



An Evaluation of **Temporal** and **Categorical** Uncertainty on Timelines: A Case Study in Human Activity Recall Visualizations

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Northeastern University, Boston, USA



What did you do yesterday?

What did you do yesterday?*

What did you do yesterday?*

Sleeping



07:00

What did you do yesterday?*

Sleeping



07:00
(ish)

What did you do yesterday?*

Sleeping



07:00
(ish)

Temporal Uncertainty

What did you do yesterday?*

Sleeping

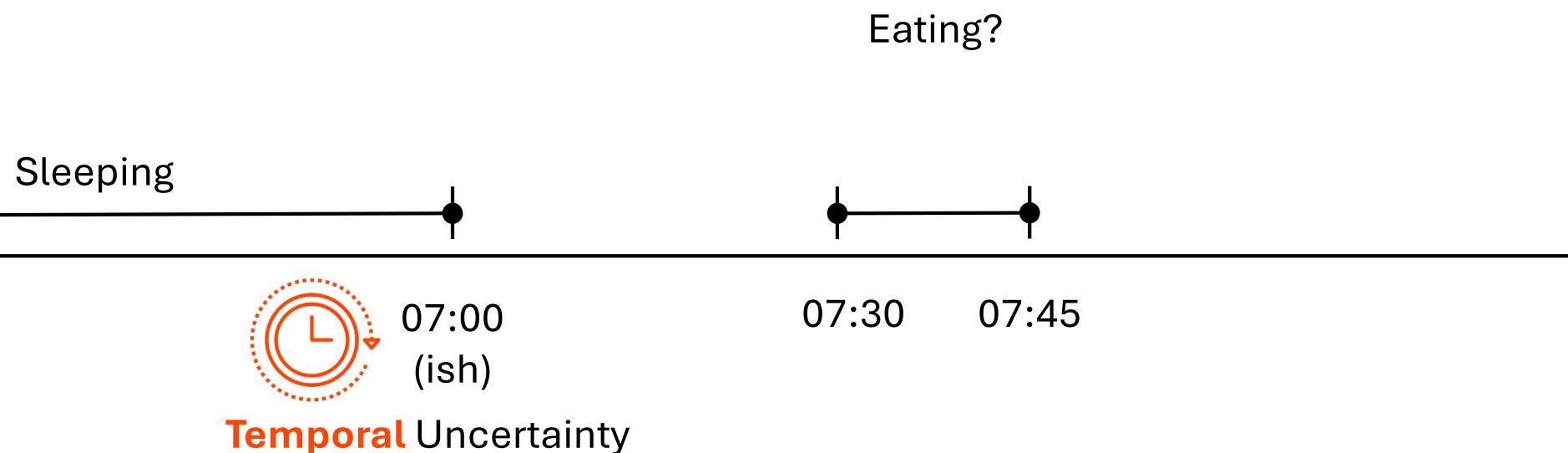


07:00
(ish)

