

**Neurobiology of Sexual Assault:
Experience, Thinking, Behavior, & Memory**

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Value of knowing the relevant
neurobiological, memory and
other science?

It can **help us answer** four
common important questions...

4 Common Questions

1. Why didn't they fight, yell, or otherwise resist, leave, etc.?
2. Why do they have memory gaps?
3. Why do they have memories that are inconsistent and/or contradictory?
4. Why do they struggle to recall the sequence of what they can remember?

4 Basic Scenarios

1. Encounter was consensual and person reporting sexual assault knows that but is misrepresenting/lying.
 2. Was consensual, but person reporting it later reinterpreted as non-consensual.
 3. **Wasn't consensual, but accused sincerely believes it was.**
 4. **Wasn't consensual and accused knows it.**
- 3 and 4:** Victim's responses and memories may be consistent with the neurobiological impacts of stress/trauma.

Yes, awkward and confusing sexual encounters can be re-interpreted afterward and reported as assaults

That's NOT what I'm teaching about.

Not assuming "evidence."

Pointing to what could be consistent with assault.

Providing knowledge to solve problems you face.

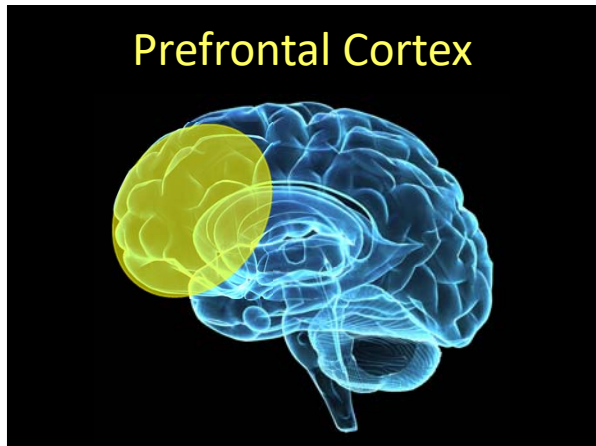
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Defense Circuitry in Control

- Impaired prefrontal cortex
- Bottom-up attention
- Survival reflexes
- Self-protection habits
- Altered memory encoding and storage

The diagram shows a brain with several components labeled: "Impaired prefrontal cortex" (top), "Self-protection habits" (middle), "Bottom-up attention" (left), and "Survival reflexes" (bottom). Lines connect these components to a central area of the brain.







Reflexes & Habits

Survival Reflexes



Detection Freezing



Stop everything, hold down brake, scan

Key moment, when

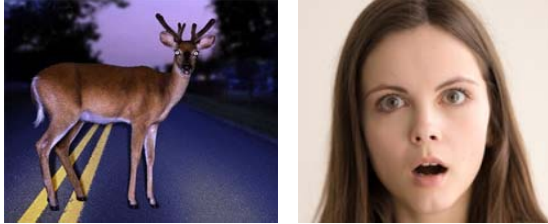
attack

is detected

Going out for a nice dinner...



Shocked Freezing



Blank mind, no behavior options arising

When behavior options and thoughts **do** (finally) arise...

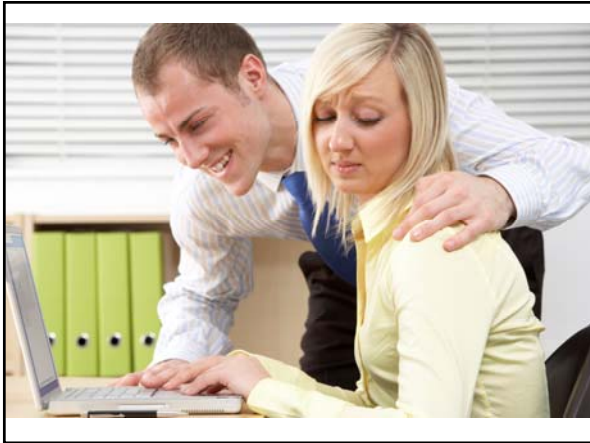
No-Good-Choices Freezing



Extremely Reactive vs. Extremely Passive

Self-Protection Habits

- **Polite** responses to dominant or aggressive people
- **Polite** responses to unwanted sexual advances
- **Hoping** and **pretending** it's no big deal – trying to **save face**



Fear-Habit Paradox

From normal, expected scenario
to **unexpected attack...**

Initial responses can be **habit behaviors** based on the just-prior
normal interaction

e.g., Schwabe 2013, *Hippocampus*, 1035-1043; Packard 2009, *Brain Research*, 121-128.

