

Emotion and Cognition: Feeling and Character Identification in Dreaming

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This study investigated the relationship between dream emotion and dream character identification. Thirty-five subjects provided 320 dream reports and answers to questions on characters that appeared in their dreams. We found that emotions are almost always evoked by our dream characters and that they are often used as a basis for identifying them. We found that affection and joy were commonly associated with known characters and were used to identify them even when these emotional attributes were inconsistent with those of the waking state. These findings are consistent with the finding that the dorsolateral prefrontal cortex, associated with short-term memory, is less active in the dreaming compared to the wake brain, while the paleocortical and subcortical limbic areas are more active. The findings are also consistent with the suggestion that these limbic areas have minimal input from the dorsolateral prefrontal cortex in the dreaming brain. © 2002 Elsevier Science (USA)

INTRODUCTION

The study of the brain basis of human consciousness received a strong and important impetus with the advent of such brain imaging techniques as positron emission tomography (PET) and functional magnetic resonance imaging (fMRI). In light of the robust regional differences in activation that characterize the transitions from wake to non-rapid eye (NREM) and rapid eye movement (REM) sleep (Braun et al., 1997, 1998; Maquet et al., 1996), we have been interested in advancing the qualitative analysis of several aspects of subjective experience which could be used in more detailed, hypothesis testing studies that use brain imaging techniques.

Previous reviews and studies were done by eliciting dream reports and analyzing cognitive differences that occur in dreams and in waking (in, for example, Blick & Howe, 1984; Bosinelli, 1995; Cartwright et al., 1998; Cicogna et al., 1991; Domhoff, 1996, 1999; Foulkes et al., 1988; Hall & Van de Castle, 1966; Hobson, 1988, 1997; Kahn et al., 1997; Kramer, 1993; Nielsen et al., 1991; Schredl & Doll, 1998). We have recently undertaken a study of how characters that appear in dreams are recognized (Kahn et al., 2000). It was found that subjects often did not recognize a dream character by appearance or by behavior, but by “just knowing.”

Noting that in the storylike scenario of a dream plot, a prominent feature is the presence of dream characters accompanied by the emotional reactions the dreamer has toward them and vice versa, we undertook the current research in which subjects were asked not only how their dream characters were recognized, but also about the

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feelings evoked both in the subject by the dream characters and those evoked in the dream characters by the subject.

We hypothesized that dream character recognition characterized as a “just know” response might reflect rapid feeling-based identification. By testing this hypothesis we were asking not only how meaningful emotions are for plot development in dreams, but also the more basic question for cognitive neuroscience, “How important is feeling for knowing?” Our hypothesis is that feeling is important for knowing (Damasio, 1996), and we tested this hypothesis by exploring how feeling informs recognition of dream characters.

The data of this study suggest that feelings are pervasive in our dreams, that the feelings most often evoked in us by our dream characters and in our dream characters by us are affection and joy, and that feelings can be used as the basis of identifying a dream character. The data also show that the majority of characters we claim to know are not accurately represented in our dreams, the most common discrepancies being in the way they behave and in the feelings they evoke.

METHODS

Participants

The 35 subjects were 17 men and 18 women who took a course in the spring of 1999 at the Harvard University Extension School called “The Biopsychology of Waking, Sleeping and Dreaming.” Due to open enrollment of the general public, the age range of the subjects of this study varied from late teens to elderly with the majority in their 20s and 30s. Similarly, their level of prior education varied. The subjects were asked to write down their dreams over a 2-week period and to record specifics about characters that appeared in their dreams. IRB approval and informed consent were obtained.

Dream Recording Procedures: General

Subjects were asked to record their dreams for 14 days and then, for each dream recorded, to use a questionnaire to describe the feelings associated with the characters that appeared in the dream. The study was structured as part of a graded class exercise which helped motivate students to comply with the complex instructions which follow. In order to discourage undesirable demand characteristics, students were told they would be given a set of dream reports if they could not recall their own dreams.

