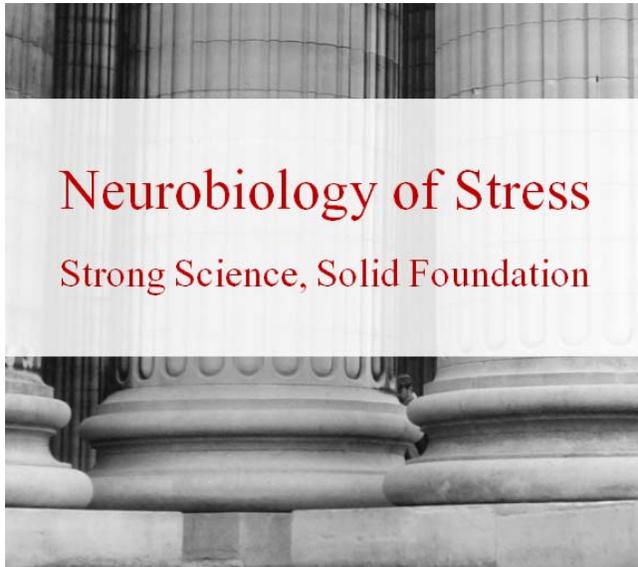


Sexual Assault and Neuroscience: Alarmist Claims vs. Facts

The science is strong, a solid foundation for trainings and fair investigations.

A misleading article in *The Atlantic* provides an opportunity to clarify key facts about the well-established neurobiology of stress and trauma.

Jim Hopper, PhD – January 22, 2018



As a psychologist who has researched the neurobiology of trauma and regularly teaches military and civilian police and prosecutors, higher education staff and others, I can expand a public conversation started in *The Atlantic* the unfortunately titled and highly misleading September 2017 story, "[The Bad Science Behind Campus Response to Sexual Assault](#)." In fact, the science on the neurobiology of stress and trauma is actually quite good, and the real issues are how that science is taught to university staff who aren't scientists and how they, in turn, apply that teaching on their campuses.

There are two parts to author Emily Yoffe's misleading discussions of neuroscience, one on sexual assault victims' behaviors and the other on their memories, and I address both here. For each, I begin with *realities* of sexual assault – realities known all too well by millions of people who have been sexually assaulted, and by victim advocates, clinicians, and investigators who truly listen and have been documenting them for decades. Then I cite well-established science on the neurobiological causes of those realities.

Whether or not you've read the article, this post will bring clarity to issues that Yoffe has clouded with confusion and alarmist claims.

Let's start with realities of how people often respond to sexual assaults that are extremely stressful or traumatic as they are happening. People respond just as they do to many experiences of military combat and police shootings – with mostly reflex and habit behaviors, not rationally chosen ones.

Reality: Reflex Responses

One extreme reflexive response that, contrary to the article's claim, people definitely experience is *tonic immobility*. It's a fear-based state of rigid paralysis, which can render one mute as well (and is very different from the transient *freeze* response associated with detection of attack). While research is still accumulating on how often tonic immobility occurs during sexual assaults, much is known about what

can trigger it, like being pinned down and terrified. And we know from direct reports that it happens to soldiers too, even if they're less likely to tell anyone.

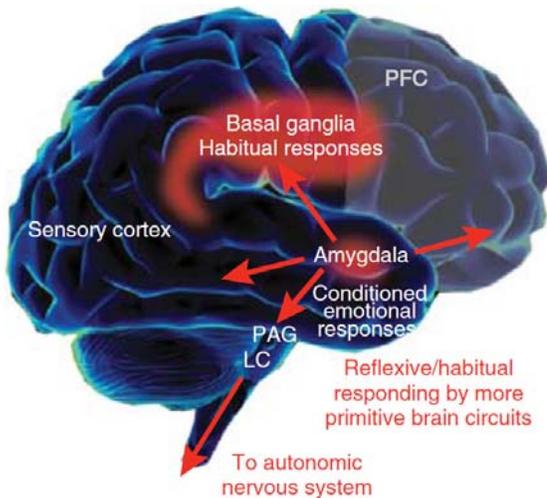
Sometimes people experience *collapsed immobility*, a different survival reflex that sends heart rate and blood pressure plummeting. The brain's loss of oxygen brings on faintness or even passing out as the body goes limp. Again, extreme fear and physical restraint, both features of some sexual assaults, can release this evolutionarily old response. (A [brief YouTube video](#) shows someone going in and out of this terror-triggered state on an amusement park ride.)

In 2015, the *Harvard Review of Psychiatry* published a [thorough review](#) of behavioral and neuroscience research on tonic and collapsed immobility (and freezing) in animals and humans. That peer-reviewed article includes multiple examples of how people have experienced those extreme reflex responses, drawn from lead author Kasia Kozłowska's many years of clinical work, and references over 200 scientific publications, including many neurobiological studies.

Of course, the reflexive "cornered animal" response also exists, and people sometimes respond with "fight or flight" behaviors that may thwart a sexual assault. But many don't – and not because there's something wrong with them or they're to blame, but simply because of how brains respond to being attacked.

Reality: Habit Responses Are Very Common

As I've been teaching for years, although some people go into those extreme survival reflexes, the more common brain-based reactions during sexual assault (and military combat) are *habit* responses. Again, let's start with the realities and then address the science.



Habit responses may include effective ways of fighting or fleeing, perhaps first learned in battles with siblings or on the playground. But the habit behaviors that emerge during sexual assaults are commonly passive ones, which can avert additional violence or retaliation, but tend to be ineffective at stopping assaults.

