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Structural models of captivity trauma, resilience, and trauma response among former prisoners of war 20 to 40 years after release

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Summary. Long-term responses to captivity trauma were measured in a national sample of American former prisoners of war. Their responses included negative affect, positive affect, and somatic symptoms as assessed by the Cornell Medical Index in 1967 and the Center for Epidemiological Study Depression Scale in 1985. These responses were strongly associated with captivity trauma (as indexed by captivity weight loss, torture, and disease) and resilience (as indexed by age and education at capture). Symptoms reported in 1967 were related to symptoms reported in 1985, suggesting symptom stability. These results are consistent with a model of trauma response that incorporates both trauma exposure and individual resilience. The findings are interpreted within a theoretical view of trauma response as adaptive when viewed from an evolutionary perspective.

Former prisoners of war (POWs) have survived the traumatic experiences of combat, capture, and the hardships of captivity. Surviving American POWs comprise a group of nearly 70,000 people (Stenger 1992) and as such, their study is important in its own right. POWs also provide a unique opportunity to examine the effects of trauma sustained in adulthood upon later adjustment. Beebe (1975) has noted that most POWs experience persisting psychiatric symptoms following release, although symptom intensity typically diminishes. A smaller proportion suffer persistent diagnosable psychiatric disorders. Posttraumatic stress disorder (PTSD), other anxiety disorders, and depressive disorders are the most common (Eberly and Engdahl 1991).

Similar persistent symptoms have been noted in World War II (WWII) airmen with significant combat exposure. A "residual stress model" was proposed to explain these observations (Grinker and Spiegel 1945). Their symptoms appeared to be directly proportional to the severity of the stressors to which they were exposed. Marked personality changes often impeded their reintegration into civilian life.

Case-control and correlational studies consistently indicate that trauma sustained while a POW can cause later psychopathology. By 1951, American POWs held by Germany and Japan during WWII had experienced a four- to five-fold excess of hospitalizations for psychoneurosis relative to non-POW combatant controls (Cohen and Cooper 1954). By 1965, more POWs had been hospitalized for a variety of psychiatric illnesses (Beebe 1975). POWs held by the Japanese were more physically and psychiatrically disabled than POWs held by the Germans, because of their harsher treatment. They suffered a higher incidence and greater severity of beatings, starvation, and untreated diseases. Torture, beatings, and weight loss experienced during captivity were the strongest predictors of persistent PTSD in a sample of WWII American POWs (Speed et al. 1989). Family history of mental illness, preservice adjustment problems, and severe childhood trauma were not predictive of PTSD development. Using the Center for Epidemiologic Studies Depression Scale (CES-D; Radloff 1977) in a 1984–1985 national survey of POWs, depressive symptoms were found to be elevated among the POWs relative to their combat controls 40 years after repatriation (Page et al. 1991). These symptoms were positively correlated with the harshness of conditions during captivity and also were negatively correlated with age at capture, education, and social support after discharge from service (Engdahl et al. 1991).

A similar pattern was found among Australian POWs: significantly more anxiety and depressive disorders were found among Australian WWII POWs than among non-POW combatants (Tennant et al. 1986), and these findings were attributed to the POWs' psychological and physical trauma. Regression analyses for these POWs and controls showed the following variables to be predictive of present-day depressive symptoms: experiencing a nervous illness during WWII or a depressive illness after WWII, having a lower level of education or socioeconomic status, and being unmarried, unemployed, or retired (Dent et al. 1987).

Variables reflecting POW captivity harshness were combined through a principal components analysis to pro-

Table 1. Center for Epidemiological Studies Depression scale (CES-D) items and corresponding Cornell Medical Index (CMI) items grouped by components

