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THE UNIVERSITY OF ALBERTA

Imagery and Self-Reflection: Effects on Facial EMG, Self-Reported Emotions, and Rorschach Movement Responses

by

Tore Andre Nielsen

(C)

A THESIS

SUBMITTED TO THE FACULTY OF GRADUATE STUDIES AND RESEARCH

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(SIGNED) Tore A Nielsen

PERMANENT ADDRESS:

P.O. Box 411

Banks Alberta Canada

T0J 0S0

DATED Sept 9, 1986

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The undersigned certify that they have read, and recommend to the Faculty of Graduate Studies and Research, for acceptance, a thesis entitled **Imagery and Self-Reflection: Effects on Facial EMG, Self-Reported Emotions, and Rorschach Movement Responses** submitted by **Tore Andre Nielsen** in partial fulfilment of the requirements for the degree of Doctor of Philosophy in Psychology.

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Supervisor

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External Examiner

Date Sept. 22, 1986

Abstract

The clinical and research literature suggests that waking dream reflection affects emotional expression. To test this possibility, emotional expression in 16 male and 16 female participants was measured during and after 4 different imagery-reflection treatments (dream vs. fantasy imagery X affective vs. cognitive reflection). Participants were awakened from REM sleep and asked to reflect either on their immediately preceding dream or on a dreamlike fantasy narrated by the experimenter. Participants then reflected on a segment of this imagery paying attention either to its affective or to its cognitive aspects. It was predicted that affective reflection on dream imagery would produce greater activation of emotion-specific facial muscles (hypothesis 1), greater self-reported emerging awareness of emotion during reflection (hypothesis 2), and greater openness to emotional experience *after* reflection as indicated by more numerous Rorschach movement responses (hypothesis 3).

Some support was found for hypothesis 1. Emotion-specific facial EMG activity was greater during dream reflection than during fantasy reflection, regardless of reflection type. This difference was most apparent during reflection intervals in which participants paid attention to the personal significance of the feelings or ideas in their dreams. Hypotheses 2 and 3 were not supported. Rather, reflection on dream imagery resulted in *less* awareness of emotion during reflection, and *less* continuing openness to kinesthetic sensation after reflection, as measured by Rorschach movement responses. This difference was most noticeable for female participants.

The apparent contradiction between the findings for hypothesis 1 and the findings for hypotheses 2 and 3 was resolved by *post hoc* analyses. Facial EMG measures taken during REM sleep and during reflection were found to be correlated with attention and suprise, rather than with emotional qualities. Thus the results can be understood as evidence for 'carry-over' into dream reflection of inhibitory processes associated with REM orienting activity.

Acknowledgments

This document is dedicated to my friends in the Psychological Aesthetics program at the University of Alberta. Especially important to me are Don Kuiken, my mentor, and Diane McGregor, my lover, who provided me with valuable opportunities to discover my best qualities as a researcher and a person. I am also indebted to Margaret Johnson for her enthusiastic help both in and out of the sleep lab, and to Shelley McDonald and Cam Wild, for their support in many different ways. Leo Mos and Tom Nelson were superlative committee members who constructively shaped the outcome of my work; I enjoyed working with them both immensely. I am grateful also to Greg Madison and Todd Bass for the time they volunteered to score Rorschach protocols. Finally, a special acknowledgment is reserved for the many persons who freely shared their time, interest, and dreams as participants in the research.

I look forward to many happy remniscences of you all.

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I. INTRODUCTION

Dreams are remembered--however fleetingly--by almost everyone. One study (Webb & Kersey, 1967) estimated that the average frequency of dream recall among the American population is about one dream every 2-3 days. This means that dreams, are quite regularly introduced into the flow of waking thoughts and feelings. Moreover, when dreams are recalled, they are ranked quite highly as affecting daily mood (Wasserman & Ballif, 1984). It is appropriate, then, to ask how remembering dreams may affect waking emotions. The present study is an attempt to address this question. Specifically, the study tests (a) whether reflecting on dreams is more likely to affect waking emotions than reflecting on waking fantasies, and (b) whether attending to the affective connotations of imagery will enhance the effects of dream reflection on waking emotion.

The capacity of dreams to affect waking cognitive and emotional processes is suggested by the continuing use of dreams in psychotherapy. Dreams are still a central source of personal material for interpretation in the Freudian tradition (Eisenstein, 1980) and in Jungian clinical practice (Hall, 1983). Innovations in dream use have emerged in several eclectic approaches to psychotherapy (Smith, 1976) and in the existential-phenomenological tradition (Gendlin, 1986). Clearly, insight-oriented therapists continue to find dreams useful for facilitating therapeutic change. The successful use of dreams in psychotherapy may depend upon the dream's effects on emotional expression. In particular, the careful consideration of dreams may open dreamers to the variety and depth of their own personal feelings. Openness to feelings is an ability repeatedly found successful in predicting client improvement in psychotherapy (e.g., Gendlin, Beebe, Cassens, Klein, & Oberlander, 1968; Kiesler, 1971; Walker, Rablin, & Rogers, 1970). Reports of dream use in psychotherapy (Perlmutter & Babineau, 1983; Jungreis, 1971; Sonne & Lincoln, 1965) and education (Jones, 1978) confirm that verbal reporting of dreams is an effective means of eliciting feeling expression.

Some experimental data also support the hypothesis that dream recall influences feeling expression. Short-term effects of dream recall on waking emotion are suggested by psychophysiological studies (Morishige & Reyher, 1975; Reyher & Morishige, 1969) in which

CNS and ANS measures of anxiety were recorded during revisualization of recent dreams and during construction or free recall of fantasies. Increases in measures of alpha blocking, eye movement, heart rate, and GSR indicated that more arousal occurred during dream revisualization than during either fantasy construction or recall. These differences suggested to Reyher et al. that dreams contain more anxiety-laden drive representations ('hot' images) than waking fantasies.

A study by Cartwright, Tipton, & Wicklund (1980) suggests that dream recall facilitates changes in long-term emotional expressiveness. In this study, some clients were given the opportunity each morning to recall and discuss dreams which had been reported during the previous night in a sleep laboratory. Later, these clients were less likely to drop out of psychotherapy than clients given no opportunity to recall and discuss their dreams. More to the point, the clients recalling and discussing dreams expressed significantly more emotion and disclosed significantly more personal material to their therapists during subsequent sessions of psychotherapy. Apparently, recall of dreams under the self-reflection conditions of this study facilitated these clients' experience and expression of emotion.

In sum, there is support from the clinical and experimental literature for the claim that recall of dream imagery facilitates emotional expression. The psychological effects of dream use are continuous with recent studies indicating that dreaming *per se* mediates emotional information processing during sleep (Greenberg, Pearlman, Schwartz, & Grossman, 1983; McGrath & Cohen, 1978; Palombo, 1978). In the following sections, a theory of emotion (Kuiken, Carey, & Nielsen, in press) is discussed which allows coordination of theory and research on waking and dreaming emotion. This theory stresses the role of kinesthetic sensation in the experience of emotion. Second, current knowledge about the phenomenology and physiology of REM sleep dreaming is reviewed. The literature suggests that dreams are images of potentially expressive movement but that physiological processes inhibiting kinesthetic sensation during REM sleep also prevent the experience of emotion during dreaming. Dream recall after arousal from REM sleep may facilitate emotional arousal by 'disinhibiting' the kinesthetic potential of the dream content.

A. Emotional Processes in Dreaming.

According to one recent theory of emotion (Kuiken, Carey & Nielsen, in press), emotion is both a motor and a sensory event. The motor aspect of emotion includes activation of emotion-specific musculature, such as facial expressions and postural shifts, while the sensory aspect includes attention to the kinesthetic sensations accompanying such activation. Emotional experience results when both processes are present. The experience of sadness, for example, occurs when attention is directed to kinesthetic sensations accompanying the facial and bodily expressions appropriate to this emotion (e.g., brow-knitting, pouting, head-drooping).

Two kinds of experimental results support this conception of emotion. First, there is evidence that emotional events induce subtle but detectable expressive movements, as measured by facial EMG (e.g., Schwartz, Fair, Salt, Mandel, & Klerman, 1976a). There is also evidence that feedback from changes in the musculature affects the experience of emotion (Tomkins, 1981). For example, when people were asked to pose expressive facial muscles for purportedly non-expressive purposes (i.e., to measure muscle response parameters), their self-reported emotions were consistent with their facial poses (Laird, 1974).

Second, there is evidence that self-directed attention during emotional events intensifies experience, again as measured by facial EMG (Schwartz, Fair, Salt, Mandel & Klerman, 1976b). There is also evidence that when attention was self-directed by the presence of a small mirror, emotional experience was intensified (Scheier & Carver, 1977). Given further evidence that orienting to significant external events reduces activity in the afferent pathways conveying kinesthetic information (Brunia, 1979, 1982; Pompeiano, 1976), self-directed attention may comparatively heighten access to emotionally relevant kinesthetic sensations. In sum, both the activation of emotion-specific musculature and the direction of attention to kinesthetic sensations appear to play a role in the experience of emotion.