I have to leave soon.
You've got a girlfriend.
My roommate is home.
My boyfriend will be angry.

Real Case

Perpetrator describing methods on social media:
"Feign intimacy," "then stab them in the back"
and "THROW EM IN THE DUMPSTER."

His victim at trial:

- "I didn't kick or scream or push."
- "I felt like I was frozen."
- "I tried to be as polite as possible."
- "I wanted to not cause a conflict"
- "I didn't want to offend him."





Extreme
Survival Reflexes

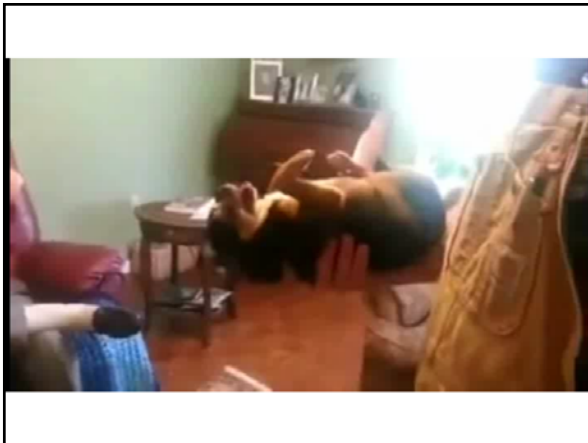
Escape When There's
No (Perceived) Escape

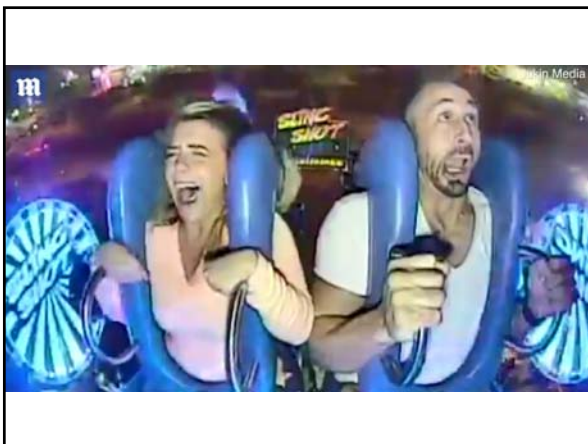


Tonic Immobility

- Freezing = Alert and immobile, but able to move
- Tonic immobility = **Paralysis, can't move or speak**
- **Caused by** extreme fear, physical contact with perpetrator, restraint, **perception** of inescapability
- **Not uncommon in sexual and non-sexual assaults**

Moller et al., 2017, *Acta Obstet Gynecol Scand*, 932; Marx et al. 2008, *Clin Psychol Sci Practice*, 74; Bovin et al. 2008, *J Trauma Stress*, 402; Fuse et al. 2007, *J Anx Disord*, 265





Collapsed Immobility

Key differences from tonic immobility

- Physiological cause = Heart gets massive parasympathetic input, resulting in...
- Extreme ↓ in heart rate and blood pressure
- Faintness, “sleepiness” or loss of consciousness
- Loss of muscle tone – Collapsed, limp, etc.

Kozlowski et al., 2015, *Harvard Rev Psychiatry*, 1-25; Baldwin 2013, *Neurosci Biobehav Rev*, 1549





I felt like a rag doll.



He was just moving me around.

Dissociation

Blanked/Spaced Out
Disconnected from Body
Autopilot

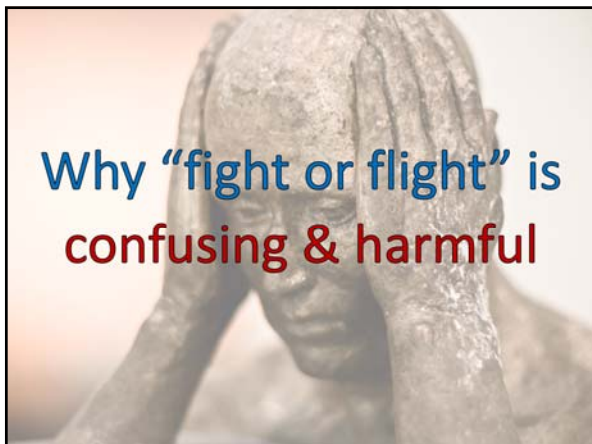
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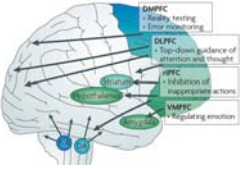
Did not resist
No attempt to escape
Did not scream
'Active participant'

