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Intergroup atrocities in war: a neuroscientific perspective

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Abstract
Studying the most extreme outcomes of intergroup hatred – murder, mass killings and genocides – has long been part of historical and social research. Neuroscientists and psychologists have also been interested in interpersonal and intergroup violence. This article considers the question of how atrocities arise from a neuroscientific perspective, focusing on war as the context in which they most often occur. It describes relevant aspects of brain function, relates them to social psychological research on intergroup hostility and applies the resulting framework to a case study: the US prison camp at Guantanamo Bay.

Keywords: *Brain processing, Genocide, Guantanamo Bay, Herd instinct, Intergroup hostility, Kin selection, Stereotyping, War*

Three assumptions

Atrocities arise from the human tendency to form groups

Three assumptions underpin the framework presented here. Firstly, atrocities are an extreme manifestation of a universal human tendency to define oneself as part of a group or groups and to treat group members preferentially. Various processes influence this tendency: ingroup and outgroup formation, stereotyping, dehumanisation, and the like. For convenience, the term 'otherisation' will be used to describe an overall continuum ranging from mildly negative attitudes to hostile and destructive behaviour [1,2]. The psychologist Ervin Staub refers to a 'continuum of destruction': a graded transition from milder forms of intergroup hostility and abuse to extreme exterminatory aggression. The otherisation continuum incorporates this, but additionally includes the mildest initial steps, such as categorising outgroup members, which do not entail destruction.

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Otherisation begins with classification – grouping individuals on the basis of perceived similarities and differences – and stereotyping – treating a group member as possessing the group's standard characteristics irrespective of whether this is the case. These mild forms of otherisation are everyday occurrences. However, the presence of certain 'otherogenic' factors (see below) facilitates increasing aggression against members of target groups. Otherisation culminates in atrocities, including genocides. Warfare concatenates otherogenic factors, making such atrocities more likely.

Otherisation is part of natural human behaviour

The second assumption is that otherisation results from brain-environment interactions, not pathology. Human beings otherise because in the past otherisation was a successful strategy for spreading genes [3]. There are two facets to this claim. The first is that the human predilection for gathering in groups is an evolved trait. The second, perhaps more controversial claim is that intergroup hatred is also natural: atrocities are extreme but not inexplicable [4,5]. Environmental 'otherogenic' and 'otherosuppressant' factors can be identified which make atrocities more or less likely to occur.

Early humans lived in an unpredictable and dangerous world in which resources were often scarce. Individuals or very small groups were more at risk from predators, and so less likely to have surviving offspring, than members of larger groups, who offered more alternative targets for a predator as well as better defences. This created a selection pressure in favour of larger groups. As the biologist William Hamilton noted, individual reproductive success is not the only way to facilitate gene survival; looking after close relatives and their children, and co-operating more with closer relatives, can also help [6]. Early human groups probably contained closely related individuals whose similar genetic makeup made them physically and mentally alike. They could form a homogenous and highly coherent group capable of defending itself against even the most dangerous predators, an effective way to enhance individual survival.

Otherisation is a kind of herd instinct, and like other herd instincts it is most clearly observable under threat. As human groups became better at dealing with animal predators the threat from other human groups comparatively increased. These outgroups were less likely to contain close relatives of ingroup members, reducing the evolutionary benefits of altruism to outgroup members – already a costly and risky strategy. Outgroup members also competed for scarce resources. In genetic terms, destroying outgroup members could be a rational act for ingroup members even if it risked their own survival, because to a gene, all human beings are by no means equal. Close kin are valued more than distant kin, distant kin

more than strangers, and under certain conditions (specified by Hamilton) close kin can be valued more than self [6].

Otherisation is influenced by both physical structure and environment

The third assumption is that understanding both brain structure and the physical and social environments is essential to understanding otherisation. The question of why humans otherise is actually two questions, relating to *why* we exhibit this behaviour at all and to *how* we exhibit it (what the underlying mechanisms are). As noted above, the *why* question looks to evolutionary theory for its answers. The *how* question looks to psychology and neuroscience: the study of human brains.