CES-D	CMI
Negative Affect	
3. I felt that I could not shake off the blues, even with the help of my family or friends.	160. Are you always miserable and blue?
6. I felt depressed.	158. Do you usually feel unhappy and depressed?
9. I thought my life had been a failure.	161. Does life look entirely hopeless?
10. I felt fearful.	151. Do strange people or places make you afraid?
14. I felt lonely.	157. Do you feel alone and sad at a party?
17. I had crying spells.	159. Do you often cry?
18. I felt sad.	160. Are you always miserable and blue?
Positive Affect	
4. I felt that I was just as good as other people.	(--)
8. I felt hopeful about the future.	161. Does life look entirely hopeless? (–)
12. I was happy.	158. Do you usually feel unhappy and depressed? (–)
16. I enjoyed life.	161. Does life look entirely hopeless? (–)
Somatic Symptoms	
1. I was bothered by things that usually don't bother me.	180. Are you easily upset and irritated?
2. I did not feel like eating; my appetite was poor.	45. Is your appetite always poor?
5. I had trouble keeping my mind on what I was doing.	149. Must you do things very slowly in order to do them without mistakes?
7. I felt that everything I did was an effort.	111. Does every little effort wear you out?
11. My sleep was restless.	139. Do you usually have great difficulty in falling asleep or staying asleep?
13. I talked less than usual.	172. Are you extremely shy or sensitive?
20. I could not get "going."	110. Do you usually get up tired and exhausted in the morning?
Interpersonal Problems	
15. People were unfriendly.	(--)
19. I felt that people disliked me.	(--)

(--), no CMI item corresponded to the given CES-D item; (–) CMI item was weighted negatively. Despite being listed twice within CES-D components, CMI item 160 was used only once in the calculation of a Negative Affect score, and 161 only once in the calculation of a Positive Affect score

duce a severity score (Eberly et al. 1991). The severity score correlated with symptoms indexed by the Minnesota Multiphasic Personality Inventory's special scale of Anxiety (A factor; Welsh 1956), and the Wiggins content scales of Depression, Poor Health, Organic Symptoms, and Psychoticism (Wiggins 1966). These correlations suggest that captivity trauma can produce a persistent general increase in the experience of negative emotions, or negative affectivity (NA; Tellegen 1985). NA may be defined as the general predisposition to experience subjective distress and unpleasurable engagement with the environment.

To improve the understanding of the POWs' increased NA, Eberly et al. interpreted their findings within the context of evolutionary biology (McGuire et al. 1992). They proposed an adaptive model of trauma response in which posttraumatic symptoms have positive evolutionary adaptational value in traumatic environments. Perceiving the world as a more unpleasant and threatening place (increased NA) increases one's chances for survival (and reproduction) in a dangerous environment. The persistence of these symptoms following an individual's return to a more benign environment may result from persisting internal biological changes, as indicated by a primary response of increased levels of the underlying trait of NA.

Psychiatric symptom occurrence and stability in other groups

Longitudinal studies of adults suggest that stability of personality traits over time is the norm (McCrae and Costa 1990). Less is known about the stability of psychiatric symptoms. A statistical model of stability and change in psychiatric symptoms was proposed and applied to several data sets (Duncan-Jones et al. 1990). Substantial symptom stability was found, along with a high correlation between stable symptom levels and the trait of neuroticism.

Anxiety disorders may be triggered by life events, and their course is often chronic and complicated by depres-

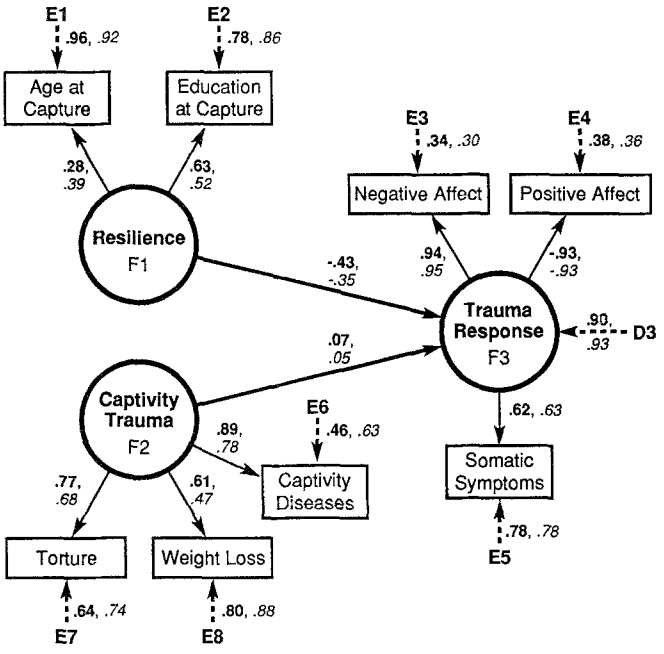

Fig. 1. Structural equation model and standardized parameter estimates for the 1967 (time 1) Cornell Medical Index based survey. *Circles* designate latent constructs, *D3* represents the construct residual, *squares* enclose the construct indicator variables, and the *E terms* represent the variable error terms. World War II POW group values are printed first, and Korean War POW group values next, in *italics*. Normed fit index = 0.952 (WWII, $n = 402$) and 0.933 (Korean, $n = 309$); comparative fit index = 0.964 (WWII) and 0.948 (Korean)

