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Representation of the Self in REM and NREM Dreams

Patrick McNamara
Boston University School of Medicine

Deirdre McLaren and **Kate Durso**
Veterans Administration Boston Healthcare SystemPatrick McNamara, Department of Neurology, Boston University School of Medicine, Boston, MA; Deirdre McLaren and Kate Durso, Veterans Administration Boston Healthcare System, Boston, MA

Abstract

The authors hypothesized that representations of the Self (or the dreamer) in dreams would change systematically, from a prereflective form of Self to more complex forms, as a function of both age and sleep state (REM vs. non-REM). These hypotheses were partially confirmed. While the authors found that all the self-concept-related dream content indexes derived from the Hall/Van de Castle dream content scoring system did not differ significantly between the dreams of children and adults, adult Selves were more likely to engage in "successful" social interactions. The Self never acted as aggressor in NREM dream states and was almost always the befriender in friendly interactions in NREM dreams. Conversely, the REM-related dream Self preferred aggressive encounters. Our results suggests that while prereflective forms of Self are the norm in children's dreams, two highly complex forms of Self emerge in REM and NREM dreams.

Keywords

dreaming; self; NREM sleep; REM sleep

Cognitive neuroscientific studies of the Self indicate that virtually every higher cognitive function is influenced by the Self: memories are encoded more efficiently when referred to the Self (Kelly et al., 2002; Fink et al., 1996; Craik, Moroz, & Moscovitch, 1999), feelings and affective responses always include the Self (Davidson, 2001; LeDoux, 2002), fundamental attributions of intentionality, agency, and mind all concern Selves in interaction with other Selves (Gallagher, 2000; Vogeley & Fink, 2003) and so on. Yet, basic problems concerning the nature, representational properties, and functions of the Self remain understudied and unresolved (McNamara, Durso, & Harris, 2006; McNamara, Durso, & Brown, 2003).

The scientific study of the Self has been somewhat slow to mature because the nature of the Self appears to be so complex (Metzinger, 2003; Northoff & Bermpohl, 2004), The Self draws on several psychologic and neuropsychologic domains such as autobiographical memory, emotional and evaluative systems, agency, or the sense of being the cause of some action, self-monitoring, bodily awareness, mind-reading or covert mimicking of other's mental states, subjectivity or perspectivalness in perception, and finally, the sense of unity conferred on consciousness when it is invested with the subjective perspective (Metzinger, 2003; Churchland, 2002; LeDoux, 2002). Any account of the psychology of Self should at least be

Correspondence concerning this article should be addressed to Patrick McNamara, Department of Neurology (127), VA Boston Healthcare System, 150 South Huntington Avenue, Boston, MA 02130. E-mail: mcnamar@bu.edu.

consistent with most or all of these properties. It is no wonder then that progress in understanding the Self has been slow.

Interestingly, all of the above properties of the Self are notably altered in the dreaming Self—the "I" that dreams. Although we experience ourselves as a "Self" when we dream, the Self in many dreams cannot be said to exhibit normal access to autobiographical memory, normal emotional reactions, or any of the other standard phenomenologic properties of the waking Self mentioned above. For example, we may see a relative in a dream who died years ago but interact with him/her as if the death never occurred, thereby indicating that autobiographical memory and emotional reactions are not operating normally. The sense of agency is altered as well. Many people report a sense of helplessness when being chased in dreams for example. On the other hand, the dream Self typically has some thing or object toward which he or she is striving, thus indicating some sense of agency or purpose. Bodily awareness appears to be globally impaired. Pain, in particular, occurs only rarely in dream reports. Self-monitoring, too, is impaired as we uncritically accept very incongruous and improbable happenings as perfectly normal events (e.g., again—the long dead relative who is accepted as alive and well etc.). While attributions of mental states (indicating a theory of mind capacity) to other dream characters apparently occur (Kahn & Hobson, 2005), dreams exhibit an extreme ego-centered perspectivalness. Everything in the dream is experienced from the perspective of the dream Self, But what about the sense of conscious unity each Self experiences during waking life? Is it experienced by the dream Self as well? Our provisional answer is no. Conscious unity extends to the waking Self's experiences across time, and we have seen that access to autobiographical memories are often blocked or at least altered in dreams.

