



Detainees are held at the United States' Guantanamo Bay detention camp in Cuba in 2002.

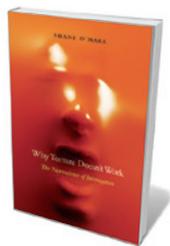
NEUROSCIENCE

Tortured reasoning

Lasana T. Harris commends a book exposing the lack of scientific basis to 'enhanced interrogation techniques'.

In 2009, following the abuse of prisoners at its Guantanamo Bay detention camp, the US government made a significant decision. It moved the responsibility for 'enhanced interrogation techniques' from the CIA to a new government organization: the High-Value Detainee Interrogation Group (HIG). The move upset many CIA insiders; torture had been in their toolkit since the early days of the cold war. The remarks of one official at a HIG-organized conference on torture in Washington DC can be summed up as: how could a new agency, created to both conduct and study torture, replace the decades of practice and perfection attained by the CIA? By adding a scientific component, responded the newly appointed head of the HIG.

This exchange highlights the theme of neuroscientist Shane



Why Torture Doesn't Work: The Neuroscience of Interrogation
SHANE O'MARA
Harvard University Press: 2015.

O'Mara's *Why Torture Doesn't Work*. Rightly, O'Mara takes a moral stand against torture (forced retrieval of information from the memories of the unwilling). However, instead of simply providing utilitarian arguments, he argues that there is no evidence from psychology or neuroscience for many of the specious justifications of torture as an information-gathering tool. Providing an abundance of gruesome detail, O'Mara marshals vast, useful information about the effects of such practices on the brain and the body.

For instance, he explains why, physiologically, it is ludicrous to claim that stress, pain and fear will coerce a suspect to surrender critical information. The prolonged release of stress hormones such as cortisol damages the hippocampus — a brain structure crucial for encoding and retrieving memories — as well as the prefrontal cortex, which is implicated in decision-making and executive control processes. Such damage works in opposition to the goal of torture. Furthermore, chronic stress creates a negative feedback loop, causing enlargement and hyperresponsiveness of the amygdala, the brain structure that underlies emotional salience, directs attention,

enables learning and communicates with most of the brain.

Another striking example that O'Mara discusses is the effect on the brain of sleep deprivation. The practice was described in the 'Torture Memos' — legal memoranda drafted in 2002 by US deputy assistant attorney general John Yoo, advising the CIA and President George W. Bush on the use of torture. Officially limited to a maximum of 180 hours, and often combined with physical restraint, isolation, starvation and beatings, sleep deprivation has been used to coerce subjects into revealing information.

The memos further argue that sleep deprivation is harmless. O'Mara, however, discusses research suggesting that it erodes memory processes and general cognitive function by flooding the brain with glucocorticoid hormones. Even military scientists have produced literature that admits psychophysiological issues with sleep deprivation. In 1990, Paul Naitoh and his colleagues at the US Naval Health Research Center in San Diego, California, published evidence that the practice leads to an increase in circulating stress hormones and the development of psychomotor epileptic discharges (P. Naitoh *et al. Occup. Med.* 5, 209–237; 1990). They argued, too, that if combined with other stressors, such as food and water deprivation and waterboarding, sleep deprivation could negatively affect respiratory–cardiovascular function.

Yet some officials and politicians continue to make announcements that run counter to such scientific evidence. Former Pennsylvania senator and Republican presidential hopeful Rick Santorum, for instance, commented in a 2011 interview that after being broken, people become cooperative. Most shocking may be this year's revelation that a handful of officials in the American Psychological Association were complicit in torture by the United States after the September 2001 attacks on New York and the Pentagon, thus providing a veil of scientific legitimacy to the practice.

Torture also affects the torturer. The cognitive dissonance required to inflict suffering results in symptoms similar to those of post-traumatic stress disorder, O'Mara warns. He cites Joshua Phillips's *None of Us Were Like This Before* (Verso, 2010), which describes how many US veterans who had engaged in torture in Iraq experienced intense guilt or turned to substance abuse once back in the United States. Interviews with former interrogators in Northern Ireland, published by Ian Cobain in *Cruel Britannia* (Portobello, 2012), reveal that many believed what they had done was wrong, but saw it as a desperate attempt to end the violence engulfing their society.

Given that information obtained under torture is rarely reliable (because the victim will generally say anything to make ▶

▶ the pain stop) O'Mara recommends an alternative: conversation. Having a conversation with a detainee may yield results comparable, and probably superior, to those obtained from torture. He cites three pieces of evidence.

First is a 1993 study by Stephen Moston and Terry Engelberg of police interrogations, which found that of more than 1,000 detainees, only 5% refused to talk (S. Moston and T. Engelberg *Polic. Soc.* **3**, 223–237; 1993). Second, research by Robin Dunbar and his colleagues finds that 40% of what we reveal in conversation is related to the self, suggesting that refusing to self-disclose is very difficult (R. I. M. Dunbar *et al. Hum. Nat.* **8**, 231–246; 1997).

