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# The Neurobiology of Trauma

What You Need to Know About the Brain and Trauma  
(PART 2)

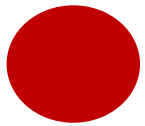
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Professor of Psychology  
Michigan State University

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In this three-part webinar series,

I want to share with you how research on the brain can help us connect the dots . . .

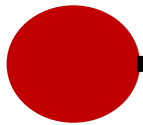


Sexual  
Assault

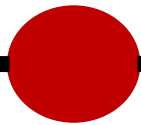


Sexual  
Assault

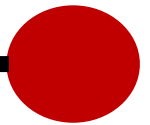
Immediate  
Aftermath of  
the Assault



Sexual  
Assault



Immediate  
Aftermath of  
the Assault



Cold Case  
Investigation  
& Notification

1 Year? 2 Years? 3 Years? ... 10 Years?



Sexual  
Assault

Immediate  
Aftermath of  
the Assault

Cold Case  
Investigation  
& Notification

# Webinar: Part 1

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- How the brain & body react to major traumas, including sexual assault
- Emphasis on understanding *victim behavior* during assault & in immediate aftermath



# Webinar: Part 2

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- How the brain & body react to major traumas, including sexual assault
- Emphasis on understanding *memory formation* & *recall* during assault & in immediate aftermath

# Webinar: Part 3

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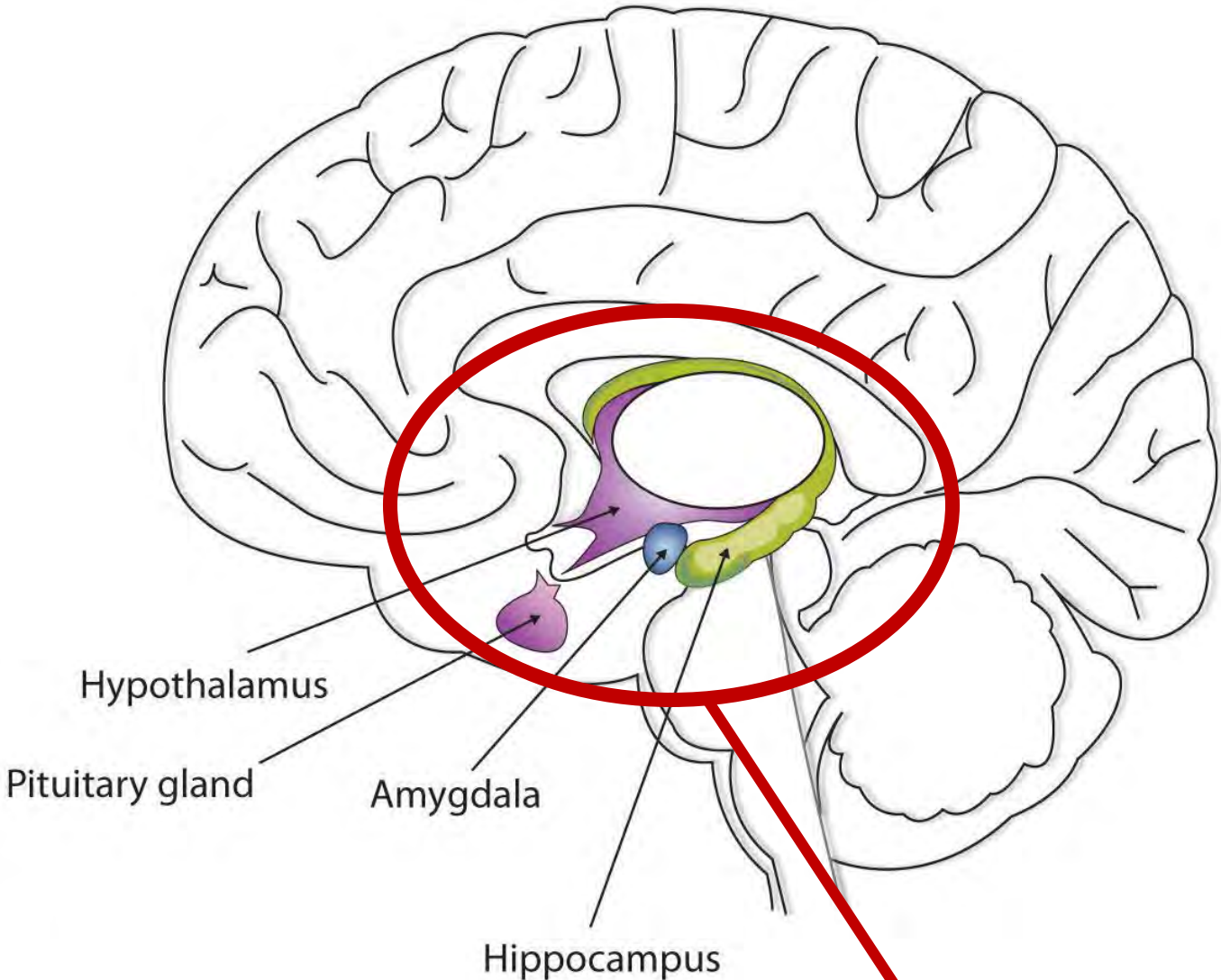
- How the brain & body react to major traumas, including sexual assault
- Emphasis on understanding *implications* for cold case investigations and victim notifications

# The Neurobiology of Trauma: RECAP

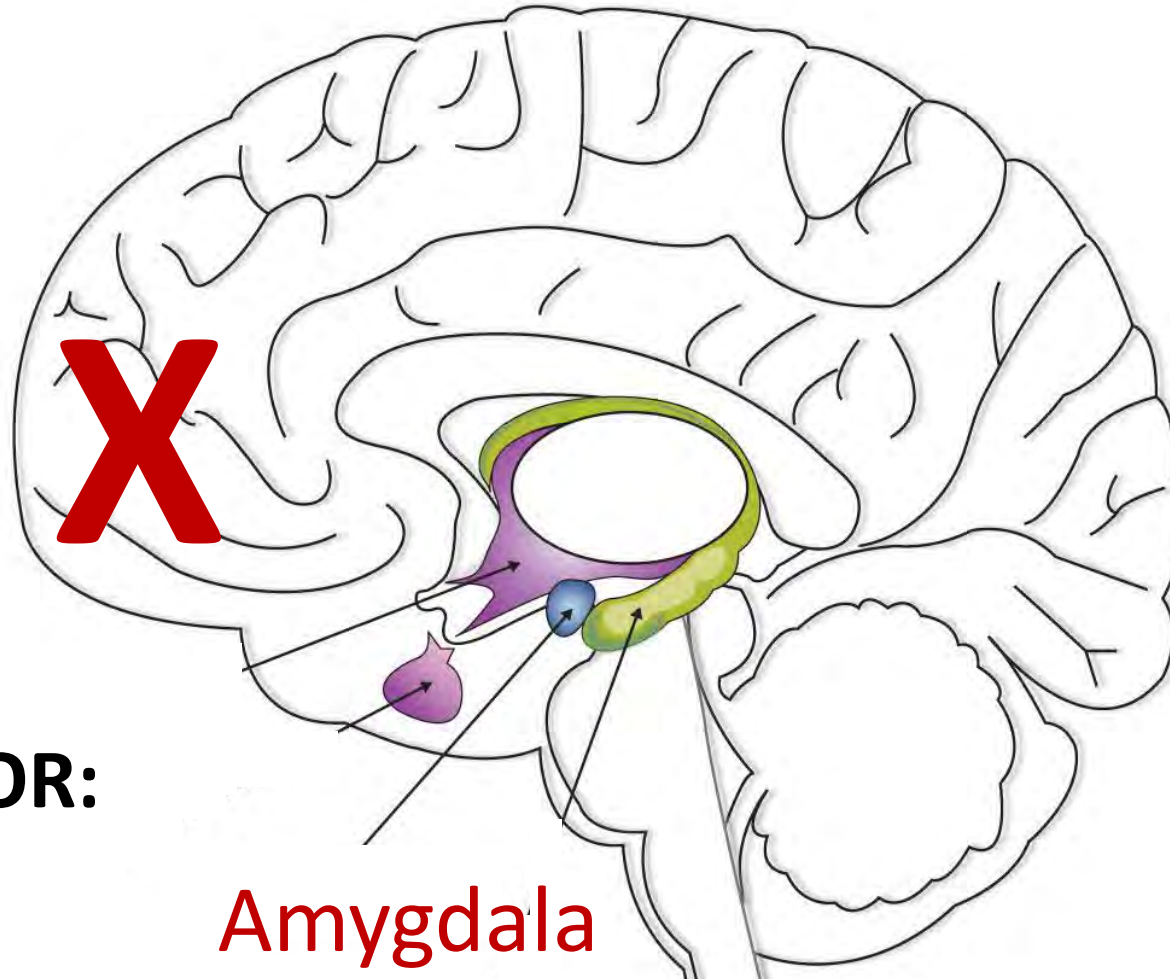
**“In the midst of assault, the brain’s fear circuitry takes over while other key parts are impaired or even effectively shut-down.**

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

Hopper & Lisak, 2014



“Fear Circuitry”



