

# The Neurobiology of Trauma

What You Need to Know About the Brain & Trauma

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# Today's Presentation

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- PART I Peer reviewed research on how trauma affects behavior, memory, and health
- PART II Applying this research to your work as investigators or support persons for MSU students, faculty, and staff

# Application: A Cautionary Note

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Trauma symptoms do not prove that trauma occurred

Absence of trauma symptoms does not mean that trauma did not occur

Uh . . . so what is this information useful for?

CONTEXT

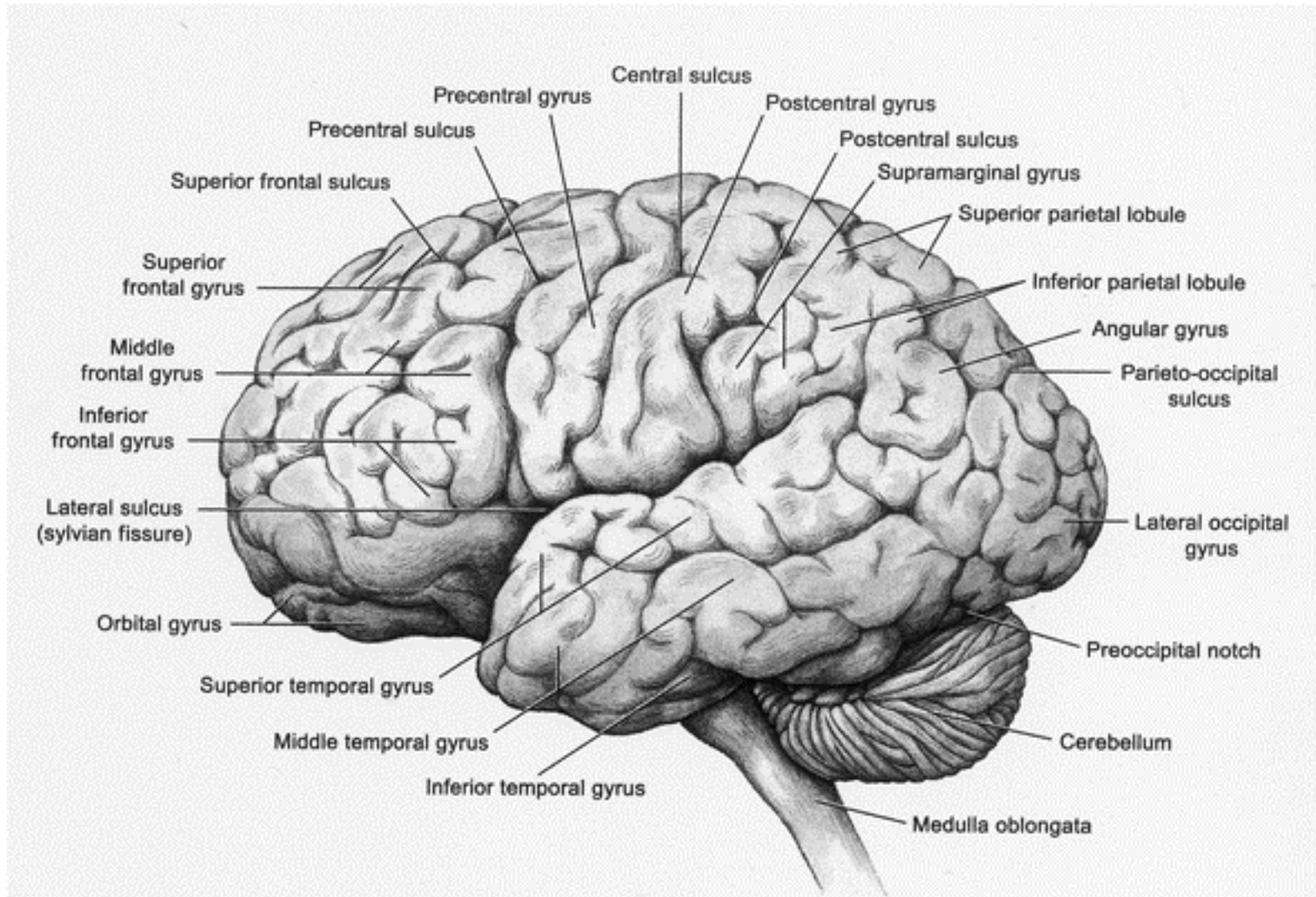
# PART I: Research on Trauma

**“In the midst of assault, the brain’s fear circuitry takes over while other key parts are impaired or even effectively shut-down.**

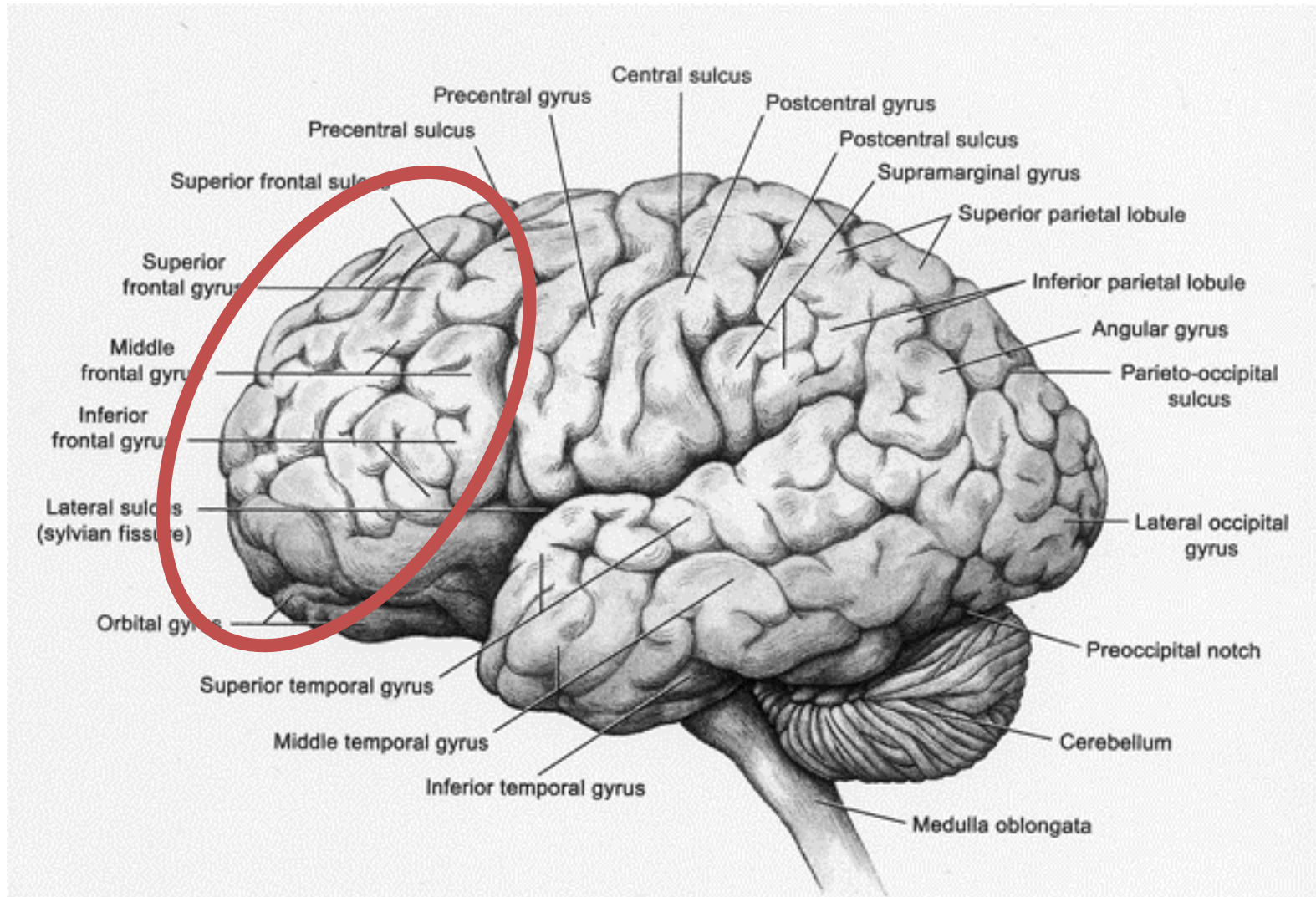
**This is the brain reacting to a life-threatening situation just the way it is supposed to.”**

