

Research Article

A "Jekyll and Hyde" Within Aggressive Versus Friendly Interactions in REM and Non-REM Dreams

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ABSTRACT

We hypothesized that representations of social interactions in REM and non-REM (NREM) dreams would reflect differing regional brain activation patterns associated with the two sleep states, and that levels of aggressive interactions would be higher in REM than in NREM dreams. One hundred REM, 100 NREM, and 100 wake reports were collected in the home from 8 men and 7 women using the Nightcap sleep-wake mentation-monitoring system and scored for number and variety of social interactions. We found that (a) social interactions were more likely to be depicted in dream than in wake reports, (b) aggressive social interactions were more characteristic of REM than NREM or wake reports, and (c) dreamer-initiated friendliness was more characteristic of NREM than REM reports. We conclude that processing of, or simulations about, selected social interactions is preferentially performed while "off-line" during the dream state, with the REM state specializing in simulation of aggressive interactions and the NREM state specializing in simulation of friendly interactions.

Social psychology rests, in part, on the understanding that evolutionary processes led to the selection of genetic patterns that facilitated social interactions. The outcome of such patterns is seen not only in these social interactions per se, but also in the thought, feelings, and even dreams of humans. Indeed, it has been proposed that dreams may serve, in part, to process memories of and information about social interactions, and social interactions are described in many dream reports. We report here that the frequency and nature of these interactions are different in dream reports and wake reports, and that within dream reports, these interactions differ between REM (rapid eye movement) and non-REM (NREM) sleep. A better understanding of these differences can contribute to understanding both of social psychology and of the nature and possible functions of dreaming.

The contrasting brain and neurochemical activity patterns of REM and NREM sleep suggest that representations of social interactions in dreams associated with the two sleep states may differ. Social aggression in many mammalian species, including humans, has been linked to reductions in serotonergic activity and to activation of hypothalamic, amygdalar, and limbic sites (Asberg et al., 1977; Halasz, Liposits, Meelis, Kruk, & Haller, 2002; Linnoila, De Jong, & Virkkunen, 1989; Linnoila et al., 1994; Ryan, 2000; Virkkunen et al., 1994). REM sleep involves periodic, significant reductions in forebrain

serotonergic activity, along with selective activation of limbic and paralimbic neuronal circuits, including the lateral hypothalamus, amygdala, parahippocampus, 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).

By contrast, in NREM sleep, there is a gradual reactivation of aminergic systems that innervate forebrain and cortical sites despite an overall decrease in cerebral metabolic rates. Although positron emission tomographic (PET) studies of NREM sleep states generally show a global decrease in cerebral energy metabolism relative to REM sleep states, this metabolic decline is not as marked in Stage 2 NREM as in deeper NREM stages (3 and 4 slow-wave sleep), and thus Stage 2 NREM sustains higher levels of brain activation compared with Stages 3 and 4. Indeed, a recent functional magnetic resonance imaging (fMRI) study found that the frontal cortices were more activated in NREM than in REM sleep (Lovblad et al., 1999). Hofle et al. (1997), as well, reported significant correlations between spindling and delta activity in NREM sleep and temporal lobe activation.

In sum, the intense and repeated activation of hypothalamic and amygdalar sites, along with deactivation of dorsolateral prefrontal cortex and significant reductions in serotonergic tone in REM sleep, may allow for or even promote emergence of aggressive impulses in REM dreams. Conversely, rising levels of activation in selected forebrain cortical sites, along with the gradual reactivation of aminergic tone, in NREM sleep should result in the inhibition of aggressive impulses or even promote emergence of nonaggressive, cooperative social impulses in NREM dreams.

We used the Nightcap, a home-based sleep-wake monitoring system (Ajilore, Stickgold, Rittenhouse, & Hobson, 1995) to collect dream and wake mentation reports from healthy individuals in their home environments. We repeatedly sampled the mental activity associated with REM sleep, NREM sleep, and waking in the same 15 individuals as they behaved and slept naturally over a 2-week period. We then used a standardized dream-content scoring system (Hall & Van de Castle, 1966) to analyze the frequency and content of both aggressive and friendly social interactions in the reports collected from these individuals. The results are consistent with our predictions and clearly demonstrate more frequent depiction of social interactions in dream than in wake reports and higher levels of aggressive content in REM than in NREM reports. In addition, we found elevated levels of friendly social interactions in NREM sleep, which suggests contrasting simulation specializations for REM and NREM sleep states.