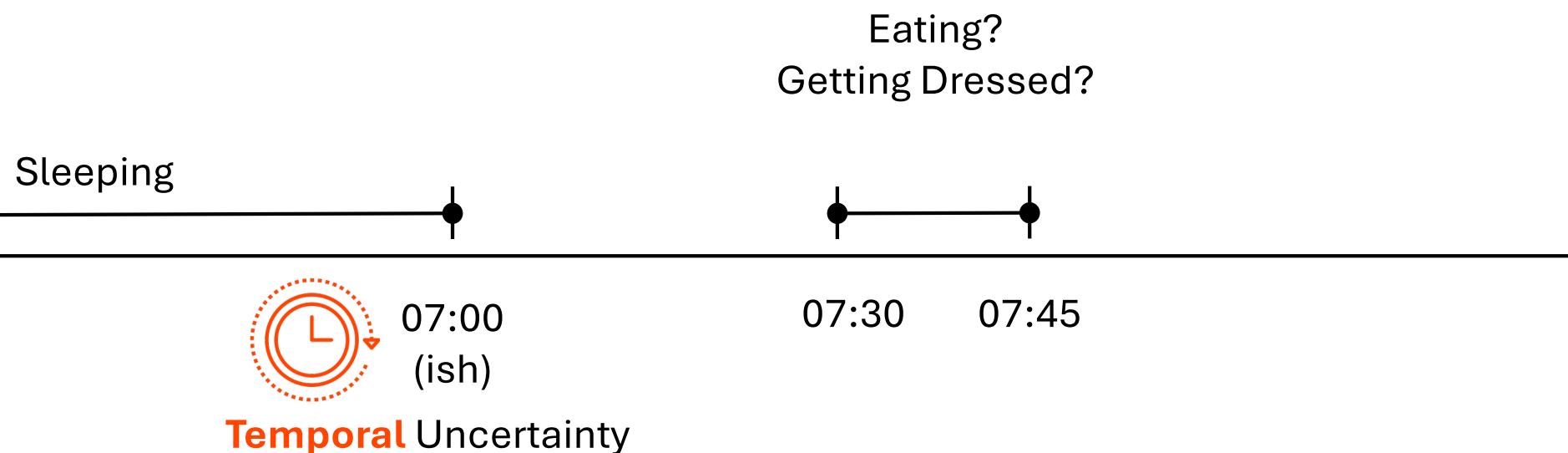
Temporal Uncertainty

07:30 07:45

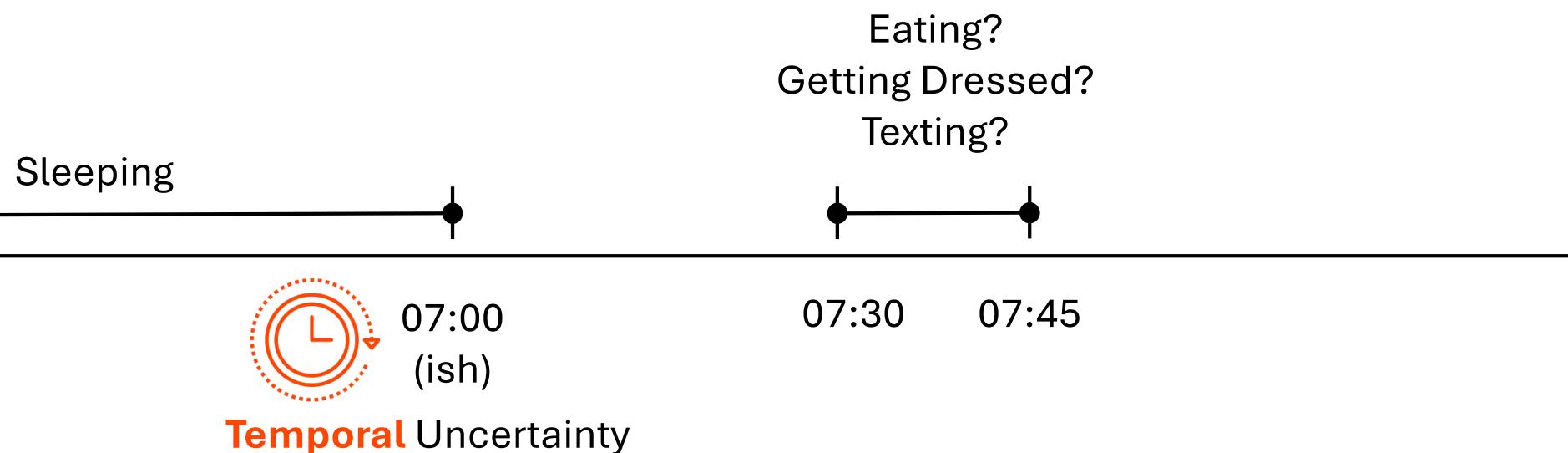
What did you do yesterday?*



What did you do yesterday?*



What did you do yesterday?*



What did you do yesterday?*

Categorical Uncertainty



Eating?

Getting Dressed?

Texting?

