

Attributes of the Dream Self related to anxiety upon awakening and its dimensionality

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Summary. The traditional interpretation of dreams has failed to live up to expectations insofar as it is purported to obtain relevant information for clinical use. Nor does conceiving of dreams as a by-product of the random nature of neuronal processes appear to permit useful information to be obtained from them. In order to verify this point, this study aimed to test the possibility of obtaining valid and reliable information from dream content based on the attributes of the Dream Self; that is, the character of the actual dreamer who appears in the dream. Information was collected from 235 dreams of 169 people with a mean age of 29.8 years. This was achieved with a self-report questionnaire evaluating 186 attributes of the Dream Self. Attributes related to anxiety upon awakening were subjected to exploratory factor analysis. There were 99 attributes related to anxiety upon awakening and with 44 of them it was possible to find a solution with 3 easily interpretable factors. These factors had alpha coefficients of between .78 and .90 and were related to anxiety upon awakening. The results obtained did not support the idea that dreams are a random phenomenon. Furthermore, it was possible to evaluate dreams through 3 dimensions of the Dream Self: Emotional-Social Unease, Threat-Avoidance and Strangeness-Confusion. It was possible to partially explain these dimensions by means of the continuity hypothesis of dreaming and Revonsuo's (2000) evolutionary theory.

Keywords: Anxiety upon awakening, Continuity hypothesis of dreaming, Dream content, Dream function, Dream interpretation, Evolutionary theory of dreaming, The dream self, Threat perception, Threat simulation theory

1. Introduction

Translating dreams into useful information is a long-held ambition of psychology. Dreams are an enigmatic cognitive product which may nonetheless have clinical utility (Do-weiko, 2002; Edwards et al., 2015; Oberst, 1998; Pesant & Zadra, 2004). Some psychological theories have attempted to obtain relevant information from dreams in the clinical sphere by means of a process of interpretation based on the accumulation of clinical evidence and which generally does not follow the scientific method. Nevertheless, the work of some authors who have managed to combine science and interpretation is contributing to improving this situation (Edwards, Ruby, Malinowski, Bennett, & Blagrove, 2013; Heaton, Hill, Peterson, Rochlen, & Zack, 1998; Hill, Diemer, Hess, Hillyer, & Seeman, 1993; Kan, Holden, & Marquis, 2001). Despite this, dream interpretation still enjoys limited scientific support (Bulkeley, Broughton, Sanchez, & Stiller, 2005; Domhoff, G. W., 1999; Domhoff, G. W., 2004; Kramer, 1994). Furthermore, with its multiple procedures and differing results, interpretation suffers from an overwhelming lack of reliability (Fisher, 1987; Kramer, 2000). In order to use dreams as a source of useful information about psychological aspects of the dreamer, the aim of this study was to

explore the possibility of obtaining valid and reliable data on the cognitive content of dreams by studying the attributes of the Dream Self (DS); that is, the character of the actual dreamer who appears in the dream.

Dreamers frequently describe an unusual attribute of the DS in dream reports, such as being of a different age, some peculiarity about their personality, being in a certain mood, etc. In addition, the DS is usually the main character and the one who appears most frequently in dreams (Hall & Van de Castle, 1966). It is also a good candidate for obtaining relevant information about dreams (Saez-Uribarri, 2013). Thus far studies have been conducted on the personality of dreamers (Aumann, Lahl, & Pietrowsky, 2012; Mathes & Schredl, 2013), the activities they perform during dreams (Hall & Van de Castle, 1966), their emotions (Schredl & Doll, 1998) and the colours they perceive (Bowe-Anders, Herman, & Roffwarg, 1974), among other aspects. However, we do not know what the most relevant attributes of the DS are, nor do we know what peculiarities it presents, or what the best words are to describe it. In other words, we are still unaware of how it is configured and specifically what configuration it takes when anxiety occurs upon awakening. The literature does not provide a systematic description of what its traits are and how they can explain post-traumatic dreams, recurring dreams, anxious dreams or nightmares.

One way of studying the attributes of the DS is to use a list of descriptive words. This method has already been used to assess the physiological activity which is reflected in dream content (Takeuchi, Ogilvie, Ferrelli, Murphy, & Belicki, 2001) and emotions (Nielsen, Deslauriers, & Baylor, 1991). Takeuchi et al. (2001) presented dreamers with a list of 200 adjectives with which to describe their dreams after waking in the laboratory. The list was in the form of a semantic differential. Through factor analysis, the authors found

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four factors of physiological activation in dreams. The four factors were Emotionality, Rationality, Activity and Impression. Significant correlations were also observed between Impression and Rationality and measures of physiological activation obtained by means of electroencephalography. Nielsen et al. (1991) used a list of emotions for 20 subjects to evaluate those which appeared in two dreams and in two life events. The list was composed of 127 words grouped into 11 positive and 11 negative categories. Participants received written instructions on how to use this list of words to rate the different scenes in their dreams. Participants first identified the presence or absence of the emotion, and subsequently scored its intensity on a 5-point scale. The results showed that greater anxiety and fewer positive emotions are experienced in dreams than in waking life.