The students were instructed to record their dreams on a Dream Report Form as soon as possible after awakening, to sequentially number the characters in the dream on the Dream Report Form, and to complete entries in that day’s Character Log for each character in the dream of the night. Additional details for each character were entered onto the Dream Character Detail Log. An abbreviated sample is shown as Fig. 1. The subjects were instructed to (1) underline each instance in which a dream character is first mentioned as being explicitly present in the dream scene; (2) give each character a Character Number in the order that they appeared in the dream; (3) if a character who was numbered 3 changed into someone else, the transformed character was given the label 3a; (4) groups of people, described in the dream only as a

Name:			Sex					
1	2	3	4	5	6	7	8	9
Rpt #	Char #	Char	N,G,U	Basis for Recog	Subj's Feeling	Char's Feeling	Bet Char Feelings	Discrepancies
1	1.	father	N	K	J			X
	2	John	N	A	C			F1
	3	a Nun	G	B	F			-
	4	a girl	U	-	S			-
	5	Susan	N	F1	W,S			Ag
2								
3								
4								

FIG. 1. Abbreviated Dream Character Log. An example of a partially filled-out dream log for one dream report. Notation: A = appearance; Ag = Age; B = behavior; C = Caring or affectionate feelings; F1 = the way the character made the subject feel; G = generic character; K = “just knew”; N = named or known character; S = sadness; U = unknown character; W = anxiety or worry; X = no discrepancies.

group, were given a single number unless specific people or subgroups within the group were distinguished, in which case both the overall group and the individual(s) or subset(s) received their own number; and (5) animals, such as pets, were considered as “characters.”

An example of how a segment of a dream was recorded is as follows:

I was at my parents’ home. My father (1) and younger brother (2) were there. My mother (3) was in the kitchen. After a while, a bunch of my high school friends (4) came over, and we went to the kitchen to get something to eat. My mother was mopping the floor . . . but then she no longer was my mother but was Aunt Sadie (3a). One of my high school friends, Ben (5), then began playing with the cat (6).

Dream Recording Procedures: Form and Content in the Character Log

The dream report number, the character number, and a description of the character (e.g., “my father,” “Bill,” “a policeman,” or “my dog”) were recorded in the first three columns (see Fig. 1). Classification as *named*, *generic*, or *unknown* was recorded in the fourth column. The basis used for character recognition was recorded in the fifth column. Feelings were recorded in the next three columns. Any discernable differences between the dream characters and a claimed waking counterpart were recorded in the last column.

TABLE 1
Character Recognition Choices

<i>Just knew</i> it was him/her
<i>Can't remember</i> how the character was recognized
The character's <i>appearance</i> aided in identification
The character's <i>behavior</i> aided in identification
<i>Logically</i> deduced who the character should be
The way <i>the character made the subject feel</i>
The way <i>the character seemed to feel toward the subject</i>
The way <i>the character seemed to feel toward another dream character</i>
The character's <i>relationship</i> aided in identification (e.g., "my wife")
The character's <i>social role</i> aided in identification (e.g., "the judge")
Some <i>other</i> aspect of the character aided in identification

Character classification as "named," "generic," or "unknown." In the fourth column the subject recorded whether the dream character was named, a generic character, or an unknown character (see Kahn et al., 2000). A *named* character included any specific identification such as "my mom," "Bill," or "my dog Skip." A *generic* character denoted a character assigned within the dream to a specific societal or psychosocial role such as "a policeman" or "the priest" but who is not an individual actually known to the subject in waking life. An *unknown* character is a character definitely present in the dream but identified only by age and/or gender, without a particular role or interactive relationship with the subject such as "an elderly man" or "a girl."

Character recognition. For each of the named and generic characters the subjects were asked to record in the next column how the character was identified from the choices shown in Table 1. More than one choice could be made.

Feelings. In the next set of three columns the subjects were asked to record the subject's feelings toward each character; the character's feelings toward the subject; and the character's feelings toward other dream characters, respectively. The subject chose from the choices shown in Table 2 for their feelings toward dream characters.

TABLE 2
Choices of Feelings Evoked in Subject by Dream Characters

Character evoked <i>no particular emotion</i> in the subject
Character evoked emotion in the subject but subject is <i>not sure what</i>
Character evoked in subject <i>fear</i> at some point in the dream
Character evoked in subject <i>worry or anxiety</i> at some point in the dream
Character evoked in subject <i>anger or irritation</i> at some point in the dream
Character evoked in subject <i>sadness</i> at some point in the dream
Character evoked in subject <i>shame or guilt</i> at some point in the dream
Character evoked in subject <i>disgust</i> at some point in the dream
Character evoked in subject <i>joy, happiness, elation</i> at some point in the dream
Character evoked in subject <i>affectionate feelings</i> at some point in the dream
Character evoked in subject <i>erotic feelings</i> at some point in the dream
Character evoked in subject <i>other feeling(s)</i> at some point in the dream

TABLE 3
Choices of Differences between Named Dream Characters and Their Waking Counterparts