Hopper & Lisak, 2014

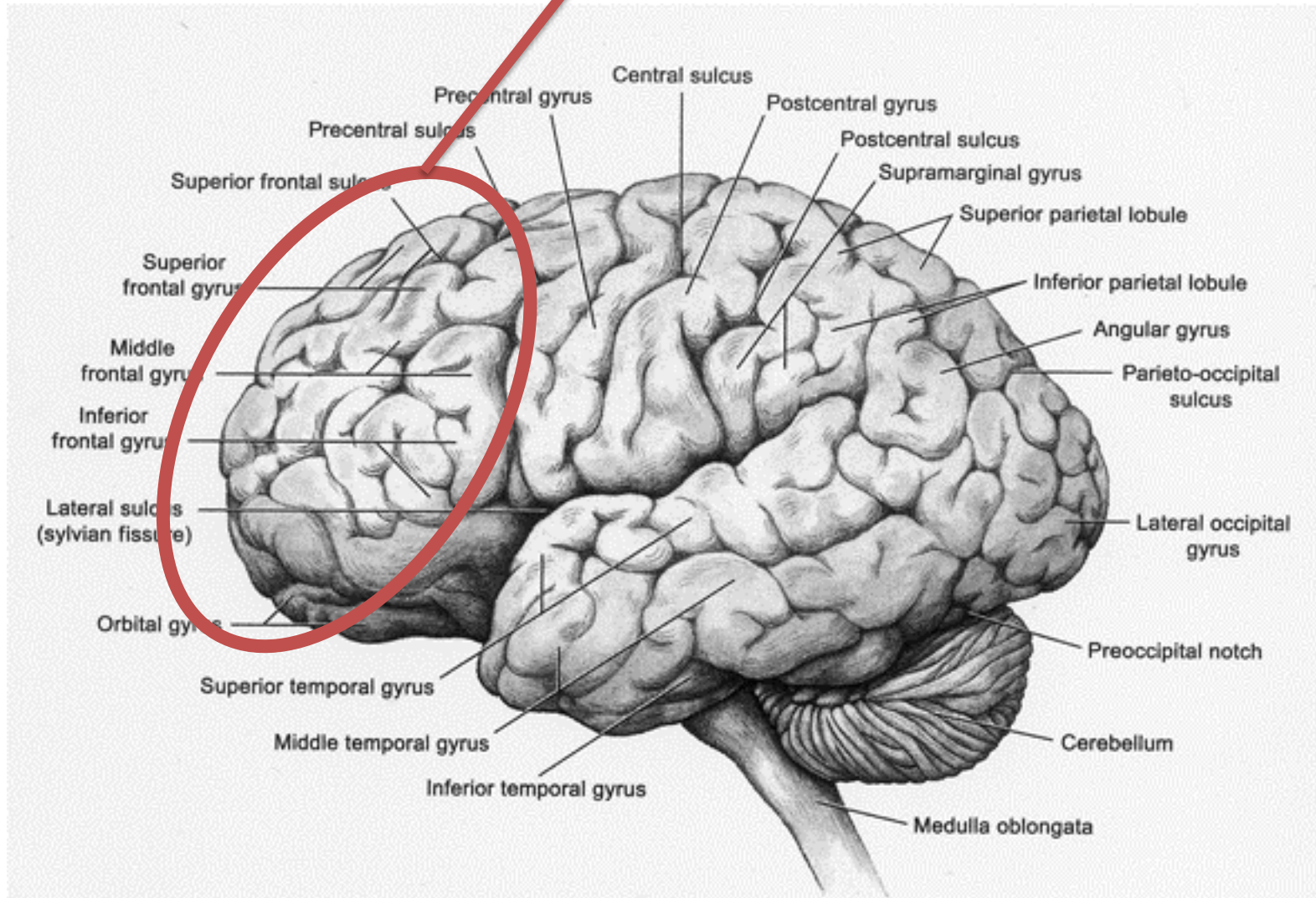
# Cerebrum



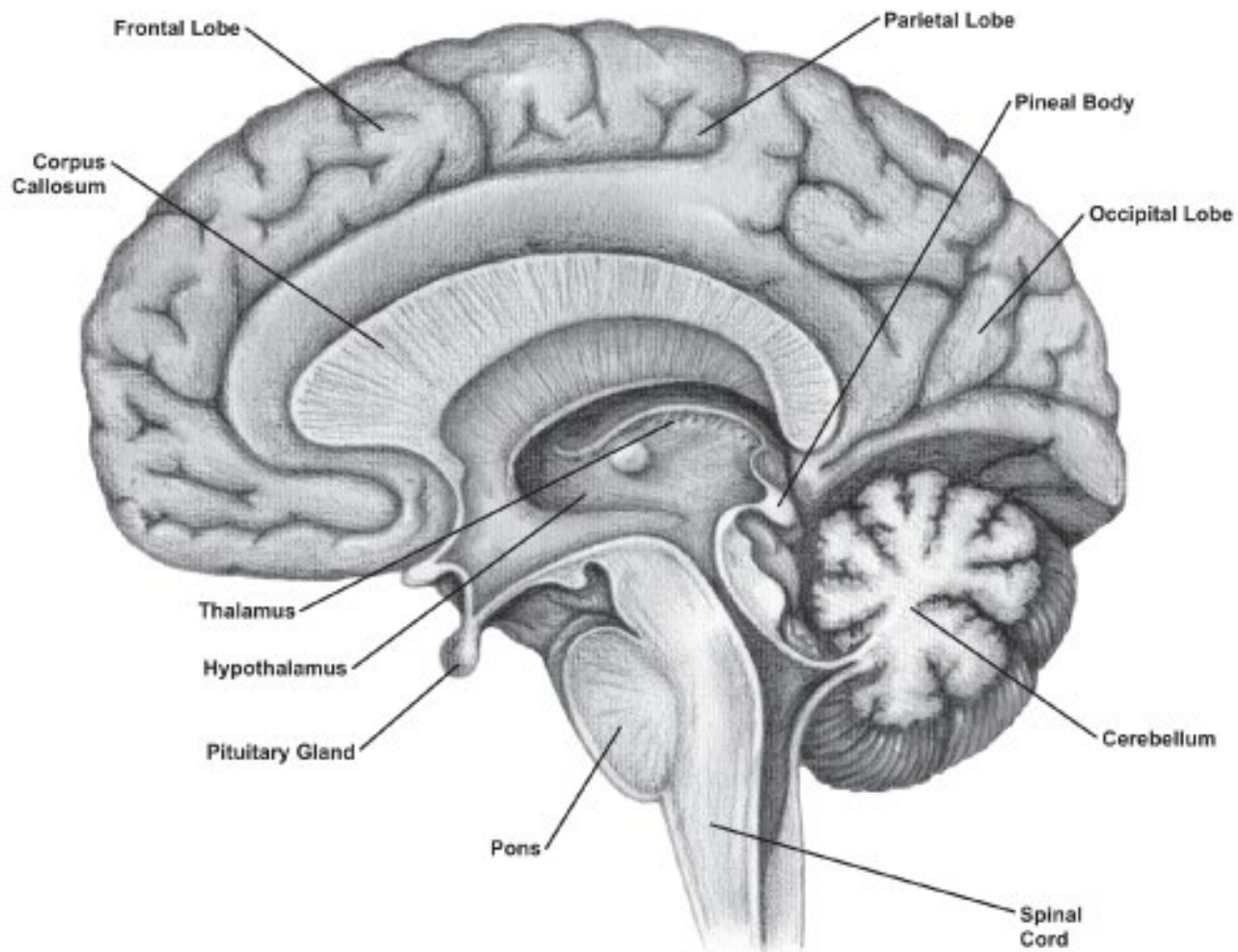
# Prefrontal Cortex



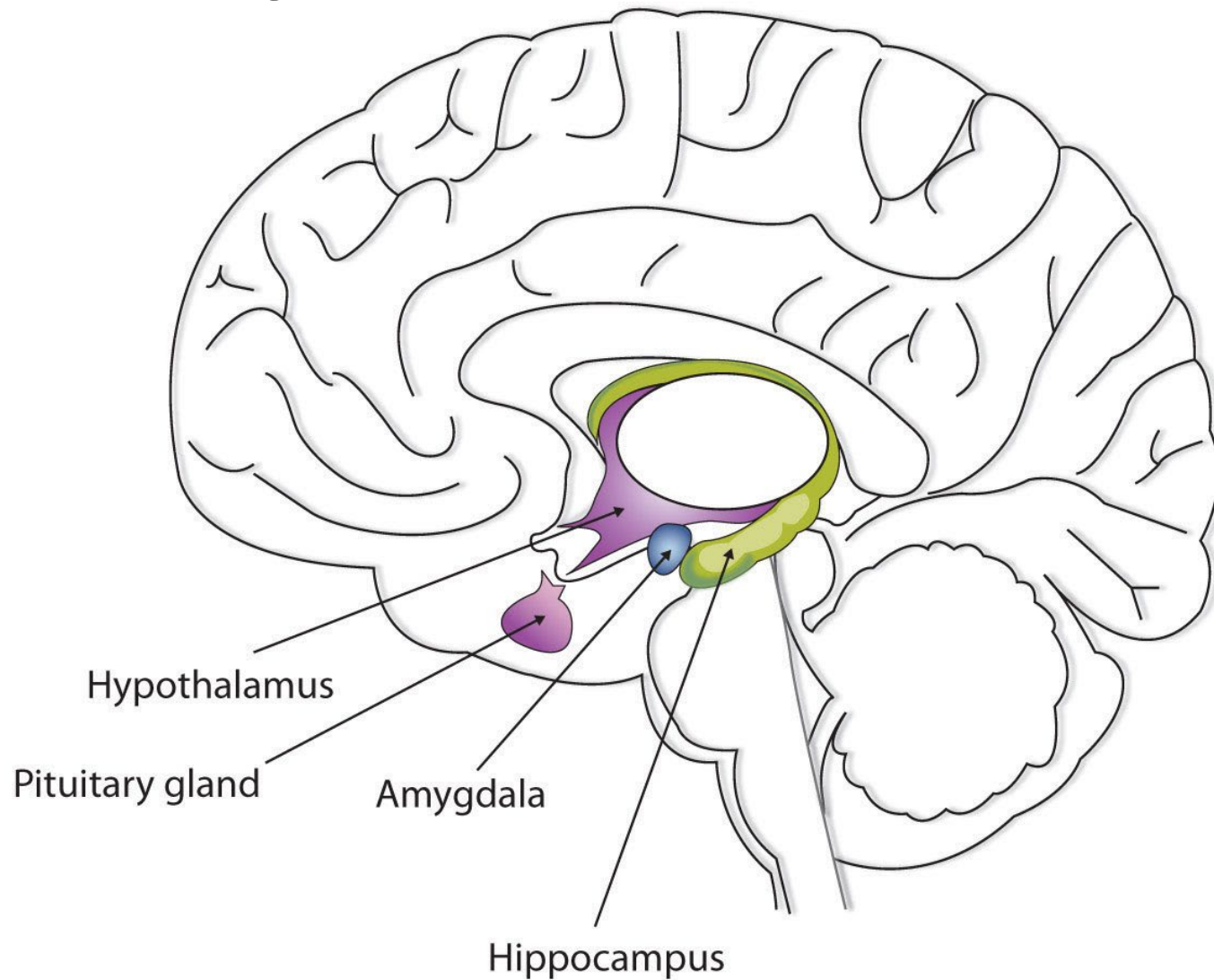
# Executive Functions

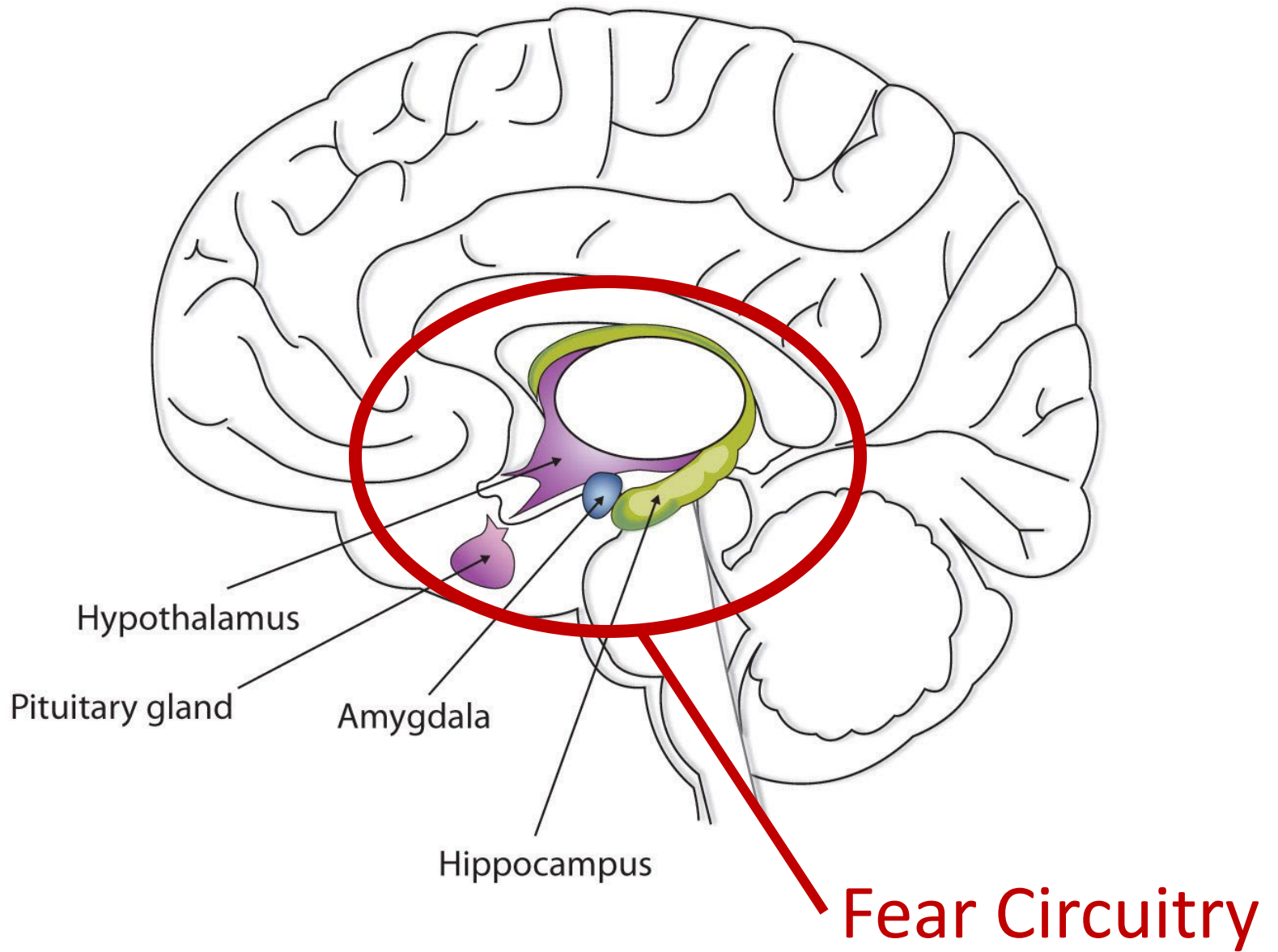






# Limbic System





**This is an autonomic process.**

**It is hard-wired into the brain.**

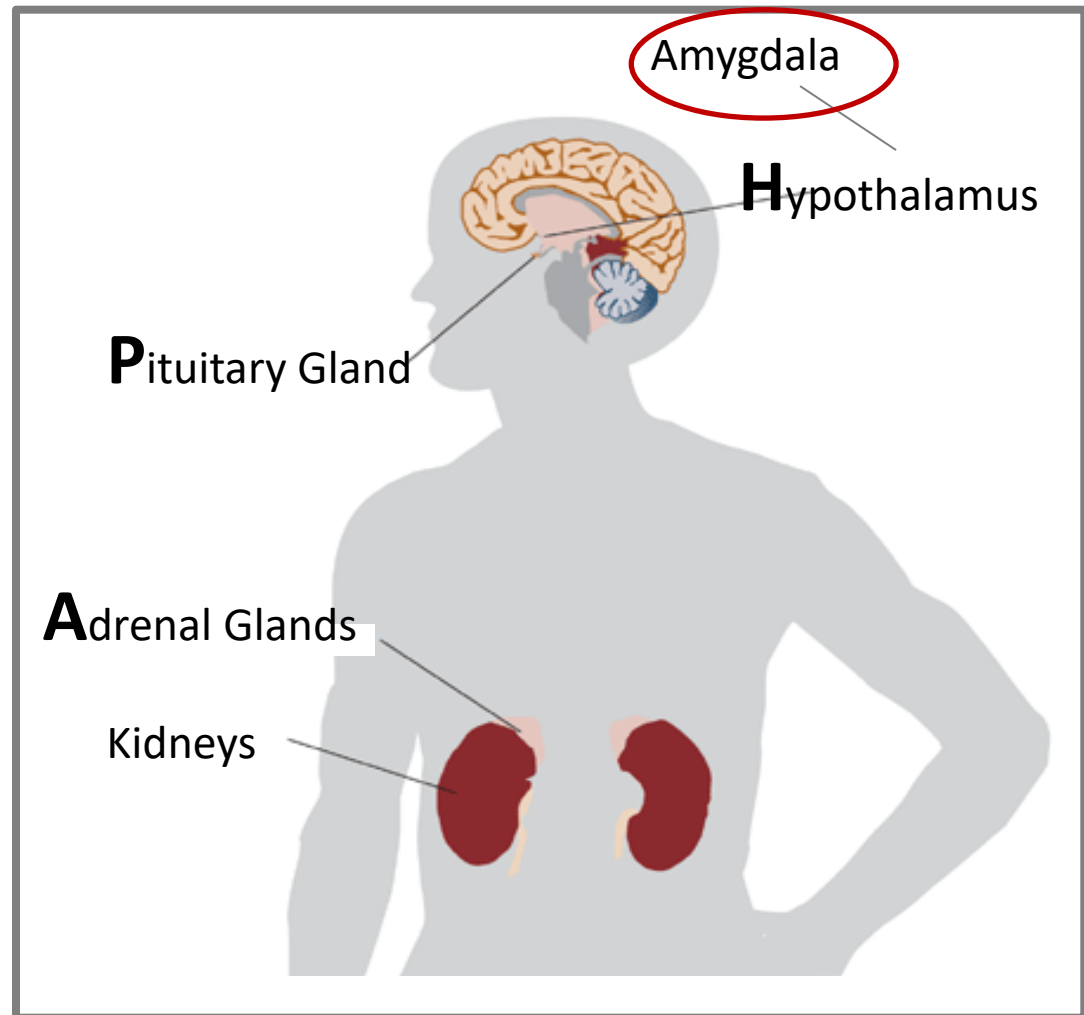
**The victim does not “choose” what happens next.**

