Dream Content: Quantitative Findings

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Chapter 50

Abstract

Considerable progress has been made in the systematic study of dream content. The most commonly used methods for collecting dream reports—laboratory awakenings, home dream logs, questionnaires, and most recent dreams collected in group settings—all have their uses and inherent advantages and disadvantages. Reliable, comprehensive, and validated instruments for the actual analysis of dream content reports have been developed, and complementary tools are now available to all researchers on the Internet. Quantitative data on dream content from laboratory and nonlaboratory settings generally converge in depicting a reliable picture about the nature of dream content in the general adult population. Few differences emerge between laboratory and home dream reports. Both data sets indicate that for the most part, dreams are a reasonable simulation of waking life characters, social interactions, activities, and settings and that dreams show systematic relationships to various dimensions of the dreamer's waking life but not to day-to-day events. Developmental changes also occur in dream content until late adolescence, when dream content becomes surprisingly stable and consistent throughout adulthood and old age. More clinically oriented studies suggest that affect and social interactions are two key dream content variables that are most strongly related to measures of psychological well-being. Taken together, these findings have several implications for theories of dreaming and provide convincing evidence that dreams are a unique and meaningful psychological product of the mind.

Researchers and clinicians have long been fascinated by the content of dreams. Although many contemporary dream researchers suggest that dreaming is functionally significant and may subserve a biologically important function, some argue that dreams are epiphenomenal to neurophysiologic activity during rapid eye movement (REM) sleep and have no value in and of themselves even though evidence suggests they have psychological meaning. This chapter reviews methodologic issues in dream research and systematic findings on the content of people's dreams, and it presents the implications of key findings on normative dream content. The implications for theories of dreaming are briefly considered in the final section.

There is no consensus on what distinguishes dreaming from other cognitive processes, such as thinking or daydreaming, nor on what constitutes dream content. Interdisciplinary groups from the International Association for the Study of Dreams and the American Academy of Sleep Medicine concluded that "a single definition for dreaming is most likely impossible given the wide spectrum of fields engaged in the study of dreaming, and the diversity in currently applied definitions."[1] Thus, depending on one's perspective, *dreaming* can be synonymous with the term "sleep mentation," which refers to the experience of *any mental activity* (e.g., perceptions, bodily feelings, thoughts) during sleep, or it may be restricted to more elaborate, vivid, and story-like experiences recalled upon awakening. As highlighted by others,[2] using a broadly inclusive versus more restrictive definition of dreaming has a direct and significant impact on the nature and sense of empirical data and theoretical modeling in the field.

In this chapter, the term *dream* is conceptualized as having four interrelated meanings. First, a dream is a form of thinking during sleep that occurs when there is a certain, as yet undetermined, minimal level of brain activation in a context in which external stimuli are typically occluded and the cognitive system that keeps us aware of our surroundings is shut down. Second, a dream is something people experience as a series of actual events (e.g., a sequence of perceptions, thoughts, and emotions) because the thought patterns simulate waking reality. Third, a dream is what people remember upon awakening, so it is a memory of the dreaming experience. Finally, a dream is the spoken or written report provided to investigators based on the memory of the dreaming experience. The empirical studies discussed in this chapter reveal that the events of a dream always include the dreamer as an observer or participant, and that they almost always include at least one other character besides the dreamer (either a person or an animal). In addition, the dreamer or the other characters in the dreams are invariably engaged in one or another activity (e.g., looking, walking, running) or a social interaction. Thus, the sense of participation in an event, along with characters, activities, and social interactions, is what distinguishes dreams from the more fleeting, fragmented, and thoughtlike forms of sleep mentation.

METHODS FOR COLLECTING DREAM REPORTS

Researchers never study dream experiences directly. Instead, they collect and have access to descriptions of the experience, the dream report. The nature and content of the verbal or written report obtained can be influenced by a number of factors. These include the setting (e.g., home, laboratory, classroom, psychotherapy), method of awakening (e.g., spontaneous, induced), time of awakening (e.g., early, middle, or late in the sleep period), sleep stage prior to awakening (e.g., REM, non-REM [NREM] sleep), type of collection instrument (e.g., questionnaire, dream journal), reporting method (e.g., written by the subject, written by the experimenter, audio recording), instructions provided (e.g., report anything that was going through your mind before your awakening, note only your dreams), probes on reported content (no, fixed, or semistructured

questions), interpersonal situation (e.g., reporting directly to an experimenter, clinician), time delay between when the dream was experienced and when it is reported, study duration, and subject characteristics (e.g., gender, personality, habitual level of dream recall).

