

Research Report

Psychophysiological Responding During Script-Driven Imagery in People Reporting Abduction by Space Aliens

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ABSTRACT—*Is recollection of highly improbable traumatic experiences accompanied by psychophysiological responses indicative of intense emotion? To investigate this issue, we measured heart rate, skin conductance, and left lateral frontalis electro-myographic responses in individuals who reported having been abducted by space aliens. Recordings of these participants were made during script-driven imagery of their reported alien encounters and of other stressful, positive, and neutral experiences they reported. We also measured the psychophysiological responses of control participants while they heard the scripts of the abductees. We predicted that if “memories” of alien abduction function like highly stressful memories, then psychophysiological reactivity to the abduction and stressful scripts would be greater than reactivity to the positive and neutral scripts, and this effect would be more pronounced among abductees than among control participants. Contrast analyses confirmed this prediction for all three physiological measures ($ps < .05$). Therefore, belief that one has been traumatized may generate emotional responses similar to those provoked by recollection of trauma (e.g., combat).*

Few controversies in psychology have been as contentious as the one concerning recovered memories of trauma (McNally, 2003b). Especially contentious has been the claim that some people may recover “false memories” of traumatic events that never occurred (e.g., Ceci & Loftus, 1994; Lindsay & Read, 1994). Only recently, however, have researchers begun to study memory function in people reporting recovered memories of trauma (e.g., Clancy, McNally, & Schacter, 1999;

McNally, 2003a; McNally, Clancy, Barrett, & Parker, in press; McNally, Clancy, & Schacter, 2001). Adapting Roediger and McDermott’s (1995) procedure, we found that adults reporting recovered memories of childhood sexual abuse were more likely to exhibit false recognition of nonpresented words than were adults who reported always remembering their abuse (Clancy, Schacter, McNally, & Pitman, 2000). A subsequent study revealed similar false memory effects in people reporting recovered memories of alien abduction (Clancy, McNally, Schacter, Lenzenweger, & Pitman, 2002).

People who have developed posttraumatic stress disorder (PTSD) usually exhibit heightened psychophysiological reactivity (e.g., increased heart rate, HR) when recalling their trauma in the laboratory (for a review, see Orr, Metzger, & Pitman, 2002). Clinical reports suggest that recovering memories of improbable traumatic events (e.g., being ritually abused by satanic cults) is likewise accompanied by intense emotional reactions (e.g., Young, Sachs, Braun, & Watkins, 1991), and some therapists interpret these reactions as evidence that something horrific must have happened to the person (e.g., Bloom, 1994).

In the present study, we investigated whether recollection of highly improbable traumatic events provokes psychophysiological reactions indicative of intense emotion. We recruited individuals who reported having been abducted by space aliens and asked them to participate in a script-driven imagery protocol (e.g., Lang, Levin, Miller, & Kozak, 1983; Pitman, Orr, Fogue, de Jong, & Claiborn, 1987). Each abductee furnished material for five personalized, autobiographical scripts: two scripts related to his or her abduction trauma; a script related to a different, extremely stressful experience; a script related to an extremely positive experience; and one related to an emotionally neutral experience. A control group consisted of individuals who denied ever having been abducted by aliens, but who listened to and imagined the scripts provided by the abductees. We predicted that if “memories” of alien abduction function like highly stressful

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memories, then psychophysiological reactivity to the abduction and stressful scripts would be greater than reactivity to the positive and neutral scripts, and this effect would be more pronounced among abductees than among control participants.

METHOD

Participants

Alien-Abductee Group

The alien-abductee group comprised 6 women and 4 men who reported having been abducted by alien beings. Their mean age was 47.5 years ($SD = 11.9$). They learned of our research program on the “psychophysiology of emotional memory” through newspaper advertisements; staff at the Program for Extraordinary Experience Research (PEER), Center for Psychology and Social Change, Cambridge, Massachusetts; or previous participants. Recruitment and testing were in accordance with the American Psychological Association’s ethical guidelines regarding the use of human participants. The protocol and informed-consent form was approved by the Harvard University Committee on the Use of Human Subjects and by the Manchester Veterans Affairs Medical Center Human Subjects Committee.