One caveat is necessary: to argue that common brain mechanisms underlie the otherisation continuum is not to imply that any two instances of otherisation must be identical. Atrocities vary hugely: for example by timescale, victim count and selection, and methods used [7,8]. Many different environmental (including social) factors contribute. These include the leaders' behaviour, the history of intergroup relations, rapid social change, political unrest, economic instability, the presence or threat of war and/or violent revolution, and perceived, propaganda-enhanced or real threats to group existence [9]. Just as the number of possible English sentences is huge, yet constrained by relatively few grammatical rules, so for otherisation the combinatorial possibilities offered by interacting environmental factors are both immense and constrained by brain structure and function.

What processes contribute to otherisation?

The processes underlying otherisation have been much studied by historians and social scientists, and there are many descriptions of the otherisation continuum. Stanton, for example, distinguishes eight stages of genocide of which seven are directly relevant to otherisation: the *classification* of groups; the *symbolisation* of a group as an independent entity with characteristic attributes; the *dehumanisation* of one group by another; the increasing *organisation* of behaviour towards the targeted group; the *polarisation* of hostile groups as stereotypes become entrenched; the *preparation* for genocide, as victims are corralled, restricted and persecuted because of their group identity; and the *extermination* itself [10]. Linda Woolf and Michael Hulsizer similarly emphasise the role of organisation, classification, polarisation and so on [11]. Helen Fein's well-known reference to perpetrators placing their targets 'outside the universe of obligation' of the perpetrator emphasises dehumanisation, but Fein also comments on other aspects of otherisation [9]. Thus there is considerable agreement on underlying processes.

Representing the target of otherisation

Otherisation has certain prerequisites. Targeted individuals must be classified *as* targets, building a symbolic representation which will spring to mind whenever they are encountered or thought about. That representation should generalise to other people with similar attributes, labelling them as target group members. It should also be simple, often involving only a few distinctive features while ignoring many others.

Human beings are agents who readily interpret behaviour in agentic terms. They thus make 'fundamental attribution errors' which overestimate the importance of agency in causation, attributing effects to dispositional causes such as a person's 'character' – some relatively unchanging essence which determines the way that person *is* – rather than to situational factors [12]. Ideally, a person's character is assessed by monitoring their behaviour. Stereotypes, however, reverse this pattern, labelling target individuals with the group's pre-determined attributes irrespective of how the person behaves. By putting assumptions about character above observations of behaviour, they decouple the link between the two, the link which helps keep representations accurate.

This tendency to judge people irrespective of their actions is typical of otherisation. During the Armenian genocide, for example, one justification used by the Turkish interior minister Mehmed Talaat and his colleagues was that some Armenians had responded to a Russian call to revolt against the Turkish state. This was true; but many more had expressed loyalty to Turkey or remained inactive. They were murdered nevertheless; the group stereotype took precedence over individual behaviour [4].

Motivating action against the target

Otherisation further requires a mechanism which links representations of targets with negative emotions which encourage prejudice and motivate aggression [13]. There must also be incentives to otherise. Mild stereotyping needs few incentives because it has few obvious costs: indeed, stereotyping can be seen as an energy-saving technique, a social short-cut [14]. But extreme otherisation entails huge costs for perpetrators. Its actions cause intense stress, consume energy and risk severe consequences. To overcome these costs, extreme otherisation must be rewarding. If it were not, repeat perpetrators would likely be rare or nonexistent, whereas in fact the past perpetration of an atrocity is one of the better predictors of perpetration [9].

Finally, extreme otherisation requires the perpetrator to overcome the inhibitions which prevent even deeply hostile groups, most of the time, from committing atrocities. Some change must occur which triggers the decision to act.