Sleeping



07:00
(ish)

07:30

07:45

Temporal Uncertainty

Additional Applications – Event Planning

Additional Applications – Event Planning

Presenting



09:37

Additional Applications – Event Planning

Presenting



09:37
(ish)

Additional Applications – Event Planning

Presenting



09:37
(ish)

Temporal Uncertainty

Additional Applications – Event Planning

Presenting



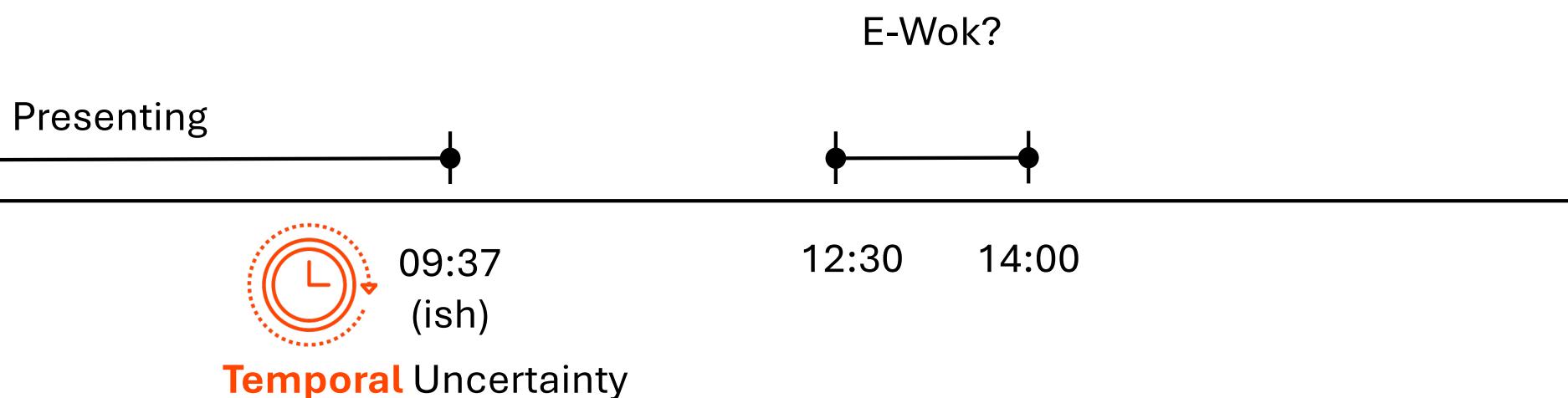
09:37
(ish)

12:30

14:00

Temporal Uncertainty

Additional Applications – Event Planning



Additional Applications – Event Planning

Presenting



E-Wok?
Uno Kitchen?



12:30

14:00



09:37
(ish)

Temporal Uncertainty

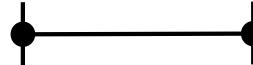
Additional Applications – Event Planning

Categorical Uncertainty



E-Wok?
Uno Kitchen?