METHOD

The data are drawn from a larger database of mentation during wake and sleep states. The overall characteristics of this database have been described in detail elsewhere (Stickgold, Scott, Fosse, & Hobson, 2001; Stickgold et al., 1998). The study was approved by the local internal review board for protection of the rights of human subjects, and all participants signed an informed-consent form. In brief, 15 undergraduate students (18-22 years of age; 8 male, 7 female) carried a pager during the day and wore the Nightcap monitoring system (Ajilore et al., 1995) at night for 14 days and nights. 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 that when paged or awakened, they should describe in detail their foregoing experiences,

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. Instructions to subjects were given at the start of the 14 days of report collection. No further instructions were given during report collection.

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

Sampling of Sleep and Wake Reports

The 200 sleep and 100 wake mentation reports were selected in a semirandom fashion from a database of 1,748 sleep and wake mentation reports. The full database contained 894 waking reports, 338 sleep-onset reports, 269 REM reports, and 247 NREM reports. Domhoff (1996, pp. 65-66) determined that a minimum sample size of 100 reports is needed to approximate the overall normative values for the various Hall-Van de Castle content indicators. We therefore pseudorandomly selected 100 REM, 100 NREM, and 100 wake reports from the overall Nightcap database and then calculated mean word count per dream for each of the three groups in an attempt to equate mean word length per report across REM, NREM, and wake reports. Because NREM dreams tended to be shorter than REM or wake reports, we had to adjust the REM and wake means to the NREM means by repeated random samplings with replacement from the REM and wake report pools until the three means were roughly equated. Using this method, we obtained a dream series from NREM sleep with a mean word count per dream of 64.33 ($SD = 46.63$), a dream series from REM sleep with a mean word count of 75.39 ($SD = 37.85$), and a wake report series with a mean word count of 70.13 ($SD = 20.20$). We were successful in equating report lengths across report types as these mean word counts across the three report types were not statistically different from one another, $F(2, 297) = 2.28, p = .103$. Word count in all of these reports was calculated by the method of Antrobus (1983), which eliminates fillers, repetitions, and pauses such as “ah” and “well,” as well as extraneous descriptions (in dream reports) of waking events.

Given that our sampling procedure for the REM and wake reports was not fully random, we wanted to assess the possibility that the nonselected (eliminated) reports were

significantly different from the selected (target) reports in terms of the focus (social interaction) of this article. We therefore randomly selected and scored one third (33%) of the eliminated reports from each category (REM, NREM, and wake). These eliminated reports did not differ significantly from the length-matched target reports in character representation or the major social interactions that are the focus of this study. For example, the number of aggressions per character (A/C index) was 0.16, 0.11, and 0.06 for the target REM, NREM, and wake reports, respectively, and 0.17, 0.11, and 0.09 for the eliminated REM, NREM, and wake reports. In terms of characters, the target and the eliminated reports were also quite similar, with males accounting for 47%, 53%, and 42% of the characters in the target REM, NREM, and wake reports, respectively, and 46%, 52%, and 62% of the characters in the eliminated reports. In sum, the target reports and the eliminated reports were reasonably similar in the percentages of male and female characters and frequencies of aggressive interactions.

On average, subjects contributed about seven reports apiece to each of the report types. After 1 subject who contributed only a single report was eliminated, the mean number of reports contributed by each of the 14 remaining subjects was 7.2 to the REM pool ($SD = 3.2$; range = 3-11); 7.1 to the NREM pool ($SD = 4.1$; range = 3-11), and 6.7 to the wake pool ($SD = 3.5$; range = 6-11).