Information and choices: the brain's decision-making

Turning to the brain, four questions arise. Firstly, how do people decide to act? Secondly, what changes underlie the move to extreme otherisation? Thirdly, what roles do emotions play in otherisation? Finally, what factors encourage or discourage otherisation?

The traditional economic model of decision-making relies on the notion of rational self-interest. Human agents are thought of as computational devices which assess the potential costs and benefits of each option, compare all available options and select the one which maximises expected utility. This 'standard model', however, has been criticised, with deviations from rational self-interest identified both in the West and cross-culturally [15,16].

One problem with the model is that it fails to take into account all the costs and benefits. Tests of the standard model typically use games with monetary prizes, but players also seem to be influenced by other factors such as social background [16]. Another problem is that the standard model compares brains to serial computers, assuming a linear decision-making process. It thus underestimates the complexity of brain processing.

Incoming signals

Human brains are constantly reacting to information in the environment. Specialised cells in the sensory organs translate this information into electrochemical nerve signals which are then transmitted, via the brain, to the neuromuscular junctions embedded in muscles, which translate them into movements. En route, a signal passes through networks of neurons highly interlinked by synapses.

Neural signals can vary in strength, with stronger signals being more likely to influence behaviour. There are two aspects to a signal's strength. The first is frequency: how many times per second the signal is sent. The second is consistency: how similar the signal's pattern is over time and how comparable to other incoming signals. Consistent signals can be trusted and used to make predictions. Signals which vary unpredictably, or contradict each other, cannot be relied on. Because the physical world is relatively predictable and not logically self-contradictory, apparent contradictions in incoming signals are assumed to indicate error and uncertainty, prompting further investigation and processing.

Brains naturally extend this assumption to the social domain, placing more trust in consistent than in contradictory signals. Social agents, however, often have conflicting goals and messages. Thus inconsistency may accurately reflect reality, making social signals especially effortful to process. Because they are resource-intensive, they are interpreted as being more important. They also make up most of human knowledge: the capacity for language has allowed our internal models of the world to

become much less dependent on the world itself and much more dependent on social sources.

Such dependence is unproblematic if those sources are reasonably accurate. During otherisation, however, this cannot be guaranteed, as the most trusted sources will be ingroup members, not neutral outsiders. By discouraging intergroup contact, otherisation reduces the chance that an ingroup member will gain the independent experience of outgroup behaviour which might provide a corrective reality check.

Filtering

The brain's networks form a dense and inescapable experience-based filter which clothes the 'naked facts' of sensory signals in many layers of interpretation. This allows incoming information to be modulated by many factors such as hormones, other brain networks, and what the person expects to perceive. Each active network embodies some aspect of current experience, while each inactive network represents a dormant 'prior': a previously-acquired but not currently utilised mental object. Networks often overlap; they also operate simultaneously, like multiple committees all assessing the same application. Brains continually alter their stored knowledge in the light of incoming information and interpret new data relative to pre-existing priors.

Learning

At any given moment, a neuron will either fire a signal or not. It decides which option to take by, approximately, adding up all the currently incoming signals. If the total outweighs the cell's natural inertia (signalling requires energy), it will fire; otherwise the incoming information gets no further. If two neurons, or networks of neurons, are simultaneously active then a synapse between them will tend to get stronger, allowing signals to flow more quickly from one to the other. Stronger networks thus allow for faster reactions to stimuli. Weaker networks slow down brain processing and the actions which result, making decisions feel more effortful [17].

Speed and simplicity

Decision-making involves the individual decisions to signal (or not) of every neuron in a network linking senses to muscles. Simple decisions use short networks comprising few synapses: an eye movement to a flash of light can be triggered so rapidly that the decision is made and the movement happening before the person becomes aware of the flash. Complex decisions involve longer networks, more brain areas and slower signal passage from input to output. This is unproblematic when the person has the security and leisure to think things through. Under threat, however,

the pressure to react quickly favours simple messages and faster decisions, leading to the active avoidance of more complicated information.

