A Content Analysis of Bizarre Elements in Dreams[1]

Antti Revonsuo[2,4] **and Christina Salmivalli**[3]

A content analysis of bizarreness was carried out in order to separate different dream contents from each other and to report the occurrence of bizarreness across these contents. All expressions describing one of 14 contents (Self, Place, Time, Persons, Animals, Body Parts, Plants, Objects, Events, Actions, Language, Cognition, Emotions, Sensory Experiences) in 32 female students' home-based dream diaries were scored. Each element was categorized as Non-bizarre or Bizarre (Incongruous, Vague, Discontinuous). The results show that bizarreness is not randomly distributed across different dream contents and that distinct types of bizarreness show a dissimilar pattern of distribution. Language and Cognition are the most and Self is the least Incongruous content. Place is high on both Discontinuity and Vagueness. We suggest that an adequate baseline for what is bizarre in dreams is the subject's personal waking reality, and for the proportion of bizarreness, the amount of comparable non-bizarre dream elements.

KEY WORDS: dreaming; bizarreness; content analysis; consciousness.

INTRODUCTION

The world we experience in our dreams involves curious aberrations and distortions compared with the world of waking life. For example, the place where we find ourselves in a dream may be a peculiar conglomerate of several actual places; dream characters and objects may be encountered in contexts where they do not belong; and our speech, thoughts, actions or emotions may be somewhat abnormal in the light of comparable waking situations. These impossible, unlikely and inconsistent features in dreams are what is meant by the term "the *bizarreness* of dreams."

There is no doubt that bizarreness is a regular property of dreams, and the question of how frequently dreams are in fact bizarre has been addressed in several

previous studies. Many studies have mainly focused on such quantitative questions as how large a proportion of dream reports include at least some bizarre features (Snyder 1970; McCarley & Hoffman 1981), or whether REM dreams are bizarre more frequently than NREM dreams or waking fantasies (Antrobus, 1983; Williams, Merritt, Rittenhouse & Hobson, 1992; Reinsel, Antrobus & Wollman, 1992). Probably due to differences in the rating scales used, the estimations as to the frequency of bizarreness in different studies vary to a considerable degree.

Recently, a cognitive approach to dreaming has become increasingly popular (Hunt, 1982, 1989; Foulkes, 1985; Cavallero and Foulkes 1993). Consequently, the bizarreness of dreams can now be approached both as a psychological and cognitive phenomenon. For example, Reinsel, Antrobus and Wollman (1992) and Fookson and Antrobus (1992) suggest that bizarreness may be understood with the help of concepts borrowed from cognitive psychology, such as spreading activation in semantic memory and parallel distributed processing. From this novel cognitive point of view, the most interesting questions concern the *qualitative* aspects of bizarreness: How often and in which ways are different kinds of dream contents distorted? As Foulkes (1985) suggests, formation of e.g., bizarre dream imagery probably is a lawful process. There may be interesting regularities in the bizarre ways in which the dream world is put together, thus providing us with insights into the cognitive mechanisms underlying the phenomenology of dreams. In this spirit, Rittenhouse, Stickgold and Hobson (1994) have found that the transformations of dream elements into other kinds of dream elements are not random, but follow the rules of semantic association. Furthermore, Revonsuo (1995) suggests that cognitive analyses of dream bizarreness may prove to be especially valuable for consciousness research, because they might reveal the neurocognitive mechanisms which are in charge of binding the contents of consciousness into a coherent world of experience.

Such a cognitive approach seems rather promising, but before we can model and conceptualize a phenomenon in detail, we must have accurate and intricate descriptions of it. In order to conduct such an analysis of the phenomenology of dreaming, we need rating scales which classify dream elements in two dimensions simultaneously: content and bizarreness. Some of the rating scales introduced recently have attempted to include such distinctions. For example, Hobson's two-stage scoring system for dream bizarreness (Hobson, Hoffman, Helfand and Kostner, 1987; Hobson, 1988; Mamelak and Hobson 1989) distinguishes among three kinds of dream contents (1. plot, characters, objects, action/2. thoughts/3. feelings and emotions) and three kinds of bizarreness (1. discontinuity/2. incongruity/3. uncertainty). The scale used by Reinsel, Antrobus and Wollman (1992) also distinguishes between three types of bizarreness, but not between different dream contents.

While these approaches certainly are steps in the right direction, it appears that the scales used are still too coarse-grained to honor the distinctions between different psychological and cognitive contents. For example, Hobson's scale lumps all plot incongruities together under one general heading. That is, seeing a dead relative or a blue banana or hearing a horse uttering neologisms in the dream represents, according to Hobson's scale, identical bizarreness. However, from the point of view of cognitive mechanisms, such incongruities probably involve disturbances

in very different information processing systems. For instance, it is a neuropsychological fact that language production, face recognition, and color vision are realized in separate neural mechanisms in the brain. Consequently, bizarreness of different dream contents may involve very different kinds of cognitive and neural mechanisms.