As a final control for individual differences, we randomly selected 3 reports from each wake-sleep state for each of 13 subjects (2 subjects did not have the requisite reports from all three states) and repeated the analyses using the number of subjects rather than the number of reports to determine degrees of freedom. We report these analyses later under Analyses Across Subjects. All other analyses (discussed in Analyses Across Reports and Analyses Involving the Hall-Van de Castle Ratios) were conducted across the 100 reports from each of the three sleep-wake states.

Content Scoring

We scored dream content using the Hall-Van de Castle scoring system (Domhoff, 1996; Hall & Van de Castle, 1966) along with Schneider and Domhoff's (2003) spreadsheet program DreamSat, which tabulates dream-content scores and derived scales and percentages using this system. This spreadsheet program greatly increases the reliability of results obtained.

The Hall-Van de Castle system for scoring dream content is a standardized and reliable content-scoring system that includes 16 empirical scales and a number of derived scales useful for analyzing social interactions in dream content. Three primary types of social interaction are scored: aggressive, friendly, and sexual. Subtypes (e.g., physical vs. verbal aggression) can be scored as well. The physical settings within which these interactions take place, the characters that initiate the interactions, and the targets or recipients of the interactions are identified. The Characters scale is of course, crucial for tabulation of social interactions. It allows for classification of characters known to the dreamer (e.g., family members, friends), 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. Once characters are identified, their social interactions can be tabulated.

Our primary use of all of the Hall-Van de Castle scales was to determine levels and correlates of aggressive and friendly interactions while adjusting for various baseline values

(see the denominator terms for standard Hall-van de Castle outcomes described in Table 1) in order to control for length effects. In addition to scoring all of the basic categories, we therefore calculated (using the DreamSat software) the Hall-Van de Castle (see Domhoff, 1996) outcome measures described in Table 1. In addition to these Hall-Van de Castle values, we computed percentage aggressions (number of aggressions divided by total number of social interactions), percentage friendly interactions (number of friendly interactions divided by total number of social interactions), and percentage dreamer-initiated interactions (number of dreamer-initiated aggressions, or number of dreamer-initiated friendly interactions, divided by the total number of social interactions).

Reliability of Scoring of Content

Three members of our team (A.B., D.S., and D.M.) scored reports, with each individual scoring 20% of the reports of the other two scorers. Scorers were blind as to the status of the reports they were scoring (i.e., whether they were REM, NREM, or wake reports). Using the method of perfect agreement (Domhoff, 1996, p. 28), we calculated interrater reliability by dividing the number of agreed-upon classifications by the sum of all the raters' classifications. Interrater reliabilities were above 80% for all outcome measures.

For an external-validity check on our scoring procedures, we compared the means of our REM and NREM values for the major Hall-Van de Castle categories with the published norms for these same categories. Our obtained values for REM and NREM percentages were nearly identical with the values of the published norms (Domhoff, 2003, p. 73, Table 3.2).

Statistical Analysis

We first compared the frequency of aggressive, friendly, and sexual social interactions per report from REM and NREM sleep across those subjects ($n = 13$, $df = 12$) with reports from all three wake-sleep states, using both protected t tests and analysis of variance (ANOVA). We next performed a similar series of analyses on frequency of aggressive, friendly, and sexual social interactions across reports. Finally, we used the DreamSat program to compute all of the scales and percentage differences, as well as certain p values, associated with the standardized content ratios derived from the Hall-Van de Castle scoring system. The program also produces Cohen's h statistic, which is an effect-size value for samples requiring nominal measurement scales. Because the Hall-Van de Castle categories and content indicators are based on nominal rating scales, we used tests for the significance of differences between two proportions to determine REM-NREM differences, REM-wake differences and NREM-wake differences on the standardized Hall-van de Castle content ratios.

RESULTS

Analyses Across Subjects

REM reports were twice as likely as wake reports ($p = .04$) to simulate social interactions and were more likely than NREM reports to do so (though not significantly so,

$p = .18$). Similarly, REM reports evidenced a significantly greater number of aggressive interactions than did wake reports ($p = .02$) and a trend toward a greater number of aggressive interactions than NREM reports ($p = .06$). No significant differences were noted in mean frequencies of friendly interactions as a function of state. REM-NREM differences were particularly evident when we looked at dreams without an admixture of social interactions: Of 28 dreams that displayed solely aggressive interactions, 21 were REM dreams and 7 were NREM dreams. Conversely, of 23 dreams that displayed only friendly interactions, 13 were REM dreams and 10 were NREM dreams. Thus, although the likelihood of a friendly interaction was essentially constant across the three states, aggressive interactions consistently higher in REM reports than in NREM or wake reports.

