

Traumatic entrapment, appeasement and complex post-traumatic stress disorder: evolutionary perspectives of hostage reactions, domestic abuse and the Stockholm syndrome

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Evolutionary theory and cross-species comparisons are explored to shed new insights into behavioural responses to traumatic entrapment, examining their relationships to the Stockholm syndrome (a specific response to traumatic entrapment) and complex post-traumatic stress disorder (PTSD). A selective literature review is undertaken examining responses to traumatic entrapment (including hostage, domestic abuse and similar situations) and the Stockholm syndrome, before examining mammalian, reptilian and other defensive responses to relevant threats. Chimpanzees, the closest relatives of humans, are closely examined from this perspective and commonalities in behavioural responses are highlighted. The neurobiological basis of defensive behaviours underlying PTSD is explored with reference to the triune brain model. Victims of protracted traumatic entrapment under certain circumstances may display the Stockholm syndrome, which involves paradoxically positive relationships with their oppressors that may persist beyond release. Similar responses are observed in many mammalian species, especially primates. Ethological concepts including dominance hierarchies, reverted escape, de-escalation and conditional reconciliation appear relevant and are illustrated. These phenomena are commonly encountered in victims of severe abuse and understanding these concepts may assist clinical management. Appeasement is the mammalian defence most relevant to the survival challenge presented by traumatic entrapment and appears to be the foundation of complex PTSD. Evolutionary perspectives have considerable potential to bridge and integrate neurobiology and the social sciences with respect to traumatic stress responses.

Key words: abuse, appeasement, complex PTSD, hostage, Stockholm.

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Paradoxes initially appear absurd and conflict with conventional wisdom. Two of the greatest paradoxes in mental health are the Stockholm syndrome and the cooperative behaviours often shown by abused chil-

dren and adults to their domestic abusers. These victims may not only comply with their abusers but idealize them, even beyond the point of release. A number of authors have noted both Stockholm and post-traumatic stress disorder (PTSD) characteristics in victims of domestic abuse [1]. Judith Herman's landmark paper noted that '...prolonged, repeated trauma can occur only where the victim is in a state of captivity, unable to flee, and under the control of the perpetrator'. She described the result as 'complex PTSD' [2].

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Compared with ordinary PTSD, complex PTSD involves more complex, diffuse and tenacious symptoms, characteristic personality changes, and vulnerability to repeated harm, both self-inflicted and by the hands of others. The DSM-IV PTSD Field Trial referred to complex PTSD as 'disorders of extreme stress not otherwise specified' (DESNOS), its components being alterations in regulating affective arousal (e.g. anger, self-destructive and sexual behaviours), alterations in attention and consciousness (e.g. dissociation), somatization, characterological changes (e.g. chronic guilt and shame, idealization of the abuser, difficulties with trust and a tendency to revictimization) and alterations in systems of meaning [3].

This paper has two aims: first, to propose an evolutionary theory of complex PTSD specific to those trapped in traumatic subordinate relationships; and second, to illustrate the relevance of evolutionary theory and cross-species comparisons generally to PTSD research. Traumatic entrapment includes sieges (military and civilian), concentration camps, wartime prisons, torture, kidnapping, abusive cults and domestic abuse. Readers must judge, but a measure of success would be if the paradox at the start has disappeared by the end of the paper.

We proceed by setting the scene of traumatic entrapment and the Stockholm syndrome, explaining their relevance to complex PTSD, illustrating related defensive phenomena in other species, before discussing a neuroscientific model especially relevant to PTSD research and clinical practice.

Traumatic entrapment

Recent global conflicts have increased the need to understand hostage experiences. Hostage captor relationships involve massive power imbalances. Torture may be involved and is associated with high rates of PTSD [4], particularly if victims are caught unprepared [5] and if torture involves sexual assault [6]. Domestic abuse often shares this oppressive relationship orientation.

