

When data are dense but theory is thin:

A formal-theoretical lens on intensive longitudinal measurement

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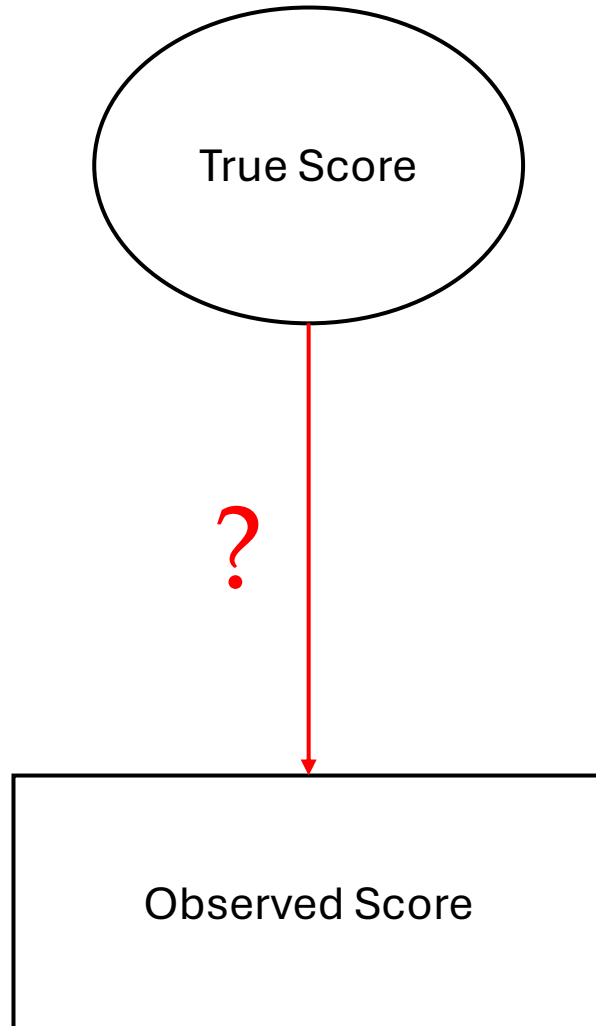


Shared 2nd authors

The Hackathon Pitch (summarized)

- Formal theory to identify knowledge gaps in intensive longitudinal measurement.
- It's hard. That is, we will fail miserably if we try.
- This is a feature of the approach, not a bug: **In failing, we get to learn how much and what exactly we do not know.**

Goal & Scope

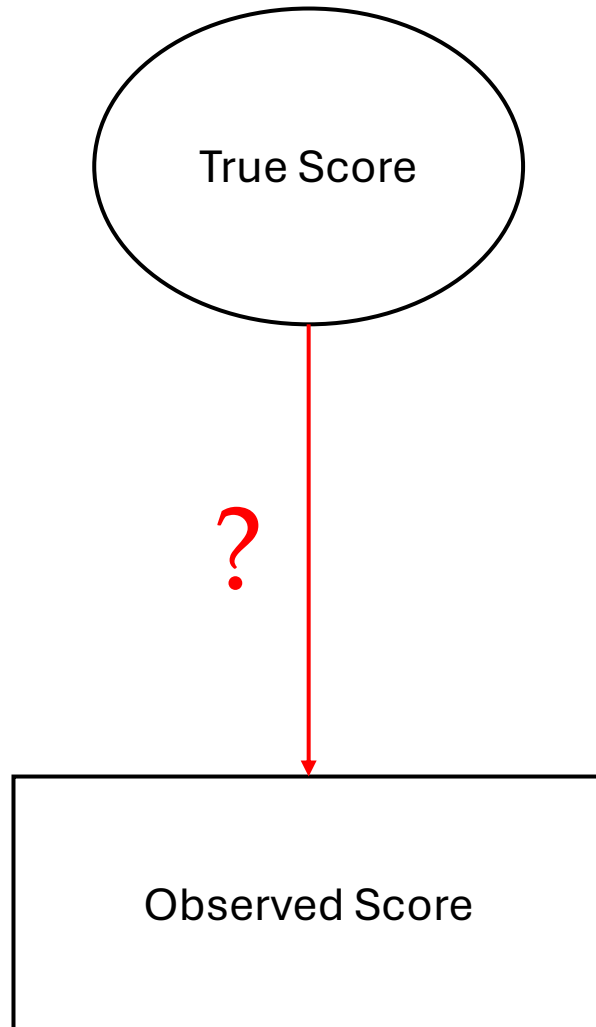


Scope:

- Self-report questionnaires
- Intensive Longitudinal Data (ILD)*
- Somewhat agnostic of target True Score