**This will affect behavior, memory, and health.**

# Behavior: The HPA Axis

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Balances body following stress by releasing of hormones

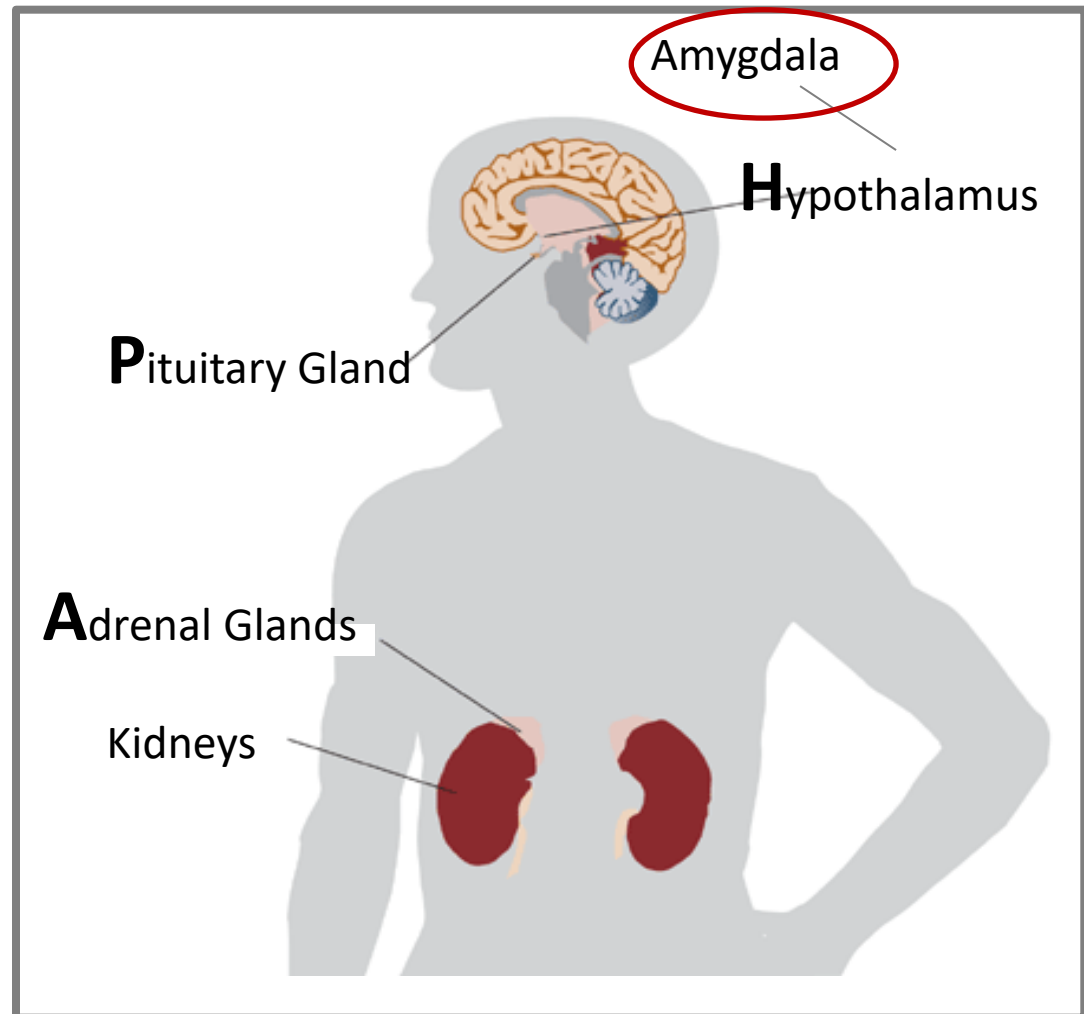


# Behavior: The HPA Axis

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**Opioids:** Prevent pain

**Oxytocin:** Promote good feelings



# Behavior: The HPA Axis

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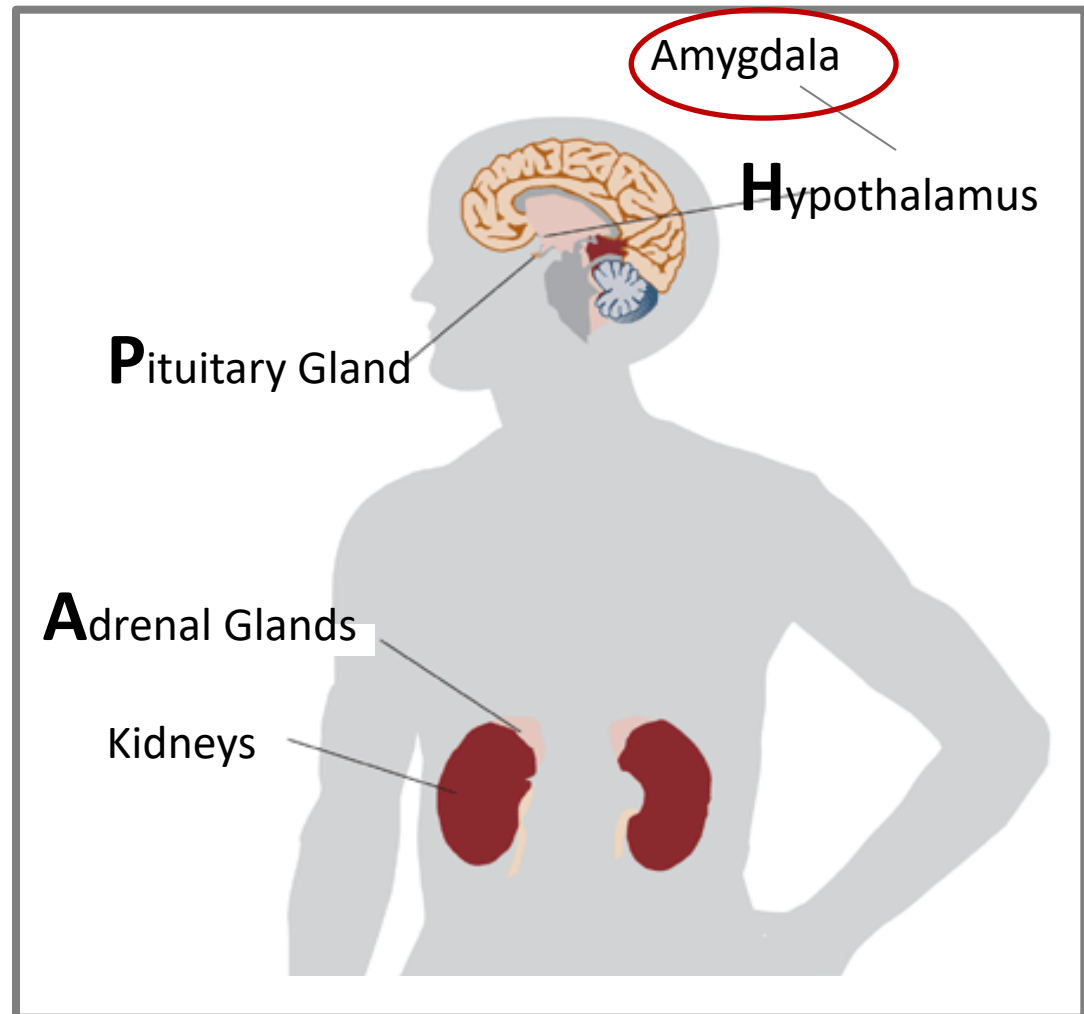
**Opioids:** Prevent pain

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**Flat Affect**

**“Inappropriate”  
Affect**

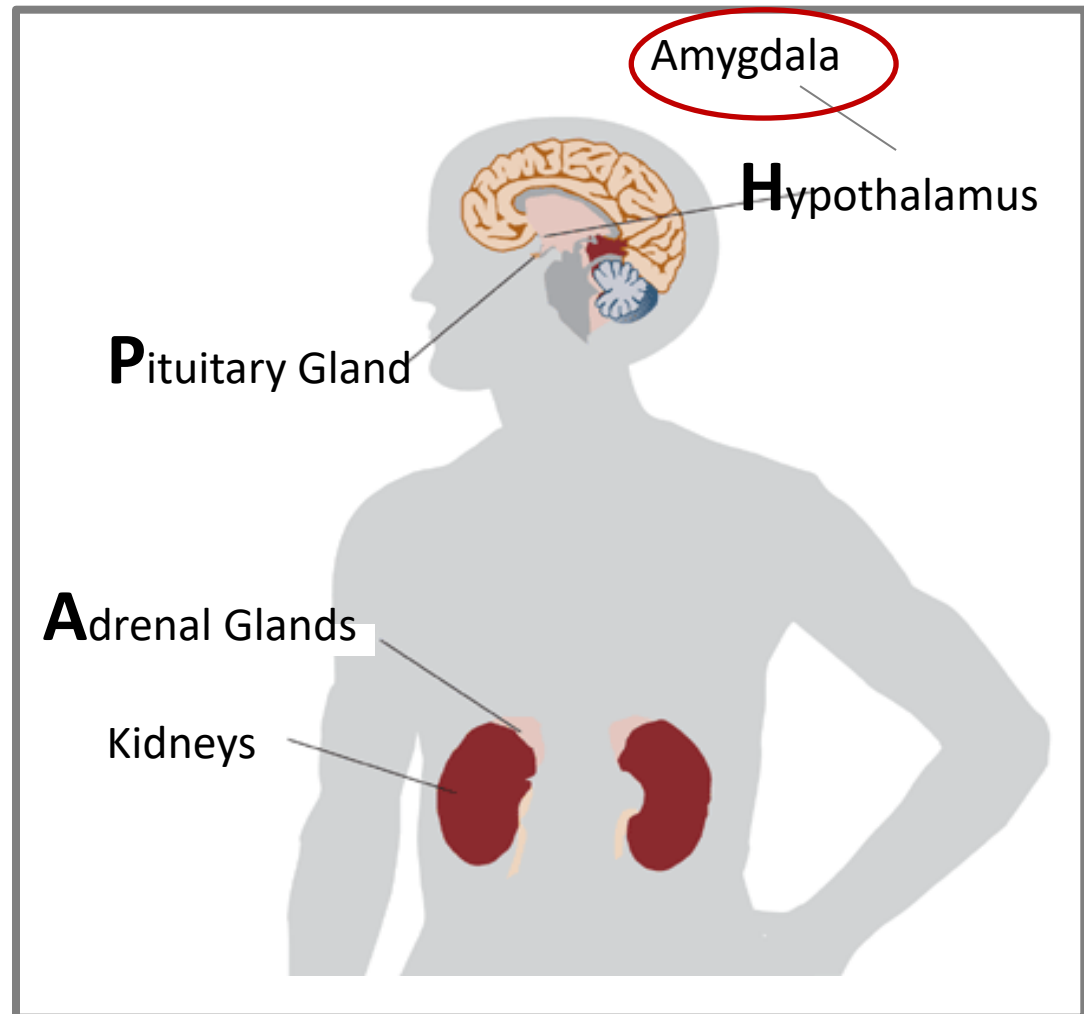


# Behavior: The HPA Axis

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**Catecholamine:**  
Adrenaline