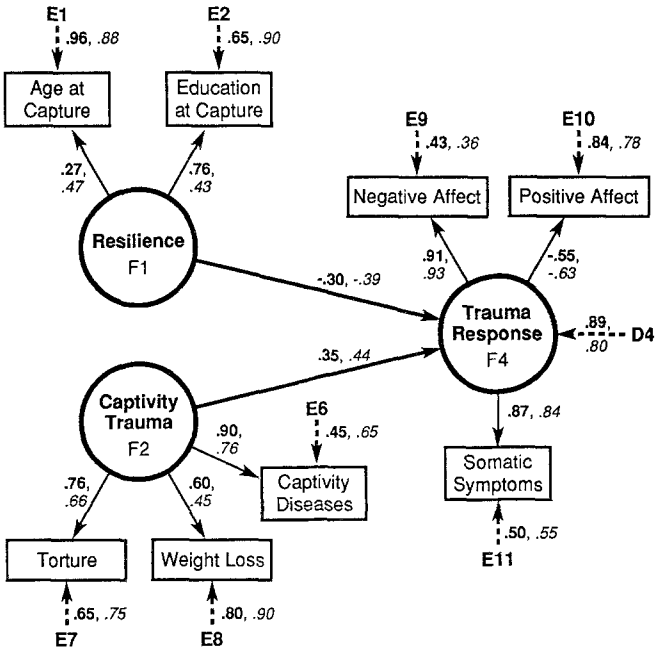

Fig. 2. Structurual equation model and standardized parameter estimates for the 1985 (time 2) Center for Epidemiologic Studies Depression scale based survey. *Circles* designate latent constructs, *D4* represents the construct residual, *squares* enclose the construct indicator variables, and the *E terms* represent the variable error terms. World War II POW group values are printed first, and Korean War POW group values next, in *italics*. Normed fit index = 0.968 (WWII, $n = 402$) and 0.969 (Korean, $n = 309$); comparative fit index = 0.982 (WWII) and 0.983 (Korean)

sion in the general population (Angst and Vollrath 1991). Angst and Vollrath found the strongest predictors of persistent anxiety disorders to be the severity and duration of symptoms, and comorbidity with depression. Additional contributing factors were used in a structural equations modeling approach in a 4-year prospective study (Holohan and Moos 1991). Selected personality characteristics, family support, and prior depression were strongly predictive of subsequent depression.

The longitudinal course of posttraumatic adjustment among victims of an Australian brushfire disaster involved more delayed and chronic symptoms than acute symptoms, including painful memories, depressed affect, and physical complaints (McFarlane 1988). A combination of predisaster variables and trauma exposure was most predictive of posttraumatic symptoms. In a sample of combat veterans and POWs, PTSD was the most common lifetime psychiatric disorder, and its onset almost always closely followed the experiences of combat and captivity. PTSD most commonly preceded the onset of phobias, major depression, and panic disorder (Mellman et al. 1992).

The present study examines the interrelationships among POW captivity trauma variables, individual variables reflecting resilience, and later symptoms of trauma response. Our data were drawn from longitudinal follow-ups of two POW cohorts assessed in 1965 and 1984, allowing cross-cohort comparisons and linkage of the results across the time intervals.

Method

Subjects

The Medical Follow-up Agency of the National Academy of Sciences' Institute of Medicine has studied the health of American former POWs since the early 1950s. The Army's roster of all known WWII POWs was used to select random, independent samples of servicemen captured in the Pacific and European theaters (Cohen and Cooper 1954). The number of Pacific prisoners in the study cohort was later doubled and a group of Korean War POWs and nonprisoner controls was added (Nefzger 1970). A 20-year follow-up was conducted in 1964–1965, collecting data from the military and the Veterans Administration (VA; now Department of Veterans Affairs) records and from questionnaires (Beebe 1975).