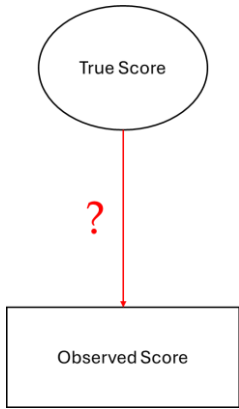
**We can most likely generalize our work to all self-report questionnaires.*

Examples of General Phenomena



- Participants may (need to) report on constructs that do not strictly 'exist' or are not well defined
- Some people can access their true scores better than others, that is, people may be not capable of perfectly assessing their states in various ways
- People may lie about their score when they answer
-and many more

Core Deliverables



“Done”:

- Basic measurement theory that other researchers can work from
 - Identify general mechanisms
 - Ordering of mechanisms
 - Common language

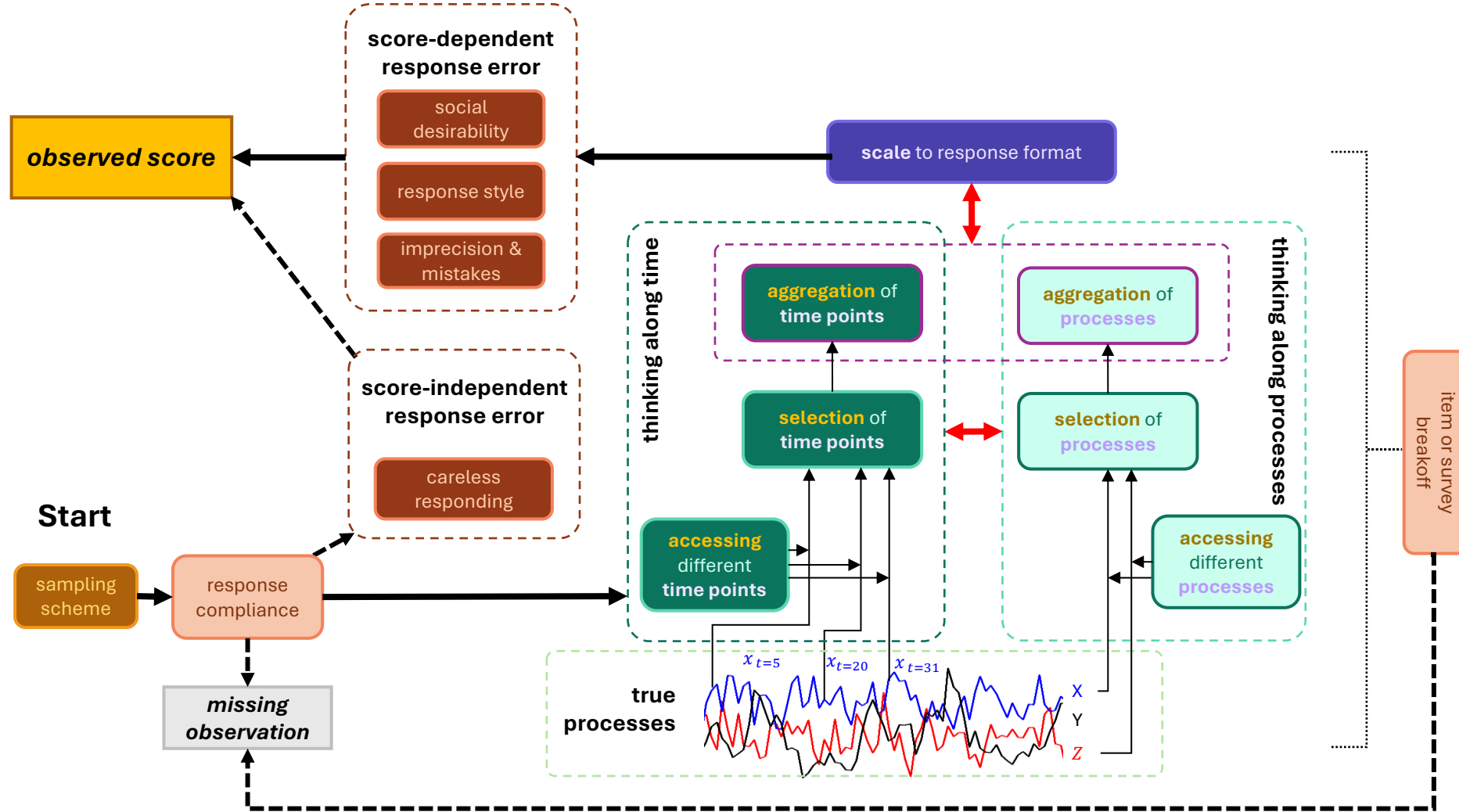
Current:

- Basic literature review on these mechanisms
- Specific example implementations in R for each mechanism
- Knowledge state/gaps wrt all of the previous