Anxiety is a very important emotion in the study of dream content, in sleep disorders and in the clinical sphere in general. As an emotion, it has the function of facilitating an appropriate response to stimuli which could affect an individual's safety (Likhtik, Stujenske, Topiwala, Harris, & Gordon, 2014), although it is also a symptom of numerous psychopathologies. Baxter, Scott, Vos, & Whiteford (2013) observed that the global prevalence of anxiety disorders was 7.3%. During sleep, nightmares are the clearest manifestation of anxiety. For example, in post-traumatic stress, they are a way of reliving trauma (Aurora et al., 2010). They are also a central aspect of narcolepsy (Pisko, Pastorek, Buskova, Sonka, & Nevsimalova, 2014) and nightmare disorder (Aurora et al., 2010). Anxiety is also reflected in dream content (Robbins & Houshi, 1983), conferring importance not just on the stimuli of waking consciousness but also on dream consciousness. Due to its clinical interest and its link with dream content, in this study those attributes of the DS which were related to anxiety were considered to be relevant. In order to assess anxiety, the moment of awakening was chosen, as it is expected to be most strongly related to the dream content which has just been produced. It is understood that the dream may be a total or partial causal stimulus of the state of anxiety upon awakening or, at the least, a stimulus which is related to such a state (Saez-Uribarri, 2008; Saez-Uribarri, 2013; Saez-Uribarri, Renieblas, Sanchez-Diez, & Oberst, 2016).

Given all of the above, the first task of this study is to test whether it is possible to obtain a list of descriptive words about the DS related to anxiety upon awakening. The attributes of the DS obtained in this way could be an interesting source of information in the clinical sphere, either for the assessment of cases or for the development of psychological therapies.

As for the possible dimensionality of the DS, this aspect is not required in order to explain the function of dreams. If the DS presents certain attributes, it is not reasonable to expect them to be grouped together forming patterns, profiles or factors. Significant controversy exists in the scientific literature about the function of dreams. Some authors assert that dreams are an epiphenomenon of neuronal processes which occur during sleep. This theory has been supported by Flanagan (1995), who considers the mental activity manifested in dreams, including the forms of representation of the DS, to be a by-product of underlying processes. Within this view, sleeping facilitates reprocessing of data from either declarative or procedural memory (Plihal & Born, 1997), in which preference is given to emotional content (Malinowski & Horton, 2014), while an encoding and consolidation pro-

cess takes place (Walker & Stickgold, 2006). Specific brain regions are involved in this processing (Desseilles, Dang-Vu, Sterpenich, & Schwartz, 2011) and mental content is generated in parallel which gradually incorporates information from wakefulness (Blagrove et al., 2011) that may be related to the content which is being reprocessed. As such, dreams would be the conscious facet of this reprocessing (Stickgold, Hobson, Fosse, & Fosse, 2001). Given the tendency of the human brain to construct memories on the basis of cues (Conway & Loveday, 2015), even if these cues are not real, dreams may be no more than a coherent story constructed on the basis of elements which are irrelevant—or which have limited relevance—as a consequence of neurobiological processes of greater biological utility. Although it does not appear to be necessary for a story to possess specific patterns in order to make it coherent, the logical expectation would be for dream content to be randomly distributed. For example, the DS is the central character in the majority of dreamed stories (Hall & Van de Castle, 1966), a bias which strongly suggests it is not a random event. Other characters could equally be the central character in the story, at least in a greater number of reports. Perhaps this bias could be a consequence of the processed information being directly related to the Self. However, it does not seem necessary for the DS to present aspects, profiles or regularities which add complexity to an element which forms part of a story without any function whatsoever, and consequently one would expect to find a set of attributes with little interrelation, based on which it would not be possible to identify a profile, pattern or factor. We refer to this complexity as multidimensionality of the DS and, if identified, it would be an unexpected aspect of dreams which would require some kind of explanation.

Although the multidimensionality of the attributes of the DS has not been studied, other research has looked at the dimensionality of dreams. For example, Hauri, Sawyer, & Rechtschaffen (1967) analysed 20 psychological variables of 127 dreams. The subjects themselves scored characteristics such as dramatisation, control and emotion. Two judges also took part in the scoring. This way, the variables were scored by the subjects in some cases, by subjects and judges in others, or exclusively by judges. By means of factor analysis, the authors obtained eight dimensions which described the general characteristics of dreams, including Active Control, Verbal Aggression and Physical Aggression. Another work (Saez-Uribarri, 2008) studied the attributes of dream characters other than the DS. Those attributes which were related to the state of anxiety at the moment of awakening were selected and their dimensionality was subsequently analysed. The factors obtained were Psychological Threat, Terrifying Threat, Auxiliary and Spectator-Victim. Meanwhile, Zlotowicz & Zazzo (1982) analysed 306 nightmares of boys and girls between the ages of 5 and 10 years. The authors developed a classification of 22 characters and 49 actions which can arise in children's nightmares. The table of frequencies of characters by actions was subjected to correspondence analysis, obtaining two factors. The first factor was related to actions between aggressors and victims and the second factor permitted the establishment of a classification of aggressors in the form of humans, fantastical creatures and animals. Yu (2009; 2012) also analysed the dimensionality of dreams based on the most frequent themes which appear in them with the Dream Motif Scale (DMS). The DMS covered dreamers' memo-

ries about their dreams over their entire lives. The themes included the activity of the DS and other characters. The data analyses grouped them into three dimensions which can be viewed as three personality traits regarding the way subjects produce their dreams. One of these dimensions, named Ego Ideal by the author, evidenced the tendency to frequently generate negative dreams in which the DS fails in its activities. These works demonstrate that dreams can present multidimensional aspects, even though they do not specifically cover the figure of the DS or provide indications that the DS is a complex entity.