In this study we mainly address the following question: How frequent are the distortions of different kinds of dream contents? In order to answer this, we introduce a more fine-grained and cognitively motivated content analysis of dream bizarreness. Our aim is to separate different kinds of dream contents from each other and to report the occurrence of bizarreness across these contents. All expressions describing some of the following 14 contents from 32 female students' one-month home-based dream diaries were independently identified and scored by two judges: *Self, Place, Time, Persons, Animals, Body Parts, Plants, Objects, Events, Actions, Language, Cognition, Emotions, Sensory Experiences*. Each content element was further categorized as *Non-bizarre* or *Bizarre*. The category of bizarreness included further distinctions between different kinds of bizarreness: Incongruity (an element inconsistent with waking reality), Vagueness (an obscure or indeterminate element), and Discontinuity (an element suddenly appearing, disappearing or transformed). The content and bizarreness categories were chosen and defined on the basis of theoretical considerations and pilot testings. This rating scale was inspired by and bears resemblance to many previously published ones (Hall & Van de Castle, 1966; Snyder, 1970; McCarley & Hoffman, 1981; Hunt, 1982; Hobson, 1988; Reinsel et al. 1992). However, we emphasize the significance of adequate baseline measures with which the observed bizarreness ought to be compared. An important feature of this scale is that both the bizarre and the non-bizarre occurrences of a certain element in the dreams are counted. The count of the non-bizarre occurrences provides us with a baseline measure against which the amount of bizarre occurrences of the same element may be compared. Thus, this scoring system enables us to compare the frequency of bizarreness between different dream contents in relation to a reference baseline counted separately for each dream content. The results of this content analysis of bizarreness indicate that different dream contents are not distorted in proportion to their frequency of occurrence in dream reports. Instead, some contents are bizarre relatively often, whereas others are rarely if ever bizarre.

Another problem associated with studies of bizarreness is how to make it possible to identify all the bizarre elements in a dream report; after all, the writers of the reports are not personally known to the judge. Many bizarre events in dreams involve subtle distortions which do not necessarily appear overtly bizarre from the perspective of the researcher, unless pointed out by the dreamer. Thus, without the help of the dreamer's own judgement the occurrence of bizarreness may be underestimated. In order to shed some light on this issue, the subjects in this study were divided into two groups, and those in one group were instructed to point out all the dream events which they themselves considered very unlikely or outright impossible in the light of their personal waking reality.

METHOD

Subjects

The subjects were 32 female students at the University of Turku who volunteered for this study (mean age 23.2 years, SD = 3.2). Group 1 consisted of 17 students participating in an introductory psychology course (mean age 24.7, SD = 4.0). Group 2 consisted of 15 first-year medical students participating in a course on biological psychology (mean age 21.7, SD = 1.2).

Procedure

Both groups were given a 1-hour lecture about keeping a home dream diary. They were instructed to systematically write down their dreams every morning, for a period of four weeks. They were asked to concentrate on any recallable dream plots or fragments immediately after waking up and to write the report with as much detail as possible. They were also advised how to enhance their memory of dreams and told to provide the researchers with as much background information to the dreams as possible, in order to enable the researchers to evaluate how the reported dream events relate to the subjects' waking lives. In addition, Group 2 was requested to point out in the dream reports those contents which they themselves regarded either as unlikely or impossible in the light of their personal waking reality.

Dream Reports

The subjects produced over 400 dream reports in all, on the average 12.7 reports per person (SD = 5.4). Since this was far more than anticipated by the researchers, only the first half of each subject's dream diary was scored. This material consisted of 217 dreams. The average length per person of these dream reports was 136 words (SD = 46, range 52-250). The groups did not differ significantly either with regard to amount or length of dream reports. The average amount of reported dreams per subject (in 4 weeks) in Group 1 was 13.8 (SD = 6.3) and in Group 2, 11.5 (SD = 4.0) and the average length per person of dream reports in Group 1 was 138 (SD = 45) words and in Group 2, 134 (SD = 49) words.

The Rating Scale and Scoring Procedure

The Content Analysis of Bizarreness is carried out in two stages: (1) Element Identification and (2) Content Bizarreness Scoring. Both stages were carried out by two judges independently. The judges first practiced the use of the scale until they reached about 80% agreement in scoring. The detailed rating scale used by the judges for identifying these contents is available from the authors. In the *Ap-*

pendix, a scored dream report is provided as an example. The basic principles and outlines of the scale are described below.

Element Identification

Both judges of the dream reports identified those words or expressions which describe an entity or a feature of an entity belonging to one of the 14 content categories.

1. Self: the subject who acts in or observes the dream world; the person or being from whose point of view the dream world is experienced and who appears in the first person in the dream report.
2. Place: the immediate surroundings and geographical location of the dream events or the dream self.
3. Time: the explicitly mentioned temporal context of the dream events.
4. Persons: the human or humanoid or other intelligent characters, and groups formed by such characters, perceived by the subject in the dream.
5. Animals: animate characters (other than Persons) perceived in the dream.
6. Body Parts: human and animal bodies and their parts perceived in the dream.
7. Plants: all kinds of vegetation perceived in the dream.
8. Objects: parts of the inanimate environment which are perceived in the dream.
9. Events: changes taking place in the inanimate environment or in animate objects which do not happen in consequence of the intentional actions of any (single) character.
10. Actions: intentional acts carried out by the animate characters in the dream and the behavior of devices directly controlled or assumed to be controlled by animate characters (e.g., vehicles).
11. Language: all linguistic messages or symbols in any form; e.g., utterances, writing.
12. Cognition: the internal intellectual and mental functions of the self.
13. Emotions: emotional states and feelings either experienced and expressed by the dreamer or observed to be expressed by other dream characters.
14. Sensory Experiences: sense experiences which occur independently of voluntary cognitive processes and which do not refer to objects outside of themselves (e.g., nausea, tickle).