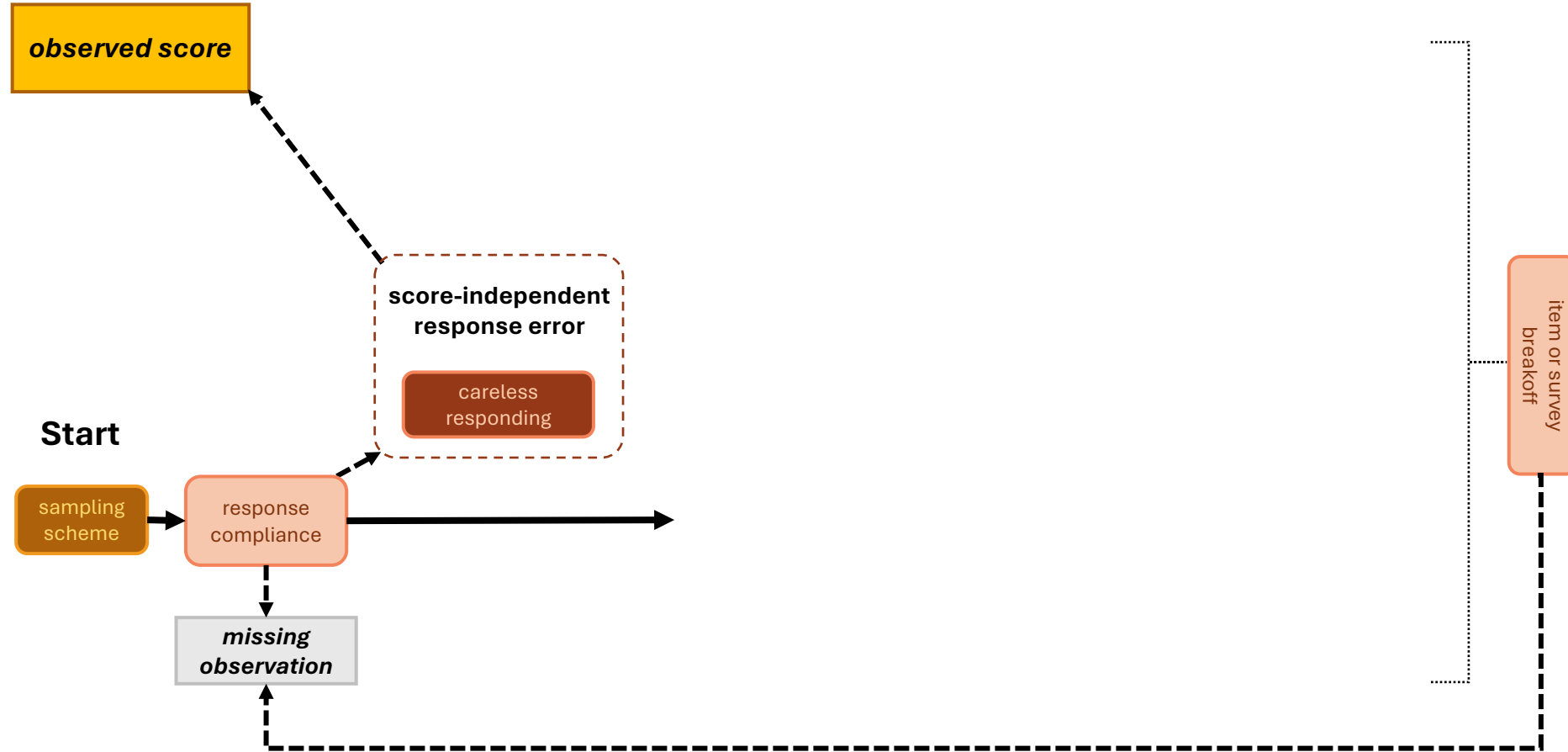
Bonus:

- Illustrative example:
 - “From true score to observed score - how bad are things really?”
- Meta-mechanisms: About learning, reactivity, (non-)compliance, and non-response.