Presenting



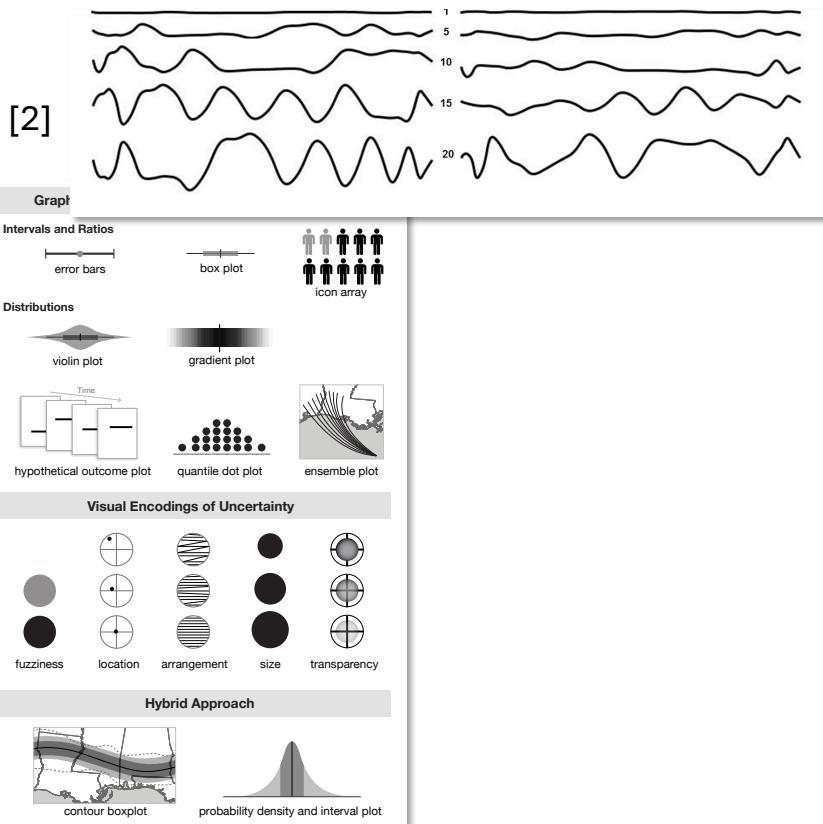
09:37
(ish)

12:30 14:00

Temporal Uncertainty

How to Express Uncertainty?

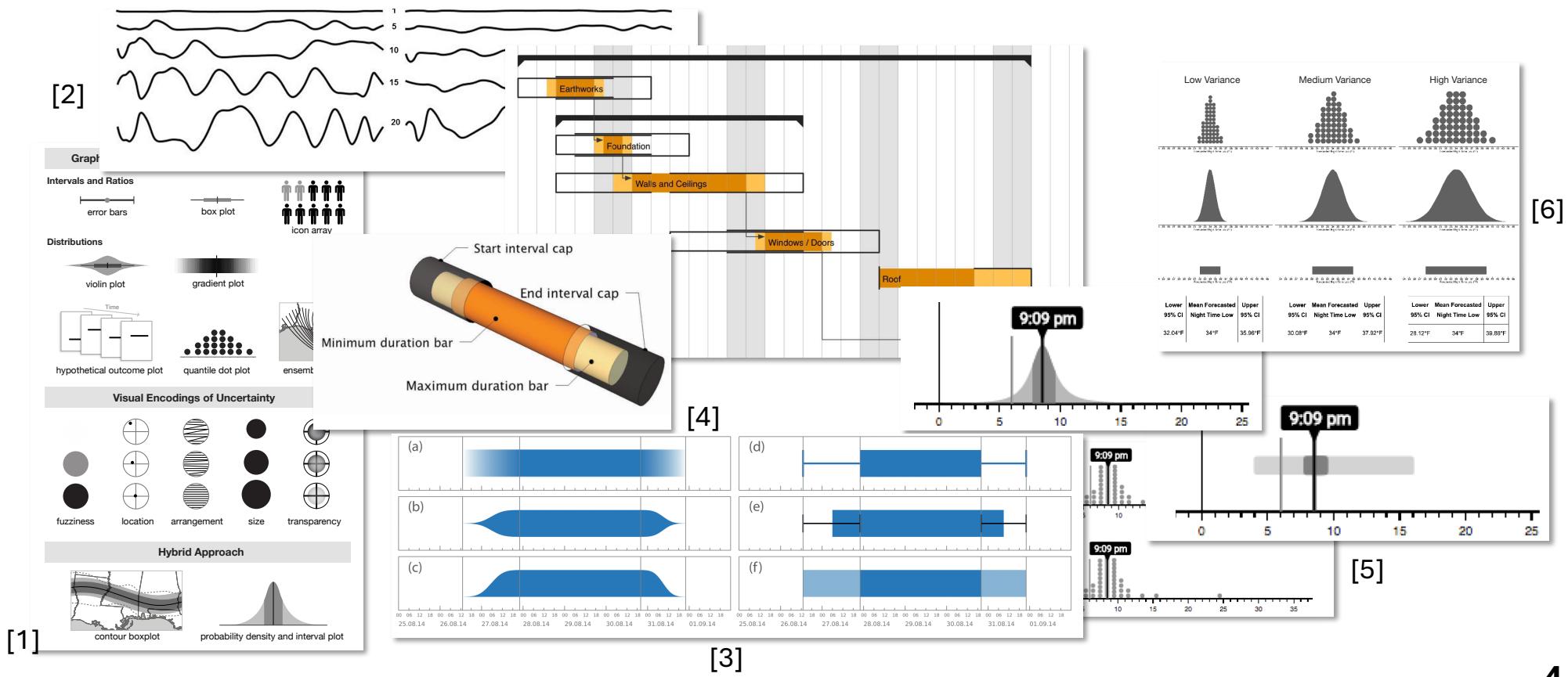
How to Express Uncertainty?