For this reason, this study aims to analyse the multidimensionality of the DS and determine whether the DS is a simple or complex entity. The existence of a multidimensional structure would not be compatible with the theory that dreams are something random or a consequence of underlying memory processing. According to the literature analysed, the processes underlying dreams do not require more than a simple DS and, as such, the DS should not have a multidimensional structure. On the other hand, if a multidimensional structure is identified, it would be necessary to explain this complexity, which is unnecessary in principle and could possibly be associated with a function of dreams which still eludes us. Recognising dreaming as a more sophisticated cognitive product lends support to the idea that it may form part of a cognitive process which is useful to people.

Therefore, the first hypothesis of this study is: It is possible to identify a series of descriptive attributes of the DS related to Anxiety upon Awakening (Hypothesis A). If the first hypothesis is correct, the second hypothesis to be tested is: The attributes of the DS related to Anxiety upon Awakening have a multidimensional structure (Hypothesis B).

2. Method

2.1. Participants

The sample was composed of 235 dreams belonging to 169 people between 16 and 63 years of age, the majority of whom contributed one or two reports. In eight cases the contribution was between three and 11 reports. Of the 235 dreams, 68 belonged to men (mean age = 29.8 years) and 167 to women (mean age = 27.7). Participants responded to a request made via the internet or were contacted by distributing leaflets in public places. Electronic mailing lists were used to distribute the request over the internet. The electronic mailing lists which the request was sent to were selected taking into account their number of subscribers. In both cases, volunteers provided their postal address in order to send them the questionnaires. Subjects were informed about the purpose of the study in the instructions which they received with the questionnaire and they returned it voluntarily, thereby giving their consent to participate. The management of personal data complied with the provisions of the applicable data protection regulations.

2.2. Research Instruments

Anxiety upon awakening: The Anxiety upon Awakening Assessment Questionnaire was used in order to measure anxiety upon awakening (CEAD, Saez-Uribarri, 2011). It is a 25-item questionnaire which includes physiological responses (e.g., feeling shortness of breath) and cognitive-emotional ones (e.g., nervousness). Subjects marked each item on a

visual scale with five possible values between a plus (+) sign and a minus (-) sign. Each response was scored according to the weightings of the original study and summed to obtain an overall score. Cronbach's alpha for the questionnaire in this study was .86.

Attributes of the DS: To collect the attributes of the DS a specific ad hoc questionnaire (Dream Self Attributes Questionnaire, DSAQ) was created. It allowed a total of 186 attributes, generally adjectives, to be assigned to the DS (e.g. sad, threatened, etc.). Responses were dichotomous (absent = 0, present = 1). In order to produce it, spontaneous descriptions of the DS were used from an initial series of everyday dreams. The initial list was extended using a thesaurus (Espasa-Calpe, 1989), including synonyms, antonyms and similar words which could be useful for describing the DS.

Variables recorded on the profile of subjects were the sex and age of the dreamer.

2.3. Procedure

The questionnaires were sent to participants' homes by post. In the instructions for the questionnaire, subjects were instructed to complete it on the same day that they remembered the dream. They were warned that their contribution would not be valid if they did not proceed as instructed. Participants were also asked to write a dream report. The instructions to describe the DS with the list of words were:

"Tell us below what you were like or how you felt during the dream. If these words appropriately describe what you were like or how you felt during the dream, mark the corresponding box with an X. Mark the aspect if it occurred at any time during the dream."

After completing the questionnaire, subjects had to send it back by regular post. For this purpose, a postage-paid envelope was sent together with the instructions for deliveries from Spain. For other countries, postage was paid by the sender. A new questionnaire was sent to those who requested one, using a checkbox for this purpose. Of the people who initially expressed an interest in participating and provided their details, 27.0% of them sent back at least one dream.

2.4. Data analysis

A bivariate analysis was conducted to test whether any of the attributes of the DS were significantly related to the state of anxiety upon awakening (Hypothesis A). The statistic used was the Mann-Whitney U, given that the CEAD scores did not follow a normal [0, 1] distribution (Kolmogorov-Smirnov $Z = 1.9$; $p = .001$). Each attribute of the DSAQ was used to test whether its presence or absence produced significant differences on the CEAD score; that is, if there was a significant difference between the scores of people who indicated the presence and the scores of those who indicated the absence of the attribute. Additionally, despite the fact that the data did not meet the requirements of a linear model, a multiple regression analysis was used as a test of overall significance. This avoided the possibility of false positives influencing the testing of Hypothesis A and a minimal list of adjectives explaining Anxiety upon Awakening was obtained. To do so, the attributes which produced significant differences with the Mann Whitney U statistic in the previous step were used as independent variables and the CEAD

Table 1. Standardised regression coefficients between the attributes of the DS and Anxiety upon Awakening

	Beta	t	Sig.
Horrified	.25	3.84	.000
Worried	.18	3.29	.001
Desperate	.19	3.18	.002
Shouting	.18	3.33	.001
Lonely	.17	3.25	.001
Tired	.15	2.89	.004
Fearful	.18	2.98	.003
Watched	-.12	-2.18	.031

scores were used as the dependent variable. The procedure for entering the variables into the linear regression model was stepwise with F statistic probabilities of entry and exit of .05 and .10.