Basic Measurement Theory

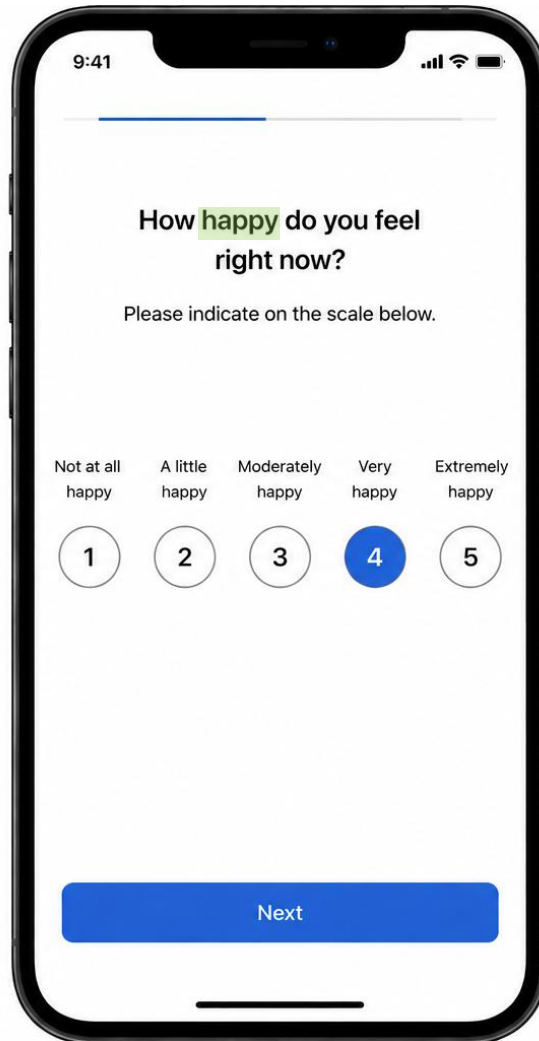


Basic Measurement Theory



Careless Responding

Example of a category preference



9:41

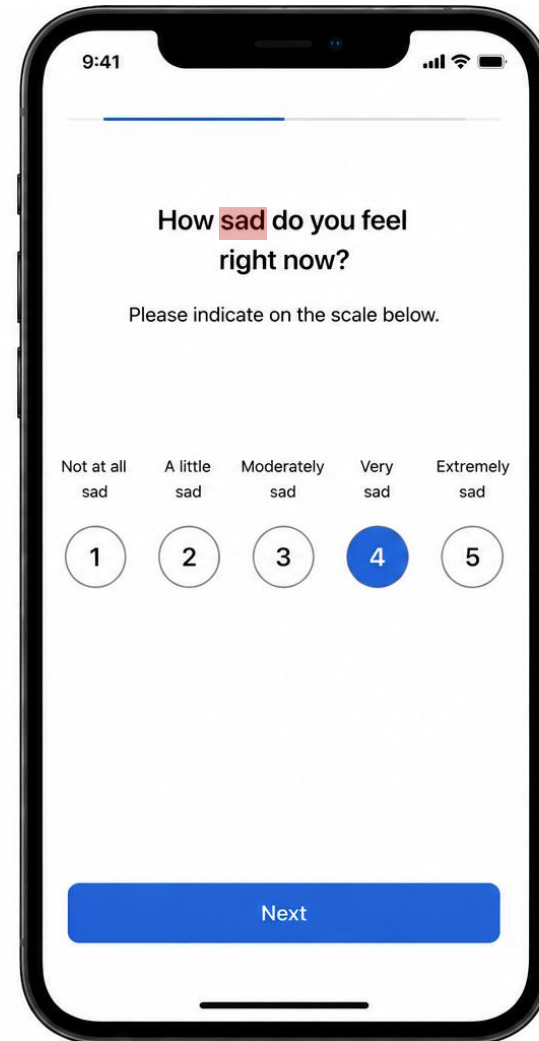
How **happy** do you feel right now?

Please indicate on the scale below.

Not at all happy	A little happy	Moderately happy	Very happy	Extremely happy
1	2	3	4	5

Next

This image shows a smartphone screen with a happiness scale. The scale has five options: 'Not at all happy', 'A little happy', 'Moderately happy', 'Very happy', and 'Extremely happy'. Below each option is a numbered circle from 1 to 5. The circle with the number 4 is highlighted in blue, indicating the selected response. A blue 'Next' button is at the bottom.



9:41

How **sad** do you feel right now?

Please indicate on the scale below.

Not at all sad	A little sad	Moderately sad	Very sad	Extremely sad
1	2	3	4	5

Next

This image shows a smartphone screen with a sadness scale. The scale has five options: 'Not at all sad', 'A little sad', 'Moderately sad', 'Very sad', and 'Extremely sad'. Below each option is a numbered circle from 1 to 5. The circle with the number 4 is highlighted in blue, indicating the selected response. A blue 'Next' button is at the bottom.