During the first session, each participant was interviewed by either Richard J. McNally or Susan A. Clancy about his or her encounters with space aliens. The participant then completed the script-preparation forms (described later). During the second session, Natasha B. Lasko used the Clinician-Administered PTSD Scale-Diagnostic Version (CAPS; Blake et al., 1995) and the Structured Clinical Interview for Axis I DSM-IV Disorders (SCID; First, Spitzer, Gibbon, & Williams, 1994) to assess for PTSD related to purported alien abduction and to assess for other Axis I disorders.

Three participants fell short, by one or two symptoms, of qualifying for lifetime PTSD related to their alien encounters, and 1 of these individuals had current subthreshold PTSD.

All abductees reported at least one episode of apparent sleep paralysis accompanied by hypnopompic hallucinations, usually figures hovering near their beds, flashing lights, buzzing sounds, and tingling sensations. In each case, the participant interpreted the experience as related to aliens. Eight of the 10 abductees had undergone quasi-hypnotic sessions during which mental health professionals helped them recover detailed “memories” of alien encounters (e.g., undergoing sexual and medical probing on spaceships).

Control Group

The control group comprised 7 women and 5 men, recruited from the community. Their mean age was 49.9 years ($SD = 13.0$).

Psychometrics

Participants completed several questionnaires: the Dissociative Experiences Scale (DES; Bernstein & Putnam, 1986); the Beck Depression Inventory (BDI; Beck & Steer, 1987); the Trait Anxiety Inventory (Spielberger, Gorsuch, Lushene, Vagg, & Jacobs, 1983); the Absorption Scale, a measure of imaginative capability and fantasy proneness (Tellegen & Atkinson, 1974); and measures of schizotypy: the Perceptual Aberration Scale (Chapman, Chapman, & Raulin, 1978), the Magical Ideation Scale (Eckblad & Chapman, 1983),

and the Referential Thinking Scale (Lenzenweger, Bennett, & Lilienfeld, 1997).

Scripts

Following the abduction-history interview, we prepared five individualized scripts describing autobiographical events from each abductee’s past: two scripts related to alien abduction, one stressful script (unrelated to abduction), one positive script (unrelated to abduction), and one neutral script (unrelated to abduction). Per standard procedure (Orr et al., 1998), we averaged the responses for the two abduction scripts prior to data analysis.

The abductees first described each event on a script-preparation form and then selected from a list of bodily responses those that they remembered experiencing when the event was occurring. Using this information, we prepared 30-s (approximately) scripts describing each experience in the second person, present tense. Each script referred to the bodily responses endorsed by the subject and incorporated words and phrases used by the subject on the script-preparation form. The scripts were audiotaped for playback in the psychophysiology laboratory.

Episodes of apparent sleep paralysis, interpreted as alien encounters, figured in both abduction trauma scripts for 3 abductees and in one abduction script for 2 additional abductees; for the remaining 5 abductees, both abduction scripts featured traumatic experiences (e.g., being sexually probed by aliens on board spaceships) that typically surfaced during quasi-hypnotic recovered-memory sessions. Examples of stressful, positive, and neutral scripts were learning of the violent death of loved ones, witnessing the birth of one’s first child, and cutting one’s lawn during the previous weekend, respectively.

Each participant in the control group heard the scripts of one of the abductees. Each control participant was matched with an abductee of the same sex and age. This yoking procedure controlled for materials effects (i.e., the possibility that anyone listening to scripts of alien abduction might exhibit psychophysiological reactivity).

