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COGNITIVE PROCESSING OF TRAUMA-RELEVANT INFORMATION IN PTSD

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Clinicians have traditionally viewed cognition as equivalent to conscious thought, and accordingly have relied on questionnaires and structured interviews to study the cognitive aspects of emotional disorders. But limitations of introspective self-report have prompted investigators to apply increasingly the information-processing methods of experimental psychology in an effort to elucidate cognitive pathology in disorders such as PTSD (e.g., Litz & Keane, 1989; McNally, 1993). These methods can isolate dysfunctions in attention and memory, and can supplement traditional self-report approaches to assessment.

PTSD researchers have conducted two types of information-processing studies. *Valence-independent* studies require subjects to process information that varies in complexity, but not in emotional valence. Included under this rubric are experiments on intelligence, short-term memory, and so forth (e.g., McNally & Shin, 1995; Yehuda et al., 1995). *Valence-dependent* studies require subjects to process affectively charged information related to trauma. Included under this rubric are experiments on attentional and memory biases favoring processing of trauma-relevant information. This article reviews a bibliography of studies of valence-dependent processing biases in PTSD.

PTSD researchers have devised methods for assessing intrusive cognition in the laboratory that do not require introspective self-report (McNally et al., 1990). One such method is the emotional Stroop (1935) color-naming paradigm. In this attentional paradigm, subjects are shown words of varying emotional significance that are printed in different colors. They are asked to name the colors in which the words appear while ignoring the meanings of the words. Delayed color-naming (i.e., Stroop interference) occurs when the meaning of a word captures the subject's attention despite the subject's effort to focus on its color. Because color-naming delays reflect involuntary activation of meaning, interference produced by trauma-related material may provide a quantitative index of intrusive cognition. That is, PTSD patients ought to take longer to name the colors of words related to trauma relative to other words, whereas people without PTSD should not.

To test the viability of this paradigm for capturing intrusive cognition, McNally et al. (1990) had Vietnam combat veterans with and without PTSD color-name words related to trauma (e.g., *bodybags*), words related to another anxiety disorder (obsessive-compulsive disorder, e.g., *germs*), words having positive emotional valence (e.g., *love*), and words having neutral valence (e.g., *input*). Each word was printed in one of several colors and words of a certain type appeared on a single large card. The dependent measure was the time taken for the subject to name the colors of all the words on a single card. PTSD patients took significantly longer to color-name trauma words relative to other words and relative to healthy combat veterans who did not respond differentially as a function of word type. Moreover, interference for trauma words was significantly related to severity of PTSD symptoms, but not to extent of combat exposure. These results suggest that Stroop interference for trauma-related words may reflect severity of intrusive cognition rather than just a history of exposure to traumatic events.

Cassiday et al. (1992) provided further data consistent with this interpretation of the trauma-specific Stroop effect. Studying rape victims with and without PTSD, they found that interference for words related to rape trauma was related to severity of intrusive symptoms, but not to severity of avoidance and numbing symptoms. Thus, experimental (Stroop) and self-report indices of intrusion converged.

Stroop experiments have repeatedly shown that words closely related to trauma produce more interference than negative words less closely related to trauma. Using a computerized procedure that enabled them to select idiographic stimuli for each subject, Kaspi and colleagues (1995) found that patients with combat-related PTSD exhibited more interference for trauma words than for equally "negative" words that were unrelated to trauma. Also studying veterans with PTSD, Vrana and colleagues

This is the second of our two-part series of bibliographies on memory and information processing in PTSD. The issue contains references to articles by a small but growing number of investigators who have examined the unique ways in which individuals with PTSD process trauma-relevant information. We will return to the topic of memory in our Winter 1996 issue, which will contain a bibliography on the psychobiology of traumatic memory.

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(in press) found that words related to Vietnam (e.g., *firefight*) produced more interference than generally negative words (e.g., *death*) or words related to Vietnam that had additional nonthreatening meanings (e.g., *point*). Cassidy et al. (1992) reported that subjects with rape-related PTSD exhibited more interference for words strongly related to trauma (e.g., *rape*) than for words moderately related to trauma (e.g., *crime*). Also, Thrasher, Dalgleish, and Yule (1994) reported that shipwreck survivors with PTSD exhibited more interference for words specifically tied to their traumatic memories (e.g., *sinking*) than for generally threatening words (e.g., *death*).