The degree to which the content of dream reports is influenced by these various factors either individually or in combination varies as a function of the collection method used. The principal sources of dream reports are the sleep laboratory, home dream journals, questionnaires, psychotherapy sessions, and classroom or other group settings where a most recent dream can be collected from everyone willing to participate. Although there is convincing evidence that working with patients' dreams can be clinically useful,[3] dream reports from the psychotherapy relationship are rarely used in systematic studies, and thus this source is not covered here.

Sleep Laboratory

Sleep laboratories are an excellent source of dream reports because they provide the opportunity for collecting a representative sample of a subject's dream life, both within and across nights, under controlled conditions. Awakening subjects from several REM or NREM periods results in the collection of dream reports that may have been otherwise forgotten by the subjects upon normal awakening in the morning. Awakenings during REM, or from stage II NREM late in the sleep period, maximize the probability of recall and make it possible to collect as many as four or five dreams in a single night. On the other hand, frequent awakenings can be difficult for participants, and factors such as sleep inertia and one's desire to return to sleep may interfere with the quality of the dream reports. However, a complimentary cued morning report of dreams recalled during the night can yield new and reliable information as to the dreams' original contents.[4]

The main problem with the laboratory collection of dream reports is that it is a very costly and time-consuming process, and even though several dreams can be collected each night, it still can take many months to obtain 10 or more dreams from each of a dozen participants. Furthermore, some types of dreams, including nightmares and sexual dreams, rarely occur in the sleep laboratory, presumably due to sociocognitive factors. In addition, approximately 20% of laboratory REM dream reports reflect direct incorporations of the laboratory environment,[5] even when collected over several consecutive nights.[6] For our purposes, the most important outcome of detailed laboratory studies is that they provide a baseline for assessing the quality of dream reports collected by other methods.

Dream Logs

Prospective daily logs are used by an increasing number of dream researchers even though they require a greater investment of time and resources than do questionnaires. In fields like nightmare research, home journals are considered the gold standard for the measurement of nightmare frequency.[7] Although limitations associated with longer-term retrospective assessments of dream recall and dream content are increasingly recognized, variations in home logs have received little attention.

Prospective logs can take two different forms. The first is the checklist format, in which participants indicate if there was dream recall and if so, the number and type of dreams recalled (e.g., nightmare). The second is the narrative log, in which participants are requested to provide a complete written transcript of each dream recalled. Findings from one comparison[8] of these two methods of data collection suggest that narrative-log participants, having a more time-consuming task, do not take the required time to provide a complete narrative of all of their recalled dreams, as Strauch[9] found with teenage boys. Instead, they may choose to focus on their more memorable, exciting or salient dreams, which would typically include bad dreams and nightmares. By comparison, people completing checklist logs would be more likely to record all of their dreams (including relatively banal or poorly recalled ones) as each entry is just as quickly completed regardless of dream type.

Although writing down one's dreams remains the most frequently used method to collect dream content, participants may also use tape recorders to dictate their reports. This approach may be particularly useful with children and younger adolescents.[10] It also proved highly useful in a study of blind participants.[11]

Questionnaires

In questionnaire studies, participants' retrospective self-reported information concerning their dream experiences is viewed as a modest but valid way of assessing different aspects of the dream experiences themselves. Three types of information are generally collected.

First, subjects can be queried about the frequency with which they experience certain kinds of dreams (e.g., everyday dreams, nightmares) over a determined period of time. There is increasing evidence, however, that data obtained with retrospective estimates differ considerably from daily prospective home logs. For instance, when compared to results from daily home logs, retrospective self-reports significantly underestimate current nightmare frequency[12,13] and this rate of underestimation is not attributable to an increase in recalled dreams caused by keeping a dream log.[13] Similarly, one study[12] found that the magnitude of the association between trait anxiety and nightmare frequency decreased significantly when daily logs were used to measure nightmare frequency instead of retrospective self-reports. This led the authors to suggest that anxious persons do not necessarily have more nightmares, but rather that they are more likely to remember and report nightmares retrospectively. Finally, a meta-analysis[14] of studies having examined the relationship between dream recall frequency and various personality dimensions found that scores on personality measures were not related to dream recall frequency per se, but rather to people's tendency to retrospectively underestimate or overestimate their dream recall. Taken together, these findings indicate that correlates of retrospective measures of dream recall should not be assumed to be correlates of log measures of dream recall. Contrary to prospective log measures, retrospective indices of dream recall are best viewed as measures of peoples' cognitive representations of their dream life.