Apparatus and Physiological Variables

The psychophysiology session was conducted in an 11- × 9-ft humidity- and temperature-controlled, sound-attenuated testing room connected via wires to an adjacent room where the apparatus was located. The participant sat in a comfortable armchair. A monitor in the subject’s room displayed the self-report scales for emotion, and participants’ self-reports were entered into the computer via a joystick. A modular instrument system (Coulbourn Instruments, Allentown, Pennsylvania) recorded analog physiological signals, which were monitored by V-212 oscilloscopes (Hitachi Denshi, Ltd., Tokyo, Japan).

Dependent physiological variables included HR, skin conductance (SC), and electromyogram (EMG) of the left lateral frontalis (LF) facial muscle. EMG was obtained through 4-mm (sensor diameter) silver/silver chloride electrodes filled with an electrolytic paste, placed according to standard specifications (Fridlund & Cacioppo, 1986), attached to a bioamplifier (Coulbourn Hi-Gain, S75-01), and integrated via a 300-ms time constant through a contour-following integrator (Coulbourn, S76-01). SC measurements were obtained through 9-mm (sensor diameter) silver/silver chloride electrodes filled with an isotonic paste, placed on the subject’s nondominant palm, and connected to an SC module (Coulbourn, S71-11), which used a constant voltage (0.5 V) in the direct-coupled mode (Fowles et al., 1981). HR

measurements were obtained via standard limb electrocardiogram leads connected to a bioamplifier (Coulbourn Hi-Gain, S75-01) that provided input to a tachometer (Coulbourn, S77-26). Analog outputs of the physiological modules were digitized by an analog-to-digital converter (Coulbourn, S25-12) prior to sampling. A personal computer controlled presentation of the audiotaped scripts, administration of the emotion self-report scales, and sampling and storing of the digitized physiological signals at 2 Hz. A Coulbourn Lablink Computer Interface connected the computer to the instrument system.

Procedure and Data Reduction

After receiving an orientation to the laboratory and having electrodes attached, participants listened to a 3-min relaxation instruction tape prior to listening to the audiotaped scripts. Each script presentation comprised four consecutive 30-s periods: baseline, listening, imagery, and recovery. Participants were told to listen carefully to each script and imagine it as vividly as possible, as if it were actually occurring (listening period), and at the end of the script to continue imagining the experience from beginning to end (imagery period) until a tone sounded. They were instructed to cease imagery upon hearing the tone and to relax (recovery period). Upon hearing a second tone, participants provided self-reports of image vividness, three dimensions of emotional response (valence, arousal, and dominance), and seven discrete emotional responses (sadness, anger, fear, disgust, surprise, happiness, guilt). These self-reports were made on 13-point Likert scales ranging from 0 (*none*) to 12 (*a great deal*). The computer was programmed to begin the baseline period for the next script after a rest period of 1 min or when the HR of the subject had returned to within 5% of its value during the previous baseline period, whichever was longer. The rest period seldom exceeded 3 min.

The mean level of each physiological variable was computed for each data-collection period for each script. As in previous work (e.g., Pitman et al., 1987), we calculated change scores by subtracting the preceding baseline-period value from the value for the imagery period that followed it. Because of recording problems, the HR data for 1 control participant could not be used.

RESULTS

Psychometrics

Abductees scored significantly higher than control participants on measures of absorption, magical ideation, and dissociation (see Table 1).

Reactions to Imagery Scripts

If reported memories of alien encounters provoke reactions akin to those provoked by traumatic memories, then abductees should exhibit greater reactivity to abduction and stressful scripts than to other positive and neutral scripts, relative to control participants. To test this hypothesis, we first applied contrast weights of -1 , -1 , 1 , and 1 to each participant's physiological response (e.g., HR increase) to the personal neutral, positive, stressful, and abduction (average of both) scripts. After multiplying each contrast weight and its respective physiological value, we created an L score for each participant by summing the products obtained. The larger the L score, the more a participant tended to produce larger responses to the abduction and stressful scripts than to the positive and neutral scripts. To test the