**Cortisol:** Energy  
available to act





# Behavior: The HPA Axis

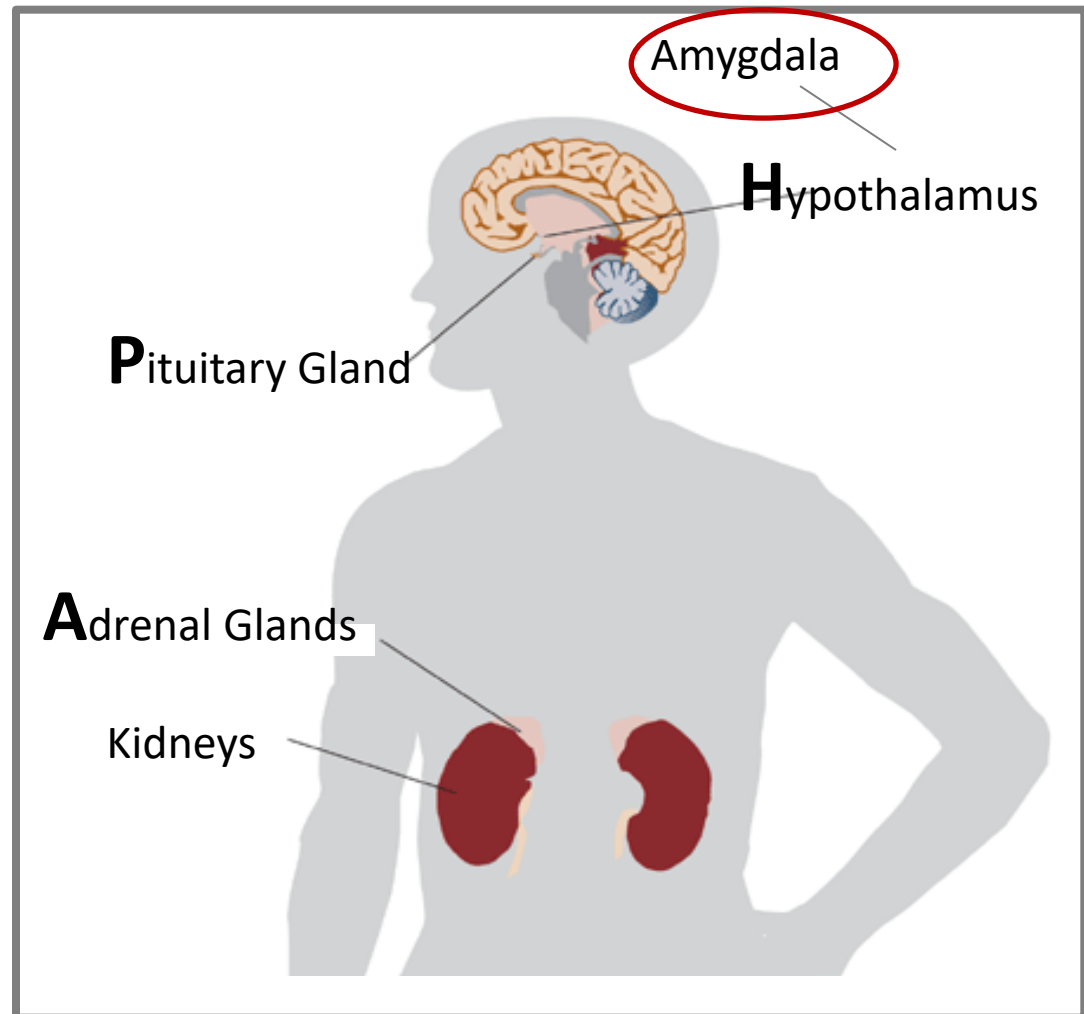
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**Catecholamine:**  
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**“Fight or Flight”**



**It's more complicated than that.**

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**“Fight” is possible, but the brain may initiate a more protective response instead.**

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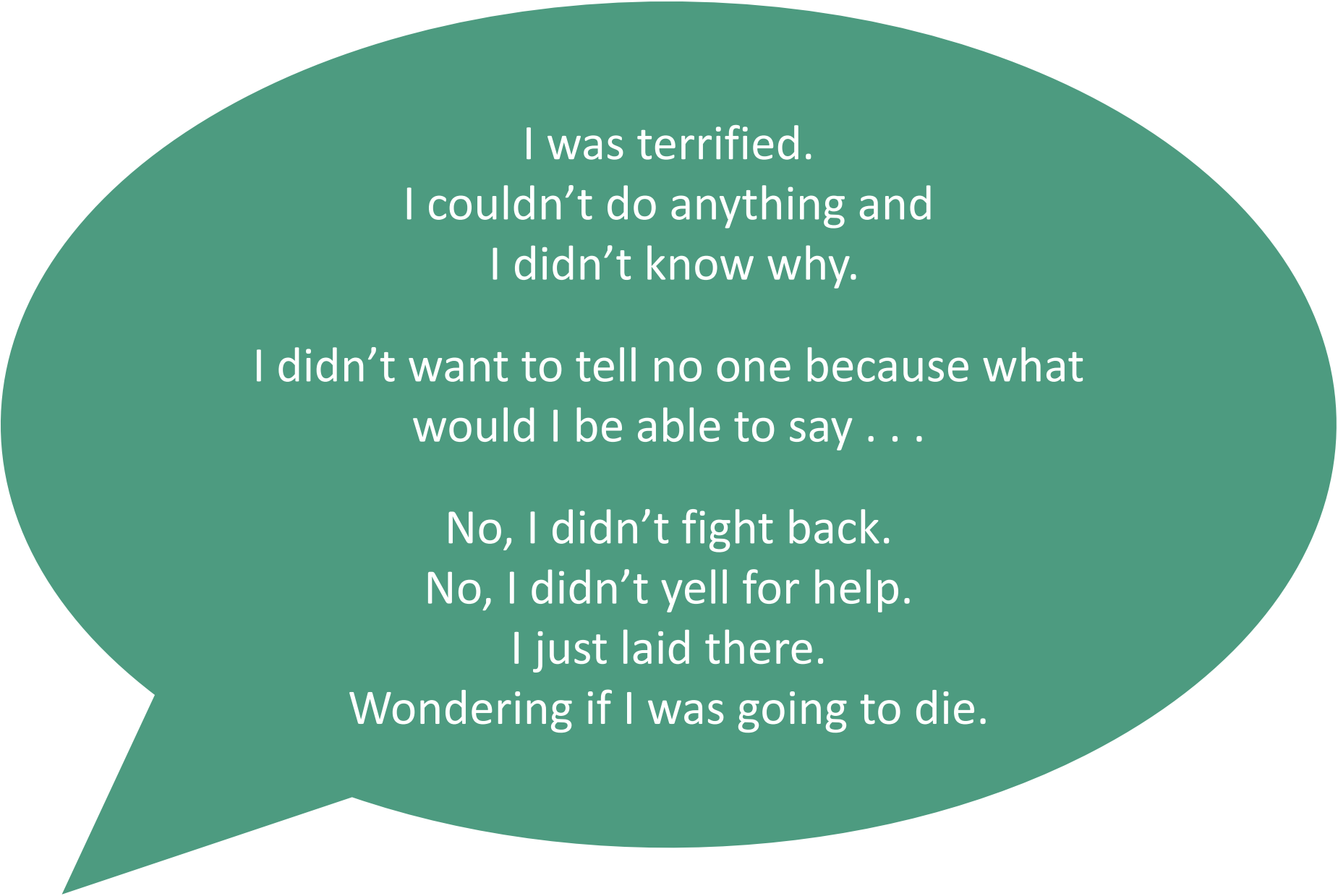
**“Fight” is possible, but the brain may initiate a more protective response instead.**

**“Freeze” may be a more protective option.**

# Behavior: Tonic Immobility

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- Often triggered by physical restraint
- Body is unable to move or talk
- Mind is aware of what's happening
- Highly variable how long it lasts
- Up to 50% of sexual assault victims experience TI



I was terrified.  
I couldn't do anything and  
I didn't know why.

I didn't want to tell no one because what  
would I be able to say . . .

No, I didn't fight back.  
No, I didn't yell for help.  
I just laid there.  
Wondering if I was going to die.

# Behavior: SUMMARY

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Victims are in survival mode → brain shutting down conscious control & fear circuitry takes over

Fight, Flight, Freeze → many possible responses

Victims may not act the way you expect them to act





**“[Trauma victims] may be unable to recall many important details . . . may be uncertain about many . . . may be confused about many . . . may recall some details inaccurately.**

**This is the human brain working the way it was designed to work.”**

Hopper & Lisak, 2014

# Memory: How Memory Works

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**Attention** → What are we paying attention to?  
What we attune to affects what we can remember