**IMPLICATIONS FOR:**

**Behavior**

**Memory**

# Understanding Memory Formation & Recall



Sexual  
Assault

Immediate  
Aftermath of  
the Assault

**MEMORY**



**“[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

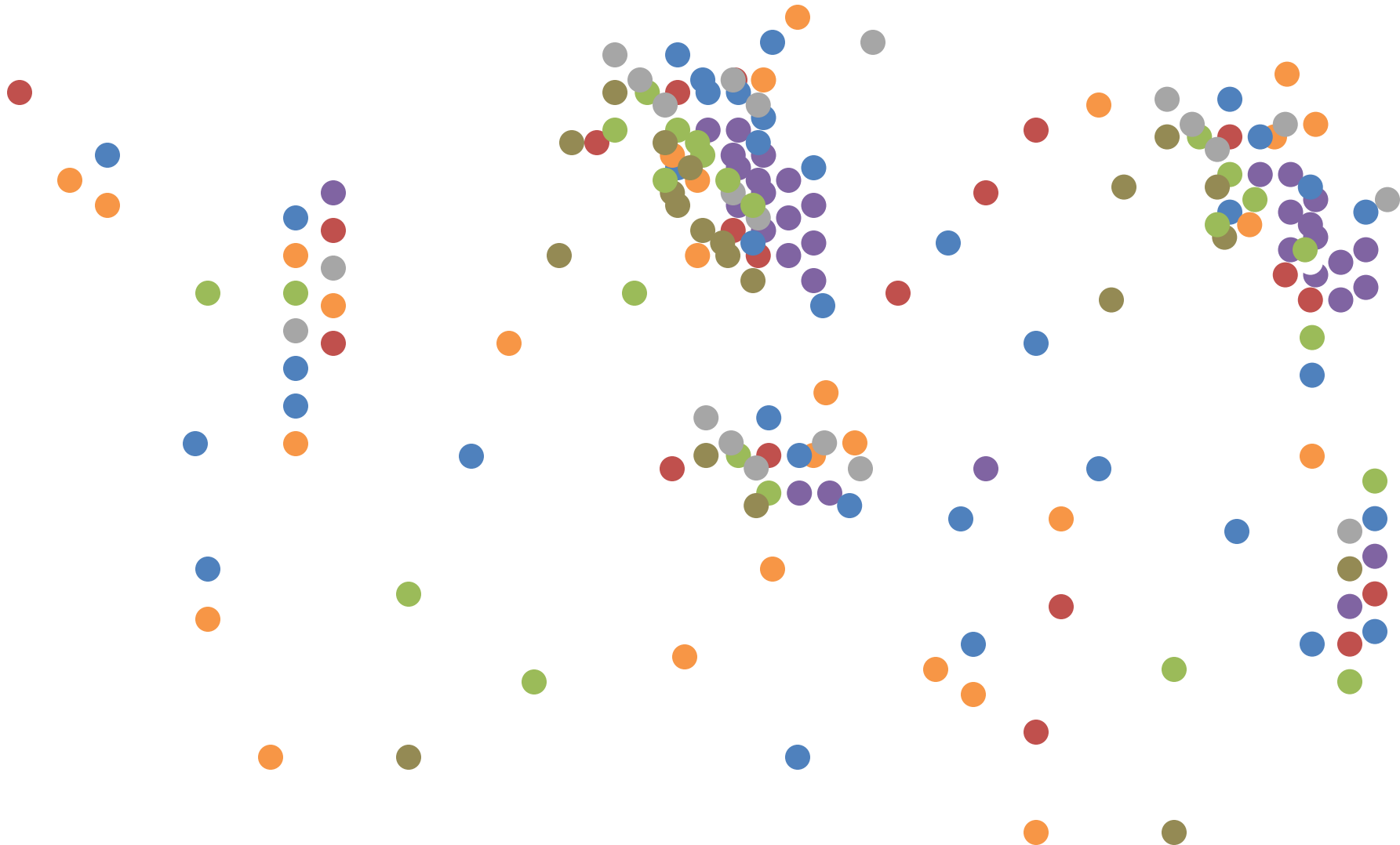
# Memory: How Memory Works

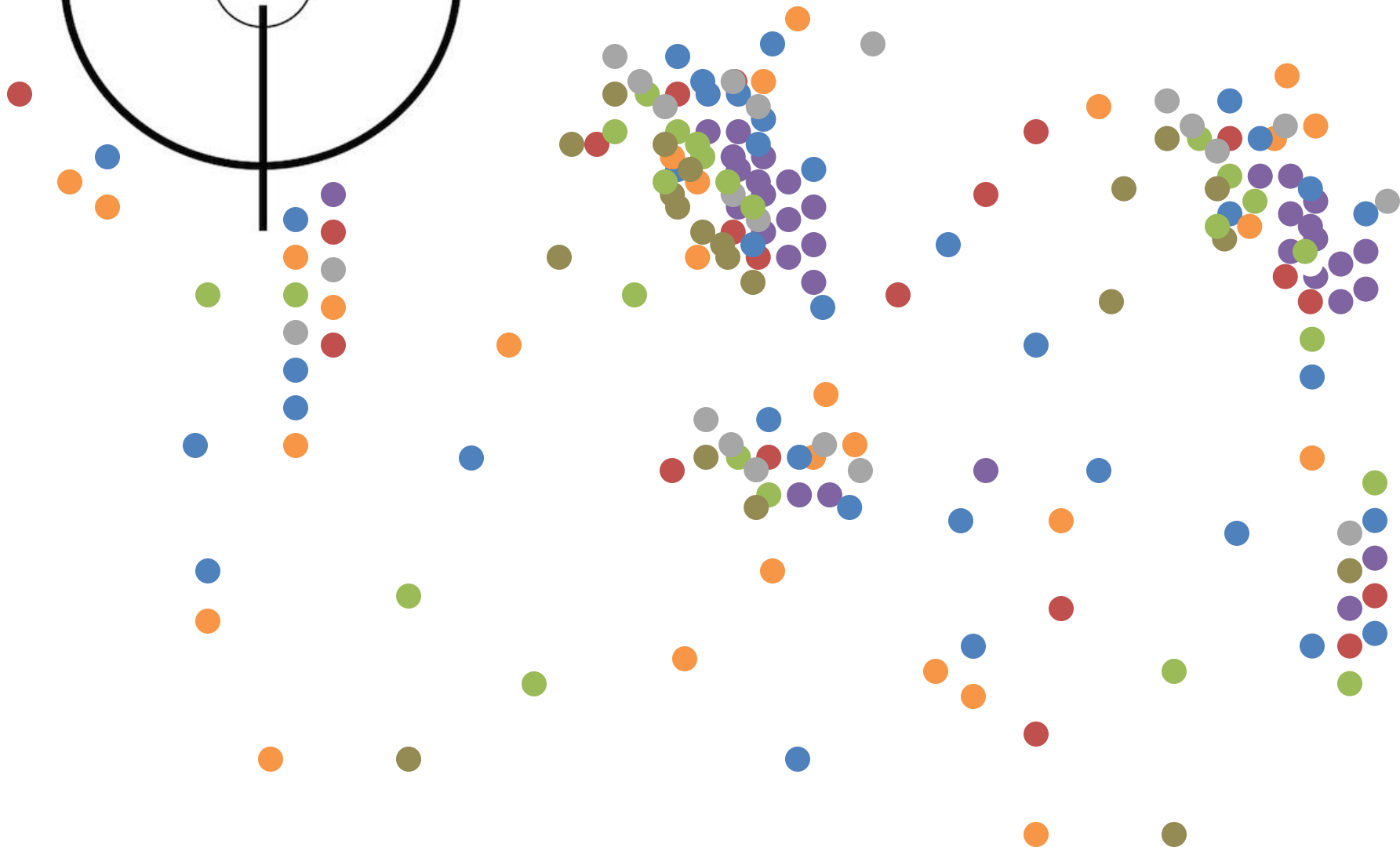
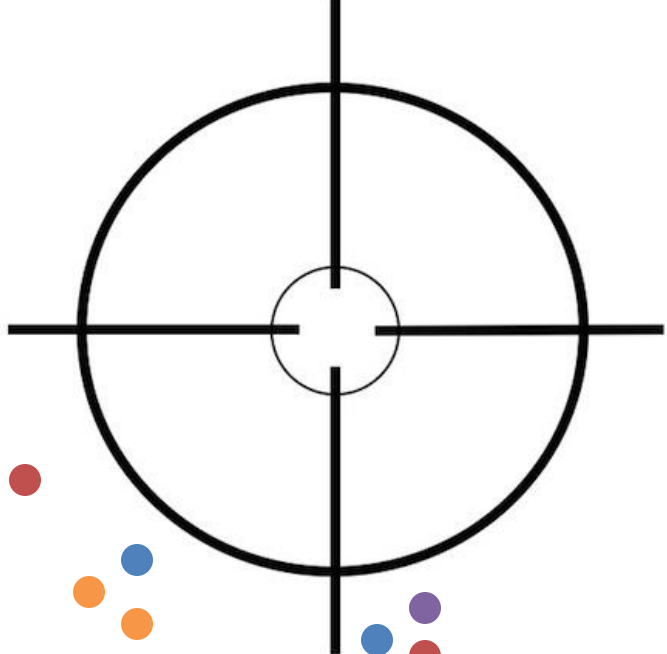
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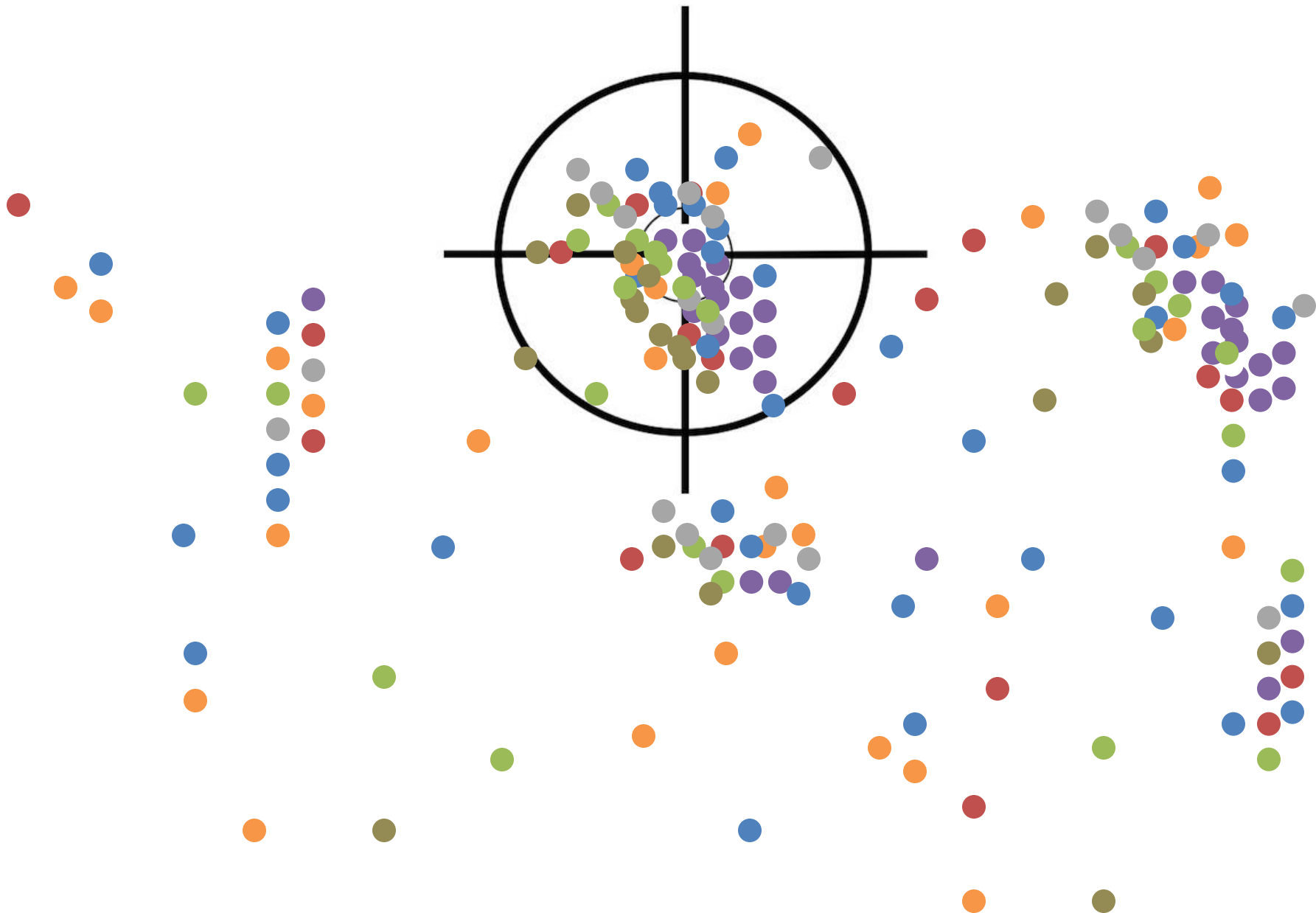
**Attention** → What are we paying attention to?  
What we attune to affects what we can remember