In prolonged captivity sensory deprivation is usually induced through blindfolding and isolation. Unhygienic conditions, physical abuse, threats of impending death, powerlessness, dehumanization, general humiliation and the need to avoid incurring the further wrath of captors are also characteristic [7]. Captors cultivate hostile environments involving total domination to massively disempower their victims [8]. Threats may be vague and incomprehensible,

adding to the unpredictability of the experience [9] – unpredictability being a potent inducer of anxiety in mammals generally [10].

The civilian case of Patty Hearst is illustrative. In 1974 Patty Hearst was kidnapped from her wealthy American family by the Symbionese Liberation Army (SLA), who kept her blindfolded in two small closets, subjecting her to sensory deprivation, repeated rape and threats of death [11]. In 2 months she was allowed out of the closet for two baths and on 'lucky' days the door to her closet was left open for fresh air, when she would hear her captors voicing propaganda. After 2 months she was too weak to flee from her heavily armed captors. Finally, before she appeared to capitulate, she was offered a choice: she could go free or join the SLA. She knew from former interrogations that requesting the former meant she would be killed, so she requested to join the SLA to live, at least for the present. She was then told that joining was contingent on her persuading each group member of her worthiness for acceptance into the group. Having earned acceptance she was forced to participate in lawbreaking, including her infamous bank robbery for which she was convicted (and many years later pardoned). She is said to have developed PTSD [12].

Stockholm syndrome

The Stockholm syndrome refers to the paradoxical development of reciprocal positive feelings between hostages and their captors, which may enhance captives' coping with traumatic experiences [13]. The Stockholm syndrome originally referred to a 1973 bank robbery in Stockholm, in which four hostages were held captive for several days [14]. Following release the hostages displayed paradoxically positive feelings towards their captors, and to a lesser extent the captors to their hostages. The hostages defended their captors, condemning the police, their rescuers. One female hostage subsequently developed an intimate relationship with one of her captors, illustrating the depth of the bonds.

In another incident, criminals discovered an undercover police agent in their midst. The leader of the criminals left instructions that the agent be killed, if he (the leader) did not phone in to confirm his successful escape. The phone call followed, the agent lived, and subsequently resisted testifying against the leader for several years, feeling that the leader had saved his life [15].

In the 2002 Chechen led siege involving more than 800 hostages in a Moscow theatre, 130 hostages died when Russian Special Forces stormed the theatre. Subsequent interviews of a sample of 11 hostages found that 10 displayed Stockholm characteristics [16].

The development of the Stockholm syndrome in hostages is considered protective, with the paradoxical bonds opposing the captors' inclinations to kill their hostages. The longer the siege, the more likely it is that the syndrome will develop [15]. However, in prolonged sieges police may be unable to trust hostages who become unreliable witnesses [17].

Four conditions form the basis for the formation of the Stockholm syndrome: (i) perceived threat to one's physical or psychological survival at the hands of an abuser(s); (ii) perceived small kindnesses from the abuser to the victim; (iii) isolation from perspectives other than those of the abuser; and (iv) the inescapability of the situation [18].

In Sardinia (Italy) kidnapping is common and was associated with a 21% mortality rate for the period 1960–1980 [19]. PTSD was found in as many as 45.9% of former captives, similar to that associated with concentration camps and torture. Humiliating and deprivation experiences predicted the development of the Stockholm syndrome, but not PTSD, suggesting that the Stockholm syndrome has important differences from PTSD.

Suggested explanations for the Stockholm syndrome have included identification with the aggressor and introjection of the valued attributes of the captor [9]. Victims may regress, identifying with their captors as a child might with an abusive parent [15]. Cognitive dissonance is also involved [18]. The victim reduces emotional discomfort arising from contradictory cognitions by bending those cognitions to accommodate the situation – the “all husbands beat their wives” perspective. As is wont in cognitive psychology this may be causal or largely an echo of inner experiences. Brainwashing has been suggested as another explanation. This usually involves captives being repeatedly debased and threatened with death or other grave consequences, if they do not confess their inferior and shameful status. Termination of this torture requires compliance with the oppressors.