Reflexes & Habits

| | |
|---|---|
| Freezing <ul style="list-style-type: none">• Detection• Shocked• No-Good-Choices | Passive, Polite <ul style="list-style-type: none">• From dating• From child abuse• From domination |
| Extreme Survival Reflexes <ul style="list-style-type: none">• Tonic Immobility• Collapsed Immobility• Dissociation | Dissociative <ul style="list-style-type: none">• Autopilot• Submission• Sex acts |

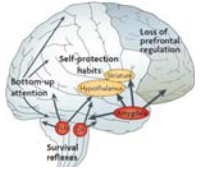


**Why "fight or flight" is
confusing & harmful**



Perpetrator

- Not stressed
- **Prefrontal cortex in control**
- Thinking and behavior:
 - Planned
 - Practiced
 - Habitual



Victim

- Afraid, overwhelmed
- **Defense circuitry in control**
- Attention and thoughts driven by perpetrator actions
- Behavior controlled by habits and reflexes

How Brain-Based Behaviors Tend to Unfold Over Time

Freezing
(scientific def.)

Detection Freezing

- Everything stops
- 1-3 seconds

Shocked Freezing

- Can follow detection
- Blank mind, no behavior options to choose from
- Can last several seconds

No-Good-Choices Freezing

- Can follow detection or shocked
- Only "bad" choices of extremely passive vs. reactive behaviors
- Seconds to minutes

Rational, Deliberate Behaviors

- Less likely with more stress and trauma, due to impaired prefrontal cortex
- If it happens, not necessarily effective – and then it's back to reflex and habit behaviors.

Habit Behaviors

- Usually passive and ineffective (no self-defense training)
- Face-saving and submission habits we've all learned
- From gender socialization (e.g., "nice girl" habits)
- From childhood abuse experiences

Extreme Survival Reflexes

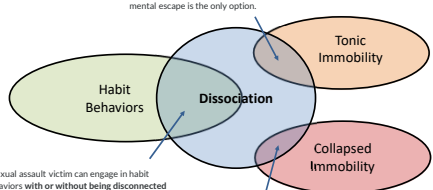
Escape (seems) impossible, intense fear and/or horror

Dissociation: Can kick in early, spaced out and/or autopilot habit behaviors

Tonic Immobility: Paralyzed, muscles rigid

Collapsed Immobility: Muscles limp, dizzy/pass out

Potential Overlaps of Dissociation with Habit Behaviors and the Other Extreme Survival Reflexes



Dissociation may or may not accompany tonic immobility. Someone may be unable to move, yell, or even speak – yet be fully aware of the horrible sensations of being assaulted and intense emotions of fear, disgust, etc. However, dissociation is common in tonic immobility states, when physical escape is impossible and mental escape is the only option.

A sexual assault victim can engage in habit behaviors with or without being disconnected from sensations and emotions. If dissociation does kick in and the person continues with habit behaviors, that's dissociative autopilot – which involves no sense of choosing the habit behaviors in which one is engaging, which can include sex acts.

Collapsed immobility involves oxygen deprivation, and the resulting faintness or dizziness can be hard to distinguish from dissociative "spacing out." Also, dissociation can happen before and/or overlap with collapsed immobility. However, the passing out of collapsed immobility is very different from dissociation.

DV / Repeated Physical Assaults

Still mostly reflexes and habits

- PTSD / Hypervigilance: Scanning for signals
- Detection freezing triggered by tone of voice, particular words, body language, etc.
- Habits of avoidance triggered by signals
- Habits of appeasing, (depressed) submission, protecting children, etc.

DV / Repeated Physical Assaults

Dissociation increasingly likely

- Mentally escape the physically inescapable
- Block out physical and emotional pain
- Block out hopes of escape
- Lots of autopilot mode