A second kind of information sometimes elicited via questionnaires focuses on specific dimensions of people's

dreams or their beliefs about their general dream life. This approach assumes that there exists a valid relationship between self-reported information on the content of one's everyday dreams and the dream experiences themselves. However, comparisons of self-report measures and log-based data indicate that this assumption may be unwarranted. For instance, one[15] comparison of participants' questionnaires and 2-week logs found no relationship between estimated frequency for the appearance of aggressive, friendly, and sexual elements and their frequency in the dream reports. Similarly, a subsequent study[16] showed that when people's level of dream recall is poor, their beliefs about the level of anxiety in their dreams is not related to the actual affective content of their everyday dreams as recorded prospectively in home logs. These findings suggest that the relation between beliefs people hold about the content of their dreams and their actual dream experiences is mediated by autobiographical memory and that these beliefs are particularly inaccurate when dream recall is low (i.e., when memories of one's dreams are not readily available).

Lastly, questionnaires are used to investigate if participants ever experienced a specific type of dream, and if so to report the most recent occurrence as best recalled. This approach allows the investigation of certain types of dreams that, due to their infrequency, are difficult to capture in laboratory settings or with home dream logs (e.g., recurrent dreams, existential dreams) or dreams that stand out in the person's past (e.g., earliest dream recalled, most terrifying nightmare). Although useful in some research settings, the resulting dream content findings must be treated cautiously due to possible memory distortions and biases.

In sum, although some dream questionnaires have good internal consistency and test-retest reliability,[17] studies of their relationship to dream content and frequency findings obtained from dream journals reveal important discrepancies and raise questions as to their validity.

Classroom and Other Group Settings

Settings such as classrooms provide an objective and structured context for the efficient and inexpensive collection of dream reports. Anonymous participants are instructed to write down the most recent dream that they can recall on a standardized form while revealing only basic background information such as age and gender. The most recent dream method has been used with children as young as ages 10 to 11 years in different countries with surprisingly similar cross-national results.[18,19] However, there is reason to believe that young children up to ages 10 to 11 years are using their waking imaginations to provide a report that fits cultural stereotypes about the nature of dreams.[20] The main drawback with this method is that there is not usually time to collect any personality or cognitive measures on the people providing the reports.

ANALYZING DREAM CONTENT: INSTRUMENTS AND ISSUES

Most past dream research used either rating scales at the ordinal level of measurement ("more" or "less" of a characteristic) or discrete categories at the nominal level of measurement (an element is "present" or "absent"). Rating scales are most useful for characteristics of dream reports that have degrees of intensity in waking life, such as activity level, emotionality, clarity of visual imagery, or vividness. Cohen[21] reports that four dimensions of dream salience can be rated by participants in dream studies: emotionality, bizarreness, activity, and vividness. A factor analysis of the ratings of 100 REM dream reports suggests that rating scales boil down to five basic dimensions: degree of vividness and distortion, degree of hostility and anxiety, degree of initiative and striving, level of activity, and amount of sexuality.[22] However, it is often difficult to establish reliability with some scales, and much of the specific information in dream reports is lost or unused with general rating scales.

Of the 150 dream rating and content analysis scales reviewed by Winget and Kramer,[23] the Hall and Van de Castle coding system[24] is the best validated and remains the most widely used system for analyzing dream content. The Hall/Van de Castle system, which provides many of the findings presented in the rest of this chapter, rests on the nominal level of measurement and uses percentages and ratios as content indicators that can correct for the varying length of dream reports from sample to sample. The dream reports used in the original normative sample, as well as the codings for them, are available to researchers through www.dreambank.net.[25] The normative findings reveal a pattern of gender differences that needs to be taken into account when doing studies of individuals. The Hall/Van de Castle coding system employs nonparametric statistics for determining *P* values and effect sizes, which can be obtained instantly after entering codings into the DreamSAT spreadsheet available to all researchers on www.dreamresearch.net.[26] The general Hall/Van de Castle norms can be used with confidence for a variety of purposes because they have been replicated in several studies.[27,28]

As documented by Winger and Kramer, there exist numerous other coding systems, and many new ones have been created since their comprehensive review. However, unlike the Hall/Van de Castle system, most of these instruments have only been used by the original investigators (limiting potential for comparisons across laboratories), many use weighting systems of questionable validity, and few are based on clearly defined and objective scoring criteria that yield good interrater reliability. Moreover, as detailed elsewhere, many of these scoring systems can be duplicated by combining two or more elements of the Hall/Van de Castle system.[27]