Because they so intimately implicate the self, dreams are potentially emotional events. However, the physiological conditions of REM sleep mitigate against the occurrence of emotional experience during dreaming. Specifically, REM dreaming occurs while highly active pontine structures coordinate both the excitation of central motor patterns and the muting of

their peripheral expression. On the one hand, these pontine discharges activate forebrain structures, such as the eye movement pathways (producing REMs), and descending pathways to the musculature. This central motor activity is as predominant during REM sleep as it is during waking (Evarts, 1964). On the other hand, thepontine discharges activate a second set of descending pathways, temporally coupled to the first, which suppress muscular expression of this central activity and which also suppress kinesthetic feedback from the musculature (Pompeiano, 1976). This system of simultaneous activation and inhibition of motor events is physiologically similar to a waking system of attentional regulation during which novel or significant stimuli will elicit a "what's that?" or "orienting" reaction (Pavlov, 1927). The orienting reaction is a form of activation, including gross realignment of the head, receptor reorientation, postural adjustment, increased GSR, HR deceleration, respiratory pause, peripheral vasoconstriction, desynchronized EEG, etc. (Rohrbaugh, 1984). On the other hand, orienting is accompanied by inhibition of ongoing (non-orienting) activity (Kahneman, 1973) and suppression of activity in the kinesthetic pathways (Brunia, 1979; 1982). Since analagous changes have been observed to occur throughout REM sleep in an intensified form (Morrison, 1979; 1983; Morrison & Reiner, 1985; Taylor, Moldofsky & Furedy, 1985), orienting activity may be the source of kinesthetic and emotional inhibition during dreaming.

The phenomenology of dreaming is consistent with this physiological picture. Dreams are rich in complex sequences of movement imagery (Rechtschaffen, 1978) and are more self-involving than simulated (waking) dreams (Carswell & Webb, 1985), suggesting that dreams have a greater potential for kinesthetic experience. Yet despite the richness of visualized dream movement, kinesthetic sensations during dreaming are not typically reported (Knapp, 1956; Snyder, 1970). When people do report kinesthetic sensation, it is typically associated with relatively non-expressive movement imagery (e.g., floating).

Similarly, reports of dream emotion are also infrequent (McCarley & Hobson, 1979) or 'bland and rather nebulous' (Snyder, 1970, p. 142). Even when participants are explicitly prompted to report qualities of dream emotion, the most frequently occurring dream emotion anomaly (17% of reports) is that emotion is reported to be absent when, by waking standards, it should be present (Foulkes, Sullivan, Kerr, & Brown, 1986). To illustrate this point:

Snyder (1970) presents the report of a dream in which a waiter in a restaurant is making erotic advances to the dreamer's sister, resulting in a fist fight, but the dream reporter specifically denies any accompanying feelings of anger. Rather he regards the fight as a necessary social amenity (p. 141). Also, when emotional reports are prompted, emotions are more frequent in longer dream episodes, as though the emotions were generated to fit the narrative rather than as a consequence of attending to and expressing REM kinesthesia (Foulkes, et al., 1986). Thus although dreams are rich in opportunities for kinesthetic and emotional experience, this richness is surprisingly absent from typical dreams. The present model of REM dreaming suggests that the absence of dreamed emotion is due to inhibitory effects of intensified REM sleep orienting processes.

There is yet another side to this picture of dreaming. During REM sleep, the phasic activating and inhibiting processes producing dreams appear to be in constant flux (Glenn, 1985) such that at times motor expression, kinesthetic sensation and emotion do occur. In experimentally brain-lesioned cats, examples of motor expression and 'emotion' are clearly seen. When the inhibitory pontine centers of cats are lesioned, these animals' normally quiescent REM sleep is punctuated with behavioral episodes suggesting release of emotion. With moderate lesions, the animals will orient and search for 'imagined' objects in the cage, suggesting interest and curiosity; with more extensive lesions, the animals express defensive and attack behaviors, suggesting fear and rage (Jouvet, 1978; Morrison, 1983).

In normal humans, partial releases of some motor events are only detectable electromyographically, for example, as phasic integrated potentials (PIPs) of the extraocular and orbicularis oris muscles (e.g., Watson, Bliwise, Friedman, Wax, & Rechtschaffen, 1978) or as phasic middle ear muscle activity (MEMA; e.g., Ogilvie, Hunt, Sawicki, & Samahalskyi, 1982). More extensive releases of motor impulses during REM occur as twitches of the limb and facial muscles and as head and body movements (e.g., Mouret, Delorme & Jouvet, 1964). In addition, abnormal releases of movement, kinesthesia, and emotion sometimes occur during certain dream irregularities. Anxiety dreams and common nightmares (Liddon, 1967) are frequently kinesthetically engaging threats to the self accompanied by fear, minor vocalizations, and motility (Fisher, Kahn, Edwards, Davis, & Fine, 1974; Kales, Soldatos,

Caldwell, Charney, Kales, Markel, & Cadieux, 1980). Acute delerium tremens patients also frequently have REM dreams accompanied by elevated tonic EMG, expressive movements, and emotional utterances (Hishikawa, Sugita, Teshima, Iijima, Tanaka, & Tachibana, 1981). Finally, night terrors and post-traumatic nightmares are often characterized by extreme kinesthetic sensitivity (e.g., being crushed, choking) and emotions (e.g., dread of immanent death, acute loneliness) and are accompanied by extreme, sometimes violent, motor expressions (e.g., screaming, thrashing) (Christenson, Walker, Ross, & Maultbie, 1981; Fisher, et al., 1974).

These examples suggest that the infrequent eruptions of intense kinesthesia and emotion during dreaming irregularities are associated with disinhibition of peripheral motor and sensory processes. Presumably, the strong kinesthetic/emotional potential in self-expressive dream imagery is normally held in abeyance by muscular inhibition, but may be released in varying degrees by disruption of these inhibitory processes. The psychological factors regulating afferent inhibition and disinhibition of personally significant dream imagery remain unclear.

B. Hypotheses

The preceding review suggests how waking reflection on dreams may facilitate emotional expression. The relative absence of REM sleep muscular inhibition during waking should allow readier access to the kinesthetic potential of self-expressive dream imagery, and thus intensify dream-related emotions. Such intensification should be apparent as increased emotion-specific movement (as indicated by facial EMG) and by increased awareness of emotions (as indicated by self-reports). Because of the kinesthetic potential of expressive dream imagery, reflection on such imagery should produce greater intensification than reflection on fantasy imagery generated during waking. And because attention to kinesthetic sensation is important in emotion, intensification should be greatest when attention is directed to emotion-specific bodily feelings associated with dream imagery. Finally, the intensification of emotion during affective dream reflection should produce an enduring 'openness' to emotional experience, as indicated by an increased frequency of Rorschach movement

responses. To summarize, 3 hypotheses about the effects of affective dream reflection on emotional intensification were tested in this study:

Hypothesis 1: *Affective dream reflection will produce greater intensification of emotion-specific muscles during reflection than other imagery-reflection conditions (facial EMG).*

Hypothesis 2: *Affective dream reflection will produce greater awareness of emotions during reflection than other imagery-reflection conditions (self-report).*

Hypothesis 3: *Affective dream reflection will produce greater openness to emotional experience on tasks following reflection (Rorschach movement responses).*

II. METHOD

A. Participants

Sixteen males (aged 17-31, M = 23.3, S = 4.9) and 16 females (aged 18-38, M = 24.6, S = 5.2) were selected from respondents to a campus-wide request for dream research volunteers. These volunteers were moderate to high frequency dream recallers, i.e., they recalled at least 1 dream per week. All volunteers were interviewed in person to determine whether they had undergone recent psychological distress or sleep difficulties; two volunteers were not accepted for the study because of current distress. During the interview, participants were also queried about typical features of the content of their dreams (see Appendix 1) and were given a tour of the sleep laboratory and a description of experimental procedures (see Appendix 2). All persons formally acknowledged their consent to participate under the conditions as described (see Appendix 3). After completion of the laboratory stayover, participants were debriefed (see Appendix 9) and given $10 for any expenses and as compensation.

B. Procedure

Participants arrived at the laboratory approximately 1 hour before normal bedtime and were escorted to a room separate from the sleep laboratory where electrodes for sleep staging and facial muscle monitoring (see "**Apparatus**" section) were applied. They were told at this time that the purpose of the electrodes was for detecting the eye, brain and muscle wave components of REM sleep; they were not told that some electrodes were used also for monitoring mood-related activity of the facial musculature. Once in bed, participants were asked to rate their current mood on the Differential Emotions Scale (Izard, Dougherty, Bloxom, & Kotsch, 1974; see Appendix 4), a 30-item checklist of emotion adjectives tapping 10 factorially pure fundamental emotions (Izard, 1977). Then, the participant's normal wake-up time was determined, laboratory procedures were reviewed with participants, instrumentation and the laboratory intercom were checked, and lights were turned out.

All participants were awakened to report their dreams after at least 5 minutes into either the 2nd or 3rd REM sleep period (see Appendix 5 for interview protocol). Collecting dreams at this time fullfilled what participants' perceived to be a requirement of the study, i.e., to 'report dreams'.

Imagery Task

The second scheduled awakening occurred at least 10 minutes into either the 4th or 5th REM sleep period, as close to the participant's normal wake-up time as possible. All participants were given one of two imagery tasks by a male experimenter (see Table 1 for a summary and Appendix 5 for the complete protocol) in which they either (a) recalled their immediately preceding dream in detail, or (b) created a guided fantasy based on a dream from a participant in the dream condition and narrated by the experimenter. Participants were then requested to report their experience of the dream or fantasy imagery while the experimenter transcribed the major points of their report. These points were subsequently read back to participants and they were asked to provide order and identifying information where necessary. Following this, participants were instructed to imaginatively review the entire dream or fantasy. Since we wished to examine the kinesthetic potential of self-expressive dream imagery, participants in the dream condition were asked to select the most personally important segment of the dream. Participants in the fantasy condition were asked to consider the importance of a segment designated by the experimenter (see below). All participants were asked to rate this segment on the Differential Emotions Scale.

