associated with the reporting of colored dreams, one might hypothesize that dreamers may attribute colors to a dream even if they are do not remember the colors of their actual dreams. In order to validate the present findings, future studies should include the amount of media consumption (TV, cinema etc.) over the life span of the individual and elicit possible confounding factors like age-related memory changes, attention to colors in waking life, and emotional valence of colored dream elements.

Keywords: Dream content, color, black and white, TV exposition, continuity hypothesis, memory, aging

1. Introduction

Visual elements are mentioned as occurring in almost every dream report (McCarley & Hoffman, 1981; Snyder, Karacan, Tharp, & Scott, 1968; Zadra, Nielsen, & Donderi, 1998), so questions have arisen as to whether there is color perception in dreams and whether this color perception might be similar to waking life.

In anecdotal reports, Aristoteles (1966), Descartes (1989) and Freud (1987) mentioned colors in dreams. Research in the early 20th century found that a considerable number of persons reported that their dreams did not include colors (Bentley, 1915; Husband, 1936; Middleton, 1933); Middleton (1942), for example, reported that 40% of the persons interviewed recalled having only black and white dreams. Some dream researchers then were convinced that people only dream in greyscales because of the analogy to black and white mass media such as television and cinema (Schwitzgebel, 2002). Schwitzgebel (2003) repeated the Middleton (1942) study 61 years later and found a prevalence of only 4.4% of the participants who reported dreams without colors, a finding which he explained by the growing popularity of colored mass media. A survey by Murzyn (2008) corroborated these findings: The age group confronted with black and white media for a longer period of time estimated that they dream more in greyscale than the younger age group, who were reported that they were less exposed to black and white media. In addition, persons within the over 55 year age group with black and white media experience reported significantly more greyscale and mixed dreams and less color dreams than the equally old group with no such experience (Murzyn, 2008). In a small follow-up study with N = 39 participants who had access to black and white media (Murzyn, 2012), medium-sized correlation coefficients between length of black and white media access and the frequency of colored or the frequency of greyscale dreams in the expected direction were found but due to the small sample size not significant.

Schwitzgebel, Huang, and Zhou (2006) replicated the Middleton (1942) study in a Chinese sample revealing that groups with more exposure to black and white media reported recalling dream with colors less often. Further support was provided by Okada, Matsuoka, and Hatakeyama (2011) analyzing the life span differences in color dreaming by comparing two cross-sectional surveys from 1993 and 2009. In both surveys, 80% of subjects younger than 30 years of age estimated recalling color in their dreams, but the percentage of recalling colors in dreams decreased with age and fell to 20% by the age of 60. The frequency of reporting colored dreaming increased from 1993 to 2009 (Okada et al., 2011); it would be interesting to carry out a longitudinal study in order to investigate within-subject changes with time.

Based on the continuity hypothesis of dreaming (Schredl, 2003), stating that daily waking-life activities are incorporated into dreams, one would expect that dreams contain colors since the daily world is colored. A study by Roffwarg, Herman, Bowe-Anders, and Tauber (1978) supported the continuity hypothesis for dreams obtained from awakenings of the early REM periods: participants wearing goggles with red filters for five days reported more dreams colored in red,

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orange and yellow. Moreover, EEG-studies have shown increased activities in the visual cortex that is involved in color perception during REM-sleep (Braun et al., 1998; Wehrle et al., 2005).

Methodological procedures might also contribute to differences between studies: spontaneously reported colors were relatively scarce. In about 20% of the dream reports (Schredl, 2008) colors were explicitly mentioned, whereas when probing for color in dreams, colors were reported by 80% of the participants (Kahn, Dement, Fisher, & Barmack, 1962; Rechtschaffen & Buchignani, 1983, 1992; Schredl, Fuchedzhieva, Hämig, & Schindele, 2008). In addition, memory processes played an important role as the percentage of black and white dreams was related to dream recall frequency: High dream recallers estimated their dreams as being black and white less often (Schredl et al., 2008). When the option that dream colors might not be remembered was presented as a third category, the frequency of explicit black and white dreams became relatively small and the percentage of dreams where colors were not remembered was about 35% (Schredl et al., 2008). In addition, Hoss (2010) found not differences in percentage of spontaneously mentioned colors in students' dreams collected in the late 1940ties (Hall & Van de Castle, 1966) and students' dreams from the 1980ties; a finding that indicate that memory for color content might be a confounder if this type of memory is decreasing with age.

To summarize, based on the continuity hypothesis (Schredl, 2003) one would expect all dreams to be colored since our daily world is colored; a hypothesis that is supported by laboratory and diary study results reporting that actual dream reports very often include colors – if the participants are questioned explicitly directly after reporting the dream (Rechtschaffen & Buchignani, 1992; Schredl et al., 2008). So there is a question as to why some persons report that their dreams are mainly black and white. The explanation offered by Schwitzgebel (2003) was based on his view that dreams are neither colored nor black and white; this seems not very plausible according to the above mentioned findings. An alternative viewpoint would be that it is difficult to remember the color of dream objects (if not being asked directly after awakening) as the actions and emotions are more prominent in dreams (Schredl, 2014). Schwitzgebel (2002) suggested that the popular opinion about the presence of colors in dreams based on the parallelism between film images and dream images affects the recall of dreamed colors, i.e., participants living in time periods in which media were mostly in black and white would report more black and white dreams due to the analogy between media and dreams – even if the dreams themselves have not changed. On the other hand, based on the continuity hypothesis persons watching a lot of black and white media should also report more black and dreams than persons not exposed to black and white media even if most of their non-media waking life contains colors and, thus, the majority of the dreams of both groups should include colors. An open question is to whether persons that are only exposed to colored media and colors in their daily world would still report black and white dreams.

The present study investigated whether having lived in a time period with very likely exposition to black and white TV might correlate with the reporting of color perception in dreams. The first hypothesis is that older participants, being more exposed to black and white TV in the past, report that their dreams are colored less often than younger participants and that they recall more often black and white dreams than younger participants growing up with colored TV. The second hypothesis is that participants with high dream recall frequency were expected to report more colored dreams because they remember dream colors more easily – based on the idea that our dream world is as colorful as the waking world and recalling colors is the key factor.

2. Method

2.1. Participants

Overall, 2929 (1742 women and 1187 men) completed the online survey between April 18, 2014 and April 29, 2014. Due to item-nonresponse and incorrect answers the final sample included 2701 persons (1620 women and 1081 men) with a mean age of 45.50 ± 14.17 years ranging from 16 to 90 years (women 43.10 ± 13.40 years; men 49.11 ± 14.53 years).

2.2. Measurement Instruments

Two questions of the Mannheim Dream Questionnaire (MADRE; Schredl, Berres, Klingauf, Schellhaas, & Göritz, 2014) that is available in German and English in its full length were used in the present study. The dream recall frequency was measured by a 7-point-scale (0 = never, 1 = less than once a month, 2 = about once a month, 3 = two to three times a month, 4 = once a week, 5 = several times a week, 6 = almost every morning). The retest reliability of the dream recall frequency scale is high with r = .756 (Schredl et al., 2014). Second, the attitude towards dreams was measured by six items coded on a 5-point-scale (0 = not at all, 1 = rather not, 2 = partly, 3 = rather yes, 4 = completely), e.g. "how much meaning do you attribute to your dreams?", "I think that dreams are meaningful". This scale has a high internal consistency (α = .910) and the retest reliability is high with r = .842 (Schredl et al., 2014).

In addition, the participants were asked to estimate the percentages for their recall of color perception for three possible color modalities. This was explained by the following text: Dreams can be colored (comparable to waking-life), or they can be in black and white, or it might be that the person does not recall as to whether the dream was colored or black and white. Please estimate the percentage of your dreams belonging to each category. If one option does not apply to you, please fill in Zero. Keep in mind that all three estimated percentages must add up to 100%.

Table 1. Frequency of recalling color modalities in dreams (N = 2701)

Color modalities	**Mean Percentage**
Colored	48.57% ± 41.79%
Black and white	10.67% ± 21.95%
No recall of color perception in dreams	40.76% ± 43.13%
	Σ 100%

Table 2. Percentage of recalled color modalities (N = 2701)

Category	Colored	Black and white	No recall of color perception
0%	32.14%	68.09%	38.95%
1-10%	3.89%	9.66%	6.33%
11-20%	3.48%	6.18%	6.96%
21-30%	3.52%	4.07%	3.89%
31-40%	2.37%	2.55%	2.81%
41-50%	9.22%	3.96%	5.74%
51-60%	3.18%	1.07%	1.30%
61-70%	3.74%	0.44%	1.59%
71-80%	6.89%	1.18%	1.74%
81-90%	4.33%	0.78%	1.18%
91-99%	1.74%	0.19%	0.41%
100%	25.51%	1.81%	29.10%

2.3. Procedure

The study link was posted on the online panel www.wisopanel.net where persons with an interest in online studies are registered with heterogenic demographic backgrounds. For some surveys, prizes or money are given for participation, but this study was voluntary and unpaid.

The participants were divided into three groups depending on historical data as to when color TV was introduced in Germany: time period with black and white TV, time period with colored TV and a transitional group. Colored TV was introduced in Germany in 1967 and, due to the Olympic Games in 1972 and the football world championship in 1974, most households had a colored TV by 1975 (Teuteberg & Neutsch, 1998). Since kids of 6 years of age regularly watch TV (Götz, 2007), participants who were born before 1961 were in the "black and white TV" group. Moreover, persons born after 1969 were in the "colored TV" group and people born between 1961 and 1968 were in the transitional "between black and white and colored TV" group.

Statistical procedures were carried out using SAS for Windows 9.4. Since the percentage data were not normally distributed they were categorized into 12 groups. Multiple ordinal regression analyses were done to test the relation between categorized estimations of color perception in dreams and the independent variables of age, dream recall frequency, and attitude towards dreams.

3. Results

Overall, the mean dream recall frequency was 3.64 ± 1.73 (according to the coding of the scale this mean is somewhat below the category "once per week"); about 11% of the participants remembered their dreams every morning, while 5% never recalled a dream. Women claimed they remembered more dreams than men (standardized estimate = .0861, $\chi^2 = 20.1$, $p < .0001$) and age was negatively correlated with dream recall frequency (standardized estimate = -.0978, $\chi^2 = 25.8$, $p < .0001$). The mean attitude towards dreams in the sample was 2.54 ± 0.90. Women had a more positive attitude compared to men (standardized estimate = .1646, $t = 8.6$, $p > .0001$) and there was a negative association between attitude towards dreams and age (standardized estimate = -.1261, $t = -6.6$ $p < .0001$). Lastly, a positive correlation between attitude towards dreams and dream recall frequency was found ($r = .348$, $p < .0001$).

Table 1 shows the means and standard deviations of frequencies of color modalities in dreams. The total sample estimated on average that about 50% of their dreams were estimated to include colors, while 10% of the dreams were estimated to be in black and white. Since the data were not normally distributed, 12 categories for the dream recall frequency were built and are shown in Table 2. The distributions are U-shaped.

Moreover, means, standard deviations, and percentages for the three categories related to the periods of black and white vs colored TV introduction are depicted in Table 3. A logistic regression for the categorized variables of the three color modalities yielded significant results for the factors of TV category (colored, transitional, black and white), dream recall frequency and attitude towards dreams while gender was only significant for the black and white modality (see Ta-

Table 3. Analysis for the three birth categories regarding black and white and colored TV access

Factors	Born before 1961"black and white TV" (N = 835)	Born between 1961-1968 "transitional" (N = 550)	Born after 1968 "colored TV" (N = 1316)
Age	62.22 ± 6.57 yrs.	49.44 ± 2.27 yrs.	33.25 ± 6.97 yrs.
Age range	54 to 90 yrs.	46 to 53 yrs.	16 to 45 yrs.
Colored dreams	39.18% ± 40.50%	42.60% ± 42.06%	57.03% ± 40.81%
Black and white dreams	15.75% ± 27.33%	11.13% ± 22.48%	7.25% ± 16.62%
No recall of color perception	45.06% ± 44.31%	46.27% ± 45.24%	35.72% ± 40.88%
Persons with 100% Colored dreams	18.92%	22.91%	30.78%
Persons with 100% Black and white dreams	3.95%	1.64%	0.53%
Persons with 100% No recall of color perception	33.89%	36.18%	23.10%

Table 4. Logistic regression for the three recalled color modalities (categorized variables see Table 2)

Color modality	Factor	SE	χ^2	p
Percentage of colored dreams (categorized variable)	Birth year (categorized into three groups)	.1549	62.3	<.0001
	Gender	-.0035	0.0	.8610
	Dream recall frequency	.1703	66.6	.0001
	Attitude towards dreams	.1325	39.3	<.0001
Percentage of black and white dreams (categorized variable)	Birth year (categorized into three groups)	-.1538	45.1	<.0001
	Gender	-.0732	10.2	.0014
	Dream recall frequency	.0858	12.0	.0005
	Attitude towards dreams	.1259	24.7	<.0001
Percentage of no recall of color perception (categorized variable)	Birth year (categorized into three groups)	-.0534	7.3	.0070
	Gender	.0072	0.1	.7202
	Dream recall frequency	-.1723	67.1	<.0001
	Attitude towards dreams	-.1345	39.6	<.0001

SE = Standardized estimate

ble 4). The estimates given for the number of colored dreams increased from the group born before 1961 to the younger group born after 1968 while the number of black and white dreams decreased. Interestingly, attitude towards dreams and dream recall frequency were both positively associated with more colored and more black and white dreams. The percentage of participants with 100% of dreams estimated to be in color increased while the proportion of participants with 100% of dreams to be in black and white decreased.

Even in a subsample of high recallers (estimating their recall higher than at least one dream recalled per week), some participants reported to have 100% black and white dreams: 3.72% of the participants born before 1961 rated their dreams to be 100% black and white and this was true for only 1.64% born between 1961 and 1968. Only 0.35% of the participants who were born after 1968 and only used to colored TV still reported their dreams to be 100% black and white.

4. Discussion

The main finding of the study indicates that older persons who had access to black and white media when they were younger reported more black and white dreams than younger persons, while more colored dreams were reported by the younger group that presumable started with colored TV. As the study did not elicit current and past media consumption of the participants, the inference that former access to black and white media is the key factor in explaining the percentage of black and white dreams is probable but has to be supported by a more detailed study eliciting actual media consumption over the participant's live span.

In the present study 50% of all recalled dreams were estimated to be colored compared to only 10% in black and white (40% dreams without color memory). It is worth noticing that even in the group born before 1961 and only exposed to black and white TV, colored dreams were already more frequent with 40%. In this group the average percentage of black and white dreams experienced with 15% was considerably smaller compared to the percentages typically reported in former studies (e.g. Middleton, 1942).

Some methodological issues have to be taken into account. In the present study, the participants rated the color modality of their dreams on a questionnaire with three options: percentage of colored dreams, percentage of black and white dreams, and percentage of dreams without color memory. They estimated a considerably large percentage of their dreams with no recall of colors (40%) – similar to 35% found by Schredl et al. (2008). This finding supports the idea that memory processes, i.e., difficulties in remembering dream colors, play an important role. Due to the third option persons are not forced to decide between colored or black and white so that there might be less black and white dreams than in the Middleton (1942) study: "Do you see colors in your dreams?" could be answered with "very frequently", "frequently", "occasionally", "rarely" and "never". The last category "never" was chosen in about 40%, so participants who were not sure about colors in their dreams might have chosen this option. In line with this finding, a significant negative correlation between dream recall frequency as well as attitude towards dreams and "no recall of color perception in dreams" was found in the present study. Therefore, persons that are not interested in their dreams or that are low recallers might have chosen this third option.

There are number of possible explanations for the result that the introduction of colored TV correlated with reporting more colored dreams. First, based on the continuity hypothesis of dreaming (Schredl, 2003), watching colored TV during the day might result in more colored dreams – this is in line with surveys showing that media consumption affects dreaming (Stephan, Schredl, Henley-Einion, & Blagrove, 2012; Van den Bulck, 2004) even though these studies have to be followed-up by content analytic stud-

ies of actual dream reports. In addition, the percentage of participants estimating that 100% of their recalled dreams were in color increased with being born later while the proportion of participants reporting that 100% of their dream were in black and white dreams decreased with – parallel to the increase of the availability of colored TV (Murzyn, 2008; Schwitzgebel et al., 2006).

Second, this effect might be explained by participants applying the analogy between dream and film (Schwitzgebel, 2002). Persons exposed to black and white media in their childhood and/or young adulthood would think that their dreams are black and white, even if they do not recall whether the dream was in black and white or in color. The finding that for a large percentage of dreams the dreamer was not able to recall the colors support this line of thinking. In the present study, attitude towards dreams was significant and positively associated with more colored dreams. One would expect people with a positive attitude towards dreams to have more knowledge about dreams (including the continuity between color perception in waking and while dreaming), so there would be more color reports. Interestingly, attitude towards dreams was also correlated positively with the percentage of black and white dreams; this maybe based on a different knowledge about dreaming. To clarify this issue, future studies should elicit the type of knowledge of the participants regarding colors in dreams whether they think dreams are mainly in black and white or in color. Other factors that have not been included in the present study might also – at least partly – explain the present findings: paying attention to colors in waking, e.g. one might expect difference between art students and psychology students (cf. Schechter, Schmeidler, & Staal, 1965), memory of colors in the waking state might change with age (the estimated percentages of black and white dreams are related negatively to color memory; Schredl et al., 2008), and colors might be associated with emotions in the individual (cf. Hoss, 2010) which might affect the incorporation of colors into the dream and/or recalling the color after waking up as emotional salient daytime experiences are more likely to be incorporated into dreams (Schredl & Reinhard, 2009-2010), and salient dreams are more easily recalled (Schredl, 2007).

Astonishingly, some participants (born after 1968) who were exposed almost exclusively to colored media (in addition to the colors of the waking world) still reported having only black and white dreams. This is partly explained by dream recall frequency as the number decreases to three persons if only high recallers were considered. For future research, these persons should be invited to a sleep laboratory with REM sleep awakenings and dream collecting to test their memory for colors occurred in the dream immediately upon awakening under controlled condition, for example by presenting differently colored pictures (cf. Rechtschaffen & Buchignani, 1992). We would expect that those persons would also report colors.

To summarize, the present study has shown that estimates of having black and white dreams are related to the introduction of and presumable access to colored TV. As the attitude towards dreams and dream recall frequency were positive associated with reporting colored dreams, one might hypothesize that dreamers might attribute colors to their dreams even if they are not really remembering any. Future studies should also investigate actual media consumption over the live span, color memory, its relation to age (cf. Schredl et al., 2008), participants' knowledge about colors in dreams, emotions associated with colors – as these factors possibly affecting the percentage of reporting colored or black and white dreams. In addition, the studies using retrospective estimates regarding colors in dreams should be complemented by content analytic studies in large samples of dream report.

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Measuring emotions in dreams: Effects of dream length and personality

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Summary. There are different methods to measure emotions in dreams: self-ratings and external ratings by blind judges. Previous research indicated that the measurement technique has a strong effect on the findings, e.g., the ratio of negative to positive dreams is much higher for findings based on external ratings compared to findings based on self-ratings. In the present study, 1207 diary dreams reported by 413 participants were included. The participants rated the intensity of positive and negative dream emotions on two four-point scales; a blind external judge applied the same two emotion scales. The results confirmed previous findings that external judges underestimate emotional intensity in general – more so for positive emotions – but the correlations between self-ratings and external ratings are satisfactory. Higher mean word count, extraversion, and neuroticism are related to smaller differences between self-ratings and external ratings. Future studies should investigate how the instruction of reporting all experienced emotions explicitly, especially positive emotions, could influence the difference between self-ratings and external ratings.

Keywords: Dream emotions, self-rating, external ratings, personality

1. Introduction

Dream content analysis is a widely used tool in modern dream research (Schredl, 2010). A large number of scales and coding systems have been developed to measure different dream content characteristics, e.g., number of dream persons, presence of threats, friendly interaction, and aggression (Hall & Van de Castle, 1966; Valli & Revonsuo, 2000; Winget & Kramer, 1979). Research has also focused on reliability and validity indices of this paradigm (Schredl, 2010). Whereas reliability, most often determined as inter-rater reliability (congruence between the rating of two independent judges), is very often high (Domhoff, 1996; Schredl, Burchert, & Grabatin, 2004), validity studies did yield conflicting results, e.g., for measuring dream emotions and dream bizarreness using self-ratings as criteria for the dream content analytic scale (Schredl & Doll, 1998; Schredl & Erlacher, 2003).