Synapses strengthen under repeated stimulation; the more often a network is active, the stronger it becomes. Networks with very strong synapses embody habitual responses which have been repeated so often, and have thus become so well-learned, that they are automatic. Many movements used in breathing, walking, facial expressions and speech are of this kind.

Human brains operate energy-intensive processes, and these high running costs provide a pressure towards energy conservation, the path of least resistance. Processing incoming signals is effortful and costly, so one way in which brains save energy is to interpret their inputs not *de novo* but by matching them against pre-existing templates: expectations in part based on recent history. Unchanging features can be ignored, minimising effort and maximising efficiency, while novel features can be interpreted relative to prior beliefs. Thus someone who believes in UFOs may see an alien vehicle where a sceptic would see a weather balloon. This built-in hermeneutics has provided gainful employment for artists, magicians and conmen over the centuries, but it also gives the brain a huge advantage: speed.

Novelty

Most of what brains detect is never noticed; most actions occur without the need for conscious attention [18]. Familiar choices are more likely to evoke a quick, automatic response than unusual ones. Familiar stimuli are a better match for the brain's prior expectations; they activate well-worn networks. Novel stimuli which conflict with priors require more effortful, resource-intensive processing. As stimuli become familiar their impact tends to decline. This applies even to highly disturbing stimuli, the basis for the desensitisation characteristic of many atrocities.

Present and past

Consistent environmental features can be predicted, and hence trusted. Threats – and opportunities – come with change. Brains evolved to seek out rapid change and novelty; more efficient detection increased survival chances. Neurons which receive a constant signal tend to habituate, diminishing their response rate so that an unchanging input becomes, in effect, no input at all. This biases brains towards novelty, and hence towards current perceptions rather than priors. During otherisation, perceptions of outgroup threat and social pressures from the ingroup can outweigh moral concepts acquired in childhood, memories of friendliness with outgroup members and the historical awareness of where otherisation can lead.

Emotion

When a stimulus is first encountered, the person may concurrently experience strong emotion. That emotion will become associated with the stimulus, such that the next time the stimulus is perceived the emotion will recur. If the person responds to the stimulus, the network linking stimulus and response will be greatly strengthened in the presence of a strong emotion. This is why happy or traumatic memories are better recalled than neutral ones. In addition, brains respond differently to positive and negative emotions [19]. Potential threats, stresses or losses have higher priority than potential benefits, as the latter are unlikely to signal a survival threat.

Brain processing is not the neutral assessment implied by the rational choice paradigm. Instead, it is systematically biased: some stimuli (familiar, simple, emotive) are processed faster than others (novel, complicated, neutral). Current perceptions tend to be preferred to past knowledge where the two conflict, allowing brains to adapt to changes in the world around them. Brains also rely heavily on social information, but they treat it as they do information about the physical world – trusting consistent messages and being wary of sources which send conflicting signals. (This is one reason why demands for unity in political parties tend to increase around election time.)

Action

In any situation there are many possible actions. Each has its own brain network, representing the action in terms of the movements needed to perform it. These networks overlap when the actions they represent are physically compatible: all possible actions which involve raising your right arm will activate the networks representing that set of muscle movements. Physically incompatible actions – for example, flexing fingers and clenching the same hand into a fist – are represented in networks linked by inhibitory neurons, signals from which reduce recipient neurons' responsiveness. Thus activity in the 'make-a-fist' network will damp down the 'flex-fingers' network, and vice versa.