Fantasy instructions were designed so that fantasy experiences would be maximally similar to dreams in structure and familiarity. To ensure similarity of story structure, each dream reported by a dream participant was rewritten as an instruction set for use with one sex-matched fantasy participant. Furthermore, fantasy participants were told to 'consider the importance' of the segment of their imagery corresponding to the segment 'chosen' as most important by the matched dream participant. To ensure similarity of element familiarity in the two groups, dream-to-fantasy rewritings followed three basic guidelines. First, possessive pronouns and associative references from the original dreams (e.g., "I am in *my* kitchen")

Table 1
Summary of Wake-up and Dream Recall/Construction Instructions

Dream Recall	Dream Construction
(Participant's name) Would you please wake up?	(Participant's name) Would you please wake up?
Lie ~~still~~ and remember everything that was going through your mind.	Lie still and listen to a description of a dream. Imagine it as if it were actually happening to you.
Please tell me everything you can remember.	Please tell me everything you can remember.
I would like to check the order of events and determine who the people and places are in relation to you.	I would like to check the order of events and determine who the people and places are in relation to you.
Do you remember anything else?	Do you remember anything else?
Review the dream once more in your mind's eye as if it were actually happening. Pay particular attention to that segment which feels most important to you personally.	Review the dream once more in your mind's eye as if it were actually happening. Pay particular attention to that segment in which *(describe segment)* and how it is an important part of this dream.
Could you describe in a sentence or two the segment of the dream as you remember it?	Could you describe in a sentence or two the segment of the dream as you remember it?
Please rate your experience of the dream segment on this emotions scale.	Please rate your experience of the dream segment on this emotions scale.

were replaced with directives to imagine pronouns and references that were appropriate for the listening participant (i.e., "Imagine that you are in *your* kitchen").

Second, idiosyncratically detailed character and setting descriptions from the original dreams (e.g., "I was with my friend *Jim* at the *Cineplex*") were replaced with directives to imagine more general, but thematically similar characters and settings (i.e., "Imagine that you are with a *male* friend at a *movie theater*").

Third, these more general characters and settings were reviewed briefly at the onset of the imagery task so participants could embellish them with personally relevant details (e.g., "Imagine who your friend is and what he looks like. Imagine what the movie theatre is like"). Pilot testing indicated that when characters and settings were introduced into the imagery

Table 2
Summary of Affective and Cognitive Reflection Instructions

Affective	Cognitive
1. Imagine the dream segment paying attention to any actions and feelings that occur.	1. Analyze the dream segment paying attention to any thoughts or ideas that occur.
2. Ask yourself 'What about this dream segment feels most important to me right now?'	2. Ask yourself 'What is the most important idea in this dream segment right now?'
3. Reflect bodily on important feelings that occur.	3. Reflect mentally on important ideas that occur.
4. Find a word, image or gesture that fits the quality of the feeling.	4. Find a word or phrase that summarizes what the idea is all about.
5. Attend to feeling changes while asking 'What's the most important part of this feeling?'	5. Attend to idea changes while asking 'What's the most important implication of this idea?'
6. Familiarize yourself with whatever makes a difference in what you have noticed.	6. Familiarize yourself with whatever makes a difference in what you have noticed.
7. Reimagine whatever makes a difference in what you have noticed.	7. Think about whatever makes a difference in what you have noticed.
8. Take a minute to use in any way you want and we will stop.	8. Take a minute to use in any way you want and we will stop.

sequence in this way (i.e., in advance), participants were not usually forced to 'backtrack' and modify existing images. Apart from these constraints, report length, plot changes, unexplained scene shifts, reported emotion, and anomalies of imagery construction comprising the original dream were not modified in the fantasy instruction sets.

Reflection Task

Following the imagery task, participants were asked to sit upright in bed against a supportive cushion. They were guided through one of two 15-minute sessions of intensive reflection on their imagery segment (see Table 2 for a summary and Appendix 6 for the complete protocol).

Affective reflection instructions encouraged participants to attend to and symbolize emotions and bodily feelings that occurred as they revjewed their dream or fantasy imagery. The instructions consisted of a series of eight directives, each followed by a quiet interval that could be terminated either by the participant, when he/she was 'ready', or by the experimenter after a maximum length of time was exceeded (between 45 and 90 secs for different intervals). These instructions were adapted from instructions developed to facilitate feeling expression in psychotherapy (Gendlin, 1981).

Cognitive reflection instructions differed from affective instructions in that they encouraged the participant to attend to and explain thoughts and ideas that occurred as they reviewed their imagery. Like the affective reflection instructions, the cognitive instructions consisted of 8 directives, followed by quiet intervals of the same maximum length of time.

Dependent Measures

Facial EMG. Facial EMG sites were selected to optimize detection of covert, emotion-specific correlates of imagery. Previous research (e.g., Fridlund & Izard, 1984; Cacioppo, Petty, Losch & Kim, 1986; Schwartz, Fair, Salt, Mandel, & Klerman, 1976) has shown that negative affect is best indicated by activity of right and left *corrugator supercilli* (RC and LC), i.e., the muscle groups responsible for the 'brow-knitting' response during sadness, and that positive affect is best indicated by activity of right and left *zygomaticus major* (RZ and LZ), i.e., the muscle groups responsible for smiling during happiness.

During REM sleep, only phasic muscle events were tallied since tonic activity is absent (Jacobson, Kales, Lehmann, & Hoedemaker, 1964). Events were defined as waveforms whose amplitude fell above a predetermined minimum amplitude criterion for a duration of .25 sec or less. On the basis of pilot testing, the minimum amplitude for detection of a phasic event was set at 35 microvolts for EMG events and 30 microvolts for EOG events. Phasic EMG scores for each participant were calculated as proportions, i.e., as the number of phasic events in the REM sleep period divided by the length of the REM period in minutes. Four phasic EMG measures were derived: RC(REM), LC(REM), RZ(REM), and LZ(REM).

During waking imagery reflection, only tonic muscle amplitude was assessed since high muscle tone during waking masks measurement of discrete phasic events (e.g., Watson, 1983). Tonic amplitude was calculated to be the rectified amplitude of the raw EMG signal averaged over 1 second intervals (256 samples). These 1-sec averages were further averaged for each of 8 intervals following reflection instructions, resulting in a total of 8 mean tonic amplitude scores for each EMG channel for each participant. For correlational analyses, tonic amplitudes for these 8 intervals were futher combined to produce a single mean amplitude for the entire reflection session. All measures of tonic EMG amplitude during waking were designated RC(WAKE), LC(WAKE), RZ(WAKE), and LZ(WAKE).

Pilot testing revealed that eye movement artifact on the EMG channels was a significant problem during recording of the relatively low amplitude EMG during REM sleep. To minimize this artifact, phasic muscle events and tonic muscle amplitudes were computed only in the absence of eye movements. By setting the minimum amplitude criterion defining eye movements events lower than the criterion defining EMG events, the chance of EOG artifact polluting the EMG channels was further reduced.

Rorschach movement responses. Immediately following the reflection task, the experimenter turned on a second overhead light and presented the participant with 6 Rorschach cards (cards I, II, III, IV, VII, and IX) according to Exner's (1974) procedures. The experimenter introduced the task as follows:

> *'In this next task I am going to show you a series of cards. I want you to take each one and look at it, and then tell me what it looks like to you. Remember that there are no right or wrong answers to this task. I am just interested in what each card looks like to you.'*

The cards were then presented one at a time with no intervention or questioning by the experimenter. Participants were allowed to view the cards as long as they wished, to report as many responses as they wished, and to turn the cards if they wished. The experimenter simultaneously made written notes of all verbal responses. The session was tape-recorded for later transcription.

Rorschach movement responses were chosen as an index of kinesthetic activity since it is widely held that movement responses reflect state changes in kinesthetic sensitivity (see Lerner, 1967, for review). Protocols were scored blind for all occurrences of movement, explicit or including postural descriptions (e.g., sitting, leaning) and the verbs 'to have' and 'to be'. A subset of these responses, the number of movements attributed to human characters, was also identified. Proportions of agreement between two judges for these scores were 82% and 92%.

Self-report Questionnaires. Following the Rorschach task, participants were administered questionnaires to assess their reactions to the reflection task and qualities of their imagery during the imagery task. Reactions to the reflection task were rated using the Post-Focusing Inventory (Appendix 7), a 26-item scale which reliably discriminates among different types of emotional and cognitive responses to intensive self-reflection instructions (Kuiken, Carey, & Nielsen, in press). One subscale of this inventory, the Affective Insight Scale (AIS), was expected to measure participants' emerging awareness of emotions during the reflection sequence. This scale included items such as 'I came face to face with feelings I usually ignore' and 'Reflection brought out feelings that gave my dream new meaning'.

A 27-item scale termed the Salience of Experience Inventory (Appendix 8) was used to assess whether dreams and fantasies differed with respect to perceptual qualities, intensity, bizarreness, storylike quality, movement, and self-representation.

C. Apparatus

EOG, EEG, and facial EMG were recorded during REM sleep and during reflection. All electrodes were Hewlett Packard (HP) gold-plated closed-disk type with a width of 2 cm. Four electrode pairs (interelectrode distance = 2 cm. center to center) were dedicated to facial EMG, one pair to EOG, and one pair to EEG recording. To maximize signal-to-noise ratio and minimize artifact, a common equipment ground was affixed to the forehead.