These categories were first chosen on the basis of theoretical considerations as cognitively different and then refined on the basis of pilot studies as unambiguous and separable from each other in dream reports. Every element is assigned to one and only one category, and an element is to be identified only if it carries genuinely novel (non-redundant) information. The identified elements were marked by underlining the respective expressions in the dream report. Thus, at this stage, the parts of the dream report to be scored were differentiated from those which were not to be scored. However, no information concerning the exact content category

to which an element belongs was indicated at this point. The dream diaries were analyzed one by one in a random order. The judges' identifications were then cross-checked in order to find out to what extent they had identified the same expressions. In the 217 dream reports, altogether 9125 elements were identified, of which 1159 were identified by one judge only and 7966 by both judges. Thus, the element identification agreement between the judges was 87.3%.

Content Bizarreness Scoring

At this stage, each identified element was classified with respect to its content (Self, Place, Time, Persons, Animals, Body Parts, Plants, Objects, Events, Actions, Language, Cognition, Emotions, Sensory Experiences) and with respect to its bizarreness. A bizarre (or non-bizarre) feature is scored only when it is mentioned for the first time in the dream. Once scored, the element then sets the context of what can be considered as a *further* bizarreness. The direct implications of a bizarre element in the dream are not themselves considered as independently bizarre. The categories of bizarreness are outlined below.

1. Non-bizarre element. A dream element (or its feature) which is ordinary and congruous with waking reality. Example: I dream that I am *in my room* which appears as it is in waking reality [Non-Bizarre Place].

2. Incongruous element. A dream element which has at least one of the following properties:

2a. Internally distorted or contextually incongruous elements. An element which has a feature that does not belong to it in waking reality or which appears in a context in which it would not appear in waking reality. Examples: *My room is much bigger* than it is in reality [Internally Distorted Place]. There is *a swan* in my backyard. [Contextually Incongruous Animal].

2b. Exotic elements. An element which is highly unlikely to occur in the dreamer's waking reality, but the occurrence of which is nevertheless possible in principle. Examples: I was in a tropical *jungle* [Exotic Place]. I met *the Secretary General of the United Nations* [Exotic Character].

2c. Impossible elements. An element or a feature of an element the existence or occurrence of which is not possible in waking reality. Examples: My dead *grandfather* came to visit us [Impossible Character]. I was *flying* above the city like Superman [Impossible Action]. We were on *an alien planet* [Impossible Place].

3. Vague element. An element or a feature of an element whose identity or precise nature is indeterminate, unknown, or obscure in a way which does not occur in waking life. Examples: I was in *a place which seemed to be my room but at the same time it was also somehow a submarine* [Indeterminate Identity of Place]. I was in *a city but I do not know or remember which one* [Vague Identity of Place].

Bizarreness categories 1–3 are mutually exclusive and each content element falls into one and only one of these categories. Hobson's (1988) scoring system has been criticized by Reinsel et al. (1992) for inflating the scores by allowing an item to be scored simultaneously in more than one category. In our scale this is not possible apart from the bizarreness category of Discontinuity. This category is not

mutually exclusive with the others, since an element can be discontinuous independently of whether or not it is bizarre in some other ways. Thus, each element scored as Discontinuous also received another score indicating whether the element is Non-bizarre, Incongruous, or Vague.

4. Discontinuous element. An element which is temporally discontinuous; it suddenly and unexpectedly appears or disappears or is transformed in the dream. The Discontinuity score is assigned to the element as it is after the change. Examples: I see a *horse* [Non-Bizarre Animal] that rises to stand on two legs and simultaneously it *changes partly into a human being* [Incongruous Person] [Discontinuous Person]. I look at a map full of small islands. Suddenly I am *on one of the islands* [Non-Bizarre Place] [Discontinuous Place].

In the Content Bizarreness Scoring, the dream diaries were again analyzed one by one in a random order. Two judges independently assigned a compound score [content/bizarreness] to each separate, previously identified element. The first symbol of the score indicates the Content Category (1/14) and the second indicates the Bizarreness Category: 1. Non-bizarre, 2. Incongruous (2a. Distorted, 2b. Exotic, 2c. Impossible), 3. Vague, +Discontinuous. After this, the scores were cross-checked and disagreements were settled through discussion. In this process, 1509 or 16.5% of the 9125 elements were dropped because they were considered to be erroneously identified, too ambiguous for scoring, or because no agreement on the scores between the judges could be reached. After these borderline cases were dropped, the final data consisted of 7616 scored elements. Of these 7125 were elements that the judges had initially independently scored as belonging to the same Content Category. Thus, the Content Agreement was 78.1%. 6693 were elements that the judges had initially independently scored to the same Bizarreness Category. Thus, the Bizarreness Agreement was 73.3%. If the compound score is considered as a whole, 6300 or 69.0% of the 7616 elements were initially scored identically with respect to both the Content and the Bizarreness, by the two independent judges. Thus, the level of agreement can be considered quite acceptable[5] (cf. Hall and Van De Castle, 1966). In addition to these mutually exclusive scores, 220 (3%) of the elements received the extra score as Discontinuous.

RESULTS

Of the 7616 scored elements, Group 1 accounted for 4309 or 56.6% and Group 2 for 3307 or 43.4%. Group 2 (with bizarreness instruction) produced more bizarre elements (22.3% of all elements were Incongruous or Vague; 77.7% were Non-bizarre) than Group 1 (19.5% of all elements were Incongruous or Vague; 80.5% were Non-bizarre). The difference was significant ($\chi^2 = 8.8$, df $= 1, p < 0.01$). However, there may have been a pre-existing difference in the baseline of dream bi-

[5]If the interjudge agreement is calculated by taking into account only the final data set of the accepted 7616 elements, the Content Agreement is 93.5%, the Bizarreness Agreement is 87.9%, and the Total Agreement is 82.7%. Thus, a high proportion of the elements constituting the final data set was actually classified without any ambiguity.

zarreness between the two study groups. Consequently, it is not certain to what extent the observed difference reflects the effect of the instruction given to Group 2.