Attributes whose presence/absence resulted in a difference in the value of the CEAD were selected to test Hypothesis B regarding multidimensionality. To do so, a factor analysis was conducted on the variance-covariance matrix using the Principal Factors method. A Quartimax rotation was applied to obtain a factor matrix with maximum differences between factor coefficients.

To obtain an interpretable factor solution, the attributes of the DS which met the following conditions were selected:

- For those which formed part of a homogenous group: those which did not initially reach an MSA value (measure of sampling adequacy of each variable) of 0.7 were ignored one by one.
- For those that formed part of an interpretable factor solution: Those attributes with loadings of above .3 on two or more factors were removed. This was performed by removing the attributes from the analysis successively one by one.

3. Results

Of the 186 attributes of the DSAQ, 99 produced significant differences on the CEAD based on their presence or absence in the DS. In the regression analysis, a significant linear relationship with CEAD scores was observed for eight of them ($R = .72$; $R^2 = .52$; $F_{8,190} = 26.29$; $p < .001$). The list of words is included in Table 1.

In relation to Hypothesis B, an initial factor analysis of the 99 attributes from the previous stage revealed the existence of 22 factors which explained 56.2% of the variance of the DSAQ. The factor structure turned out to be complex and

difficult to interpret. A complementary analysis was therefore conducted by which it was possible to set the number of factors to be extracted in advance. The way in which the attributes were associated in groups was studied by applying a cluster analysis with the K-means method. Attributes which formed small groups were discarded. Based on the groups of larger size, it was determined that the solution could contain three or four factors. On extracting 3 factors, ignoring attributes with MSA values below .7 and those with coefficients of greater than .3 on more than one factor in the structure matrix, an interpretable factor solution was obtained (Table 3).

With the extraction of three factors, the factor analysis explained 29.6% of the variance. Forty-four attributes of the DS from the DSAQ were finally selected. This produced a value of 0.81 for the KMO (Kaiser-Meyer-Olkin) sampling adequacy index, which indicated that the variables formed a homogeneous group given the relationship between them. The value of the index can be described as meritorious, according to Kaiser's (1974) criteria. The factors explained 16.51%, 6.72% and 6.33% of the total variance. The rotated and rescaled factor matrix is shown in Table 3. The extracted factors presented a distribution which could not be considered to fit a normal [0,1] distribution (Table 2). In accordance with the nature of their content, the factors obtained were named: Emotional-Social Unease, Threat-Avoidance and Strangeness-Confusion.

Emotional-Social Unease: The first factor encapsulates negative emotional reactions of the dreamer and social threats. This factor measures the psychological situation of the DS. It also evaluates the perception of social threats through the attributes Misunderstood, Rejected, Accused and Embarrassed. Dream events with high scores provoke a strong sensation of impotence in the dreamer. An extract of a dream with a high score illustrates this: "[...] they give me a beating and grab my girl and start getting her drunk. They start putting their hands on her. I can't do anything. I'm bleeding and tied up. I shout out, but it's no use..." Other examples included a dream of an exam with a host of difficulties which eventually led the dreamer to fail; a dream in which the suffering meant that the dreamer could not avoid his own superficial and inappropriate behaviour in an incident in which children died; and a dream in which the dreamer was unable to say goodbye to a neighbour because she arrived when his funeral was being held.

Threat-Avoidance: This was the second factor extracted and it assesses the defensive or avoidant attitude of the Self when faced with a threatening stimulus. Attributes such as Pursued, Attacked and Captured expressed a risk to the integrity of the dreamer. Other attributes expressed the reaction of the DS to an attack: Fleeing, Struggling and Fighting. These attributes can be viewed as assessing a threat to

Table 2. Normality of factors of the DS, influence of sex and age

Factor	Normality ^a		Sex ^b		Age ^c	
	z	p-value	χ^2_1	p-value	ρ	p-value
Emotional-Social Unease	2.83	< .001	8.35	.004	-.056	.398
Threat-Avoidance	2.69	< .001	0.35	.554	-.094	.160
Strangeness-Confusion	2.05	< .001	1.61	.205	-.329	<.001

^a Kolmogorov-Smirnoff test of normality. ^b Kruskal-Wallis analysis of variance. ^c Spearman's Rho correlation.