Electrode sites were daubed with a pumice skin cream and massaged with a blunt toothpick until test impedances were as close to 1 K ohm as possible.[1] EMG and EOG

[1]For 3 participants, electrode impedances were greater than 5 K ohms in the morning. Data for

electrodes were then affixed to the skin with adhesive collars overlaid with hypoallergenic tape and EEG electrodes were glued to the scalp and earlobe with Grass EC-2 paste.

Two pairs of electrodes were affixed to right and left *corrugator* (RC and LC) above the medial aspect of either eyebrow and two pairs of electrodes were affixed to right and left *zygomaticus* (RZ and LZ) over the right and left cheeks.

The EOG electrode pair were affixed as follows: one electrode of the pair was attached 1 cm lateral to the outer canthus of the right eye and as close to 1 cm above the canthus as the anatomy of the eyebrow would permit. The other electrode was placed 1 cm lateral to and 1 cm below the outer canthus of the left eye. This arrangement permited detection of both horizontal and vertical eye displacements with a single electrode pair. The EEG electrode site was the right parietal (C4) area, referred to the left earlobe (L3) according to the international 10-20 placement system.

Bioelectric potentials were amplified using 6 HP-8811A Bioelectric Amplifiers with a dynamic range of 1.5 - 100 Hz. Potentials were subsequently sampled and digitized at a rate of 256 Hz/channel by a Digital Acquistions Systems Model 5 Analogue I/O device and recorded for storage with 2 HP-3960 4-channel Instrumentation Recorders. A Micro Technology Unlimited microcomputer with a 16-bit DMX Datamover Board rectified the 6 channels of digitized data, passed them in raw form to a high speed point plotter (Finley, 1985) for display on a HP CRT screen. The same computer was programmed to assess each channel for frequencies of REM phasic muscle events and waking tonic muscle amplitudes.

[1](cont'd) these 3 participants were deleted from analyses of all EMG measures.

III. RESULTS

A central purpose of the present design was to assure that guided fantasy and dream recall instructions elicited imagery which was equally salient to the participants, i.e., which did not differ in degree of storylike structure, sensory vividness, familiarity, etcetera. As a check on whether this goal was met by the instructions, 1-way ANOVAs with *Imagery type* as the between groups factor were performed on the ratings for each Salience of Experience Inventory (SEI) item (N = 32 per item). No significant between groups differences in imagery salience were found.

A. Facial EMG

Tonic facial EMG measures were expected to index emotion-specific muscle activation during reflection (hypothesis 1). These measures were submitted to 2 X 2 X 2 X 8 ANOVAs with *sex*, *imagery type* (dream vs. fantasy) and *reflection type* (affective vs. cognitive) as between participant factors and *directive* (1 to 8) as the within participants factor (N = 29).

No significant *imagery type X reflection type* interactions were found for any EMG measure, failing to confirm the hypothesis that affective reflection on dream imagery would maximize emotion-specific muscle activity. However, a significant *directive* main effect for RZ(WAKE) ($F(7,133) = 2.774$, $p = .010$) indicated that different directives induced different degrees of EMG activity. Furthermore, a significant *imagery type X directive* interaction for this measure ($F(7,133) = 2.627$, $p = .014$) showed that the *directive* effect held only for the dream condition. As shown in Table 3, the interaction was attributable to higher RZ(WAKE) amplitudes among dream imagery participants (M = 16.50 microvolts) than among fantasy imagery participants (M = 3.92 microvolts) in the interval following directive two ('What is the most important feeling/idea in this imagery?') and to a lesser extent following directive four ('Find a word or phrase that seems to fit this whole feeling/seems to summarize this whole idea') (M = 10.00 vs M = 4.50). Similar results were found for LZ(WAKE), although none of these comparisons were statistically significant.

For RC(WAKE), a pattern like that found for RZ(WAKE) occurred during interval two, but a *sex X imagery type X directive* interaction ($F(7,133) = 2.224$, $p = .036$) suggested

Table 3

Average rectified EMG amplitudes (microvolts) during successive self-reflection intervals for two types of imagery and four facial muscle sites.

			Interval								
EMG	Site	Imagery	1	2	3	4	5	6	7	8	M
	RZ	Dream	4.49	16.50	4.84	10.00	6.42	4.88	4.58	4.34	7.01
		Fantasy	3.36	3.92	3.45	4.50	3.57	3.99	3.71	4.71	3.90
	LZ	Dream	5.03	11.09	4.79	9.59	5.35	5.16	4.62	4.45	6.26
		Fantasy	4.43	4.93	4.57	5.49	4.62	5.05	4.90	5.47	4.93
	RC	Dream	5.71	10.79	5.46	6.98	6.51	6.57	6.55	6.96	6.94
		Fantasy	4.97	5.86	5.82	6.10	5.80	7.49	6.24	6.74	6.13
	LC	Dream	5.91	8.80	6.21	6.81	6.16	6.14	6.46	6.27	6.60
		Fantasy	4.48	5.00	4.43	4.95	4.50	5.56	4.57	5.02	4.81

this effect was specific to female participants. That is, for females during interval two, RC(WAKE) amplitudes were greater in the dream condition (M=16.35) than in the fantasy condition (M=5.41). For males this difference was negligible (M=6.03 vs. M=6.19). For LC(WAKE) a similar but marginal trend was found ($F(7,133)=1.845$, $p=.084$). Because of the small degrees of freedom, higher order interactions were not interpreted.

In sum, evidence was found that reflection on dream imagery led to greater emotion-specific muscle activation than did reflection on fantasy imagery. The imagery effect was most robust for RZ(WAKE) after reflection directives in which attention was directed toward the most important personal feeling or idea in the dream segment.

B. Self-reported awareness of emotion

One subscale of the Post-focusing Inventory, the Affective Insight Scale (AIS), was intended to measure the extent to which emerging awareness of emotions would occur during imagery reflection (hypothesis 2). This measure was submitted to a 2 X 2 X 2 ANOVA with *sex*, *imagery type*, and *reflection type* as between groups factors (N=32). Results did not

support the hypothesis that affective reflection on dream imagery would facilitate awareness of emotion. In fact, they revealed an opposite trend. A marginally significant *sex X imagery type* interaction ($F(1,24) = 3.165$, $p = .088$) indicated that female participants in the dream condition reported *less* awareness of emerging emotion after the reflection instructions ($M = 2.01$) than females in the fantasy condition ($M = 2.79$) or male participants in either the dream ($M = 2.58$) or fantasy ($M = 2.50$) conditions.

A supplementary analysis prompted by this unexpected result indicated that dream imagery was also experienced as less emotional prior to the reflection task. ANOVA of an emotional intensity measure, the mean rating of all 30 DES items ($N = 32$), revealed that dream emotion before reflection ($M = 1.62$) was signficantly *less* intense than fantasy emotion before reflection ($M = 1.95$) ($F(1,24) = 5.992$, $p = .022$). This difference is consistent with the prior finding for the AIS, but does not explain it. The AIS *sex X imagery* interaction was unchanged when pre-existing differences in emotion were removed from the ANOVA as covariates ($F(1,20) = 3.659$, $p = .070$).

C. Rorschach movement responses

Rorschach movement responses were used to measure whether affective dream reflection would produce an openness to kinesthetic sensation which continued beyond the imagery reflection period (hypothesis 3). These scores were submitted to 2 X 2 X 2 ANOVAs with *sex*, *imagery type*, and *reflection type* as between groups factors ($N = 32$). Results did not support the hypothesis. Rather, a significant *imagery* main effect for total number of movement responses ($F(1,24) = 4.154$, $p = .053$) indicated that dream reflection was followed by production of fewer responses ($M = 2.63$) than fantasy reflection ($M = 3.75$). A significant *sex X imagery type* interaction ($F(1,24) = 7.212$, $p = .013$) indicated that this difference was reliable only for female participants. That is, females in the dream reflection condition produced few movement responses ($M = 3.25$) while females in the fantasy condition produced many ($M = 9.13$), compared with the moderate numbers of responses produced by males in either the dream or fantasy conditions ($M = 5.75$ vs. $M = 5.38$). A parallel, although weaker, interaction effect was found for the measure of movements by human characters

($F(1,24) = 4.322$, $p = .048$; females: $M = 1.88$ vs. $M = 4.75$; males: $M = 3.75$ vs. $M = 2.75$).

In sum, results from the Rorschach analyses are consistent with analysis of the AIS and indicate that dream reflection leads to *less* kinesthetic sensitivity on a subsequent task, especially for female participants.

D. Supplementary analyses

Results from the Affective Insight Scale and from the Rorschach movement responses suggested that dream reflection attenuated rather than intensified emotional and kinesthetic experience. These results were inconsistent with the facial EMG analyses showing an intensification of the emotional musculature (especially RZ) during reflection on dreams. It seemed likely, then, that facial EMG activity was not an index of emotional activation, as we had expected. Recent research linking facial movements with orienting activity (Karis, Druckman, & Donchin, 1984), suggested that the EMG may have been reflecting orienting reactions to the dream imagery. Two supplementary analyses were conducted to examine this possibility.