There were <i>no discernable differences</i> between dream character and waking counterpart
Dream character differed from waking counterpart but the subject <i>could not recall how</i>
The dream character differed from the waking counterpart only in <i>how sure the subject was of their identity</i> in the dream
The dream character differed from the person they represented in real life in that the dream character had a <i>different name</i>
The dream character was a <i>blend</i> of two or more known waking characters
The <i>mortal status</i> of the character in the dream differed from that of the real person in the subject's current real life
The character in the dream is of a <i>different gender</i> than the real person in real life
<i>Age</i> of character is different than age of the real person in the subject's current real life
The <i>health status</i> of the character differed in the dream from his/her health status in the subject's current real life
The character had a <i>different appearance</i> from the person they represent in real life
The character had a <i>different behavior</i> from the person they represent in real life
The <i>feelings/emotions evoked in the subject by the dream character</i> differed from those which would have been evoked in the subject by the real person in waking
The <i>feelings/emotions evoked by the subject in the dream character</i> differed from those the subject evokes in the real person in waking
The <i>feelings/emotions evoked in the dream character by another character(s)</i> differed from those which would be evoked in the real person in waking
<i>Relationship</i> subject had with character in the dream was not the same as it is in real life
The character's <i>social role</i> differed from that of the real person in waking
The characters differed from that of the real person in waking in some <i>other way</i>

For an entry in the first of the three “feelings” columns (Fig. 1, column 6), the subject would have experienced or expressed some emotion toward a character at some point in the dream. For entry in the second of the three “feelings” columns, a character in the dream would have experienced or expressed some kind of emotion toward the subject at some point in the dream. For entry in the third of the three “feelings” columns, a dream character would have experienced or expressed some kind of emotion toward another dream character (besides the subject) at some point in the dream.

Differences between named dream characters and their waking counterparts. For each of the named dream characters that the subject believed represented someone in his/her waking life, the subject was asked to imagine this person as normally experienced in waking. The subject was then asked to recall how the dream character appeared, felt, and behaved in the dream. The subject then made a judgment whether the dream character differed from his or her waking counterpart in any of the ways shown in Table 3.

Data Analysis

Means, standard deviations, and standard errors were computed for the data on how often dream characters were classified as named, generic, or unknown; on how dream characters were recognized; on which feelings were evoked; and on how often discrepancies between dream characters and their waking counterparts were noted.

TABLE 4
 Dream Characters Classified as Generic,
 Named, or Unknown

Classification	Mean (relative to all the others; %)	SE (%)
Named	52.3	2.8
Generic	25.5	3.3
Unknown	22.2	2.3

Percentages of dream characters in each class were calculated for each subject and then averaged across subjects. Standard errors are likewise calculated across subjects. There were 35 subjects.

Percentages of dream characters that fell into each class, recognition category, feeling category, or discrepancy category were calculated for each subject and then averaged across subjects. Unless specifically stated otherwise, all quantities were calculated as relative values. For example, for dream character classification, assessment of *named* relative to the other choices (*named*, *generic*, and *unknown* characters) and for dream character recognition, appearance relative to the other choices (*appearance*, “*just know*,” *behavior*, *logic*, *feelings evoked in dreamer*, *relationship*, *feelings evoked in dream character*, *social role*, *feelings evoked in one character by another character*, *other*, and *can’t remember*).

One of our hypotheses was that the basis for identifying a dream character is biased toward feelings. Specifically, the “*just know*” response for dream character identification found in our previous study (Kahn et al., 2000) will be reduced, the difference to some extent made up by feelings as a basis for knowing.

RESULTS

General Characteristics of Data

Thirty-five subjects submitted 320 dream reports over a 2-week period. The mean number of reports per subject was 9.14 (median = 8, range = 1–37, standard deviation = 6.14). The average word length of the reports was 229 (median = 191, range = 63–786, standard deviation = 138). The mean number of characters per dream report (not including the dreamer him-/herself) was 3.9 (median = 3.46, range = 1–9, standard deviation = 2.05).

Classification of Dream Characters

Of a total of 1205 dream characters, 609 were classified by the subject as known (50%), 299 were generically identified (25%), and 297 were recorded as unknown (25%). The following is an excerpt from a dream report containing both unknown and known dream characters: “When we get in the plane we join our group [unknown], all women, including Hillary Clinton [known] and Susan [known]. . . .”

Table 4 presents data on the percentages of dream characters in each class as calculated for each subject and then averaged across subjects.

Recognition of Dream Characters

When a character was identified as known to the subject ("named") it was recognized predominantly by appearance (44.5%) (see Table 5). Recognition was also made based on feelings evoked in the subject by dream characters, feelings evoked in dream characters by the subject, and feelings evoked between dream characters (12.7%). Subjects also stated that recognition was made based on "just knowing" who it was (11.9%). Recognition was also made based on a character's behavior (11.5%). Other ways of recognizing known characters were by relationship to the dreamer (7.1%) and by logical deduction (7.9%).