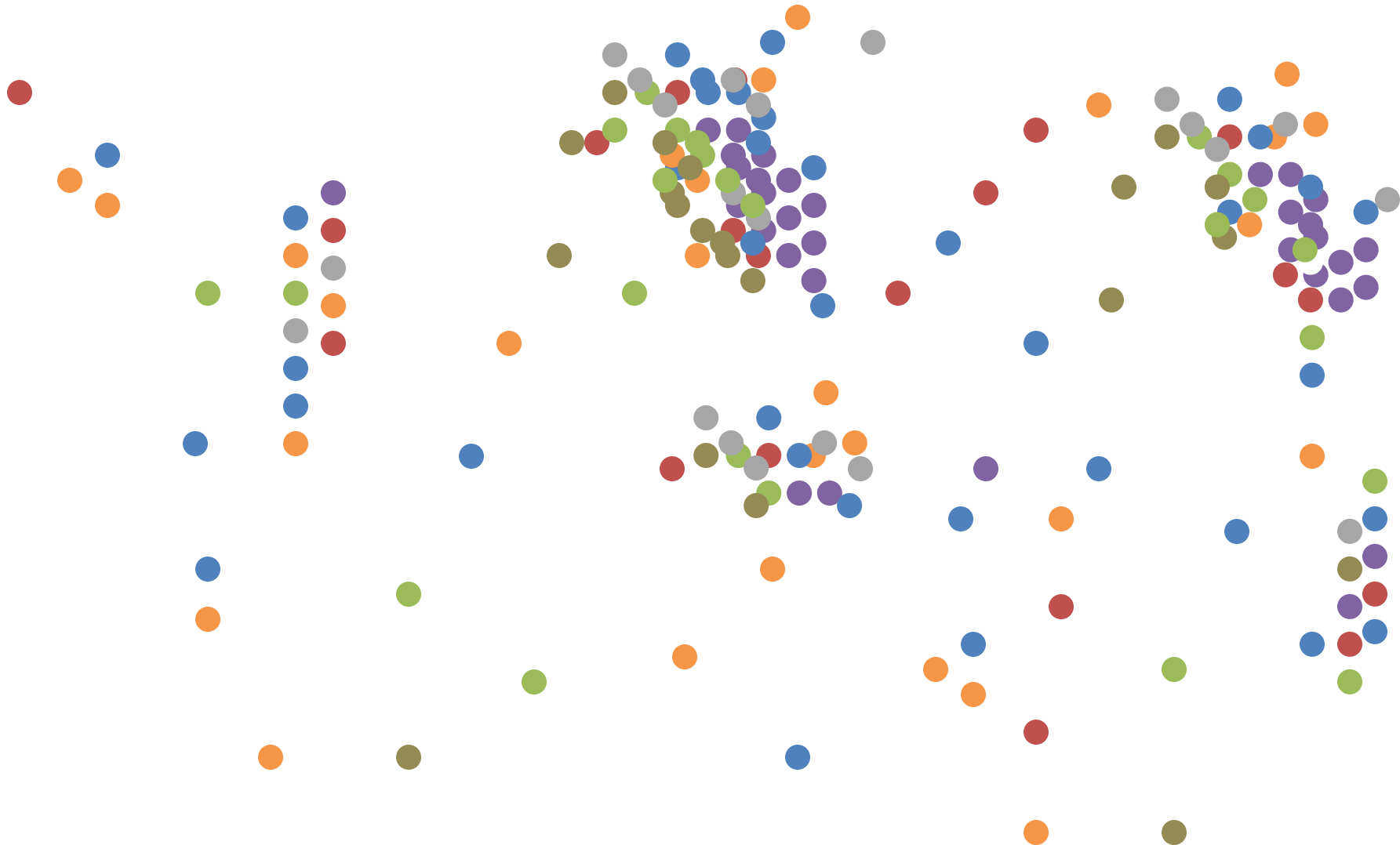
# Memory: How Memory Works

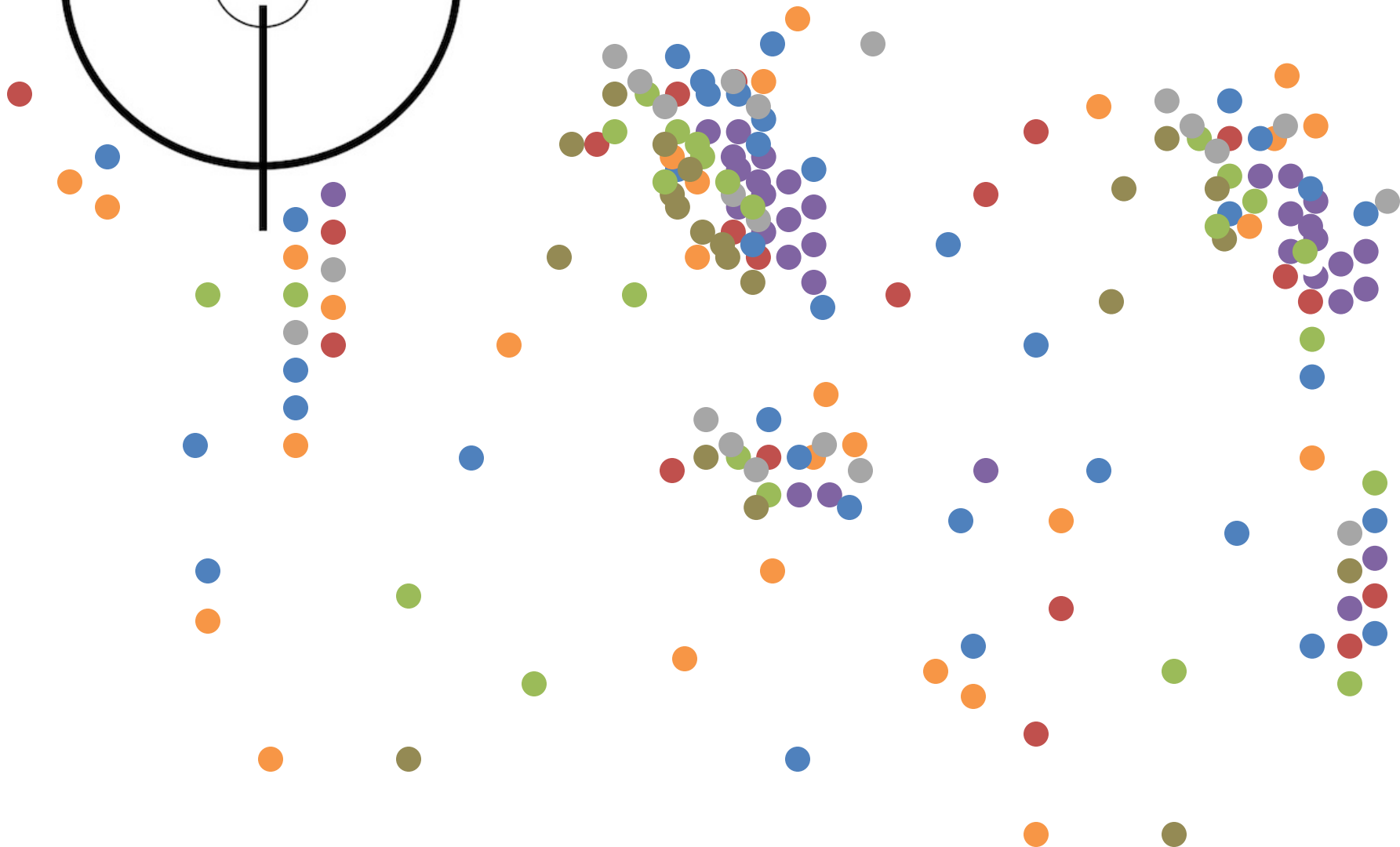
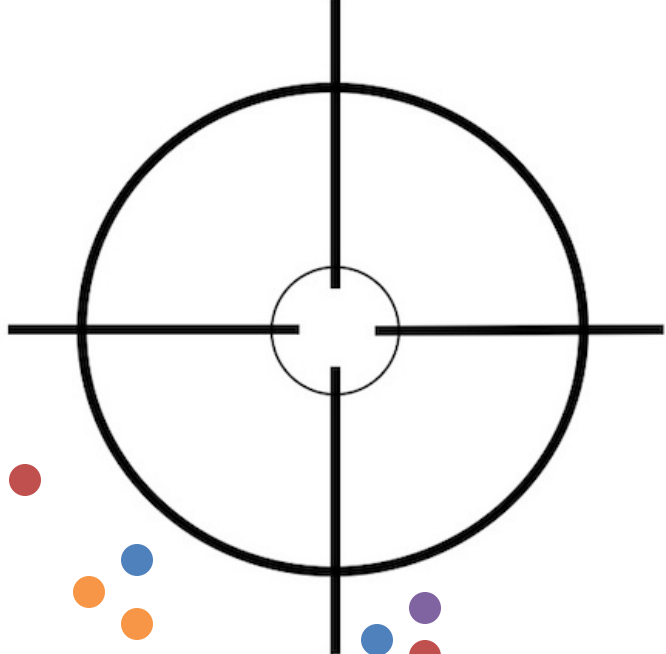
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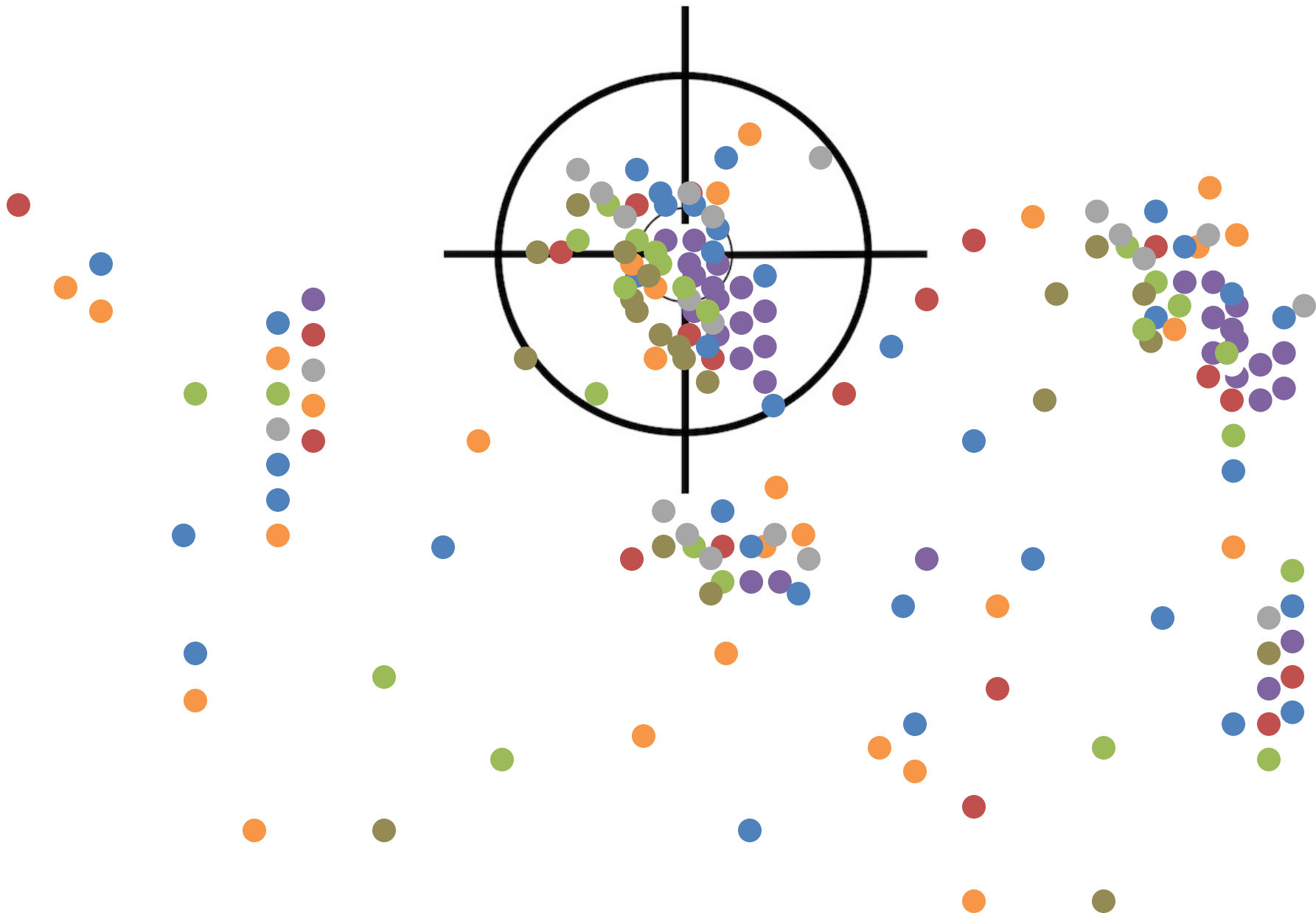
**Attention** → What are we paying attention to?  
What we attune to affects what we can remember