The Stockholm syndrome has been experimentally tested from the perspective of interpersonal theory using simulated captivity [13]. This involved two central interpersonal dimensions: control (dominance–submission) and affiliation (friendliness–hostility). The less the ‘hostages’ perceived the ‘terrorists’

as dominant and the more they perceived them as friendly, the better was the hostage adjustment.

Both the Stockholm syndrome and complex PTSD share the central characteristic of a seemingly paradoxical idealization of the abuser. It is this phenomenon on that we will now focus on from an evolutionary perspective.

Appeasement: a mammalian defence

Anxiety and fear have been essential to survival. Further, anxiety disorder subtypes are associated with symptoms that make sense from a survival perspective [20,21]. Fear of heights is associated with freezing, making one less liable to falling. Blood phobias are associated with fainting, which helps restore blood pressure in bleeding individuals. Bracha *et al.* have recently proposed detailed and specific evolutionary origins for anxiety subtypes, including PTSD [22,23]. Nesse has also emphasized the adaptiveness of physiological defences including pain and fever [24].

Cantor proposed a comprehensive theory of PTSD suggesting that it is a disorder of mammalian defences complemented by vigilance and risk assessment, operating on high alert over extended periods [25]. The theory emphasizes that most of *Homo sapiens'* genes involved in defence evolved millions of years prior to the advent of the first hominid (upright great ape) 5 million years ago. *Homo sapiens* arrived as recently as approximately 150 000 years ago. Fundamental survival behaviours such as breathing, eating, drinking and those involved in reproduction are highly conserved throughout the animal world. They did their jobs effectively and their functions were so central to survival that major mutations affecting these functions would have tended to be fatal. Another fundamental survival behaviour (collectively) is defence.

The DSM-IV PTSD criteria include re-experiencing phenomena, which Cantor suggests represent exaggerated recall of threats: an inability to forget [25]. Heightened memory would be a prerequisite for learning a more defensive strategy [26]. Avoidance behaviours are clearly defensive even though the DSM-IV grouping confuses true avoidance, withdrawal (flight) and numbing phenomena. Similarly, DSM-IV overarousal symptoms represent hypervigilance phenomena plus aggressive defence (irritability/anger). Hypervigilance in mental health tends to be interpreted in its physiological sense, but in zoologi-

cal ecology it relates more to heightened scanning for sources of threat.

Diseases can be properly conceptualized only if their associated normal functions are understood [27]. Psychiatry has neglected the study of mammalian defences, commonly grossly oversimplifying them as 'fight or flight' [25,28]. There are six major mammalian groups of defensive behaviours, all of which are found in exaggerated states in PTSD [25]. A logical sequence for approaching defences recognizes the needs for energy conservation and minimization of injuries. Accordingly, the first defence is avoidance of threats, followed in approximate order of physical proximity and risk by attentive immobility (freezing as a prelude to more definitive action), withdrawal (including 'flight'), aggressive defence (including 'fight'), appeasement and tonic immobility. The latter is a physiologically different form of freezing to attentive immobility. It is the final defence typically used when a predator is about to eat its prey. Victims by freezing may yet deter predators by confusing them, inhibiting attack reflexes and simulating dead and possibly contaminated meat.

Traumatic entrapment situations are well beyond the avoidance stage; withdrawal may be desired but is impossible; aggressive defence is not viable because of much lesser status and the situation is not yet terminal (tonic immobility). This leaves appeasement as potentially more relevant.

Appeasement comprises pacification, conciliation and submission. It is primarily a defence strategy relevant only to conspecifics (one's own species) and mostly social species. It is generally an irrelevant response to predators, in contrast to all the other mammalian defences in which predation threat has figured prominently in their evolution [25]. If trapped subordinate individuals under serious threats from dominants attempted to use withdrawal or aggressive defence they would escalate the risks. Appeasement serves a de-escalating function [25,29]. Subordinates using appeasement suspend efforts to win the contests, but thereby decrease the costs of losing.