As emotions are also central part of dreams (Kramer, 2007), the following review is focusing on this topic. There are different methods to measure dream emotions (Schredl & Doll, 1998): (1) self-rating by the dreamer himself/herself, (2) external rating by a blind external judge who is coding dream reports with regard to explicitly mentioned emotions as well as emotions derived from the dream action, and (3) external rating of explicitly mentioned emotions, e.g., using the classification system by Hall and Van de Castle (1966). The differences between the external ratings are illustrated by the following fictive dream example "I see a monster and run away as fast as possible." given by Schredl (2010): An external judge would code fear based on the dream action whereas no emotions would be coded according to Hall and Van de Castle (1966) as no explicit emotions were mentioned. I. e., the problem of validity does not concern the content analytic scale itself but the question whether the dream report which is the basis for the judge to code the dream according to the scales is including all information that is needed, as the primary aim is not to analyze what kind of emotions are reported but what kind of emotions are experiences within the dream (Schredl, 2010). Another source of error might be that situations in dreams evoke different emotions compared to the emotions experienced in a waking-life situation but Foulkes, Sullivan, Kerr, and Brown (1988) were able to demonstrate that this occurs very rarely, below 5% of the analyzed dream situations.

Schredl and Doll (1998) demonstrated that external ratings underestimate dream emotions compared to self-ratings using the same four-point scales measuring intensity of negative and positive emotions ranging from 0 = none to 3 = strong, particularly for positive emotions. If only explicitly mentioned emotions were considered, the underestimation was even stronger: According to the classification system by Hall and Van de Castle (1966) more than half of the dream reports did not include explicitly mentioned emotions even if self-ratings showed at least some form of emotion was experienced within the dream (see Table 1). Also depicted in Table 1, the ratio of positive and negative emotions was almost balanced for the self-ratings findings, whereas negative emotions outweighed positive emotions if external ratings were considered. This difference can be explained by the underestimation of positive emotions by the external judges (Schredl & Doll, 1998; Sikka, Valli, Virta, & Revonsuo, 2014).

Sikka et al. (2014) attributed the general underestimation of emotions to the fact that external judges can reliably assess only the emotions that were explicitly named in dream reports but not emotions that are implicit or not

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Table 1. Emotions in diary dreams (Schredl & Doll, 1998) (N = 133 dream reports)

Category	Self-ratings	External ratings	Hall & Van de Castle
No emotions	0.8%	13.5%	57.9%
Balanced emotions	12.0%	9.0%	6.8%
Predominantly negative emotions	50.4%	56.4%	26.3%
Predominantly positive emotions	36.8%	21.1%	9.0%

mentioned. Schredl and Doll (1998) hypothesized that negative emotions more probably affect the mood of the subsequent waking period than positive ones and, therefore, are more likely to be explicitly reported. Interestingly, the correlations between external rated and self-rated emotions is quite high: r = .557 (positive emotions) and r = .669 (negative emotions), despite the considerable underestimation by the external judge (Schredl & Doll, 1998).

The aim of the present study is to replicate previous studies concerning the underestimation of dream emotions by external judges. In addition, possible effects of dream length and personality-related factors on the difference between self-ratings and external ratings were examined in an exploratory manner.

2. Method

2.1. Participants

Overall, 425 participants who were recruited at the universities of Mannheim, Heidelberg and Landau took part in the present study. The total sample consisted of 361 women and 64 men, mainly psychology students, with a mean age of 23.40 ± 5.41 years (range: 16 to 61 years; two missing values). Participants were paid or received course credit.
For the present analysis, participants who reported more than one dream per night or had missing values in the self-ratings were excluded from data processing (see procedure section). The resulting sample included 413 participants (350 women and 63 men) with a mean age of 23.19 ± 4.83 years (range: 16 to 55 years, two missing values). In total, they reported 1207 dreams with a mean word count of 137.63 ± 111.98 words. The mean number of reported dreams per participant was 2.92 ± 1.28.

2.2. Dream diary

A standardized dream diary was given to the participants. They were asked to keep the diary for 14 consecutive days with the instruction to record all dreams of the previous night as completely as possible (to a maximum of 5 mornings with dream recall). After recording the dream(s), participants were asked to rate the intensity of positive and negative emotions in their dreams on two four-point rating scales (0 = none, 1 = mild, 2 = moderate, 3 = strong); the same scales were used by Schredl and Doll (1998).

2.3. Dream content analysis

For the external ratings, the same two four-point rating scales (0 = none, 1 = mild, 2 = moderate, 3 = strong) as used for measuring self-rated emotions. The external judge was instructed to consider any explicitly mentioned emotions as well as emotions that can be inferred from the dream action and to score the most intensive one if various positive or negative emotions appeared. Interrater reliabilities for these scales in previous studies were r = .825 for negative emotions and r = .642 for positive emotions (Schredl et al., 2004).

2.4. Personality measure

To assess the personality of the participants, the German version of the NEO PI-R (Ostendorf & Angleitner, 2004) was applied. It contains 240 five-point items (coded: 0–4) and measures interindividual personality differences on the main scales of neuroticism, extraversion, openness to experience, agreeableness, and conscientiousness. The internal consistencies of these scales are high (r = 0.89–92) as reported by the test authors. Confirmatory multitrait–multimethod analyses replicated the findings for the English version (Ostendorf & Angleitner, 1994).

2.5. Procedure

Originally, the study entitled “Sleep, dreams, and personality” was carried out to investigate factors of home dream recall (Schredl, Wittmann, Ciric, & Götz, 2003). Participants completed different questionnaires investigating personality, sleep quality, stress, and creativity. Dream diaries were handed to the participants with oral instructions how to fill in the diary. To prevent loss of motivation, participants should only report their dreams on the first five mornings with successful dream recall and afterward just state if they recalled a dream or not. Morning reports that contained more than one dream per night were not included because in such cases it was not possible to match the subjective ratings to the corresponding dream reports of this night unambiguously. Dreams with missing self-ratings were also excluded.

The collected reports were typed to facilitate external rating and randomized to ensure blind rating. All information not describing the dream experience was deleted. The intensity of positive and negative dreams was estimated by an external judge (see dream content analysis section). Dreams were classified into four categories: (1) neutral dreams, if dreams included neither positive nor negative emotions, (2)

Table 2. Intensity of emotions in dreams measured by self-ratings and external ratings (N = 1207 dream reports)

	Positive dream emotions		Negative dream emotions	
Category	Self-ratings	External ratings	Self-ratings	External ratings
Strong	16.98%	2.65%	22.78%	6.05%
Moderate	24.19%	10.60%	26.18%	26.18%
Mild	29.91%	24.44%	27.34%	37.45%
None	28.91%	62.30%	23.70%	30.32%

Table 3. Emotions in dreams measured by self-ratings and external ratings (N = 1207 dream reports)

Category	Self-ratings	External ratings
No emotions	4.72%	17.15%
Balanced emotions	16.16%	10.60%
Predominantly negative emotions	44.41%	53.94%
Predominantly positive emotions	34.71%	18.31%

Table 4. Intensity of positive and negative emotions in dreams (N = 413 participants)

Category	Self-ratings	External ratings	Effect size	t-test
Positive Emotions	1.26 ± 0.76	0.51 ± 0.51	d = 1.134	t = 23.1 p < .0001
Negative Emotions	1.51 ± 0.77	1.08 ± 0.64	d = 0.614	t = 12.4 p < .0001

balanced dreams, if the intensity of positive and negative dream emotions was balanced, (3) predominantly positive dreams, if the intensity of positive dream emotions outweighed the intensity of negative dream emotions, and (4) predominantly negative dreams, if the intensity of negative dream emotions outweighed the intensity of positive dream emotions. For each participant who could report up to five dreams (two participants reported more than five dreams), average values for dream emotions were calculated. The difference between self- and external ratings was calculated by subtracting the value of the external rating from the value of the self-rating.

To control for potentially confounding variables, regression analyses included age, gender, number of dreams per person, and mean word count per report. Statistical comparisons for differences within the participants paired t-tests were computed. Statistical analyses were conducted using the SAS software for Windows 9.4.

3. Results

For all 1207 dreams, the external ratings and the self-ratings are depicted in Table 2. Self-ratings included moderate and strong emotions more often than external ratings. Table 3 shows that for external ratings the ratio of predominantly negative dreams to predominantly positive dreams was much higher compared to the ratio if self-ratings were analyzed. The correlations between self-ratings and external ratings were as followed: positive emotions ($r = .480$, $p < .0001$, $N = 1207$) and negative emotions ($r = .567$, $p < .0001$, $N = 1207$). With regard to self-ratings, dreams were rarely categorized as neutral compared to the classification based on external ratings.

Using the averages per participant, the external judge rated the dreams less intense than the dreamer (see Table 4). The difference between self-ratings and external ratings was higher for positive emotions (0.76 ± 0.67) than for negative emotions (0.43 ± 0.70) with an effect size of d = 0.351 ($t = 7.1$, $p < .0001$).

Table 5 summarizes the two regression analyses. Concerning negative emotions, a higher mean word count, as well as a higher degree of extraversion and neuroticism (marginally significant) is related to a smaller difference between self-ratings and external ratings, whereas a higher mean self-rating is associated with a higher difference between self-ratings and external ratings. In respect to positive emotions, the analysis only indicated that a higher mean self-rating is related to a higher difference between external ratings and self-ratings. Regarding all other variables, no significant effects were found.

Table 5. IEffect of personality variables on the difference between self-ratings and external ratings of negative and positive emotions in dreams

	Negative emotions		Positive emotions	
Variable	Standardized estimate	Statistical test t =... p =...	Standardized estimate	Statistical test t =... p =...
Age	-.0650	-1.7 .0998	-.0083	-0.2 .8094
Gender	-.0700	-1.8 .0812	.0371	1.1 .2847
Mean word count	-.1299	-3.3 .0011	-.0204	-0.6 .5541
Number of dreams	-.0198	-0.5 .6052	-.0608	-1.9 .0658
Neuroticism	-.0898	-1.9 .0591	-.0223	-0.6 .5808
Extraversion	-.0978	-2.2 .0311	-.0446	-1.1 .2588
Openness to experience	-.0121	-0.3 .7705	-.0475	-1.3 .1873
Agreeableness	.0506	1.3 .1947	-.0398	-1.2 .2420
Conscientiousness	.0036	0.1 .9292	.0229	0.7 .5115
Mean self-rating	.6528	16.4 <.0001	.7738	22.2 <.0001

4. Discussion

In line with the studies of Schredl and Doll (1998) as well as Sikka et al. (2014) the present findings showed that by using the same scales external judges underestimate emotional intensity in general but especially for positive emotions. Although the underestimation is considerable, the correlation between self-ratings and external ratings is satisfactory. For negative emotions, a higher mean word count, extraversion, and neuroticism are related to smaller differences between self-ratings and external ratings.

From a methodological view point, the strong effect of emotional intensity levels on the difference between self-ratings and external ratings is very plausible as underestimations are only possible if dreams include moderate to strong emotions. Comparing the present findings to the study of Sikka et al. (2014) which used another method for measuring dream emotions, it seems unlikely that the type of scale plays an important role as the findings regarding underestimating dream emotions are comparable. The current study used only one external rater but previous studies have shown that for samples of students' dreams and different raters the interrater reliabilities were comparable (Schredl et al., 2004), so it is not necessary to obtain rating from a second judge every time. Although the two variables (differences between self-rating and external rating) were not normally distributed (due to the small number of distinct values), the shape of the distribution was symmetrically around the mean value. One would assume that the findings of this exploratory study have not been affected by this methodological issue. Nevertheless, in future studies this issue should be taken into consideration, e.g., by applying scales with much more than four categories.

The negative correlation between mean word count and the difference between self-ratings and external ratings (found for negative emotions) support the idea that the most probable explanation for this difference is the incomplete description of the dream experience since a more detailed dream report makes it easier for an external judge to rate dream emotions adequately. To test this hypothesis, it would be interesting to instruct participants to describe dream emotions as fully as possible in the dream report and test whether the difference between self-ratings and external ratings decrease. By comparison, the instruction in this study was to note the dream as completely as possible without indicating the necessity of mentioning emotions explicitly.

Concerning the fact that the underestimation of emotions is stronger with regard to positive emotions we hypothesized that negative emotions more probably affect the mood of the subsequent waking period and, thus, are more likely to be mentioned in the dream report. One possibility to test this assumption is to ask participants to rate the intensity of the dream emotions persisting upon awakening during the process of dream recording. If negative dream emotions are more persistent than positive emotions the above mentioned hypothesis would be supported.

An explanation for the finding that higher degrees of extraversion and neuroticism are related to smaller differences between self-ratings and external ratings of negative emotions, might be that extraverted persons, as well as persons with high neuroticism, tend to communicate negative emotions more explicitly. One might assume that the narrative style not only affect findings obtained from dream reports but also from reports of waking experiences. In a future study, participants could be asked, for example, to retell the emotions of an emotional story in order to analyze whether there is a preference of telling negative emotions more often than positive emotions is also present in waking life and whether this preference is related to dream reporting. If personality measures are also included one could investigate whether extraversion and neuroticism are related to describing more explicitly mentioned negative emotions in these waking reports.

To summarize, the measurement method has a strong influence on the results regarding dream emotions, e.g., the ratio between positive and negative dreams. Future studies should investigate whether the instruction of reporting all experienced emotions explicitly, especially positive emotions, could influence the difference between self-ratings and external ratings. Another option would be to provide the judge with verbal records of dreams instead of written dream reports; this might reduce the underestimation since the judge is able to perceive the emotional state of the dreamer while s/he is reporting the dream emotions, especially if the dream is collected in the sleep laboratory directly upon awakening.

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Pass or Fail? Examination dreams in a long dream series

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Summary. Examination dreams had being classified as typical dream because many people have them. The literature focused on the negatively toned dreams, e.g., failing the exam, being obliged to take the exam again, being unprepared. The present findings analyzing 10,713 dreams of an academic indicate that examination dreams show high variability in content, i.e., there are examination dreams including positive emotions and knowledge about the subject of the exam and dreams about examinations without being examined. Furthermore, examination dreams were found more often in periods when the dreamer was facing a lot of exams in his waking life – supporting the continuity hypothesis of dreaming. To expand the present findings, it would be interesting to study examination dreams in persons with different educational background and in faculty staff who are examiners.

Keywords: Dream series, examination dreams, continuity hypothesis

1. Introduction

Sigmund Freud (1991) classified examination dreams as being typical and wrote that everyone who has pass the final school exam complains of anxiety dreams of failing the exam or as obliged to take the exam again, being unprepared, etc. Some of these dreams even become nightmarish, i.e., the negative emotion becomes so intense that the dreamer is awakened (Robert & Zadra, 2014). Typical dreams can defined as dreams with similar contents reported by a high percentage of dreamers, but not necessarily occurring with high frequency within the person's total dream life (Schredl, Ciric, Götz, & Wittmann, 2004). The lifetime prevalence of examination dreams is quite high, a large proportion of students report having such dreams (see Table 1). The prevalence in psychiatric patients is much lower; possible explained by lower education as higher education is related to higher examination dream frequency (Schredl, 2010). A considerable number of adults report examination nightmares (see Table 1). The frequency of examination dreams within a person (all remembered dreams) is relatively small (3% or less), i.e., it is not a dominating dream topic.

Starting with Sigmund Freud a variety of authors speculated about the possible meaning of examination dreams in adults (after the phase in one' life taking a lot of exams; school, university etc.). Freud (1991) formulated two ideas: the first is that examination dreams reflect punishment the person suffered for her or his evil deeds in childhood. But he also put forward the idea that examination dreams can offer some consolation as most of the dreams he collected included examinations already passed in real life. The consolation aspect, however, is only present after waking up from the dream and realizing that one has already passed. Interestingly, Freud himself failed one examination (forensic medicine) but never dreamed about it. Instead he dreamed sometimes of an oral school examination (history) that he passed with excellence but received help from his professor during the examination (guilt?). This idea that these dreams might reflect guilt about passing the examination with dishonest means was suggested by Ward (1961). Garfield (1984) focused on the basic pattern of the examination dream and not on the examination topic itself and hypothesized that examination dreams reflect a feeling of being unprepared in waking life. Stekel (1909) related examination dreams to sexual topics, proving one's potency in intercourse. Failing would reflect impotence (Renik, 1981).

Despite the considerable number of clinical case reports (Anonymous, 1919; Gutheil, 1974; Guttmann, 1934; Kafka, 1979; Kaplan, 1985; Ostow, 1995; Sadger, 1920; Schmideberg, 1933; Sterba, 1927; Sutherland, 1941), empirical research is this area is sparse. Ekeh (1972) investigated 345 most recent dreams of students in Nigeria and found that examination dreams were more often reported by tribes that are more modern, thereby attaching more value to higher education, than in more traditional tribes. Interestingly, persons who failed and persons who passed with excellence did not report as many examination dreams as those who were just able to pass the examinations (Ekeh, 1972). Halliday (1993) presented findings of 33 persons with examination dreams (students, adults) and found that most examination dreams were based on real examinations (about 84% of the examinations were successfully passed) and a number of participants reported examination dreams before the actual examination. This finding led Halliday (1993) to the idea that examination dreams can also be explained by fear of the anticipated event. Fitting in this line of thinking is the fact that school-aged children who reported that their worst nightmares were examination dreams also showed more examination anxiety as measured by a questionnaire (Schredl, Pallmer, & Montasser, 1996). Arnulf et al. (2014) analyzed dreams of the night preceding a very competitive examination and found that reporting an examination dream was related to slightly better examination grades. This find-

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Table 1. Frequency of examination dreams reported in the literature

Author	N =	Population	Measure	Percent
Griffith, Miyagi, and Tago (1958)	250 223	Students (USA) Students (Japan)	TDQ (lifetime)	38.8% 41.0%
Ward, Beck, and Rascoe (1961)	748	Psychiatric patients	TDQ (lifetime)	16.7%
Nielsen et al. (2003)	1348	Students (Canada)	TDQ (lifetime)	45.0%
Schredl, Ciric, et al. (2004)	444	Students (Germany)	TDQ (lifetime)	60.8%
Yu (2008)	348	Students (Hong Kong)	TDQ (lifetime)	79.3%
Arnulf et al. (2014)	696	Students (France)	Single item (lifetime)	73.7%
Schredl (2010)	1022	Adults	Recent nightmare topic	12.7%
Schredl and Pallmer (1998)	624	School children	Most recent bad dream	3.0%
Mathes and Schredl (2014)	1612	Students	Diary dreams	2.2%
Mathes et al. (2014)	2893	Adults	Most recent dream	0.7%

Note. TDQ = Typical dream questionnaire

ing could be interpreted in the view of the Threat Simulation Theory (Revonsuo, 2000) as most examination dreams (85%) included failure, i.e., dreaming of the examination is helpful in preparing for the actual event – actually several participants reported that they addressed some weakness in their knowledge before the examination due to the negative examination dream (Arnulf et al., 2014). An alternative explanation – much in line with the continuity hypothesis (Schredl, 2012) – that student who took the examination more seriously and put a lot of work into the preparation are more likely to dream about it and, of course, obtaining a better grade.

Lastly, Schredl (2010) reported that adults with high education reported more examination dreams and that examination dreams decline with age. To summarize, the literature has focused on the negative aspects of examinations dreams as a recurrent and/or typical dream but little is known about the variability in the content of examination dreams. In students, the majority of examination dreams included failure but a small percentage of examination dreams (5%) before a competitive examination included success; the percentage was even higher (about 20%) if examination dreams during the study period were analyzed (Arnulf et al., 2014). So, at least in students there is variability in content of examination dreams. Several studies (Ekeh, 1972; Halliday, 1993; Schredl, 2010; Schredl & Pallmer, 1998) are in line with the continuity hypothesis of dreaming (Schredl, 2003) as those persons who took a lot of examinations or value their importance or have worries about examinations dream about them more often.

The present study was undertaken to study the content of examination dreams in a detailed way (e.g., positive and negative emotions, subjects, examiners). Secondly, it was investigate whether the phenomenology of these dreams, e.g., subjects, examiners, provides any hints as to whether these dreams are continuous with regard to the waking life of the dreamer, e.g., are the examination subjects in the dream those he experienced in waking life. As the dreams were recorded over a long period of time, it was also tested to see whether examination dreams were more frequent in periods that include a lot of exams, i.e., being a student, compared to periods with fewer or no exams.