Some research questions (e.g., self-reflectiveness in dreams, contextualizing images in dreams), have necessitated the creation of new instruments.[29,30] The Dream Threat rating scale was developed to test an evolutionary theory of dreams that stipulates that the function of dreaming is to simulate threatening events with the intent of improving the subject's ability to recognize and avoid diverse threats in real life.[31] Although this rating scale has been criticized, it is noteworthy in that it has been used by different groups to assess various kinds of dreams and that it yields good to excellent inter-rater agreement.[31-33] Taken together, findings indicate that a significant proportion of dreams contain a wide range of threats, but few of these dreams present

realistic life-threatening events, and the dreamer rarely succeeds in escaping the threat.

Finally, given the time-consuming nature of traditional scoring of dream reports, some groups have tried to develop computerized systems that can carry out such tasks both reliably and accurately. Because emotions are viewed by some dream theorists as playing a key role in structuring dream content, and given that dream affect is one of the most frequently investigated dream content variables, some of the more innovative work in this field has focused on the classification of emotions. Online search tools available to researchers at www.dreambank.net allow for rapid and accurate searches for specific words, phrases, and long word strings, and one study shows that the use of word strings for emotions yields results comparable to when standard Hall/Van de Castle codings are scored on the same dream reports.[34] Another promising project is based on an algorithm that seeks to accurately categorize dream emotions both at fixed times and dynamically as the dream narrative progresses.[35] Moreover, the algorithm has the potential of improving its performance as a function of training (machine learning). Although this research is still in its infancy, such innovations might allow efficient and accurate scoring of large data banks across laboratories.

Problems in Studying Emotions and Bizarreness in Dreams

Although both rating scales and the Hall/Van de Castle nominal coding categories have proved useful for most dimensions and elements of dream content, there are methodologic problems relating to the study of emotions and bizarreness in dreaming. Several different studies using blind coders find that negative emotions outnumber positive ones.[24,36] However, very different results emerge when the dreamers themselves make a global rating of each of their dream reports on a pleasant–unpleasant dimension. Such studies regularly find that the dreamers rate the emotions in their dreams as at least equally pleasant and unpleasant, and sometimes as more pleasant.[37-40] There is no ready explanation for these contrasting results with the two different methods.

Dreamers also tend to attribute many more emotions to their home dreams than do blind judges when they are asked to recall the emotions that accompanied the report they have written down. However, it is an open question in need of further study as to whether or not this greater amount of emotions in self-ratings of home dream reports is the result of two extrinsic factors: the demand characteristics of such a rating task and the waking-life assumption that certain emotions would logically be present in many of the situations experienced in the dream.

There is also a lack of agreement on how to assess unusual or bizarre elements in dreams, which leads to widely varying prevalence and frequent estimates. In studies that focus on clearly impossible events, the figure is 10% or less for large samples of both REM and home dreams.[41,42] When sudden scene changes, uncertainties, and small distortions are included, the figure rises to between 30% and 60%.[43-45] Using a rating scale based on the degree to which any dimension of the dream differs from waking experience and behavior, it was found that 75% of 500 REM reports from men and women had at least one bizarre aspect, as compared with 7% to 8% that were bizarre in three or more ways.[46, p. 95-103] In addition, studies of bizarreness in dreams have been handicapped by the fact that there have been no studies comparing the nature and frequency of bizarre elements in dreams and waking thought samples from the same participants, which seems to be an essential step given the evidence that waking thought often contains unexpected and anomalous elements.[47]

The Importance of Adequate Sample Sizes

One important variable that is all too often overlooked when investigating dream content is the sample size required to detect changes in various content variables. First, as detailed elsewhere, it is unlikely that repeatable and scientifically useful results can be obtained with dream reports much shorter than 50 words, especially when using Hall/Van de Castle content categories.[27] Second, although coefficients of internal consistency for dream diaries indicate that everyday dream recall is relatively stable over time, several dream content variables appear infrequently in dream reports and show large intrasubject fluctuations.[8,48] Approximately 20 dream reports from a given participant are required for correlational studies involving rare or unstable dream content variables.[17] Finally, the use of an approximate randomization algorithm provides robust evidence that it takes 100 to 125 dream reports to detect significant content differences even in the more rarely observed Hall/Van de Castle indicators either between groups or in comparison to men's and women's normative samples, although fewer dream reports are needed with frequently occurring elements.[34]