On the other hand, differences between the dream and the waking selves should not be overemphasized. After all systematic empirical comparisons between the two Selves have not yet been conducted (indeed our report may be the first of its kind). Also dream reports of deceased loved ones sometimes do contain reports of shock and surprise; people feel helpless presumably when they are being chased during waking life and the experience of pain is relatively rare in waking life also—at least for most college-aged adults (on whom most dream content studies are based). In sum, we get a paradoxical picture of the dream Self when it is compared to the waking Self. While the dream self appears to be impoverished in its access to systems like autobiographical memories, bodily awareness, self-monitoring and that form of consciousness that yields a unity of experience that the Self "owns," the dream Self appears to surpass the waking Self with respect to the experience of emotions and perspectivalness. Can these phenomenological differences between the waking and the dream Selves tell us anything interesting about the nature of the Self itself? At a minimum they tend to confirm the view that the experience of the Self can range from a prereflective form (the Dream Self) that is reduced to mere perspectivalness and emotion to a fully reflective waking Self that possesses all of the phenomenological properties mentioned above.

We believe that study of the dreaming Self can tell us even more about the nature of the Self experience if we supplement our analyses of the dream Self with analyses of the Self as it appears in the two major dream states: the Self associated with REM sleep dreams and the Self associated with NREM sleep dreams. It may be that the prereflective Self that appears in spontaneously recalled dreams does not accurately reflect the Self that appears in dreams that come from REM or NREM sleep states. It may be that spontaneously recalled dreams tend to be those that are most bizarre and memorable (though see Domhoff, 2003) and are constrained by a number of strong personality variables as well (McNamara, Andresen, Clark, Zborowski, & Duffy, 2001). They may not be representative of the dreams that naturally occur during the course of a good night's sleep—especially NREM dreams.

The dreaming mind is composed of at least two distinct substates: REM sleep or REM and non-REM. The contrasting brain and neurochemical activity patterns of REM and NREM suggest that representation of social interactions and of representations of the dreaming Self may differ as a function of sleep state. These naturally occurring differences in brain activation patterns associated with the two major sleep states provides an invaluable opportunity to assess potential brain-related variations in the phenomenologic properties of Self in individuals who are healthy and not subjected to artificial experimental tasks or invasive brain imaging procedures.

REM sleep involves periodic, significant reductions in forebrain serotoninergic and noradrenergic activity along with selective activation of limbic and paralimbic neuronal circuits, including the lateral hypothalamus, amygdala, parahippocampal, and medial and orbitofrontal cortices, but not dorsolateral prefrontal cortex (Braun et al., 1997, 1998; Maquet et al., 1996; Nofzinger, Mintun, Wiseman, Kupfer, & Moore, 1997), Areas reactivated in REM have been characterized by Nofzinger et al. (1997) as the “anterior paralimbic REM activation area” that they describe as “bilateral confluent paramedian zone which extends from the septal area into ventral striatum, infralimbic, prelimbic, orbitofrontal and anterior cingulate cortex” (Nofzinger et al., 1997, p. 192).

NREM is composed of four progressively deeper substages. While positron emission tomographic (PET) studies of NREM sleep states generally show a global decrease in cerebral energy metabolism relative to REM, this metabolic decline is not as marked in Stage II NREM as in deeper NREM Stages (3 and 4 slow-wave sleep), and thus Stage II NREM sustains relatively higher levels of brain activation compared to stages 3 and 4 (Maquet, 1995, 2000). Indeed, a recent functional MRI (fMRI) study found that the frontal cortices were more activated in Stage II NREM than in REM sleep (Loevblad et al., 1999) although this effect is not as clear in PET studies (Braun et al., 1997). We can therefore expect some amount of Self-representation to occur in NREM as well as in REM; however, the frequency and pattern of Self-related instances should differ between the two sleep states.