Measures

Variable selection for the present study was based on the captivity maltreatment literature, particularly the studies of Australian POWs (see Engdahl and Eberly 1990 for a review) and preliminary data analyses. *Years of education* and *age at capture* were abstracted from the 1964–1965 (time 1) survey (Beebe 1975). The time 1 survey asked for a self-report of diseases suffered during captivity. These included malaria, dysentery, pneumonia, tuberculosis, in-

testinal worms, scabies and other skin diseases, pellagra, beriberi and other vitamin deficiency diseases, and diphtheria. A *POW camp disease* score was calculated by adding the number of "yes" responses for each of these 11 disease categories. *Percentage of body weight lost* was calculated as the difference between self-reported weight at induction and self-reported lowest weight during captivity, divided by self-reported weight at induction. The Cornell Medical Index (CMI; Brodman et al. 1949), a self-report measure of somatic and psychiatric symptoms was also included. The CMI is a 195-item questionnaire organized by symptom groups that can yield a number of composite scores.

The 1984–1985 (time 2) survey included the 20-item CES-D, a standardized self-administered rating instrument measuring depressive symptoms. Although CES-D screening results correlate modestly with clinical diagnoses of depression (Myers and Weissman 1980; Boyd et al. 1982), the CES-D does not yield a diagnosis. Its primary utility is in the estimation of symptom prevalence. CES-D responses reflect anxiety as well as depression (Breslau 1985; Roberts et al. 1989). Its items are often grouped into four factors as shown in Table 1: Negative Affect (NA), Positive Affect (PA), Somatic Symptoms (SS), and Interpersonal Problems (IP) (Golding and Aneshensel 1989). These factors share substantial variance with each other (Engdahl et al. 1991) and have much in common with persistent affective states recognized among survivors of adult trauma. These states include anxiety (high NA) and depression (low PA), Rundell et al. 1989). Somatic symptoms have been especially noted among survivors of concentration camps (Eitinger 1971) and POWs (Eberly et al. 1991). Somatic symptoms appear frequently with anxious and depressive symptoms in the general population (Simon and Von Korff 1991).

To obtain representations of the CES-D factors in the time 1 survey data, the authors selected the CMI items that most closely correspond to the CES-D items; they are summarized in Table 1. The CMI did not have items corresponding to the CES-D IP factor items.

Procedure

Time 2 mailing began late in 1984, and replies were accepted up to the end of December 1985. After excluding deceased subjects discovered by survey, the final response rates were 74.5 % for the Pacific, 75.3 % for the European, and 68.8 % for the Korean POWs. Overall response rates for time 1 and time 2 surveys were roughly 65 % and 71 %, respectively. Attrition was arguably modest considering the length of time spanned. If response tendency at time 1 had been independent of tendency at time 2, the combined response rate would only be 46 % (0.65 X 0.71). The actual combined response rate was nearly 60 %, showing (not surprisingly) that time 1 respondents were more likely to respond at time 2.

Time 1 and time 2 survey data suggested that bias from nonresponse was not great. Time 1 response was unrelated to key findings in the history and physical examination obtained earlier at repatriation except for weight loss (nonrespondents having lost slightly more). More importantly, VA hospital use, ascertained independently of the survey, was quite similar for respondents and nonrespondents. However, respondents were better educated and of higher rank than nonrespondents, suggesting a social class difference. Moreover, time 2 respondents tended to be older and to report fewer POW camp medical symptoms. However, a statistical model using these differences predicted only a small discrepancy in reported depressive symptoms; adding imputed data for nonrespondents to the study would have increased depressive symptom scores only minimally (Page 1991).

Methodology

The theoretical topics outlined earlier in this article were investigated by translating their relationships into structural equation models (SEMs). The EQS program (Bentler 1989) was used for all SEM procedures. Maximum likelihood estimation of SEM parameters was used. Two indices of model fit, the normed fit index (Bentler and Bonnet 1980) and the comparative fit index (Bentler 1989), were used to evaluate the fit of the final models.

Results

As expected, weight loss, POW camp diseases, and the experience of torture were moderately intercorrelated, as were the CMI and CES-D measures. The CMI scales of NA and PA were highly negatively correlated ($r = -0.880$), suggesting that they may, in fact, measure unpleasant vs pleasant affect, because *pure* measures of NA and PA tend to be less closely correlated (Tellegen 1985). As in previous studies of CES-D structure, its components of NA and SS were highly correlated ($r = 0.792$).