One example of character recognition difficulty associated with implicit emotion and a "just know" explanation is the following: "I'm at work in a cozy yet unfamiliar office where I'm attacked by my boss. . . . I go to complain to my parents who don't look at all like my parents, and yet I know they are."

Feelings Evoked in the Dreamer by a Dreamer's Dream Characters

Subjects commonly reported having feelings evoked in them by their dream characters. When characters were known to the dreamer, feelings were reported 81.4% of the time. For generic and unknown characters feelings were reported slightly less

TABLE 5
Recognition of Named Characters: Proportionate Number of Times
a Recognition Category Was Reported

Recognition based on	Mean (relative to all the others; %)	SE (%)
Appearance	44.5	3.7
"Just know"	11.9	2.6
Behavior	11.5	2.0
Logic	7.9	1.7
Feelings evoked in dreamer	7.8	1.3
Relationship	7.1	1.8
Feelings evoked in dream character	4.0	1.0
Social role	.9	.4
Feelings evoked in one character by another character	.9	.4
Other	1.7	.8
Can't remember	1.2	.6
	100%	

Relative (proportionate) values for each of the recognition categories were calculated. For the appearance category, for example, the number of characters recognized by their appearance was divided by all possible choices (number of characters identified by appearance, "just know," behavior, logic, feelings evoked in the subject, relationship, feelings evoked in dream characters, other, can't remember, social role, and feelings evoked between dream characters). This was done for each subject from which means, standard deviations, and standard errors were calculated. There were 35 subjects.

often, 69.3% of the time. As an example, a subject reported affectionate feelings for her pupil's father in the following dream excerpt: "A's father comes in. Suddenly he's giving me a foot massage. I tell him all parents should do this for teacher appreciation."

Figure 2 shows the number of occurrences of specific feelings evoked in the dreamer by known dream characters. Feelings of caring/affection were evoked most often in the dreamer.

Feelings Evoked in a Dreamer's Dream Characters

Feelings evoked by the dreamer in dream characters known to the dreamer were distributed similarly to feelings evoked in the dreamer by characters known to the dreamer, with caring and joy occurring most often followed by anger and worry/anxiety.

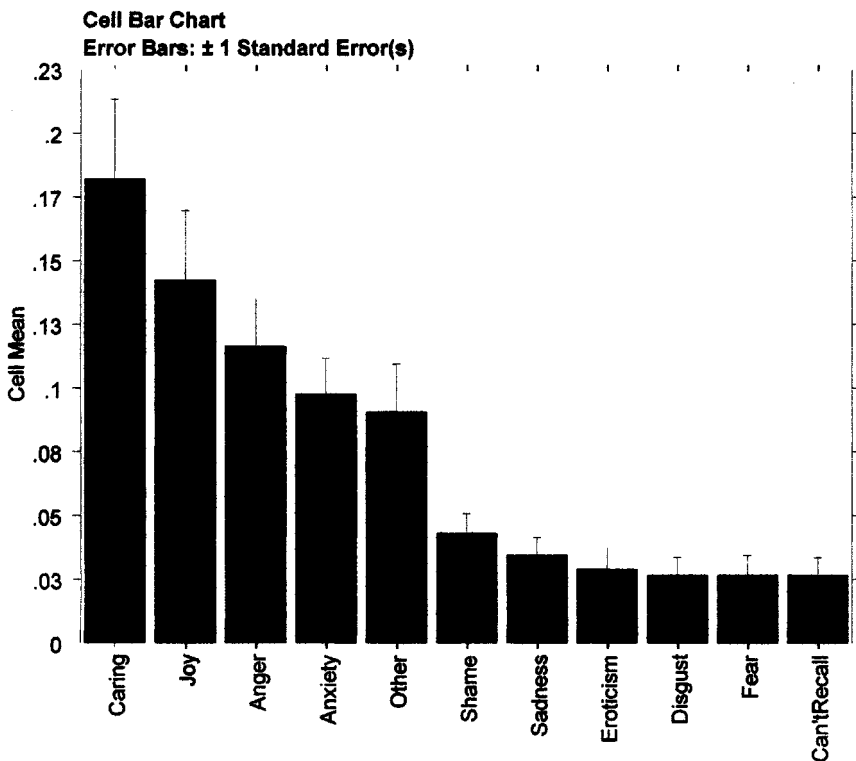


FIG. 2. Feelings evoked in the Dreamer by named dream characters (dream characters claimed to be known by the dreamer). Relative (proportionate) values for each of the feeling categories were then calculated (error bar shows SE). For the caring category, for example, the number of known dream characters who evoked caring in the dreamer was divided by all possible choices (number of characters who evoked caring, anger, worry, joy, other, fear, shame, disgust, erotic, sadness, and not sure feelings), giving the proportionate number of times caring was reported. This was done for each subject. There were 35 subjects.