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











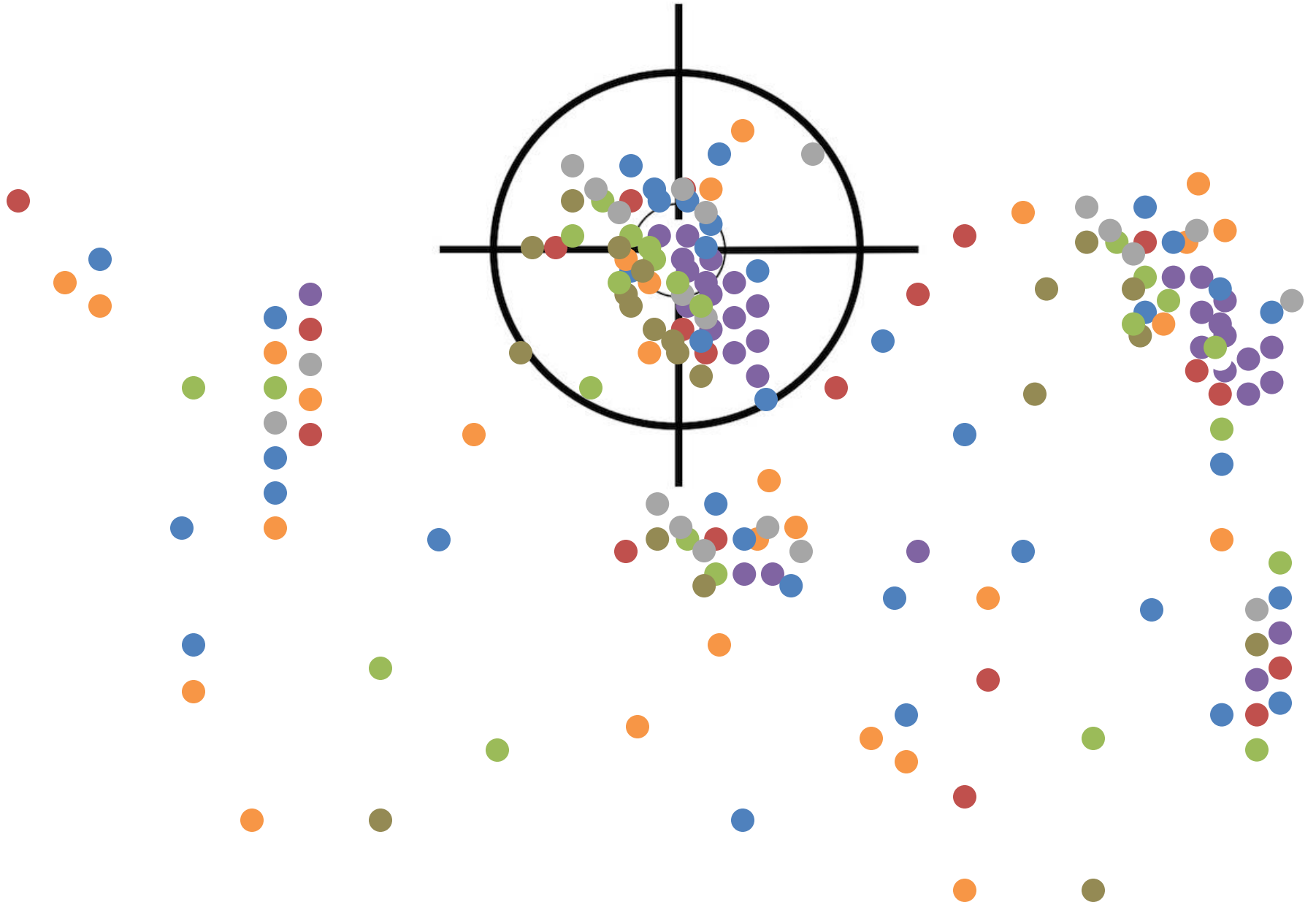
# Memory: Encoding

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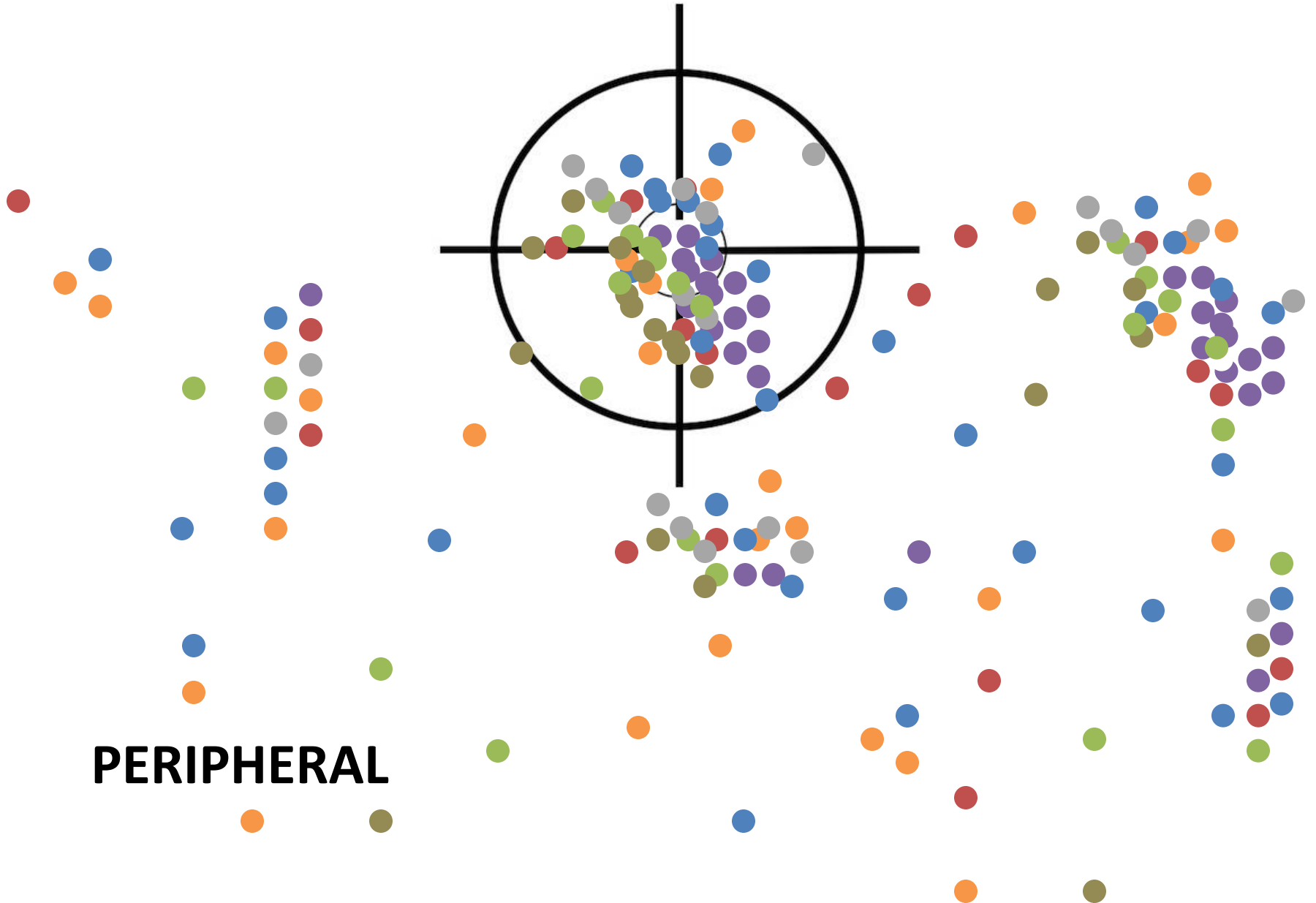
**Central Details** → Core aspects of an experience that captured our attention (more likely to be encoded)