For example, habits of submission learned from childhood experiences of sexual, physical, or emotional abuse can suddenly reappear when a perpetrator becomes violent or ignores yet another clearly implied or unmistakable "no." Especially common are habitual behaviors socialized into girls and women for nicely saying "no" to unwanted advances, or for clearly sending that message without actually saying "no" (to avoid hurting feelings or incurring wrath). Also common during sexual assaults are habits we've all learned for politely dealing with aggressive people, especially those with power over us.

Stress shifts brain functioning to habits and reflexes. Image from review by the world's leading researcher on the topic (see Arnsten 2015 in references).

Such habits for saving face and moving on may help with navigating a relatively safe workplace or fending off a pushy date, but are unlikely to prevent or end a sexual assault. (Effective habits learned from self-defense or “resistance” training [may reduce the odds](#), but are no guarantee: more ingrained habits may still take over, just as a well-trained soldier, in that first real battle, may assume the same fetal position he did during brutal childhood beatings.)

The Shift to Reflexes and Habits Is Well-Established Neuroscience

There is *very solid science* on how stress, such as that of being sexually assaulted, can impair the rational prefrontal cortex and leave the brain dependent on such reflexes and habits. [Amy Arnsten](#), an influential Yale neuroscientist and the world’s leading researcher on the topic, reviewed much of that science in [2009](#) and [2015](#).

Just [two months ago](#), Arnsten wrote, “Stress tends to promote simple decision-making strategies that depend on ingrained habits, at the expense of more thoughtful, goal-directed actions,” and, “Uncontrollable stress flips the brain from a more ‘reflective’ state, mediated by the more recently evolved PFC [prefrontal cortex], to a more ‘reflexive’ state, mediated largely by subcortical structures.” European neuroscientist Lars Schwabe recently published a [review](#) focusing, in part, on how stress shifts the brain to habit behaviors. Not only is the science strong – it keeps getting stronger.

Reality and Neuroscience: Fragmentary Memories

Now let’s address the other focus of the *Atlantic* article. Do *fragmentary memories* of sexual assault exist? Are there well-known brain bases of those too?

Unfortunately, the author confusingly entangles the issue of memory fragmentation with the issue of accuracy and the scientifically irrelevant red herring of “recovered memories.” While a full clarification of her distortions is not possible here, it’s critical to understand two key points.

First, fragmentary memories definitely exist, as the author admits when she acknowledges that military personnel *might* have them due to stress hormone effects “in conditions of the most extreme stress.” In fact, military commanders hear them *all the time* in subordinates’ combat after action reports, where different collections of fragments are like the proverbial hands on different parts of the elephant. In reality, police and district attorney investigators *routinely* contend with the fragmentary memories of police officers involved in shootings, as do the attorneys who defend them in court.

Are we to believe that the brains and memories of survivors of sexual assault, on campus or anywhere else, are fundamentally different from those of people serving in the military and law enforcement?

Second, we have a pretty good understanding, including from the extensive neuroscience literature, of *how* stress can cause incomplete or fragmentary memories. Lots of research shows how stress can enhance memory for details close to the onset of stress and then impair it for details that come later, as reviewed in depth by [Diamond and colleagues in 2007](#) and [Schwabe in 2017](#). Many studies have shown that “central details,” which had the [most attention and significance](#) at the time, can be strongly encoded and stored, while “peripheral details” may not get into memory and, even if they do, may fade quickly or be recalled inconsistently.

Fragmentary Memories Should Be Expected

Such gaps and inconsistencies are normal, especially when a victim's central details seem peripheral to an investigator, and vice versa. As shown by a realistic and disturbing [scene from *Mad Men*](#), a person may reflexively "check out" (or dissociate) from the terrible body sensations of being raped and focus on a sofa across the room or the sounds of traffic on the street below. Later, when asked for details of what the perpetrator did after he began raping her, she may draw a blank, recall details incompletely, or recall some (peripheral) details inconsistently.

Such gaps and inconsistencies should be *expected*, especially when investigators or attorneys ask leading and "gotcha" questions about peripheral details that sexual assault victims or police officers weren't focused on at the time. *Was his hand on your face or your neck when you claim he was raping you? That's not what you said before reviewing the body cam video of you shooting that innocent man, is it?*

Remembering always involves reconstruction and is never totally complete or perfectly accurate. Such gaps and inconsistencies are simply how memory works – *especially* for highly stressful and traumatic experiences like sexual assaults and shootings, where the differential encoding and storage of central vs. peripheral details is the greatest.

Such gaps and inconsistencies are never, on their own, proof of *anyone's* credibility, innocence, or guilt. (Alcohol can prevent storage of peripheral details, and at higher levels of impairment central details too, and in blacked out or passed out states all is lost. But as with stress, there's no scientific basis for assuming the inaccuracy or accuracy of any details that do survive alcohol's effects.)

How the Neuroscience Is Taught and Used

Finally – and most importantly, given the polarized politics of campus sexual assault – it's vital to clarify what Ms. Yoffe is actually trying to critique in her article.

Contrary to her story's title and subtitle, Yoffe does not discredit or even assail the well-established neuroscience on how severe stress and trauma can, in fact, "impede the ability to resist or coherently remember sexual assault." Instead, she raises concerns about the *teaching* of that science to campus staff, police, and others who are striving for best practices in responding to reports of sexual assault.

She also raises concerns about how that teaching – or rather, an extremely selective and harsh characterization of one particular person's past teaching – has been received by campus staff and put into practice. There, she offers only anecdotes and alarmist claims to suggest that some problems with some practices are creating widespread harm on campuses across the country.

Flawed as the argument and article are, we can thank the *Atlantic* for providing an opportunity to clarify some key facts. And like my colleagues who teach "the neurobiology of trauma" to campus staff, police, military commanders and other professionals, I welcome constructive suggestions for improving [how I teach](#) the established and growing science on stress, behavior and memory, and the practical implications of that science for sexual assault investigations and campus, civil and criminal proceedings.

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