QUANTITATIVE FINDINGS ON DREAM CONTENT

Dream Reports from Laboratory Awakenings

The best starting point for the systematic study of dream content remains the classic studies completed by dream researchers during the heyday of laboratory dream research in the 1960s and early 1970s. They show that dream content simulates everyday life to a far greater degree than had been anticipated based on the clinical cases that had been the basis for theorizing before the laboratory era of dream research.[49,50] They characterize a prototypical REM dream report as a "clear, coherent, and detailed account of a realistic situation involving the dreamer and other people caught up in very ordinary activities and preoccupations, and usually talking about them".[49, p. 148]

For example, of all the dream settings that were described, only 5% were exotic, in the sense of highly unusual or out of the ordinary, and less than 1% were fantastic, in the sense of unrealistic.[49, p. 134] Using a conservative standard to guard against imputing any emotions to the dreamers, specific emotions were judged to be present in only 30% to 35% of the reports, with unpleasant emotions outnumbering pleasant ones by 2 to 1. Anxiety and anger were the most frequent types of emotions; erotic feelings occurred in only 8 of the 635 reports.[49, p. 141] The

dreams were rated as having a low degree of bizarreness. Focusing here on the longest reports because they were more often rated as bizarre, 50% were rated as having no bizarreness, 30% as having a low degree of bizarreness, 8% as having a medium degree, and 2% as having a high degree.[49, pp. 145-146]

A low degree of bizarreness was also reported in a highly detailed laboratory study of that issue.[42] The authors "emphasize the rarity of the bizarre in dreams" because major distortions of actual waking experiences reach a high of only 17% of all the activities and social interactions, and of 6% and 8% for all characters and physical surroundings, respectively.[42, p. 367] When they carried out global ratings of each dream for overall novelty, they found that most of them contained very little novelty: Only 9% were highly improbable by waking standards; another 26% showed large but plausible differences from previous waking experiences.

The issue of emotions in REM dream reports was first investigated in great depth in the sleep laboratory, where participants were quizzed in detail after each awakening about the presence of emotions and the appropriateness of the emotion to the content. Drawing on ratings by both participants and naive judges, it was concluded that about 70% of the dream reports had at least some affect.[40] A study in a Swiss sleep laboratory came to very similar conclusions about the frequency and intensity of emotions in dreams.[46, p. 93]

Several early laboratory studies probed for any changes that might occur in dream content from REM period to REM period, uncovering very few replicable differences. Employing categories for settings, characters, activities, social interactions, and emotions, both quantitative and qualitative analyses find few or no differences from REM to REM when corrections are made for the length of report.[37,51] In the most comprehensive study of this issue, there were two minor differences among 26 analyses employing Hall/Van de Castle categories for the first four REM periods, whether they were nights with single or multiple awakenings, and there were no differences with spontaneously recalled dreams that came from night or morning REM self-awakenings.[52] However, there may be some degree of thematic continuity from REM to REM on a few nights.[46, p. 206]

REM and NREM Dream Reports

Although there were indications in early laboratory studies that dreaming occurs almost exclusively in REM sleep and that there were differences in the content of REM and NREM reports, many later studies suggest that the differences in recall are not black and white, especially late in the sleep period, and that some but not all of the content differences disappear when there is a control for word length.[53,54] Still, most studies conclude that dreams are more frequent and longer during REM periods and that many NREM reports seem to be thoughts, not dreams. In fact, NREM reports are more often a continuation of waking thoughts and memories, whereas there are few episodic memories in REM or home dream reports.[55,56]

The differences in content relate to a greater character density in REM reports, which in turn leads to the possibility of social interactions.[41,53] Then, too, there is evidence that NREM reports late in the sleep period are more similar to REM reports than are NREM reports from the first few hours of sleep.[57,58] In the most recent studies of this issue, the thoughtlike nature of NREM decreased by 56% and the hallucinatory nature increased by 62% over the course of the night, leading to the conclusion that "as the night progresses, NREM approaches the neurocognitive characteristics of REM.[59, p. 302] In two separate studies it was found that the major difference between late-night REM and NREM dreams is in aggressive interactions.[60]

Laboratory and Home Dream Comparisons

Several careful investigations reveal that there are relatively few differences between home and laboratory dream reports, even when the dreams are obtained by tape recorders in the sleep laboratory and by written reports at home.[41,46] Furthermore, most of these differences disappear when the proper controls are introduced.[10,61] The one exception to this generalization seems to be hostile and aggressive dream elements, which occur more frequently in the home dream reports of young adults in three different studies.[41,61,62]

These findings on the relatively small differences between home and laboratory dreams may be explainable in terms of the results from laboratory studies that compare what is reported from REM awakenings with what is still remembered in the morning.[63,64] Such studies reveal that recency and length of report are the primary factors in later recall, which at home would lead to a representative sample of nightly dream content given the lack of content differences from REM to REM and between REM and late-night NREM. However, some of these studies also show that intensity can be a tertiary factor in morning recall, which suggests there is some selection bias toward the everyday recall of more emotionally salient content.