4 Common Questions


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Sexual Assault and Memory

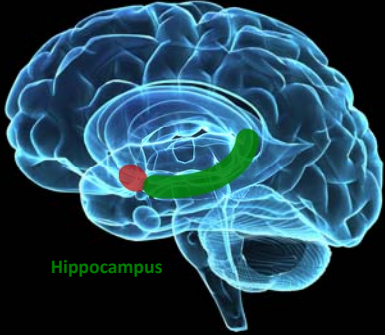
Bottom-Up Attention and Memory

Defense circuitry focus: **what seems most important** to survival and coping

Attended = **Central Details** = Encoded



Episodic Memory Circuitry

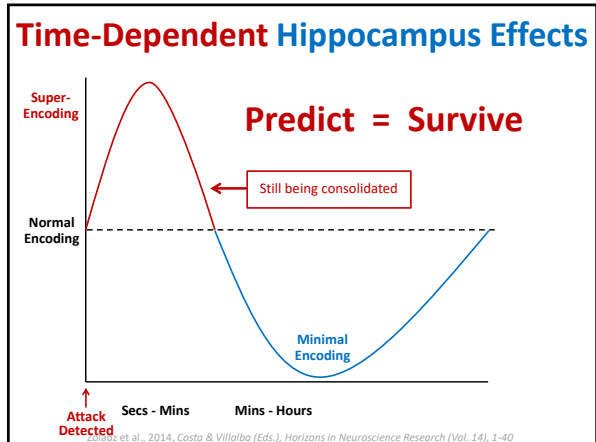


Hippocampus



Are you getting the
central details?

Key moment, when
attack
is detected



Are you getting and using central/early details?

Stress Impairs Retrieval

...At least of poorly encoded and consolidated info

e.g., Schwabe et al., 2012; Neurosci Biobehav Rev, 1740; Smith et al., 2016; Science, 354, 1046

Implications

1. Very stressed or traumatized victims **cannot recall everything recorded** in their brains, no matter how good and gentle the interview.
2. Two or more interviews (over days) may yield much more information than one.
3. Yes, recall can get better over time!

Vulnerability to Distortion?

- Central Details = Very Low Vulnerability
- Peripheral details = High Vulnerability

Gist

Abstract
Stripped of many details



e.g., Gilboa & Marlatte, 2017, Trends in Cognitive Sciences, 618-631.

Implications

4. Lots of details missing, even some central details? **Gist still there.**
5. More time since assault = More of recall is gist + reconstructed details.
6. **However long ago, central details can be vivid and accurate. Don't miss them!**

Does alcohol change any of this?

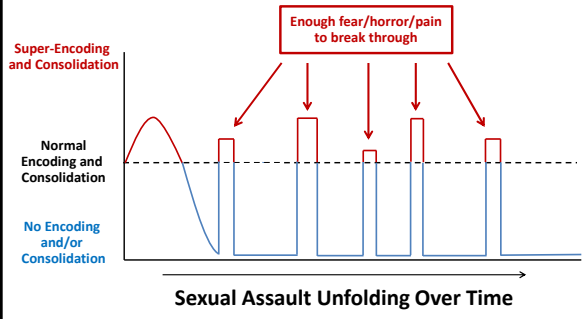


Alcohol and Memory

- **Low-moderate dose/intoxication**
 - Impairs context encoding
 - Does not impair encoding of sensations
 - Resembles effect of fear/trauma
- **High dose/intoxication:**
 - Impairs hippocampus-mediated encoding and consolidation of both context and sensations

Melia... LeDoux, 1996, Neuroscience, 74, 313
Bisby et al. 2009, Psychopharmacology, 204, 655; Bisby et al. 2010, Biol Psychiatry, 68, 280

Fear/Horror/Pain Can “Break Through” Severe Alcohol/Drug Effects



Where there is a **FRAGMENT** there was usually...

FEAR **HORROR**
PAIN

So **listen** and **explore** for them



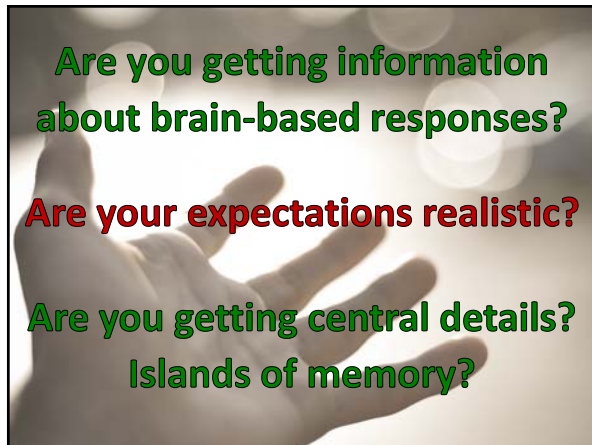
DV / Repeated Assaults

Like arguments of married couples

- Fight over same things, say same things

What do we remember?

- **Not** every detail, date, order of things said
- **First/early** really bad argument, and **last** one
- One or two **really bad ones** in the middle
- **Common phrases, very disturbing details**



Value of knowing and applying the relevant neurobiological, memory and other science?

It can help us **understand** victims, help them feel **safe and supported**, and get their ongoing **cooperation**.