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 May 2013. The dreamer is German speaking and his occupation is research psychologist (starting after completing two degree programs in 1991). The examination "history" of the dreamer is presented in Table 2. In the third semester of his engineering studies the participant failed one examination (advanced mathematics III) with about 56% of his fellow students but passed on the second attempt. During the engineering studies he passed over 30 examinations in different subjects. During the last year, he had to undergo one or two examinations per week. Although the amount of time studying was high, the examinations were not highly selective, i.e., about 50% of the students started studying engineering completed all examination and obtained a degree. The psychological studies were less arduous with about 15 examinations. Similarly, about 50% of the students fin-

Table 2. Examination "history"

Year	Age of the dreamer	Topic
1981	18 yrs.	School finals (with distinction in mathematics, physics, chemistry, and computer sciences)
1981-1986	19 to 23 yrs.	Electrical Engineering (Diploma = Master Degree)
1986-1991	24 to 29 yrs.	Psychology (Diploma = Master Degree)
1998	36 yrs.	Ph.D. (Thesis plus two oral examinations in general psychology and philosophy of science)
2001	38 yrs.	Examination (sleep specialist)
2003	40 yrs.	Habilitation (examination lecture)

Note: All examinations were passed at the first time, except one examination during studying electrical engineering (passed at the second attempt).

Table 3. Examination dreams for five time intervals

Year	Time period	All dreams	Examination dreams
1984-1986	Electrical Engineering	279	3.94%
1986-1988	Psychology (part 1)	785	0.89%
1988-1990	Psychology (part 2)	703	1.42%
1990-1991	Psychology (part 3)	832	1.68%
1991-2013	Professional life	8027	0.72%

ished with a degree. In addition to the dissertation, the PhD exam involved two oral examinations: one topic was general psychology and the other was philosophy of science. The dreamer also underwent a sleep medicine examination for psychologists. For the title of an associate professor, the dreamer had to present a 30 minute talk with subsequent questioning in front of the full professors of the faculty. For the present analysis, all 10,713 dreams from the period mentioned above were included. The mean dream length was 133.05 ± 84.79 words.

2.2. Procedure

The dream reports were originally hand-written but were then typed and entered into a database (Alchera 3.72, created by Harry Bosma, www.mythwell.com) by the dreamer himself. This database allows one to assign key words to the dreams, which was also a task carried out by the dreamer himself. Each dream was coded by the dreamer for the occurrence of examinations as a theme. In a second step, all examination dreams were categorized according to whether the dreamer himself was examined or examination was a general topic of the dream, the examination topic, the type of examination (oral, written, practical), explicitly mentioned positive or negative emotions, explicitly mentioned level of knowledge regarding the examination topic, and the setting of the examination (school, university, other). 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 the data analysis was carried out using the SAS 9.4 software package for Windows. For comparing percentages of different time periods, the algorithm of Klingenberg (2008) was adopted. This algorithm was developed specifically to analyze binary time series with varying time intervals between the measures (which is of course the case in a dream series as dreams are not remembered every morning). To analyze the single binary time series we fitted an autoregressive Generalized Linear Mixed Model (AR-GLMM) with a logit link and serial correlation within the GLIMMIX procedure with a power covariance structure. The exact dates for the different periods depicted in Table 2 are: Sep 5, 1984 (first recorded dream) to April 26, 1986 (electrical engineering studies finished), Oct 13, 1986 (starting psychology studies) to Oct 13, 1988 (first part of psychology studies finished), Oct 14, 1988 to March 31, 1990, and April 1, 1990 to Sep 29, 1991 (final parts of the psychology studies), Sep 30, 1991 to May 11, 2013 (professional life). As the algorithm of Klingenberg (2008) can only handle a limited number of observation, the first year of professional life (N = 797) was chosen for the comparisons. Effect sizes for the differences in percentages were computed by the formula given in Cohen (1988).

3. Results

Overall, in 0.97% of the dreams (104 out of 10,713) the dreamer underwent some form of examination. In an additional 29 dreams (0.27%) examination was a topic: 16 dreams in which other persons undergo an examination, 9 dreams with the dreamer talking about an examination with other persons, 3 dreams with monitoring a written examination, and one dream in which it was unclear whether there is really an examination or not. The percentages of examination dreams (dreamer being examined) for the three time intervals (engineering studies, psychology studies, and professional life are depicted in Table 3. For the two study periods together the percentage of examination dreams was 1.62%. The first year of professional life (N = 797 dreams) was used as reference in the analyses as the percentage of examination dreams was 0.75%. The difference between the electrical engineering period and the psychology studies (part 1 to part 3) was significant ($t = 3.1$, $p = .0019$, effect size: $d = 0.168$); also the difference between the electrical engineering period and the first year of professional life ($t = 3.1$, $p = .0022$, effect size $d = 0.226$). The difference between psychology period (part 3) and the first year of professional life was marginally significant ($t = 1.7$, $p = .0975$, effect size: $d = 0.087$), whereas the comparisons of the other psychology period parts did not reach significance.

The subjects of the examinations are depicted in Table 4. In about one third of the dreams, a particular subject was not mentioned. Psychology and electrical engineering oc-

Table 4. Subjects of examinations in dreams

Subject	Dreams	Percent
Psychology	29	27.88%
Electrical engineering	16	15.38%
Bizarre topics	5	4.81%
German (school)	3	2.88%
Art (school)	3	2.88%
Physics (school)	2	1.92%
Juggling	2	1.92%
Mathematics (school)	2	1.92%
Physiology	2	1.92%
Geography (school)	2	1.92%
Economics	1	0.96%
Martial arts	1	0.96%
Latin	1	0.96%
Chemical engineering	1	0.96%
Subject not mentioned	34	32.69%

Table 5. Examiner in examination dreams

Examiner	Dreams	Percent
Teacher (an examiner in waking life)	3	2.88%
Unknown teacher	9	8.65%
Engineering academic (an examiner in waking life)	14	13.46%
Engineering academic (who has not been an examiner in waking life)	1	0.96%
Psychology academic (an examiner in waking life)	21	20.49%
Psychology academic (who has not been an examiner in waking life)	2	1.92%
Academic teacher (unknown)	16	15.38%
Boss/colleague	5	4.81%
Others	4	3.85%
Not specified	29	27.88%

curred most often. A total of 12 school-related subjects were found in the examination dreams. During the engineering studies 4 dream subjects were studies-related whereas three dreams included other topics (4 dreams without an explicitly mentioned topic). During the psychology studies, 13 dreams contained studies-related subjects, 9 dreams other subjects and 9 without an explicitly mentioned subject. In the time period after the two studies, 16 dreams included psychology-related examinations, 5 engineering-related subjects, 16 other subjects (21 dreams without an explicitly mentioned subject).

The distribution of persons carrying out the examination in the dream is depicted in Table 5. Interestingly, dream examiners were often persons who were real examiners in the dreamer's waking life (38 dreams). During engineering studies 10 examiners were engineering academics (one dream unspecified) whereas during psychology studies 15 examiners were psychology academics (one of them not a "real-life" examiner) and 11 other examiners (5 unspecified dreams). During the professional life period no engineering examiner was present in the dreams, 8 psychology examiners and one school teacher as examiner.

The emotions of examination dreams were more often negative than positive (see Table 6) but the difference didn't reach statistical significance (Sign test: M = -2.5, p = .4869). Interestingly, the dreamer was more often than not well prepared for the examination (see Table 5); this difference was significant (Sign test: M = 13, p = .0029).

Examples of examination dreams

E1: "… Eventually I realize that tomorrow or so the oral geography exam (final school examination) will take place and that I haven't prepared at all because I was so occupied with my social issues. On the one hand, I am sure that I know something but there might be a topic of which I know nothing at all. I am telling that to someone nearby. I am thinking how I will survive that."

E2: "Auditorium of my old school, final math exam. About 20 persons are present. The examination lasts one hour, I am able to solve a few simple items but I am not progressing with the really important tasks. These consist of putting together Lego bricks according to complicated manuals. … Time slips away, I not able to solve anything. After the examination I throw myself to the ground and start to weep. I never had such a bad grade. A teacher is asking me whether I expected a very good grade. I say no but I am a person who normally has good grades. Some of the task solutions were presented on a screen: I have some correct answers (not a complete failure); this should serve as consolation."

E3: "I am in the examination about the psychology of language. The examiner is Prof X. with a second person who is sitting at some distance. Prof X. is asking question about Chomsky and wants to hear another name. I admit that I do not know every person in the psychology of language field, but I was able to report the facts. Then, he wants to know a Gestalt psychology name, Max Horckheimer. My associations are running away. I comment on that. Then the name Kafka, Franz, comes to my mind, yes, Koffka with two fs. This is the end of the examination; he said I should wait outside so they can determine the grade. He is smiling. I am very unsure. After a short period of time he calls me, there are other persons in the corridor. I receive the best mark. I answer: "It is a pity that this is a dream." and go away.

E4: "I am standing with several persons in front of a big lecture hall. In this hall the entrance examination for studying electrical engineering has just finished. I am very happy that I already finished the studies; other persons had quite some difficulties with the examination.

E5: "A beautiful, friendly morning. In a cozy room we (several students) take a written exam. The end is approaching, 2 p.m. The suggestion of the professor is to continue after a short break during the afternoon hours but she immediately says that she was not serious about it. We get another 5 minutes to finish our exam. I am going through my answer sheets; I just manage to complete all tasks of the exam. I am very confident regarding my performance, most of the answers should be correct. I clear away my stuff and the empty sheets but I am careful not to put away one of the answer sheets.

E6: "I am a pupil in the 9th grade (age 15 in Germany). We took a brief written test consisting of three tasks. These are quite simple; all pupils had no difficulties. I return my two sheets after I entered the abbreviation of my class (c'). I am curious whether I will get the best grade and whether my grades are overall on a high level."

4. Discussion

The present findings indicate that examination dreams show much more variability in content than previously described in the classical literature (Freud, 1991; Renik, 1981; Ward, 1961), i.e., there are examination dreams including positive emotions and knowledge about the subject of the exam and dreams about examinations without being examined; a finding which is in line with the findings of Arnulf et al. (2014) also reporting a considerable percentage of successful examination dreams. Furthermore, examination dreams were found more often in periods when the dreamer was facing a lot of exams in his waking life – supporting the continuity

hypothesis of dreaming (Schredl, 2003). As the exact dates of the examinations could not be reconstructed, it was not possible to differentiate whether the examination dreams occurred prior to the examination which might reflect anxieties about successfully passing or after the examination, i.e., incorporating salient life events into the dream (Malinowski & Horton, 2014; Schredl, 2006).

From a methodological viewpoint it must been noted that the findings are based on one dreamer who is highly educated and passed a lot of exams successfully (failed only once and successfully passed the second attempt). Thus, it would be very interesting to study the phenomenology of examination dreams in other persons, preferably not only students since education is related to higher frequencies of examination dreams (Schredl, 2010). Compared to the student sample (Mathes & Schredl, 2014), the frequency of examination dreams during the studies was comparable (dream series: 1.62% and students: 2.2%); also the frequency of examination dreams during professional life was comparable to the figure of 0.7% reported by adults (Mathes, Schredl, & Göritz, 2014). This supports the validity of the present findings. As the coding was done by the dreamer himself, it should be noted that simple content analytic scales (Topic present/not present) show high interrater reliabilities (Schredl, Burchert, & Grabatin, 2004) and, thus, possible coding biases regarding the results should be minor.

As the examination dream frequency is considerably higher during the studies periods when facing a lot of examinations, the present finding supports the continuity hypothesis (Schredl, 2003) and the cross-sectional finding that examination dreams decline with age (Schredl, 2010). Furthermore, the examination subjects and the examiners are also often continuous with regard to the waking life of the dreamer, i.e., the dreamer dreamed about examination he took in his waking life. On the other hand, there are dreams including topics that are not related to waking life, e.g., taking a Latin exam (the dreamer never took classes in Latin) or even bizarre subjects like putting together Lego bricks. Like Freud (1991), the dreamer never dreamed about the examination (advanced mathematics) he failed. It would be very interesting to study whether this type of examination dream is related to waking-life in a more general level like a basic pattern of being unprepared (Garfield, 1984), especially in adult who have not to face any formal examinations (compared to students).

Whereas the emotions of examination dreams were balanced, the dreamer more often reported examination dreams in which he was quite well prepared also reflecting waking life as the dreamer was an above-average pupil and student; these percentages are higher than those reported by Arnulf et al. (2014) in a large student sample. Thus, it would be very interesting to study examination dreams like Ekeh (1972) in persons who struggle a lot to pass their exams. One would expect more negatively toned dreams and more often the feeling of having not prepared enough. Another interesting topic would be to study academics and teachers who administer a lot of examinations; the dreamer reported three dreams where he was on the “other side” but he was never an examiner in his waking life although he helped a few times to prepare written exams.

To summarize, examination dreams show a broad spectrum of contents, continuous and discontinuous to the waking life of the dreamer. In the future, it would be interesting to carry out longitudinal diary studies which include measuring daytime challenges (including examinations) and measures of examination anxiety, for example, in students at different points of their studies but also in the working population in order to elucidate the relationship between waking life and examination dreams. Moreover, the educational background and the average grades should be elicited as these factors might contribute to the frequency and content of examination dreams.

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Continuity, conscious dreaming and dying: Implications of dream-travel to the afterlife

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Summary. The continuity hypothesis poses the waking state as hegemonic to that of dreaming with hardly any reference to the relationship between dreaming and dying. In the revival of shamanic dreaming as conscious dreaming, the traditional shamanic journey to the afterlife is repackaged as dream-travel for the discovery of otherworldly realms beyond death. Conscious dreamers are guided to construct personal geographies of the afterlife. If this form of dream discovery comes to make a difference in people's waking lives, it would also lead to a reappraisal of the continuity hypothesis for including the meaning of dying in the nexus between waking and dreaming.

Keywords: Afterlife, consciousness, continuity, dream-travel, dying, shamanism

1. Introduction

Continuity between waking and dreaming concerns the question of whether the dream-state is a derivative one that is contingent on the perceived dominance of the waking world (Lee, 2015). It tends to dispute the notion that dreaming can arise quite independently as a set of events and experiences without being fully influenced by actions in the waking state. The assumption is that the waking state is likely to be temporally prior to the dream-state, which suggests the meaning of continuity to be a sequentially determined condition based on diachronic rather than synchronic phenomena. It can be said, without going into details, the standard view of dreaming infrequently calls into question this assumption but instead reinforces the diachronic position by addressing how and when prior waking events are incorporated into current dreaming activities. We may refer to the classic Freudian approach to dreaming as showing the indispensability of knowing the meanings of past actions in order to understand present dream experiences. Schredl (2003) also suggests the time interval between waking experiences and dream events as one of the important factors in demonstrating continuity. In short, continuity is seen to be irreversible since its flow may be synonymous with the arrow of time. However, in the light of the debate between Hobson and Schredl (2011), we may ask if this arrow of time can be bent or become reversible, i.e. whether dream events can develop independently of waking actions to affect our waking lives at a later time. Here we are not speaking of a discontinuity between waking and dreaming but of rethinking continuity as a complex relationship between the two states in which neither is always prior to one another. I propose to depict this relationship diagrammatically (Figure 1).

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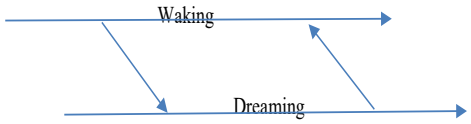
In Figure 1, waking and dreaming are represented as parallel unidirectional lines moving from already completed actions toward new scenarios that have yet to be formed. The two vertical arrows running from waking to dreaming and vice versa depict, respectively, continuity as past waking moments impacting on current dreaming and futuristic dreaming reshaping waking behavior as it unfolds beyond the present. There is no breakage between waking and dreaming because the two vertical lines provide the link between the two temporal states of consciousness. It implies that continuity is premised on a future state that may or may not be anticipated. In waking life, people routinely conduct themselves with the firm belief, or perhaps some inkling, that what they do now would affect some or all aspects of their future selves. Memory of completed waking actions may manifest in different ways as later dream events. But in dreaming, there could be moments in which premonitory events are experienced and later recalled in the waking state to affect the future outcome of a person's life and thinking. A good example is Kekule's snake dream in 1890 that supposedly resulted in his later conception of the benzene molecule (see MacKenzie, 1965). Thus, a corollary of the continuity hypothesis would pose the human concern with behavioral outcomes for the future state as a catalyst for bridging the flow of waking and dreaming events. In particular, we may speak of this concern in terms of the transcendental-future. The concept of transcendental-future concerns people's projection of their existence beyond the present world and how it may come to influence their present behavior (Boyd & Zimbardo, 1997). In the present discussion, it represents the construal of mortality not only as physical termination but also the continuity of the self in ex-

Figure 1. Waking - Dreaming



istences not defined by the conventional ideas of time and space. It suggests that confrontation with one's mortality is not merely an intellectual exercise for managing the fear of death but more poignantly an inquiry into preparation for the eventual end of waking life and the uncertainties that may follow. These uncertainties underlie the need of most people to speculate or ruminate about their transcendental-futures, i.e. to wonder what awaits them when they no longer exist in waking bodies.

If considerations of the transcendental-future were indeed basic to all or most of human striving, then it would not be implausible to ask whether dreaming consciously of a future state can reshape continuity by rearranging the direction of waking lives in tandem with the remembered scenarios of specific futuristic dreams. My aim is to examine this aspect of continuity by addressing the quest for conscious dreaming that allegedly creates new understandings of the transcendental-future through the discovery of the afterlife. First, I would like to place in context the meaning of conscious dreaming in relation to shamanism. Then I discuss some of the writings of Robert Moss (1996, 1998, 2005a, 2005b, 2011) as a leading advocate of conscious dreaming and his claims to offer understandings of the transcendental-future through dream-travel to the afterlife. The implications of these claims for the continuity hypothesis are reviewed in the final section.

2. Shamanism and conscious dreaming

The quest for conscious dreaming can be located in shamanism that propagates beliefs and practices aimed at healing and promoting visionary contact with otherworldly powers (see Eliade, 1964). Originating in small-scale hunting-gathering societies, shamanism was the focus of thaumaturgy and spirituality among peoples with limited technological skills that banded together for communal support and survival. Anthropological works have shown the widespread patterns of shamanism in the world but anthropologists themselves have not fully agreed on whether they demonstrate a unitary or homogeneous form (Atkinson, 1992, p.308). However, research on shamanism has consistently addressed the fundamentals of shamanic behavior and their relationship to a cluster of psychological or mental experiences termed altered states of consciousness or ASC (e.g. Bourguignon, 1973; Peters & Price-Williams, 1980). This focus on shamanism and ASC has also produced a new term, shamanic states of consciousness or SSC (Harner, 1980) to resonate with the idea of shamanism as a learned art or profession (Rogers, 1976, p.15). It suggests that SSC are not necessarily spontaneous but develop through a period of training in which the novice becomes attuned to otherworldly communication such as vision seeing and clairvoyance. Embarking on arduous vision quests forms a training device for the novice to attain new experiences in consciousness exploration. One of these experiences relates to the cultivation of acute awareness in dreaming in order to complete a spiritual journey. In the example of the Warao Indians given by Moss (1996, p.129), a novice is expected to make such a journey in a trance where he faces terrifying ordeals. If he survives he progresses to several magical waterholes, one of which becomes his selected power spot where he returns in dreaming to cleanse and revitalize his energy. The power to dream consciously symbolizes his transition to a new role as healer and psychopomp.

Shamanic dreaming was therefore perceived as a form of privileged consciousness because they implied entry into the "pure sacred life" for reaffirming connections with gods, spirits and ancestors (Eliade, 1964, p.103). This form of transaction between shamans and the dream world drew attention to the ability of the shaman to enter "the dream world as if it were a space of heightened consciousness filled with varieties of knowledge to be utilized in the waking world" (Lee & Ackerman, 2002, p.103). There was no lack of faith among followers and thaumaturgy seekers who only saw shamanic dreaming as the gateway to better health and personal well-being. Shamanic dreaming can be thought of as a bridge of consciousness created by the shaman to bring the dream world into the lives of followers and believers. To many outsiders unaccustomed to the practice of shamanic dreaming, the faith of these followers and believers became a reminder of a time when flights of fancy went unquestioned. Yet various anthropologists from modern societies researching healing cultures among native peoples did not disregard the meaning and power of shamanic dreaming. They not only addressed the personal and cultural meanings inherent to the dreams of native peoples but also placed the significance of their own dreams in those contexts they studied (e.g. Tedlock, 1991). By making known how their dreams worked and what they meant in the natives' frame of reference, they enabled the quest for relevancy of shamanic dreaming in their own societies.