Table 3
Factor analysis and reliability results of attributes and dimensions of the DS

Factors and characteristics in English and (Spanish)	Selection criteria (a)	Factor analysis					Reliability analysis		
	General Anxiety	Initial MSA	Final MSA	Factor 1 (b)	Factor 2 (b)	Factor 3 (b)	Alpha	Corrected Item-Total correlation	Alpha if item deleted
Social-Emotional Unease									
Aggrieved (Dolorido/a)	-4,95	,80	,89	,67	,04	,05	,90	,64	,891
Sad (Triste)	-3,76	,78	,82	,63	-,17	,15		,59	,892
Distressed (Acongojado/a)	-5,30	,83	,86	,61	,15	-,11		,56	,893
Afflicted (Afligido/a)	-4,68	,77	,85	,61	,13	,01		,57	,893
Furious (Enfurecido/a)	-4,04	,84	,84	,59	,21	,06		,57	,893
Ashamed (Apenado/a)	-2,51	,70	,84	,58	-,10	,05		,54	,894
Tormented (Atormentado/a)	-5,90	,83	,83	,57	,22	,06		,55	,893
Pessimistic (Pesimista)	-3,98	,75	,85	,56	,00	,10		,54	,894
Crying (Llorando)	-3,92	,76	,72	,56	-,02	-,15		,51	,895
Downhearted (Desanimado/a)	-4,32	,77	,89	,56	,07	,09		,54	,894
Heartbroken (Desconsolado/a)	-4,73	,71	,83	,55	,04	,01		,51	,895
Displeased (Disgustado/a)	-3,71	,83	,89	,54	-,04	,06		,52	,894
Burdened (Apesadumbrado/a)	-2,21	,77	,87	,50	,04	,06		,48	,895
Misunderstood (Incomprendido/a)	-3,03	,74	,83	,50	-,01	,24		,50	,895
Rejected (Rechazado/a)	-3,34	,77	,85	,47	,07	,03		,46	,896
Upset (Molesto/a)	-2,78	,84	,85	,47	,00	,11		,45	,896
Depressed (Hundido/a)	-4,62	,74	,79	,47	,15	,01		,45	,896
Affected (Afectado/a)	-2,80	,70	,80	,46	-,05	,10		,43	,897
Unsuccessful (Fracasado/a)	-4,30	,80	,89	,46	,11	,22		,46	,896
Shouting (Gritando)	-5,29	,72	,80	,46	,08	-,02		,42	,897
Bad-tempered (Malhumorado)	-2,47	,77	,76	,43	,10	,07		,43	,896
Accused (Acusado/a)	-2,32	,82	,79	,41	,09	,16		,43	,896
Embarrassed (Avergonzado/a)	-3,43	,67	,78	,40	-,08	,25		,40	,897
Threat-Avoidance									
Threatened (Amenazado/a)	-5,12	,84	,87	,21	,69	,24	,80	,64	,759
Pursued (Perseguido/a)	-3,83	,78	,76	,06	,67	,15		,61	,766
Fleeing (Huyendo)	-3,13	,70	,74	,02	,64	,04		,52	,777
Attacked (Atacado/a)	-4,68	,82	,82	,23	,57	,22		,57	,771
Struggling (Luchando)	-3,49	,86	,80	,24	,51	,04		,51	,779
Fighting (Combatiendo)	-4,30	,80	,70	,22	,45	,02		,44	,788
Captured (Capturado/a)	-2,80	,75	,79	,22	,38	,02		,40	,792
Frightened (Espantado/a)	-4,94	,75	,73	,22	,36	,05		,39	,793
Detained (Retenido/a)	-3,01	,76	,76	,21	,33	,09		,33	,799
Strangeness-Confusion									
Strange (Extraño/a)	-3,87	,77	,79	,27	,02	,61	,78	,54	,737
Different (Diferente)	-2,66	,68	,73	,13	,11	,59		,54	,738
Distinct (Distinto/a)	-2,27	,73	,80	,11	,15	,51		,47	,749
Confused (Confuso/a)	-3,07	,80	,83	,29	,00	,48		,46	,748
Unusual (Inhabitual)	-1,82	,63	,78	,20	-,03	,45		,40	,755
Distrusting (Desconfiado/a)	-2,44	,80	,83	,15	,22	,39		,37	,757
Changed (Cambiado/a)	-2,56	,72	,75	,17	,12	,37		,41	,756
Unpleasant (Antipático/a)	-1,84	,65	,75	,18	-,02	,37		,37	,763
Lost (Perdido/a)	-3,21	,75	,77	,24	,10	,36		,39	,755
Surprised (Sorprendido/a)	-3,03	,70	,82	,21	,02	,36		,35	,763
Lonely (Solitario/a)	-4,61	,77	,83	,26	,10	,34		,39	,756
Surrounded (Rodeado/a)	-2,55	,71	,70	,04	,28	,33		,33	,764

Notes: MSA = Measure of Sampling Adequacy

(a) z-scores of the U statistic with p < .05 are highlighted in bold. (b) Rotated and rescaled factor matrix with coefficients > .30 highlighted in bold.

physical integrity or a life threat. All attributes in this factor except for one implied a serious threat or a response to a serious threat. The only attribute which did not imply severity was Threatened, which has a very general meaning. An extract from a dream which scored highly on this factor was the following: “There is a snake near the cage which begins to follow me [...] I see a viper on a table which is trying to catch me. While I defend myself against the first one, I call for help [...] the snake on the table comes towards me. [...] I scream because I realise they’re wrapping their tails around my legs. [...] I think maybe they’ve bitten me. I wake up with a jolt when I try to get them off me.” Other threats which were observed in dreams which scored highly on the factor were: “a force which grabbed me by the neck and pushed me up against the wall”, “somebody entered the doorway with an Alsatian. [...] so I started hurrying up the stairs floor by floor, taking two steps at a time and I was scared” and “I was afraid that they would realise that I knew they were mad.”