Stroop interference for trauma-related words is a sensitive measure of clinical state. People with active PTSD exhibit the effect, whereas those who have recovered do not. Thus, inpatients with chronic combat-related PTSD exhibit equally marked interference for trauma words when retested after a two-week interval (McNally et al., 1993). Patients with rape-related PTSD exhibit enhanced interference for words related to rape trauma, whereas those who have recovered after receiving behavior therapy do not (Foa et al., 1991). These data underscore the potential utility of the emotional Stroop paradigm as a convenient measure for evaluating response to treatment.

Stroop studies suggest that information about trauma is readily accessible in patients with PTSD, and data parallel self-reports concerning the ease with which traumatic memories involuntarily come to mind. If these memories are characterized by hyperaccessibility, then other paradigms that directly assess explicit and implicit memory may also triangulate the phenomenon. *Explicit* memory is revealed when task performance requires conscious recollection of previous experiences; it is usually assessed by direct tests such as recognition, free recall, and cued recall. *Implicit* memory is revealed when previous experiences enhance performance on a task that does not require effortful, conscious recollection of these experiences; it is usually assessed by indirect tests such as word-stem completion, lexical decision, and tachistoscopic word identification.

Zeitlin and McNally (1991) investigated explicit and implicit memory biases favoring trauma-related material in Vietnam veterans with and without PTSD. Subjects first studied a series of trauma words (e.g., *medevac*), positive words (e.g., *tranquil*), social threat words (e.g., *humiliated*), and neutral words (e.g., *wardrobe*) before completing three-letter word stems (e.g., *med*, *tra*) with the first word that came to mind. In this word-stem completion task, implicit memory is revealed when subjects complete stems (e.g., *med*) with words that were previously presented (e.g., *medevac*) more often than with words that were not previously presented (e.g., *medium*), and an implicit memory bias for trauma material occurs if this priming effect is greater for trauma-related stems (e.g., *med*) than for other stems (e.g., *tra*). Subjects were also given another set of stems that corresponded to another set of valenced words, and were told to use the stems as cues to recall words they had seen earlier. This cued recall task provides a measure of explicit memory, and an explicit memory bias for trauma-

related material would be revealed by subjects recalling more trauma words than other words.

The results revealed that combat veterans with PTSD exhibited an implicit memory bias for trauma words, whereas combat veterans without PTSD did not. Combat veterans with PTSD also exhibited a relative explicit memory bias for trauma words, whereas combat veterans without PTSD did not. That is, veterans with PTSD exhibited poor recall for all but trauma words, in contrast to veterans without PTSD who exhibited equivalently good recall for all word types. Also, Vrana et al. (in press) recently found that PTSD patients, relative to healthy combat veterans, exhibited enhanced explicit memory for trauma words relative to neutral words. These investigators, however, did not test for implicit memory biases.

Two studies have revealed autobiographical memory disturbances in Vietnam combat veterans with PTSD. In the first study, PTSD subjects exhibited difficulties retrieving specific personal memories in response to cue words having either positive (e.g., *kindness*), neutral (e.g., *appearance*), or negative (e.g., *panic*) valence (McNally et al., 1994). When asked to retrieve an autobiographical memory triggered by a cue, PTSD subjects tended to retrieve general memories that did not reference any specific event. This "overgeneral" memory problem was exacerbated in PTSD subjects whose trauma-related memories were cued by a combat videotape. This suggests that activation of trauma-related thoughts may hamper access to other memories.

In the second study (McNally et al., in press), Vietnam veterans with and without PTSD participated in an autobiographical memory experiment in which they attempted to retrieve specific personal memories exemplifying traits denoted by positive (e.g., *loyal*) and negative (e.g., *guilty*) cue words. Relative to healthy combat veterans, those with PTSD had difficulty retrieving specific autobiographical memories, especially in response to positive trait cues. These deficits were markedly pronounced in PTSD subjects who wore Vietnam War regalia (e.g., medals, fatigues) to the laboratory (*nb*: non-PTSD subjects never wore regalia). Regalia-wearing PTSD subjects disproportionately retrieved episodes from the Vietnam War, unlike other subjects who exhibited the standard recency bias by overwhelmingly retrieving memories from the past month. The self-presentational style of wearing regalia is a marker for autobiographical memory disturbance as well as an emblem of psychological fixation to a war fought more than 20 years ago. Deficits in retrieving specific memories about one's past may underlie difficulties envisioning one's future (i.e., "future foreshortening"), and may hamper efforts to solve the problems of everyday living.