First, we examined whether the most robust facial EMG measure (RZ) was more reliably correlated with subjective ratings of orienting or with subjective ratings of emotion in the dream imagery segments. As shown in Table 4, there was a significant correlation ($N = 29$) between two subjective ratings of orienting in the dream segment (*attention, surprise*) and EMG measures taken during both dreaming (RZ(REM)) and dream reflection (RZ(WAKE)). The corresponding correlations for the fantasy segments were not significant. In other words, the correlations between orienting and RZ were both (a) consistent across two different measures of RZ EMG and (b) specific to the dream imagery condition. For subjective ratings of emotion, however, a similar pattern of correlations did not occur. RZ measures correlated significantly with some emotional qualities (e.g., *happiness, disgust*), but these correlations did not obtain for both RZ measures and were not specific to the dream imagery condition. In sum, RZ facial EMG appears to be most clearly associated with orienting activity rather than with emotion-specific motor activity as originally expected.

Table 4

Correlations between two measures of right zygomaticus (RZ) activity and subjective ratings of orienting and emotion in dream and fantasy imagery.

	RZ(REM)[1]		RZ(WAKE)[2]	
	Dream	Fantasy	Dream	Fantasy
Attention	*.69	-.10	*.58	.31
Surprise	*.58	.12	*.65	.06
Orienting[3]	*.70	.02	*.68	.16
[illegible]	*.67	*.59	.03	.17
[illegible]	*.60	-.45	-.22	.36
[illegible]	-.34	-.31	-.21	.33
[illegible]	-.41	-.26	.19	.19
[illegible]	-.31	.34	.15	.14
Sadness	-.28	-.21	.41	.28
Guilt	-.10	-.10	-.47	-.19
Fear	.21	-.28	.09	.19

[1]RZ(REM) = frequency of phasic events per minute in prior REM period.
[2]RZ(WAKE) = mean tonic amplitude over 8 successive reflection intervals.
[3]Orienting = Attention + Surprise
*$p < .05$, two-tailed.

Second, since orienting reactions during waking inhibit non-orienting motor activity (Kahneman, 1973) and since orienting activity as indicated by RZ(WAKE) was apparently intensified during dream reflection (hypothesis 1), it seemed likely that RZ(WAKE) would correlate *negatively* with measures of (a) emerging awareness of feelings and (b) continuing sensitivity to kinesthetic sensation. In fact, RZ(WAKE) correlated -.57 with the Affective Insight Scale in the dream condition and +.11 in the fantasy condition, correlations which differed significantly from one another ($p < .05$, one-tailed). Similarly, RZ(WAKE) correlated -.35 with Rorschach human movement in the dream condition and +.37 in the fantasy condition, correlations which again differed significantly ($p < .05$, one-tailed).

These supplementary analyses suggest that the unexpected effect of dream reflection in the present study was activation of the orienting reaction, with associated kinesthetic and emotional inhibition.

IV. DISCUSSION

Initially, results from the facial EMG analyses appeared to partially confirm the hypothesis that affective dream reflection would activate emotion (hypothesis 1); reflection on dream imagery produced larger EMG amplitudes than reflection on fantasy imagery. Furthermore, the reflection directive which most clearly activated facial EMG for the dream condition required participants to consider 'the most important feeling/idea in the imagery', a task seeming to involve emotion. These results seemed consistent with hypothesis 1 even though the experimental manipulation of attention to bodily feelings during reflection did not interact with dream imagery to maximize EMG activation as expected.

The original hypothesis became untenable, however, in light of analyses indicating that participants reported less emerging awareness of emotion during dream reflection (hypothesis 2) and fewer Rorschach movement responses after dream reflection (hypothesis 3). That these effects involved female participants was also surprising, since females tend to rate imagery as more emotional than do males (Schwartz, Ahern & Brown, 1980) and since females perceive their dreams as affecting their moods to a greater extent than males (Wasserman & Ballif, 1984). It should be remembered that these findings may be attributed either to sex of the participant or to the fact that a male experimenter conducted interviews for both male and female participants. In the latter case, male participants underwent same-sex interviews, while female participants underwent opposite-sex interviews.

Regardless of this distinction, the obtained pattern of results failed to support our original assumptions about affective dream reflection in two ways. First, there was no evidence that affective reflection facilitated emotional arousal to a greater degree than cognitive reflection, regardless of whether dream or fantasy imagery was the object of reflection. Neither the physiological indices (facial EMG) nor the psychological indices (self-report, Rorschach movement) varied significantly as a function of manipulated attention to bodily feelings. These results for facial EMG are similar to results from prior studies in which affective reflection produced small and insignificant (Kuiken & Mathews, 1986) or only marginally significant (Schwartz, et al., 1976) increments in facial EMG. Also, the results for self-reported awareness of emotion are consistent with the negative results for self-reported

awareness of emotion in the study of affective reflection by Kuiken and Mathews (1986). Scheier and Carver's (1977) exceptional finding that self-directed attention did increase emotional intensity may be attributed to their use of a different manipulation of self-directed attention, i.e., the presence of a small mirror during review of emotional imagery. By contrast, the use of reflection instructions in the present and earlier studies, may have led participants to more deliberately regulate self-directed attention and thus to restrict the intensity of their emotions.

Second, there was no evidence that dream imagery possesses a greater potential for kinesthetic and emotional involvement than fantasy imagery; in fact, the results suggest that the opposite may be true, since there was less self-reported awareness of emotion during dream reflection and less openness to kinesthetic sensation after dream reflection. One possible explanation for these findings is that dream imagery, when compared with fantasy imagery, is less self-involving and thus provides fewer opportunities for activation of emotion-specific kinesthetic sensation. However, this possibility is contradicted by data indicating that real dream imagery is more self-involving than simulated dream imagery (Carswell & Webb, 1985). Also, this hypothesis cannot account for the present finding that facial EMG amplitudes were greater during dream reflection than fantasy reflection.

Supplementary analyses suggested an interpretation which parsimoniously explains these unexpected and apparently contradictory findings. According to this interpretation, both (a) activation of facial muscles and (b) attenuation of emotional/kinesthetic experience may reflect the persistence or reactivation of REM sleep processes during waking. More specifically, these effects may be a "carry-over" of REM sleep orienting processes, which include components of both muscular activation and kinesthetic attenuation. These effects will be elaborated below. First, RZ activation during reflection may be understood as "carry-over" of the muscular activation component of REM orienting, since, in the dream condition, ratings of attention and surprise correlated with facial EMG measured during both dreaming (RZ(REM)) and dream reflection (RZ(WAKE)). This interpretation is consistent with the finding that RZ(WAKE) amplitudes were highest during dream reflection intervals calling for assessment of imagery significance, since orienting activity is frequently a response to the

perceived significance of a stimulus (Kahneman, 1973). That RZ was most clearly involved in these analyses is also compatible with a recent study (Karis, et al., 1984) in which orienting reactions to a cognitive event (i.e., discovering a change in a computer's 'bargaining' strategy) included mouth lengthening movements. The latter are especially likely to affect EMG in the zygomatic musculature.

Second, the attenuation of kinesthetic/emotional experience in the dream condition may be understood as "carry-over" of the inhibitory component of orienting, i.e., of the processes of kinesthetic inhibition which are temporally coupled to processes of muscular activation during REM orienting. Negative correlations between RZ(WAKE) and the Affective Insight Scale and between RZ(WAKE) and Rorschach movement responses are consistent with the notion that reactivated orienting processes include inhibition of non-orienting movement (Kahneman, 1973) and reduced kinesthetic sensation (Brunia, 1979; 1982). Since emotions have a kinesthetic substrate (Izard, 1977), "carry-over" of REM orienting inhibition during dream reflection may also include the inhibition of emotion. In sum, the apparently contradictory results from hypotheses tested in this study may be resolved by the explanation that both facial activation and kinesthetic and emotional attenuation are a type of "carry-over" of REM sleep orienting processes into the post-REM period.

Imagery conditions in the present study may be usefully compared with conditions in other studies of REM "carry-over" effects (Bertini, Violani, Zoccolotti, Antonelli, & DiStefano, 1984; Fiss, Klein, & Bokert, 1966). Fiss, et al. (1966) found that TAT fantasies elicited after REM awakenings contained *more* emotion than TAT fantasies elicited during wakefulness. The TAT task is similar to the fantasy condition of the present study. In both cases, the immediate post REM awakening task was to construct fantasies, which in the Fiss et al. study were prompted by TAT cards and in the present study were prompted by guided fantasy instructions. In both studies the post-REM fantasy condition was found to be more emotionally involving than other conditions. Furthermore, in both studies this emotionality was found to be associated with prior REM state motor activity. Specifically, Fiss et al. found that intensity of emotion in the post-REM fantasies was significantly correlated with the number of REMs in the prior REM period. Similarly, we found that intensity ratings of some

emotions in the post-REM fantasies (*happiness, disgust*) were correlated with phasic zygomaticus activity in the prior REM period ($r = .59$, $p = .016$ and $r = -.45$, $p = .078$, two-tailed) (see Table 4). Thus, there is similar evidence of emotional "carry-over" in the fantasy conditions of both studies.

However, the present results suggest that the Fiss et al. findings may be better described as a type of fractionated "carry-over" effect in which only a subset of REM processes persists or is reactivated during TAT fantasy instructions. In particular, the present results suggest that fantasy reflection, which directs attention away from the dream *per se* to related memories and fantasies, produces "carry-over" of REM sleep emotions but no "carry-over" of orienting processes and thus no emotional attenuation. In contrast, dream reflection produces "carry-over" of some REM sleep emotions *and* "carry-over" of REM sleep orienting activity which attenuates these emotions. Dream reflection can thus be understood as optimizing the persistence or reactivation of REM state processes, most notably the processes underlying dreams' typical lack of kinesthetic sensation and emotion (Knapp, 1956; Snyder, 1970). Fantasy reflection, by contrast, can be understood as partially disrupting this reactivation such that REM orienting is not "carried over", and a greater variety of emotions is allowed to emerge.