Although Group 2 tended to produce more bizarreness, another question is whether the bizarreness was qualitatively similar in both groups. After all, it is possible that some contents were highly bizarre for one group and some other contents for the other group. To find out whether this was the case the distribution of all Non-bizarre and Incongruous elements (in one content category at a time) was compared between the two groups with Pearson's χ^2. The results showed that the *distribution of bizarreness across the content categories was not significantly different between the groups* (Self: $\chi^2 = 0.005$, df $= 1$, $p = 0.94$; Place: $\chi^2 = 1.80$, df $= 1$, $p = 0.19$; Persons: $\chi^2 = 0.92$, df $= 1$, $p = 0.34$; Animals: $\chi^2 = 0.83$, df $= 1$, $p = 0.36$; Body parts: $\chi^2 = 0.58$, df $= 1$, $p = 0.45$; Plants: $\chi^2 = 0.01$, df $= 1$, $p = 0.91$; Animate Objects: $\chi^2 = 0.0215$, df $= 1$, $p = 0.90$; Objects: $\chi^2 = 0.53$, df $= 1$, $p = 0.47$; Events: $\chi^2 = 0.0$, df $= 1$, $p = 0.99$; Actions: $\chi^2 = 3.13$, df $= 1$, $p = 0.08$; Language: $\chi^2 = 0.38$, df $= 1$, $p = 0.54$; Cognition: $\chi^2 = 0.55$, df $= 1$, $p = 0.46$; Emotion: $\chi^2 = 1.60$, df $= 1$, $p = 0.21$). Consequently, the elements from both groups were summed together to form a single data base to be used in the analysis of bizarreness distribution across contents. Two content categories, Sensations and Time, were dropped from the analyses because the observed cell frequencies were minute (<1%). In addition, three content categories (Animals, Body parts, Plants) were merged into one category, Animate Objects, for the same reason.

The distribution of the content elements in the remaining 10 different content categories is presented in Figure 1.
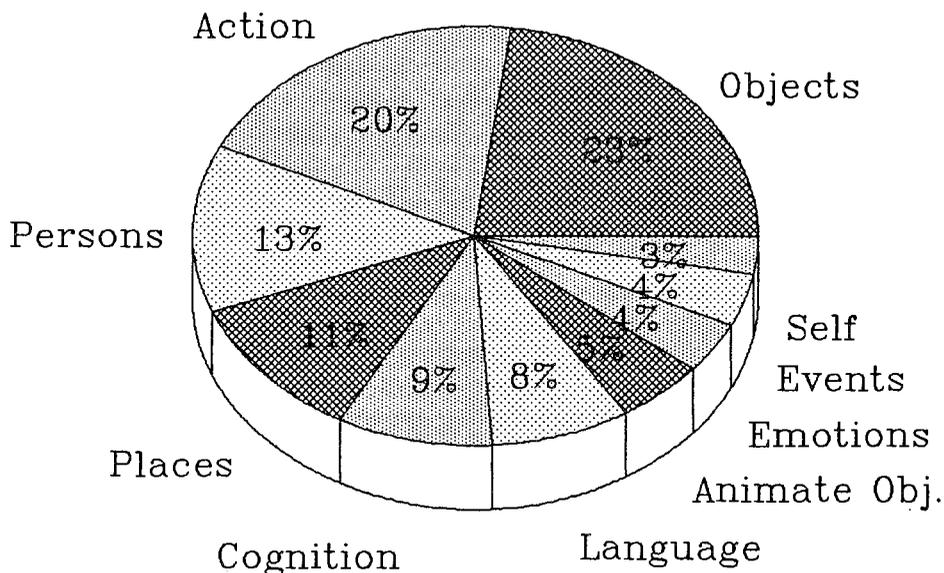

Fig. 1. The distribution of dream content elements in different content categories.

These results give a fairly detailed idea concerning the content elements which together make up the phenomenology of dreams. The most prominent contents described were Objects, Action, Persons, and Places, which together account for nearly 70% of all content elements. Language and Cognition accounted for nearly 20%. Self, although present in the vast majority of dreams, apparently is not often described in any detail, since content elements in that category account for only 3% of all elements. Thus, although dreams almost always have a self-character, the dream plot is rarely "self-centered"—the detailed features of the self-character seem to be largely ignored. Instead, the inanimate and social environment and acting in it is the focus of attention. These results are in agreement with previous ones, but our study gives a slightly different perspective because all informative elements are counted instead of simply counting the proportion of dreams in which a certain kind of content occurs.

Incongruity Across Dream Content Elements

Relative Incongruity or percentage of Incongruous elements in each of the remaining 10 content categories is reported in Figure 2. Incongruity was not equally distributed over different contents. The deviation from random distribution was highly significant ($\chi^2 = 46.0$, df $= 9$, $p < 0.0001$).

Further analyses revealed that Language and Cognition were the most Incongruous contents and the ones contributing the largest components to the total chi square value. Self was the least incongruous content and the third largest component of the total chi square value. Of special interest is that Self was significantly less incongruous than other Persons observed in the dreams ($\chi^2 = 7.6$, df $= 1$, $p < 0.01$).