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Basic Measurement Theory

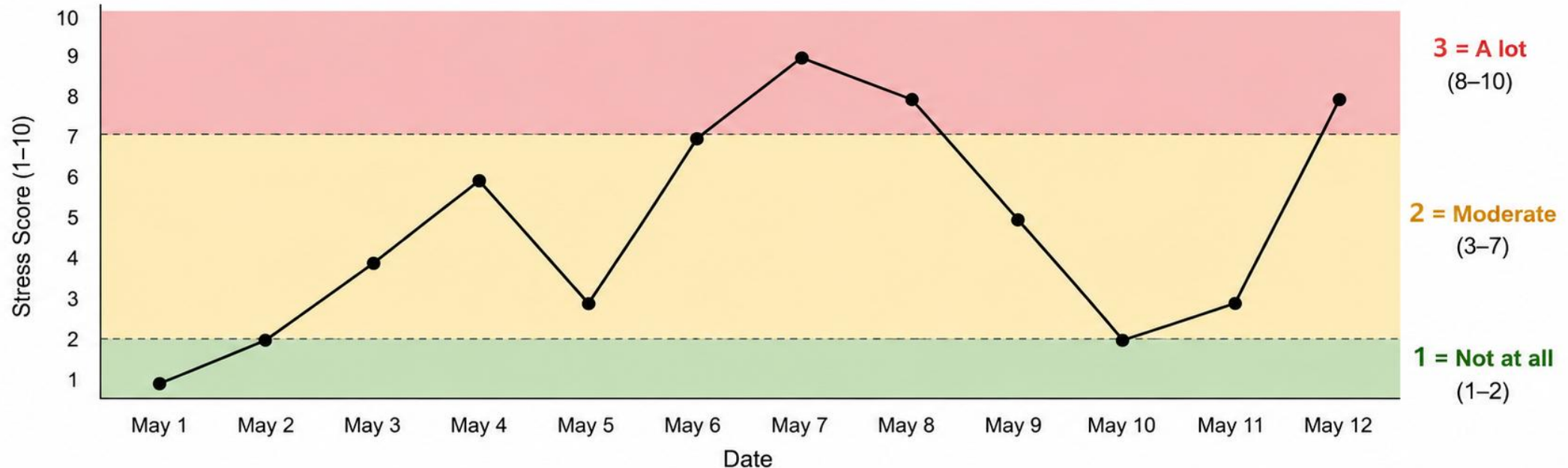


Basic Measurement Theory



Access mechanism (sensitivity)

Stress Scores Over Time (1–10 Scale) and Binned into 1–2–3 Categories



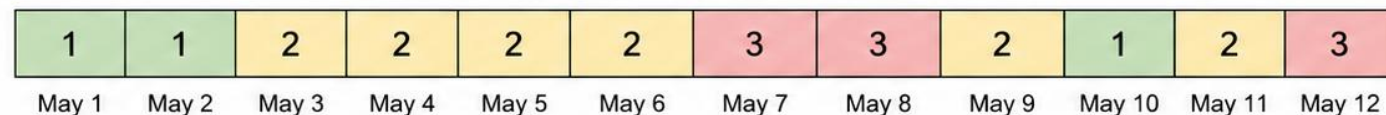
Binning Rule (1–10 → 1–2–3)

- 8 – 10 → 3 (A lot)
- 3 – 7 → 2 (Moderate)
- 1 – 2 → 1 (Not at all)

Date

Binning Process

Binned Stress Over Time (1–2–3 Scale)

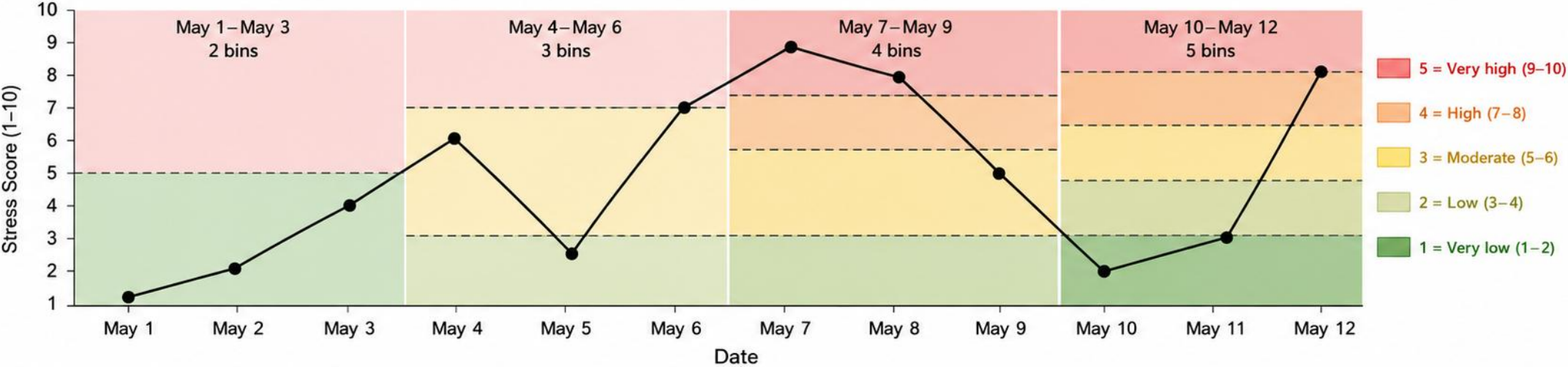


Each original score (1–10) is mapped to a category:

1 = Not at all (1–2) | 2 = Moderate (3–7) | 3 = A lot (8–10)

Access mechanism (memory effect)