Figure 1 presents the standarized solution for a time 1 SEM, including error terms (E1–E8) and their measured variables (boxes), and latent variables (circles); D3 is the latent variable regression residual. Resilience (F1) is defined by age at capture and education at capture; captivity trauma (F2) is defined by captivity diseases, torture, and weight loss; and trauma response (F3) is defined by CMI-based negative affect, positive affect, and somatic symptoms. In all figures, WWII POWs' coefficients are shown in bold type and placed first in the model paths; the highly similar values for the Korean War POWs are shown in italics following the WWII POWs' values.

The SEM in Fig. 2 is comparable to the SEM in Fig. 1, except that it uses negative affect, positive affect, and somatic symptoms based on the CES-D (rather than the CMI) to index time 2 trauma response (F4). Figure 3 presents a SEM that includes *both* the CMI and CES-D-based variables, (times 1 and 2, trauma response factors F3 and F4). To test the possibility that time 2 trauma response was indeplendent of resilience and captivity trauma, (and primarily related to time 1 trauma response),an alternate model (not shown) was tested that omitted

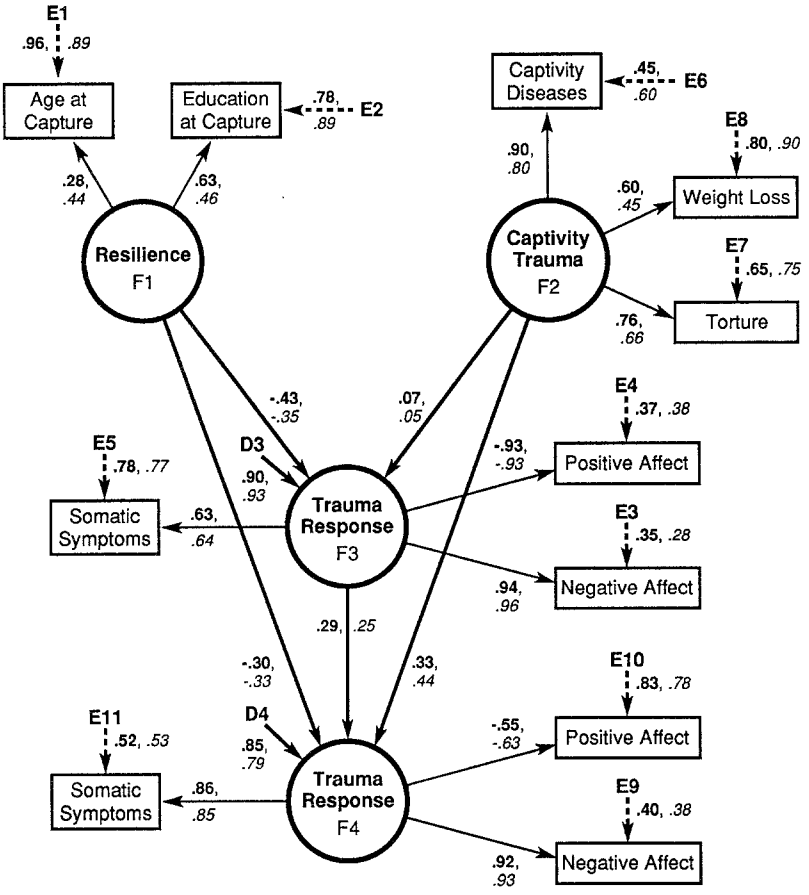

Fig. 3. Structural equation model and standardized parameter estimates using the 1967 (time 1) and 1985 (time 2) surveys. *Circles* designate latent constructs, *D3* and *D4* represent the construct residuals, *squares* enclose the construct indicator variables, and the *E terms* represent the variable error terms. World War II POW group values are printed first, and Korean War POW group values next, in *italics*. Normed fit index = 0.943 (WWII, $n = 402$) and 0.934 (Korean, $n = 309$); comparative fit index = 0.956 (WWII) and 0.949 (Korean)

paths from F1 to F4 and from F2 and F4. This model displayed severely degraded SEM fit indices and therefore was rejected.