Normative Dream Content in Home Dreams

As might be expected from the results of the laboratory versus home comparisons, studies of large samples of dream content collected from young college-educated adults outside the laboratory show many similarities with the laboratory results when the same or comparable content categories are employed. Dreams mostly occur in commonplace settings, contain a large number of familiar characters, and revolve around family concerns, love interests, and activities engaged in during waking life.[38,65] This point is best seen in a study of several hundred dream reports from German college men and women in which the dream content was coded for at least one instance of several simple ad hoc categories constructed to determine the degree to which the dreams involve people and activities from everyday life.[66] There were four categories for familiar characters, five categories for commonplace leisure activities, and a single category for involvement in work, school, or politics. The everyday nature of most of these dreams is seen in the fact that 75% of the women's dreams and 62% of the men's have at least one instance of one of

the four categories of familiar characters. Similarly, 42% of the women's dreams and 27% of the men's have at least one instance from one of the five leisure-time categories. The routine matters of work, school, or politics appear in 20% of the women's dreams and 29% of the men's dreams. Overall, only 13% of the women's dreams and 20% of the men's have no instance of any of the above categories. In keeping with other findings on gender differences in dream content, the men's dreams are less likely to have familiar characters and familiar leisure time activities, and they are more likely to have instances of school, work, or politics, but the important point for purposes of this chapter is that only a minority of dreams for either gender involves unknown characters and activities that are out of the ordinary.

Given the long-standing clinical and popular interest in dreams with erotic or sexual content, this dream content category has received surprisingly little attention. Questionnaire studies indicate that approximately 80% of adults answer positively to the question "Have you ever dreamed of sexual experiences?"[67,68] with men reporting sexual dreams more often than women. The normative data from Hall and Van de Castle indicates that 12% of men's dreams and 4% of women's dreams contained sexual content, including having or attempting intercourse, petting, kissing, sexual overtures, and fantasies. However, one study of more than 3500 dream reports found no gender differences, with approximately 8% of dream reports from both men and women containing sexually related activity.[69] The differences with the Hall and Van de Castle data may be partially due to sample composition (college students versus student and nonstudent adults). Alternatively, it is also possible that women actually experience more sexual dreams now than they did 40 years ago, or that they now feel more comfortable reporting such dreams due to changing social roles and attitudes, or both.

Age Differences

There appear to be major changes in dream content from the preschool to teen years, but there are few changes from the late teens to old age. Dream content thus seems to parallel cognitive and emotional development during childhood as well as the stability of adult personality. Much of what is known in a systematic way about children's dreams comes from a classic longitudinal laboratory study of children between the ages of 3 and 15 years old, supplemented by a cross-sectional laboratory replication a few years later with children ages 5 to 8 years old.[70] More recently, a 5-year longitudinal laboratory study of Swiss children ages 9 to 15 years old has provided additional supporting information.[9,71] Detailed summaries of the methods, samples, and findings can be found elsewhere.[26]

The most unexpected finding in the first study was the low amount of recall from REM periods in the 3- to 5-year olds (only 27% of the REM awakenings yielded any recall that could reasonably be called a dream), and the static, bland, and underdeveloped content of the few reports that were obtained. The reports became more "dreamlike" (in terms of characters, themes, and actions) in the 5- to 7-year olds, but it was not until the children were 11 to 13 years old that their dreams began to resemble those of adult laboratory participants in frequency, length, emotions, and overall structure or to show any relationship to personality.[72, p. 127]

A cross-sectional replication of these results with children ages 5 to 8 years supported all of the main original findings.[70] The median rate of reporting was only 20% for all age groups. The imagery in the dreams was more static than dynamic until age 7 years, and the child's "self" character did not tend to take an active role in the dreams until age 8 years.[70] As with young adult dreams, there were more characters in the girls' dreams, and there was the same gender difference in the percentage of male and female characters. There were no failures, few negative emotions, and very few misfortunes. There were few aggressive or friendly interactions, with more friendliness in the girls' reports.[27, p. 94]