The preceding considerations bear directly on studies in which dream reflection appears to have had an activating effect on waking emotions (Cartwright, et al., 1980; Reyher & Morishige, 1975). These authors reported immediate emotional arousal and continuing emotional expressiveness as a function of dream reflection. However, the experimental procedures used in these studies were perhaps more like the fantasy condition than the dream condition of the present study. Participants in the Cartwright et al. study recalled their dreams after REM awakenings and again after rising in the morning. In the morning they discussed their dreams in relation to their current life concerns. Similarly, participants in the Reyher et al. studies were asked to recall in the laboratory dreams which they had initially recalled earlier in their homes, thereby increasing the likelihood that these dreams too had become associated with waking images and concerns. Furthermore, during reflection these participants were requested to reveal other types of "hot images" associated with their dreams. In neither

of these two studies was dream reflection limited to consideration of the dream *per se*, as it was in the dream condition of the present study. Therefore, their results may be due to emotional "carry-over" instigated by processes of relating dreams to waking imagery, rather than to processes instigated by direct reflection on dreams themselves.

Implications

The present results are also usefully compared with applications of dream reflection in psychotherapy. For example, the present results suggest that dream collection in the post-REM period may be most useful when a client actively relates dream feelings or images to waking thoughts and images. The consequence of a client's inability to do so are demonstrated in a recent sleep laboratory psychotherapy study (Kramer, Allen, & Schoen, 1983). Kramer et al. reasoned that the post-REM state is more 'regressive' than later waking states and that therefore dream interpretations provided immediately after arousal from REM sleep would be more impactful. However, the client studied did not discern connections between the therapists' interpretations of his dreams and his current concerns, even though these concerns were reported by the client just prior to sleep. Kramer et al.'s client may, in effect, have responded like a participant in the dream reflection condition of the present study in which there was apparently a "carry-over" of REM sleep emotional inhibition. The interpretations provided to clarify the dream's meaning may have been insufficiently fantasylike to disrupt this inhibitory effect and allow emotional awareness. Our results suggest that a more successful strategy for facilitating emotional involvement after collection of dream imagery in a case such as this would be to substitute traditional interpretations with more imaginative imagery tasks, such as the TAT, guided fantasy, or elicitation of personal associations. Such a strategy was used with psychotherapy clients in the Cartwright et al. (1980) study and may have contributed to their enhanced feeling expression.

The psychotherapeutic usefulness of relating dreams to waking thoughts and images is also demonstrated in the 'dream enhancement' technique developed by Fiss and Litchman (1976; summarized by Fiss, 1979). In this study, participants were assisted in developing a positive 'set' toward using their dreams and were asked to try to dream about their current concerns in the laboratory. The reported dreams (elicited from either REM or nonREM sleep)

were recorded and played back to participants the next day to enhance their recall. Finally, participants were encouraged to reflect extensively on the meanings and possible uses of these dreams. Fiss et al. found that REM dream enhancement, when compared with nonREM dream enhancement, was associated with increased self-awareness and decreased psychopathology (i.e., symptom distress, anxiety, and depression). From the present perspective, these beneficial effects are attributable not to dream reflection alone but to the extensive measures used to facilitate participants' imaginative elaboration of their dreams.

To summarize, the present results and discussion suggest specific applications for dream and fantasy reflection in psychotherapy. When the therapeutic goal is to identify novel representations of a client's current concerns without emotionally involving the client in these concerns, then laboratory procedures for REM dream collection similar to those used in the dream reflection condition of the present study might be useful. On the other hand, when the therapeutic goal is to facilitate emotional arousal or insight, rather than nonemotional reflection, then adjunctive fantasy reflection procedures such as those used in the fantasy condition of the present study would seem appropriate. Finally, most prior studies reporting therapeutic success with dream reflection differed from the present study in that they were conducted in whole or in part during daytime hours (Cartwright, et al., 1980; Reyher & Morishige, 1975; Fiss & Litchman, 1976). Thus, it is also likely that reflection on dreams and related imagery conducted outside of the post-REM period may be more therapeutically effective than reflection conducted during this period. Together, these considerations suggest that one effective psychotherapeutic sequence for eliciting emotional involvement using dreams may be for the therapist to identify dream themes expressing current conflicts and concerns using REM reflection, 2) help clients connect these dream themes as much as possible with waking life through imaginative elaboration in the post-REM period, and 3) facilitate full affective realization of these dream-concern connections using reflection later in the day.

The comparisons, conclusions and applications described above depend largely upon the validity of *post hoc* analyses of data from the present study, and they require replication and further validation. Most importantly, they require replication with (a) more conventional

physiological measures of orienting activation (e.g., heart rate, GSR, speed of habituation) and afferent inhibition (e.g., H-reflex, P300), and with (b) more precise psychological measures of orienting experience (e.g., interest, attention, surprise, personal significance of imagery). Since physiological measurements--validated with psychological measurements--can be made continuously throughout sleep and wakefulness, they can be used as precise indicators of (1) which REM orienting processes are reactivated in the waking state under differing reflection conditions, and (2) how long these processes remain active after awakening. Recent studies of the basic rest-activity cycle (BRAC) suggest that REM reactivation may occur as much as 90 minutes after awakening from REM (Armitage, 1986). Other studies suggest that REM processes may recur at 90-minute intervals throughout the day as the waxing and waning of spontaneous fantasy episodes (Kripke & Sonnenschein, 1978). The veracity of these processes and their relationship to the waking orienting reaction remain to be determined.

In conclusion, the picture of dream reflection suggested by the present study is a surprising echo of typical REM dreaming. When participants reflect on their dreams, dependent measures reflect the facial activation and emotional/kinesthetic inhibition typical of REM dreaming. Apparently, the emotional inhibition carried forth from dreaming into the waking state is a consequence of the manner in which persons orient to the significance of their own dream imagery. They orient with great intensity to hallucinated dream events just as they would to an unceasing presentation of personally significant, objectively perceived, real world events; yet they are shielded from either behaviorally enacting these events or fully appreciating their emotional implications. Dream reflection appears to preserve this orientational aspect of dreaming, such that the inhibitory processes preventing enactment of dreams, also insulate against the emotional consequences of reflecting upon them. It is not until the dream is wedded to an appropriate imaginative event--perhaps a personal memory, story, or other significant waking image--that its rich affective potential may be fully realized.

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Appendix 1. Screening Interview

Name: _____

1. Have you recently experienced any personal problems for which you have sought psychotherapy or psychological counselling?

2. Are you currently on any medication?

3. Do you have any difficulty sleeping (e.g., sleep too much, sleep too little, never feel rested, etc.)?

4. Do you have a physical condition the researchers should be aware of? If yes, please describe:

5. Have you recently been depressed or so concerned about some personal problem(s) that you have lost weight, had trouble sleeping, etc.?

6. Have you experienced any emotional crisis in the past six months, e.g., a death in your family or a divorce?

7. How often do you recall your dreams?

   _____a few times a month

   _____once a week

   _____a few times a week

   _____once a night

   _____more than once a night

8. How often do you experience nightmares?

   _____never

   _____less than once every year

   _____once a year

   _____a few times a year

   _____once a month or more

Appendix 2. Briefing

"Participation in this study includes spending an evening in the sleep laboratory, reporting your dreams when we awaken you, and completing some questionnaires. Also, if you are willing, when the experiment is complete I will provide you with a booklet for recording your dreams at home for a one week period. After one week, I will collect this booklet from you. The purpose of collecting these dreams is to have an additional sample of non-laboratory dreams with which to compare the dreams that you report while staying in the laboratory.

Our laboratory is equipped with a computer which can record your sleep state and indicate to the experimenter when you are more likely to be dreaming. Therefore, we will need to attach small electrodes to record eye movements, and brainwave and musclewave activity. Six pairs of electrodes will be attached on your forehead, near your eyes, and near your mouth (demonstrate positions) with a mild adhesive tape. These electrodes are completely harmless to use. I want to emphasize that electrodes only record the minute electrical signals from your body, they produce no electricity whatsoever.

The sleeping and dressing area is completely private. No one will enter the area before advising you well in advance over the intercom. Also, you can call the experimenter at any time over this intercom, should you require assistance for any reason. In the unlikely event that the intercom is not working, you may alert the experimenter with this battery-powered signalling device (demonstrate operation of device). There will be someone in the computer area available to assist you at all times.

We will awaken you by calling your name over the intercom. We will ask you to take about one minute to try to remember as much as possible about what you were experiencing before being awakened. If you cannot remember anything, that is fine; we are also interested in times when you cannot remember what you were experiencing before being awakened. The experimenter will then ask you to relate whatever you remember and will record your report on tape. These reports will be transcribed and stored securely and without any identifying information in the computer. Only the experimenters and scoring judges associated with this experiment will have access to the reports. If you are concerned about having your dreams

recorded you may request that they not be included in the analysis of the data, or that they be destroyed altogether. They will be destroyed, in any event, once the study is complete.

After you have reported what you remember, the experimenter will ask you to complete some paper and pencil questionnaires about the nature of your experiences.

Do you have any questions about the laboratory, the use of electrodes, awakening procedures, or any other part of the experiment?

Are there any additional arrangements we could make which would make your stay in the lab more comfortable or convenient?"