Among these anthropologists, Castenada (1972) and Harner (1980) became recognized for their works that popularized the use of shamanic techniques in dreaming. They came to epitomize the increasing number of researchers and laypeople paying attention to native forms of dream communication that allegedly improved lifestyles in the waking world. Popularity of these dreaming techniques in modern society suggests a scenario of dreamers learning to become self-aware in the dream-state and exploring it in a manner contrary to the conventional assumption that dreaming is not waking. It implies that within populations that make clear distinctions between waking and non-waking consciousness, there are cultural interstices for deemphasizing these distinctions to enable the discourse and practice of waking up in dreams. These interstices have also facilitated systematic inquiry of lucid dreaming (LaBerge, 1985) as a parallel development to shamanic dreaming, although both forms do not always share a common focus. Whereas the latter seeks to promote native traditions of dreaming in modern society, lucid dreaming poses the paradox of being awake in dreams as a psychological question addressing the perceptual processes that create mental representations of the world (LaBerge & Rheingold, 1990, p.287).

As the third category in the new dreaming consciousness, conscious dreaming does not depart radically from the principles of induced awakening in dreams as found in the shamanic and lucid types. Moss (1996, pp.116-7) specifies it as a phenomenon that not only produces heightened self-awareness in dreaming but also alters the normative perception of the waking world like a person descending from a mountaintop through a series of base camps. In his view, these experiences may make it unnecessary for aspiring conscious dreamers to apply stringently techniques for exercising full control over the dream-state as emphasized in lucid dreaming. His criticism of lucid dreaming techniques brings him closer to the shamanic type that stresses spontaneity and spirituality (Moss, 1996, p.125). In particular, his

preference for drumming as a method for inducing dreams suggests that the age-old shaman's technique for entering trances forms a backbone of conscious dreaming. In addition to initiating dream journeys, drumming is also seen as an effective way to summon spirits of the departed. As with the belief in the shaman's ability to visit the afterlife in dreams, assisting dreamers to become conscious in their dreams is also believed to be a means to cultivate for them the opportunity to converse with the dead as well as travel to the afterlife. It is this goal of conscious dreaming that seemingly distinguishes it from the scope of lucid dreaming. While the aim of training to become lucid is primarily directed toward maintaining lucidity in order to manipulate the dreamscape, one of the purposes of conscious dreaming is journeying to the afterlife to explore the conditions there. What meanings might such discovery have for conscious dreamers?

3. Dream-travel and the afterlife

Belief in the afterlife is intrinsic to the human concern with mortality. Since time immemorial, this belief has been the template for human anticipation of rebirth in other worlds. Even in prehistoric times, death was not just treated as physical termination but a passage to another existence. Later association of this existence with a dark subterranean region became the mythological Sheol for the ancient Hebrews and Hades for the ancient Greeks. By the time of early medieval Christianity, this journey was no longer portrayed as simply a path of descent but one made toward the grandeur of the Celestial City (Hick, 1980, pp.57, 210). But the perceived pervasion of sin in Christian thought also made it necessary for this portrayal to exemplify the consequence of human actions as culminating in separate journeys to heaven, hell and purgatory (for a history of thought on these journeys, see Le Goff, 1984; McDannell & Lang, 2001; Segal, 2004). This idea of post-death peregrination suggests a perspective of the transcendental-future with many imagined levels of existence. Present studies of afterlife belief (Miller, 1998; Fontana, 2009; Frohock, 2010; Vanolo, 2016) not only demonstrate the old themes of heaven and hell but also suggest multi-dimensional explorations of the self after death. What this implies is that belief in the afterlife may be undergoing transformation for re-imagining it as a realm of discovery. In this respect, the emerging discourse on conscious dreaming as a portal to alternative experiences can be treated as a practical guide to personal explorations of the afterlife. It represents an attempt to frame the afterlife as a ground of new experiences in the non-waking state. In this effort, the afterlife is once again brought to the fore as a direct experience of otherworldly realms and not as a vicarious brush with the unknown.

Moss (1998, p.184) approaches this experience through conscious dreaming as ars moriendi or the art of dying. It is meant to help people allay their fear of dying by teaching them to dream consciously and travel to the afterlife to see what lies there. This type of soporific journeying forms one of the key areas of conscious dreaming: to develop a personal geography of the afterlife. It also introduces an alternative means of addressing the transcendental-future in space-time discoveries not governed by the parameters of the commonsensical world. Constructing a personal geography of the afterlife necessitates planned explorations of certain stable locales in the dreamscape. Moss (1996, pp.128-9) argues that not all dreamscapes lack stability. What is important to him is that one can learn to dream-travel to afterlife locales that are already in place for discovery. Accordingly, some of these locales have a manufactured quality, like movie sets, created by other people who predeceased us. Once set up in the dreamscape, these locales are treated as autonomous realms and invite exploration by dream-travelers who may also observe the processes of transition between different after-death states (Moss, 1998, pp.185-6). It suggests that dreamers need not assume as givens the narratives of heaven and hell. Instead of clinging to pre-determined notions, each dreamer is encouraged to assess individually the nature of dream-travel to the afterlife. Some of these practices are taught in death workshops conducted by Moss (1998, pp.194-202) to "produce a personal source of inner certainty and continuing guidance on issues of death, dying, and the afterlife…as an Upper World journey."

As a new art of dying, conscious dreaming prioritizes knowledge of the dream world as equivalent to maps of the afterlife. Knowing how to dream also means knowing how to die. Training to dream in this way involves mind relaxation and cultivation of dream awareness to meet the appropriate escort to the afterlife. The escort is the dream figure who assists the dreamer in exploring the environments of the afterlife. By shifting preparation for dying to the dream-state, practitioners of this art redefine sleep as an ideal condition for confronting death since it supposedly frees the mind to connect with the dream world and to reach the afterlife. Yet the idea that anyone can access the afterlife through conscious dreaming may not be regarded as appealing to everyone. Modern skeptics would be reluctant to suspend disbelief of such practice largely because the uncertainties of dreaming cannot always be articulated as a vehicle for confronting or overcoming the certainty of death. However, what has become permissible in a re-enchanted world is the creation of new cultural spaces for amalgamating recondite beliefs and practices with conventional ideas of self-development. Beliefs and practices such as those found in shamanic dreaming proliferate as a new form of guidance for the self to discover and nurture its inner potentialities. Since the advocacy to develop these potentialities as part of creative dreaming (Garfield, 1976), the search for new interpretations of dream experiences has extended beyond the Freudian unconscious into the imagination of other realms (e.g. Norbu, 1992). These other realms have also come to be considered as coinciding with the afterlife because they are seen as existing in dimensions not governed by the conditions and conventions of the present world. In the new cultural spaces, the afterlife is no longer restricted to heaven, hell and purgatory but extended to other worlds that have yet to be explored. Dream explorers are treating this redefinition of the afterlife as a way to transform the uncertainties of dreaming into a new art of dying. Confronting death through dreaming is not simply promoted as a panacea for death fears but also taught as a form of self-discovery in which the dream becomes the medium for encountering other worlds represented as the vistas of the transcendental-future.

The growing number of dream websites and workshops attest to an expanding market that caters to the curious as well as seekers of new worlds. In this market, the visibility of conscious dreaming suggests that the opening initially created by anthropologists proactive in traditional dreamwork has now blossomed into a subculture of dream explorations dovetailing with the new concerns of consciousness transformation in death and dying. It implies a new situation

where the quest for self-discovery in dream explorations reactivates the need for knowing the meaning of the afterlife. This also opens up the question of whether dream-travel to the afterlife can reshape the contours of waking behavior, i.e. is dream-travel a prescient component of waking life? Moss's adage (1996, p.131) that "as you become more conscious in dreams, you become more conscious in life" would suggest another view of continuity as a form of synchronicity in which dreaming and waking knowledge are simultaneously connected. His reference to the classic tale of the researcher Herman Hilprecht who in 1883 solved the puzzle of two fragments of agate at a temple excavation through a dream encounter with a long deceased priest (Moss, 2005a, p.73) serves as a memorable example of such synchronous connections. If training to dream-travel to the afterlife could provide new ideas on our discernment of dream consciousness, in what ways would it also affect our conception of the continuity between waking and dreaming?

4. Implications for the continuity hypothesis

The most obvious implication of dream-travel is its indication of the continuing tradition in shamanic practices of vision seeing and otherworldly sojourns. Even in a high-tech world of instant jet travel and mobile communication, the techniques developed by shamans for dream-travel have not become obsolete or lost to the passage of time. Although traditional shamans are gradually becoming an anachronism, the acolyte of conscious dreaming depicts a rebirth of practices carried by shamans for knowing the afterlife. In this sense, the relevancy of shamanism for understanding modern death and dying should not be underestimated but be applied to the debate on the relationship between waking and dreaming. If the quest for conscious dreaming were indeed a renewed shamanic means to dream-travel to various transcendental-futures, it would also undeniably reset the parameters for thinking about the nature of continuity between waking and dreaming. It may suggest that we need not always feel compelled to assume the hegemony of the waking state in order to make sense of all our dream memories. Dream-travel experiences could be treated alternatively as a sine qua non of waking behavior which the dreamer, like the shaman, performs as if it were a script of the dream itself.

This would imply that even when we become conscious in dreaming, the likelihood of a discontinuity between waking and dreaming does not arise because what is dreamed could come to be enacted in waking. We may consider this carryover as a waking simulation of the dream-state in which consciousness is not broken up or disrupted but re-streamed into waking life like the case of Hilprecht redeploying his dream experiences into his archeological work during waking hours. Affirmation of this continuity is based on the presence of self-reflective awareness spanning both the dreaming and waking state, as is also evident in the case of lucid dreaming (see Stumbrys, 2011, p.94).

In view of shamanic dreaming being revived as conscious dreaming, is it possible to reconsider the idea of dream-travel as a means for deconstructing the meaning of dying as the dissolution of consciousness? Rather than assuming the waking-dreaming continuum as an unequivocal part of life, we may also want to rethink it as a part of death. In other words, it would be more fruitful to reimagine dream-travel as a bridging of waking and dying consciousness than as a fantasy flight to otherworldly realms. By stepping into the shoes of the shaman, the dream-traveler may get to experience more than just a glimpse of the transcendental-future. Opportunities for using that experience to reappraise the conventional meanings of death could arise in the wake of increased sensitivity to the continuity of consciousness across the states of waking, dreaming and dying. As yet, the quest for conscious dreaming is still unfolding and one would be too presumptuous at this stage to imagine growing receptivity to a form of dreaming that emphasizes travels to the beyond. However, the concern for human mortality never wanes and would provide an impetus for dream researchers to investigate the claims of conscious dreamers. If this comes to be a future project of dream researchers, then we would likely witness a rethinking of the continuity hypothesis as not limited to waking and dreaming but broadened to the state of dying.

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Ancester dreaming: A portal for inner and outer world peace when dreaming for and with the ancestors

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Summary. It is commonly believed that dreams are only for the dreamer. However, in my experience, some of our dreams are for and from the ancestors, and as such, ask for healing so we can live our own lives, while tending to the grief of the ancestors.

Keywords: Dreams, ancestor dreaming, grief

1. Introduction

I had dreamed as a child, but childhood and my early years as an adult were focused on survival. One of my anchors was learning that my father, as a boy, had a wolf as a pet. My beautiful, silent father. So whenever my father said anything, my ears were at attention. He spoke one sentence, and in what context he was inspired, motivated, and moved to speak it, I no longer remember. As a boy, he had a wolf, but after a time, the wolf was given to a farmer because the cat population in the neighborhood was being decimated. I heard the sadness in my father's voice, and, I caught his wry humor. The introduction of a wild animal so close to me was a great gift.

Once I started to record my dreams in 1976, the animals came, sometimes in great numbers; at other times, it was as if they had disappeared into a deep and dark forest. Perhaps this accounts for my pilgrimages to zoos, so I can be closer to them in the physical when they are absent in my dream world.

At the end of each year, I re-read all my dreams, and make notations of patterns or themes, prescient dreams, symbols, animals, and anything else that comes through. As I read, I am able to immerse myself in the dreams once more, feeling their particular essence.

When the animals started to appear, I wanted to know what they meant. There are animal dictionaries and online sources, but two books that found me were Jamie Sams and David Carson's "Medicine Cards", and Ted Andrews' "Animal Speak". If an animal appeared that I couldn't find a meaning for, I intuited it, or not, or we just hung out for the time being, as meaning and symbolism fell to the wayside.

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2. Animals in Shamanism and strengthening those dreaming muscles

I'm an inveterate student with a wide curiosity. That became an entre into shamanic studies. One day, a magazine that I hadn't subscribed to, arrived in the mail. It had my name on it, but I had not ordered it. It was called "Shaman's Drum" and I fell into its pages. Thus began my formal study of shamanism, which heralded a deeper dive into the animal world; then the animals began to visit in droves.

My interest in dreams took me to The Ojai Foundation and Dream Circle classes, and the Pacifica Graduate Institute, both in California.

I will tell you that I have acted and reacted to messages in dreams. Once, I was given a telephone number, which I called. I calmly explained to the person why I was calling. When I hung up, I understood that this was part of strengthening my dreaming muscles.

3. The ancestor's dreams

Mid-2015, I began not only waking in the middle of the night, but waking and remembering some dreams. This had never happened before. The waking usually occurred around 2-3AM. Having recorded my dreams for 40 years (and the analogy of a tribe wandering in the desert for that long is not lost on me), I knew their shape, form, and color, like a mother knows her children. But something about these dreams was different. They were elusive; they were like wisps of smoke that when I reached for them, vanished.

At about this same time, I have a clear memory of a thought that stopped me in my tracks in my living room, which was my bedroom, which was next to the fireplace. My word for fireplace is hearth. It has a connection for me with a warm home, and since that experience had been missing, something said that the right place for the bed in this home was next to the hearth.

On this day, the thought that was asking to speak literally shouted to the ancestors that I had work to do, and that if they didn't want to come along for the journey, then they had to leave. While I was stunned by the sound of my voice to the invisible, it had been necessary. It was as if I had said

or understood that while the ancestors were connected, there were some that were dead weight, so to speak. I was willing to help, I said, but I needed some give and take.

Here's what I don't know

The thought that stopped me? Did I think it or was it thought through me? I don't have an answer except to say that whatever "spoke" needed to be said, and it needed to be heard.

Here's what I do know

These dreams were not mine but needed to be dreamed through me. These dreams were not mine but were connected with me. These dreams were not mine, and they were happy to be dreamed now.

It was as if something were being expelled, exonerated, exorcised, released, diffused (much like a bomb), blessed, and then made sacred.

I have learned, since this experience, and when these dreams come in the middle of the night, to not strain to remember them. If I remember them, I write them down. If I don't remember them, I let them go. This is another strengthening of my dreaming muscles.

4. A.R.E. Dream helper Circles

Almost a year later, I read in A.R.E.'s monthly magazine Venure Inward, an article titled: "Let's Normalize the Paranormal: A Revolution in Dreamwork" by Henry Reed, PhD. I answered the clarion call and participated in two Dream Helper Circles, and was the administrator for a third.

In the second Dream Helper Circle (DHC), it was as if a Cosmic Tumbler had clicked into place. When dreaming for the Focus Person in the DHC, we were asked to record the first dream of the night after we went to sleep. I had that first dream and tried to capture it, but it was a wisp of smoke and I couldn't wrap my remembering mind around it. I realized at once that it was an ancestor dream and not one to be shared for the person in the DHC we were dreaming for. I learned from this that even though the circle was given the dictum to record the first dream of the night for the focus person, the ancestors clearly had not intended this first dream for that person.

5. World peace, one issue at a time

During the DHC, I had the idea that we could have Circles that dream for a 'situation' in the world, like refugees, global warming, bullying. Maybe we wouldn't have a discernible or measureable effect, but it might be interesting to explore. Because at the heart of it, as I learned, the dreamer is healed too. This could generate some interesting articles & reflections.

So if this is possible, why not dream for the ancestors?

About a week after the DHC was over, a book I had ordered called "The Wild Edge of Sorrow" by Francis Weller arrived. I was into the Forward when I read of the five gates of grief, that one of the gates was "ancestral grief." It was the explanatory sentence that took my breath away: "This is the grief we carry in our bodies from sorrows experienced by our ancestors…tending this undigested grief of our ancestors not only frees us to live our own lives but also eases ancestral suffering in the other world."

This made consummate sense, and I could not advance further in my reading until I had digested, understood, and backtracked through my life.

6. The puzzle pieces of an ancestral dreamer

When I was a young girl, my father purchased a set of the World Book Encyclopedia. I ripped through the volumes like a house on fire, as if I were looking for something. A clue that I, and only I, would recognize. I found it further down the alphabet in the picture of a South African miner. His face was covered in dust so he no longer had his black skin. In his outstretched hands were diamonds. The look on his face, the placement of his hands, as if in supplication, the new color of his skin – it spoke to me and I tore out the picture. I had to give it back when one of my siblings ratted on me, and I was severely punished.

But I knew there was something in that photograph that was me on a soul level. That touched me in a way few things in childhood had. And, that I should pay attention. Also, I knew that this, too, would be my job in this lifetime: to mine and mind the underground of my family's history to unearth the gems of my ancestral line. To heal, if I could; to help, if asked.

Once I had left the confines of my mother's house, slowly I began to remember dreams again. Thus began 40 years of dream journals. What I realized was that I had been mining my own dreams, so that at some point, more attention could be paid to the dreams of the ancestors.

7. Postscript

Something unexpected came through in my DHC experience. This is the unexpurgated sentence: "Remember that you are a healer, and accept and bless what heals you."

I believe that we all have the potential to heal and be healed by our dreams, and by the dreams we dream for others. When you add the ancestor component, the possibilities for inner, and outer world peace become profound, life-saving, and a blessing.

Another unexpected epiphany came through a few months after the DHC's.

I consulted with an herbalist about, among other things, my fairly consistent waking between 2-3AM, and, what I was doing with that time because I did not like to toss and turn. I had stumbled upon a solution, and why, with my meditation practice that began in the early 1970's I hadn't thought of it sooner, was a mystery. When I was awakened at this hour, I would fall myself back into sleep by visualizing or imagining something good in my life – a kind of active meditation. My imagination had a field day with this. I relayed this to the herbalist.

His response, without missing a heartbeat, was that he had been told by a Lakota Medicine Woman that 2-3AM is the Time of the Ancestors, that the noise from the Collective Unconscious is quieter, and more subdued. Static is low, and thus it is a more subtle time to tune in for clarity, insight, and visioning. This made consummate sense, and I could see how it was thus easier for the dreams of the ancestors to slip through.

So not only had I stumbled into a sacred time, but that wider wisdom of mine, rooted in my meditation practice, taught me how to utilize that time, and how it linked with the ancestors.

It also taught me that certain visualizations/meditations "felt" better than others, calmed me down, infused me with a welcome peace, and soon shuttled me back to sleep. I can now better identify these "better feeling" visualizations/meditations. I must add that I don't exactly know where they are coming from. I do not recognize any of them as events from my past. Are they my dreams, hopes, and wishes hidden deep in a memory well that had been cemented over with family and cultural verbotens? Was it extending back to forbidden desires and thoughts from my ancestors? Are they a thread on the loom of my life that is asking to be heard, and healed? Is it me dreaming my life forward? Are the ancestors dreaming through me? Am I participating in ancestral healing? Alas, I don't have an answer. But I feel that I don't need to know right now, and maybe never. Bottom line? Over 90% of the time, it helps me to go back to sleep!

I will say that there are certain visualizations/meditations that I return to time and time again. And that if I try to go back to one I've already have and I have visited there recently, sometimes the door is not opened and I have to conjure another visualization/meditation. I have learned that there are plenty of them to choose from!

Closing thought

I think it is possible that this ancestral dreaming doorway is another way for the ancestors to communicate what they knew and could not (some of them) never tell us. After all, they had dreams too.

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Oneiric bizarreness and continuity between waking and dreaming

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Summary. Based on real examples of oneiric bizarrenesses whose link with waking life of the previous day was established on the basis of the presence of similarities between the oneiric and waking-life feelings, the author presents observations that support the continuity hypothesis.
This continuity is robust and concerns barely mentalized, intra-subjective processes. The form of the elements that populate the dreams (animals, characters…) seem to reflect a vision that is governed by one's mind-set at that time and the oneiric elaboration presents itself as the fruit of a very precise process of creation that exploits a linguistic-like competence. The oneiric expression is better described as symbolic and regulated than metaphoric and fantastical.