Discrepancies between Dream Characters and Their Waking Counterparts

For 62% of the named dream characters, subjects found discrepancies between the dream character and his/her waking counterpart. To give the reader a sense of these discrepancies, listed as italicized headings, we present several excerpts from subjects' dream reports.

Relationship and behavior. "Ricky walks in and shows her his college report card (he is her son). . . ." (Subject commented that Ricky is not her son in real life; subject also commented that Ricky's behavior is different than in real life.)

Age. "I was in a classroom with my classmates from junior high although we were at the present age."

Appearance, relationship, gender, blend, and feeling.

Two of her sisters were there. One of her sisters had dark brown hair . . . I tried to fall asleep, but at 1:30 AM (in February) an ice cream truck went by the window flashing lights and playing ice cream truck music. . . . Then Allie and I take her children, Bailey (who was a boy). . . . I pile up two bras and approximately eight skirts, but at least six of these skirts aren't mine . . . I realize they belong to Allie's sister, who is also my friend Janette.

The subject marked that the sisters look different in real life and that is not the same relationship as in real life; in real life Bailey is a girl; and the dream character Janette is a blend of her friend Janette and Allie's sister and the feeling evoked in the dream is different than what would have been evoked in real life.

Feeling. "My mother and I were together. She wasn't like my mother. She was self-contained and unemotional." The subject wrote that in life her mother was very emotionally needy, in the dream she was self contained and almost aloof.

Mortal status and age. "I was walking my dog Tiffany who in real life has been dead for 8 years. The location was the neighborhood that I grew up in as a child. . . . As I encountered each person they appeared to me as they were many years ago. Even though I was my current age in this dream my friends appeared to be young children, about 12 or 13 years old."

Specific Discrepancies between a Dream Character and Its Waking Counterpart

When there were discrepancies between a dream character and its waking counterpart, the discrepancies were mostly in the character's behavior and in the feelings evoked (Fig. 3).

DISCUSSION

Four major findings have emerged from this study: (1) Feelings are one of the most common ways of knowing who dream characters are, (2) feelings are pervasively evoked in the dreamer by dream characters and in dream characters by the dreamer, (3) affection and joy are the feelings that are most often evoked by known dream characters and most often evoked in known dream characters, and (4) the majority of characters are not represented accurately in dreams. The most common discrepancies are in how the dream characters behave and in the feelings evoked by the dream characters compared to the feelings evoked by their wake counterparts.