**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

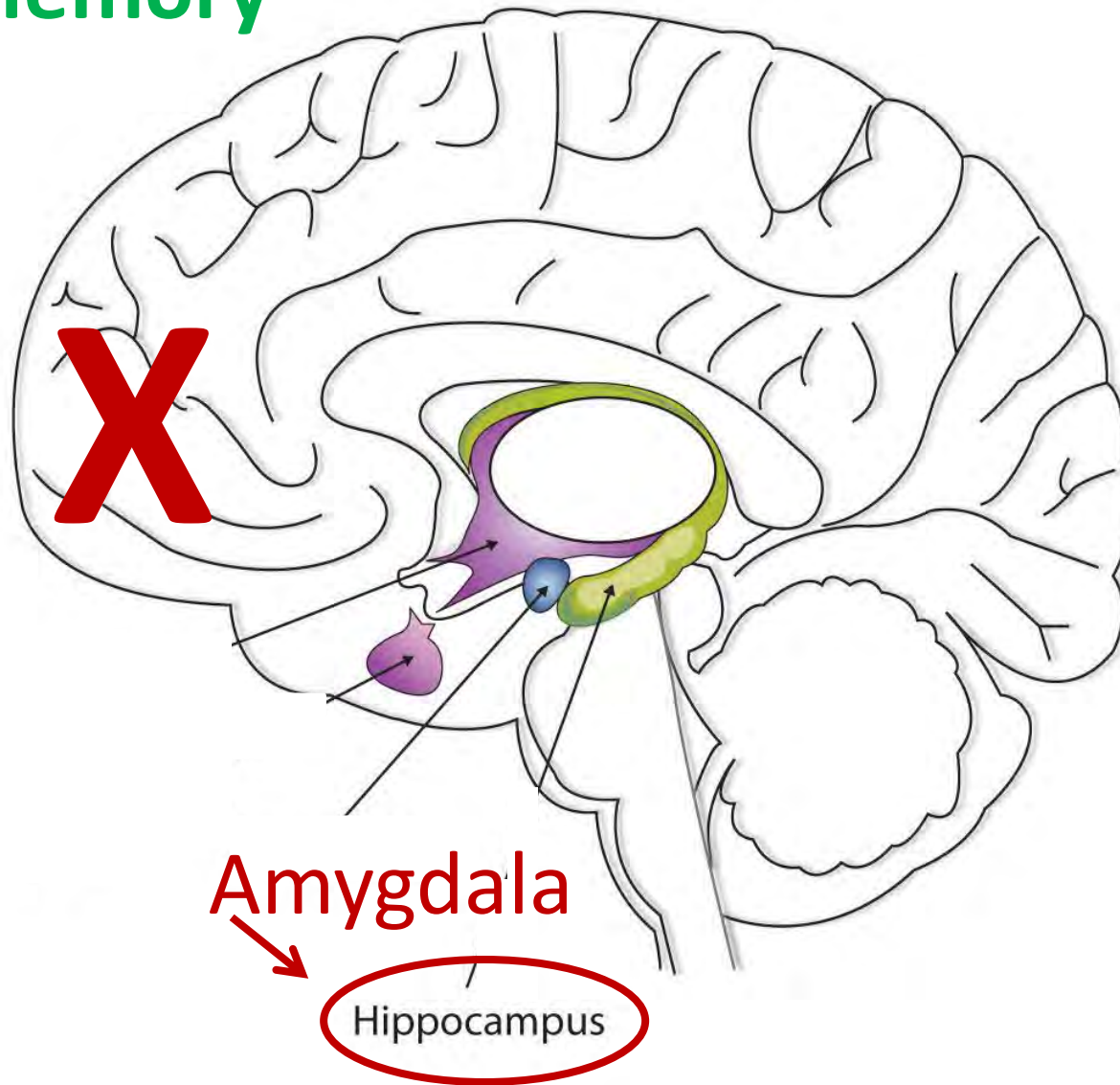


**CENTRAL**



**PERIPHERAL**

# IMPLICATIONS: Memory



# **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

# Memory: How Trauma Affects Memory

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## Central Details in Trauma →

Central to survival

Often are SENSORY-based

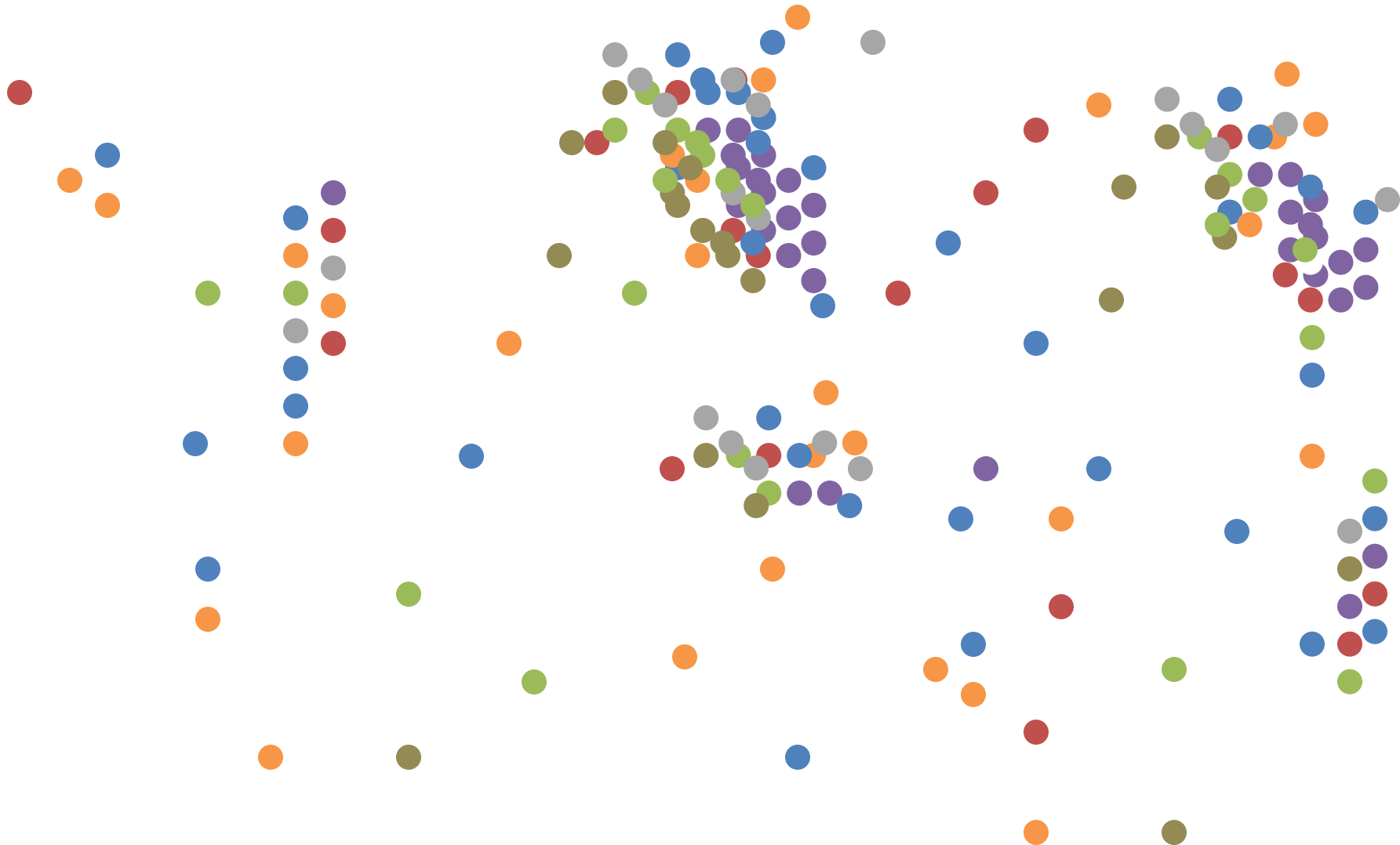
“Small” details that may not seem important to others