(Participants are shown the laboratory facilities, including the private sleep and dressing area, the computer and monitoring area, the electrode application area, and the washrooms. Participants are reminded to bring with them nightwear, robe, toothbrush, and other necessary personal effects.)

Appendix 3. Consent Form

I am aware that I will spend the night in the dream laboratory, that I will be awakened from sleep and asked to report my dreams, and that I will be asked to answer questions about my feelings and reactions during the experiment. I am also aware that my dreams and any other information I provide are completely confidential and that I may discontinue participation in the experiment at any time. I also understand that, either during or after my participation, on request, my dreams and/or other information will not be used in the research and will instead be destroyed.

Signature:_____

Date:_____

Appendix 4. Differential Emotions Scale

The following scale consists of a number of words that describe different emotions or feelings. Please indicate the extent to which each word describes your feelings during this particular dream segment. Record your answers by circling the appropriate number on the five-point scale following each word where 1 = very slightly or not at all, 2 = slightly, 3 = moderately, 4 = considerably, 5 = very strongly.

repentant	1 2 3 4 5	angry	1 2 3 4 5
delighted	1 2 3 4 5	sad	1 2 3 4 5
distasteful	1 2 3 4 5	guilty	1 2 3 4 5
downhearted	1 2 3 4 5	bashful	1 2 3 4 5
surprised	1 2 3 4 5	disgusted	1 2 3 4 5
contemptuous	1 2 3 4 5	joyful	1 2 3 4 5
sheepish	1 2 3 4 5	revulsion	1 2 3 4 5
attentive	1 2 3 4 5	disdainful	1 2 3 4 5
scared	1 2 3 4 5	blameworthy	1 2 3 4 5
enraged	1 2 3 4 5	astonished	1 2 3 4 5
happy	1 2 3 4 5	alert	1 2 3 4 5
scornful	1 2 3 4 5	mad	1 2 3 4 5
concentrating	1 2 3 4 5	discouraged	1 2 3 4 5
amazed	1 2 3 4 5	shy	1 2 3 4 5
fearful	1 2 3 4 5	afraid	1 2 3 4 5

Appendix 5. Dream Recall/Construction Instructions

1. *Dream Recall Instructions*

_____(participant's name), would you please wake up? I am going to come in to the chamber.

(Wait 15 seconds. Enter chamber, close door)

I would like you to lie completely still and remember everything that was going through your mind before I woke you up. Let me know when you have done this. (CODE 1, START)

(Wait 30 secs, then prompt with 'Just take a minute and see if anything comes to mind')

(STOP)Would you please tell me everything that you can remember?

(Record major events and characters)

I would like to check the order of events with you and also determine who the people and places are in relation to you.

(List order of events and verify with participant)

(Request identification of all characters and scenes)

Do you remember anything else?

(Wait 15 seconds or until pariticipant's cue)

I would now like you to review the dream once more in your mind's eye from beginning to end, as if it were actually happening again. As you do so, pay particular attention to that segment of the dream which feels most important to you personally. It may not logically seem important, but see what part feels most important. I will give you a minute to do this now; that is, to review the whole dream and choose the segment which feels most important to you personally. When you have done this let me know. (START)

(Wait for participant's cue)

(STOP) Could you describe in a sentence or two the segment of the dream as you remember it?

(Record segment)

Now would you please rate your experience of the dream segment on this emotions scale? (START)

(Administer scale)

(STOP)

Awakening #2 only: (CODE 2, START) Now for a minute please just lie quietly and get as relaxed as you can without going back to sleep. I am going to check the equipment.

(Wait 30 seconds, STOP, sit participant upright)

Now again get as comfortable and relaxed as you can while I get the next task. (START)

(Wait 30 seconds, STOP)

2. *Dream Construction Instructions*

_____ (participant's name), would you please wake up? I am going to come in to the chamber.

(Wait 15 seconds. Enter chamber, close door)

This time I would like you to try something different. I would like you to lie still for the next few minutes while I read you a description of a dream. As I describe the dream to you I want you to try to imagine it as if it were actually happening to you. Let your imagination construct a dream which is as realistic and vivid as an actual dream. To begin, I will ask you to imagine some scenes and characters which occur in the dream. Then I will ask you to imagine some events involving these scenes and characters. Here is a description of the setting and characters: (CODE 1, START)

(Read instructions constructed for that participant)

Would you please tell me everything you can remember about your experience while you imagined this dream? (STOP)

(Record major events and characters)

I would like to check the order of events with you and also determine who the people and places are in relation to you.

(List order of events and verify with participant)

(Request identification of all characters and scenes)

Do you remember anything else?

(Wait 15 seconds or until participant's cue)

I would now like you to review a the dream once more in your mind's eye from beginning to end, as if it were actually happening. As you do so, pay particular attention to the segment in which _____ (describe segment) and how it is an important part of this dream. Even though it may not logically seem important, just let yourself see how it may be an important part of the whole dream. I will give you a minute to do this now: that is, to review the whole dream and pay particular attention to the importance of the segment in which _____ (paraphrase). When you have done this, let me know. (START)

(Wait for participant's cue)

(STOP) Could you describe in a sentence or two the segment of the dream as you remember it?

(Record segment)

Now would you please rate your experience of the dream segment on this emotions scale? (START)

(Administer scale)

(STOP)

Awakening #2 only: (CODE 2, START) Now for a minute please just lie quietly and get as relaxed as you can without going back to sleep. I am going to check the equipment.

(Wait 30 seconds, STOP, sit participant upright)

Now again get as comfortable and relaxed as you can while get the next task. (START)

(Wait 30 seconds, STOP)

Appendix 6. Imagery Instruction Sets

1. *Affective Reflection*

Now I want you again to re-experience the dream segment you just rated on the emotions scale. This time, pay particular attention to how your body reacts and feels in the imagining of this dream segment. That is, keep your attention focused on your body and how you are expressing yourself with your body in your imagination. Pay attention to any movements, gestures, or expressions which occur in the dream segment and also to any feelings which the characters may be experiencing. Remember that all this is private, to yourself. I will not ask you to talk about these experiences. So allow whatever happens to happen this time when you reexperience the actions and feelings in this dream segment. Take a minute to do this now: imagine the dream segment and any actions and feelings that occur in it. Let me know when you have done this. (CODE 3, START)

(pause 60 seconds)

(STOP) Now I would like you to let go of your feelings related to the dream for a moment. You can come back to them later if you like. But right now just relax. You may even want to move around a little to relieve some of the tension that you feel while reflecting on your feelings.

(pause 15 seconds)

Now try asking yourself: "What about this dream segment feels most important to me right now?" and see what occurs inside yourself, in that place where you normally feel happy, sad, upset, or satisfied. Whatever that feeling is inside you, just let yourself attend to it for a while now. Just see what comes in your body now when you ask: "What about this dream segment feels most important to me right now?" Let me know when something like that happens inside. (START)

(pause 30 seconds)

(STOP)Now just pay attention to the feelings that you have noticed. Don't do anything about those feelings, just pay attention to them. They may seem kind of fuzzy or unclear at first but just notice what happens in your body when you begin to reflect on what

the most important feeling is for you right now. (START)

(pause 30 seconds)

(STOP) Now, very gently find some words or an image or even a gesture that seems to fit what this whole feeling is like, the sheer quality of your feeling. Take a moment to pay attention to the feeling and any words, images or gestures that seem to best fit that feeling. Choose whatever seems to work for you, whatever seems to fit what your feeling is like. Then let me know if something like that happens. (START)

(pause 45 seconds)

(STOP) As you pay attention to the feeling now, gently ask yourself, "What's the most important part of this feeling?", "What's right in the center of all this?". Just let whatever happens happen when you do this. There may be new words, images or gestures, or even different feelings. Just pay attention to those changes. Old thoughts or arguments may come to mind, but just let all of that go by. Continue to pay attention to the feeling itself and whatever seems to come right from the feeling when you ask yourself, "What's the most important part of this feeling?", "What's right in the center of all this?". Take a minute to do that now. (START)

(pause 60 seconds)

(STOP) If something comes to you, something that seems to come right out of the feeling and make some kind of difference to you, protect that. Stay with it quietly, gently. Let yourself become familiar with it. There's nothing else to do right now but accept and protect whatever makes a difference in the way you feel about yourself or your experience. Just let me know if or when something like that happens. (START)

(pause 30 seconds)

Stay with that for a moment. If what came to you was some word or phrase, you might want to say that to yourself and notice any difference that it makes in your experience. If what came to you was an image, hold it in your mind's eye, let it affect you, and notice any difference it may make. If it's a sense of movement, stay with that and see what that does. I will give you a little while to do that in any way you wish. (START)

(pause 60 seconds).

(STOP) Now I will give you a minute to use in any way you want and then we will stop. When you feel ready, open your eyes. (START) *(wait for cue)* (STOP)

2. *Cognitive Reflection*

Now I want you to analyze the dream segment in your thoughts as logically and thoroughly as possible. This time, pay particular attention to the thoughts or ideas that occur to you while you imagine the dream. That is, keep your attention focused on your images and your thoughts and ideas about them. You should attend to any thoughts, ideas, or explanations related to your images. Remember that all this is private, to yourself. I will not ask you to talk about these experiences. So allow whatever happens to happen this time when you analyze your thoughts and ideas during the dream segment. Take a minute to do this now: analyze the dream segment and pay attention to any thoughts or ideas that you may have while doing this. (START)

(pause 60 seconds)

(STOP) Now I would like you to let go of your thoughts related to the dream for a moment. You can come back to them later if you like. But right now just relax. You may even want to move around a little to relieve some of the tension that occurs while thinking about a dream.