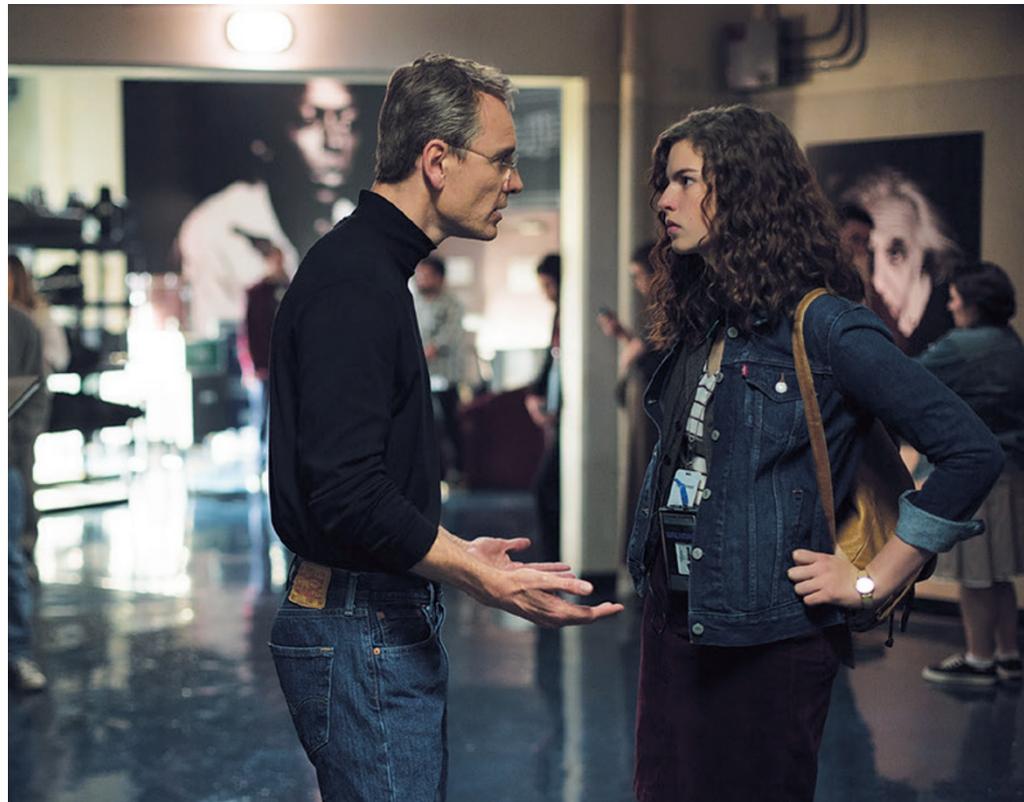
Third, a study by Diana Tamir and Jason Mitchell showed that people are willing to forgo money to talk to others about themselves. Indeed, the nucleus accumbens (part of the brain's reward circuitry) activates during such an opportunity, suggesting that people find disclosure intrinsically rewarding (D. I. Tamir and J. P. Mitchell *Proc. Natl Acad. Sci. USA* **109**, 8038–8043; 2012). O'Mara does acknowledge that the difficulties of having such a conversation with a non-compliant person demand advanced social skills that are comparable to those of clinical psychologists and psychiatrists, who often deal with non-compliant patients. He suggests that alternative approaches such as virtual reality and role playing may be useful for information gathering during interrogation.

Why then, given its uselessness in eliciting valuable information, do people torture? It is a form of vengeance or punishment, intended to discourage the victim from future transgressions and to communicate to others that harm will not be tolerated. In some cases, it occurs because the torturer believes that terrorists have mental illnesses. In science, however, punishment is not a viable response to someone with such an illness — just as torture is not a viable method for gathering information, as O'Mara repeatedly points out. ■

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“Conversation with a detainee may yield results comparable, and probably superior, to those obtained from torture.”



Steve Jobs (Michael Fassbender) confronts his daughter Lisa (Perla Haney-Jardine) in *Steve Jobs*.

INNOVATION

A binary life

A polished biopic of tech titan Steve Jobs fails to plumb fully his inner contradictions, finds **Timo Hannay**.

The closest I came to meeting Steve Jobs was in the late 2000s, shortly after the birth of the iPhone. I was attending Foo Camp, a California mustering of digital demigods. Jeff Bezos of Amazon was a regular; the year before, Google co-founder Larry Page had turned up in his helicopter. Everyone but me took such things in their stride. That year, however, there was something different in the air: a rumour had spread that Steve Jobs himself might join us. He never showed up, but such was his unique status that even his absence generated more excitement than the presence of other tech giants.

Blessed as he was with formidable taste and rock-star showmanship, Jobs was always going to stand out from the crowd of awkward nerds (like me) who populate much of the technology landscape. Add to this his death at the height of his powers, and we have all the ingredients of a legend. This is not undeserved. Many technologists talk of changing the world; Jobs actually did so. More than anyone else, he broke down the

Steve Jobs

WRITTEN BY AARON SORKIN
DIRECTED BY DANNY BOYLE
Universal: 2015.

barriers between technology and humanity, helping to turn computers into consumer products. Then, with the iPhone, he pulled off the reverse, turning

an established consumer product into a computer.

How best to understand such a life? Jobs's answer was to invite high-flying writer and former media executive Walter Isaacson to pen his biography — a superb account published within days of Jobs's death. *Steve Jobs* (Simon and Schuster, 2011) is likely to remain the closest we will ever get to a definitive account.

The film version of Isaacson's blockbuster is a highly competent creation — as you would expect from writer Aaron Sorkin (*The Social Network*, *The West Wing*) and director Danny Boyle (*Slumdog Millionaire*, *Trainspotting*). The dialogue zips along at 100 beats per minute; the acting (especially by Michael Fassbender in

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