As apparent from this brief review, most studies on valence-dependent cognitive biases in PTSD have been conducted very recently. Indeed, when they wrote their seminal review paper on information-processing approaches to PTSD, Litz and Keane (1989) were able to cite only two experimental articles that had been published at that time (McNally et al., 1987; Trandel & McNally, 1987). Others have also written theoretical papers on informa-

tion-processing and PTSD (Chemtob et al., 1988; Foa et al., 1989), and Litz (1992) has tackled the problem of emotional numbing from this perspective. McNally's (1993) chapter covers recent cognitive experiments in PTSD, whereas another chapter addresses methodological and substantive issues regarding cognition and emotion research in anxiety disorders, including PTSD (McNally, in press).

In summary, experimental information-processing research on PTSD suggests the following conclusions. The emotional Stroop paradigm provides a quantitative measure of intrusive cognition that is sensitive to clinical state, yet avoids the limitations of introspective self-report (e.g., tendencies either to deny or exaggerate distress). Although experimental psychopathologists have increasingly used computerized versions of this task, card versions are easy to construct and suitable for routine clinical assessment (McNally et al., 1993). Of all the experimental paradigms tested recently, the emotional Stroop clearly has the most immediate relevance for the trauma therapist.

Experimental memory paradigms, such as word-stem completion, cued recall, and autobiographical cuing, suggest patterns of bias associated with PTSD. Patients with PTSD seem characterized by explicit and implicit memory biases favoring trauma-relevant information, yet also characterized by difficulties retrieving specific (usually nontraumatic) personal memories from their past. The relation between intrusive cognition and memory biases and dysfunctions warrants further elucidation. Intrusive cognition may preempt processing resources, thereby interfering with normal memory.

Debates about trauma and memory have become increasingly prominent in recent years. Experimental cognitive psychology may provide additional means of illuminating the effects of traumatic events on memory.

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MACLEOD, C.M. (1991). **Half a century of research on the Stroop effect: An integrative review.** *Psychological Bulletin*, 109, 163-203.

MCNALLY, R.J. & SHIN, L.M. (1995). **Association of intelligence with severity of posttraumatic stress disorder symptoms in Vietnam combat veterans.** *American Journal of Psychiatry*, 152, 936-938.

YEHUDA, R., KEEFE, R.S.E., HARVEY, P.D., LEVENGOOD, R.A., GERBER, D.K., GENI, J. & SIEVER, L.J. (1995). **Learning and memory in combat veterans with posttraumatic stress disorder.** *American Journal of Psychiatry*, 152, 137-139.

SELECTED ABSTRACTS

CASSIDAY, K.L., MCNALLY, R.J. & ZEITLIN, S.B. (1992). **Cognitive processing of trauma cues in rape victims with post-traumatic stress disorder.** *Cognitive Therapy and Research*, 16, 283-295. Rape victims with PTSD (n = 12), rape victims without PTSD (n = 12), and nontraumatized control subjects (n = 12) performed a computerized Stroop color-naming task in which they named

the colors of high-threat words (e.g., RAPE), moderate-threat words (e.g., CRIME), positive words (e.g., LOYAL), and neutral words (e.g., TYPICAL). In contrast to rape victims without PTSD and to nontraumatized control subjects, those with PTSD were slower to color-name high-threat words than moderate-threat, positive, and neutral words. Rape victims without PTSD nevertheless exhibited greater Stroop interference for high-threat words than did nontraumatized subjects. Interference for high-threat words was correlated with scores on the Impact of Events Scale-Intrusion subscale, but not with scores on the Avoidance subscale. These findings suggest that interference for trauma cues may provide a nonintrospective index of intrusive cognitive activity.