[1]

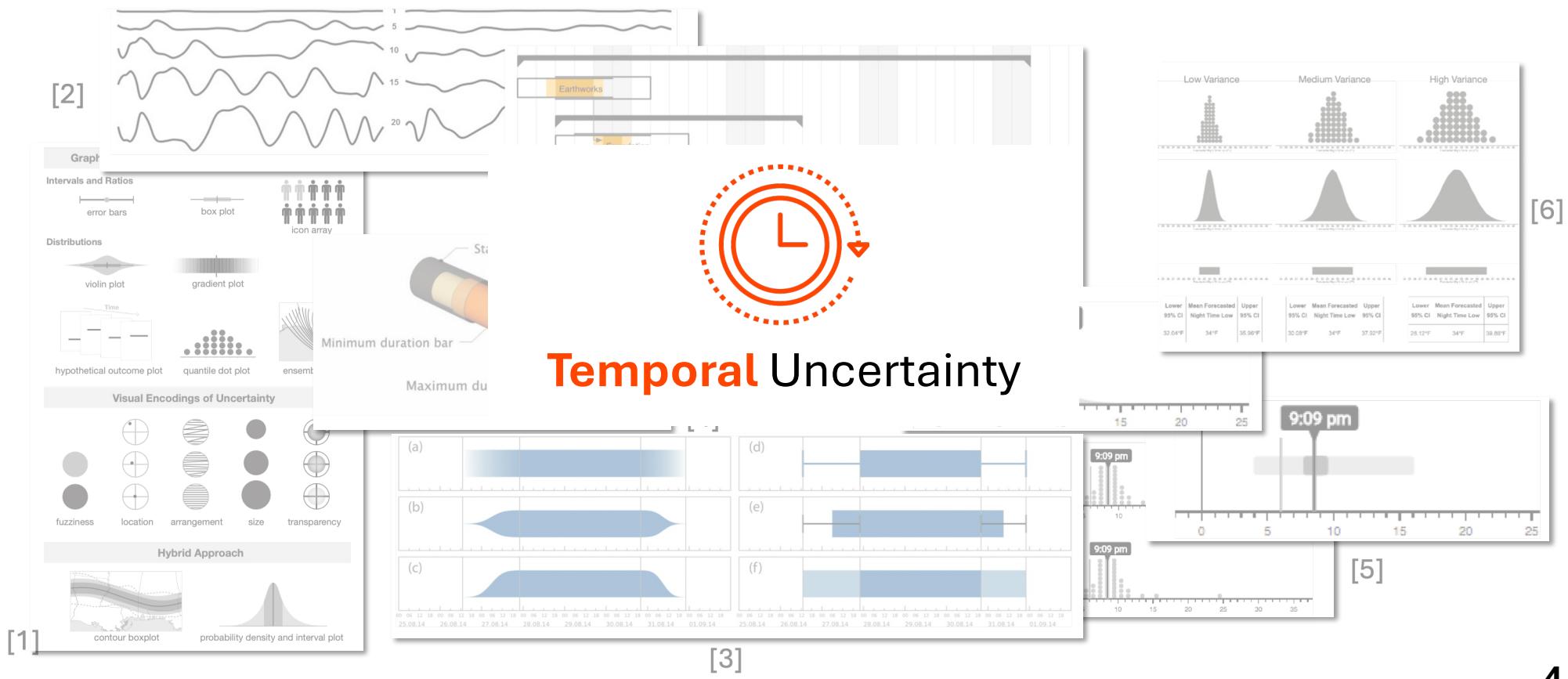
[1] Padilla et al. (2022) [2] Boukhelifa et al. (2012)

How to Express Uncertainty in Timelines?