**Memory Encoding** → How the hippocampus captures what we're attending to to start forming a memory











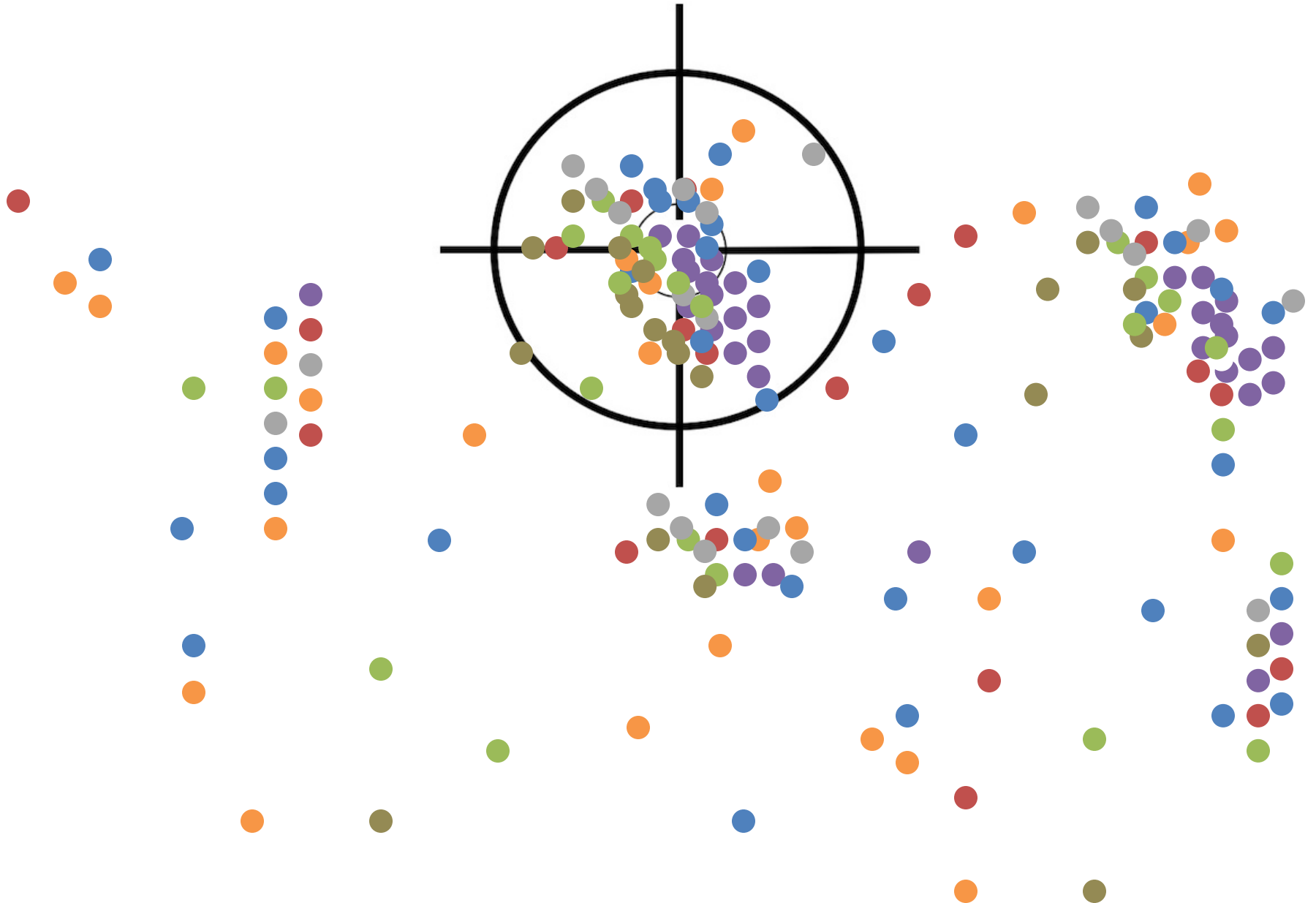
# Memory: Encoding

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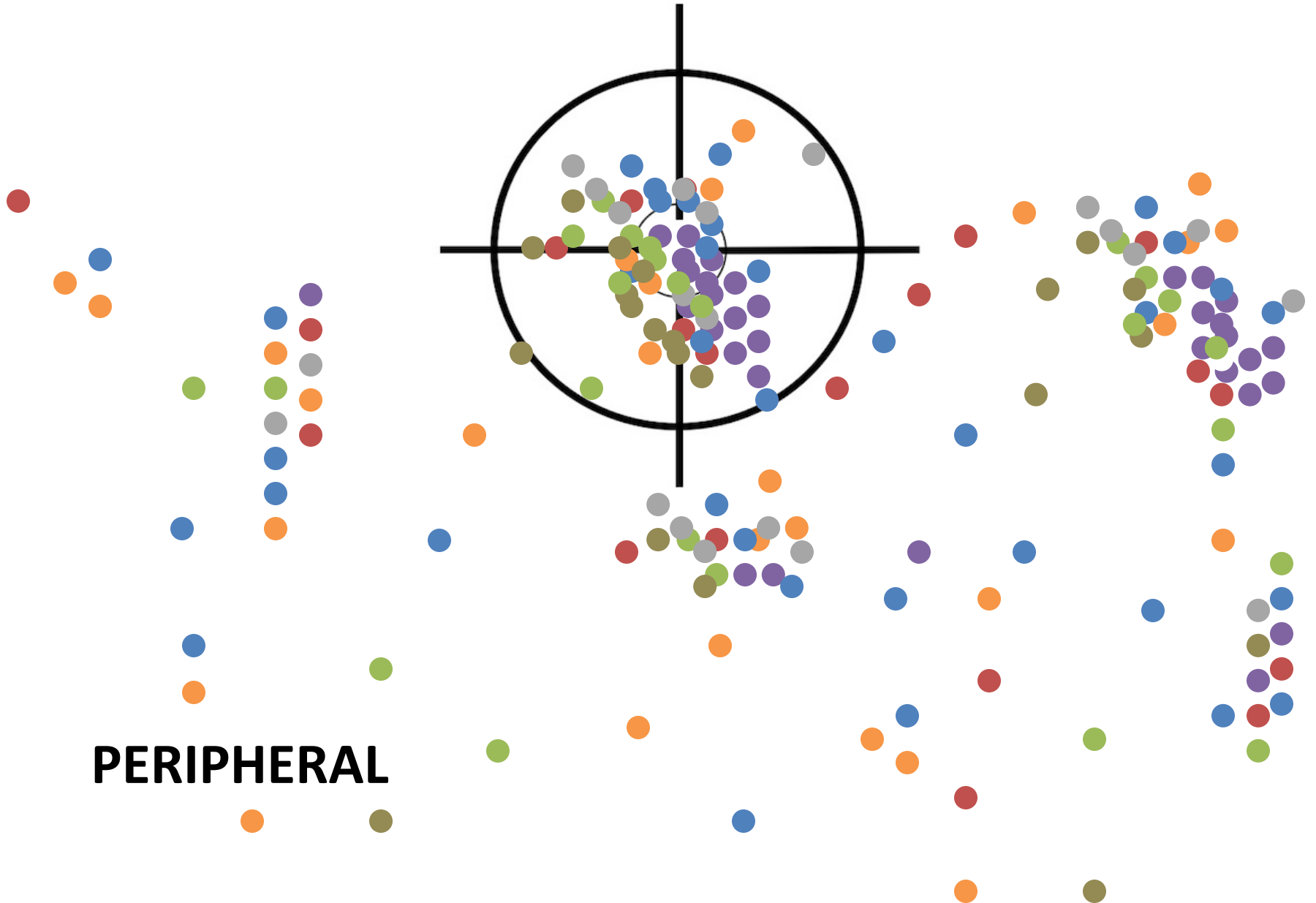
**Central Details** → Core aspects of an experience that captured our attention (more likely to be encoded)

**Peripheral Details** → What's happening around the core experience that didn't capture our attention (less likely to be encoded, not as strongly encoded)

# CENTRAL



**CENTRAL**



**PERIPHERAL**

# Memory: How Trauma Affects Memory

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## Central Details in Trauma →

Central to survival

Often are SENSORY-based

“Small” details that may not seem important to others

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## Central Details in Trauma →

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Often are SENSORY-based

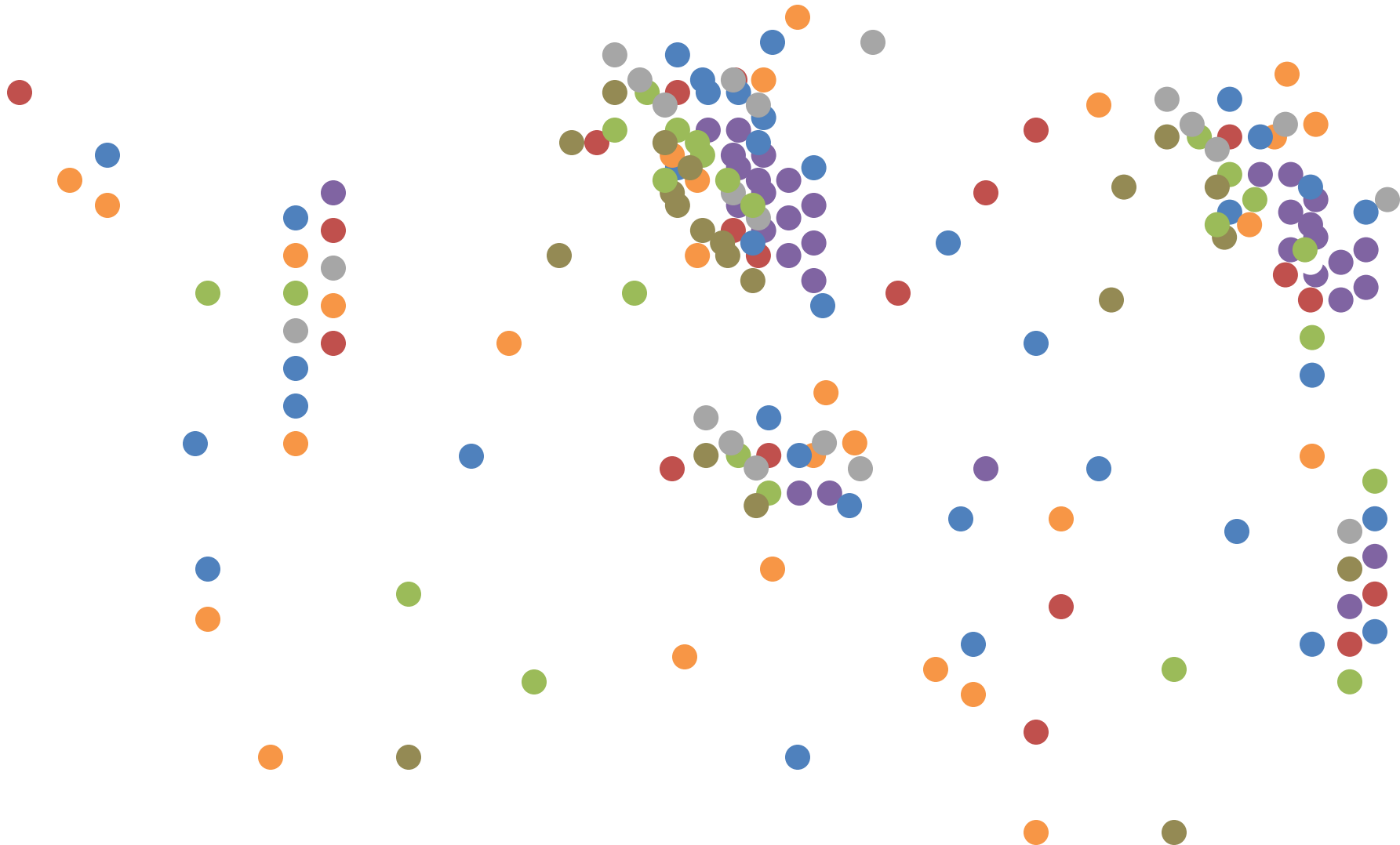
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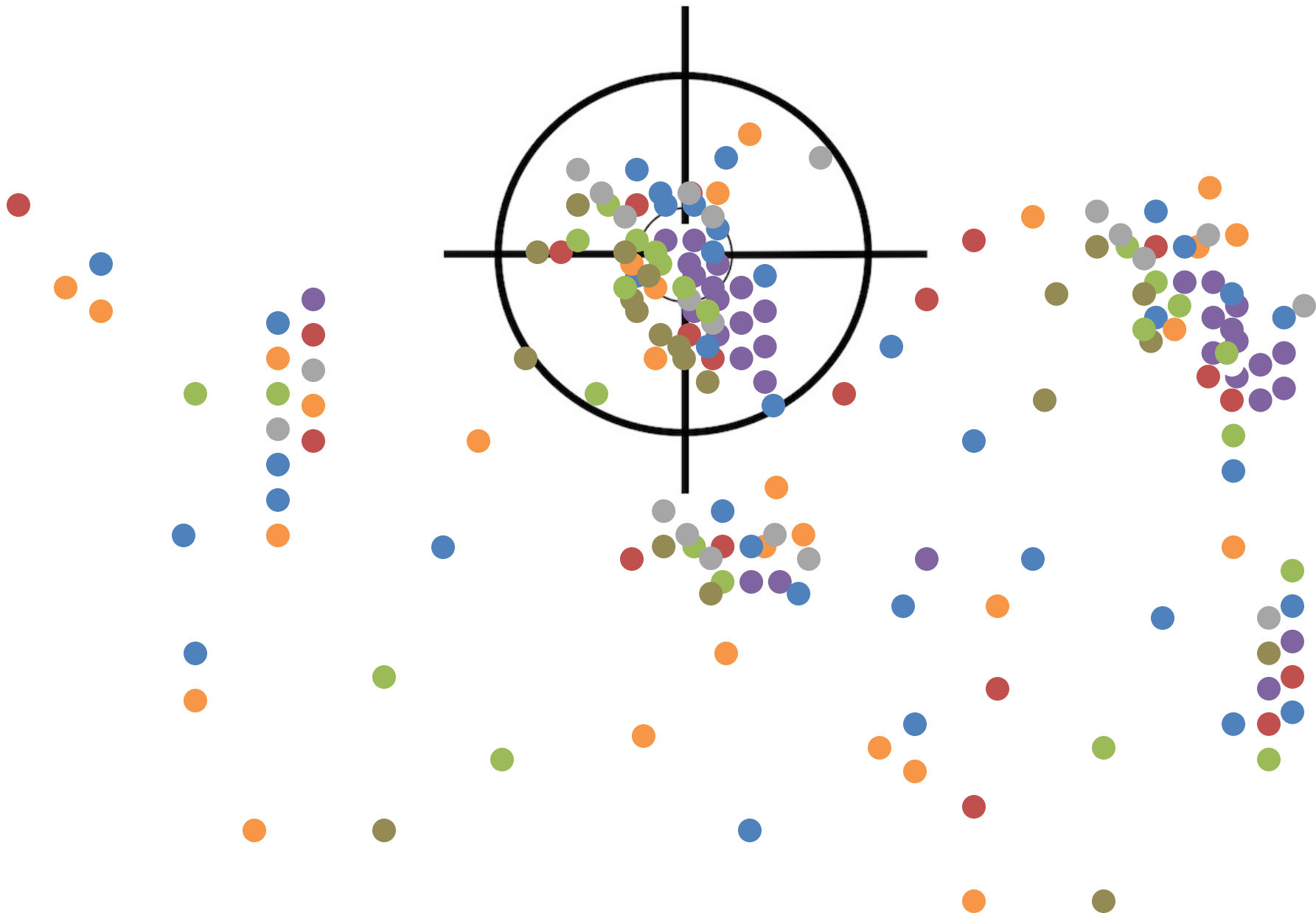
## Peripheral Details →