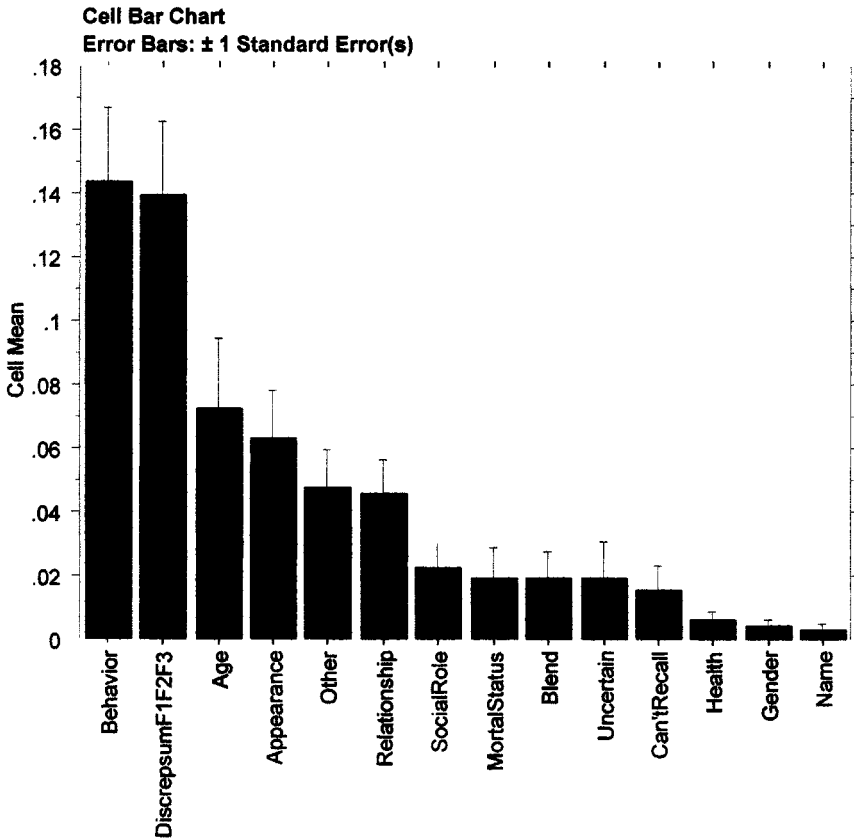


FIG. 3. How dream characters differ from their waking counterparts. Discrepancies between named dream characters and their waking counterparts. Relative (proportionate) values for each of these discrepancies are reported (error bar shows *SE*). For the behavior category, for example, the number of dream characters who differed from their waking counterparts by their behavior was divided by all possible choices (number of characters who differed by their behavior, the feelings evoked, age, appearance, other attributes, relationship, social role, mortal status, being a blend of character attributes, uncertainty of identity, can't remember, health, gender, and name), giving a proportionate number of times behavior was cited. The feelings shown in the figure (14.0%) are the sum of feelings evoked *in the dreamer* by dream characters (7.9%), feelings evoked in dream characters *by the dreamer* (4.3%), and feelings *between dream characters* (1.8%). There were 35 subjects.

Finding 1: Feeling as Knowing

Dream characters evoked feelings in the dreamer, and these evoked feelings were often used by the dreamer as the basis for recognition of the dream character. In fact, *feelings* were used as the basis for recognition second only to *appearance* and slightly more often than the “*just know*” response as a basis for recognition.

In a previous study (Kahn et al., 2000) when respondents were asked for the basis of recognition of their dream characters, they chose “*just know*” more often than any of the other choices (*face*, *other appearance*, *behavior*, and *can't recall*). In the present study, subjects were given a choice of nine bases for recognition (*appearance*,

behavior, “just know,” feelings, logic, relationship, social role, can’t remember, and other) instead of just the five above.

Behavior relative to the other recognition categories was cited as the basis for recognition of a dream character about equally in both studies (14% in the first study and 11.5% in the present study). *Can’t remember* was cited almost the same percentage in both studies (1% versus 1.2%). However, the *just know* category of the first study, which was cited 31% of the time relative to the other recognition categories, was chosen only 11.9% of the time relative to the other recognition categories in this study where subjects were given additional choices. Thus, given additional choices, subjects used these additional choices to identify their dream characters mostly at the expense of the “just know” choice. *Feeling* used 12.7% of the time was an important way by which subjects identified who their dream character was.

We also hypothesized that recognition in REM sleep would be somewhat different from that in waking because of the changed neuromodulatory environment in the regions involved in dream construction. In REM sleep generation, cholinergic neurons in the brain stem become disinhibited owing to the cessation of firing of locus coeruleus and dorsal raphe neurons and the resulting withdrawal of the modulatory influences of norepinephrine and serotonin. Cholinergic systems, released from serotonergic and noradrenergic inhibition, increase their activity over that in waking and provide bursts of cholinergic modulation to forebrain areas involved in dream construction (Hobson, 1988). Recognition would be different from that in waking also because of differing regional brain activation (the dorsolateral prefrontal cortex being less active and the limbic and paralimbic areas being more active in REM sleep compared to waking; Maquet et al., 1996; Braun et al., 1997, 1998; Nofzinger et al., 1997). The dorsolateral prefrontal cortex is active during short term memory tasks and during recall (Fletcher et al., 1997; Wagner et al., 1998). Thus, the “just know” and *feeling* responses, each cited around 12% of the time by subjects as the bases for recognition, may reflect the lessened participation of the dorsolateral prefrontal cortex in, and the heightened participation of the limbic and paralimbic systems in the recognition of characters during REM sleep. Data on how characters are recognized when awake are now needed to compare with character recognition in dreams.

Finding 2: Feeling Is Pervasively Evoked in Us by Our Dream Characters and in Our Dream Characters by Us

Results reported in Fig. 2 show that feelings evoked in the dreamer by his/her known dream characters are very common occurrences (82% of dream characters evoked feelings in the dreamer). This, we believe, is another major hallmark of dreaming and is consistent with the selective activation of the cortical and subcortical limbic areas of the brain during REM sleep. The results are also consistent with those of Merritt et al. (1994), who found that 95% of the dream reports in their study were associated with emotion, but not with Hall and Van de Castle (1966), who found emotion in only a third of dreams. One possible explanation is that emotions are seldom mentioned in dreams unless they are asked for explicitly (Domhoff, 1996, p. 20).