Keywords: Continuity hypothesis, animal dreams, dreamed characters, symbolism

1. Introduction

The issue of continuity, an issue that can be summarized as *"to what extent do dreams reflect waking-life of the previous day?"*, is still under debate today. While this continuity can be understood as complete (that all elements of a dream reflect something from the preceding day's life) or as illusory (that a dream in no sense whatsoever reflects life during the previous day), it can also be understood as partial (that only one part of the dream reflects something from the life during the previous day). In the context of this debate, dreams presenting bizarrenesses have attracted particular attention because they are considered as representing possible cases of discontinuity (Hobson & Schredl, 2011; Malinowski & Horton, 2011). Here we give a contextualised presentation of our own oneiric bizarrenesses that produced affects that were sufficiently original as to render the idea of their possible link with waking-life viable. After presenting our method based on the principle of the oneiric replay of real-life affects, we demonstrate why our observations lead us to believe that dreamed bizarrenesses are not, in fact, a sign of discontinuity. We argue in favour of the possibility of a strong continuity that draws on a linguistic type competence.

2. Method

2.1. Making the dream/previous days' life link by considering affect similarities

Recognising in every affect experienced in a dream, a rediffusion of a similar, barely mentalised, affect experienced during waking life of a previous day (Ruyneau de Saint George, 2016b), we took the approach of relating the oneiric image to a "primary" subjective stimulus (Ruyneau de Saint George, 2016a). This primary stimulus can be described as a barely perceptible psychological conglomerate. Given a mind that is otherwise occupied, this stimulus is only barely mentalised and the processes, while constituting real, albeit, muted experiences, emerge unawares and in a reflexive manner. We illustrate this with the example of finding oneself face to face with a tormenting memory, a primary subjective cognitivo-affective stimulus that adopts the image of, for example, a vicious dog. Being confronted with this memory triggers a "secondary" sense of anxiety that could be expressed as *"…will I manage to avoid being completely overwhelmed by this torment?"*; if my defences are inadequate I will be bitten. We consider that this "secondary" sense of anxiety, the experience of which floats in the background during waking life, is fully experienced in our dreams. This similarity of affects allows us to forge a link between an oneiric experience and the real life experience from which an observation (an observed case) was produced.

These observations (that is to say, the paired oneiric/real-life elements that are related via the impressions common to both) can prove useful to the study of how dreams develop but, due to the method employed, not all are of the same quality. Indeed, in addition to the fear that can block any retrospective introspection, in addition to the risk of narcissistic, self-deception (and as a consequence, the risk of false observations) and in addition to the risk of losing oneself between the dream itself and its recreation, the technique applied here grapples with obstacles that could undermine the quality of the observations.To describe in greater detail:

- A mnestic flaw
  We have found ourselves unable to recall certain real episodes. A breakdown of 58 recent particularised dreams was carried out (2012- mid 2016: a "particularised" dream is a dream that was recorded in written form and whose details were studied, in contrast to those dreams that were merely synthesised and processed "on the fly"). This breakdown revealed that, after training (it is necessary to begin by familiarising oneself with the real-life experiences that we need to attend to due to their particular nature) mnestic flaws affect approximately 15% of the dream/

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waking-life links. However, given that half of these memory lapses were concentrated over 10% of the dreams, the end result was that 90% of our dreams constituted acceptable material (with about 7% of scenes that could not be linked to waking life of the previous day due to mnestic flaws). We point out also that over half of these dreams (55%) were not effected by this type of flaw.

- The issue of the uniqueness of a real experience
  The linking of a dream and a real, lived experience reposes on a similarity of affects. Described in concrete terms, we look for the series of real affects that overlap with the sequence of oneiric affects. But, can we be certain of having isolated the correct sequence of real, lived affects? There is really no reason why a certain sequence of affects would not have been experienced several times during a single day and in several, different situations. That said, in certain cases, the uniqueness of a sequence of affects appears highly probable. Indeed, 20% of our particularised dreams contain an emotion or an affect such that, on the one hand, we can have little doubt about the link between the dream and waking life and, on the other hand, the probability of an unidentified recurrence of such impressions during the day appears very low. In addition, when the sequence of affects is especially long, the probability of its uniqueness is higher. We consider this to be case when the number of affects composing the sequence goes beyond 15 (which is true of 50% of our particularised dreams).
  Thus, while the quality of certain dreams can be questioned based on our effort to create a dream/waking life link through a comparison of the impressions induced, others, on the contrary, present characteristics that facilitate our endeavour. The particular case of oneiric scenes that induce out of the ordinary impressions is especially interesting because they yield highly trustworthy observations.

2.2. “Raw” Observations/ “Fine” Observations

The principle of oneiric rediffusion of affects allows us to relate the dream to a moment in waking life of the previous day, and, depending on whether the experiences that we attend to are highly mentalised or weakly mentalised, the observation can take one of two forms.

To illustrate this, let us consider scene 3 of table 1. In this dream, I find myself face to face with snakes. By means of observation via a comparison of affects, we relate this scene to a moment of the previous day during which, believing myself to be the victim of malicious rumours spread by “poisonous tongues”, I was confronted with the potentially painful thought, “…what will people say”. Here we have the identification of a highly mentalised experience and, thus, the type of observation that we will refer to as “raw”. We could attribute the snakes to the highly mentalised stimuli: the imagined, malicious rumours, or to the “poisonous tongues” that spread these rumours or, indeed, to the feeling encapsulated by “what will people say”. However, a finer observation, one based on feelings that float in the background, would lead to another insight : something deep inside me would whisper, *“Ah, had I not acted as I did, those poisonous tongues would have remained silent!”*. In reality, another story lies behind these highly mentalised ruminations: that of Myself being confronted by my own, potentially damaging, conduct; this confrontation was, therefore, viewed as a challenge. In this “fine” observation, the snake is attributed to a painful, autobiographical peripeteia (my conduct); this corresponds to the general pattern observed in all of our examples of animal dreams.

Such “fine” observations, observations based on the barely mentalized, intra-subjective story (that is to say, observations that focus on the secondary processes that play out in the background) appear to give rise to certain constants in the oneiric conversion. It is for this reason that we consider that the “fine” observation provides fertile ground for studying dream. That said, a simple “raw” observation is sufficient to recognise, in the dream, the reflection of waking life of the previous day.

2.3. Methods employed – a sample

Our aim is to consider the phenomenon of oneiric bizarrenesses in terms of the theme of continuity and to limit ourselves to the question, *“Does an oneiric scene with bizarrenesses embody a redifussion of a recent, lived experience?”*. To help us respond to this question, we recapitulate, in table 1, the totality of the oneiric bizarrenesses that appeared in scenes characterised by affects classed as hors norm. If, in doing so, we can establish a link with waking life of the previous day, then this connection will, thereby, benefit from a high degree of reliability. Such a connection need not be anything more elaborate than a “raw” observation because such an observation is sufficient to recognise, in an oneiric element, a reflection of waking life of the preceding day.

3. Results

We counted 23 scenes with *hors norm* affects that present 32 different bizarrenesses and were able to link the totality of these scenes with waking life of the day preceding the dream. These dreams and their real-life antecedents are presented in Table 1. It can be deduced from the following that the oneiric bizarreness cannot be considered as an indicator of discontinuity.

4. Discussion – Perspectives

Thus, on the basis of highly trustworthy observations (as they are founded on a rediffusion of *hors norm* affects), it seems possible to postulate that the oneiric bizarreness itself can be related to an experience from the previous day. Occasionally, a parallel appears between the nature of the impressions: the bizarreness seems to reproduce impressions of incongruity, of surprise, of incomprehension, of facing an amazing thingexperienced in real life. For instance, an element that is incongruous and unexpected emerges in a dream just as, in real life, an astonishing thought seems to emerge from nowhere. An exemple of this is a seemingly inevitable collision that is surprisingly avoided in the same way that, at the last minute, an unexpected intellectual pirouette saves one from a potential conflict. A meaningful juxtaposition of images may also arise, such as the example of the lion in the tree, which creates an image of a primary stimulus that combines that which the lion symbolises (see below) and that which the tree symbolises (the attribution of meaning to this symbol has not yet been confirmed and, at present, we consider the tree as an accomplished task). The bizarreness, therefore, looks like a stylistic device that facilitates the replay of impressions of incongruity, surprise, the vision of something seen as being important.

Table 1. A summary of the bizarrenesses in the scenes characterised by *hors norm* affects.

Oneiric Scenes	Bizarrenesses	Corresponding moment from the previous day	Common impression
1. I am taking a shower	Unfamiliar place*	After some consideration, the polluting character of certain obsessive thoughts are eliminated (for good).	A marked impression of cleansing.
2. A lion perched in a tree.	A lion in a tree in France.	The vision of a great but all-consuming task.	A curious feeling comprising a combination of a tightening of the stomach and a sense of being sucked up.
3. Snakes handled in an unorthodox manner.	An unorthodox method.	Being confronted with an imagined "what will people say" directed at me. (A non-sentimental-sexual theme.)	Impressions of excitement, of concentration, of victory and of controlled fear.
4. Without warning, a white dog-bear, with a bizarre mouth bites me.	An animal, part dog, part bear with a bizarre mouth.	The reminder of a personal conduct (a memory) in which I saw myself as a "white knight", albeit, a bit heavy-handed. I ended up enduring personal torment.	Attraction, sudden pang then considerable anxiety.
5. An iguane attacks me.	Theoretically, when possible, an iguane flees.	Counter to all expectations, I am confronted with a memory, that should have remained inoffensive, but turns out to be painful.	Terror and the impression of being terrorised by something that should not cause such terror.
6. Attacked by a killer monster.	The monster.	Facing a particularly severe disappointment.	Terror and dispair.
7. Physical relationship with a married mistress.	1. Unknown person*. 2. Behaviour.	The immense pleasure of a success achieved under the yoke of an uncustomary motivation. (A non-sentimental-sexual theme.)	An impression of excitation, pleasure and triumph combined with a lurking sense of guilt.
8. A sentimental embrace with P (partner), who is missing one tooth.	1. The power of the sentimental embrace. 2. They are missing a tooth.	Filled with a vision of what life might offer me, while, at the same time, anticipating something slightly upsetting. A non-sentimental-sexual theme.	An intense moment of well-being tainted by a sense of discomfort.
9. Amorous feelings with a young stranger.	A pretty, young woman expresses her affection for me.	Overwhelmed by a (dreamed of) opportunity. (One of the 2 scenes presented in this table that deals with a sentimental-sexual theme).	Hope, all-absorbing emotion of the kind experienced during one's first amorous encounter.
10. I am raining blows on my adversary.	I am beating somebody up.	I launched a pitiless attack on somebody.	An unfamiliar feeling of release and of domination.
11. Completely out of the blue, my car, which had been stationary, starts to spin around.	1. The car is spinning. 2. No visible cause.	Destabilization due to a realization following a shock, which, like an intuition-surprise, seemed to emerge from nowhere.	Surprise, the impression that things are reeling out of control, the impression of being acquainted with this type upheaval.
12. In the car and cannot put it into gear, so I remain at a standstill.	The gearbox does not function; it is blocked.	Unable to respond to a precise question, I remain stuck.	The marked feeling of being blocked and at a standstill
13. In the car, in a bend in the road, a tyre veers off the road.	1. To negociate a bend badly. 2. It does not, however, lead to an accident.	A blunder committed in handling an affaire. I manage to salvage things.	A burst of adrenaline accompanied by a fear that, while significant, is not desperate.
14. In the car opposite a lorry and car side-by-side, which block the way. We pass each other without colliding.	1. A lorry and a car side-by-side blocking the road. 2. Passing without colliding.	With some academic pirouetting, I extricate myself from a conflict of interests (a clash of moral and economic interests).	Incomprehensible surprise, huge relief.
15. In a coach travelling at full speed.	The speed of the coach.	During a phase of activity, a sense of hurtling out of control.	The impression of being swept along.
16. A door suddenly opens at the side of the road on bend that the coach cannot take, due to the speed at which it is travelling. We pass through this door, which opened, unaided, onto a track, thus allowing the coach to break.	1. A door at the side of the road. 2. A sudden appearance "as if by magic". 3. The door opened autonomously.	As if by a surprise-intuition, a surprising and unforeseen solution suddenly appears.	Immense fear, surprise and a return to calm.
17. In an inflatable boat on a stormy sea.	1. An inflatable boat in the open sea. 2. The strange appearance of certain waves.	The impression of not being equipped to face a project strewn with upheavals.	Shocks that are peculiar and all consuming.
18. Wonderment while orbiting the world in a rocket.	In a rocket in space.	A phase of exaltation.	Wonderment tinged with a fear of the depths.
19. I am flying and am rattled when a stone is thrown at me.	1. I am flying. 2. A stone thrown from a distance and from below (implying that, theoretically, it has little force when it hits me) produces an impact that is powerful enough to rattle me.	Rattled by an accusation that would normally have had little effect while I considered myself at the height of a successful phase.	Shock, surprise, disarray, bewilderment.
20. I am not fully dressed.	Incomplete outfit.	A moment of disconcertment.	Disconcertment, the unusual impression of being " left out in the cold".
21. I eat a bar of chocolate while in the middle of preparing for an imminent bombing.	1. The bombing. 2. Eating a bar of chocolate at such a time.	A moment of respite whilst anticipating difficulties.	The curious feeling of having a brief moment of respite and of pleasure in the midst of a phase of anxiety.
22. I experience the onset of a malaise.	A malaise.	The culmination of a period of (accidental) melancholy	Despair.
23. Gassed by a post-card.	A toxic gas-emitting post-card.	In the grip of nostalgia.	The impression of passing away all the while remaining conscious.

Note. *The discontinuities due to the unfamiliar nature of the places and characters are presented in other cases listed in the above table ; we make the most of them. Each one corresponds to a singular (a non-familiar aspect), real lived experience.

4.1. A metaphorical expression

To explain an oneiric bizarreness, certain authors base their hypothesis on the continuity and advance the possibility of a metaphorical oneiric expression (Malinowski & Horton, 2011). On the basis of our "raw" observations we recognised this phenomenon of the metaphorical expression: in the dream we can fly, we can move at great speed and sail on a small, fragile vessel to re-diffuse the real impression of a certain type of well-being, to recreate the feeling of being "drawn into an affaire" that, at times, imposes its own rhythm or of being badly equipped to fulfil one's goals; the examples are numerous.

We believe that this manifestation is the consequence of at least two phenomena that we frequently encountered: the phenomenon of resonance and that of reverberation. In the case of the phenomenon of resonance, a real, secondary affect seems to have the same substance as a primary affect. For example, the secondary anxiety of not handling a primary anxiety, i.e. the joy of being joyful…In the phenomenon of reverberation, the effect of a barely mentalized stimulus is similar to the effect of a highly mentalized stimulus, as is the case in the example of the snakes (an example presented in paragraph 2.2 in which the highly mentalized situation of being faced with the potentially painful thought, "what will people say" is accompanied, in the background, - and this is what is re-diffused in the dream -,by a memory of a personal conduct that we experienced as potentially painful). In these circumstances it is not surprising that the highly mentalized story is linked, by analogy, to the oneiric story, as the oneiric story often re-diffuses intra-subjective experiences that may resonate or reverberate with a highly mentalized story.

On the other hand, a fine study, a study based on intra-subjective experiences, is founded on a well-defined language and would, therefore, appear to argue in favour of an oneiric expression that goes beyond metaphor.

4.2. A well-defined symbolic expression?

After a detailed observation of our 19 dreams involving animals we discerned a constant conversion: in all of our dreams, including those comprising bizarrenesses, the animal symbolised an emotionally charged, autobiographical peripeteia, real or fantasized (Ruyneau de Saint George, 2016a). The dog-bear (table 1, scenario 4), the iguana (table 1, scenario 5) and the snakes (table 1, scenario 3) represent memories of personal conduct from the, distant or immediate past. The lion (table 1, scenario 2), for instance, represented a fantasized, future autobiographical peripeteia (the thought of an imminent conduct had consumed us to such an extent that our awareness of virtuality disappeared at that time and throughout this imaginative flight everything was played out as if the future act, albeit imagined, had been a reality).

In line with what appears to emerge in our other dreams, the form that the symbol adopts seems to be founded on the momentary intra-subjective appraisal of the act, with a focus on the primary stimulus. Could it be that the conduct was considered as being noble? The animal did take the form of a lion. Did it posses any crude connotation? The animal adopted the form of an iguana. Did I judge myself as being irreproachable, albeit a bit heavy-handed? The dog was white and part bear. However, the consistency between the form adopted by the image and the reality appears to go further still and the oneiric creation points to an astounding inventiveness and ability to re-create. Taking, for instance, the case of the iguana, whose bite and tail whip I fear, the generator of the dream adapted the form of the animal to the memory. This memory was ill-considered because of its association with a conduct that was deemed, wrongly or otherwise, coarse (element pertaining to the iguana). It was also a memory whose tormenting effect I feared (a focussing on what was considered a failure/a bite) just as much as its guilt-inducing effect (a focussing on a feeling of one's own inadequacy/a laceration). In the case of the devouring lion, the generator of the dream forged a form in such a way that it echoed a behaviour that while perceived, rightly or wrongly, as noble, was also perceived as having devoured one's time and, therefore, one's life. Taking the case of the dog, a more classic form of an "animal" symbol; the generator of the dream produced a form that corresponded to a memory that was partly gratifying (the cuddly aspect of the dog) but that could "turn sour".

The oneiric reproduction of the appraisal, correct or otherwise, of the primary stimulus, via the form of the symbol, seems to be just as effective in dreams comprising characters.

A study of 40 dreams involving characters permitted us to recognise in them a symbol of the "will to push forward" (an expectation, an obligation, a part of oneself that seeks to obtain this or to avoid that…), possessing a motivation of greater or lesser power, being in a state of greater or lesser satisfaction or dissatisfaction and of a motivation with a functional basis (the choice of character was consistent with the intra-subjective contexts; the *"I owe it to myself to…"* is converted into a figure of authority, the *"what I expect from life"* appears to manifest itself through the presence of a partner, a sense of motivation and inspiration symbolised by a peer…).

Thus, for example, the "raw" observation links the scene of amorous feelings shared with a young stranger (table 1, scene 9) with a moment of joyful hope experienced during the previous day while considering an opportunity. A finer observation revealed it to be a manifestation of an emotionally charged motivation that brought us closer to a sense of satisfaction; our frame of mind at that time was such that the driven character in question was cherished, although it was felt with a certain lack of maturity. The generator of the dream created a feminine face, young (and unfamiliar because the stimulus was not customary).

The plasticity of the symbol's form is such that it seems that this same driven character could be symbolised by different characters. For example, the driven character attributed to P. (table 1, scene 8; a high probability of correct attribution) is the same as that attributed to the husband of the married mistress (table 1, scene 7; moderate probability of correct attribution). But this plasticity is very evidently regulated on the basis of the intra-subjective appraisal of the context: the married mistress was attributed (with a very high probability of correct attribution) to a driven character that is seen as complementing the driven character symbolised by her husband (by this we understand their marriage) and which, for a brief period, I embraced (the mistress). This motivation was considered as perverted and contrary to the driven character symbolised by the husband (the wife betrays a commitment made to her husband for no reason and, in the dream, this was experienced as the source of the husband's misfortune).

We will not comment on the other dreams as these concerned artefacts (vehicles…) and, despite recognising them as constant and regulated conversions, we have not yet arrived at a satisfying global formulation. We take, however, this opportunity to point out an advantage of an introspective investigation that is carried out by the experimenter: this technique allows one to access those manifestations that have not been formalised and which would, therefore, elude the questioning of an external experimenter.

5. Conclusion

By means of the principle of the oneiric replay of experiences, 23 oneiric bizarrenesses were linked to recent real-life experiences. These connections are considered as highly probable because these oneiric scenes were selected on the basis of the out-of-the-ordinary nature of the impressions experienced therein. The observations presented support the hypothesis of continuity.

A finer observation of the oneiric conversion of intra-subjective experiences (i.e. secondary processes that play out in the background) has led us to believe that the oneiric imagery may be founded on a lexicon (the fundamental "symbols": animals, characters, artefacts, flora, natural elements…) whose form originates from an intra-subjective appraisal of the real-life moment replayed in the dream. This argues in favour of the hypothesis of robust continuity.

We do not wish to suggest that a real situation can only be expressed in one, specific manner, that is to say, by a single, pre-determined dream. Indeed, in the same way that a meaning can be conveyed by different sentences, there is nothing to prevent us from believing that the same real-life situation can give rise to different dreams. However, just as a sentence can express something pre-determined thanks to spoken production, the fruit of a miraculous routine that uses only those words that adhere to a grammar, we believe that a dream is the product of a process of creation that is just as routine-based and, at the same time, astonishing, and which uses symbols that are fashioned in a regulated manner to represent, in detail, something determined (the intra-subjective experience). Considered in this light, the hypothesis of robust continuity could be understood as the exploitation of a linguistic-like competence for the creation of a dream.