CHEMTOB, C., ROITBLATT, H.L., HAMADA, R.S., CARLSON, J.G. & TWENTYMAN, C.T. (1988). **A cognitive action theory of post-traumatic stress disorder.** *Journal of Anxiety Disorders*, 2, 253-275. PTSD is an anxiety disorder characterized in part by such phenomena as intrusive memories, flashbacks, numbing of affect, memory and attentional impairment, hyperalertness, and adjustment difficulties. In this paper we describe a new theoretical approach to understanding PTSD in combat veterans that has implications for understanding PTSD resulting from other life-threatening situations, and for understanding other anxiety disorders and ordinary cognitive processes. Previous approaches to understanding PTSD have derived from associative learning theory, from a reinterpretation of psychodynamic theory, or from general notions of information processing. The perspective presented in this paper integrates these previous approaches and elaborates them into a hierarchical network view of cognition and action. According to this view, emotion, action, and memory all flow from the processing of information by specific mental network structures. The symptoms of PTSD are derived from structures that were acquired during combat because they were then adaptive in promoting the soldier's survival, but now lead to actions that are inappropriate for the civilian environment. The presence of these structures continues to produce difficulties for some individuals. Such occurs because they are particularly susceptible to a vicious-cycle positive feedback loop in which mild evidence of threat activates threat-response structures that bias the individual to interpret ambiguous evidence as threatening. This, then, further raises the threat arousal, further activates the threat-response structures, and so forth. The implications of this view for the treatment of PTSD and other anxiety disorders are discussed.

FOA, E.B., FESKE, U., MURDOCK, T.B., KOZAK, M.J. & MCCARTHY, P.R. (1991). **Processing of threat-related information in rape victims.** *Journal of Abnormal Psychology*, 100, 156-162. We investigated selective processing of threat information in persons with PTSD by using a modified Stroop procedure. Subjects were 15 rape victims with PTSD, 13 rape victims without the disorder, and 16 nontraumatized control subjects. They were asked to name the color of four types of words: specific threat (rape-related) words, general threat (related to physical harm and death) words, neutral words, and nonwords. Rape victims with PTSD evidence a longer response latency for color naming of rape-related words than for other target-word types. Response latencies of non-PTSD victims and nonvictim control subjects did not differ across word types. Possible mechanisms underlying the selective processing of threat material are considered, and clinical implications are discussed.

FOA, E.B., STEKETEE, G. & ROTHBAUM, B.O. (1989). **Behavioral/cognitive conceptualizations of post-traumatic stress disorder.** *Behavior Therapy*, 20, 155-176. The paper reviews and

considers the existing cognitive and behavioral accounts for the acquisition and maintenance of PTSD. Mowrer's two-state theory as applied to rape victims and Vietnam veterans is critically reviewed. It was concluded that traditional S-R learning theories can adequately account for fear and avoidance consequent to a traumatic event, as well as the greater generalization as compared to simple phobias. However, these theories do not explain the remaining PTSD symptoms. The literature on experimental neurosis predicts that uncontrollable and unpredictable events produce responses that are highly reminiscent of PTSD irrespective of stimulus intensity and complexity. An additional shortcoming of S-R theory is the difficulty in incorporating meaning concepts which are so central to PTSD. Evidence for the necessity of a theory to accommodate meaning concepts is the finding that perceived threat is a better predictor of PTSD than actual threat. Therefore, we have presented a theoretical framework developed by Foa & Kozak (1986) which accommodates meaning concepts in explaining mechanisms of fear reduction and adapted this theory to PTSD.

KASPI, S.P., MCNALLY, R.J. & AMIR, N. (1995). **Cognitive processing of emotional information in posttraumatic stress disorder.** *Cognitive Therapy and Research*, 19, 319-330. Vietnam combat veterans either with or without PTSD participated in a computerized Stroop color-naming experiment in which they named the colors of neutral, positive, negative, and combat words. Idiographic stimulus selection established the personal emotional significance of the stimuli. Words appeared either randomly or blocked by type. Results indicated that PTSD patients exhibited more interference for combat words than for other words, whereas control subjects exhibited similar, but less pronounced, patterns of interference. Positive words produced no more interference than neutral words, and much less than combat words. This paradigm may provide a nonintrospective index of intrusive cognition in traumatized people.

LITZ, B.T. (1992). **Emotional numbing in combat-related post-traumatic stress disorder: A critical review and reformulation.** *Clinical Psychology Review*, 12, 417-432. Emotional numbing symptoms are considered in the clinical literature as cardinal signs of PTSD and have been formally codified in DSM-III-R. However, the term has not been consistently defined nor adequately researched. The present paper critically reviews the extant empirical and theoretical literature in combat-related PTSD that has explored emotional numbing systems. A theoretical framework, based on Levanthal's perceptual-motor theory of emotion, is posited to account for the parameters of emotional processing in PTSD, and specific hypotheses concerning selective or differential emotional processing deficits in PTSD are described in order to clarify empirical issues about the development and maintenance of emotional processing deficits in PTSD and to stimulate future research in this underexplored, yet clinically important, area.