Finding 3: Feelings That Are Most Often Evoked in Us by Dream Characters We Know Are Affection and Joy

The data of this study show that the emotion most often evoked in the dreamer by known dream characters is affection. This is true, though to a lesser extent, even when all of a dreamer's dream characters are taken into account, not only those known to the dreamer but also the generic and unknown dream characters.

The four major feelings evoked in the dreamer by known dream characters were caring (18.2%) followed by joy (14.2%), anger (11.6%), and anxiety (9.7%). The least reported feelings to be evoked in the dreamer by his/her known dream characters were fear, disgust, and eroticism (between 2.7 and 2.9% each). Thus, the findings suggest that we dream more about the people we like than the people we do not like. This is significant in light of previously found results indicating that the predominant emotion in dreams is anxiety (Merritt et al., 1994; Nielsen et al., 1991). Thus, despite a feeling of anxiety in the dream overall, affection and joy are still the predominant emotions dreamers feel toward their known dream characters. We note that our results are consistent with those of Schredl and Doll (1998) and Fosse (2001), who also found that positive emotions exceeded negative ones when subjects self-rated their dream reports.

A typical example of anxiety in a dream that also contained affection and eroticism toward the dream character is illustrated in the following dream excerpt: "I'm on a bus . . . Harrison Ford is on the bus. . . . He gets off the bus. A while later the bus driver says to me that she has a note for me. I read it, it's from him. The note says to meet him for a date at a certain street address on Charles Street between 6 and 8. I look at my watch it's almost 6. I'm frantic to get to him. I ask where Charles Street is. . . . I go past two alleyways, people are blocking my way . . ." The subject reported that feelings of anxiety as well as affection and eroticism were evoked in her by the "Harrison Ford" dream character.

The dissociation between the feelings engendered by dream characters, and by the dream overall, suggests a prevalence of affectionate feelings toward dream characters despite anxiety-producing situations. However, according to the findings of both Schredl and Doll (1998) and Fosse (2001), there may not be a dissociation after all. These authors found that positive feelings equaled or exceeded negative ones in the overall dream as long as subjects self-rated their dreams for feelings. These studies, as well as our own, highlight the importance of self-rating of dream emotions by the subjects themselves since subjects do not always write in their emotions in a dream report. Subjects may need to be asked specifically what feelings came up for them during the dream and, in our study, specifically for each character in the dream.

Finding 4: The Majority of Dream Characters We Claim to Know Are Not Represented Accurately by Us

Subjects were asked to report if there were any discernable discrepancies that could be found between their named dream characters and their waking counterparts. Discrepancies were reported for the majority, 62%.

Dream characters differed from their waking counterparts in many aspects, includ-

ing their behavior, the feelings evoked, their age, appearance, and so on. Thus, it is clear that even when people dream about people known to them in their waking life, differences between their dream characters and their waking counterparts still exist. The question is why can't the dreamer get it right? Why is a dream character's behavior so often different than the character's waking behavior? Why does the dream character evoke different feelings in the dreamer than the waking character?

The altered neuromodulation of the brain in REM sleep may be one reason why the dreamer has such a hard time getting his characters right. In REM sleep release of the two neuromodulators, norepinephrine and serotonin, which normally activate the forebrain, ceases. Without the aminergic system, error rates increase (Foote et al., 1983; Mamelak & Hobson, 1989). Mamelak and Hobson (1989) showed that without the aminergic system active, the neural networks of the brain become more prone toward unpredictable response patterns which are reflected cognitively by loose associations which are manifested as discrepancies in character recognition in our study. And during REM sleep, though the brain is as active globally as in the waking state (Hobson et al., 2000), specific regions are more or less active. There is a reduced involvement of the dorsolateral prefrontal cortex (DLPFC), but increased activity of the extrastriate visual cortex and the limbic and paralimbic brain areas compared to waking. As a result, dream characters may very well be seen differently and elicit different feelings than those in waking life where the DLPFC is in communication with these areas. When the DLPFC is in poor communication with these areas as in REM sleep, the ability to perform logical inference, to recall accurately, and to discern whether a premise is fact or fiction may very well be compromised (Mujica-Parodi et al., 2000; Barbas, 1995; Barbas et al., 1999; Bosinelli, 1995; Cicogna et al., 1991; Cummings, 1993; Duncan et al., 1996).

Classification of Dream Characters by the Subject

Last, we briefly comment on the finding about dream character classification. We were interested in how subjects would classify dream characters: *known* to them by name or relationship (my friend John, my father), *generically* (a policeman), or as *unknown* (see Methods).