On the basis of the foregoing REM and NREM brain activation profiles, we predicted greater Self-related content in REM as compared to NREM reports. We also checked for differences in Self-representation in spontaneously recalled dreams collected from children as compared to spontaneously recalled dreams collected from adults. Our results point to some surprising conclusions: the Self that is described in spontaneously recalled dreams of both children and adults is consistently experienced as negative or under some threat, but the Selves described in REM versus NREM dreams differ from one another in interesting but complex ways. The REM associated Self is very frequently an aggressor while the NREM associated Self never engages in aggression. Conversely, the NREM associated Self frequently initiates friendly interactions while the REM associated Self only rarely does so. Both Selves exhibit phenomenologic properties that extend beyond the prereflective Self we normally see in spontaneously recalled dreams.

METHOD

The dreams upon which our analyses are based are drawn from two sources: (1) the online dream bank resource created by Adam Schneider and Bill Domhoff (www.DreamBank.net; described in Domhoff, 2003) and (2) a database of sleep-wake mentation graciously made available to us by Dr. Robert Stickgold and whose overall characteristics have been described in detail elsewhere (Stickgold, Scott, Fosse, & Hobson, 2001). We first describe the dream collection we used from the online dream bank site.

Selection of Spontaneously Recalled Dreams From DreamBank

Since we were interested in assessing change in representation of the Self in spontaneously recalled dreams collected from different age groups, we downloaded 100 dreams from each of two different age groups: children and adults. Once the two different datasets were identified dreams from each dataset were selected randomly until $N = 100$ dreams were obtained from each dataset. The children's dreams were collected from 4th to 6th graders located in the San Francisco Bay Area. It is safe to assume that these girls (no dreams from boys were available) were all under the age of 12. The spontaneously recalled dreams from adults were all from the collection from which the Hall/Van de Castle norms were derived. These were 200 college students (100 men and 100 women) each of whom contributed five dreams between 1947 and 1950. We wanted to use this collection because it has formed the basis of many dream studies (see Domhoff, 1996, 2003, for reviews), and thus they represent a well-understood set of dreams.

Selection of REM and NREM Dreams

The other source of dreams we analyzed was from a study conducted by Stickgold and colleagues. Fifteen undergraduate students (18–22 years of age; 8 male, 7 female) carried a pager during the day and wore the Nightcap monitoring system (Ajilore, Stickgold, Rittenhouse, & Hobson, 1995) at night for 14 days and nights. The study was approved by the local internal review board for protections of the rights of human subjects, and all participants signed an informed consent form. Subjects verbally provided mentation reports via a portable tape recorder four times each day when paged, as well as when they awoke from sleep during the 14 nights. The subjects were instructed to describe in detail their foregoing experiences when paged or awakened, including where they (thought they) were, who else was present, and what they were doing, perceiving, feeling, and thinking. Instrumental awakenings were performed by a Macintosh computer that received continuous input from the Nightcap.

The Nightcap (Mamelak & Hobson, 1989) consists of a 25-mm × 8-mm piezoelectric eyelid movement (ELM) sensor and a cylindrical, multipole mercury switch that detects head movements (HMs; Ajilore et al, 1995), The Nightcap counts ELMs and HMs in intervals of 250 ms, identifying an ELM interval whenever a voltage in excess of 10mV is detected within an interval. The sensor and associated circuitry are sensitive to rapid eye movements and twitches of the *levator palpebrae* and *orbicularis oculi* (eyelid muscles), but not to the slow eye movements (SEMs) characteristic of sleep onset. Sleep onset is normally scored as the start of a period of at least two 30-sec epochs of ELM quiescence following waking or, when hypnogogic reports are collected, after 15 seconds of ELM quiescence. The beginning of a NREM sleep epoch is scored at the start of at least 5 minutes without ELMs or HMs. NREM periods are characterized by no ELMs and HMs. REM sleep is scored when ELMs occur but with few or no head movements. Nightcap identifications of REM and NREM sleep states have been verified by concomitant EEG studies (Ajilore et al., 1995, p. 95) thus demonstrating that it can accurately distinguish REM from NREM, although the Nightcap cannot resolve stages within NREM.