Vagueness Across Dream Content Elements

Seven content categories had a cell frequency of more than 5 in the bizarreness category "Vague." The elements in these categories were chosen for further analyses. Relative Vagueness or percentage of Vague elements in each of the remaining seven content categories is reported in Figure 3. Vagueness was not equally distributed over different contents, and the deviation from random distribution was highly significant ($\chi^2 = 108.5$, df $= 6$, $p < 0.0001$).

Events and Place were the categories with the highest proportion of vague elements, whereas Action and Objects were the contents with the least proportions of vagueness. Action and Place contributed the largest components to the total chi square value.

Discontinuity Across Dream Content Elements

Six content categories had a cell frequency of more than 5 in the bizarreness category "Discontinuous." The elements in these categories were chosen for further
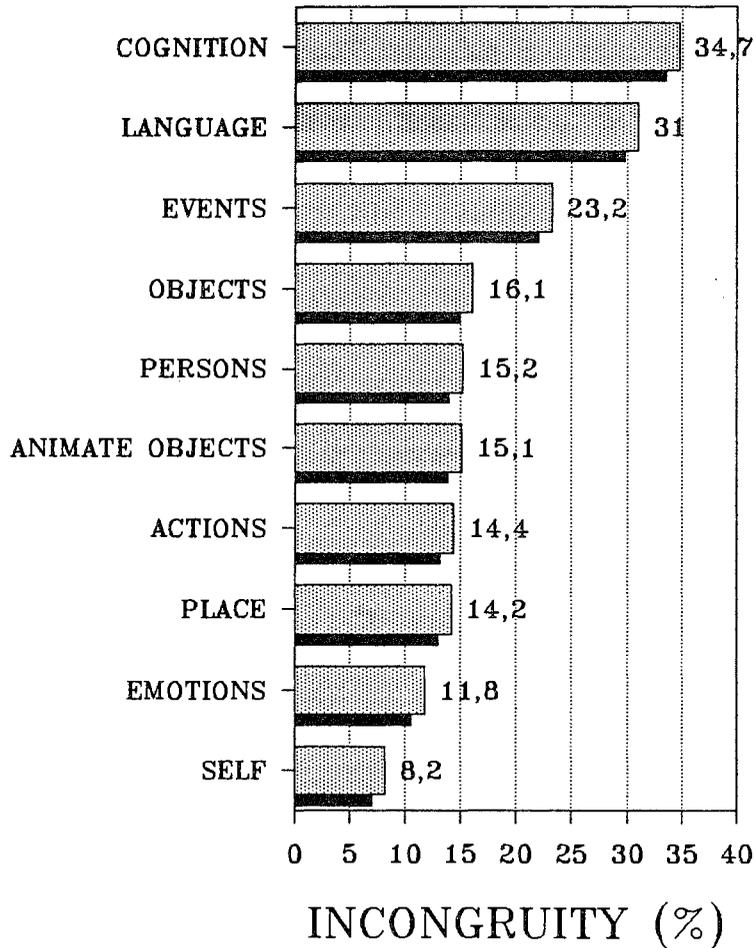
Dream Content

Fig. 2. The relative distribution of Incongruous elements in different dream content categories.

analyses. Relative Discontinuity or percentage of Discontinuous elements in each of the remaining six content categories is reported in Figure 4. Discontinuity was not equally distributed over different contents and the deviation from random distribution was highly significant ($\chi^2 = 187.0$, df $= 5$, $p < 0.0001$).

Place was clearly the most discontinuous element, and it was by far the greatest component of the total chi square value. Action and Objects were the contents with the least proportions of discontinuity. The five content element categories that were included both in the analyses concerning Vagueness and Discontinuity show similar patterns across those two dimensions of bizarreness: Place > Persons >
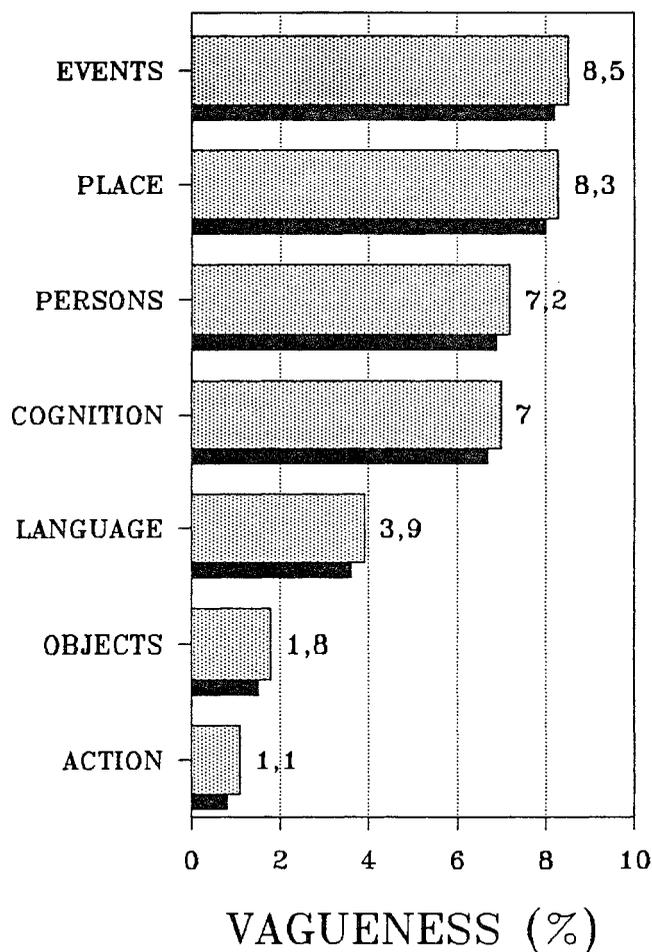
Dream Content

Fig. 3. The relative distribution of Vague elements in different dream content categories.