Studies of contemporary primates provide clues as to how affiliative tendencies may have become associated with coercive control situations in our hominid ancestors. Ethopharmacologist Michael Chance noted that, after being attacked, monkeys and apes tend to turn to the attacker for comfort and safety [30]. He called this 'reverted escape', because after fleeing from the attack the attacked animal returns, or reverts, to the attacker rather than turning to another member of the group for succour. This observation has been confirmed by recent work on

'post conflict anxiety' in chimpanzees (measured by self-directed behaviour such as scratching) [31]. After a fight both contestants show anxiety, especially the loser, and this anxiety is assuaged by affiliative behaviour (e.g. hugging and kissing) between the former combatants. If defeated animals turned to other group members for comfort, victors might interpret this as enlisting agonistic support for comebacks.

The dominant having accepted the subordinate back, may later repeat threatening behaviour causing further arousal and reverted escape, reinforcing the dominant/subordinate orientation and bonds. Male baboons herd their female baboons by neck bites, resulting in reverted escape by the female baboons and strengthening of bonds [32]. Social structures are more stable if there is acceptance of the hierarchy. Further, conflict or extrusion from the group carry costs to both the subordinate individual and the group because the group loses whatever potential resources the individual may bring [33]. The latter is the reason for taking hostages.

Different mammals manifest different appeasement behaviours. Many reduce their apparent size, signalling 'no threat'. Humans cower, bow, kneel, prostrate themselves, and doff their hats. Dogs may submit by way of infantile mimicry, rolling on their backs like puppies. Human appeasement may be expressed with the metaphor of sickness, conveying the message, 'I am a weak sick person' [34]. Somatic PTSD symptoms may reflect this. Many primates use sexual strategies. Submitting adult male primates may offer their genital regions to the dominant, conveying the message, "I am like a weak female". Dominants may respond by emphasizing their rank by token mounting actions [34]. In humans this expression of dominance is recognized in violent closed subcultures such as prisons and sometimes the armed forces. Newcomers may be sodomized as a means of promoting submission and acceptance of their subordinate status. Similar dominance behaviours have been documented in the recent Iraq conflict. They are understandable from a mammalian perspective, but incompatible with civilized standards.

Hunter-gatherer women have been remarkably frequently kidnapped by opposing tribes, with little likelihood of rescue. From an evolutionary perspective defiance in such circumstances carries the prospect of death and the non-transmission of related genes. Submission and defection may promote genetic survival. This has been described as 'capture-bonding' [35]. Thus the transmission of genes for appeasement may have been facilitated.

Appasement followed by conditional reconciliation in chimpanzees

The relationship between torturers, other oppressors and their entrapped victims can be illustrated by observations of chimpanzees, the closest relative of *H. sapiens*. While female chimpanzees tend to change groups at puberty, male chimpanzees remain for life in the same small groups (usually under 10 individuals), living in clear dominance hierarchies. Peace is interspersed with occasional aggressive challenges by subordinates for dominance. Dominant male chimpanzees are strongly motivated to protect the resources associated with dominance and may engage in savage retaliation, for example tearing off the challenger's testicles [36]. Escape is not an option for the vanquished subordinate because the natal group is the only one that will accept a male chimpanzee.

Defeated chimpanzees seek comfort from the winner because of the importance of agonistic (aggression-driven) alliances [37]. In such small closed groups if the loser sought safety and comfort from other individuals this could be misinterpreted as seeking help for a further challenge and result in the renewal of punishment; therefore the only permissible source of comfort is the chimpanzee that has just defeated the subordinate, and who therefore combines the roles of both the punisher and source of safety. Reverted escape is followed by 'conditional reconciliation', hugging and kissing each other, with reconciliation conditional on subordinates accepting their lesser rank [32]. A period of 'post-conflict anxiety', more marked in the losing chimpanzee, may be indicated by self-directed scratching [31]. Similarly, humans may bite their nails. Depression complements anxiety in post-conflict reconciliation. Anxiety motivates safety and comfort seeking [38], whereas depression demotivates the loser from regaining his former rank, fulfilling a longer-term de-escalating function. It induces an 'involuntary subordinate self-perception' (analogous to low self-esteem), reconciling the losing animal to its subordinate status [34,39].