Of course, this perspective needs to be taken with caution as it arises from a sample of observations made by one person.

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Just A Dream? A student essay

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Summary. This article is about the questions that pop in to most people's minds when they think about dreams. Why we have them? What our dreams mean? etc. I believe that this article will answer most of the questions people have roaming around their minds about dreams. Because I know it answered a lot of mine.

Keywords: Dreaming, attitude towards dreaming, functions of dreams

1. Introduction

People have had dreams for as long as they can remember. But the same questions keep coming up: Why do we have dreams? What do my dreams mean? Etc. Many people have google searched these questions to try and figure out the real answers, but the fact is that everyone ends up on some pointless website talking about their zodiac signs and stories about some famous person's dream they "supposedly" had. This essay is going to tell people what they have been looking for this whole time. If someone wants answers to their questions keep reading.

A question that is gets debated very often is: Do dreams have meaning? Scientists still continue to debate this issue, but most people find that their dreams are very meaningful for them. Many think dreams are full of symbolic messages that may not be clear to us on the surface. But, if we dig deeper and think about what is going on in our lives, we can usually come up with an interpretation that makes sense. Many people have done with a few of these common dreams. Falling is said to symbolize insecurity and anxiety. Being chased is said to mean that someone is running away from their problems. Taking an exam (or forgetting that you have one), experts say this means that they are being scrutinized about something or feel they're being tested. It may also mean there is something that person neglected that they know needs their attention. Flying typically, means that they are on top of things. They are in control of the things that matter to them. Running, but going nowhere, according to some, this dream means they have too much on their plate. They are trying to do to many things at once and can't catch up or even get ahead.

There are a few different types of dreams we have. Nightmares, which most of us have had at some point, they are frightening dreams that usually result in waking the dreamer from sleep. Sleep terrors also known as night terrors, distinct from nightmares, sleep terrors are intense periods of fright during sleep. They may be accompanied by screams, agitated movement, or jumping from bed. Recurring dreams are dreams that we have over and over. Lucid dreams, these striking dreams are ones in which the dreamer, thought sleeping, is aware they are dreaming, and may be able to control some aspects of the dream.

"Almost everyone has experienced dreams that contain anxiety or outright fear. These dreams can be quite traumatic or recurrent. For some, unpleasant dreams or nightmares repeat on real content. For others, the content may change but while the theme remains the same such as scenes of falling, or of being pursued or attacked, of being late or unprepared for class, a presentation or exam. Many dream theories converge in their view that this type of experience is associated with lack of progress by the dreamer to recognize and solve related conflicts in life."

Dreams let us play out painful or puzzling emotions or experiences in a safe place. Dreams also allow us to process information or events that may be painful or confusing in an environment that is at once emotionally real but physically unreal. They are useful in learning more about the dreamer's feelings, thoughts, behaviors, motives, and values. Dreams reveal a person's "deepest desires and deepest wounds."

Dream analysis is a key component in the process of becoming whole as a person. When people think about analyzing their dreams, they think of crystal balls, dream dictionaries, and psychologists, but in reality dream analysis is none of these things, and it's actually a valuable way to better understand yourself. Dreaming is the communication between our conscious mind and our unconscious mind, helping people create wholeness. "Dreams are the bridge that allows movement back and forth between what we think we know and what we really know."

Most people think of dreams as something that happens to them, but we happen to dreams. We create everything in them, every atom, every photon, every person, and every event. We can't control everything we dream about, somethings just happen.

Some examples of these instances are genes can influence your nightmares. Identical twins may usually have the same interests and habits, but scientists have discovered that their genetic basis are stronger than anyone can imagine. It's so strong that they can even experience nightmares on almost the same frequency. Black and white television even affect your dreams. University of Dundee has shown that the type of television you watched as a child has a profound effect on the color of your dreams. So it's possible that media has as much influence on our subconsciousness as life experiences. The different types of cheeses you eat affect your dreams. All cheese contain amino acid called

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tryptophan, which is helpful in normalizing sleep and reducing stress levels. A 2005 study done by the British Cheese Board discovered that the people who normally ate cheddar cheese dreamt more about celebrities; the people who ate Blue cheese experienced bizarre dreams. Cheshire gave the best night's sleep, but it caused the dreamer not to dream. The people who ate Red Lancashire had nostalgic dreams about their families and childhood and the ones who ate Blue Lancashire dreamt mostly about their work. Research has even found out that what you hear and smell influence your dreams. Our minds interpret the noise occurring around us while we're asleep, and our minds make it a part of our dreams. That means if we heard a sound in our dream the sounds familiar it could easily be something we have heard before. The way smells can influence our dreams are similar to how noise can, our brain interprets smells as a signal and incorporates it in dreams. For example, the scent of cookies or candles might have taken you back to when you were a kid or you might have had a pleasant dream, but if you smelt something foul you might not have had a very good dream.

There are many different theorists and theories about dreams and why we have dreams. Sigmund Freud is one of these theorists. He had designed other theories that many people had thought to be true but, most of his theories were about the stages of child development. So when people heard that he had this new theory they began to believe it without even questioning it. Freud's theory stated that he considered dreams to be the "royal road to the unconscious" as it is in dreams that the ego's defenses are lowered so that some of the repressed material comes through to awareness, albeit in distorted form. Meaning that he believed that dreams are an attempt to satisfy sexual and aggressive impulses that we cannot satisfy when we are awake. He also believed that dreams perform important functions for the unconscious mind and serve as valuable clues to how the unconscious mind operates.

Another well-known theorist is Calvin Hall who created the Cognitive Theory of Dreaming. Hall was a psychologist who explored the cognitive dimensions of dreaming. His work began before the discovery of REM sleep, so little was known about the biology of sleep and dreams. His theory was among the first scientific theories of dream interpretation based on quantitative analysis… rather than wishful thinking. Hall's cognitive theory is that dreams are thoughts displayed in the mind's private theater as visual concepts. Hall dismissed the Freudian notion that dreams are trying to cover something up. In his classic work The Meaning of Dreams, Hall writes, "The images of a dream are the concrete embodiments of the dreamer's thoughts; these images give visual expression to that which is invisible, namely, conceptions." So dreams reveal the structure of how we envision our lives, a display that is clearly valuable for anyone who remembers and studies their own dreams. After studying thousands of dreams collected from his students and from around the world, Hall suggested that the main cognitive structure that dreams reveal include, conceptions of elf (how we appear to ourselves, the roles we play in life), conceptions of others (the people in our lives and how we react to their needs), conceptions of the world (our environment: is it a barren wasteland or a nurturing place?), conceptions of penalties (how we view the Man. What is allowed? What is forbidden?), conceptions of conflict (out inner discord and how we struggle with resolving it.) As a behavioral psychologist, Hall believed these conceptions are antecedents to our behavior in the waking world. He thought they were like maps to our actions, and "with these maps we are able to follow the course of man's behavior, to understand why he selects one road rather than another, to anticipate the difficulties and obstacles he will meet, to and protect his destinations."

There are people who believe in one of those two theories, and there are people who believe in different theories. Among those people some of them believe that dreams are nothing more than images resulting from random electrical activity in the brain. Those on the physiology side of the "why do we dream" argument see dreams as only nonsense that the brain creates from fragments of images and memory. For centuries, however, people have looked at their dreams as both omens and insights into their own psyches. The people who have tried to come up with the answer to "Why do we dream?" But the truth is no definite answer exists.

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Vita Somnium Breve (Is Life but a Dream?)

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Summary. In view of my finding that dreams are the precursors of waking life, its blueprint in fact, (IJoDR, Vol. 7, No 2, October 2014, entitled, "To Test or not to Test, that is the Question") dreaming and waking must be seen as an interdependent unit. Both are equivalent occurrences with the dream being the primary aspect. This interdependent relationship can best be compared with Einstein's famous formula of $E=mc^2$ where E stands for the dream and mc^2 for waking life. For mystics, both states are solipsistic projections. The world is not an objective reality. To argue that it is a permanent and shared experience is based on a double premise. We can't have the sleeper's point of view and that of the waking individual at one and the same time. In other words, just as dreams come and go, the waking world disappears as we go to sleep and resurfaces as we wake. Clearly, the world, like our dreams is a cerebral projection. Karl Pribram agrees when he sees the brain as a holographic machine that projects the universe as we wake, in the same way as a holographic plate projects its images in 3D outwards when a laser light strikes it. He states: "The rules of quantum mechanics apply all the way through to our psychological processes, to what's going on in the nervous system – then we have an explanation perhaps, certainly we have a parallel to the kind of experiences that people have called spiritual experiences". The precursor of the holographic plate 'containing the world' may be found in a poem by the mystic Shabistari who writes: "Know that the world is a mirror from head to foot, in every atom are a hundred blazing suns" And as in quantum mechanics, this projection is characterised by 'omnipresence' much as it is described in Hindu mysticism: "In the Heaven of Indra, there is said to be a network of pearls so arranged that if you look at one, you see all others reflected in it. In the same way, each object in the world is not merely itself, but involves every other object, and in fact, is every other object". All this is only possible because we are 'suspended' in an all-pervasive medium: CONSCIOUSNESS. Indeed consciousness is the sine qua non of existence. It is therefore the prime factor in any theory of existence. It is in fact that which lends reality to all there is. This is in perfect agreement with quantum mechanics, which states that 'energy', typified by an interactive dualism, only 'coalesces' to matter as we focus on it. In short, the world cannot exist as such, but only unfolds in a living medium, the mind - in consciousness. In turn, the necessity of a living matrix for the 'creation' of the universe underpins the argument that the world only exists while we are awake. It also demonstrates how right Chuang Tzu was when he said: "I and the universe are one", and such oneness is not just a theoretical unit, but a living whole.
In a theory where the world is an objective reality, consciousness emerges from complex computations among neurons. (Hameroff) But the medically induced NDE of Pam Reynolds that was observed by twenty staff assigned to Dr. Spetzler's operation on Pam and is recorded in detail, demonstrates in incontrovertible terms that consciousness exists outside the brain, and is in fact the fundament of existence. It also demonstrates that consciousness is non-intermittent and hence the only entity that can claim reality status. In fact as E, the creative energy that in quantum mechanics is typified by an interactive dualism, where photons and particles are an 'hermaphroditic emulsion' of potentialities, where unitive E is better described as 'not two' than as 'one', we understand at once that mc^2, the material expression of E, is never pure matter, but also energy, and ultimately a form of consciousness. Such toppling of our antiquated western perceptions is rocking the foundations of our science. Clearly, a massive paradigm shift is under foot. East and West are moving closer together, paving the way for a new worldview and a new kind of spirituality. In that climate the dream and its function as a messenger will gradually be saved from confusion and underestimation. Indeed, like Hermes, it will eventually be recognised as the messenger of life's most fundamental information. Instead of being dismissed as Prospero's vacuous wisps of smoke, it will be recognised, once again, as the DNA of life on earth.

Keywords: Absolute reality, Consciousness, DNA, Double Premise, Dreams, $E=mc^2$, Hologram, Interactive dualism, Manifest, Matter, Mind, Metaphysics, Mysticism, Omnipresence, Physics, Quantum mechanics , Relative reality, Virtual reality, Wakingy

This Latin quote gives us an indication that in antiquity some philosophers, at least, thought of life as nothing more substantial than a dream. I venture to say that such questioning goes back much further than that since it is one of the musings that defines what it is to be human. It not only casts doubt on the substance of waking life, but it also implies that dreams may be nothing more than vacuous experiences, which is quite a common perception in western culture. But are they? If they truly lacked a sense of reality, would we run from a lion in our dreams? Or would we dismiss a horrifying nightmare as something trite? Indeed, in many cases such disturbing night terrors will carry over into the light of day and haunt the dreamer for days, and at times even longer.

The fact, that their memory in many cases will gravely affect the mental disposition of the dreamer points to a perception that dreams in themselves must give us a sense of

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their reality. Their impact on waking life sets them almost on a par with it. This was certainly the case with so-called primitive man, some of whom not only saw dreams as almost equal to waking reality, but completely so, as was the case with the Gran Chaco Indians. They *"relate the most incredible stories as things which they themselves have seen and heard; hence strangers who do not know them intimately say in their haste that these Indians are liars. In point of fact the Indians are firmly convinced of the truth of what they relate; for these wonderful adventures are simply their dreams, which they do not distinguish from waking realities".* (Frazer)

But there are also cases where the sense of reality in a dream can be more intense than what it is in everyday life. I have had such a dream. "It took me into a green field. In the middle of it stood, buried up to the buttocks, a black statue of what I later found to be a representation of Persephone. As I looked over to the dark Goddess I was suddenly whisked away into her womb, which felt like a pitch-black cellar. There I floated about in frozen angst. Suddenly, a green fluorescent swastika and a luminous disk of the same colour began to spin before my eyes. A few moments later a TV screen lit up below me. On it appeared a cartoon-like figure on a throne. It reminded me of a painting of Daruma by an old Zen master. His fierce eyes protruded from their sockets like a couple of tennis balls. In his raised hand he held a sceptre made from the wheel and axle of a railway car. There, the dream broke off. I woke in a sweat gasping for air. The dream had been more real than waking. In fact, as I slowly woke from this terrible vision, I thought I was going to sleep". (Forrer)

The repercussions of this dream were immense. It unlocked the mysteries of the dream for me that had eluded me during twenty years of intense questing. Ultimately, it not only handed me the key to their interpretation, but also showed me a way of verifying their meaning, which I have described in my essay for IJoDR, Vol. 7, No 2, October 2014, entitled, "To Test or not to Test, that is the Question". In other words, it showed me that dreams don't just occasionally affect our waking life, but that they are its precursors and ultimately its blueprint.

In view of such interdependence of dream and waking life, which is akin to the progression of *infinite iteration as occurs in the fractal world of the Mandelbrot set*, dreaming and waking become an equivalent and decidedly indivisible process. This becomes tangibly evident when we remember that every dream has a residual component, material from yesterday and the extended past that regularly feeds into a new dream scenario. And just as Benoit Mandelbrot observed that the electrical impulses in his IBM computers often evidenced *cluster formations* (Clarke) I have discovered that in a day of dream manifestations there would be precisely such clusters of manifestations of a particular dream motif. It is not unlike the rush hours of a city, for example, or the cluster of shoppers appearing in a business at certain intervals. This cluster pulse, as it were, shows how interwoven all the facets of waking life are, but it also reveals the intimate connection between dream and waking life.

Indeed, if dreams are the *blueprint of waking*, then they are, despite their *ethereal nature*, the primary factor in the relationship with waking and not something insubstantial and ineffectual as assumed by those who have no interest in their dreams. *Thus, in Einstein's famous formula, $E=mc^2$, our dreams stand in the place of E, the energy that ultimately 'coalesces' into one condition or other of mind and matter.* Consequently, they also represent ethereal ideas that come to the mind of an artist - ideas, which he subsequently fashions into forms of tangible substance. Likewise, they also stand for *metaphysics*, while their materialisations cover the domain of *physics*.

With regard to their allocation of time it is of interest to note that dreaming time is considerably shorter than its corresponding waking time. We see this in the fact that we only dream at ninety-minute intervals for short periods that admittedly extend in time in the course of the night. Yet this is still considerably less in terms of conscious experiences that occur in the corresponding waking time. As well as that, a dream scene will expand substantially as it *manifests* in terms of waking time. This the more so since a single *dream motif* is able to recur in waking several times during the day and even recur on the second day and in some instances over extended periods.

This time ratio highlights once again the dream's function as the *motivator and inspirer* that parallels the creative process, which as an initial idea is subtle, concise, compact and instantaneous, but as its manifestation takes on the appearance of a drawn-out development and materialisation that seems coarse and crude in comparison with its mental conception. This is yet another reminder of how easy it is to take the ethereal substance of the dream as the shadow of the material world, when in fact the reverse is true.

Clearly, dreaming is no less real than waking, for without dreams, there are no waking experiences. But what is not so certain is whether or not the *sense of reality* that characterises both dreaming and waking really deserves this designation? Indeed, can we justly assign *reality status* to something that is *constantly changing?* So let us look at this facet of our enquiry.

At a casual glance, we have no trouble with declaring our dreams to be ethereal and fluid shadows rather than firm realities since they won't give us the same foothold, as do our waking experiences. In waking, we generally are anchored in our home, and when we go out we are confident that it will still be there for us when we want to return to it. Not so in our dream life. There we only seldom return to the same place, and when we do, it is more often than not just a vague notion that we have been there before, instead of getting the definite feeling of being face to face with a physical house and home.

For this reason we tend to consider our dreams to be little more than *virtual reality*, meaning that although they feel real while dreaming, they vanish into thin air when we wake up from them. As well as that, we often declare them to be absurd or bizarre, which is something quite unlike the steady and consistent states and occurrences of the waking world. This leads us to hold our dreams for nothing more substantial than phantoms.

Since we have seen that our *dreams are the primary component of the dream-waking unit*, that they provide the energy, ideas and motivation for our waking experiences, it must follow that if dreams are but phantoms, waking experiences could fare no better. Clearly, if E is a phantom, then mc2 could be no more real.

So, does this actually match our waking experience? Could we regard it as equally tenuous and fluid as our dreams? Not at a casual glance, but once we embark on a thorough investigation of such a premise, we are in for some real surprises. First of all, we find that waking *comes and*

goes much like dreaming. It is not nearly as rock-solid as we generally believe. Apart from the fact that our world, on the level of gross manifestation, is subject to changing seasons and that our bodies grow steadily old and deteriorate in health, which alone changes our perception of the world, we are also told by our physicists that the substance of waking matter on the atomic and subatomic level is subject to the vicissitudes of unimaginably rapid vibrations. This makes the substance of our waking world equally as fluid and tenuous as 'the stuff as dreams are made on'. Astonishingly, Shakespeare's magician, Prospero, knows this: *"These actors, as I foretold you, were all spirits, and are melted into air, into thin air…and like this insubstantial pageant faded, leave not a rack behind. We are stuff as dreams are made on; and our little life is rounded with a sleep"*. (Shakespeare)

For Prospero, the world is just a dream without substance. He agrees with the Roman philosophers' dictum: 'Vita Somnium Breve'. But more than that, this tenuous world that disappeared like a dream was created by himself. It reminds us of the way our own dream world arises and then vanishes as we wake or dive into deep sleep. It seems almost as if we were creating it ourselves much as a magician would. While this is not quite the case, we certainly can't deny that our dreams are a world like no other, individually crafted, *a private universe*.

While we have no difficulty in relating to this coming and going of the dream world with its unique and private character, we baulk at the thought that this same characteristic might also apply to our waking world. Y*et, like a dream, it disappears as we fall asleep and resurfaces again as we wake.* But, so we protest, surely the waking world does not actually disappear like a dream as we are overwhelmed by sleep. It surely must remain in existence. The fact that other people who are still awake will nevertheless experience the world is surely enough evidence that the universe, unlike the world of our dreams, does not vanish and must therefore remain a shared experience and unbreakable continuum.

But alas, the thought that other people who are not asleep would guarantee the permanence of our world is untenable since they are not in our dreams to be called upon in order to verify our conjecture. *Indeed, in this quest we are faced with a double premise: one cannot have two points of view at one and the same time, which makes the world-experience no more objective than the dream world. We are compelled to concede that the world, like the dream, is a solipsistic fact.*

So, what is it then that makes the dream and waking experiences from two isolated and independent experiences into one *interdependent unit*? Is it memory? Most certainly so, but memory cannot exist in a vacuum: it has to be sustained by something that is an *unbreakable continuum*. This continuum is provided by consciousness. It carries the memory of the dream experience over to the waking experience and vice versa. It is the glue that holds the two processes together. In fact, it is the *sine qua non of existence*. Without it, there would be no world for us, neither one of waking nor one of dreams. Indeed, there would be absolutely nothing, no thing, no *think*. Clearly, *consciousness is the life and light of every living creature*. It is Prospero's *magic ingredient* that imbues our dreams and waking world with that *sense of reality* that we have found to be of varying degrees. But such variation only occurs as consciousness floods the brain. As such it is like the sun, always strong and constant and only impeded when clouds obstruct its light; as when it pervades the brain.