(pause 15 seconds)

Now try asking yourself: "What's the most important idea in this dream segment for me right now?" and see what occurs in your mind. Whatever that idea is, just let yourself attend to it for a while now. Just see what comes in your mind now when you ask: "What's the most important idea in this dream segment for me right now?" Let me know when something comes to you. (START)

(pause 30 seconds)

(STOP) Now just pay attention to the ideas that you have noticed. Don't do anything about those ideas, just pay attention to them. They may seem kind of illogical at first but just notice what happens when you begin to think about the most important idea for you right now. (START)

(pause 30 seconds)

(STOP) Now, very gently find some word or phrase that seems to summarize what this idea is all about. Just take a moment to pay attention to the idea and any words or phrases that seem to summarize what this idea is all about. Choose whatever makes sense to you, whatever seems to summarize what your idea is all about. Then let me know if something occurs to you. (START)

(pause 45 seconds)

(STOP) As you pay attention to the idea now, gently ask yourself, "What's the most important implication of this idea?", "What follows directly from all of this?". Just let whatever happens happen when you do this. There may be new words or phrases, or even different ideas. Just pay attention to those changes. Old sensations or feelings may occur in your body, but just let all of that go by. Continue to pay attention to the thought itself and whatever seems to come right from the thought when you ask yourself, "What's the most important implication of this idea?", "What follows directly from all of this?". Take a minute to do that now. (START)

(pause 60 seconds)

(STOP) If something comes to you, something that seems to follow from the thought and makes some kind of sense to you, protect that. Stay with it quietly, gently. Let yourself become familiar with it. There's nothing else to do right now but accept and protect whatever seems to follow from the thought that you have in mind right now. Just let me know if or when something like that happens. (START)

(pause 30 seconds)

(STOP) Stay with that for a moment. If what came to you was some explanation, you might want to think about that and notice any difference that it makes in your analysis. If what came to you was a new idea, hold it in mind, think about it, and notice any difference it may make. I will give you a little while to do that in any way you wish. (START)

(pause 60 seconds)

(STOP) Now I will give you a minute to use in any way you want and then we will stop. When you feel ready, open your eyes. (START) *(wait for cue)* (STOP)

Appendix 7. Post-Focusing Inventory

The items on the following pages concern the ways people sometimes think and feel during the instructions. On the response sheet please rate each of these items on a scale from 1 to 5 as follows:

1 = This statement is false or not at all descriptive of my experience during the instructions.

2 = This statement is slightly descriptive of my experience during the instructions.

3 = This statement is moderately descriptive of my experience during the instructions.

4 = This statement is very descriptive of my experience during the instructions.

5 = This statement is completely true or extremely descriptive of my experience during the instructions.

On the answer sheet blacken the space of the number that indicates your answer. Do not put your answers on this booklet.

Affective Insight Scale

1. Reflection brought out feelings that I had not experienced in quite the same way before.
2. I experienced feelings that gave my dream new meaning.
3. During reflection, I had words of images for what I was feeling that fit better that any I had before.
4. I can now say something more about what I feel when I reflect on my dream.
5. I now see things I was previously afraid to see.
6. I came face to face with feelings I usually ignore.

Solution Orientation Subscale

1. Reflection gave me time to think about solutions to a difficulty related to the dream segment I selected.
2. While reflecting on feelings related to the dream, I considered what I could or should do about them.
3. During reflection I tried to find explanations for my feelings or concerns.
4. I felt it was important to find a solution for a difficulty related to the dream segment I was

reflecting on.

Regret Subscale

1. Reflection on my dream gave me a chance to see what events led up to it.
2. I remembered experiences that led up to my dream and thought about what I could or should have done.
3. During reflection I tried to figure out what was wrong with my feelings or concerns.
4. I recalled some things that I have done but now regret.

Absorption Subscale

1. I experienced my images and/or memories as if they were actually happening.
2. I experienced images and/or memories with particular clarity and vividness.
3. My images and/or memories seemed to unfold around me as if I were actually participating in them--not as if I were watching myself from the outside.
4. I was so involved in my images and/or memories that I c[illegible]e sights, sounds, smells and feelings as if they were actually happening.

Anxiety Management Subscale

1. I wanted to stop paying attention to my personal feelings.
2. I was reluctant to experience the full sense of my feelings about the dream I was reflecting on.
3. I felt anxious as I began to reflect on the feelings related to my dream.
4. I would not like to reflect further on the feelings related to my dream.

Emerging Anxiety Subscale

1. Feelings emerged during reflection on my dream that I would like to explore more fully.
2. I was disturbed by the feelings that emerged during self-reflection.
3. During reflection feelings emerged that I am reluctant to go into more deeply.
4. The feelings that emerged were accompanied by a sense of relief, like letting go of some tension.

Appendix 8. Salience of Experience Inventory

The items on the following pages concern the ways people sometimes think and feel during the instructions. On the response sheet please rate each of these items on a scale from 1 to 5 as follows:

1 = This statement is false or not at all descriptive of my experience during the instructions.

2 = This statement is slightly descriptive of my experience during the instructions.

3 = This statement is moderately descriptive of my experience during the instructions.

4 = This statement is very descriptive of my experience during the instructions.

5 = This statement is completely true or extremely descriptive of my experience during the instructions.

On the answer sheet blacken the space of the number that indicates your answer. Do not put your answers on this booklet.

1. The experience was realistic.
2. The experience was personally important to me.
3. I was doing things with my body, such as walking, pushing, bending, etcetera.
4. I experienced images of other people moving or doing things.
5. Overall, the experience was active and full of movement.
6. The experience was visually intense.
7. The experience included sound (e.g., speaking, noise).
8. I was aware of the laboratory surroundings.
9. I was aware of the actual position or posture of my body in the laboratory.
10. There were images of some familiar people.
11. There were images of some unfamiliar people.
12. There were images of some familiar places.
13. There were images of some unfamiliar places.
14. I was engaging in some familiar actions.
15. I was engaging in some unlikely or impossible actions.

16. The experience reminds me of a real experience I have had.
17. My experience was like a well-formed story in parts.
18. The events in my experience were logically connected.
19. The experience included images involving my skin (e.g., touching, itching).
20. There was imagery involving taste.
21. There was imagery involving smell.
22. I was emotionally involved in the experience.
23. There were sensations from inside my body (e.g., stomach, chest).
24. There were vestibular sensations in my imagery (e.g., turning, balancing).
25. The experience was easy to imagine.
26. During the latter part of the instructions I focused on feelings or images related to the dream segment.
27. During the latter part of the instructions I focused on feelings or images <u>not</u> related to the dream segment.
28. In which area of your body did you focus your attention during the instructions?

Appendix 9. Debriefing

The purpose of the experiment was to explore the effects of imagery and self-reflection on a person's emotional experience. Our main hypothesis was that dream imagery, as opposed to waking imagery, and self-reflection on feelings, as opposed to self-reflection on ideas, together would have the most impact on emotional experience. I will explain how we tested this hypothesis in 3 steps.

First, we were interested in 2 types of imagery: imagery that occurs when you remember a dream after sleeping, and imagery that occurs when you listen to instructions to create a fantasy while awake. So we had 2 groups of 16 participants each; each group experiencing a different kind of imagery. The group asked to create a fantasy while awake was asked to do this from the description of another person's dream report. This was done to ensure that the two types of imagery were as similar as possible in all respects. We expected that dream imagery would cause more and longer-lasting emotional experience than would waking fantasy imagery, even though the two types of imagery were both "dream-like", i.e., contained dream plots and themes, and were similar in terms of their story structure and familiarity to the person. You, of course, were in the group asked to experience (dream/waking) imagery.

Second, we were interested in two types of self-reflection as well: reflection on feelings and reflection on thoughts. So each of our 2 groups of 16 persons was further divided into groups of 8 persons each. One half of each group of 16 was asked to reflect upon the feelings in their imagery, the other half of each group of 16 was asked to reflect upon the ideas in their imagery. We expected, in this case, that self-reflection on feelings in the imagery (whether it was dream or waking imagery) would lead to more emotional experience that would self-reflection on ideas in the imagery. You were asked to reflect upon the (feelings/ideas) in your imagery.

So to summarize these 2 steps, we had altogether 4 groups of 8 participants each performing the following events: 1) reflecting on feelings in dreams; 2) reflecting on feelings in waking fantasy; 3) reflecting on ideas in dreams; and 4) reflecting on ideas in waking

fantasy. We expected that group 1 - reflecting on feelings in dream imagery - would experience the greatest degree of emotional activity.

Finally, I will describe how we measured your level of emotional experience, i.e., what the dependent measures of the experiment were. We had 3 different measures of emotional experience:

1) Measurement of facial muscle activity which is usually too faint to be detected visually (facial EMG). An increase in muscle activity means an increase in emotional experience. Facial EMG was recorded throughout the experiment.

2) Your reports on paper-and-pencil tests of your experienced feelings, both before and after the imagery task.

3) The types of imagery reported in response to the Rorschach cards. We expected that emotional experience would be indiated by reports of movement imagery in the inkblots.

We expected that instructions to reflect on feelings contained in a dream would lead to an indication of heightened emotional experience on each of these 3 measures.

Do you have any questions about the imagery types, the self-reflection types, the 3 dependent measures, or any other aspects of the experiment?