## Peripheral Details →

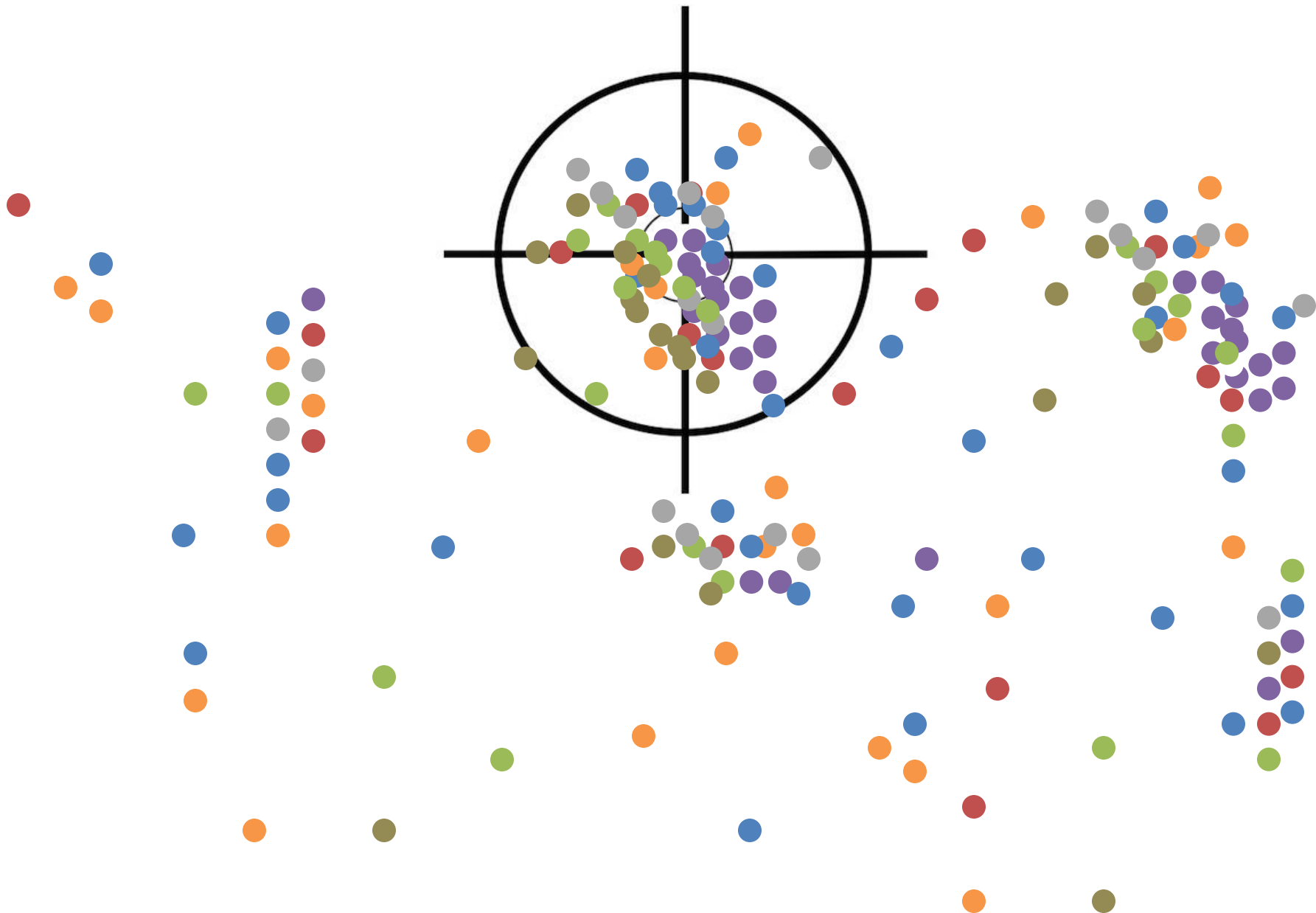
Not central to survival

Often are CONTEXT-based

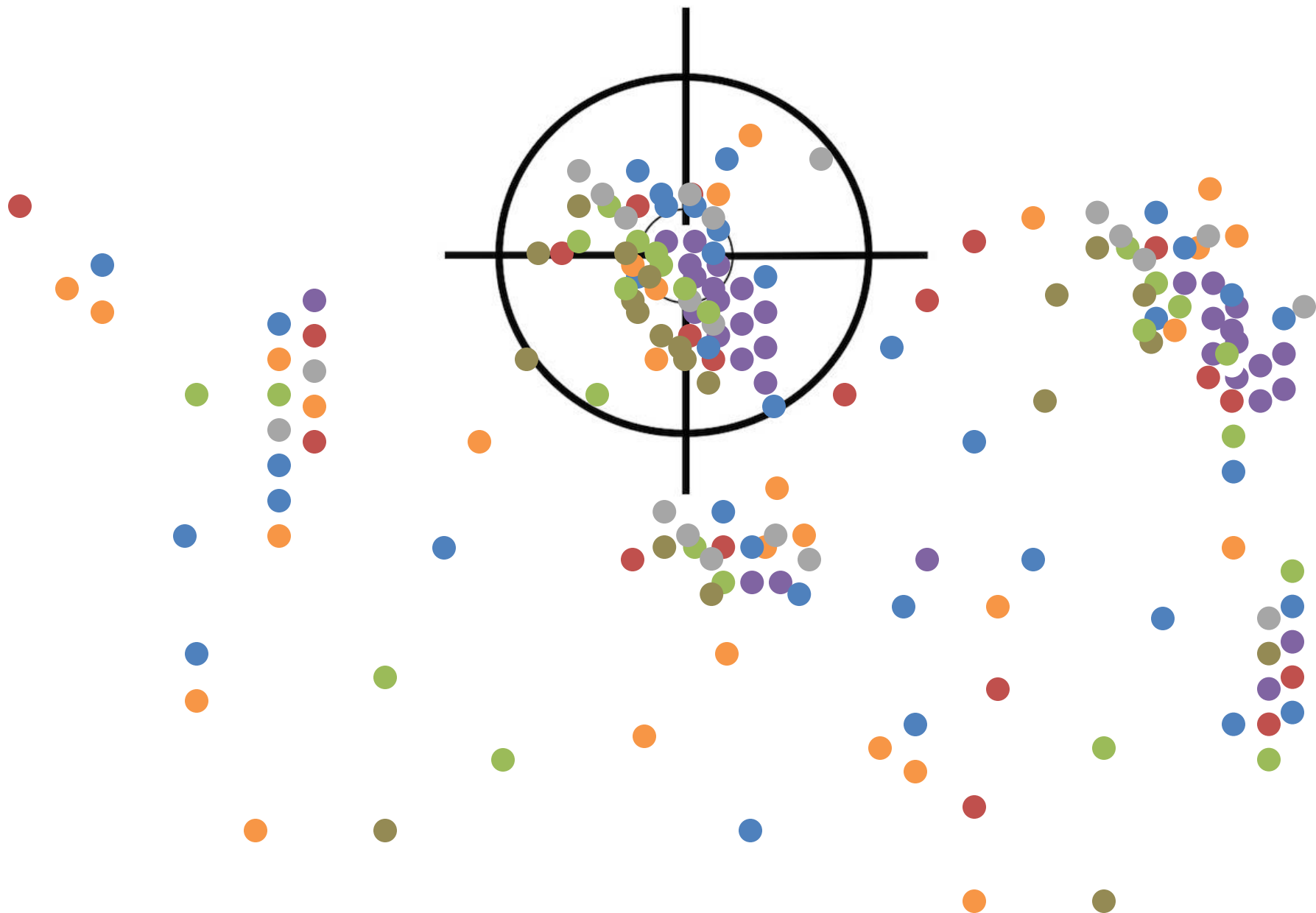
Details that others may see as important