Stress Scores Over Time (1–10 Scale) with Gradually Increasing Number of Bins



Binning Rules by Time Window

May 1–May 3 (2 bins)		
1–5	→	1 (Lower)
6–10	→	2 (Higher)
May 4–May 6 (3 bins)		
1–3	→	1 (Low)
4–7	→	2 (Moderate)
8–10	→	3 (High)
May 7–May 9 (4 bins)		
1–3	→	1 (Low)
4–6	→	2 (Somewhat low)
7–8	→	3 (Somewhat high)
9–10	→	4 (High)
May 10–May 12 (5 bins)		
1–2	→	1 (Very low)
3–4	→	2 (Low)
5–6	→	3 (Moderate)
7–8	→	4 (High)
9–10	→	5 (Very high)

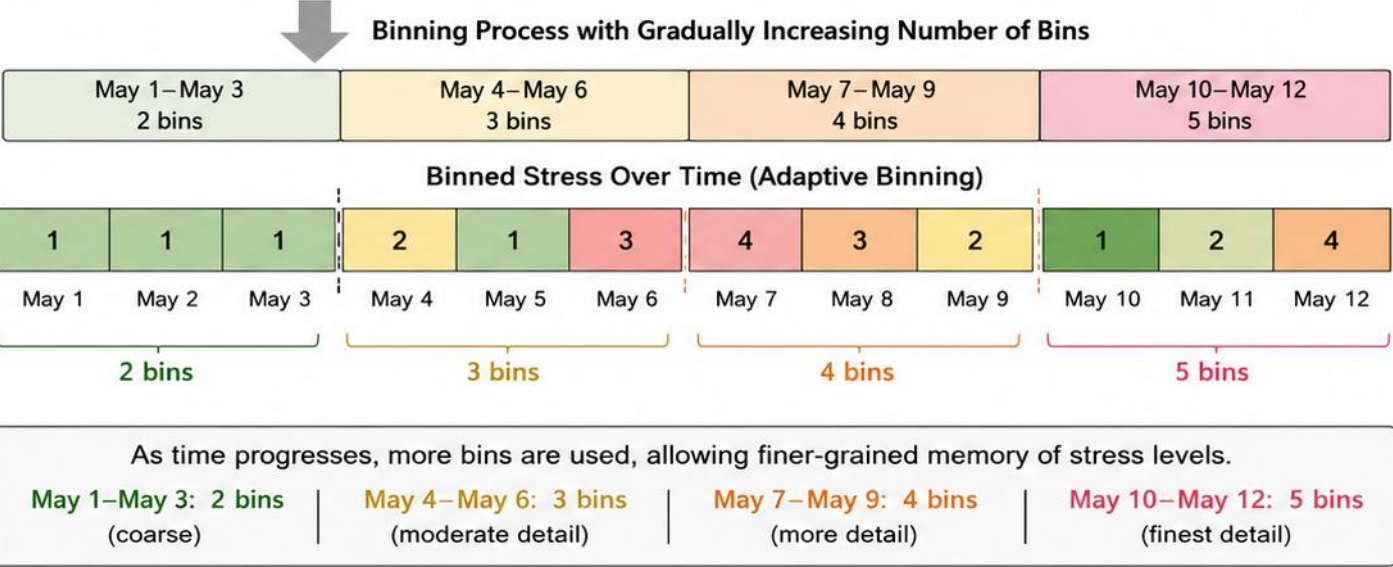
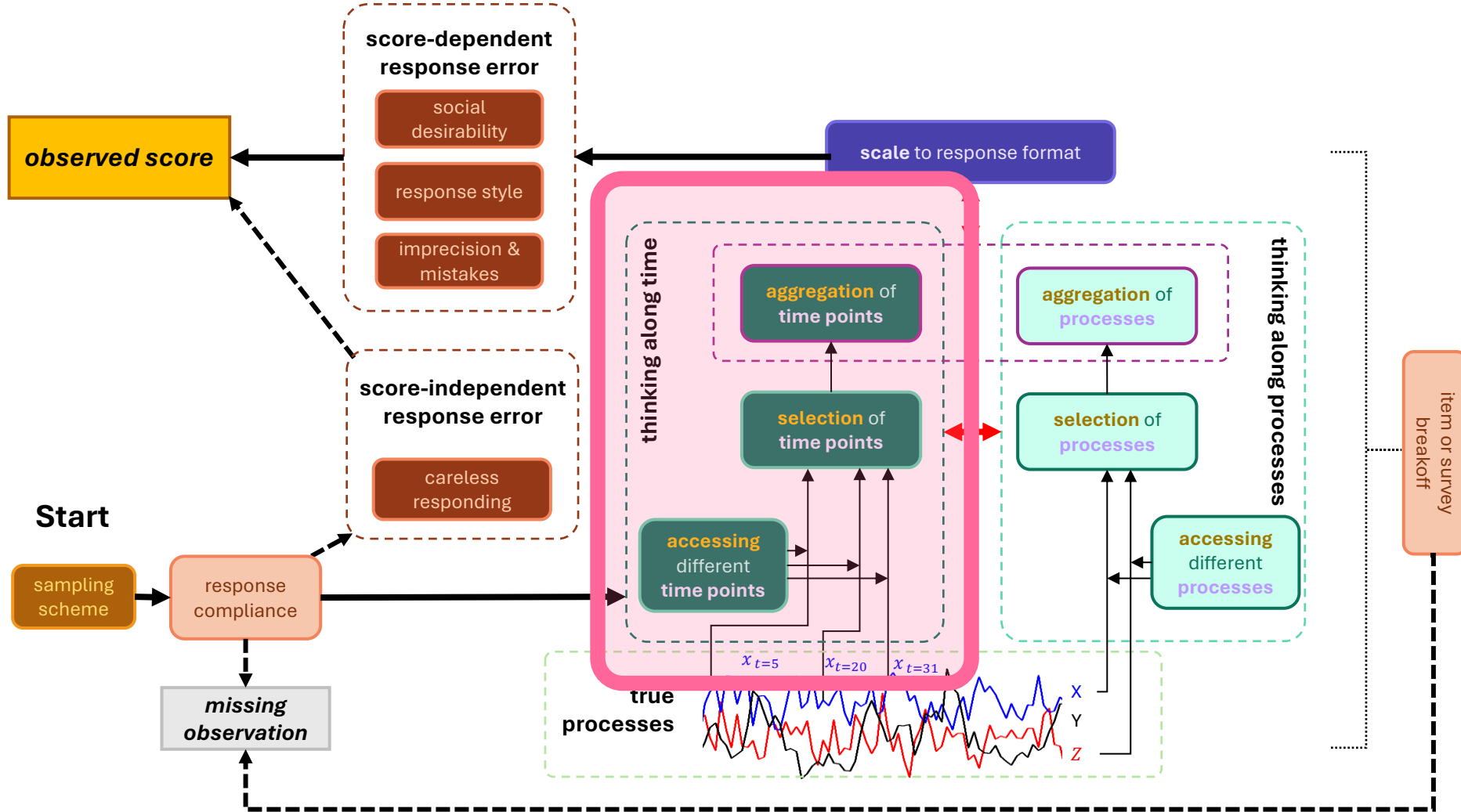