TABLE 1
Psychometric Measures

Variable	Group				t	df	p
	Abductee		Control				
	M	SD	M	SD			
CAPS-L	38.2	20.4	—	—	—	—	—
CAPS-C	15.4	13.4	—	—	—	—	—
DES	8.4	7.0	3.3	3.5	2.22	19	.039
Absorption	21.6	6.0	9.6	6.1	4.50	19	.001
BDI	3.6	5.7	1.7	2.4	0.92	16	.373
Trait Anxiety	36.1	9.3	30.5	7.2	1.38	15	.189
RTS	2.9	4.1	1.6	2.0	0.87	16	.397
PAS	3.3	4.0	1.7	1.7	1.16	16	.262
MIS	9.2	4.4	2.9	2.7	3.65	16	.002

Note. CAPS-L and CAPS-C = Lifetime and Current total scores, respectively, on the Clinician-Administered PTSD Scale (Blake et al., 1995; possible range: 0–136); DES = Dissociative Experiences Scale (Bernstein & Putnam, 1986; possible range: 0–34); Absorption = Absorption Scale (Tellegen & Atkinson, 1974; possible range: 0–34); BDI = Beck Depression Inventory (Beck & Steer, 1987; possible range: 0–64); Trait Anxiety = Trait Anxiety Inventory (Spielberger, Gorsuch, Lushene, Vagg, & Jacobs, 1983; possible range: 20–80); RTS = Referential Thinking Scale (Lenzenweger, Bennett, & Lilienfeld, 1997; possible range: 0–34); PAS = Perceptual Aberration Scale (Chapman, Chapman, & Raulin, 1978; possible range: 0–35); MIS = Magical Ideation Scale (Eckblad & Chapman, 1983; possible range: 0–30). Because of missing data, degrees of freedom vary.

hypothesis that this effect would be greater among abductees than among control participants, we conducted a one-tailed t test on the L scores.

The results were consistent with our hypothesis. Relative to control participants, abductees exhibited greater psychophysiological reactivity to abduction and stressful scripts than to positive and neutral scripts. This hypothesis was supported for HR, $t(19) = 2.01$, $p = .03$, effect size $r = .42$; for SC, $t(20) = 1.88$, $p = .04$, effect size $r = .39$; and for LF EMG, $t(20) = 2.00$, $p = .03$, effect size $r = .41$ (Fig. 1).¹

Self-reported emotional responses were consistent with physiological responses in that the abductees reported heightened ratings of arousal, fear, surprise, and imagery vividness during exposure to scripts featuring their most traumatic abduction memories (see Table 2).

DISCUSSION

Recollections of purported traumatic encounters with space aliens are accompanied by physiological reactions and emotional self-reports akin to those accompanying other highly stressful experiences.² Relative to control participants, the abductees scored significantly higher on questionnaire measures of dissociation, absorption, and

¹For the abductees, the abduction and stressful scripts were physiologically indistinguishable, as evinced by two-tailed paired t tests: HR, $t(9) = 0.57$, $p = .58$; SC, $t(9) = 0.10$, $p = .91$; LF EMG, $t(9) = 1.17$, $p = .27$. In contrast, participants with PTSD usually exhibit greater responses to trauma than to other stressful scripts (Orr & Roth, 2000).

²It is highly unlikely that our findings are attributable merely to the abductees' having been exposed to personalized scripts and the control participants' having been exposed to the scripts of strangers (i.e., the abductees). Indeed, personalized combat scripts are insufficient to provoke heightened physiological responses in Vietnam veterans who do not have PTSD (Orr et al., 2002).