To select dreams to be analyzed we used exactly the same sampling procedures as McNamara et al. (2005). Briefly, the 200 sleep-mentation reports were selected in a semirandom fashion from the database of 1748 sleep and wake-mentation reports. The full database contained 894 waking (W) reports, 338 sleep onset (SO) reports, 269 REM reports, and 247 NREM reports. In order to approximate the overall normative values for the various Hall/Van de Castle content indicators, Domhoff (1996, pp. 65–66) determined that a minimum sample size of 100 reports is needed. We therefore pseudorandomly selected 100 REM and 100 from the overall Nightcap database and then calculated mean word count per dream for each of the two groups in an attempt to equate mean word length per report across REM and NREM reports. Because NREM

dreams tended to be shorter in length than REM, we had to adjust the REM and report means to the NREM means by repeated random samplings with replacement of reports from the REM pool until the two means were roughly equated. Using this method, we obtained a dream series from NREM with a mean word count per dream of 64.33 (*SD* = 46.63) and dream series from REM of mean 75.39 (*SD* = 37.85). We were successful in equating report lengths across report types as mean word counts across the report types were not statistically different from one another. Word count in all of these reports was calculated by the method of Antrobus (1983) which eliminates fillers, repetitions, and pauses such as "ah," "well," and so forth, as well as extraneous descriptions (in dream reports) of waking events.

Content Scoring

Domhoff and Schneider (http://www.dreamresearch.net) provide a spreadsheet program, DreamSat, which allows for tabulation of dream content scores and automatic computation of derived scales and percents when using the Hall/Van de Castle scoring system. This spreadsheet program greatly increases the reliability of results obtained with use of the system. The Hall/Van de Castle system for scoring dream content (Domhoff, 1996; Hall & Van de Castle, 1966) is a standardized and reliable content scoring system which consists of up to 16 empirical scales and a number of derived scales useful for an analysis of social interactions in dream content (see Table 1). Three primary types of social interaction are scored: aggressive, friendly, and sexual with the ability to score subtypes as well (e.g., physical vs, verbal aggression). The character that initiated the social interaction is identified as well as the target or recipient of the interaction. The characters scale allows for classification of characters known to the dreamer (e.g., family members, friends, etc.) as well as those unknown to the dreamer. Characters (known or unknown) can also be classified as to gender, age, and relation to the dreamer. These scales allowed us to determine character frequencies and number and types of social interactions while adjusting for various baseline values in order to control for length effects.

Representation of Self-related content is captured primarily by the Self-concept scales. These are self-negativity, bodily misfortunes, negative emotions, and dreamer-involved success.

Word Count Analyses

We used a computerized word count program, Linguistic Inquiry and Word Count (LIWC; Pennebaker, Francis, & Booth, 2001), to assess word-related indicators of Self and emotions and social interactions (e.g., one way to get at the phenomenology of Self representation in dreams is to count the number of times the personal pronouns such as "I" and "we" are used). The LIWC program is able to tabulate these sorts of words thus providing an independent check on Self-related content in dreams. The output from this program consists of a spreadsheet with total number of words in each sample, as well as percentages of words in each of several target categories. LIWC 2001 is a well-validated instrument (Pennebaker et al., 2001, and see www.liwc.net). For the purposes of the current study, we had the program tabulate for REM and NREM dreams the following categories of words: instances of "I," "we" "Self'-related words, Social Processes, and Emotion. The Emotion category contains 615 words drawn from two subcategories called Positive Emotions and Negative Emotions, Positive Emotions is further divided into two subcategories of "Positive Feelings" (e.g., "happy," "joy," "love") and "Optimism and Energy" (e.g., "win," "excitement"). Examples of Negative Emotion words include "hate," "worthless," and "enemy." The category of Negative Emotion also includes three subcategories of Anxiety/Fear (e.g., "nervous"), Anger (e.g., "hate," "pissed"), and Sadness/Depression (e.g., "cry"). Note that we focused only on the superordinate categories for this study. The target category, Social Processes, is made up of social pronouns (1st person plural, 2nd and 3rd person pronouns), communication verbs ("talk," "share"), and references to family, friends, and other humans. In addition to the overall social processes category, we

analyzed the "references to other people" category as these potentially contain instances of Self-related content.