As shown in Table 4 twice as many characters were classified as known to the subject compared to either the generic or unknown classifications. This is in general agreement with previous studies (Kahn et al., 2000; Domhoff, 1999) as is the finding that almost a quarter of the dream characters were unknown to the subject. Though the majority of dream characters are known, many are not recalled from memory but are constructed anew within the dream process or else are so different from a waking counterpart so as to be completely unidentifiable with any known waking life character.

CONCLUSIONS

Recognition

Subjects claim to identify dream characters mostly by their appearance; nonetheless they also identify dream characters by the feelings they evoke and by a statement

such as *I just knew who it was*. Thus, *feelings* evoked in the dreamer by a dream character and feelings evoked by the dreamer in his or her dream characters may be used by the dreamer as a way of recognizing who his or her dream character is. When feeling and other ways of recognizing a dream character fail, dreamers use another, as-yet-unidentified, way of knowing who their dream characters are: They say they *just knew who it was*.

Evoked Feelings

Dream characters known to the dreamer are reported to evoke feelings in the dreamer 81.4% of the time. Feelings that are most often evoked in the dreamer are *affection* and *joy*.

Thus, a subject's dream world is full of feelings, but there is a dissociation between the feelings present in the dream situation, which are predominantly anxiety (Merritt et al., 1994; Domhoff, 1996; but see Schredl & Doll, 1998, and Fosse, 2001), and the feelings felt toward and from the dreamer's known dream characters, which are affection and joy.

We believe that though a dream situation may cause anxiety in the dreamer, the dreamer still mostly dreams about people he or she likes, and the anxiety of the dream situation does not change this. Further, as has been found by others (Schredl & Doll, 1998; Fosse, 2001), positive emotions are equal to or exceed negative ones when the dreamer, rather than a judge, is allowed to state what the feeling was. It would seem that judges underrepresent the positive emotions (Schredl & Doll, 1998), or subjects do not write down all their emotions in the dream report. The excerpt from the "Harrison Ford" dream report given previously is an example whereby a judge would have no way of knowing that the dreamer had feelings of affection and eroticism toward "Harrison Ford," the character that appeared in her dream report.

Differences between Dream Characters and Their Waking Counterparts

Dream characters claimed to be known to the dreamer are often inaccurately portrayed (62%). The most common discrepancies are in a dream character's behavior and in the feelings they evoke in the dreamer. This finding is consistent with what one would expect to find from brain imaging studies. In these studies the dorsolateral prefrontal cortex (DLPFC) is far less active in REM sleep compared to the waking brain. The DLPFC is known to be involved in working memory, in logical processing, and in planning and volition (e.g., Scalaidhe et al., 1997; Wagner et al., 1998; Fletcher et al., 1997). Thus, in REM sleep the DLPFC only minimally interacts with other areas that participate in the recognition process. These other areas that are activated include the cortical and subcortical limbic and paralimbic structures, which mediate emotion, and the anterior cingulate and the extrastriate visual areas. Thus recognition in REM sleep dreaming is strongly emotion-driven and is deficient in memory, volition, and analytical thinking (Hobson et al., 2000).

This study suggests that additional research is needed in several areas. One is methodological. This study used the self-rating or affirmative probe method for eliciting information from the dreamer. This study, and the few others like it (Fosse, 2001; Schredl & Doll, 1998) need to be replicated as the finding implies that judges

who rely only on reading dream reports may miss out on important aspects of the dream. In our study these were the existence of more affect and the existence of more positive feelings than negative feelings for the characters in dreams. Another area where additional research is needed is to help answer the question we raised previously, "Why can't the dreamer get it right?" Our study found that when a dreamer dreamed about a character known in waking life, the dreamer very often reported that there were discrepancies in behavior, feelings, appearance, age, and the like between the known and the dream character. One avenue of possible research would be to use analyses and methods in brain imaging that specifically target obtaining information about the relative participation of brain structures in the wake, REM, and NREM stages of sleep. In this way we shift the question from asking, "What are the neural correlates of consciousness?" to "How is consciousness affected by the relative participation of different parts of the brain?"

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Note added in proof. We were interested to read the paper by Schwartz and Maquet (2002), which suggests that in REM sleep the face recognition areas of the brain may be activated in a manner different from that in waking, causing the dreamer to have recognition difficulties similar to those seen in prosopagnosia and Frégoli syndrome. Their interpretation, similar to our own, is that the lack of prefrontal activation prevents detection of mismatches in identity.

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