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Basic Measurement Theory



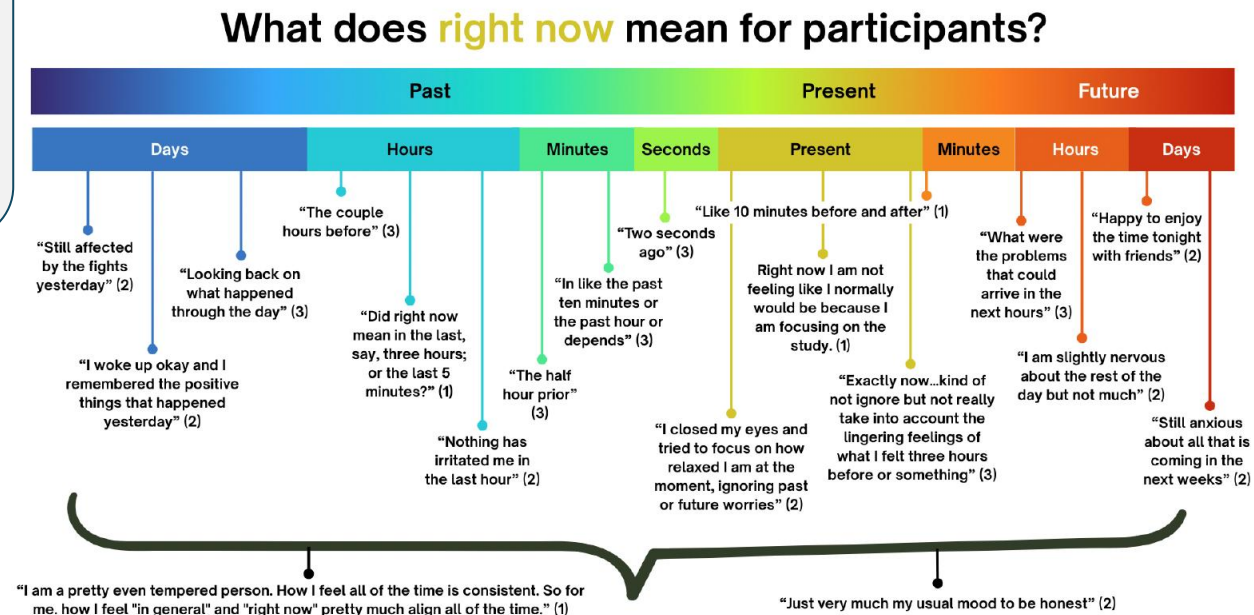
Thinking Along Time

Time Frame Instructions of the Item

Examples:

- How anxious are you **right now**?
- How anxious did you feel in **the last hour**?
- How anxious did you feel in **the last day**?