Cognition > Objects > Action. This pattern is quite dissimilar from that manifested by the same contents with regard to Incongruity (Cognition > Objects > Persons > Actions > Place).

DISCUSSION

The primary aim of this study was to find out the extent to which different kinds of dream elements are affected by different types of dream bizarreness. For this purpose, a rating scale dividing dream content elements and forms of bizarreness
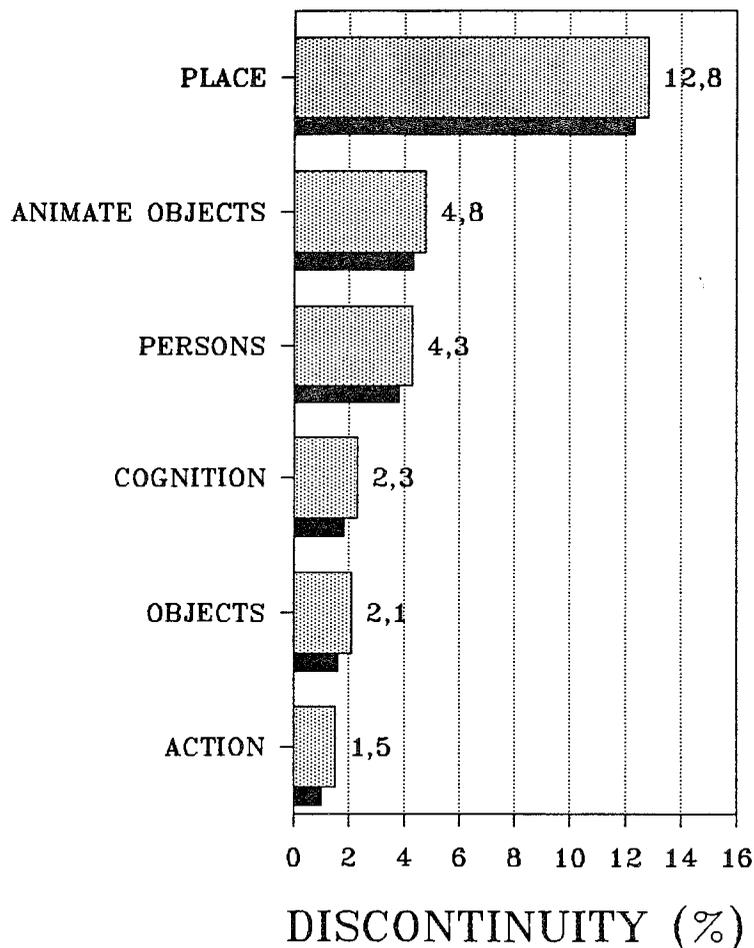
Dream Content

Fig. 4. The relative distribution of Discontinuous elements in different dream content categories.

into several different categories was developed. The results show that bizarreness is not randomly distributed across different dream contents, and that different types of bizarreness are differently distributed across the various dream contents.

The analysis of Incongruous elements indicates that the representation of the dreamer's Self is well preserved in dreams and rarely plagued by features incongruous with waking reality. Also the occurrence of Emotions and Actions are often quite reasonable in dreams. By contrast, such mental functions categorized as Cognition (e.g., reasoning, belief formation or memory), and the Language used in dreams relatively often contain rather peculiar features, rendering them incongruous with waking reality. The analysis of Vague and Discontinuous elements revealed

that Place (the perceived immediate environment or its geographical location) is frequently Vague or Discontinuous in dreams.

Methodological Considerations

The generalizability of the present results is somewhat limited because all our subjects were female and relatively young. Furthermore, good dream recallers provided more material for scoring than did poor recallers; their dream reports are consequently overrepresented in the scored material.

However, the deepest difficulties of comparing the present results exactly with previous ones are not related to the subject variables but rather to the question of choosing an adequate baseline when counting and comparing dream contents. Very often the frequency of a certain kind of dream content is expressed as the percentage of dreams which contain at least one instance of this content. For example, Meier (1993) claims that language is *not* one of the most bizarre contents in dreams, because bizarre dream actions were found in 43.6% of dreams, bizarre characters in 26.5% of dreams, settings in 18% of dreams and objects in 13.7% of dreams, but bizarre speech in only 3.4% of dreams. These claims are in apparent contradiction with our results, but the reason for this seems rather obvious. All of these contents considered more bizarre than language (action, persons, places, objects) are, according to the present study (see Fig. 1), simply occurring more frequently as dream contents than is dream language. Consequently, it is to be expected that an *absolute* count of bizarreness yields a result which covaries with the frequency of occurrence of the dream content in general.

We suggest in the present study that a more useful (even though also more laborious) way to quantify dream contents is to count *all informative content elements* belonging to a certain category. This gives us a more accurate picture of the proportions of informational and phenomenological contents of which dreams actually consist. Furthermore, it provides us with a reasonable baseline for comparing e.g., the *relative* bizarreness of different contents. Provided that we have a big enough data base of dream reports, such a count of content elements can be used independently of dream report length or number of subjects to describe the data set as a whole. This feature makes it an ideal method to be used in separate studies, the results of which could consequently be compared with each other. We suspect that e.g., the results reported by Meier (1993) would look much more like those of the present study had the baseline of measurement been chosen in a way comparable to ours (or vice versa).