The models in Figs. 1–3 were statistically significant according to both the normed fit indices and the comparative fit indices, indicating that both captivity trauma and resilience were predictive of trauma response. Cross-validational analyses (not shwon) applied model parameters developed from WWII POWs' data to the Korean War POWs' data, and vice versa. In all cases, goodness-of-fit indices were only slightly reduced.

Taken cross-sectionally, time 1 (Fig. 1) trauma response was linked primarily to resilience and only marginally to captivity trauma, while time 2 (Fig. 2) trauma response was strongly linked to resilience *and* captivity trauma. These time 1 and time 2 interrelationships are also evident in the combined model presented in Fig. 3, which added a link between time 1 and time 2 trauma response factors. Figure 3 indicates that the effects of resilience (F1) and time 1 trauma response (F3) made approximately equal contributivons to time 2 trauma response (F4), with captivity trauma (F2) being a somewhat stronger contributor.

Previous research has shown that symptom levels decrease over time for these men. The present findings of consistent linear relationships spanning two time intervals suggest that these men may have maintained their symptom level "rank order"; many may have experienced symptom level decreases of similar magnitude between time 1 and time 2. Future analyses will examine this hypothesis directly.

Discussion

Negative and positive affect

Depressive symptoms are known to be elevated among POWs and other survivors of trauma, as is diagnosed depression (Page et al. 1991). The present findings were consistent with other findings linking increased depressive symptoms and decreased positive affect with higher levels of captivity trauma and lower education and younger age. Case histories suggest that depressive symptoms experienced upon release from captivity often were in reaction to the various losses sustained in the course of combat and captivity. Other depressive symptoms could arise over time in response to chronic anxiety symptoms.

Somatic symptoms

The interpretation of the chronic war neurosis observed by Kardiner (1941) as a "physioneurosis" is consistent with the present findings of increased somatic symptoms (and several of the NA symptoms) among POWs exposed to high levels of captivity trauma. To Kardiner, the war

neurosis was different from social neurosis in that the central focus of distress in war neurosis rested in the individual's difficulty with his body image – his somatic functioning – and not with social conflict.

Of course, the injuries, malnutrition, and diseases suffered by many POWs during combat and captivity must be recognized in an interpretation of their symptoms (Eberly and Engdahl 1991). Their persistent somatic symptoms are probably traceable to the direct physical effects of injuries, malnutrition, or disease, and to "stimulus trauma" (Kolb 1987) that may have caused cortical neuronal and synaptic changes. Clinical and laboratory findings have demonstrated both functional and neuronal change following high-intensity stimulation of the peripheral nervous system.

Overarousal, as reflected in items related to concentration difficulties and sleep problems, is consistent with the anxiety disorder diagnoses given to many of these POWs in the years following their service. The more recently developed diagnostic category of PTSD (now recognized as central in the adjustment of many trauma survivors) has a primary feature of increased arousal. PTSD's other primary features of intrusive memories and feelings, and behaviors aimed at avoiding reminders of the trauma, were not assessed in these surveys. Research in progress is examining these features of PTSD in this sample.

Many factors known to affect POWs' long-term adjustment were not included in the surveys that comprise the present study and therefore are not represented in our models. Combat exposure has significant impact on many POWs, sometimes rivaling the impact of captivity experiences. Wounds and other injuries have a major impact on the adjustment of many POWs (Speed et al. 1989). Postwar social support is significant in the adjustment of POWs (Engdahl et al. 1991). Preliminary analyses showed that several theoretically relevant variables from these surveys were, in fact, unrelated to trauma response variables, in part because they were statistically infrequent (e.g., family or personal history of mental illness), or skewed (marital status at capture was nearly always "single," and military rank at capture was "enlisted"). These variables were not included in the final models.

Conclusion

In these models, paths from predictors (resilience and captivity trauma) to outcome variables assessed later in adulthood (trauma response) were estimated separately for WWII and Korean War POWs. The patterns of interrelationships were highly similar and consistent with a model in which trauma exposure and individual buffering factors jointly produce symptoms. Trauma response was not primarily dependent on characteristics of the individual or characteristics of the trauma, but was determined by an interaction of the two. Trauma response, especially its persistent nature, may be more adequately understood when viewed – from an evolutionary perspective – as adaptive.

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