Marked REM-NREM differences also emerged when we looked at the role of the dreamer in each social interaction. Self-initiated social interactions were analyzed by comparing the number of self-initiated friendly and aggressive interactions per report from REM and NREM sleep, across the 13 subjects with reports from all three wake-sleep states. An ANOVA showed no main effect of the type of social action or of sleep state, but a significant interaction between the two, $F(1, 24) = 4.88, p = .037$ (Fig. 1). Post hoc tests revealed significantly more self-initiated aggression than friendliness in REM, $t(12) = 2.24, p = .015$, and a trend toward significantly more self-initiated friendly interactions than aggressive interactions in NREM, $t(12) = 2.00, p = .069$. To follow up on these results, we conducted further analyses across report types.

Analyses Across Reports

Table 2 presents the frequencies of major social interactions across reports. REM reports were twice as likely as wake reports to contain descriptions of social interactions ($p < .0001$) and significantly more likely than NREM reports to contain social interactions ($p < .002$). Among reports with social interactions, both REM and NREM reports had significantly more social interactions per report than did wake reports ($ps < .015$ and $.001$, respectively). Similarly, 24% of REM, 12% of NREM, and 8% of wake reports contained at least one aggression. In this case, both REM and NREM reports had significantly more interactions than wake reports ($ps = .025$ and $.001$, respectively). In contrast, the number of reports with at least one instance of friendliness did not differ significantly across sleep-wake states (17% for REM, 15% for NREM, and 17% for wake). (Sexual interactions were virtually never depicted in any of the reports.) Thus, although the likelihood of a friendly interaction was essentially constant across the three states, aggressive interactions were three times as likely in REM sleep as in the wake state and twice as likely in REM sleep as in NREM sleep.

Analyses Involving the Hall-Van de Castle Ratios

The Hall-Van de Castle ratios (Tables 3 and 4) largely confirmed the pattern of findings in the preceding analyses. The aggression/friendliness percentage was significantly higher for REM reports (65%) than for either NREM (33%) or wake (23%) reports; the associated effect sizes were moderately large (Cohen's $h = .64$ for REM-NREM, $.88$ for REM-wake, and $.24$ for NREM-wake) and were statistically significant (all $ps \leq .01$). Conversely, NREM reports exhibited a far higher befriender percentage than REM or wake

reports (90% for NREM, 54% for REM, and 76% for wake). This effect was also quite strong (Cohen's $h = .85$ for REM-NREM, $.48$ for REM-wake, and $.37$ for NREM-wake) and was statistically significant for REM versus NREM ($p \leq .04$).

The most dramatic difference concerned the aggressor percentage, which adjusts the number of dreamer-initiated aggressions by the number of instances in which the dreamer was a victim of an aggression. The aggressor percentage for NREM reports was 0%, indicating that the dreamer was never reported to be an aggressor in NREM sleep. By contrast, this percentage was 52% for REM reports ($p < .0001$). Reports of waking mentation, however, never involved the self as victim, and therefore the aggressor percentage in this case was 100%. Although REM and NREM reports were associated with a greater percentage of physical aggressions than wake reports (25% and 18% vs. 0%, respectively), the difference between REM and NREM was not significant.

Relations between social interactions and characters appearing in these interactions were complex. Although the ratios of male to female characters were roughly the same across report types (Table 4), wake reports contained a significantly greater percentage of familiar characters (75%) than either REM reports (54%) or NREM reports (49%). More characters appeared in dreams than in wake reports, but roughly equal numbers of characters participated in aggressive interactions in the two dream states. The A/C index, for example, was $.16$ in REM reports, compared with $.11$ for NREM reports and $.06$ for wake reports. For friendly interactions, however, NREM reports patterned more closely with wake reports than with REM reports; the friendliness (F/C) index was $.11$ for NREM reports, $.14$ for wake reports, and $.08$ for REM reports (Table 4).