[1] Padilla et al. (2022) [2] Boukhelifa et al. (2012), [3] Gschwandtner et al. (2016), [4] Aigner et al. (2005), [5] Fernandes et al. (2018), [6] Castro et al. (2022)

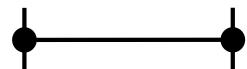
How to Express Uncertainty in Timelines?



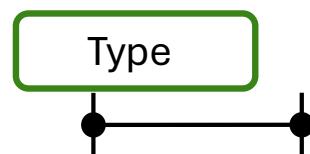
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Our Uncertainty Encodings

Type

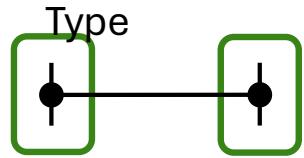


Our Uncertainty Encodings



- 1. Label**
- 2. Endpoint**
- 3. Timeframe**

Our Uncertainty Encodings



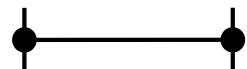
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Our Uncertainty Encodings



Our Uncertainty Encodings

Type

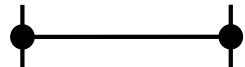


Our Uncertainty Encodings



Temporal
Uncertainty

Type



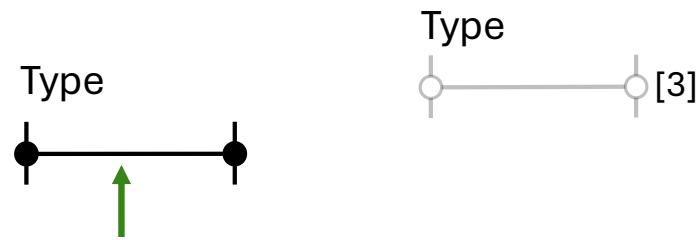
Our Uncertainty Encodings



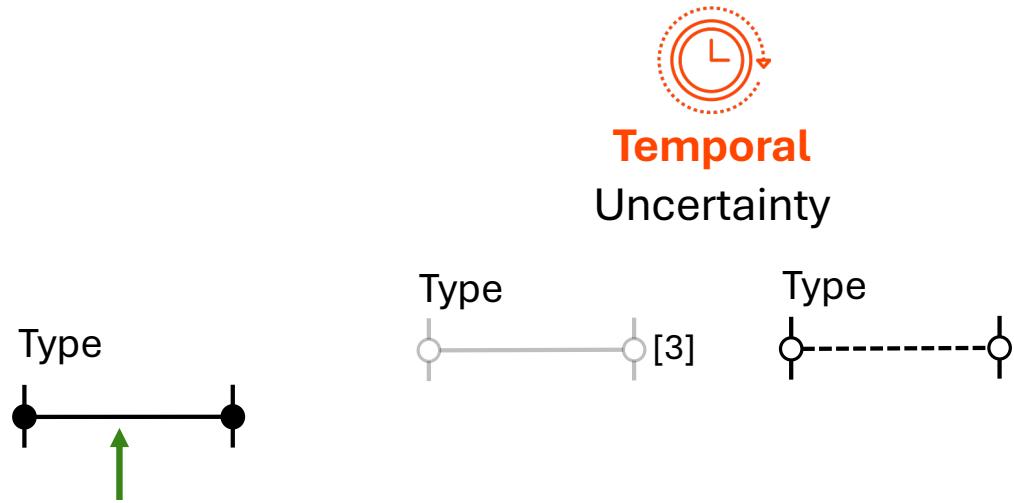
Type



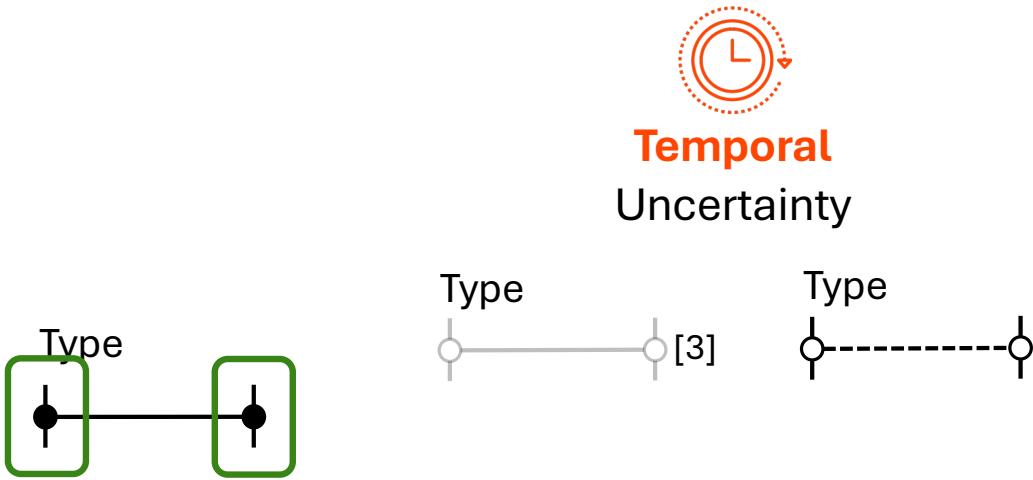
Our Uncertainty Encodings



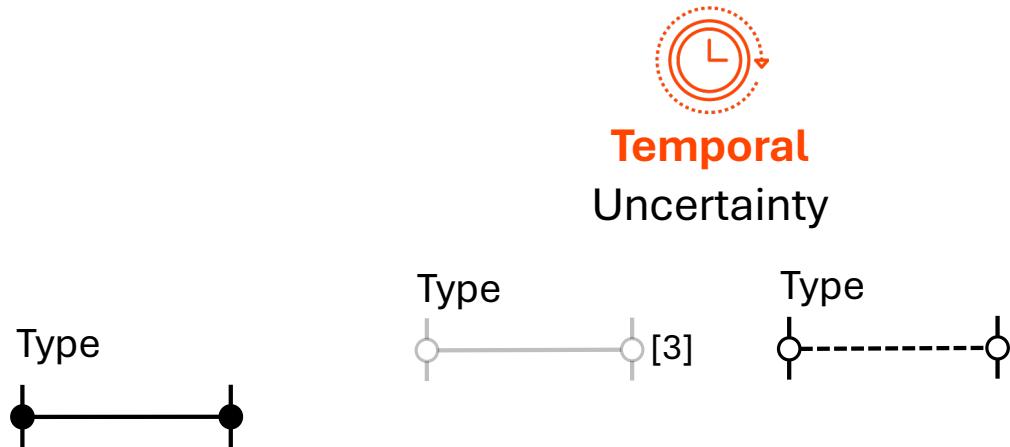
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Our Uncertainty Encodings