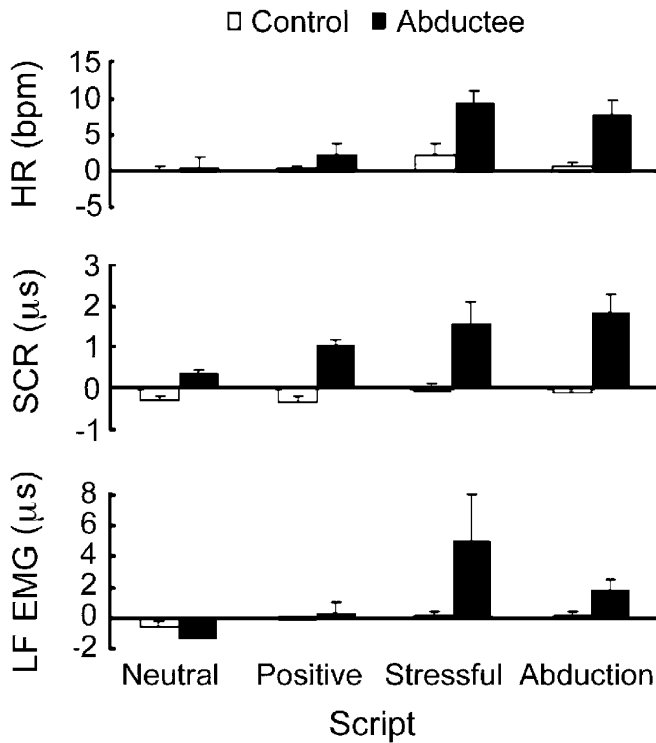


Fig. 1. Group mean (and standard error of the mean) heart rate (HR, top panel), skin conductance (SCR, middle panel), and left lateral frontalis electromyogram (LF EMG, bottom panel) responses during imagery of neutral, positive, stressful, and abduction (average of two scripts) scripts.

magical ideation. People scoring high on these three measures tend to experience alterations in consciousness, to have a rich fantasy life, and to endorse unconventional beliefs (e.g., mind reading, prophetic dreams), respectively.

TABLE 2
Self-Reported Emotional Responses During Abduction Imagery

Variable	Group				t(20)	p
	Abductee		Control			
	M	SD	M	SD		
Vividness	10.8	2.1	7.1	2.8	3.4	.003
Emotional dimensions						
Arousal	10.2	2.2	8.4	1.8	2.1	.047
Valence	1.9	2.7	3.6	3.2	1.3	.20
Dominance	2.2	2.6	4.4	4.0	1.5	.14
Discrete emotions						
Happiness	0.5	0.8	1.5	2.7	1.2	.26
Sadness	5.0	4.9	3.8	4.4	0.6	.57
Fear	9.4	3.5	5.8	4.6	2.0	.06
Surprise	9.1	3.8	5.3	3.6	2.4	.03
Anger	6.8	4.7	5.4	4.7	0.7	.48
Disgust	5.0	4.0	5.0	4.8	0.0	.98
Guilt	2.9	3.3	2.0	3.7	0.6	.54

Note. Scale ranges were as follows—arousal: 0 = *unaroused*, 12 = *aroused*; valence: 0 = *displeased*, 12 = *pleased*; dominance: 0 = *submissive*, 12 = *dominant*; vividness and discrete emotions: 0 = *none*, 12 = *a great deal*. Tests were two-tailed.

The responses of abductees to their traumatic abduction scripts bear comparison to the responses of PTSD patients to scripts of their traumatic experiences. The abductees' mean HR, SC, and LF EMG in response to their abduction scripts were 7.8 bpm, 1.8 µS, and 1.8 µV, respectively. The corresponding values for 72 PTSD participants' responses to their trauma scripts were 7.9 bpm for HR, 1.0 µS for SC, and 2.6 µV for LF EMG (Orr & Roth, 2000).

Although improbable traumatic memories (e.g., being sexually probed on a spaceship) provoke physiological reactions comparable to those provoked by more conventional and verifiable traumatic memories (e.g., a firefight in Vietnam), one should not conclude that PTSD patients are reporting false memories of trauma. Conversely, the physiological markers of emotion that accompany recollection of a memory cannot be taken as evidence of the memory's authenticity. The script-driven imagery protocol reflects the emotional significance of a memory, not necessarily its veracity.

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