As a check on the reliability of the procedure, we compared the word counts we obtained with the LIWC program published norms (available at www.liwc.net). Since the norms are established on discourse passages averaging 353 words per passage, we collapsed all the dreams obtained for each subject into a single "dream passage" per subject per dream state (REM and NREM). Thus, the values obtained for each subject are averaged across all of that subjects REM or NREM dreams (as stated above that amounted to about 6–7 dreams per subject per state). Thus, the mean word count for this sample of dreams was 511 — about 100 words greater than published norms. Inspection of Table 2 will show that the means for each of the categories we analyzed here approximate the published norms, thus increasing our confidence in the reliability of the LIWC analyses. We hypothesized, that relative to NREM dreams, REM dreams would evidence higher mean numbers of Self-related pronouns and words, negative emotion words; social process words.

In order to provide an external validity check on our scoring of the Hall/Van de Cāstle categories, we compared the means of our REM and NREM values for the major Hall/Van de Castle categories to the published norms for these same categories. Our obtained values for REM + NREM percents are nearly identical with the values of the published norms (Domhoff, 2003, Table 3.2, p. 73).

Statistical Analysis

We used Bonferroni-corrected *t* tests to compare LIWC word count means for REM and NREM dreams. With respect to analysis of the Hall/Van de Castle categories and content indicators, these are based on nominal rating scales. We used tests for the significance of differences between two proportions as well as chi-square analyses to compare REM and NREM differences. We used the Dream-Sat program to compute all of the scales, percent differences, and certain *p* values we report. The program also produces Cohen's *h* statistic which is an effect size value for samples involving nominal measurement scales.

RESULTS

Representation of Self in Adult Versus Children's Spontaneously Recalled Dreams

Table 2 presents the Self-concept content profiles of the children's and the adult's dreams. Interestingly, self-negativity percent did not differ significantly between the two age groups (64% adults and 58% for children, $h = -.12$, $p = .377$). With respect to social interactions of various types adult and children's dreams were remarkably similar in content with the sole exception of depiction of friendly interaction. The befriender percent was significantly higher in adult's (50% vs. children's (24%) dreams ($h = -.54$, $p = .026$). There was a slightly higher amount of negative emotion in the adult (77%) versus the children's (64%; $h = -.28$, $p = .09$) dreams. Dreamer-involved success percent was marginally significantly higher in the adult (63%) as compared to the children's (35%; $h = -.56$, $p = .056$) dreams. Relative to the children's dreams (who it should be recalled were all girls), adult's dreams were significantly more likely to contain depictions of male characters (male/female percent was 62% for adults and 32% for children; $h = -.61$; $p = .0001$). On the other hand, relative to the adults, the children were more likely to dream of familiar characters (68% vs. 54% respectively; $h = .28$, $p = .002$), including friends (49% vs. 37%, $h = .24$, $p = .006$) but not family members (17% vs. 14%, $h = .06$, $p = .508$). A greater number of adult dreams contained at least one instance of aggression (48% vs. 21% in adult vs. children's dreams respectively, $h = -.58$, $p = .0001$) and sexuality (7% vs. 1% respectively, $h = -.34$, $p = .018$). However, a greater number of children's dreams contained at least one instance of good fortune (17%) relative to adult dreams (6%; $h = .36$, $p = .012$).

Representation of Self in REM and NREM Dreams

When we compare content profiles of REM and NREM dreams, we find that character profiles did not distinguish REM from NREM dreams. Nor did representation of Self, as measured by self-negativity, bodily misfortune, negative emotion, and dreamer-involved success percents, differ across REM versus NREM dreams. On the other hand, the dream Self in NREM dreams was never represented as an aggressor. Indicators of aggressive content were significantly higher among REM than among NREM dreams (65% vs. 33% for the aggression/friendliness percent, $h = -.64$, $p = .026$; and 52% vs. 0% for the aggressor percent, $h = -1.62$, $p = .0001$). Conversely, the indicator for "initiating friendly social interactions" (befriender percent) was lower for REM (54%) versus NREM dreams (90%; $h = .85$, $p = .043$). Relative to NREM dreams, there was a significantly higher number of REM dreams with at least one instance of aggression and at least one instance of sexuality (see Table 3).