LITZ, B.T. & KEANE, T.M. (1989). **Information processing in anxiety disorders: Application to the understanding of post-traumatic stress disorder.** *Clinical Psychology Review*, 9, 243-257. Several of the key defining features of PTSD are symptoms that reflect problems related to perception, attention, and memory processes (hypervigilance, flashbacks, nightmares, psychogenic amnesia, and concentration difficulties). Although there have been several recent attempts to explain such phenomena through facets of cognitive psychology, little empirical work has been completed to confirm or explicate such processes in PTSD. This paper critically reviews the theoretical and empirical work done

to date in the area of information processing in anxiety disorders, so as to provide a context for future empirical work to identify the specific psychological mechanisms and controlling variables responsible for symptoms of PTSD. A working theoretical model of information processing variables in PTSD is also proposed to stimulate future research in this area.

MCNALLY, R.J. (in press). **Cognitive bias in the anxiety disorders.** *Nebraska Symposium on Motivation*. During the past decade, experimental psychopathologists have increasingly applied paradigms drawn from cognitive psychology to elucidate information-processing biases that may figure in the maintenance, and perhaps etiology, of anxiety disorders. Studies have revealed disorder-specific attentional biases for processing threat cues for every anxiety disorder diagnostic category, and have revealed interpretive biases for panic disorder and generalized anxiety disorder. Memory biases favoring retrieval of threat information have rarely been observed except in panic and post-traumatic stress disorders. Further research is needed to distinguish between strategic and automatic processing biases, and among different forms of automaticity. Implications for therapy are addressed.

MCNALLY, R.J. (1993). **Self-representation in post-traumatic stress disorder: A cognitive perspective.** In Z.V. Segal & S.J. Blatt (Eds.), *The self in emotional distress: Cognitive and psychodynamic perspectives* (pp. 71-91). New York: Guilford Press. This chapter concerns self-representation in PTSD as viewed from a cognitive perspective. It contains much speculation because cognitive research on PTSD has scarcely begun. Although this research was not designed to elucidate self-representation, it may have indirect implications for self pathology in PTSD. The first section of this chapter provides a brief phenomenological overview of PTSD, as conceptualized in the DSM-III-R. The second covers cognitive theory and research on PTSD. The third outlines possible applications of cognitive-experimental methods for investigating self pathology in PTSD. The chapter closes with a discussion of conceptual issues in studying the traumatized self from a cognitive perspective.

MCNALLY, R.J., ENGLISH, G.E. & LIPKE, H.J. (1993). **Assessment of intrusive cognition in PTSD: Use of the modified Stroop paradigm.** *Journal of Traumatic Stress*, 6, 33-41. In this article, we review research supporting the modified Stroop color-naming paradigm as a means for assessing intrusive cognition in patients with PTSD. Because Stroop interference reflects involuntary semantic activation, delayed color-naming of trauma-related words can provide an objective index of intrusive cognition that is not based on self-report. In a replication and extension of previous research, we found that Vietnam combat veterans with PTSD exhibited Stroop interference for trauma-related words but not for other threat words, positive words, or neutral words. Also, we provide reliability and validity data on the paradigm.

MCNALLY, R.J., KASPI, S.P., RIEMANN, B.C. & ZEITLIN, S.B. (1990). **Selective processing of threat cues in posttraumatic stress disorder.** *Journal of Abnormal Psychology*, 99, 398-402. Vietnam combat veterans with (n = 15) and without (n = 15) PTSD performed a modified Stroop task in which they named the colors of neutral words (e.g., INPUT), positive words (e.g., LOVE), obsessive-compulsive disorder (OCD) words (e.g., GERMS), and PTSD words (e.g., BODYBAGS). In contrast to normal controls, PTSD patients took significantly longer to color-name PTSD words than to color-name neutral, OCD, and positive words. Because Stroop interference reflects involuntary semantic activa-

tion, it may provide a quantitative measure of intrusive cognitive activity - the hallmark symptom of PTSD.