DISCUSSION

Humans typically spend about 16 hr of each day awake and 8 hr asleep. Within sleep, they spend about 2 hr in REM sleep and 6 hr in NREM sleep. In all three of these brain-mind states, actual or simulated social interactions occur. Our results indicate that experiences of social interactions are more frequent in sleep states than in the waking state and that REM and NREM sleep states may be specialized in the types of social interactions they preferentially simulate.

These functional correlations were particularly apparent when we considered the social intentions of the dreamer as depicted in the dream scenario. Dreamer-initiated aggressive interactions were reduced to zero in NREM dreams, whereas dreamer-initiated friendly interactions were approximately twice as common in NREM as in REM dreams. It is therefore apparent that the lack of aggression in NREM reports was not due simply to fewer social interactions occurring in NREM relative to REM dreams, as friendly interactions were more likely to be dreamer initiated in NREM than in REM reports (90% vs. 54%, respectively, $p < .05$). This fact, along with the total absence of dreamer-initiated aggression in NREM reports, suggests an active process in NREM sleep that inhibits aggressive social impulses while promoting the emergence of cooperative social impulses. Conversely, REM sleep appears to facilitate emergence of aggressive impulses. This pattern of findings emerged in analyses both across subjects and across reports.

Recall that in order to adjust for length effects, we equated report lengths before conducting analyses across reports. Some investigators argue that adjusting for word length when comparing REM and NREM content may underestimate or reduce robust content

differences, because NREM reports are typically shorter on average than are REM reports. Thus, it is very likely that without the word-count correction we implemented here, the REM-NREM difference in social interactions would have been even greater than what we found using the correction.

If confirmed by future studies, this REM-NREM difference in expression of social interactions would be an extremely important finding for dream-content research, as it would suggest a major and easily identifiable index of difference for the two sleep states that may point to functional correlates of REM and NREM. Our results may also facilitate attempts to identify basic components of the cognitive architecture of the dreaming mind-brain. The documentation of high dreamer-initiated friendliness and low aggression in NREM sleep along with the opposite profile in REM sleep suggests, in neuropsychological terms, a kind of double dissociation in site and function. This dissociation in functional states suggests that the dreaming mind-brain is composed of at least two fundamental component processes (REM and NREM) that give rise to distinct computational processes and psychological states (aggression vs. friendliness). These data, then, place constraints on theoretical attempts to account for sleep mentation differences in terms of a single factor or physiological process.

To our knowledge, these REM-NREM differences in social interaction, though sporadically documented by other researchers, have not been commented on before. In an abstract, Faucher, Nielson, Besette, Raymond, and Germain (1999) also reported a zero aggressor percentage in NREM sleep, but they did not comment on the REM-NREM difference. In an addendum to a discussion of another topic, Domhoff (1996) reported a higher number of REM than NREM dreams that contained at least one aggression, but indicated that the difference was reduced after adjusting for number of characters. He did not consider the crucial role of dreamer-initiated aggression.

The surprising dissociation in social interaction styles in REM and NREM sleep states documented here presents a challenge to current modeling of dream processes and functions. If dreams are simply epiphenomenal images without causal, intentional, or semantic content, then one would not expect to find that dream states exhibit processing specializations of the kind reported here. Similarly, if dreams merely reflect the current psychology or concerns of the dreamer, there would be no reason to expect high levels of aggression in either REM or NREM dreams, except perhaps in abnormally aggressive people.

In sum, no current model of dream content can straightforwardly account for our results. However, they may be at least partially consistent with Hobson and McCarley's (1977) theory of the reciprocal interaction of two neuronal groups (acetylcholine in the REM state, norepinephrine and serotonin in the NREM state) during sleep and with McNamara's (2004; McNamara, Dowdall, and Auerbach's (2002) position concerning the effects of genetic conflict on REM and NREM sleep states.