This has two important consequences. Firstly, mutually inhibitory networks 'compete' for the incoming signals which can trigger action: as one network's activity increases, others diminish. Competition also occurs between networks representing conflicting thoughts and beliefs. Otherisation, like any set of behaviours, is facilitated by some beliefs and suppressed by others. In most people this balance between positive and negative is quite delicate for minor otherising acts, such as stereotyping. The more extreme the otherising act, however, the more heavily the balance tilts towards inaction, as inhibitory priors acquired through socialisation (such as 'do not kill') combine with expectations about the high risks of action and compete with otherogenic priors, reducing the chance of the act being

carried out. In addition, should an action commence, it may rapidly be inhibited by distress signals from the victim. Certain individuals (psychopaths) are less affected by signals of fear and distress, but for most people watching someone in pain is profoundly unpleasant and a strong deterrent [20]. Understanding whether a factor makes extreme otherisation more or less likely thus requires assessment of how that factor affects the balance of priors and current stimuli.

The second consequence results from the fact that action-networks strengthen when activated even if no action occurs. Every time a movement is performed, or even thought about, *all* the overlapping networks whose actions include that movement will strengthen, making those actions a little more likely to happen in future. There is a caveat: if the action produces negative effects, networks which inhibit that action are powerfully reinforced, making it less likely to happen again. Thus, contemplating or discussing hostile behaviour, or carrying out mild acts like verbal abuse, makes more extreme behaviour more likely to happen – *if* such thoughts or actions go unpunished. This is one reason why atrocities and military training are often graded, with milder activities escalating to extreme ones.

Otherisation and emotion

One effective way to strengthen a prior is to associate it with a strong emotion. Negative emotions are particularly useful in this regard. They function as warnings, linked to an automatic, evolutionarily ancient threat response which activates stress hormones, such as adrenaline. These flood, and boost signal flow through, the most active brain networks, resulting in faster decision-making and reactions. The most active networks become much stronger, while less active networks are rapidly shut down by inhibition. This removes distracting thoughts and focuses the brain's resources on the task in hand; it is the basis of the intensely present-centred 'living in the now' experience often reported by perpetrators and noted by observers [21]. Moreover, signal flow can become so fast that by the time conflicting priors (reasons not to carry out the action) are activated the action itself may have already been triggered. Thus otherising behaviour may become an automatic response.

Symbolic threats

In most species threat responses are triggered by direct and obvious threats, e.g. predators. The resulting strong negative emotions can bypass the need for confirmation from the external world. This makes sense: an animal which took the time to make sure of a predator's presence would be less likely than its hastier neighbour to survive.

In humans, however, the ability to use symbols – words and images – to trigger emotions has decoupled threat responses from the necessity to have

an actual threat to hand. Using symbols, a skilled otheriser can conjure up the strong emotions of a threat response – hatred, fear, disgust and anger – and link them to prior beliefs about a target group, prompting an audience to act on those beliefs without pausing to check their accuracy. This way lies unreason, one might say, except that the behavioural responses are themselves rational; but they are driven by distorted representations of reality. This capacity to link threat responses to purely symbolic, as opposed to physical, targets is at the heart of otherisation.

Changing prior beliefs

Otherisation establishes negative priors about a target outgroup in ingroup members' brains, so that behaviour benefiting the outgroup becomes undesirable. Otherisation also undermines conflicting priors, like the moral rules absorbed during socialisation, by providing contradictory messages (for example, glorifying aggression or describing compassion as weakness). These may reduce the stress caused by conflicting priors, making otherisation feel pleasurable by comparison: thinking using strong, consistent priors is easier than thinking through a multitude of weaker ones. Meanwhile, ingroup-related priors become linked to positive emotions, rewarding behaviour which benefits the ingroup. The perceived threat to group identity makes that identity seem increasingly important, so behaviour seen as bolstering the group will be more highly rewarded by other members.

Being biased against an outgroup, however, is not the same as harming its members. Most people learn from childhood that extreme otherising actions directed against ingroup members are unacceptable. They provoke punishment and are associated with fear, guilt and shame. The tendency to generalise this lesson to other, more distant human beings (making them 'symbolic kin') has been encouraged by the modern human rights movement. To overcome it, otherisers use various strategies to tip the balance of priors in favour of action.