MCNALLY, R.J., LASKO, N.B., MACKLIN, M.L. & PITMAN, R.K. (in press). **Autobiographical memory disturbance in combat-related posttraumatic stress disorder.** *Behaviour Research and Therapy*. Vietnam combat veterans with ($n = 19$) and without ($n = 13$) PTSD participated in an autobiographical memory experiment in which they attempted to retrieve specific personal memories exemplifying traits denoted by positive (e.g., *loyal*) and negative (e.g., *guilty*) cue words. Veterans with PTSD exhibited difficulties retrieving specific autobiographical memories, especially in response to positive trait cue words. These deficits were especially pronounced in PTSD subjects who wore Vietnam War regalia (e.g., medals, fatigues) to the laboratory. Regalia-wearing PTSD subjects disproportionately retrieved memories from the Vietnam War, unlike other subjects who retrieved relatively recent memories. Wearing regalia in daily life may be emblematic of psychological fixation to a war fought more than two decades ago. Difficulties remembering one's past may underlie difficulties envisioning one's future, as reflected in the PTSD symptom of "future foreshortening," and difficulties using memory specifically may also hamper efforts to solve personal problems.

MCNALLY, R.J., LITZ, B.T., PRASSAS, A., SHIN, L.M. & WEATHERS, F.W. (1994). **Emotional priming of autobiographical memory in post-traumatic stress disorder.** *Cognition and Emotion*, 8, 351-367. Vietnam combat veterans with PTSD, with other psychiatric disorders, or with no disorder participated in an autobiographical memory experiment. Half of the subjects in each group viewed a combat-relevant videotape, whereas the others viewed a neutral videotape. Immediately after this emotional priming manipulation, subjects were asked to retrieve specific autobiographical memories in response to a series of neutral, positive, and negative cue words. The results revealed that PTSD patients experienced difficulty retrieving specific autobiographical memories, especially after having viewed the combat videotape. Overgeneral memory appears to characterize PTSD as much as it does depression, and a relative inability to retrieve specific autobiographical memories, especially of positive valence, may contribute to the maintenance of PTSD.

MCNALLY, R.J., LUEDKE, D.L., BESYNER, J.K., PETERSON, R.A., BOHM, K. & LIPS, O.J. (1987). **Sensitivity to stress-relevant stimuli in posttraumatic stress disorder.** *Journal of Anxiety Disorders*, 1, 105-116. This study investigated perceptual and physiological sensitivity to stimuli semantically associated with trauma in 10 Vietnam combat veterans with PTSD. We used an auditory recognition task in which subjects were presented with target words related to Vietnam stressors (e.g., Firefight), phonetically similar words (e.g., Firefly), and neutral words (e.g., Fingertips). Skin conductance responses (SCRs) occurring to detected targets were also measured. 10 combat and 10 noncombat veterans with other psychiatric disorders served as control subjects. We hypothesized that, in comparison to controls, PTSD subjects should: (a) detect more stress targets than neutral targets, (b) exhibit larger SCRs to detected stress targets than to detected neutral targets, and (c) misperceive phonetically similar words as stress words. Although all groups detected more stress than neutral targets, only PTSD subjects exhibited enhanced SCRs to detected stress targets. This suggests that retrieval of trauma-related information from memory is accompanied by physiological responses consistent with fear in subjects with PTSD.

THRASHER, S.M., DALGLEISH, T. & YULE, W. (1994). **Information processing in post-traumatic stress disorder.** *Behaviour Research and Therapy*, 32, 247-254. Previous research has established that patients suffering from anxiety disorders, including PTSD, exhibit a cognitive bias that selectively favours the processing of threat material. This information processing bias has frequently been demonstrated by subjects' performance on the Stroop colour-naming task. The current experiment investigated the selective processing of threat information in people with PTSD using a modified Stroop procedure. Subjects were 13 ferry disaster survivors with high PTSD symptomatology, 20 survivors of the same disaster with low PTSD symptomatology, and 12 non-traumatized control subjects. All were asked to colour-name five types of words: ferry disaster words, general threat words, neutral semantically-unrelated words, neutral semantically-related words, and positive words. The disaster survivors with high levels of PTSD symptomatology evidenced a significantly longer response latency for colour-naming disaster-related words than for other word types. The results of the low-PTSD survivors and non-traumatized controls showed no significant difference between response latencies for general threat words and disaster words, although all 3 groups showed increased latencies for threat words compared with neutral words. The mechanisms proposed to underlie this response pattern are discussed, and clinical implications are considered.