The results from the longitudinal study of Swiss children ages 9 to 15 years were generally similar to those for preadolescents and adolescents in the earlier longitudinal study, and there were only relatively small changes in most categories over the 6-year period. The largest change was a decline in bizarreness for both boys and girls, as defined by degrees of deviation from waking experience and social norms; just over 60% of the dream reports had at least some degree of bizarreness at ages 9 to 11 and 11 to 13 years, but the figure fell to 41% at ages 13 to 15 years.[9]

In contrast to the changes in dream content from childhood to adolescence, dream content is extremely stable in terms of characters, social interactions, and most other dream elements after age 18 years according to cross-sectional studies in the United States, Canada, and Switzerland that are summarized in Domhoff.[27] The elderly recalled fewer dreams in one large longitudinal study,[73] but separate studies suggest their dream content remained generally the same—except perhaps for aggression, where three different studies suggest a decline.[74-76]

Dream Content and Well-Being

Considerable research efforts have been expended trying to establish dream content correlates of standardized personality variables, measures of psychological well-being in nonclinical samples, and indices of psychopathology in clinical populations. Taken as a whole, there is mixed evidence that psychometrically defined personality traits (e.g., neuroticism, extraversion), are related to everyday dream content.[77] Robust relations, however, have been demonstrated between waking levels of well-being and specific types of dreams such as nightmares[7] and recurrent dreams,[78] as well as between dream content and various dimensions of waking life, including people's general waking concerns.[28,34,79]

Several studies[80-82] have shown that dream content is reactive to the experience of naturalistic and experimental stressors, but whether or not dreams play a role in people's actual adaptation to stress remains an open question. In a series of longitudinal studies of REM dream reports from depressed and nondepressed adults undergoing marital separation or divorce, Cartwright and her collaborators[79,83] provide suggestive evidence that dream content variables that centered around affect and the representation of the ex-spouse are associated with how well people adapt to their situation over time. Similarly, one longitudinal

study[84] of normal adults found that participants' dream content from home logs was moderately to strongly correlated to their scores on measures of psychological well-being both at fixed points in time and over a 6- to 10-year period, with content variables of dream affect and social interactions showing the strongest relations.

Dream content in severe psychopathological conditions such as schizophrenia has been reviewed elsewhere,[85] and with few exceptions, little by way of consistent findings has emerged from this literature. In addition, many studies in this field suffer from methodological problems including unclear diagnoses, inadequate controls, unknown effects of medications, few dream reports per patient, and the use of untested coding systems.

Individual Case Studies

Within the context of the many well-established group findings, individual case studies can be of great value for both research and possible clinical applications. The dream journals on which such studies are based have value as nonreactive measures that have not been influenced by the purposes of the investigators who later analyze them. The conclusions drawn from nonreactive archival data are considered most reliable and useful when they are based on a diversity of archives likely to have different sources of potential biases.[27] Studies of several different dream journals first proved their usefulness for scientific purposes by revealing an unexpected consistency in dream content when several hundred dream reports were studied.[27] This consistency begins in the late teens and continues to old age as expressed by three measures: *absolute* (the frequency with which an element appears remains the same year after year), *relative* (the incidence of one element always exceeds the incidence of another element, even though they both may increase or decrease in frequency), and *developmental* (there is a consistent increase or decrease from one period of time to the next). Two studies of discontinuous dream series show that the consistency revealed in continuous dream journals is not the result of practice effects.[27,86]

Individual dream journals also provided the basis for the most rigorous work to date on the lawfulness of dreams and their relationship to waking conceptual processes. This work by mathematical psychologist Richard Schweikert[87] shows that the social networks in dreams—that is, the pattern of direct and indirect relationships among the characters—have the same properties as waking social networks in that the paths between characters are short and the clustering of characters is high. These results also hold for subnetworks, which are created by removing key characters from the overall network. Moreover, the frequency distribution of the characters and the degree distribution of characters (the frequency with which characters occur with another given character) are consistent with Zipf's law, a power law for describing frequency distributions in which the top few entities occur very frequently and most other entities appear very rarely.