Reducing the fear of punishment

One strategy weakens the links between otherising actions and inhibitory networks by playing down the chances of punishment. Making such claims convincing is not difficult, as the lamentable history of western responses to genocide suggests [7]. If, for instance, a leader claims that attacks on an outgroup will not be punished, a follower's first instinct may be to check with other social sources: those individuals or institutions whom they regard as peers, experts or superiors. Because the brain prioritises changing or negative data – but not unchanging, absent or emotionally neutral input – the follower will take account of other sources only if they actively support or contradict the leader's claim.

The follower will assess any such responses according to his beliefs about their sources' social status and power relative to him (one reason why leaders play a central role in guiding atrocities). He will also consider their consistency over time (and between sources) and the passion with which they respond. Signals inconsistent with the source's previous behaviour, or diluted in diplomatic language, will weaken the follower's reliance on that source. Stronger signals are better predictors of behaviour, so united, consistent condemnation of the leader's claim is more likely than disunity or silence to signal a genuine threat of hostile action.

Rewarding aggression

Otherisation may also strengthen the link between otherising actions and positive emotions by rewarding or failing to punish aggression. When someone overcomes their moral qualms and commits an aggressive act, the ingrained expectation of punishment triggers the release of stress hormones [22]. If, however, no punishment materialises, the resulting surprise and relief will be experienced as intensely pleasurable, and the effects of the stress hormones as euphoric rather than unpleasant [23]. This rush of positive sensations, similar to that provided by certain drugs and probably activating similar brain regions, can be an addictive incentive to commit more otherising acts. It may help to explain the ecstatic sense of participation in group activity, particularly transgressive activity, which Saul Friedländer calls *Rausch* and Elias Canetti 'the discharge' [24,25, p 109–10; 26, p 18].

Identifying the target as the cause of negative emotions

Associating a target group with strong negative emotions can encourage extreme otherisation as the way to remove those emotions. Distancing an ingroup from an outgroup by imposing social death upon the latter (by ghettoisation, or punishing members who interact with other groups) makes negative myths about the outgroup – and the dubious logic of otherisation – harder to challenge and often self-fulfilling. Social death can be facilitated by labelling an outgroup as unclean.

When the role of emotions in atrocities is discussed the focus is usually on anger and fear (which also predominate in neuroscience); but the neglected emotion of disgust plays an important part in otherisation. It deters ingroup–outgroup interactions by rendering even talk of outgroup members, let alone contact with them, a socially polluting act, subject to disapproving peer pressure. Disgust, unlike anger, is hard to dispel. Humans, like other animals, use non-verbal distress and appeasement signals for example, such as averted gaze or slumped posture, to present themselves as nonthreatening. Presenting oneself as clean is more difficult, especially when the dirt is symbolic.

Otherisation and war

War is not the only situation in which otherogenic factors come together to provoke atrocities; others include destructive cults like Jonestown [27]. War, however, has the greatest human impact. To see how it facilitates otherisation, consider the American abuse of alleged terrorists in the Guantanamo Bay detention camp, as described by US military translator Erik Saar [28].

Otherogenic and otherosuppressant priors

Terrorists are unpredictable and therefore threatening. By weakening Americans' faith in a stable and secure future, the attacks of 9/11 forced them to rely less on prior knowledge and more on current information and trusted ingroup authorities (such as the President). Public awareness of al-Qaida and its context was low prior to 9/11, allowing simplistic negative stereotypes to flourish. Negative attitudes to terrorists intensified after 9/11, but most Americans' understanding of the complex causes and personalities involved remained sketchy.