TRANDEL, D.V. & MCNALLY, R.J. (1987). **Perception of threat cues in post-traumatic stress disorder: Semantic processing without awareness?** *Behaviour Research and Therapy*, 25, 469-476. Research suggests that anxiety-disordered patients semantically process, without awareness, threat cues occurring in unattended prose passages during dichotic listening (Mathews, 1984). In the present study, we attempted to demonstrate unaware semantic processing of threat cues in Vietnam combat veterans with PTSD. Control subjects included alcoholic and normal veterans, all without combat experience. To provide a rigorous test of the hypothesis, we employed a dichotic listening procedure that strictly controlled subjects' attentional resources and prevented momentary attention shifts from producing results spuriously suggesting semantic processing without awareness. The processing measures included skin conductance responses and shadowing errors following presentation of threat words related to Vietnam, phonetically similar words, words threatening for other anxiety-disorder groups and neutral words. The results were inconsistent with the semantic processing without awareness hypothesis, suggesting that previous data adduced as evidence for the phenomenon may have stemmed from prose shadowing procedures that permitted momentary awareness of threat cues on the unattended channel.

VRANA, S.R., ROODMAN, A. & BECKHAM, J.C. (in press). **Selective processing of trauma-relevant words in posttraumatic stress disorder.** *Journal of Anxiety Disorders*. This study investigated Stroop color-naming of trauma-related words in male Vietnam combat veterans with ($n = 42$) and without ($n = 15$) PTSD. The anxiety connotations of the words were either very specific to the Vietnam experience (point, lead), general but still Vietnam-related (medevac, bodybags), or general and not specifically related to Vietnam (crash, grief). All three categories of words slowed color-naming compared to neutral control words. This was true for all subjects, but the effect was larger in veterans with PTSD. The generally-negative but still Vietnam-related words caused more interference in color-naming than did the other categories of words, which was attributed to their ability to access Vietnam combat memories more efficiently. There was a

free recall and recognition memory advantage for the emotion words, suggesting that the Stroop interference effect was mediated by an attentional bias towards the anxiety-related material rather than avoidance of it. Veterans with PTSD were slower in color-naming overall, an effect that could not be attributed to group differences in psychiatric medication, depression, or anxiety.

ZEITLIN, S.B. & MCNALLY, R.J. (1991). **Implicit and explicit memory bias for threat in post-traumatic stress disorder.** *Behaviour Research and Therapy*, 29, 451-457. We investigated explicit (cued recall) and implicit (word completion) memory in Vietnam combat veterans with ($n=24$) and without ($n=24$) PTSD. Half of the subjects in each group encoded combat, social threat, positive, and neutral words elaboratively, whereas the others encoded these words nonelaboratively. On the cued recall test, under both encoding conditions, both groups recalled more combat words than other words. However, difference scores obtained by subtracting the mean recall for neutral words from the mean recall scores for the other words revealed that PTSD patients exhibited a relative explicit memory bias for combat words. That is, PTSD patients tended to exhibit poor memory for everything but combat words. On the word completion test, only PTSD subjects exhibited an implicit memory bias for combat words. This bias was greater for primed than for unprimed words, thereby ruling out a response bias. Such memory bias may underlie the 'reexperiencing' symptoms characteristic of PTSD (e.g. intrusive thoughts, nightmares).

PILOTS UPDATE

A unique feature of the PILOTS database is particularly helpful to clinicians and researchers interested in assessment of PTSD. For each journal article or book chapter we index in PILOTS, we include a list of all the psychological and medical assessment instruments used in the work reported. All you need to do is type the command `FIND INST IMPACT OF EVENT SCALE` and you will find entries for more than 300 studies in which it was used.

If you are considering using a particular instrument in your own work, this feature lets you see what results others have had with it. Or if you want to identify instruments that have been used successfully with certain groups, you could use Boolean searching—the combination of search terms using the conjunctions AND, OR, and AND NOT to expand or restrict the output of a search—to confine your search to studies dealing with those populations. (The command `FIND INST IMPACT OF EVENT SCALE AND DESC AFRICAN AMERICANS` will retrieve four papers in which the Scale was used with African American subjects.) And if you have produced an assessment instrument, the PILOTS database "Instruments" index allows you to find work in which your measure was employed.