Without a common baseline measure, no agreement concerning the frequency of bizarreness can be established. For example, in the studies of McCarley & Hoffman (1981) and Reinsel et al. (1992) Discontinuity was the most common form of bizarreness, whereas in Mamelak and Hobson (1989) and Williams et al. (1992) it was the rarest form of bizarreness. Such controversies underscore the need for common measures in cognitive dream research. The rating scale introduced in the present paper allows comparisons of occurrence of bizarreness relative to the baseline of occurrence of non-bizarre elements in each content element category. This com-

parison reveals that Incongruity is the most frequent type of bizarreness: all content elements in the present study have a higher proportion of Incongruity than Vagueness or Discontinuity.

Nevertheless, one has to be cautious when comparing the relative proportions of bizarreness between very different kinds of dream contents. We are on relatively safe ground when comparing e.g., object-like elements with each other (Self, Places, Animate and Inanimate Objects), since the baseline units for each element consists of rather similar kinds of expressions in the dream reports. But if we try to compare Objects with Language, or Emotions with Places, the comparison may not be very illuminating. Elements describing Objects consist mostly of single nouns and adjectives, Language consists mostly of sentence-long expressions uttered by dream characters. Thus, the basic unit of elements describing Objects is something very different from the basic unit of elements describing Language, and it would be an oversimplification to say that dream Language is "more bizarre than" dream Objects are. The different baseline measures (e.g., single descriptive words versus sentence-long utterances) may not be exactly comparable. Thus the differences in bizarreness that are discovered between fairly similar kinds of dream contents (such as Self and Persons) ought to be emphasized, because in those cases the comparisons are more illuminating.

There is also a problem of choosing a baseline with regard to judging what is bizarre within a dream. The dreamer is the only person who really can compare all of the dreamed events with their corresponding waking counterparts and decide which features exactly are incongruous with his or her personal waking reality. Thus, the adequate "baseline" of non-bizarreness to which the dream is compared ought to be the waking life of the same person who had the dream, not that of a stranger (like the researcher). We attempted to deal with this problem by dividing our subjects to two groups and giving them slightly different instructions: one group was told to explicitly point out the dream contents which they themselves judged to be out of the bounds of their personal waking realities; the other group was given no suggestions to pay attention to bizarreness. Even this minor difference in the instructions was associated with significant differences between the groups in the quantity of bizarreness. However, we cannot rule out the possibility that the observed difference reflects a pre-existing difference between the study groups. Our impression is that if subjects are instructed to pay attention to the bizarre elements in their dreams and to point them out, this can led to enhanced scoring of bizarreness, but also to more bizarreness in the dreams themselves. We suggest that in future studies on bizarreness the subjects simply ought to be instructed to report their dreams in as much detail as possible, and they should be asked to point out the contents they themselves consider bizarre only after the dreams have been reported. In this way it can be ensured that we can compare the dream with the adequate baseline provided by the dreamer and that all the bizarre elements will hence be recognized. Nevertheless, the suggestion to dream or remember more bizarre dreams can be avoided. Thus, we agree with the recent suggestion made by Hobson and Stickgold (1994) and Rittenhouse et al. (1994) that affirmative phenomenological probes ought to be used in studies concerned with detailed content analyses of dreams.

The Incongruity, Vagueness, and Discontinuity of Dream Contents

Despite the difficulties in accurately comparing the present results with previous studies, we may say that there is at least a partial agreement. Foulkes, Sullivan, Kerr and Brown (1988) discovered that dream feelings are, for the most part, appropriate to dreamed situations. In their study only about 5% of the dreams contained inappropriate or exaggerated feeling. In the present study, Emotions was one of the least bizarre content categories. The bizarreness of dream language has previously been studied in detail by Heynick (1993). He reports that out of 561 dream utterances, 88 or 15.6% were evaluated by the dreamers as not of the kind one can say oneself or hear someone else say in normal waking life. However, two linguists evaluated only 22 or 3.9% of the same utterances as definitely not acceptable. The linguists' criteria of acceptability of dream language were syntactic and semantic. In another study also reported by Heynick (1986, 1993) the contextual appropriateness of dream language was evaluated by 5 judges. Of 94 immediately recalled directly quoted utterances, 62.3% were judged to be entirely appropriate to the dream narrative, 23.4% not entirely appropriate, 8.9% largely unacceptable and 5.3% entirely unacceptable to the dream narrative.

In the present study, all these types of inappropriateness (syntactic, semantic, contextual) were considered together as criteria of dream language bizarreness, and also additional forms of linguistic messages and symbols (other than spoken ones) were taken into account. On the basis of the present study and Heynick's work (1986, 1993) one may still say that the *majority* of dream language (over 65% of elements scored as Language) is completely appropriate: syntactically, semantically and contextually. This, however, does not change the fact that Language seems to be *much more frequently distorted* in dreams than are most other phenomenological contents (excluding Cognition).

Our findings concerning the Incongruity of different dream contents may be illuminated by referring to various cognitive concepts. The representation of self is presumably one of the fundamental cornerstones of our long-term memory systems or "contexts" (Baars, 1988). Similarly, actions, at least self-initiated actions, are largely represented in the procedural memory system which can release certain habitual action patterns quite automatically when a deliberate intention to act occurs (Baars, 1993). Thus, these representations are deeply established structures which merely have to be activated from their respective long-term memory stores to produce an appropriate psychological content. Language and thinking, by contrast, are open-ended cognitive processes, each instance of which is usually unique and has to be generated anew by processes using general cognitive rules and representations. Such a processing task may be more vulnerable to the distorting effects of the random and internally-generated stimulation during dreaming (Hobson, 1988) than automatically released and fixed representations. Although there probably are multiple cognitive factors affecting the distribution of incongruity across contents, and more detailed analyses within single content categories are called for (e.g., exactly what *kinds* of bizarre objects are there), the present study indicates that one such factor is the distinction between activated long-term memory representations and constructive processes. One possible way to understand the underlying mechanisms

of dream incongruity is to think of them in terms of connectionist networks (Antrobus, 1993). During dreaming there is no sensory input to constrain the possible combinations of activation patterns, which may result in an atypical configuration of activation in the network. Such activation could be reflected in subjective experience as incongruous dream imagery.