Neoconservative rhetoric emphasises US military power, encourages Americans to see themselves as an exceptional 'chosen people', and is highly ahistorical. It undermines otherosuppressant beliefs in the likelihood of punishment or sanction from other states and disregards the history of failure in the Middle East which might otherwise counsel caution. After 9/11, commentators who made otherosuppressant statements – for example, suggesting that US policy might have contributed to al-Qaida's development or pointing out legal and moral objections to the treatment of the Guantanamo detainees – were ignored or labelled unpatriotic. Incidentally, Saar's comments indicate that his knowledge of Arabic culture made it particularly hard for him to reconcile conflicting priors. He did not see the detainees monolithically, as terrorists; and the discrepancies between official US government statements and what he saw at Guantanamo left him stressed and disorientated.

Motivation to otherise

War also affects emotional responses. The threat of future terrorist attack provided an ongoing strong incentive to otherise, even in the comparative safety of Guantanamo. Guards were constantly reminded of the wider threat and, of course, of 9/11 itself. The detainees also provoked their captors' anger and disgust, for instance by hurling excreta. Otherisation in Guantanamo was not a one-way street.

Military training is an excellent way of boosting an individual's sense of power, yet the guards at Guantanamo appear to have felt seriously threatened by their prisoners. That sense of threat was heightened, as Saar

reports, by inconsistency within their ingroup: different agencies competing for access to detainees and team members taking contrasting attitudes to prisoners. Saar also indicates that in Guantanamo ingroup status and well-being became conditional on support for otherisation. Complaints about detainee treatment evoked considerable hostility; a team leader who shook hands with a detainee was labelled a traitor.

Saar rationalises his acquiescence as follows: 'Sure there might be problems with the place, but maybe in the end the good would outweigh the bad. Maybe the leadership would work out the kinks . . . Maybe I should just watch, wait, and see' [28, p 196].

What factors encourage extreme otherisation?

Otherisation emerges from human brains. Brains construct models of reality which depend heavily on current perception, biasing them to favour current over stored information and ingroup sources over others. They privilege certain types of inputs – a stimulus accompanied by strong feelings is more 'real' than its neutral counterpart – and assume that the resultant models are complete unless explicitly told otherwise. Brains also seek to minimise processing, particularly when busy or under stress. Messages which fit established priors are easier, and therefore pleasanter, than challenging stimuli, which are more likely to be avoided. Finally, linking priors to strong emotions can give them the power to override conflicting priors – like moral dictates.

Otherogenic factors, in short, are those which:

- Form, maintain or strengthen otherogenic priors.
- Weaken otherosuppressant priors, e.g. by removing critics of otherising policies.
- Weaken a person's trust in prior knowledge in general by suddenly transforming their environment, reducing their ability to predict from past experience and increasing their reliance on current information. Abrupt societal changes, such as revolutions, can have this effect [4].
- Increase consistency among outgroup-related priors, for example by suppressing or controlling information sources and stimulating disgust to discourage direct contact.
- Stimulate threat responses by portraying the outgroup as dangerous, emphasising historical intergroup conflict or even provoking an attack.
- Emphasise the ingroup's power to cope with the threat by downplaying fear in favour of 'activist' emotions like anger and disgust. Enhancing ingroup unanimity also makes members feel stronger. The combination of high confidence in power and a perceived threat to that power is dangerous [21].

- Make status and well-being conditional on group approval, requiring the tolerance of or participation in aggression.

When more of these factors are operative violent otherisation is more likely to occur.

Conclusions

This paper has reviewed information about wartime atrocities in the light of current brain research. Of course it can be no more than a brief outline; many details remain to be elucidated. Nevertheless, it suggests that the brain sciences may be useful in understanding the processes which underlie atrocities.

'Watch, wait, and see' – Erik Saar's guide to enduring Guantanamo – is also the bystander's catchphrase: its spirit haunts descriptions of how we have failed to prevent atrocities [7]. Neutrality is never enough. Brains do not abandon their beliefs unless contradictory inputs force them to do so. Vigorous and wholehearted condemnation early on, challenging the beliefs which foment otherisation and reinforcing those which condemn it, together with a genuine and consistent threat of punishment, can help tip the balance of priors away from action. These must be a priority for individuals and governments if we are to see fewer atrocities in future.

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