What I am saying here presupposes, of course, that there is such a thing as *'consciousness as such'*. I am aware that Hameroff, for instance, maintains that 'the general assumption in modern science and philosophy is that consciousness *emerges from complex computations among neurons'*. (Hameroff) In other words this assumption presupposes that consciousness arises from biology where the world is an objective reality, where matter was created first and consciousness later. This goes against the idea that *the world is a solipsistic fact* and may therefore be discounted.

Another scenario, an even stronger case showing that consciousness exists independently from our brain, will be addressed later on.

In order to visualise the interaction of consciousness in a solipsistic world it is best to imagine consciousness, absolute consciousness, as an infinite primal sea of 'energy' from which emerges all there is. In such a scenario we must imagine ourselves as 'floating' in an ocean much like fish. As our brain is being pervaded by this consciousness the universe arises, yet the 'full light of consciousness' would be excluded. A good illustration of this is to picture us wearing *virtual reality headgear. While this would conjure up a virtual universe when switched on, it would at the same time isolate us from the 'full light of consciousness' surrounding us; isolating us, in other words, from absolute consciousness.*

Putting on such headgear not only illustrates the creation of our waking world, but also that of our dreams. To regard our brain as such headgear is actually far closer to the mark than we might assume at first thought. When we learn that there are *more potential synapse connections in the brain than atoms in the universe, it makes this quite feasible.* (Sethi) In such a scenario the universe becomes a projection produced by the individual brain rather than being perceived by it as an *objective reality from 'out there'. In short, both the dream and waking are seen in this scenario as individual projections rather than receptions from some external source. The only difference between the two is merely one of direction: while one peers inwards, the other looks outwards.*

Seeing the world as a *projection* is as old as mankind. I am saying this because mysticism is an integral part of humanity, and although it has largely been ignored by western science, ironically since the so-called Age of Enlightenment, it nevertheless has wielded enormous influence, albeit a 'subterranean' one. But since the birth of quantum mechanics this has been changing gradually. Schrödinger, for instance, talked about the Upanishads, as did Bohr and Heisenberg. In fact in Jeffrey Mishlove's interview with Karl Pribram, for instance, we read, *"the rules of quantum mechanics apply all the way through to our psychological processes, to what's going on in the nervous system – then we have an explanation perhaps, certainly we have a parallel to the kind of experiences that people have called spiritual experiences.* ***Because the descriptions you get with spiritual experiences seem to parallel the descriptions of quantum physics****".* (Mishlove)

One such spiritual experience is that of the Sufi mystic Mahmud Shabistari, exemplified in his poem "The Garden of Mystery'.

"Know that the world is a mirror from head to foot,
In every atom are a hundred blazing suns.
If you cleave the heart of one drop of water,
A hundred pure oceans emerge from it …
In the pupil of the eye is a Heaven,
What though the corn grain of the Heart be small
It is a station of the Lord of both worlds to dwell therein"

The 'corn grain of the Heart' is a reference to the seat of consciousness in the human body. Sri Ramana Maharshi of Tiruvannamalai describes this corn as a lotus bud turned upside down or a plantain bud. (Ramana) It is on the right side of the chest and has nothing to do with the pumping heart on the left side. In Sanskrit literature it is called the *Hrit*, the same word, in fact, as the English 'heart' with the typical inversion of two consonants, which is so common in all languages. (Just recall the old 'aks' which now is 'ask') From there it rises to the brain on subtle nerve paths called *nadis*, ultimately pervading the entire body, so giving life to it. (Op. cit. 547-8)

At first sight this scenario of consciousness seems to negate the one I have painted earlier. Yet it does not really since we still can float in the ocean of consciousness and imagine it penetrating the Hrit 'osmotically', taking up residence there and moving on to the head and body in the described manner, consequently isolating us from absolute consciousness due to our constraining headgear, the brain.

A special point of interest is that Shabistari speaks of the world as a *'mirror from head to foot'*. It is as if in this likeness he had anticipated what later would become Karl Pribram's idea to compare the universe to the projection of a *holographic* brain. He came to this notion in the course of studying brain functions during which he came to compare what is happening in our grey matter to the operation of a *holographic* machine that stores all its information on a *holographic plate*. The marvellous thing about such a plate is that when a *laser beam* lights it up, images that have been imprinted on the plate, project outwards from it in three-dimensional form. And, what is even more fascinating, as we change our point of view, we see the images from different perspectives. So we will not only see the image from the front, but also from the side or any other angle we wish to inspect. Not only that, it also is endowed with the characteristic of '*omnipresence*'. By this is meant that when such a plate shatters to pieces, every single fragment, no matter how small or how large it may be, is able to reproduce *all* the information that was originally embedded in the unbroken plate.

This very same notion has been part of Hindu lore for millennia. This is evident from a Sutra quoted by Marilyn Ferguson when writing about 'Karl Pribram's Changing Reality':

"In the Heaven of Indra,
there is said to be a network of pearls
so arranged that if you look at one,
you see all others reflected in it.
In the same way,
each object in the world
is not merely itself,
but involves every other object,
and in fact,
is every other object". (Ferguson)

This parallels the quality of '*omnipresence*' in the holographic plate. It can store such an enormous amount of information because it is *non-spatial*, having the quality of eternity so to speak. This is to say that hologram upon hologram can be superimposed on the same plate *without taking up any space at all*. If the brain functions like such a plate, then it is more than plausible that it can produce and store all the data necessary to create the entire universe and its countless objects and events.

This collapses our traditional conception of an objective world like a house of cards. Thus, in 'hologrammatic' thinking, there is no longer any need for actual space and time, it's now an *apparent thing only, a projection of information stored non-spatially.* The world, the infinite universe, is not really out there, for *what appears to be out there is clearly a projection of what is stored in the holographic matter of the brain*. So let's remember: things that are apparently light-years apart reside very cozily together in that small lump of grey matter. And, since all things are contained in each part, 'all the pearls in one pearl', they are even closer together. *The 'Big Bang' theory with its tedious teasing out of time and matter disintegrates in the blink of an eyelid, and in its place Chuang Tzu looms large when he says: "Heaven, earth and I were produced together, and all things and I are one".* (Chuang Tzu)

Such toppling of our antiquated western perceptions is rocking the foundations of our science. Clearly, a massive paradigm shift is under foot. East and West are moving closer together, paving the way for a new worldview and a new kind of spirituality.

We might pause at this point for a moment and reflect on the mystery of consciousness. First, let me repeat here that a consensus of biologists argues that consciousness arises from biological processes. This means that they must believe that matter was created first, which then somehow *emanates consciousness*. From this follows that these theorists contend that the waking world is an objective reality. In view of the fact that such thinking is based on a *double premise*, their theory must be abandoned. The creative sequence is the other way round. Consciousness gives birth to matter. *The very fact that consciousness is the sine qua non of existence places it in the primary position in any hypothesis of creation.* There can be no other way without perverting the hierarchical order, without deposing the king and instigating anarchy.

But, let's not forget at the same time that in truth there is no sequence at all since the universe comes into being at once and in totality the moment we become aware of our waking state. *This not only concurs with Prospero's magic, but it is also in perfect agreement with quantum mechanics, which states that 'energy' only 'coalesces' to matter as we focus on it. In short, the world cannot exist as such, but only unfolds in a living medium, the mind; in other words, in consciousness. In turn, the necessity of a living matrix for the 'creation' of the universe underpins the argument that the world only exists while we are awake. It also demonstrates how right Chuang Tzu was when he said: "I and the universe are one", and such oneness is not just a theoretical unit, but a living whole.*

Here again, quantum mechanics is able to bring this curious symbiosis of man and the universe to life for all those who have not had the corresponding mystical experience: *Once we learn that E, the creative energy, is typified by an interactive dualism, where photons and particles are an 'hermaphroditic' ingredient of potentialities, where unitive E is better described as 'not two' than as 'one', we understand at once that mc2, the material expression of E, is never pure*

matter, but also energy, and ultimately a form of consciousness. Indeed it could hardly be any other way since manifestation utterly depends on the sea of consciousness for its existence.

This same principle is also reflected in the *interdependency of dreaming and waking*. In other words, dreams are never purely dreams; they borrow an enormous amount of waking imagery, while waking is never without the shadow of our dreams, particularly since they anticipate the waking world. As well as this, the same duality principle also raises the biblical dictum '*let there be light*' from myth to physics, for the first apprehension of light is nothing other than what happens at the moment of birth, as we are thrust from the womb's darkness into the light of the waking world.

I have said that it was consciousness that *engenders a sense of reality* and that it provides the glue between the two states of dreaming and waking. What else has to be mentioned in this context is that anything intermittent like the alternating coming and going of dreams and waking cannot be regarded as true reality. Only what remains unalterably the same can be seen as *absolutely real*. It is for this reason that *the waking process is to be seen as no more real than the dream, as something just as ephemeral and thus of relative or even illusive reality.*

The notion *illusive reality* might need a little explanation, especially since it might well be understood as something ineffectual, which it is not. We might regard our dreams, for instance, as illusive reality and declare that they leave not even a 'rack' behind, as Prospero said of his magic revelry. But, as we have seen, they are more than a wisp of smoke, especially when they come in the form of a nightmare.

A good illustration of *illusive reality is the mirror picture*. Its reflections are a kind of shadow of substantial objects. If we place a bowl of fruit in front of it, for example, we recognise at once what the reflection portrays, but we would also be aware that we couldn't eat it. In short, *while reflections are real, the substance of the reflected is not* since it can't nourish us, since in fact it is false. So what the mirror image signals is that there is something in existence that might be edible like the fruit in the bowl, or more generally, that *something exists that would sustain, or indeed, enhance our life.* This means that what the world offers, the successes, the pleasures and so on, have no more substance then the mirrored fruit in the bowl. Although such fruit might be *pleasurable* to look at, it is in fact no more than a *promise*.

In life, a rather telling example of this would be sex, for instance. Although pleasurable while we are in its thrall, the sensations it causes will not last and in the end engender addiction, disappointment, frustration and even violence, ending up in breakups and in murder in extreme cases. In that realm we ultimately bump endlessly against the glass of the mirror that holds up so much promise.

Yet paradoxically, in the mystical marriage sexual love stands for transcendental euphoria. What the mirror upholds here is particularly bewildering. An example of this is the vision and ecstasy of St. Teresa of Avila in which she *"saw in the hands of the highest types of angels a long, golden spear and at the end of the iron tip I seemed to see a point of fire. With this he seemed to pierce my heart several times so that it penetrated to my entrails. When he drew it out, I thought he was drawing them out with it and he left me completely afire with a great love for God. The pain was so sharp that it made me utter several moans; and so excessive was the sweetness caused me by the intense pain that one can never wish to lose it, nor will one's soul be content with anything less than God".* (Canterburyatheists)

Not surprisingly, atheistic commentaries in response to this vision run something like this: "Her sexual desires unable to find a physical outlet, she finds 'pleasure' and 'release' in her visions…In her autobiography she wrote, *"During ecstasy the body stops moving, breathing becomes slower and weaker, you only sigh and pleasure comes in waves"*… For all intents and purposes, she is describing an orgasm. Many interpret her most famous vision as having strong sexual connotations, and the angel's golden spear to be phallic symbolism". (Op. cit.)

Thankfully, misunderstandings such as these among those who have not taken the trouble to delve into mysticism to greater depth, are deftly countered by comments like this: *"Imagine that the "Spiritual Marriage" of St. Catherine or St. Teresa veils a perverted sexuality, that the visions of the Sacred Heart involved an incredible anatomical experience, or that the divine inebriation of the Sufis is the apotheosis of drunkenness"*. (Underhill)

Clearly, what 'analysts' of the atheistic temperament fail to understand is that the word LOVE is a JANUS head with one face looking towards things *venereal*, while the other is fixed on affection devoid of eroticism, towards veneration. Both terms are derivatives of VENUS, the Goddess of love. These critics, or indeed amateur analysts, are blind to the fact that in the mystical context Eros can stand in for Agape. It does not occur to them that sex is capable of the *most passionate expression of all love, including that of transcendental passion.* In this connection it is quite revealing to find that many teenage girls will dream that they had sex with their father. Naturally, this invariably disturbs them and indeed disgusts and frightens them.

I have examined many such cases and found that dreams of this nature, more often than not, indicate a particularly strong bond between daughter and father. I generally explain scenarios of this kind in the following manner: 'Dreams are chiefly pantomime. For them to *mime* affection there are various options such as a kiss, a hug, an embrace, stroking the hair and so on. But when affection is particularly intense between daughter and father, such gestures are inadequate and only representations of sexual intercourse will do justice to such deep affection'.

Surely, it is quite facile to insist that Teresa's most famous vision was initiated by thwarted sex, and that her vision was 'for all intents and purposes describing an orgasm'. (Canterburyathesists) In fact, Teresa's ecstasy is nothing like an orgasm, which comes to light when we take a closer look at what she actually wrote in her autobiography: *"During ecstasy the body stops moving, breathing becomes slower and weaker, you only sigh and pleasure comes in waves"*. (Op. cit.)

Anyone who has physically experienced an orgasm will know that it is a violent event. At such times Teresa's sighs, as she is carried along in waves of pleasure, are replaced by roars and screams while her 'slower and weaker breathing' is transformed to the desperate huffing and puffing of a marathon runner. Indeed, the whole act is not for nothing alluded to as 'heavy breathing'.

But such misdiagnoses by her atheistic detractors do not end there. So when she says: *"This prayer is a glorious foolishness, a heavenly madness where 'true wisdom' is learned; and it is for the soul a most delightful way of enjoying",* (Op. cit.) her critics readily see *clinical madness*.

Nothing could be further from the truth. In point of fact, it would be a sad world if psychiatric illness was no different from 'true wisdom'. Obviously, Teresa resorted to speaking of 'madness' because in this physical world there are no comparative terms for ecstatic experiences. To be sure, the word 'ecstasy' makes this quite clear, for being made up of 'ex' (out) and 'histanai' (stand), it shows that mystical experiences are, like quantum mechanics, 'out of this world'.

Clearly, Teresa's visions are of a *different reality* to what we enjoy in everyday life. For true ecstasy does not just slow the breath, *but stops breathing altogether.* And when the breath stops, the stream of thoughts stops; in other words, *it is not the brain that produces ecstasy, but the shutting down of the brain and its functions. It is then that illusive reality is replaced by a transcendental reality.*

So when we say that the world is an *illusive reality* we must understand that its images signal that they in themselves are nothing but reflections of a '*fuller reality*' behind them. A reality, or indeed an energy, that is not diminished by providing life with the imagery and configurations of waking and dreaming. For just as the reality of the sun is not affected as it creates the play of light in the sunsets and sunrises on earth, so *transcendental consciousness* is never touched as it brings us and our virtual reality headgear into existence.

In other words, while the brain, the headgear for our virtual reality world is only *relatively real*, the source of consciousness that brings it into existence, is *absolutely real*. It is at this point where we must add the proviso that this can only be the case if that source consciousness is *non-intermittent*, steady as the sun in the sky.

On the surface, consciousness seems to have *intermittent qualities.* We say of the man, for instance, who suffered a blow to his head and lies motionless that he is *unconscious*. Yet when he comes to himself again, we realise that he was only unresponsive to the outside world. In other words, *his consciousness remained uninterrupted*. His case is little different from the man who has fallen asleep and is able to recount a dream when he wakes up. His ability to relate what he saw in that state is sufficient evidence that his consciousness remained intact all the while he was unaware of his surroundings. But what about the case of a man or a woman who is considered to be dead? Has their consciousness atrophied?

Before addressing this question in detail, it is instructive to see what occurs in *complete and utter mystical ecstasy*. Here, Teresa's raptures serve again as an informative example: *"Sometimes the person is at once deprived of all the senses, the hands and body become as cold as if the soul had fled; occasionally no breathing can be detected*…When this profound suspension diminishes, the body seems to come to itself and gain strength to return again to this *death* which gives more vigorous *life* to the soul". (Underhill)

'*To this death*', is a phrase that describes this state of suspended animation quite dramatically, but also accurately. For the body of a mystic whose breath is arrested and becomes '*cold as if the soul had fled*' can only be described as being in a state equal to what today goes under the name of 'Near Death Experience' or NDE. It parallels in many ways the yogic experience of Samadhi, which outwardly displays precisely the same physical symptoms and inwardly transcends all of virtual reality. If we examine this situation thoroughly, we find that 'near death' is somewhat of a misnomer, for the patient reaches a state where his or her body is truly dead. But since the patients, like Lazarus, return to life again, it is considered to be a *near death* experience.

Among countless records of NDEs, one of them stands out as the most extraordinary, one that from the point of view of scientific integrity can only be hailed as the best-attested case. It is, as I see it, the equivalent of the 'Rosetta Stone' that unravelled ancient Egypt's innermost secrets. We are faced here with the proceedings of Pam Reynolds' *artificially induced death* for the purpose of operating on a basilar artery aneurism that could not be accessed by the usual pathways of operational procedures.

It was doctor Spetzler whose idea it was to *suspend all animation* of his patient *totally* in order to forestall any fatal injury during the operation. The attending doctors, nurses and medical technicians, *twenty in all*, quite aptly nicknamed this daring hypothermic arrest 'stand still'. It is because there were so many professionals present who witnessed this necessary preparation for the operation that makes it so completely unique and scientifically incontrovertible. In brief, the temperature of the patient's body was reduced to a mere 60 degrees Fahrenheit or 15.55 Celsius. Her blood was drained from her body. *In this state the heartbeat was flat-lined, the lungs drew no breaths and the EEG registered no brainwaves at all. In short, as Sabom writes: "In everyday terms she would be dead".* Dead not just for minutes, but for over an hour. Yet, miraculously, she returned to the living unharmed. (Sabom, chapter 3)

Even more amazingly, like so many near-death patients, she was transported to the Elysian Fields along a route made familiar by Dr. Moody's book on NDEs, "Life after Life". But, of course, the same route was also well known in medieval times as its illustration by the Dutch artist Hieronymus Bosch so palpably shows. "It was like a tunnel but it wasn't a tunnel", Pam recounted… "It's a dark shaft I went through, and at the very end there was this very little tiny pinpoint of light that kept getting bigger and bigger and bigger. The light was incredibly bright, like sitting in the middle of a light bulb". (Op. cit. P. 44) It was there where Pam heard her grandmother calling her. Soon she began to discern different figures in the light, "and they were all covered with light, they *were light* and had light permeating all around them". (Ibid.)

A *crucial observation*, which Pam made during her crossing of the River Styx is that she heard the sound of the natural D. As she listened to it, she felt it was pulling her out of the *top of the head*. And amazingly, the further out she got, the clearer this tone became. Here, we must note two important factors. The top of the head is in Hindu lore the location of the seventh and highest chakra. This is a magenta coloured 'wheel of energy' and a portal through which the soul or etheric escapes at death. It goes under the name of Sahasrara, the *lotus with a thousand petals*. Pam's description of her departure not only verifies this age-old Hindu wisdom, but also affirms that the Hindu's chakra lore is no mere fancy. (Mookerjee and Khanna)

But it also attests to the fact that not only do we have an '*etheric double*', a subtle entity that slips out of the body of flesh and blood at point of death, but that *consciousness is not interrupted when the body dies; that on the contrary, general perception is intensified, thus demonstrating that perceiving the world by means of the physical senses is a lesser and with it a secondary means of apprehending it.*

Indeed, once Pam had slipped out of her body, her etheric allowed her to enjoy the ordinary waking world from above

with greater intensity. "I remember", so she reported, "seeing several things in the operating room when I was looking down. It was not like normal vision. It was brighter and more focused and clearer than normal visions". (Op. cit. P. 41)

Some sceptics attribute the cause of such transcendental experiences to a 'demented and drugged brain'. (Carroll) Clearly, a brain in such deteriorating state could not achieve the kind of clarity of vision and enhanced focus as Pam reported. Besides, all the medical records indicate indubitably that at the time of leaving her body and looking down into the operating room she must have been *totally brain-dead.* After all, there could not have been a heartbeat with blood pulsating through the brain since *all her blood had been drained before the operation began*, nor was there any pulmonary activity. So those who will approach Pam's discarnate adventure with an open mind will no doubt concede that Dr. Moody's reports on NDEs were clearly trustworthy. This means that it is on indisputable and multiple records that when the body dies, the soul is not destroyed, but is rather liberated so that it can enjoy the freedom and joy of the transcendental realm.