Not central to survival

Often are CONTEXT-based

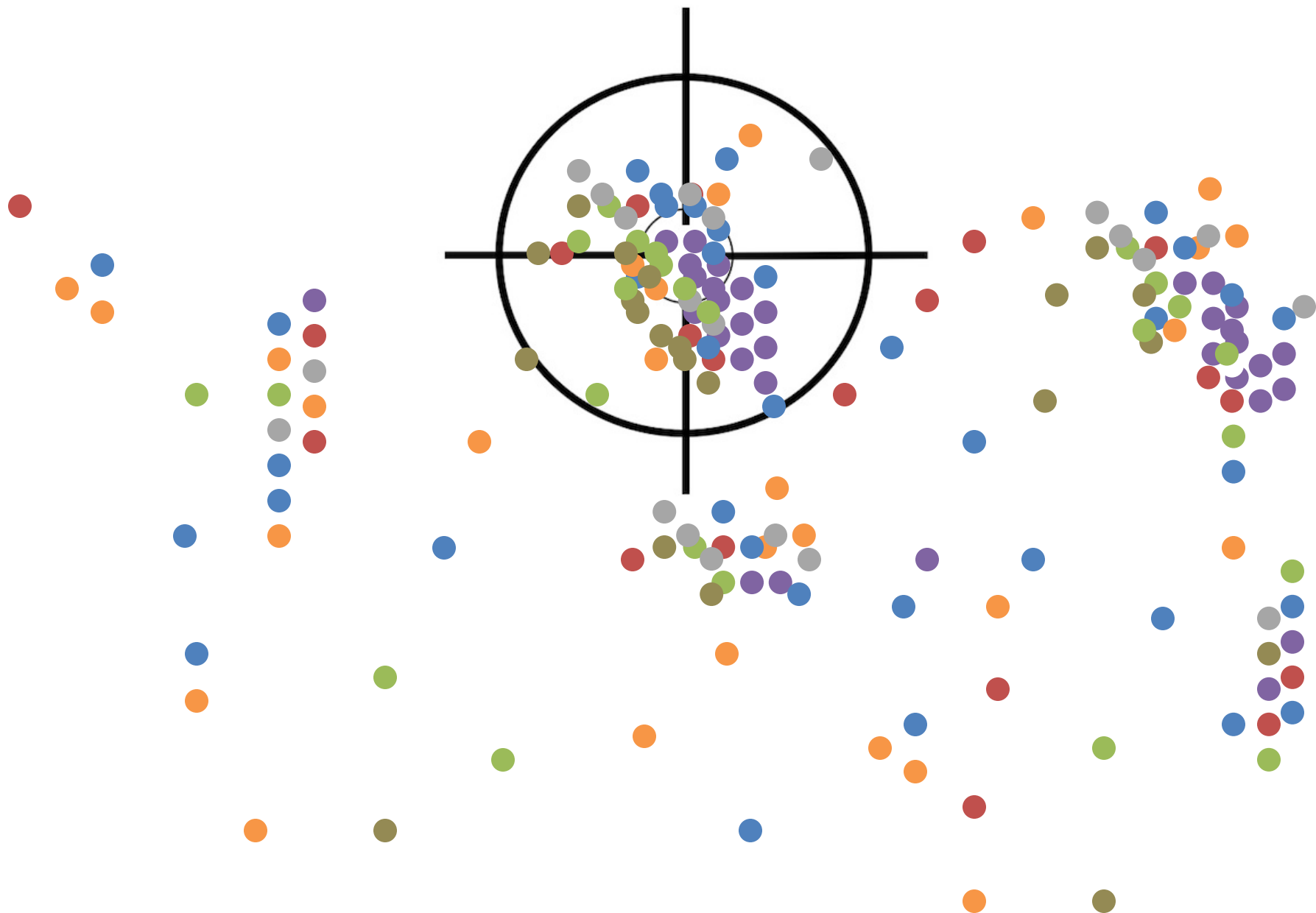
Details that others may see as important