Strangeness-Confusion: This factor measures a distortion in the mental activity of the dreamer compared to wakeful-

ness; that is, something went wrong in the coherence of the reality perceived by the dreamer. The DS maintains enough logical awareness to compare the situations in the dream with reality during wakefulness. In order to illustrate the factor, an extract from a dream which scored highly on it is reproduced here: “I was in an office going into a job interview [...] and I remember I ‘felt’ like it was going really, really badly, even though I got the job. [...] I thought it was really odd that I got the job immediately and with an excellent salary with the interview having gone so badly.” Other strange situations were: “I realised that they were all dressed up—in suits—and I looked like a beggar”, “despite knowing the time on each clock and knowing there are three hours’ difference between the two, I don’t know what time it is,” and “we say hello and most of them seem very cheerful [...], I think I have acted very coldly.”

The three factors obtained showed a significant correlation with CEAD scores (Emotional-Social Unease: $\rho = .49$, $p < .001$; Threat-Avoidance: $\rho = .26$, $p < .001$; Strangeness-Confusion: $\rho = .18$, $p = .012$).

3.1. Dreamer Profile

Sex and age were related to the attributes presented by the DS. On the one hand, Table 2 shows that the only factor which produced a significant relationship with sex was the Emotional-Social Unease factor. Women presented higher scores than men. On the other hand, the older participants were, the less Strangeness-Confusion there was in their dreams.

4. Discussion

In the psychological literature on the qualitative interpretation of dreams, a range of rules which generally have a limited scientific basis are used to obtain information for clinical use. In addition, proposals for quantitative analysis are impractical or lack a clear psychological interpretation. On the one hand, the results of this study show that dreamers can provide information from their dreams with clinical relevance. A list was obtained with 99 attributes of the DS which presented a significant correlation with the state of anxiety upon awakening. This list of words could act as a basis for observing the qualitative evolution of the DS and could also serve for the future construction of a measurement instrument and testing of its reliability and validity. On the other hand, it was found that eight attributes of the DS are sufficient to explain half of the variance in a person's anxiety upon awakening. The results confirm Hypothesis A. We can therefore assert that a relationship exists between the intensity of the anxiety response upon awakening and the attributes presented by the DS. However, this result does not explain the origin of this anxiety. It could be caused not just by the attributes of the DS, but also by dispositional factors, developmental factors, exposure to a stressor (Germain, Buysse, Ombao, Kupfer, & Hall, 2003), general psychological distress (Beaulieu-Prévost, Charneau Simard, & Zadra, 2009; Schredl, 2003) caused by exposure to a traumatic event (Bulkeley & Kahan, 2008; Cernovsky, 1990; Helminen & Punamäki, 2008; Merckelbach, Dekkers, Wessel, & Roefs, 2003; Punamäki, 1999; Valli et al., 2005) or be a memory intrusion into the content of the dream (Malcolm-Smith, Solms, Turnbull, & Tredoux, 2008). Furthermore, it is highly likely that these factors determine the attributes of the DS, indirectly influencing anxiety upon awakening.

In relation to the second question of this study, reports with a complex and well-structured DS like the one which was found cannot be exclusively justified as background noise from neuronal processes that may occur during sleep, as proposed by Flanagan (1995). Rather it demonstrates a structured form of consciousness, as shown by other studies (e.g., Yu, 2019). In this case, this structured form of consciousness is shown by three easily interpretable factors. The first factor, Emotional-Social Unease, highlights the importance of emotional attributes and groups together a number of them related to the perception of a social threat. This factor is in contrast with the limited information on emotions obtained in dream reports, unless they are explicitly requested from the dreamer. According to Wolman & Kozmová (2007), affective thought is infrequent (9.5%) in dream reports. Nevertheless, almost all subjects report emotions in their dreams when asked to (Schredl & Doll, 1998), and when these emotions are negative, as is the case here, they show significant stability over time (Schredl, Funkhouser, Cornu, Hirsbrunner, & Bahro, 2001).

As for social threats, these are widely represented in dreams. In Hall and Van de Castle's (1966) normative data, threats which did not comprise a physical aggression represented 57.4% of the total (Domhoff, G. W. & Hall, 1996). In general, social threats are more complex than physical ones and require more elaborate responses. People are capable of being aware of themselves, their own behaviour and their personal image, as well as obtaining information about themselves through others and in anticipation of the future. These skills offer enormous advantages in social relationships (Cantor, 2009; Gilbert, 2001) and also for dealing with threats (Cantor, 2009). Furthermore, social emotions evoke responses which promote group acceptance, such as submission to dominant members (Nesse, 1994). Negative emotions can therefore increase fitness after the loss of an advantage in the group. These emotions can guide behaviour so as to prevent future losses, avoid situations and actions associated with the loss, attempt to understand the cause of the loss, etc. (Nesse, 1998). If the loss comprises a loss of status, then obedience and submissiveness may be appropriate behaviours to prevent attacks. Subordinates in the group often need to continue to form part of the community in order to survive (Cantor, 2009). In this case, sadness and low mood may increase fitness after a loss of status (Nesse, 1998). Based on the above, strategic defensive behaviours can be understood to involve both active-energised behaviours as well as passive-inhibited ones. The former correspond to fighting and avoidance, and the latter to submission, demobilisation and passive avoidance (Gilbert, 2001). As such, it can be proposed that passive-inhibited behaviours are a dimension of dreams which generate anxiety upon awakening.