If your interest lies in assessment techniques in general, rather than in a specific instrument, the PILOTS Thesaurus offers several descriptors to facilitate your search. The "Assessment" hierarchy, shown on page 35 of the *PILOTS Database User's Guide*, contains descriptors for several categories of Assessment Instruments: Interview Schedules; Projective Techniques; PTSD Assessment Instruments; Self

Report Instruments; and Trauma Assessment Instruments. These descriptors are reserved for papers that discuss in some substantive way these categories of instruments, or one or more instruments within these categories. The search `FIND DESC PROJECTIVE TECHNIQUES` would locate 26 papers on that approach to assessment.

A paper reporting work in which the Impact of Event Scale was employed would receive one of these descriptors *only if* the properties of the Scale, the techniques of its use, or its suitability were described. In such a case, the descriptors assigned to that paper would include both "PTSD Assessment Instruments" and "Self Report Instruments," as the Scale falls into both categories. (The term "Impact of Event Scale" would appear in the "Instruments" field.)

Because the PILOTS database supports Boolean searching, you can easily identify those papers that focus on a particular instrument. To continue with our example, if you wanted to read papers *about* the Impact of Event Scale, you would type in the command `FIND INST IMPACT OF EVENT SCALE AND DESC PTSD ASSESSMENT INSTRUMENTS` to locate the 37 papers that discuss it.

To facilitate searching for specific assessment instruments, we have established a standard form of the name of each instrument. This form represents, to the best of our knowledge, the official name of the instrument as given by its author or publisher. We attempt to use that name consistently, regardless of the form of name used by the author of a particular paper.

These standardized names are assembled in the *PILOTS Database Instruments Authority List*, which may be purchased in paper or microfiche form from the National Technical Information Service, or downloaded free of charge in PostScript or ASCII form from the Internet host `ftp.dartmouth.edu/pub/ptsd`. This bibliography lists all identifiable projective tests, self-report questionnaires, structured interviews, and other instruments that have been used in papers indexed in the PILOTS database. Each entry includes:

- the name of the instrument
- the surnames of its creators (this information is intended primarily to indicate which instrument is meant—there are several with similar names—and should not be taken as a definitive ascription of authorship)
- a bibliographic reference to one or more publications cited as the source of information on the instrument by those reporting its use
- the PILOTS ID number of the document referenced or of the document citing it.

In addition, many entries also include a brief description of the nature of the instrument or its relationship to other instruments. There are also many cross-references, linking alternate names for instruments with the form used in the PILOTS database.

As always, we encourage PILOTS database users to request help or offer suggestions. Telephone us at (802) 296-5132 between 08:00 and 16:30 Eastern time, or send email to `ptsd@dartmouth.edu`.

COMPLETION OF NVVRS DATABASE

Thomas L. Murtaugh, PhD
Perry Point VAMC

In 1993, data from the survey component of the National Vietnam Veterans Readjustment Study became available through the Inter-University Consortium for Political and Social Research (ICPSR) at the University of Michigan in Ann Arbor. The database now has been completed by the acquisition of the clinical component of the study. This portion of the data is composed of information acquired from clinical interviews and testing with 343 Vietnam theater veterans and 96 Vietnam era veterans. The Vietnam theater veterans were presumed to be cases of PTSD based upon their survey responses. Additional theater veterans (noncases) were selected based on their high scores on a combat exposure scale and their reports of high non-specific psychological distress. Vietnam era veteran cases were selected for the clinical subset based on their scores on PTSD indicators in the survey component and reported levels of high non-specific psychological distress.

The Clinical Data Set contains the Structured Clinical Interview for DSM-III-R and the Minnesota Multiphasic Personality Inventory. The database will include necessary weights for its use. Documentation has been developed by the Study's authors through a VA contract with the Research Triangle Institute. A second more elemental database for this component of the NVVRS also will be available. This database, termed "Clinical Raw Data," consists of the individual item responses for the clinical subsample. However, issues of confidentiality mandate that microfiche copies of the individual clinical protocols will not be made available.

The complete electronic database for the NVVRS will be available through ICPSR by the fall of 1995. Microfiche copies of the individual protocols will follow. Prospective users should be advised to employ a statistical program appropriate to stratified random samples. Moreover, users should be advised that only those files directly utilized by the NVVRS have been completely cleaned. All other files have been machine-edited.

For further information and assistance, interested parties should contact Thomas Murtaugh, Ph.D., Project Officer, VAMC, Perry Point, MD 21902, phone (410) 642-1100.

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