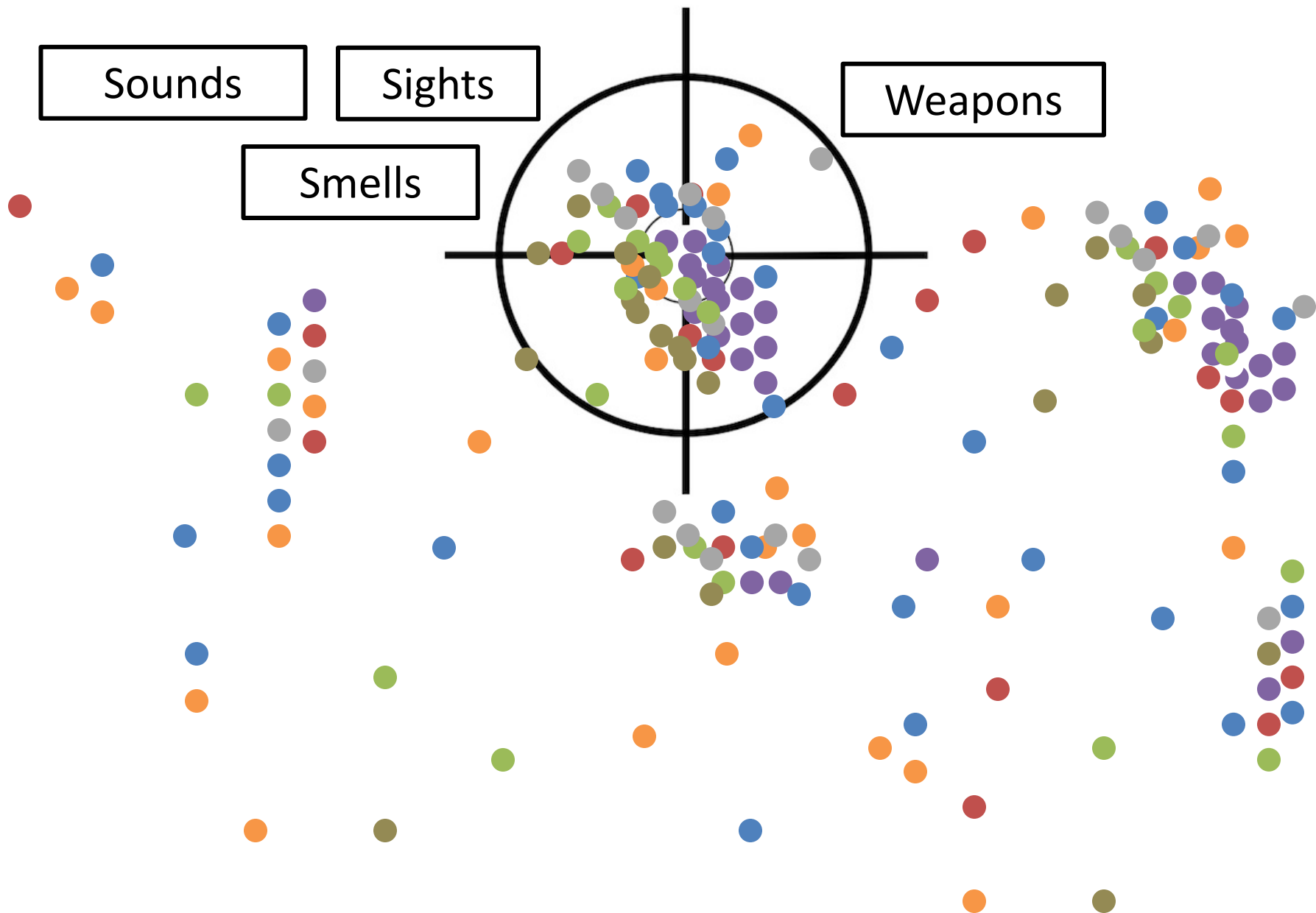


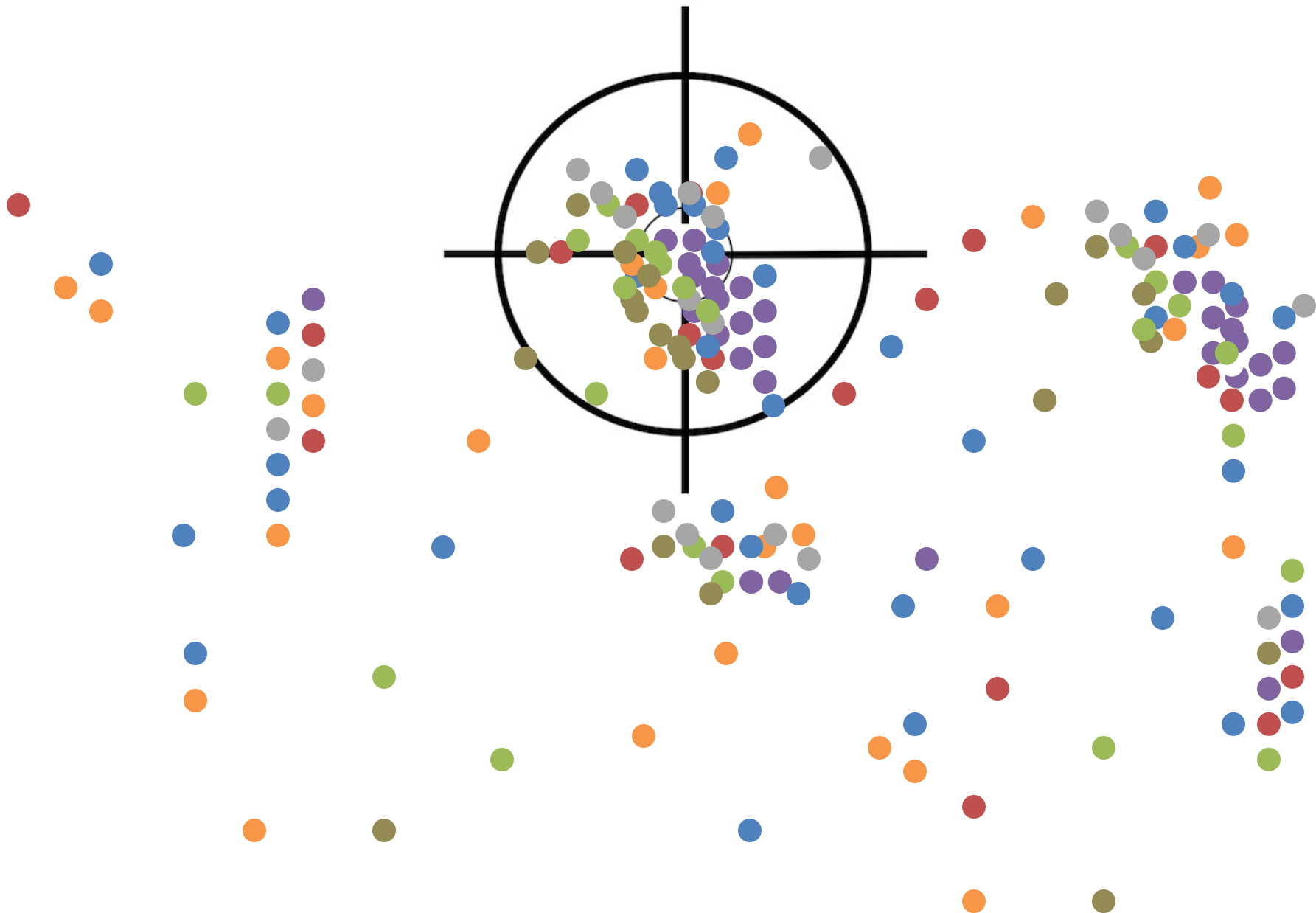


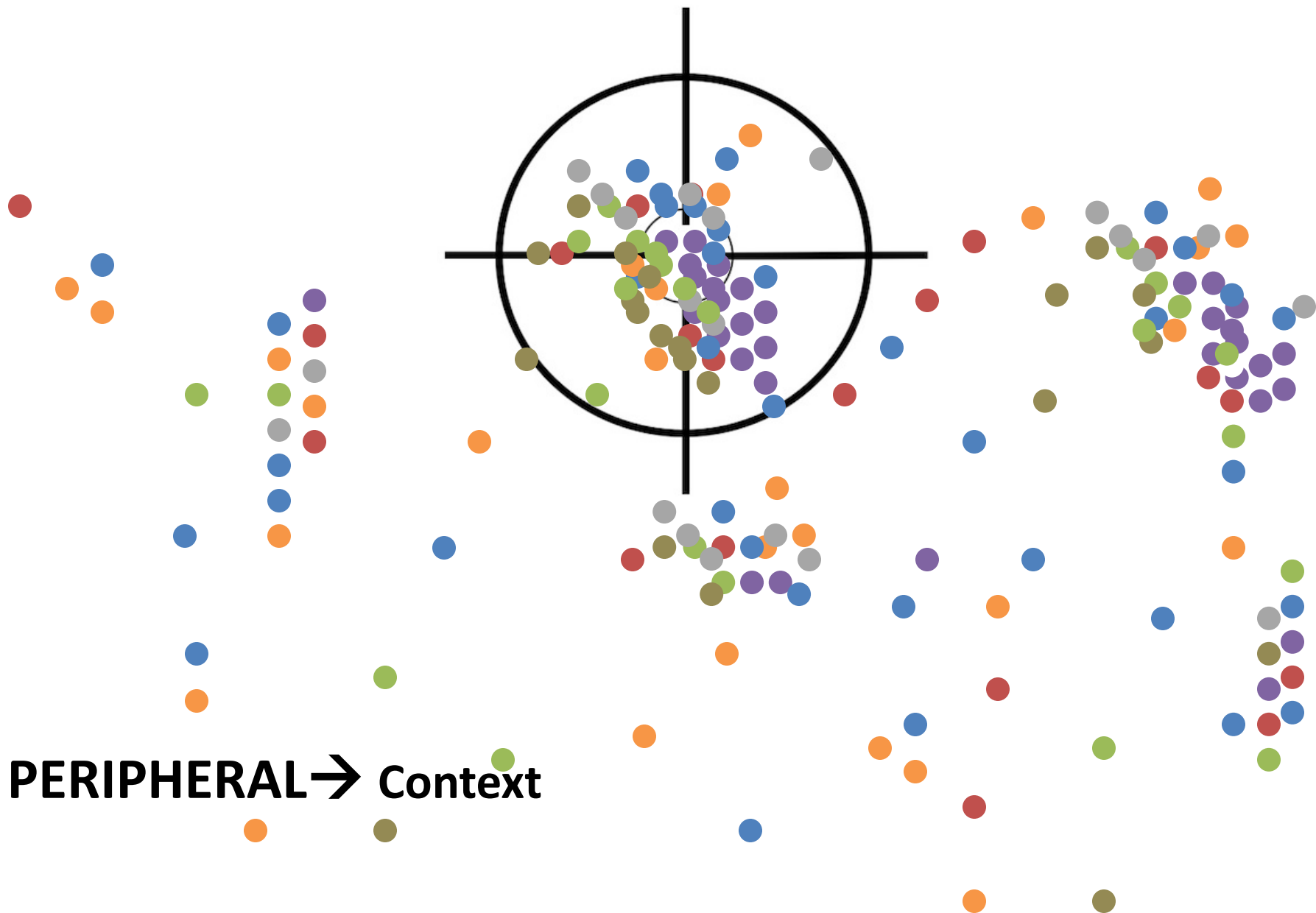
**CENTRAL** → Survival, Sensory

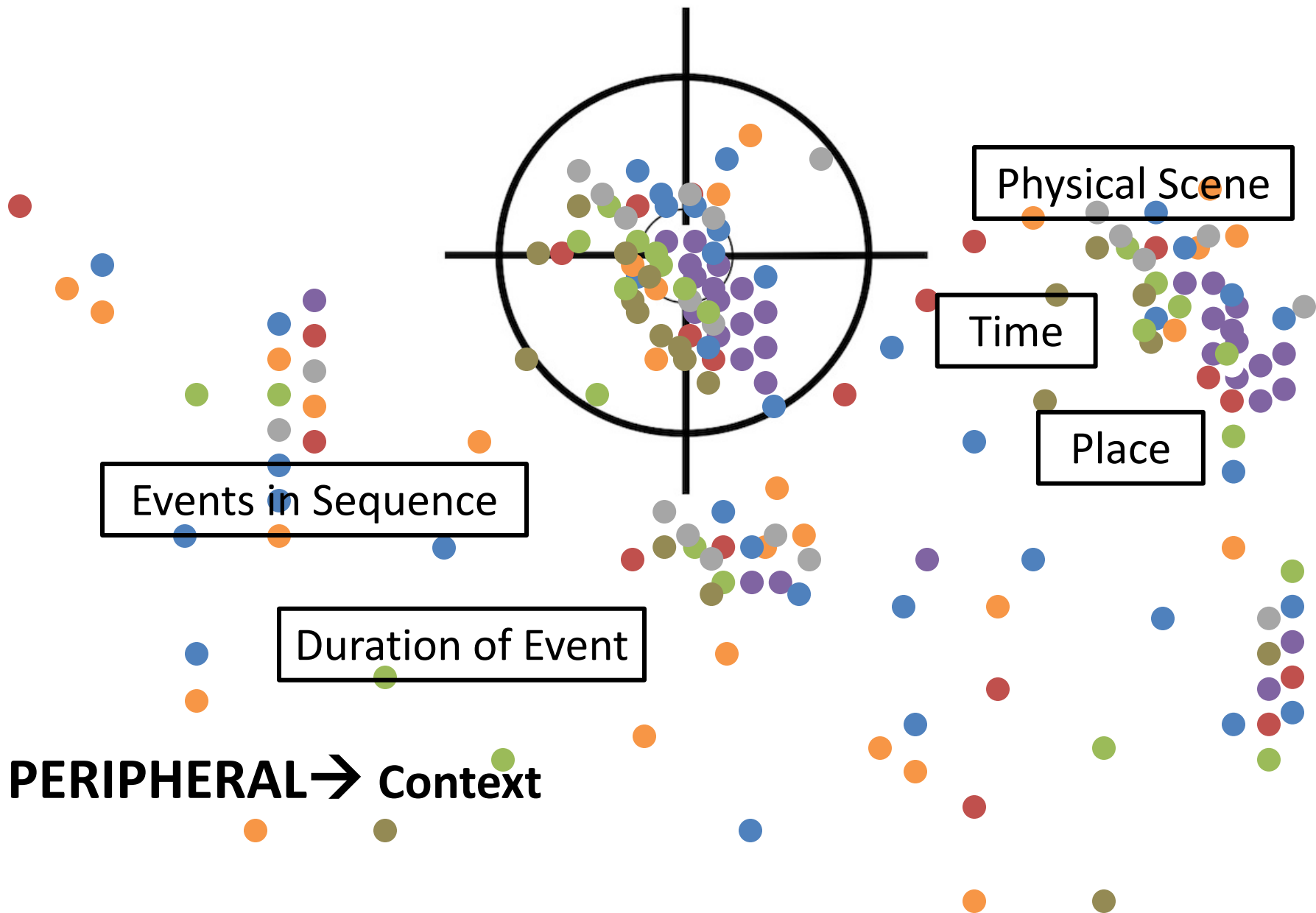


# CENTRAL → Survival, Sensory









# Memory: Recalling Traumatic Memories

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**Fragmented** → Not organized in a linear sequence

# Memory: Recalling Traumatic Memories

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**Incomplete** → Some details are missing

# Memory: Recalling Traumatic Memories

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Incomplete → Some details are missing

**WHY?**

Peripheral

Alcohol/Drug Use

Can't Find *RIGHT NOW*

Withheld



# Memory: Recalling Traumatic Memories

---

**Fragmented** → Not organized in a linear sequence

**Incomplete** → Some details are missing

**Incorrect** → Peripheral details could be wrong

# Memory: Recalling Traumatic Memories

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**Fragmented** → Not organized in a linear sequence

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**WHY?**

“Filled In” by Victim (unconsciously)

Feel Pressured to Answer

Lying

# Memory: Recalling Traumatic Memories

---

Fragmented → Not organized in a linear sequence

Incomplete → Some details are missing

Incorrect → Peripheral details could be wrong

**BUT...**

Central memories stable, accurate

Peripheral memories often accurate

Very few victims fabricate assault

# Memory: SUMMARY

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Victims are in survival mode → brain shutting down conscious control & fear circuitry takes over

What is central vs. peripheral varies victim-to-victim, assault-to-assault

Reasons for why story is fragmented & scattered → re-evaluate through a neurobiological lens

# Health: Immediate Impact

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- Shock or numbness
- Fear & high startle response
- Depression
- Anger
- Self-blame, shame, guilt
- Isolation, lack of interest

# Health: Immediate Impact

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- Shock or numbness
- Fear & high startle response
- Depression
- Anger
- Self-blame, shame, guilt
- Isolation, lack of interest
- Difficulty concentrating
- Sleeplessness
- Nightmares
- Headaches & body pain
- Overeating/appetite loss
- Stress-related illnesses

# Health: Long-Term Impact

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# Health: Long-Term Impact

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- Post-traumatic stress disorder
- Clinical depression & anxiety
- Suicidal thoughts & behaviors
- Chronic pain
- Chronic health problems

# Health: Long-Term Impact

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- Post-traumatic stress disorder
- Clinical depression & anxiety
- Suicidal thoughts & behaviors
- Chronic pain
- Chronic health problems
- Work struggles/job loss
- School struggles/drop-out
- Strained relationships
- Increased social isolation
- Financial stress

# Health: SUMMARY

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Neurobiological effects of trauma → cause psychological and physical health distress

Connect survivors to services → to try to prevent negative long-term impact

Health consequences are severe → need to connect to trained professionals/para-professionals

## PART II: Application

# Application: A Cautionary Note

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Trauma symptoms do not prove that trauma occurred

Absence of trauma symptoms does not mean that trauma did not occur

Uh . . . so what is this information useful for?

CONTEXT

# Application: What Is Your Role?

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Be clear with yourself and others on your role

Fact-finders interview

People who are not fact-finders do not interview

Fact-finders can be kind

People who are not fact-finders can be kind

# **Application: Trauma Informed Interviewing**

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BUILD RAPPORT

ESTABLISH TRUST

FACILITATE DISCLOSURE

# **Application: Trauma Informed Interviewing**

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Open-ended questions

Do not interrupt. Do not interrupt.

Better recall of peripheral details once have had a chance to talk through what was central to them

Cycle back later on detail/clarification questions



“Can You Help Me Understand  
What You’re Able to Remember  
About Your Experience?”

“Tell Me More About [That] . . .”

Resources At:  
End Violence Against Women International

# Application: Trauma Informed Support

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Expect fluctuations in behavior, mood, engagement

Difficulty tracking complex information/processes

Clear, simple, direct communication

Warm connect to other support services

Be kind. They may not be kind. That's ok.

I'm sorry  
this happened  
to you.

I believe  
you.

You are  
not to  
blame.

This was  
not your  
fault.

Thank you for  
telling me &  
trusting me.

How can I  
help you?

I will support  
you no matter  
what.

## EXAMPLES OF SUPPORTIVE LANGUAGE



I do not believe you.



Don't tell anyone else.



Are you sure?



Do you have proof?



You need to move on.



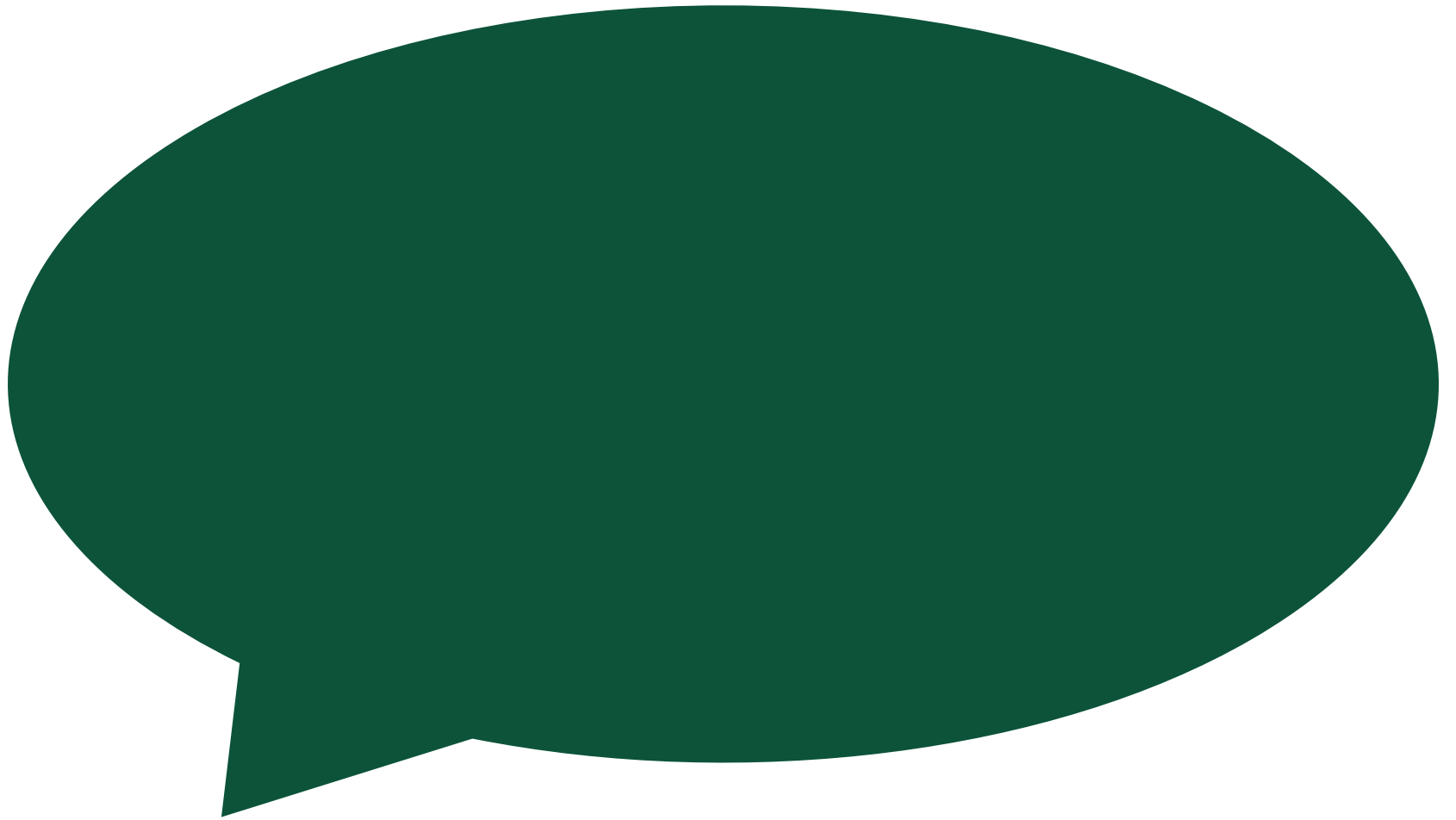
You need to stop talking about it.




Put it in the past.

## EXAMPLES OF HURTFUL LANGUAGE

# CLOSING THOUGHTS





Everything you say,  
everything you do is a chance  
to help me or hurt me.

Make the choice to help.  
Please help me.

# THANK YOU!

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