In the second factor, Threat-Avoidance, the attributes describe threats directed against the physical integrity of the DS which can cause confrontation and avoidance reactions. These latter attributes therefore describe active-energised defence behaviours (Gilbert, 2001). There are certain dreams which favour the perception of these threats: dreams resulting from traumatic events (Valli et al., 2005), recurring dreams (Zadra, Desjardins, & Marcotte, 2006), first remembered dreams (Bulkeley et al., 2005) and the dreams of children (Crugnola, Maggiolini, Caprin, Martini, & Giudici, 2008), amongst others. Confrontation and avoidance reactions could be the stereotyped expression of a set of cognitive strategies (Hobson & Kahn, 2007) which follow three out every four physical threats (Saez-Urribarri, Sanchez-Diez, Renieblas, & Oberst, 2016).

The third factor, Strangeness-Confusion, can be interpreted as a measure of the dream's realism. High values involve a lack of realism in the plot. Distortions are a frequent phenomenon in dreams (Cicogna, Occhionero, Natale, & Esposito, 2007). The majority of characters are not accurately represented in dreams compared to their counterparts during wakefulness (Kahn, Pace-Schott, & Hobson, 2002). Nevertheless, the ability of the dreamer to judge him or herself or the way which he or she appears to others is not reduced compared to this ability during wakefulness (Kahan & LaBerge, 2011). Accordingly, the DS may be aware of distortions in the reality which is being experienced, and this phenomenon favours an increase in anxiety upon awakening.

These dimensions are confined to a single dream, and the dreamer may have a different configuration of the DS in oth-

er dreams. This is a key difference from the results obtained with the DMS (Yu, 2009; Yu, 2012) which comprise all of the dreams from a subject's lifetime, including the DS and other characters, and which form individual dimensions or traits of their dreaming. As such, the Ego Ideal trait proposed by Yu can be seen as a personality measure obtained from the themes of dreams. The author interprets this trait as a function of the ego ideal present during wakefulness and sleep, which represents an image of the perfect self, and which nevertheless fails in dreams (Yu, 2019). High scores on this trait produce an increase in the frequency of dreams in which there is social inadequacy, feelings of distrust or failure in action.

The dimensions obtained in this study, their attributes and the stories which accompany the highest scores are reminiscent of nightmares. This is not unexpected given their relation with anxiety. One of the characteristics of nightmares is precisely that they are accompanied by anxiety upon awakening (American Psychiatric Association, 2013). High scores on any of these dimensions appear to describe a state of the DS which can generate or accompany a level of sufficient activation to awaken the dreamer. This way, the psychic state of the DS during the dream does not allow them to continue sleeping and the dreaming process is interrupted (Åkerstedt et al., 2002). This can cause them problems getting back to sleep (Stepansky et al., 1998) or the effect could even persist into wakefulness, generating distress. The study of distress generated by nightmares has important connotations due to its relationship with psychopathology (Belicki, 1992; Levin & Fireman, 2002; Levin & Nielsen, 2007), meaning that the relationship between the states of the DS, the distress of nightmares and psychopathology may be an interesting area of study for future research.

The results obtained in this study are partially compatible with Revonsuo's (2000) evolutionary theory. Revonsuo proposes that one of the possible functions of dreams is to provide a safe virtual environment in which to simulate avoidance behaviours to ancestral threats, such that this learning has produced an evolutionary advantage for humans. In this study, the physical threats, avoidance and confrontation directly fit with this theory. The justification for the negative emotions suffered by the DS is less clear. In any case, they could be justified by the usefulness of passive attitudes in certain socially threatening situations. However, the negative emotional and social attributes of the first factor can also be viewed as a contribution which is not highly relevant or, at best, debatable in terms of survival. For example, according to Malcolm-Smith et al. (2008), only threats which are relevant for this function should be considered when validating the threat simulation theory (TST). On the contrary, under the TST an emotional reaction to a severe psychological or social threat would only be considered to be a mild psychological consequence (Revonsuo & Valli, 2000). Nevertheless, the perception of social threats and the negative emotional attributes of the DS form two coherent facets grouped together in the same factor. It still remains to be determined whether this coherence increases the probability of human survival. In opposition to the TST, it was observed that a loss of realism of the dream is related to greater anxiety upon awakening. It does not seem compatible that less realistic content and greater activation of the dreamer are positive for learning. This could be interpreted as a failure of the dream simulation system.