The analysis of Vague elements was carried out only for seven content categories because of low cell frequencies in the other ones. Interestingly, a pattern different from the analysis of Incongruous elements emerged. Place and Events were most often the elements with vague features, whereas Objects and Action did not contain them very often. The high proportion of vague Events is probably due to the fact that Events also included social situations, like parties and gatherings, the precise nature of which was often obscure. It may be that such social happenings would have been more appropriately scored together with Places under a common category of e.g., "settings."

The analysis of Discontinuous elements was carried out only for six content categories, also due to low cell frequencies in the other ones. Place was by far the most discontinuous element, whereas Objects and Action were only rarely discontinuous. The finding that Place is the content element that most frequently is Vague and Discontinuous is in agreement with the proposal that dreams are typically characterized by orientational disturbances (Hobson 1988). Interestingly, Vagueness and Discontinuity showed a somewhat similar pattern of distribution across different contents: the same contents which tended to be high/low in Discontinuity also tended to be high/low in Vagueness. We suspect that this may be an indication of a common underlying mechanism contributing, at least to some extent, to both types of bizarreness. Intuitively, both discontinuity and vagueness of e.g., places may be interpreted as an *unstable state of activation* in the semantic networks dealing with spatial orientation. In the case of vagueness of place, no single recognizable representation receives the highest activation, leaving the identity of the place underdetermined or impossible to remember clearly; in the case of discontinuity, the highest activation peak abruptly shifts from one representation to another. In accordance with our results, Rittenhouse et al. (1994) also observed the greatest amount of discontinuities in dream settings and plots, which probably coincide with our category of Place. Furthermore, they found that transformations of dream elements by and large follow associative rules and constraints. Such a finding can also neatly be explained by referring to spreading of activation in semantic networks.

Rittenhouse et al. (1994) observed more discontinuities in Objects than in Persons, which is seemingly in contradiction with our results. However, they report the *absolute* number of observed discontinuities, whereas in the present study we consider amounts *relative to the frequency of such dream contents in dreams* in general. If Objects are described more often in dreams than are Persons (as seems to be the case), it is to be expected that discontinuous objects also outnumber discontinuous persons. If only the absolute frequencies are considered, the observed discontinuities in a certain content category are difficult to compare with each other without any information concerning the frequency of occurrence of that content in general (see the discussion above in *Methodological Considerations*).

Theoretical Implications

At a more general level, what is the significance of research on dream bizarreness in modern cognitive science? Foulkes (1990) and Revonsuo (1955) suggest that cognitive dream research could play an important role in the rapidly growing new field of consciousness studies. One of the core questions of consciousness research is the "binding problem" (Revonsuo 1994). The experienced reality is a coherent whole of color, form, texture, sound, touch, etc., although we know that in the brain all the different sensory features are processed by anatomically distinct neural mechanisms: there is no center of consciousness in the brain. How does phenomenological coherency then arise out of those distributed neural representations? This is the binding problem. Further research charting the detailed cognitive topography of dream incongruities could provide us with intricate descriptions of spontaneous failures in binding the phenomenological world together in a coherent way. Thus, the possible patterns of the breakdown of the binding of consciousness—the patterns of incoherent phenomenology in dreams—form an important source of information for future theories of consciousness.

The link between dreams and consciousness is very intimate, since dreaming is a psychological reality at its barest, a subjective "virtual reality" existing independently of externally controllable stimulus inputs or meaningful behavioral outputs (Revonsuo, 1995). Consciousness already is a legitimate object of study in the current cognitive sciences, after an exile of more than half a century. Consequently, cognitive dream research should become an integral part of the multidisciplinary effort to understand consciousness and be fully acknowledged as a respectable and indispensable branch of mainstream psychology and cognitive neuroscience.

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APPENDIX

An Example of a Dream Scored Using the Content Analysis of Bizarreness Scale

"THE APARTMENT"

My father, [person] my little sister [person] and I [self] were driving [action] to take a look at an apartment (for me). Only I went in [incongruous action]. In the apartment [place] there was a girl, [person] who was doing her homework [action] at a table [object] (there were some papers [object] on the table. There was one room [place] and doors, [object] "There is a draft in here", [language] said the girl. I noticed that there were holes [incongruous object] in the white [object] walls, [object] It was indeed slightly cool there. [place] "It doesn't matter, I thought [incongruous cognition] , "the room is anyway wonderfully old-fashioned by its shape"(?) [incongruous cognition]. I opened [action] a door, [object] There was a wonderful [cognition] sauna, [object] Beside the sauna there was a fireplace, [object], and when I was leaving, [action] I still noticed a bedroom. [object] My sister and father had left by car [incongruous cognition] . I was alone here, far away, [cognition] (I do not know the place where I was) [vague place] .) I called home, [action] Mother [person] said that father and sister had lost me and came home [language] . I became irritated [emotion] and I wondered why they did not wait for me [cognition] . After all, they had come with me to see the apartment [cognition].