Blind analyses of dream journals also have led, through the formulation of inferences that can be accepted or rejected by the dreamer and other respondents, to the conclusion that some but not all dream content is continuous with the dreamers' waking conceptions, concerns, and interests.[27, p. 111-133] The most direct continuities involve the main people in a dreamer's life and the nature of the social interactions with them. There also is good continuity for many of the dreamer's main interests and activities. However, these findings on continuity have to be qualified in two ways. First, the continuity is with general concerns, not day-to-day events. Three studies that tried to match detailed waking reports of daily concerns with dream reports, two based on REM awakenings, one based on morning recall at home, found that blind judges could not reliably match records of daily concerns or events with dream content. The content of the dreams often revolved around daily life, such as family, friends, and school, but if the actual events of the day were incorporated in any specific way, it was not understandable to independent raters.[88] This finding is consistent with studies showing low levels of episodic memory in dreams.[55] Secondly, the continuity usually is with both thought and behavior, but sometimes it is only with waking thought. For example, people who have highly aggressive dreams are not always aggressive people in waking life, but they usually admit to many aggressive thoughts and fantasies during the day.[27]

Sensory Experiences and Dreams of Blind Subjects

Although the overwhelming majority of dream reports contain visual and, to a lesser extent, kinesthetic elements, the presence of other sensory modalities has also been noted in both laboratory and home dream reports.[89,90] More than 50% of dream reports contain auditory experiences, and explicit references to olfactory, gustatory, and pain sensations occur in less than 1% of all dream reports. One study found that women's dream reports were more likely to contain olfactory or gustatory sensations, whereas references to auditory and pain experiences occurred in a higher percentage of men's dreams.[90] That the more infrequent modalities of smell, taste, and pain occur at all in dreams is an important demonstration of the representational capacities of dreaming.

Perhaps due to the highly visual nature of dreaming, people always have wondered if blind people dream, so some of the earliest systematic interview studies on dreams dealt with this topic, showing that people who are born blind or become blind before age 4 or 5 years old do dream even though they do not see images in their dreams,[91] a finding that was then supported by laboratory studies.[92,93] Nor is there much if any difference in dream content, except that there may be less aggression in their dreams.[11,91] There is also much greater mention of touch, taste, and smell in blind people's dreams.[11] It is noteworthy that people who become blind after age 5 or 6 years old often have visual imagery in their dreams, which suggests that there is a window for the development of the capacity to have visual dreams that parallels what was found in longitudinal studies of children ages 3 to 7 years old.[94,95]

Implications for Theories of Dreaming

The array of systematic results presented here suggests that a considerable amount of psychological information can be extracted from dream reports. This conclusion

provides support for the core idea of all 20th-century dream theories, but it must be stressed that much dream content is not yet understood. The findings also suggest that a majority of dreams focus on a handful of personal concerns revolving around social interactions with family, friends, and coworkers. The greatest variability in dream content seems to concern the appearance of aggression, especially physical aggression.

Despite the originality and creativity that is displayed in the cognitive production of dreams, and even given the aspects of dream content that are not understood, most dreams are more realistic and based in everyday life than is suggested by most traditional dream theories. In addition, much dream content seems more transparent than might be expected by older clinical theories that emphasize disguise or symbolism in understanding dreams. Finally, a significant minority of dreams might not be as emotionally based as theories imply, especially before the adolescent years.

At the most general level, the findings based on systematic content research suggest that many dreams are the embodiment of thoughts through dramatizations of life concerns and interests. As a starting point, perhaps dreams are best understood as simulations that enact the person's main conceptions and concerns, including emotionally salient interpersonal preoccupations. This type of conceptualization is at the heart of the continuity hypothesis, which posits a relationship between everyday dream content and general waking states and concerns. Although most of the research findings reviewed here are consistent with the continuity hypothesis, much work remains to be done to clarify which specific dimensions of waking life (e.g., particular learning tasks, daily mood, major life events, ingrained behaviors, sustained fantasies, cognitive styles) are most robustly associated to what kind of dream content and the nature of these relationships over time.[55] In fact, instead of referring to *the* continuity, it may be more appropriate to consider multiple levels of continuity between various waking and dream parameters. The observations that dreams rarely depict episodic memories and that the nature of temporal references in dreams can take many forms (see Chapter 49) add a layer of complexity to an already difficult problem. In the end, dreaming may or may not have a function, but data convincingly show that dream content is a unique and meaningful psychological product of the human brain, and as such dreams will continue to interest and challenge clinicians and researchers alike.

❖ Clinical Pearls

Examining a series of dreams often yields more meaningful information about a patient's psychological state than focusing solely on one particularly salient dream.

Changes over time in the frequency and content of repetitive dream themes, especially those involving strong affect and social interactions, are most likely to reflect a patient's clinical progress or deterioration.

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