The results obtained are also partially compatible with the continuity hypothesis of dreaming (Domhoff, G. W. & Hall, 1996 pp. 153-190; Hartmann, 2010; Oberst, 2006; Schredl & Hofmann, 2003), although the contribution of this study is limited and confined solely to the attributes of the DS and anxiety. This theory is widely accepted, even though the evidence does not always support it. It is based on content regularities maintained between wakefulness and dreams, such as concepts, concerns, general thoughts and events from wakefulness. It also encompasses regularities between psychological variables which are produced in these two states. Waking consciousness and dream consciousness share a flow of information which is not completely separable. The results of this study support this theory insofar as a relationship exists between certain content of dreams and the state of anxiety upon awakening. Furthermore, social threats were observed to have a greater effect on anxiety upon awakening. This is in keeping with the modern lifestyle, which is more focussed on social events than on survival and which is also safer than that of our ancestors. Given the above, this theory needs to account for the fact that threats to physical integrity, avoidance and confrontation are widely overrepresented in dreams (Hall & Van de Castle, 1966; Saez-Uribarri et al., 2016), and this aspect therefore does not appear to support the theory.

The interpretation of the results strongly supports the idea that a functional theory of dreaming must explain the presence of threats and avoidance and the emotions generated by them. It also supports Revonsuo's (2000) prediction that the "construction of threat simulations are not random but, on the contrary, systematically modulated by the negative emotional charge". This prediction by Revonsuo attempted to allow for the possibility of verifying the hypothesis that "dream consciousness is an organized and selective simulation of the perceptual world". The data obtained do not permit this hypothesis to be rejected, and supporting evidence has been found in other studies (Saez-Uribarri, 2008; Takeuchi et al., 2001; Yu, 2012). Finally, the relationship between content and the state of anxiety supports the idea of continuity between conscious states. What we dream is related to our emotions upon awakening, demonstrating a dream-wakefulness continuum.

4.1. Dreamer profile

The attributes of the DS were related to the sex and age of the dreamer. This was observed in the emotions, social threats and level of consciousness of the dream. However, a significant relationship was not found between physical threats and avoidance/confrontation. Other studies have also failed to confirm the existence of this relationship (Oberst, Charles, & Chamarro, 2005; Punamäki, 1999; Saez-Uribarri, 2008). In relation to social threats and emotions, the results did show a greater frequency among women, as has been found by other authors (Domhoff, G. W., 2005; Hall & Van de Castle, 1966). From an evolutionary perspective, it could be argued that good management of the social medium and associated emotions offers advantages in caring for offspring. From the perspective of the continuity hypothesis of dreaming, it may be consistent with a greater expression of emotions by women (LaFrance & Banaji, 1992) and with the greater social pressure they come under being reflected in their dreams (Lortie-Lussier, Simond, Rinfret, & De Koninck, 1992). In relation to the sensation of Strangeness-Confusion, this was greater in the dreams of younger people.

This means that people's dreams were more credible as the age of the subjects increased. This result agrees with those obtained by Aumann (2012) and implies a greater efficiency of the mechanism of dreams to create a credible virtual environment with age. From the perspective of the continuity hypothesis of dreaming, it can be interpreted as there being easy access to waking consciousness within dreams for younger people or that a reflection of developmental changes is produced. With age, processes which can improve the dream production system (Humphrey, 2000) or make dream consciousness more impermeable are strengthened. From the point of view of TST, worse simulation for young people does not appear capable of aiding survival.

5. Limitations

The factor solution found only explains a limited amount of information about the DS (29.6% of the variance). Explaining more variance was rejected in favour of a simpler solution. Furthermore, the use of binary measures to score the attributes of the DS negatively affects the percentage of variance explained (Lozano, García-Cueto, & Muñiz, 2008). This measure was chosen because it is less laborious for subjects and permits a longer initial word list. In the future, the results may be notably improved by adopting a continuous measurement scale now that some initial dimensions of the DS and their corresponding associated attributes are available.

This study did not analyse exposure of the dreamer to threatening situations in wakefulness. In future studies it will be necessary to include the perception of the physical and social threats to which subjects have been exposed during waking life. Despite the fact that the sample is composed of everyday dreams, the sample is not the product of representative or random sampling and may be affected by sampling biases. Nor were dreamers excluded who could influence the results due to psychopathology, the use of medications or drugs, sleep disorders or for other reasons which may be relevant.

6. Conclusions

This is the first study to provide information on the dimensionality of the DS. From the results it can be deduced that it is possible to obtain valid and reliable data from dreams. Valid data can be obtained because:

- They are based on attributes that were selected, taking anxiety upon awakening as the criteria.
- They form part of a group of words with factor validity.
- They form three dimensions which are related to anxiety upon awakening.
- They are interpretable under two current theories on the function of dreams.

They are reliable because the attributes form dimensions with acceptable alpha coefficients. These dimensions permit the definition of states of the DS with clinical relevance to be used to evaluate cases and implement therapies. All of this is based on a self-report questionnaire which, by its nature, is easy to apply and requires little investment in resources and time for clinicians.

According to our data, dreaming is not a random or disorganised experience. The identification of a factor solution which points to a complex and well-structured DS does not support the idea that dream content is a random epi-

phenomenon of biological functions, information processing or unlearning. Nor is it possible to rule out Revonsuo's proposal that dreaming constitutes an organised and selective simulation of the perceptive world. As predicted by Revonsuo, the DS exhibits a reasonable defensive reaction when in danger. However, the importance of social threats and their emotional correlates does not receive sufficient emphasis in the TST (Revonsuo, 2000), but it does support the continuity hypothesis of dreaming-wakefulness. The results obtained can therefore be explained complementarily based on two theories of dream function which currently receive broad support.

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