To reproduce, the male chimpanzee confined to his group has to achieve a certain rank in the hierarchy, by forging alliances with both subordinates and dominants and intimidating those ranking below him [37]. In this highly social species the restoration of cooperation following conflict is important for group cohesion and defence against predators and out-group conspecifics [40]. Strong selection pres-

ures have driven the evolution of these hierarchical aggressive and affiliative intra-group behaviours.

From chimpanzees to human entrapment

If the common ancestor of humans and chimpanzees had a similar social structure to present-day chimpanzees, we can see how the infliction of punishment onto defenceless human victims is compatible with the development of affiliative relationships. Nevertheless, these chimpanzee appeasement behaviours contrast with usual contemporary human experiences whereby oppressed individuals can seek solace from others within a larger, multigenerational, dual-sex group, or from beyond the group. However, in the closed environment of a hostage situation the hostage may have only dominant oppressors to turn to (reverted escape). Being seen to seek comfort from other hostages may be perilous and interpreted as insubordination. In the closed environment of a psychiatric ward we might refer to such comfort seeking as 'splitting'.

Appasement is also activated in situations of domestic abuse. Leaving the family group is not to be undertaken lightly. The abused child or partner, like the hostage, may be forced by circumstance to accept their subordinate status and their oppressive abusers. The battered wife may undergo conditional reconciliation with her dominant partner, perhaps by a tearful childlike flirtatious display of inferiority (a behaviour remarkably similar to that observed in chimpanzees). Furthermore, she had best not be seen turning to her friends for comfort. Herman [2] noted, 'To the chronically traumatized person, any independent action is insubordination, which carries the risk of dire punishment'.

As observed in primates, sexual offerings may be used to appease the oppressive dominant individual. Adult stalking victims may at times consent to sexual intercourse with their stalkers in desperate attempts to appease them – another manifestation of reverted escape. Submitting humans may use diverse behavioural strategies including shrinkage in size, infantile and sexual behaviours as suits the situation [34]. Self-destructive behaviour may represent a metaphor for lowering of one's status.

Appasement is associated with the emotions fear and shame [41]. Fear motivates defence; shame facially and otherwise signals 'no threat'. Shame is an emotion that is so uncomfortable that dissociation is often involved in the context of PTSD [42]. Shame

is experienced in rape victims who blame themselves for their humiliation.

Neurobiology, evolutionary psychology and the social sciences

Evolutionary psychology has great potential to bridge the gulf between the biological and social sciences. Neurophysiology can be related to social function [43]. The early study of PTSD was heavily socially orientated but currently is facing an unprecedented neurobiological swing. The following section demonstrates how these sciences can be simultaneously understood, with new insights. Understanding PTSD symptoms from this perspective may aid both research and therapy because it suggests answers to questions of why and how.

Paul MacLean, the developer of the well-known limbic system concept [44], also developed the concept of the 'triune brain' [45], which assists understanding the 'sociophysiology' of defence and PTSD [43]. The triune brain suggests both anatomically and functionally that brain structures evolved in three major eras: the reptilian era (originating approximately 300 million years ago), the early mammalian era (from 200 million years ago) and the new mammalian era (from 65 million years ago) [45,46]. Some features of PTSD are purely involuntary, for example the startle reflex, hence are likely to be activated by older brain structures and have been located as emanating from the brainstem [47].