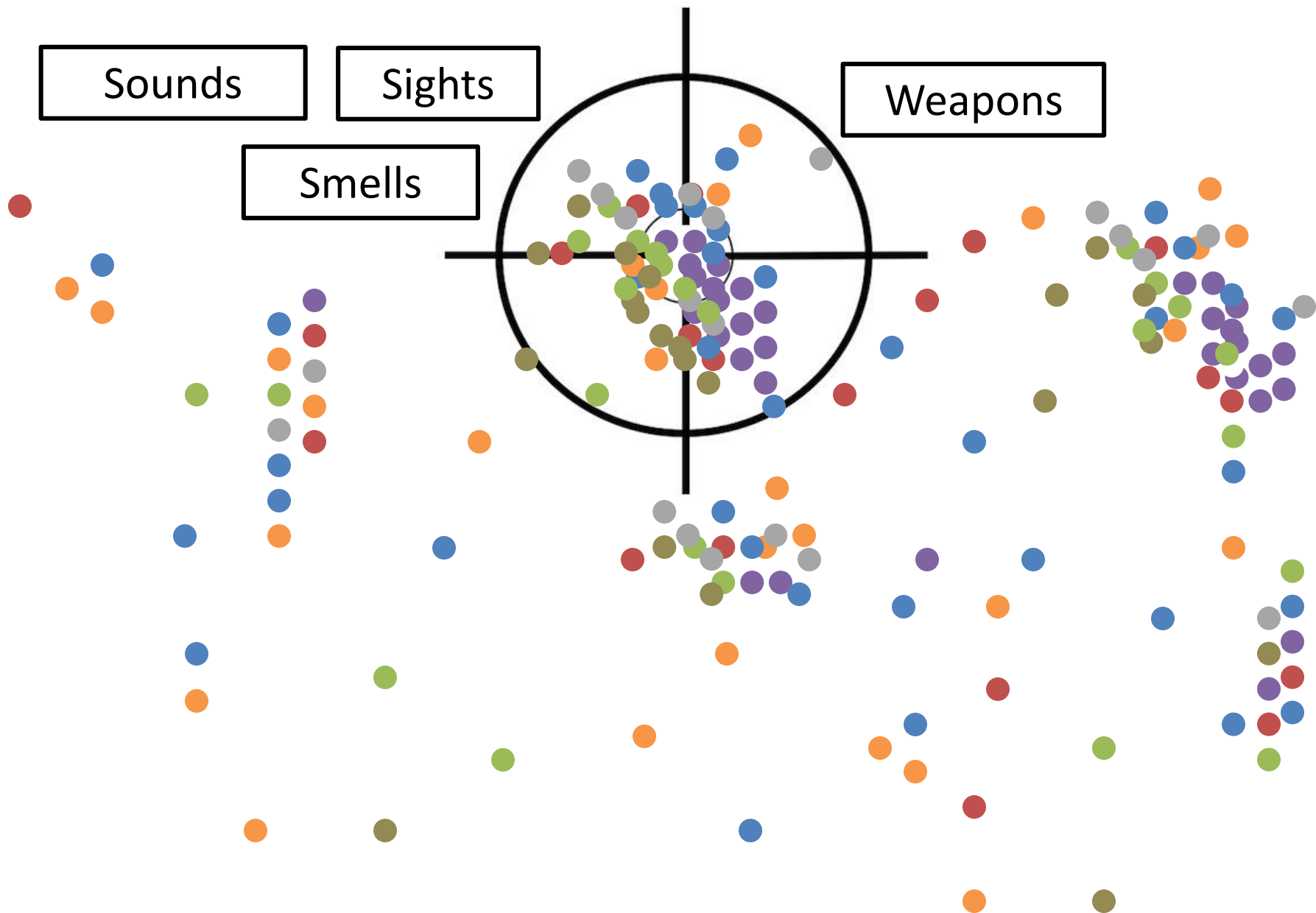


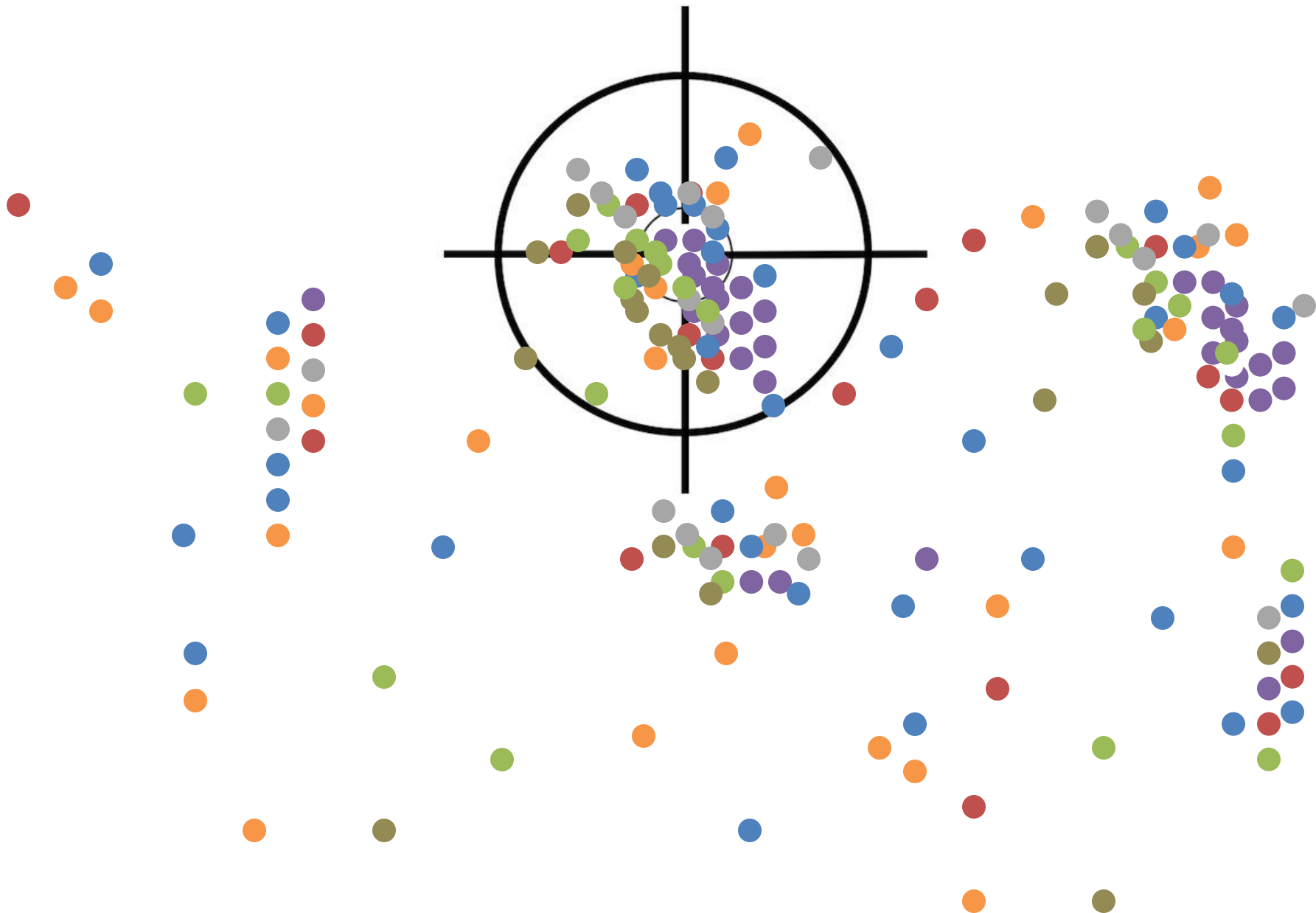


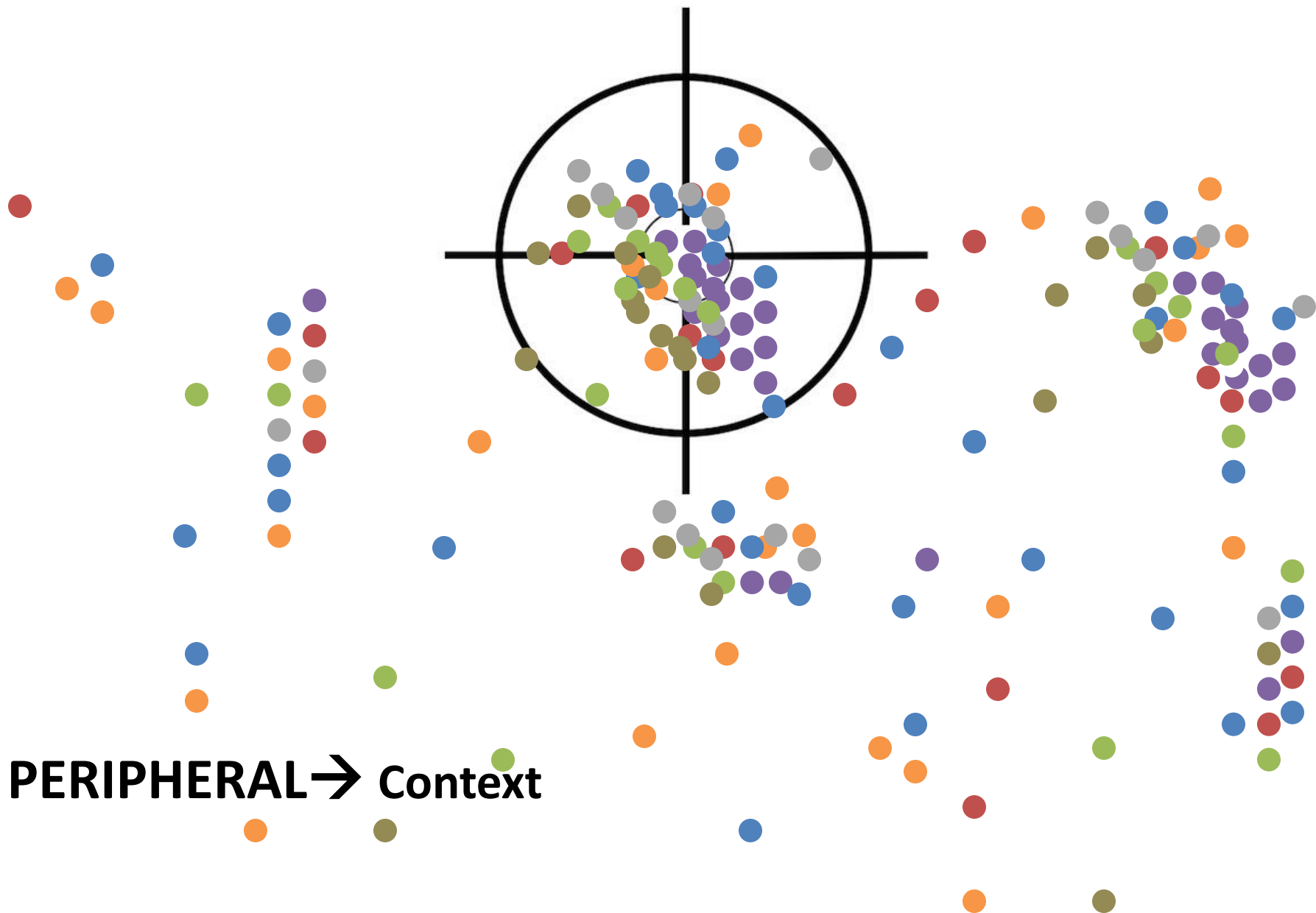
**CENTRAL** → Survival, Sensory

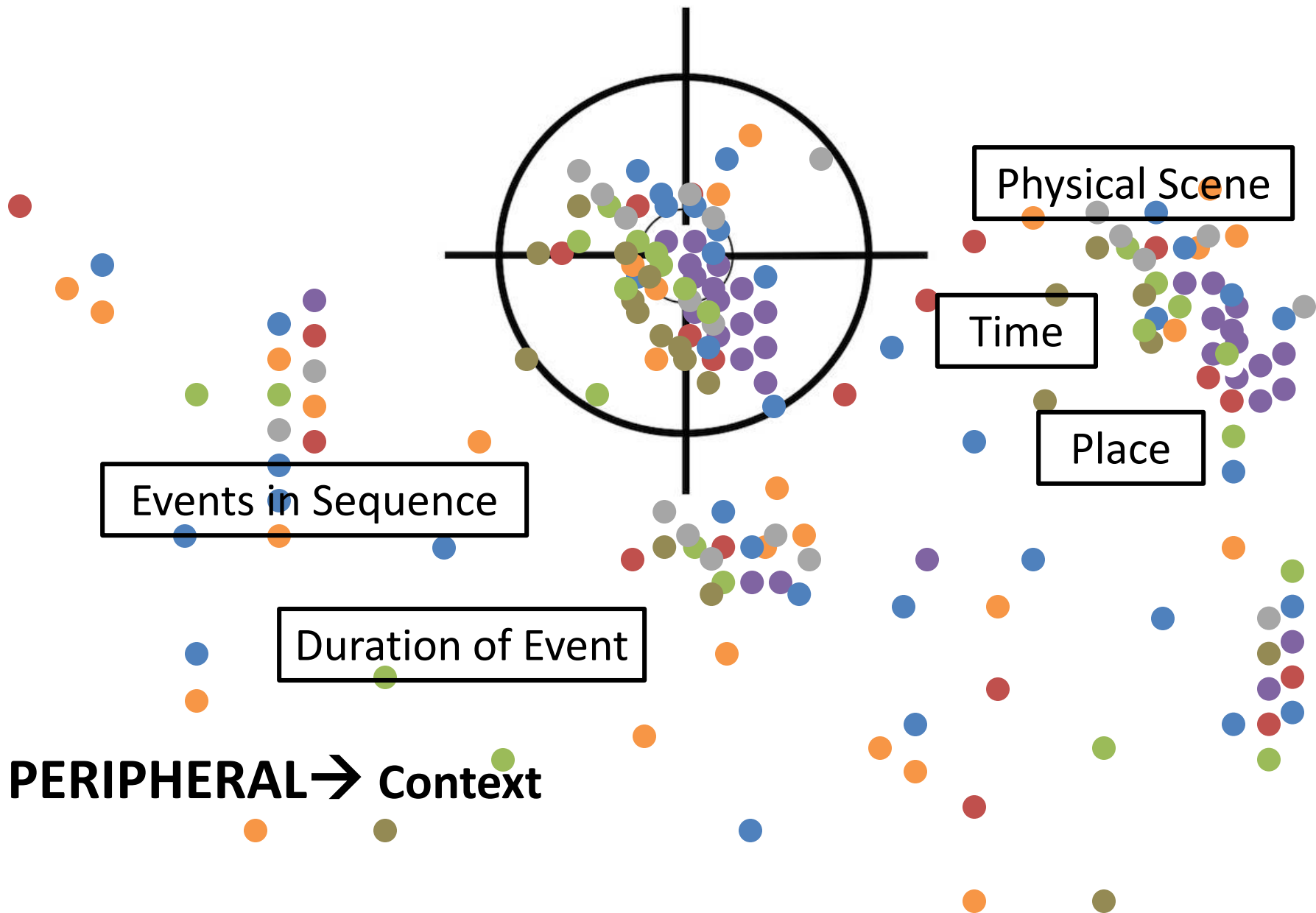


# CENTRAL → Survival, Sensory









# Memory: Recalling Traumatic Memories

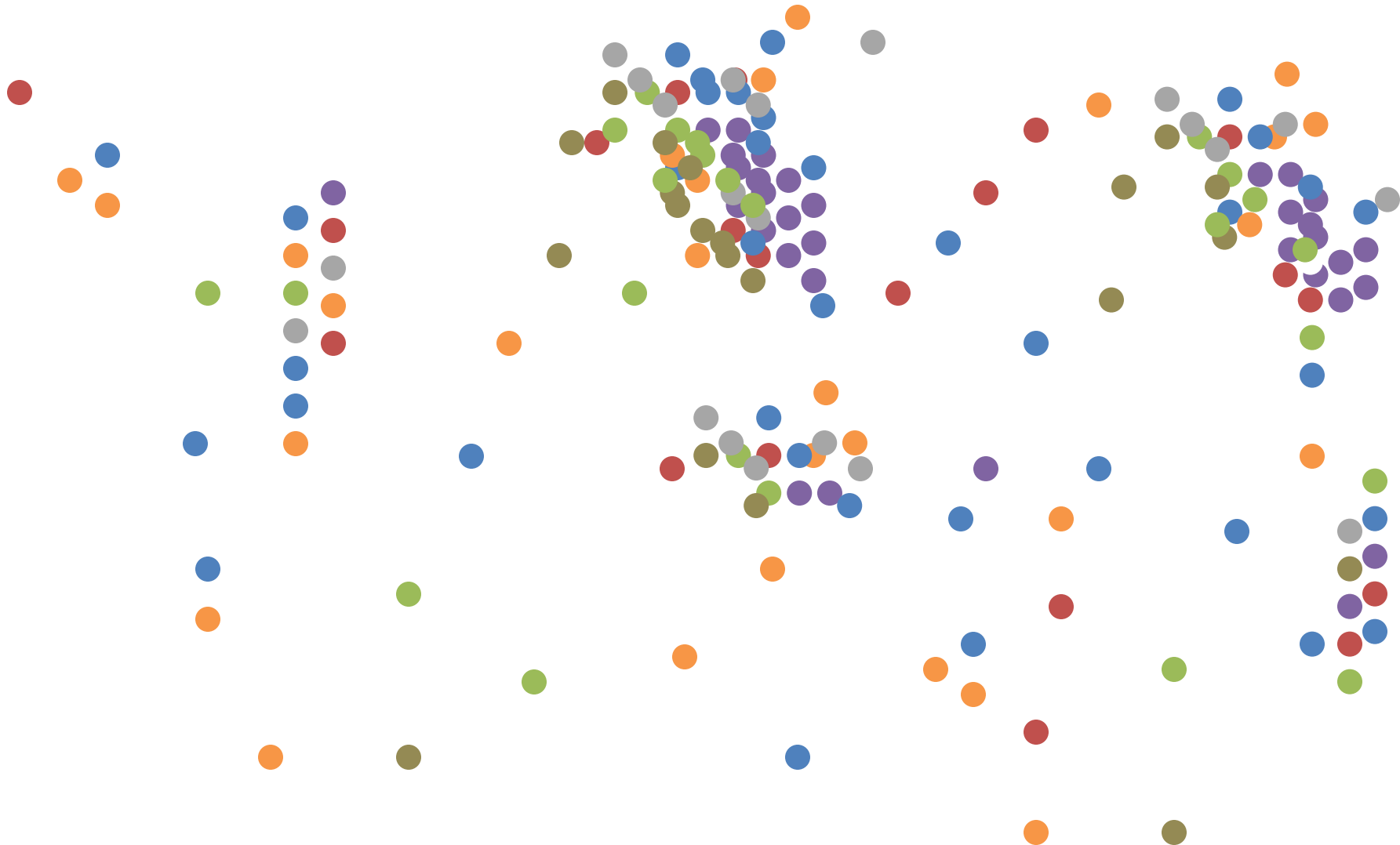
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# **Memory:** Recalling Traumatic Memories

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





# Memory: Recalling Traumatic Memories

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

**Incomplete** → Some details are missing

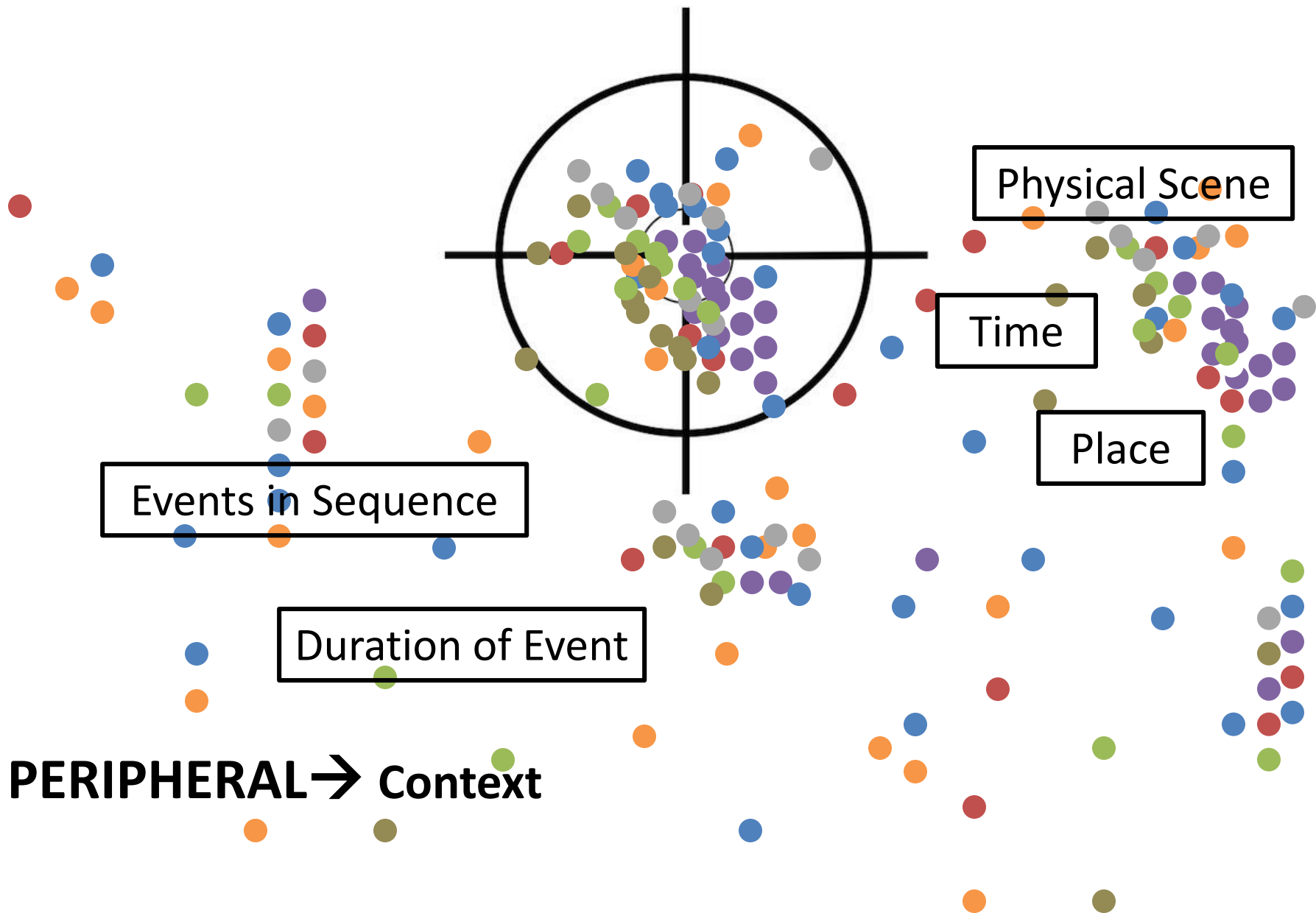