Word Count Analyses in REM Versus NREM Dreams

Table 4 summarizes REM, NREM differences on mean LIWC word count categories indicating potential Self-related content. First, it should be noted that no differences were found for a measure of semantic content across dream types (a count of "unique" words). The mean "unique" word count for REM dreams was 42.8 (7.4) and for NREM was 47.7 (17.2). The norm is 50.8 (see Table 4). Table 4 reveals that there was a trend for higher numbers of "I" words in NREM dreams, $M = 6.9$ (1.4), as compared to REM dreams, $M = 5.8$ (1.7), $p = .08$. Consistent with the greater amount of social interactions in REM versus NREM dreams, there were greater mean numbers of "we" words in REM, $M = 1.9$ (1.2), as compared to NREM dreams, $M = .97$ (1.0), $p = .045$. There were no significant differences between REM and NREM dreams for the categories of positive or negative emotion. Consistent however with the Hall/Van de Castle analysis, there were significantly greater mean numbers of words indicating social processes in REM, $M = 10.2$ (2.1), as compared to NREM dreams, $M = 6.8$ (3.0); $p = .003$. Interestingly, references to other people were significantly more frequent in REM, $M = 5.36$ (1.8), than in NREM dreams, $M = 3.5$ (2.1); $p = .024$.

DISCUSSION

We found that while the Hall/Van de Castle self-concept dream content ratios did not differ significantly as a function of dream type (REM vs. NREM) and adult versus children's dreams, character, and social interaction profiles did. Children's dreams (all dreams were collected from girls) contained fewer males and greater numbers of characters who were familiar and friends with the dreamer. Friendly social interactions, however, were more frequent in adult than in children's dreams. Consistent with the report of McNamara, McLaren, Smith, Brown, and Stickgold (2005), aggressive social interactions were more frequent in REM than in NREM dreams. The dream Self in NREM dreams was never represented as an aggressor. "We" words were more frequent in REM than NREM dreams while "I" words were marginally more frequent in NREM than REM dreams.

The above pattern of findings concerning the representation of the Self in spontaneously recalled dreams suggests a relatively constant depiction of a Self in social interaction that is experiencing negative emotions and social interactions. Children's experience of Self in dreams is more likely to be as a victim of social aggression when compared to adult dreams. The self negativity percent is high (58%); the dreamer involved success percent is low (35%), and the dreamer-initiated aggressor percent is low (32%) in these girls' dreams. All of these data indicate a relatively low level of agency and relatively high levels of perspectivalness in the experience of Self in these children's dreams. The dream Self undergoes negative experiences, and the action is centered on the dream Self. These results provide a contrast with Strauch and Lederbogen's (1999) hypothesis that children portray themselves in their dreams

as they conceive of themselves in everyday life, while in their waking fantasies they imagine themselves as they would like to be.

In adults by contrast, while the self-negativity percent is also relatively high and the aggressor percent low in spontaneously recalled adult dreams, the dreamer involved success percent is relatively high in adult dreams. Thus, while it may be accurate to characterize the Self in children's dreams (at least girl's dreams) as primarily negative (i.e., on the receiving end of aggressive social encounters), the adult Self in dreams cannot be characterized as merely a victim of aggressive social encounters since its social strivings/interactions are largely successful. On the other hand, the high self-negativity percent and low aggressor percent tends also to place the adult experience of Self in the low agency/high perspectivalness prereflective mode. The relatively high dreamer involved success percent tempers this conclusion and suggests something more than just a prereflective form of Self experience in spontaneously recalled adult dreams. Specifically the sense of agency is enhanced in adult relative to children's dreams, but we still cannot speak about a fully reflective Self in these spontaneously recalled adult dreams.

Interestingly, while the self-negativity percent does not vary as a function of dream state (REM vs. NREM), the dream Self is never an aggressor in NREM as compared to REM where the aggressor percent rises to 52%. Compare that aggressor percent to the 32% seen in spontaneously recalled dreams that form the basis of the adult norms. An anonymous reviewer for this article pointed out that aggression is the variable that differs the most in a wide range of dream studies. It shows the largest longitudinal variation, as replicated in this article, the largest cross-cultural variation, the largest home-lab variation, the largest male-female variation, and now once again the largest REM/NREM variation. It may therefore be that study of patterns of aggression in dreams could be more helpful in understanding both the state differences between REM and NREM and questions about the Self in dreams than more general measures like the self-negativity percent.