It also verifies the belief that we rejoin our relations in a world of light and bliss, which makes it hard to leave it and return to earth. This becomes evident, as Pam is to depart from the realm of light: "My grandmother didn't take me back or asked me to go… My uncle said he would do it. He's the one who took me back through the end of the tunnel. Everything was fine…*But then I got to the end of it and saw the thing, my body, I didn't want to get into it…It looked terrible, like a train wreck. It looked like what it was: DEAD"*. (Op. cit. 46)

Some critics of Pam's transcendental adventure claim that her experiences took place before she was clinically dead. This scene of her return shows clearly that such a view is untenable. It becomes the more apparent as we read on: *"It was communicated to me that it was like diving into … a pool of ice water…it hurt"*. When we remember that her blood had been cooled to 60 degrees Fahrenheit and learn in addition that the d*octors had started to pump the blood back into her body before she had returned to normal waking, it becomes more than evident that Pam could only have had her transcendental experience after she was clinically dead.* It makes Pam Reynolds' medically induced NDE into the classic and scientifically recorded 'mysterium coniunctionis'.

In that state the relative reality we experience with our 'earthly headgear' is raised to incomparable heights. *Not, of course, to the ultimate level,* but well above that which waking and dreaming afford us. A good example from western tradition is Jung's experience described in his "Memories, Dreams, Reflections". (Jung)

It was part of the period of visions that was triggered off by a heart attack that struck him down after he broke his foot in 1944. As the period of convalescence set in, a series of visions followed, which enveloped him in a *"magical atmosphere"*. (Op. cit. 326) He understood then what the mystics meant when they spoke of *"the odour of sanctity, the sweet smell of the Holy Ghost"*. (Op. cit. 326) Describing the level of reality at such an occurrence he writes: *"We shy away from the word 'eternal', but I can describe the experience only as a non-temporal state in which present, past, and the future are one. Everything that happens in time had been brought together into a concrete whole. Nothing was distributed over time; nothing could be measured by temporal concepts. The experience might best be defined as a state of feeling, but one that can't be produced by imagination. How can I imagine that I exist simultaneously the day before yesterday, today, and the day after tomorrow? There would be things which would not yet have begun, other things which would be indubitably present, and others again which would already be finished and yet all this would be one"*. (Op. cit. 326-7)

Mystical encounters such as this bear out the illusion of time and space. They highlight the deception of our earthly headgear with its holographic trickery. But above all, they underpin the 'density' of a higher reality, Indra's network of pearls, Shabistari's 'heart of one drop of water from which a hundred oceans emerge'. And, of course, it underpins, once again, the 'hermaphroditic' state of E, the creative 'NOT TWO', which then 'disintegrates' into the world of duality, of contrast and contradiction. It further illustrates the working of the holographic brain that stores its information NON-SPATIALLY, yet projects it by means of the '*laser light of waking consciousness*' as a world of space and time.

It is perhaps worth noting at this juncture the fact that the illusion of time and space can be uncovered without the help of holographic experimentation. *Indeed, logic alone will accomplish this.* All we need to do is to ask ourselves how long is twelve noon precisely, for instance. Is it an hour, a minute, a second, a nanosecond or an infinitesimal fraction thereof? The short answer is: none of these applies. It is none of these because all propositions produce the end result of twelve noon *plus. Noon plus is not noon precisely*. The true answer is zero, 0. This seems at once absurd because it would mean that all clocks had no purpose in our life, that they all should forever rest their hands on midday and spare their energy of running round the clock face.

So what is wrong with this answer, or is it right and we misunderstand what zero implies? The latter, I am sure, and some mathematicians, at least, must know this. Zero, 0, is very much related to the word 'nothing', which is not nothing, but no thing. In other words it is something that is utterly real, yet unmanifest. In fact, zero represents the womb containing everything. It is what the mystics call the VOID.

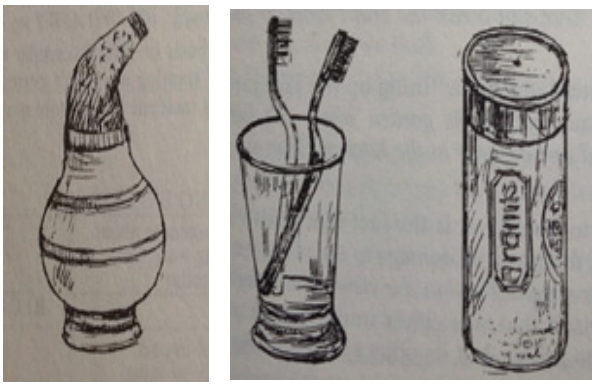
Indeed, from zero spring all the other numbers, both positive and negative. Clearly, zero is the mother of all numbers giving birth to infinity. *It is the sign for eternity, which contrasts with the prostrate eight, the sign for ad infinitum.* Eternity distinguishes itself from infinity, which is an endless *flow* of numbers and ultimately of all that is to become manifest, while eternity, the VOID, does not flow, was not born or created, has no extension, yet contains all there is, was and will be. (Forrer)

And since time and space are an 'hermaphroditic' entity, space too is a figment produced by our 'headgear'. A quick glance at Euclid's definition of the straight line will unravel this for us. While the straight line in the abstract, in our head, is the shortest connection between two imaginary points, this changes the moment we materialise this theorem by means of pencil and paper. No matter how fine the tip of our tools may be, the line will become an extended ribbon and the points will end up as circular areas. In other words, while our world in the realm of *eternity* Jung described via his mysterium coniunctionis is devoid of both space and time, it becomes falsified the moment it projects itself onto the plain of waking manifestation.

Yet another illustration comes from the world of dreams. I have already said that the dream imagery is very much

condensed. However it loses its compactness as it projects onto the waking field. In other words, the density of the dream imagery disintegrates and draws out into an imaginary field of space and time. The two images illustrated here exemplify this. The dream image is to the left while its corresponding waking manifestation is to the right. (Forrer)

Figure 1: Drawings by the author



From such manifestational 'disintegration' or rather unfolding of the dream construct it transpires that the dream is accordingly closer to the imagery of Jung's mysterium coniunctionis. Put another way, the dream is closer to the realm of Heaven than waking. It is, in other words, an intermediate state between absolute and earthly consciousness. No doubt, it is for this reason that sacred scriptures declare that the dream is a message sent from God or the Absolute. But more than that, as is evident from what Job said about dreams: "*For God speaketh once, yea twice, yet man perceiveth it not. In a dream, in a vision of the night, when deep sleep falleth upon men, in slumbering upon the bed: Then he openeth the ears of men, and sealeth their instruction"*. (Job 33: 14/15/16) This, like no other ancient dream lore makes it quite clear that dreams are transmitters and transformers of the contents of the creative and 'hermaphroditic' E. But the phrase, *'yet man perceiveth it not'*, also draws attention to mankind's ignorance of this fact.

Interestingly, such lack of perception seems to be a deliberate attribute of the dream's character and its function in the life of ordinary men and women. Freed of such ignorance, life, the dream's manifestations, would have fewer secrets. Its '*hide and seek principle*' that adds so much spice and mystery would be lost. It would be like watching a drama on stage of which we know the whole plot in detail. While this would still retain a certain amount of tension, it would certainly be drastically undermined.

There is yet another and most important point that Job's dream wisdom makes. It is contained in the last sentence: *"Then he openeth the ears of men, and sealeth their instruction"*. Clearly, it declares that the dream's instructions are not just warnings, but prophecies. Dreams seal our fate, and all there is to do for us is to surrender to what is in store for us. As Aesop's fable has it, in which a dream came true despite all the efforts of the dreamer to forestall it: *"A man should resign himself to his fate with patience and courage, for no artifice can deliver him from it"*. (Aesop)

We have seen how quantum mechanics is hauling the mystic out of his subterranean realm into the light of day. A major effect this has is that much of what was considered to be *ancestral superstition is being re-evaluated and returned to its rightful station.* The soul, for instance, is no longer our forebear's superstition, but a scientifically attested reality. *On the other hand, the body is being downgraded to a kind of space suit with virtual reality headgear that conjures up a realm of reflective illusions.*

In view of this, the dream too, and its function as a messenger, will gradually be saved from confusion and derision. As in biblical lore, where it was portrayed as an angel, meaning messenger, it will regain its standing as a vital link between absolute consciousness and our world of relative values. *Indeed, like Hermes, it will eventually be recognised as the messenger of life's most fundamental information. Instead of being dismissed as Prospero's vacuous wisps of smoke, it will be recognised, once again, as the DNA of life on earth.*

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Auditory evoked potentials in lucid dreams: A dissertation summary

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Summary. Are lucidly dreaming subjects able to discriminate between two different auditory stimuli using an oddball paradigm? How does the evoked potential (P300) in the EEG during this task look during lucidity, as compared to wakefulness and to non-lucid REM sleep? These are the central questions in Dr. Johannes Oliver Strelen's dissertation, which is summarized in English language in this article. Six experienced lucid dreamers underwent polysomnographic recordings in the sleep laboratory for a total of 21 nights. Their task was to move their eyes from left to right, whenever they heard the target stimulus of an oddball paradigm, which was presented throughout the whole night. Three of the six subjects experienced a verified lucid dream and conducted the given task within it. The performance (correct responses) in the oddball task during lucid dreaming was worse than during wakefulness, but significantly better than what could be explained by chance. Thus, Strelen showed,that it is possible to react to simple auditory stimuli with a pre-defined eye movement, while dreaming lucidly, without waking up in between. Moreover, for two of his subjects, Strelen analyzed the auditory evoked potential (P300) of the EEG signal during the oddball paradigm. In one case, he found a clear, in the other case a unclear P300 peak. The morphology of the P300 EEG pattern for the correctly answered target stimuli during lucid dreaming was similar to the P300 EEG pattern during wakefulness, suggesting that information processing during lucid dreams is closer to wakefulness than to non-lucid REM sleep.

Keywords: Lucid dreaming, auditory evoked potentials, P300, dissertation summary

1. Introduction

This review summarizes the most important results from the dissertation of Dr. Johannes Oliver Strelen, which was handed in at the Johannes Gutenberg University, Mainz, Germany, in 2006 under the title "Akustisch evozierte Potenziale bei luziden Träumen - eine Untersuchung über diskriminierendes Wahrnehmen und selektives Beantworten von Tönen in REM-Schlaf" (Auditory evoked potentials in lucid dreams – an investigation of discriminative perception and selective answering of tones during REM sleep). The goal of this review is to make the study's main findings available to the scientific community by translating them into English, as they might be of great interest to other lucid dream researchers, and possibly to researchers from other fields, as well.

2. Summary of Strelen's dissertation

2.1. Motivation of the study and study goals

Even though evoked potentials can deliver information about the consciousness state, they have not yet been used for lucidly dreaming subjects – other than, for example, for the sleep stage N1, for which it was demonstrated that they describe the subjective and objective state of consciousness better than the spontaneous EEG (Campbell and Colrain, 2002).

Investigating evoked potentials during lucid dreams could thus lead to new insights about the phenomenon of lucid dreams. Besides this, Strelen sees it as an exciting challenge to let experienced lucid dreamers conduct the paradox task of reacting to waking world stimuli during sleep with eye signals.

Thus, the aim of Strelen's study was to present auditory stimuli using an oddball paradigm during lucid dreams and to analyze both the performance of the subjects during the oddball task, as well as the evoked potentials in the EEG signal.

2.2. Methods

2.2.1 Participants

Six healthy volunteers (three male, three female, aged 21-50) were recorded at the Stanford Psychophysiology Laboratory in the year 2001. The subjects were experienced lucid dreamers (based on self-assessment), and underwent polysomnographic recordings for 6, 7, 5, 1, 1, and 1 nights. No adaptation night was recorded. The subjects went to bed at their preferred time and slept ad libitum. Written informed consent was obtained for the study.

2.2.2 Materials

Stimuli were presented using in-ear speakers in the left ear throughout the whole night at 30 dB above the individual perceptional threshold. The stimuli consisted of 70 ms long sine wave tones in random order at either 1000 Hz (80% probability, non-target stimuli) or 2000 Hz (20 % probability, target stimuli), according to the oddball paradigm.

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Table 1. Definitions

Definitions
- lucid dream: a dream in which the dreamer knows that he or she is dreaming
- evoked potential: event-related brain activity pattern following a (e. g. auditory) stimulus, measured using EEG
- oddball paradigm: a series of stimuli of two types, one with high probability (non-target items) and one with low probability (target items)
- P300: evoked potential measured around 300 ms after stimulus onset, which is thought to reflect processes involved in stimulus evaluation, e. g. in an oddball paradigm (Sutton et al., 1965)

The single stimuli were each followed by 2.0 ± 0.1 seconds of silence.

A Neuroscan SynAmps system was used for recording physiological (EOG, EMG, ECG) and EEG data (28 channels, using the 10-20 system). Impedances were kept below 5 kOhm. The data were sampled at 1000 Hz. Baseline correction was applied to the EEG data, as well as filtering (0.3 – 30 Hz) and artifact rejection.

2.2.3 *The task of the subjects*

The task, which the subjects were supposed to conduct in case they experienced a lucid dream during the nights in the sleep laboratory consisted of:

- moving the eyes left-right-left-right (LRLR) when reaching lucidity,
- listening to the auditory stimuli and moving the eyes another time LRLR when incorporating them into the lucid dream,
- moving the eyes LR immediately after each of the target (higher pitched) auditory stimuli, but not after the non-target (lower pitched) stimuli,
- moving the eyes LRLRLRLR directly after waking up,
- writing down a dream report after each waking up from a lucid dream, as well as filling out a questionnaire about the tones.

The subjects were asked to practice their task for at least 10 minutes a day during wakefulness during the days before the sleep laboratory nights. The task was also conducted at the sleep laboratory during wakefulness for 10 minutes (wakefulness condition).

2.2.4 *Data analyses*

Sleep stages were scored according to the criteria of Rechtschaffen and Kales (1968).

Only those lucid dreams were used for further analysis, which took place during REM sleep, were marked clearly by a LRLR eye signal in the beginning of the lucid dream, and had a written dream report indicating subjective lucidity.

For the evaluation of the oddball task, the LR eye movements were identified without knowing the timing or the category of the tones. For each LR eye movement, the tone was assigned, which was played during the 2000 ms before the eye movement. The oddball task was counted, if the subject tried to conduct the task (even if he or she did not succeed in hearing the tones), and if there was at least one target tone during the try.

The auditory evoked potentials were calculated for four conditions: wakefulness (based on the training periods before going to sleep and after waking up in the morning), non-lucid REM sleep, lucid REM sleep with signals to the oddball tones, and lucid REM sleep without signals to the oddball tones (if the task was not conducted during lucidity). If sufficient data was available, the EEG data was averaged for each condition, both for the target and the non-target tones, and the P300 EEG pattern was identified. Furthermore, the latency and amplitude were determined.

2.3. Results

2.3.1 *General lucid dreaming results*

Five of the six subjects subjectively experienced a lucid dream. In total, there were 23 subjective lucid dreams. Eighteen of these lucid dreams could be verified in four subjects, i.e. they took place during REM sleep and were clearly marked with a LRLR eye signal.

2.3.2 *Oddball task*

The oddball task was correctly conducted in 10 of the 18 verified lucid dreams, by three subjects. Reasons for not correctly conducting the task were lack of time (too short lucidity phase), forgetting the task or remembering it in a false way, giving unclear eye signals, or being distracted by the dream content (e. g. distractions by other dream characters, or the dream was too loud, i. e. louder than the stimuli).

The 10 lucid dreams, in which the subjects tried to conduct the oddball task, were on average 143 seconds long and contained on average 54 non-target tones and 14 target tones. In eight lucid dreams, the subjects managed to respond to the target tones with eye signals. The hit rates (correctly responded target tones divided by the total number of target tones) lay between 27% and 100% for the individual lucid dreams. In five of the 10 lucid dreams, the subjects responded also to the non-target tones (hit rates between 1% and 8%). Viewing the average performance over all lucid dreams for each subject separately, the hit rates for the target tones were 71%, 35%, 27%, and for the non-target tones 0.5%, 3%, 3%. The task was never conducted by the subjects subconsciously during non-lucid REM sleep. During wakefulness, the oddball task was conducted by all subjects nearly perfectly (hit rates > 98 % for the target stimuli and < 0.5 % for the non-target stimuli).

The subjects were further asked whether they heard the tones only after concentrating on the task or already before. In seven of the 10 lucid dreams, the subjects noticed the tones only when concentrating on them, in two lucid dreams already before, and in one lucid dream the memory was unclear.

2.3.3 *Evoked potentials*

For calculating the evoked potentials, only two subjects supplied enough data of sufficient quality (in the one case with 42 target tone EEG epochs, and in the other case with 56 epochs).

During wakefulness, as to be expected, a clear P300 signal could be detected in both subjects. The latencies were 319 ± 28 ms and 339 ± 39 ms. During non-lucid REM sleep, only less clear P300 patterns were visible (especially in one of the two subjects), with latencies of 350 ± 32 ms and

391 ± 22 ms. During lucid REM sleep, the P300 EEG pattern of the correctly signaled target stimuli showed a similar morphology as the ones during wakefulness, and were clearly visible for one of the two subjects, and less clear for the second subject (it must be noted that this subject also showed a less clear P300 signal during wakefulness and REM sleep). During lucid REM sleep, the latencies were 323 ms and 297 ms (as only a grand average was computed for this condition, no standard deviation is reported). The amplitudes of the lucid REM sleep P300 patterns were in both subjects much smaller than during wakefulness, comparable to the P300 during non-lucid REM sleep. For one subject, enough data was available to analyze the lucid dreaming EEG signal of those target stimuli which were missed and not reacted to via eye movement during the lucid dream. For these stimuli, no P300 peak could be found.

2.4. Discussion

In this study, Strelen showed that it is possible for a lucidly dreaming subject to consciously discriminate between two auditory stimuli of an oddball paradigm, which were presented in a random order during sleep. For this, six lucid dreaming experienced subjects underwent polysomnographic recordings in the sleep laboratory, and were instructed to react to the target stimulus (a short 2000 Hz sine wave tone) with a simple pre-defined eye movement to the left and right. Three of the six subjects were able to conduct the given task during their lucid dreams. All of them were able to send eye signals to the target stimuli with worse performance than during wakefulness, but significantly better performance than what would be expected by chance.
The analysis of the P300 EEG patterns suggests that the cognitive information processing capabilities of lucid dreamers tend to be more similar to awake subjects than to non-lucid REM sleep subjects. For two subjects, sufficient data was available to compare the P300 evoked potentials for the lucid dreaming state, non-lucid REM sleep and wakefulness. The morphology of the P300 EEG pattern for the correctly answered target stimuli during lucid dreaming was similar to the P300 EEG pattern during wakefulness. A clear P300 peak was visible in one of the two subjects, in the other one, a less clear P300 peak was visible. The latency of the clear P300 EEG pattern was similar to the one during wakefulness, for the other case, it was slightly shorter. The amplitudes of the P300 peaks were in both cases much smaller than during wakefulness, and comparable to the ones during non-lucid REM sleep of the same subjects. For one subject, enough data was available to analyze the lucid dreaming EEG signal of those target stimuli which were missed and not reacted to via eye movements during the lucid dream. For these stimuli, no P300 peak could be found.

3. Remarks on Strelen's study

Strelen's experiment extends the knowledge of lucid dreaming regarding the interaction with the waking world, as well as the knowledge of the underlying neuroscientific processes of this phenomenon. As Strelen points out himself, his study builds on previous research: It was already known that external stimuli are sometimes incorporated into dreams (Schredl, 1999); that sleeping subjects can react subconsciously to external stimuli (Harsh and Badia, 1990); that a similar discriminative information processing takes place during REM sleep as during wakefulness, as suggested by the analysis of auditory evoked potentials (Niiyama et al., 1994, Bastuji et al., 1995); and that lucid dreamers are able to conduct given tasks within their lucid dreams (e. g. Hearne, 1978, LaBerge, 1980). In a case study, a lucidly dreaming subject was able to react to external stimuli (electric shocks) with muscle contractions, however, by initiating the stimuli himself (Fenwick et al., 1984).

As is unfortunately the case for many lucid dreaming studies, Strelen's experiment also suffers from a very low subject count. Only three subjects had verified lucid dreams during the experiment, and only two subjects delivered sufficient data for an evoked potential analysis of the EEG data. As a result, this experiment can only be regarded as a case study. Thus, the results must be treated cautiously, as Strelen himself also suggests in his dissertation.

Since 2006, when this dissertation was handed in at the Johannes Gutenberg University, Mainz, Germany, other lucid dreaming research has extended Strelen's experiments. For example, in an experiment by the author of this summary, it could be shown that even transferring a meaningful message (a random math problem) using Morse code into the dream, and answering to it using Morse-coded eye movements, is possible (Appel, 2013).

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