# Memory: Recalling Traumatic Memories

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Fragmented → Not organized in a linear sequence

Incomplete → Some details are missing

**WHY?** Peripheral



Physical Scene

Time

Place

Events in Sequence

Duration of Event

PERIPHERAL -> Context

# Memory: Recalling Traumatic Memories

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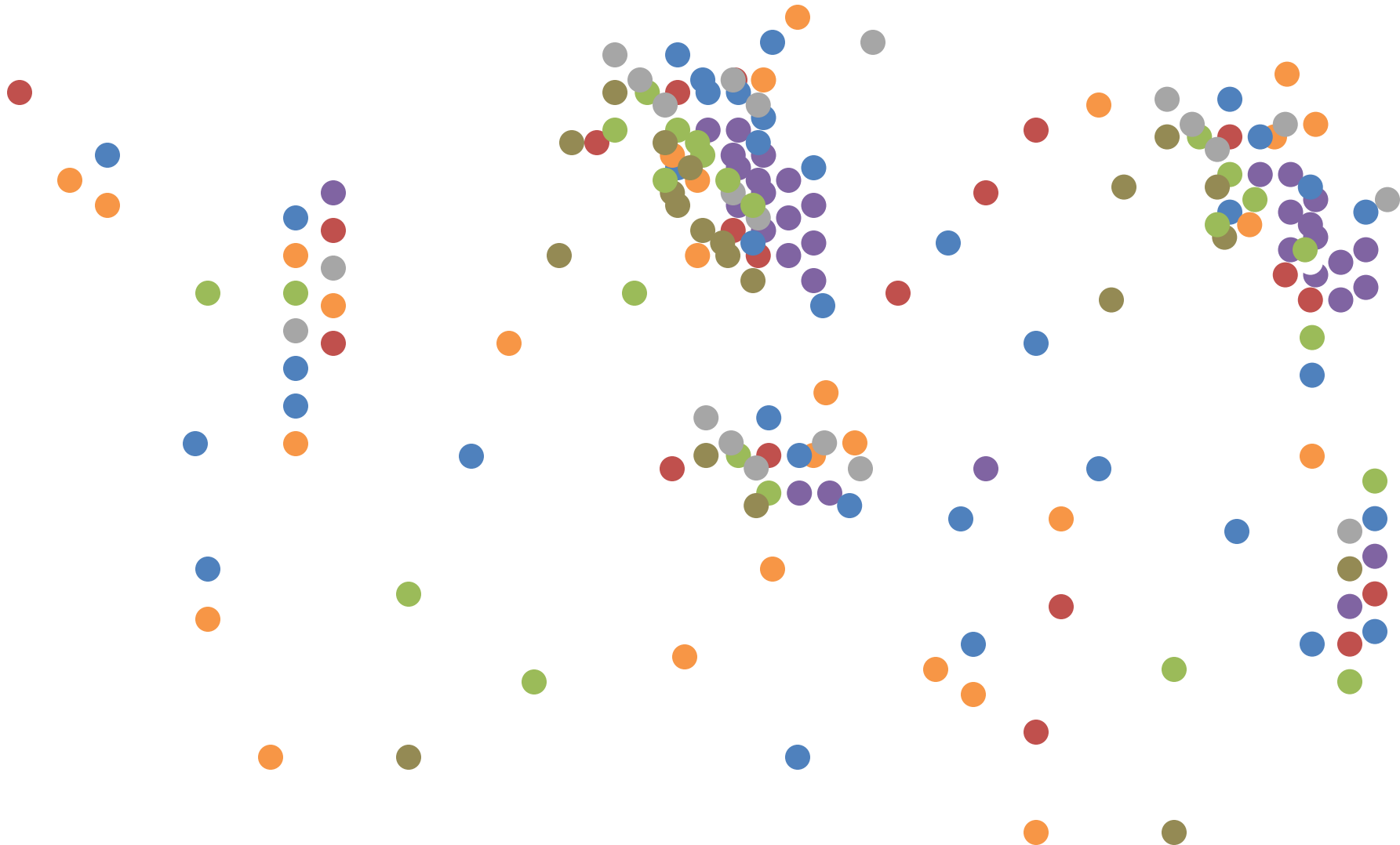
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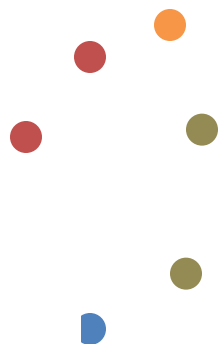
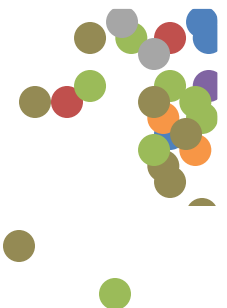
Incomplete → Some details are missing