Overall our data indicate relatively higher levels of agency in dreams elicited from the two major sleep-states than what is seen in spontaneously recalled dreams. The Self in these REM dreams is also more likely to appear with others bearing similar intentions (i.e., as "We"). The increased (relative to spontaneously recalled dreams) number of social interactions in REM and NREM dreams suggests enhanced access to theory of mind capacities in these dreams as well. Although we get higher levels of agency, along with increased cognitive capacities in these dreams, we have no reason to believe that increased self-monitoring occurs in these dreams and thus that the extreme perspectivalness characteristic of spontaneously recalled dreams is altered in any way in these REM dreams.

Nevertheless, the striking dissociation seen in the roles of the Self in REM versus NREM dreams raises a host of intriguing questions concerning the nature of the Self. Why is the NREM Self constrained to engage solely in friendly interactions in NREM versus REM? And conversely why is the REM Self constrained to engage primarily in aggressive interactions? Given the specializations in social interactions, we have to assume a very high level of agency, purposiveness, cognitive evaluative capacity (after all whole classes of social interactions are excluded for one vs., the other self), and so forth in these REM and NREM Selves. These REM and NREM Selves appear to have evolved beyond mere prereflective forms of Self—yet they clearly do not exhibit fully reflective Self properties. How, in fact, are these two Selves related to the waking Self, if indeed they are related at all?

In short, the picture is complex. Clearly, dream content, insofar as it is related to the Self-representation, is not random. Instead it appears to be sharply constrained and relatively consistent. The dream data suggest at least two Selves: an aggressive Self either initiating or

responding to aggressive social encounters appearing in REM dreams. The aggressor Self never appears in NREM dreams. Instead a friendly Self emerges in NREM dreams. Like his REM counterpart, he interacts with both familiar and nonfamiliar characters in social encounters that apparently are experienced as largely negative—yet his responses are much more likely to involve befriending the interactants than is the REM Self. The befriender percent reaches 90% in NREM as opposed to only 54% for REM dreams. In short, the dreaming mind creates two dramatically different Selves who engage in differing behavioral strategies in response to unpleasant social encounters. Why this is the case is at present a mystery.

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Table 1

Dream Variables According to the Hall and Van de Castle Method Meaning

Characters (%)	
Male/female	(total male characters)/(male characters + female characters)
Familiarity	(number of familiar characters)/(total familiar characters + total unfamiliar characters)
Friends	(known characters/all human characters)
Family	(family + relatives)/(familiar characters + unfamiliar characters)
Dead and imaginary	(number dead & imaginary)/(familiar characters + unfamiliar characters)
Animal	(total animal)/(total characters)
Social interaction (%)	
Aggression/friendliness	(number of aggressive interaction/total number of aggressive + friendly interaction)
Befriender	(dreamer as befriender)/(dreamer as befriender + dreamer as recipient)
Aggressor	(dreamer as aggressor)/(dreamer as aggressor + dreamer as victim)
Physical aggression	(physical aggression)/(total aggression)
Social interaction ratios	
A/C index	(total number of aggressions/total number of characters)
F/C index	(total number of friendliness interactions/total number of characters)
S/C index	(total number of sex interactions/total number of characters)
Self-concept (%)	
Self-negativity	(dreamer as viclim + dreamer involved in misfortune + dreamer involved in failure)/(dreamer as victim + dreamer involved in misfortune + dreamer involved in failure + dreamer as befriender + dreamer involved in good fortune + dreamer involved in success)
Bodily misfortunes	(bodily misfortune)/(all misfortunes)
Negative emotions	(negative emotions)/(negative emotions + positive emotions)
Dreamer-involved success	(dreamer-involved success)/(dreamer-involved success + dreamer- involved failures)
Dreams with at least one:	
Aggression	(dreams in which aggression occurs)/(number of dreams)
Friendliness	(dreams in which friendliness occurs)/(number of dreams)
Sexuality	(dreams in which sexuality occurs)/(number of dreams)
Misfortune	(dreams with misfortunes)/(number of dreams)
Good fortune	(number of dreams with good fortune)/(number of dreams)
Success	(number of dreams with success)/(number of dreams)
Failure	(number of dreams with failure)/(number of dreams)
Striving	(dreamer-involved successes + dreamer-involved failures)/(number of dreams)