Participant's Compliance with Instructions



(Hackathon 8, MITNB 2025) Maciejewski, D., Schorrlepp, L., Cloos, L., Cohen, Z. D., Blanchard, M. A., De Smet, M. M., & Stadel, M. (2026, May 14). When 'Right Now' Isn't 'Right Now': The Elasticity of the Moment (ary) in ESM Studies.

Aggregation Mechanism (over time points)

Literature (Alaybek et al., 2022; Neubauer et al., 2020) suggests to combine the 'average' experience and the 'peak and end rule'.

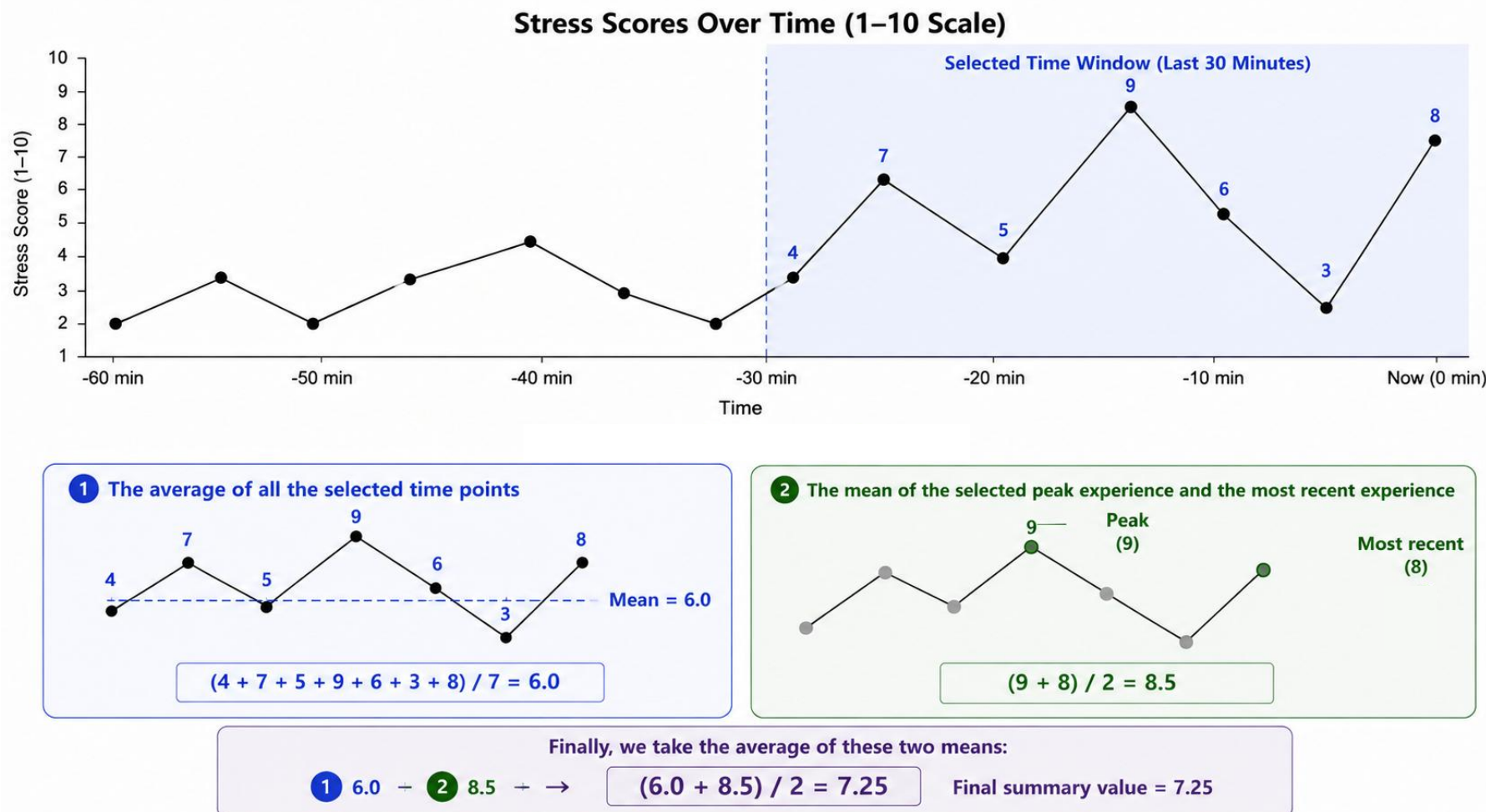


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Thanks for your attention!

In sum:

- Building theories is fun.
- In failing, we succeed.