**WHY?**

Peripheral

Alcohol/Drug Use





# Memory: Recalling Traumatic Memories

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Fragmented → Not organized in a linear sequence

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**WHY?**

Peripheral

Alcohol/Drug Use

Can't Find *RIGHT NOW*



# Memory: Recalling Traumatic Memories

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Fragmented → Not organized in a linear sequence

Incomplete → Some details are missing

**WHY?**

Peripheral

Alcohol/Drug Use

Can't Find *RIGHT NOW*



Stressed, No Sleep, Lack of Trust

# Memory: Recalling Traumatic Memories

---

Fragmented → Not organized in a linear sequence

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

**WHY?**

Peripheral

Alcohol/Drug Use

Can't Find *RIGHT NOW*

Withheld



Embarrassed, Ashamed, Lack of Trust

# 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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**WHY?** “Filled In” by Victim (unconsciously)

# Memory: Recalling Traumatic Memories

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**WHY?**

“Filled In” by Victim (unconsciously)

Feel Pressured to Answer

# Memory: Recalling Traumatic Memories

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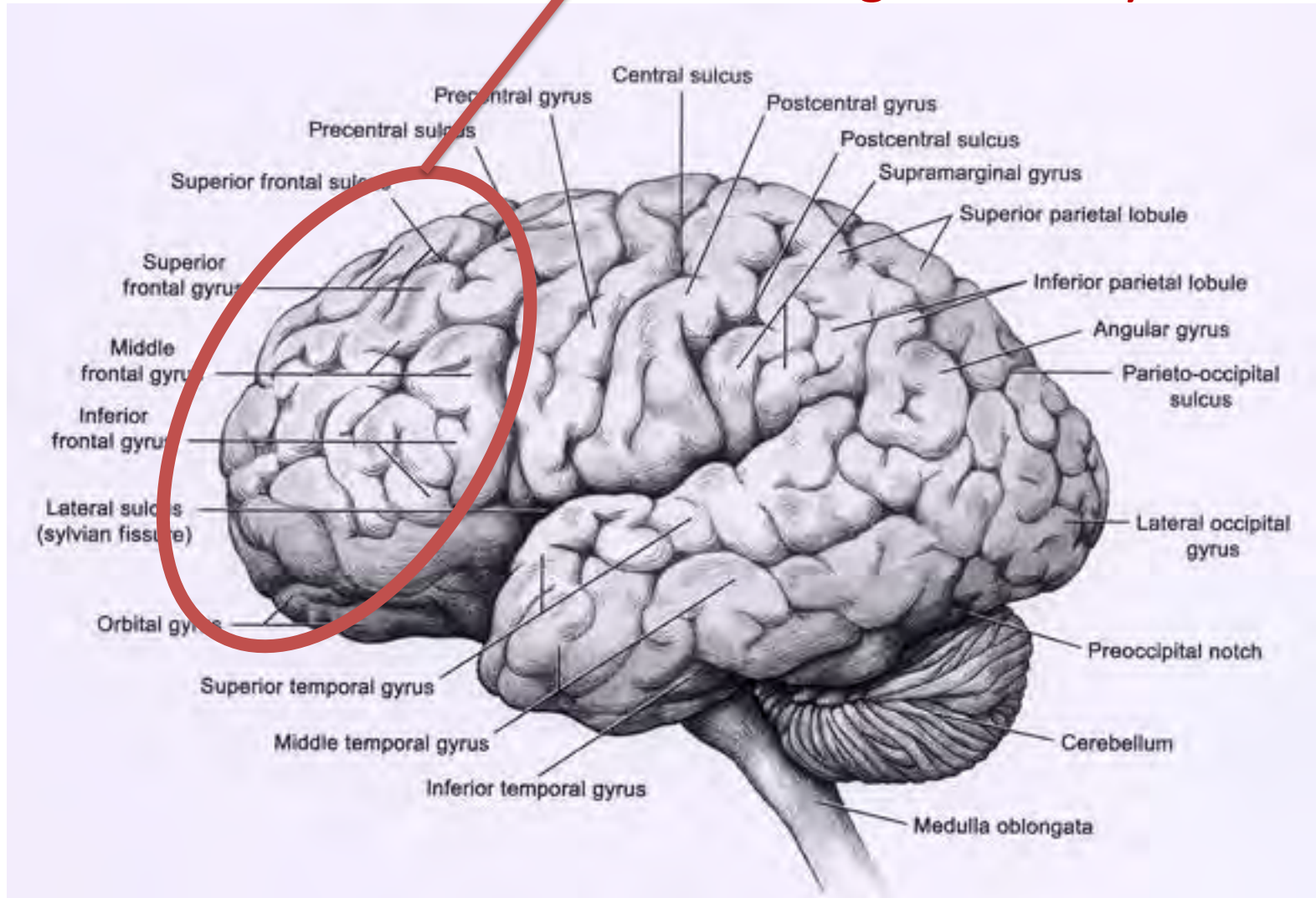
**WHY?**

“Filled In” by Victim (unconsciously)

Feel Pressured to Answer

Lying

# “Executive Functions” Including Inhibitory Control





# Memory: Recalling Traumatic Memories

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# Memory: Recalling Traumatic Memories

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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: Recalling Traumatic Memories

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

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**BUT . . .** Central memories stable, accurate  
Peripheral memories often accurate  
Very few victims fabricate assault

# Memory: Recalling Traumatic Memories

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Fragm

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Incom

Implications for How To  
Interview Victims

Incorr

accurate

accurate

Very few victims fabricate assault

“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

# 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

# **Why It's Important To Understand the Neurobiology of Trauma . . .**

# Why It's Important To Understand the Neurobiology of Trauma . . .

He wouldn't let up,  
pounding me with question after  
question after question.

Trying to trick me,  
trying to get me to mess up.

I wanted to say,  
'hold on, give me a minute to think'.

No, he kept coming at me.



# **When You DO Understand the Neurobiology of Trauma . . .**

# When You **DO** Understand the Neurobiology of Trauma . . .

He offered me a cup of coffee.

Coffee? OK fine. How do I take it?  
WHAT? Why does he care how I  
take my coffee? Well, he did.

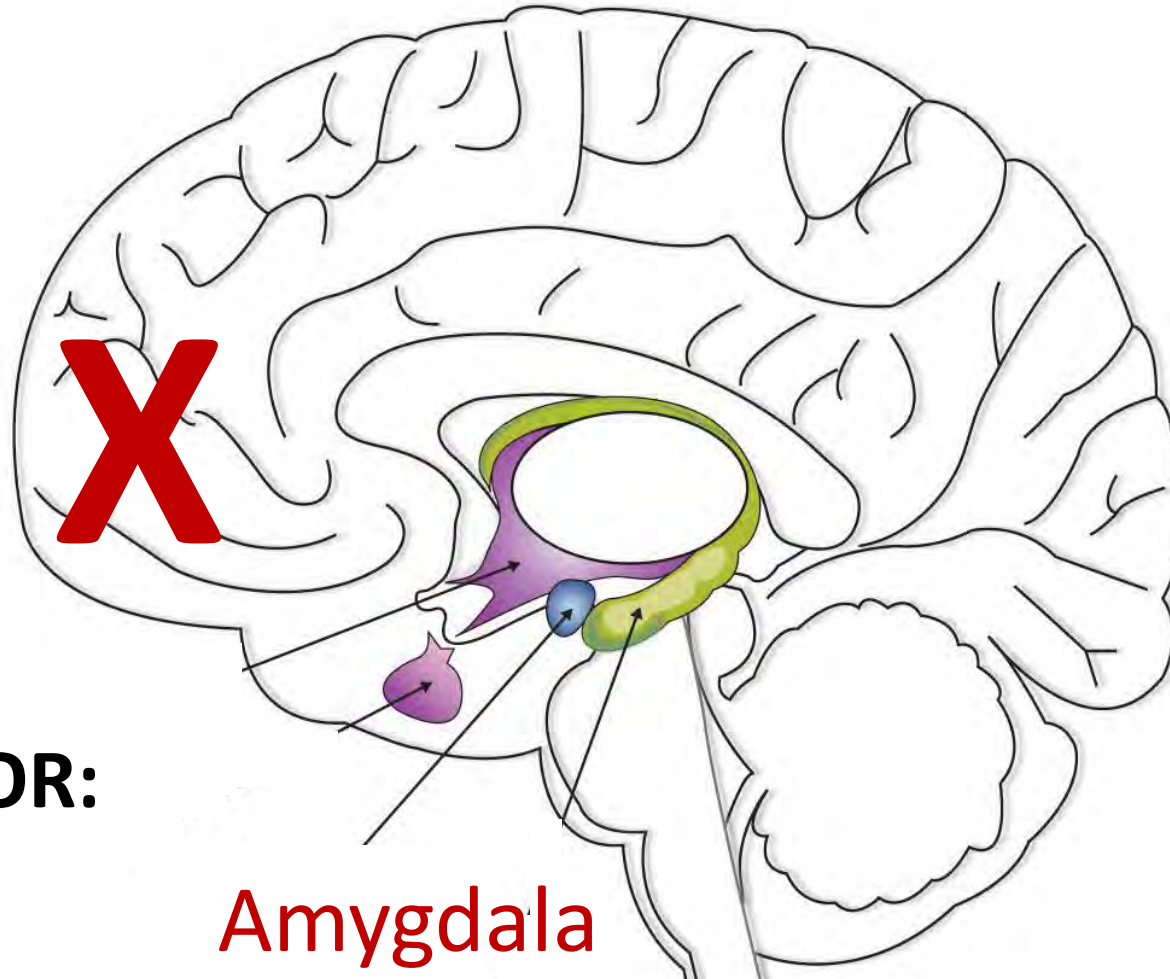
He made me coffee. He gave me  
time to just sit, collect my thoughts.

# When You DO Understand the Neurobiology of Trauma . . .

We talked it through.  
And I didn't feel rattled and freaked out. I'm sure I was incoherent and he just let it roll. He was patient.

I felt like I was piecing it together, like a puzzle, we were putting together a puzzle.

And drinking coffee.



**IMPLICATIONS FOR:**

**Behavior** ✓

**Memory** ✓



**SAKI**  
SEXUAL ASSAULT  
KIT INITIATIVE  
Reform. Accountability. Justice.

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**Please Join Us For Part 3!**