Table 2
Dream Content Indexes of Children and Adults

	Adult sample	Bay area girls	h: Bay area girls vs adult norms	p: Bay area girls vs. adult norms
Characters (%)				
Male/female	62%	32%	−.61	**.000
Familiarity	54%	68%	+.28	**.002
Friends	37%	49%	+24	**.006
Family	14%	17%	+.06	.508
Dead and imaginary	1%	1%	−.02	.850
Animal	7%	6%	−.04	.673
Social interaction (%)				
Aggression/friendliness	55%	40%	−.30	.078
Befriender	50%	24%	−.54	*.026
Aggressor	32%	32%	−.01	.979
Physical aggression	59%	63%	+.07	.734
Social interaction ratios				
A/C index	.28	.11		
F/C index	.19	.12		
S/C index	.03	.00		
Self-concept (%)				
Self-negativity	64%	58%	−.12	.377
Bodily misfortunes	24%	23%	−.03	.880
Negative emotions	77%	64%	−.28	.091
Dreamer-involved success	63%	55%	−.56	.056
Dreams with at least one:				
Aggression	48%	21%	−.58	**.000
Friendliness	34	30%	−.09	.544
Sexuality	7%	1%	−.34	*.018
Misfortune	34%	38%	+.08	.556
Good fortune	6%	17%	+.36	*.012
Success	12%	9%	−.10	.488
Failure	10%	13%	+.09	.505
Striving	20%	17%	−.08	.583

Note. Social interaction ratios do not use the *h* statistic.

*Significant at the .05 level or better.

**Significant at the .01 level or better.

Table 3
Dream Content Indexes of REM and NREM Sleep States

	REM	NREM	h: NREM vs. REM	p: NREM vs. REM
Characters (%)				
Male/female	47%	53%	+.12	.454
Familiarity	54%	49%	−.09	.379
Friends	34%	39%	+.09	.395
Family	13%	7%	−.21	.054
Dead and imaginary	1%	0%	−.19	.070
Animal	2%	4%	+.13	.220
Social interaction (%)				
Aggression/friendliness	65%	33%	−.64	*.026
Befriender	54%	90%	+.85	*.043
Aggressor	52%	0%	−1.62	**.000
Physical aggression	25%	18%	−.18	.540
Social interaction ratios				
A/C index	.16	.11		
F/C index	.08	.11		
S/C index	.01	.00		
Setting (%)				
Indoor	53%	55%	+.04	.855
Familiar	65%	74%	+.19	.496
Self-concept (%)				
Self-negativity	58%	67%	+.18	.473
Bodily misfortunes	46%	22%	−.51	.283
Negative emotions	88%	83%	−.14	.597
Dreamer-involved success	60%	46%	−.28	.463
Torso/anatomy	13%	8%	−.16	.676
Dreams with at least one:				
Aggression	24%	12%	−.32	*.025
Friendliness	16%	15%	−.03	.845
Sexuality	2%	0%	−.28	*.045
Misfortune	12%	9%	−.10	.448
Good fortune	3%	2%	−.06	.649
Success	13%	7%	−.20	.153
Failure	9%	9%	0	1.000
Striving	18%	14%	−.11	.440

Note. Social interaction ratios do not use the *h* statistic.

* Significant at the .05 level or better.

** Significant at the .01 level or better.

Table 4

Mean Word Count Analyses for REM vs. NREM Dreams

	REM	NREM	p value	Published norm
Unique words	42.8 (7.4)	47.7 (17.2)	.36	50.8
I	5.8(1.7)	6.9(1.4)	.08	8.5
We	1.9 (1.2)	.97 (1.0)	.045	1.1
Self	7.7(1.8)	7.9(1.5)	.78	9.5
Insight	1.9(1.1)	2.8 (1.3)	.09	2.0
Positive emotion	1.0 (.80)	1.4(1.0)	.26	2.4
Negative emotion	1.2 (.80)	1.2 (.81)	.86	1.6
Social processes	10.24(2.1)	6.8 (3.0)	.003**	8.8
References to other people	5.4(1.8)	3.5 (2.1)	.023*	5.0

* Significant at the 0.05 level or better.

** Significant at the .01 level or better.