If our findings are replicated by other research groups, important functional questions will naturally emerge: Why should dreams "concern themselves" with simulations of social interactions more often than waking cognitive processes do? Why should dreams specialize in simulation of social interactions? And why should the REM sleep state further specialize in aggressive interactions and the NREM sleep state specialize in altruistic actions? It is tantalizing to consider the possibility that these specializations exert a regulatory impact on waking social interactions. New experimental paradigms would need

to be developed to test this possibility. In any case, the view of sleep as an essentially content-less and passive state appears to be false, and a new model of sleep and dreams may need to be developed.

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Fig. 1. Number of self-initiated aggressive versus friendly interactions in the REM and non-REM (NREM) reports. The *p* values indicate the significant main effects and interaction from the analysis of variance.

Table 1
Hall-Van de Castle Content Ratios

Aggression/friendliness percentage (the relative frequency of aggression and friendliness) = dreamer-involved aggression/(dreamer-involved aggression + dreamer-involved friendliness)^a

Befriender percentage (the percentage of all dreamer-involved friendly interactions in which the dreamer befriends some other character) = dreamer as befriender/(dreamer as befriender + dreamer as befriended)

Aggressor percentage (the percentage of all dreamer-involved aggressions in which the dreamer is the aggressor) = dreamer as aggressor/(dreamer as aggressor + dreamer as victim)

Physical aggression percentage (the percentage of all aggressions, whether witnessed or dreamer involved, that are physical in nature) = physical aggressions/all aggressions

Aggression (A/C) index (frequency of aggressions per character) = all aggressions/all characters

Friendliness (F/C) index (frequency of friendly interactions per character) = all friendly interactions/all characters

Sexuality (S/C) index (frequency of sexual encounters per character) = sexual encounters/all characters

^aIf the percentage is higher than 50%, aggressions predominate over friendly interactions. If the percentage is lower than 50%, friendly interactions predominate over aggressive interactions.

Table 2: Frequency of Social Interactions across reports (by State)

	REM	NREM	WAKE
Total social interactions	56 ^A	34 ^B	26 ^B
Social interactions/social reports	1.4 ^a	1.55 ^A	1.13 ^b
Reports with at least one social interaction (of any type)	40 ^A	22 ^B	23 ^B
Reports with at least one Aggressive interaction	24 ^a	12 ^b	8 ^B
Reports with at least one friendly interaction	17	15	17

Note: Within a row, those values having different superscripts are reliably different. Uppercase letters indicate

p<.01. Lowercase letters indicate p<.05.

Table 3: Hall-Van de Castle Social Interaction Percentages.

	REM	NREM	WAKE
Aggression/Friendliness	65 ^a	33 ^b	23 ^B
Befriender	54 ^b	90 ^a	76
Aggressor	52 ^A	0 ^B	100 ^C
Physical Aggression	25 ^A	18 ^a	0 ^b

Note. Aggression/friendliness = Dreamer-involved aggression / (Dreamer-involved aggression + Dreamer-involved friendliness); Befriender = Dreamer as befriender / (Dreamer as befriender + Dreamer as befriended); Aggressor = Dreamer as Aggressor / (Dreamer as Aggressor + Dreamer as Victim); Physical Aggression = Physical Aggressions / All aggressions.

Note: Within a row, those values having different superscripts are reliably different. Uppercase letters indicate p<.01. Lowercase letters indicate p<.05.

Table 4: Hall-Van de Castle Character Percents

	REM	NREM	WAKE
Male/Female %	47	53	42
Familiarity %	54 ^A	49 ^A	75 ^B
Friends %	34 ^A	39 ^A	60 ^B
Family %	13	7	9
A/C Index	0.16	0.11	0.06
F/C Index	0.08	0.11	0.14
S/C Index	0.01	0.00	-

Note. Male/Female % = Males / (Males + Females); Familiarity % = Familiar / (Familiar +

Unfamiliar); Friends % = Friends / All humans; Family % = (Family + Relatives) / All humans;
A/C index (Aggression/Character index) = All aggressions / All characters; F/C index
(Friendliness/Character index) = All friendliness / All characters; S/C index
(Sexuality/Character index) = All sexuality / All characters.

Note: Within a row, those values having different superscripts are reliably different. Uppercase letters indicate $p < .01$. Lowercase letters indicate $p < .05$.