MacLean's theory has been criticized, but only in matters of detail [48]. The main point is that there are at least three 'central processing assemblies' arranged rostrally/caudally in the forebrain, and that each assembly makes decisions relatively independently in dealing with the environment. This contrasts with the idea of a gradual and homogeneous accretion of brain volume during evolution. The triune concept reflects the difficulty that sophisticated humans experience in reconciling discordant emotions with logical cognitive appraisals. With fundamental survival behaviours, the neomammalian forebrain has relatively little control over the reptilian and palaeomammalian levels.

Panksepp emphasized the desirability of examining psychiatric disorders from the bottom-up by way of 'endophenotypes', primal brain functions that can be linked to neural circuits and the underlying genetic controls [49], similar to the 'psychobiological response patterns' of Gilbert [39]. We propose that appeasement is the most likely endophenotype for

complex PTSD. Appeasement may be associated with changes in the chemistry and anatomy of the brain. Such work is currently being carried out on cynomolgus monkeys [50], tree shrews [51], rats [52], mice [53] and cichlid fish [54].

Appeasement may operate at any of the triune brain levels. In its most primitive form appeasement is an all-or-nothing response, as seen in some contemporary reptiles, in which appeasement takes the form of total body colour change. An adult male *Anolis carolinensis* may lose its bright colouring, reverting to the muddy brown of immature animals, but if a dominant-subordinate pair is broken up then the subordinate's colour often becomes lighter again [55]. Sometimes the colour change is irreversible, becoming progressively darker and the lizards die, reflecting pathological processes associated with status change. Interestingly this colour-changing animal cannot appease one rival while dominating another. This all-or-nothing characteristic of reptilian appeasement is one reason we allocate to the reptilian level of the forebrain the strategy selection between elevation and depression of mood, both of which have pervasive effects on behaviour. Complex PTSD entails more depressive elements than simple PTSD, consistent with our emphasis on appeasement.

The middle, or palaeomammalian level, of the triune brain involves the limbic system and emotional reactions. The subordinate rodent, canid or primate feels fear and a sense of being chastened by the dominant. Depressed emotion is context dependent, unlike the pervasiveness of depressed mood, reflecting the fact that in mammalian hierarchies most animals operate in the middle and, while being chastened from above, may be aggressive to those lower in rank. They express anxiety looking up but irritability looking down the hierarchy. Also, because sanctions may be applied by the group as well as by individuals, they feel shame when not reaching the group's standards. Human blushing forms part of this primitive appeasement display.

At the neomammalian level we have the rational, voluntary, conscious adoption of appeasement, which may require considerable social skill, as in a flowery speech of submission. Moreover, appeasement at this level may be either genuine or simulated, in which the individual appears appeasing but lacks submissive feelings and may be planning a comeback or rebellion (a possibility which Milton, an expert in appeasement or the lack of it, has Satan consider, and reject, in the first book of *Paradise lost*). Patty Hearst described during her captivity being orientated to doing whatever was needed to survive, but found herself also led

on by a deeper appeasing force she did not understand [11]. This would be compatible with triune levels of appeasement operations.

Fear responses involving flight and aggressive defence/fight require rapid processing. Neomammalian cognitions permit complexity but are slow. The more primitive brain levels provide more rapid reactions [56,57]. Bracha has even suggested specific evolutionary time-frames for the origins of the many fears humans experience, for example fears of heights, separation, darkness, snakes, drowning etc. [23]. PTSD may involve contributions predominantly from the reptilian and palaeomammalian brain levels. Patients often report surprising difficulty implementing exposure programmes. It is as if there is something unexplainable deterring the progress that otherwise logically seems readily attainable. However, the association of appeasement with complex socialization suggests that appeasement in the great apes (including ourselves) is likely to have evolved with greater neomammalian selection pressures than the other defences [25].

Finally, we suggest that PTSD research needs to pay closer attention to the context in which PTSD arises. The appeasement context of complex PTSD is highly specific. This gives rise to the possibility that PTSD may constitute a range of disorders of defences. In the evolutionary journey to the present day the sources of threat were predators, conspecifics and the environment. Might these types of threat give rise to different PTSD symptom profiles?

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