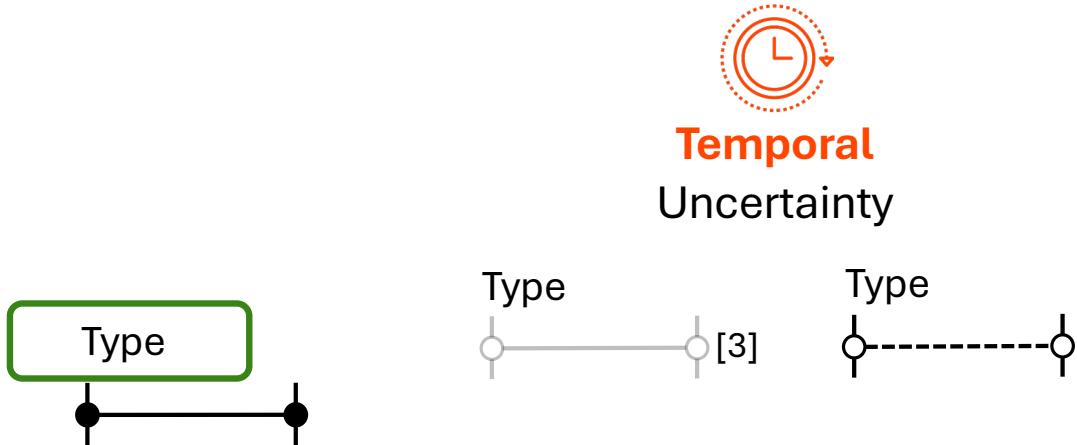


Our Uncertainty Encodings



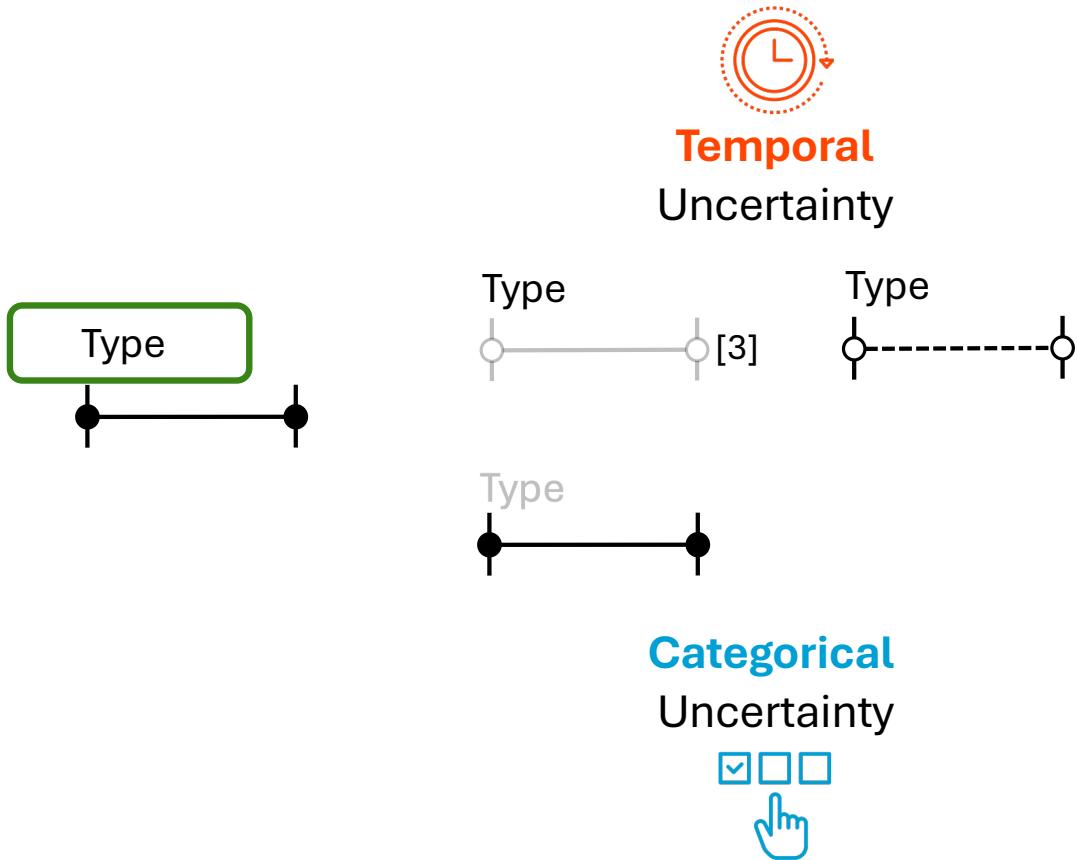
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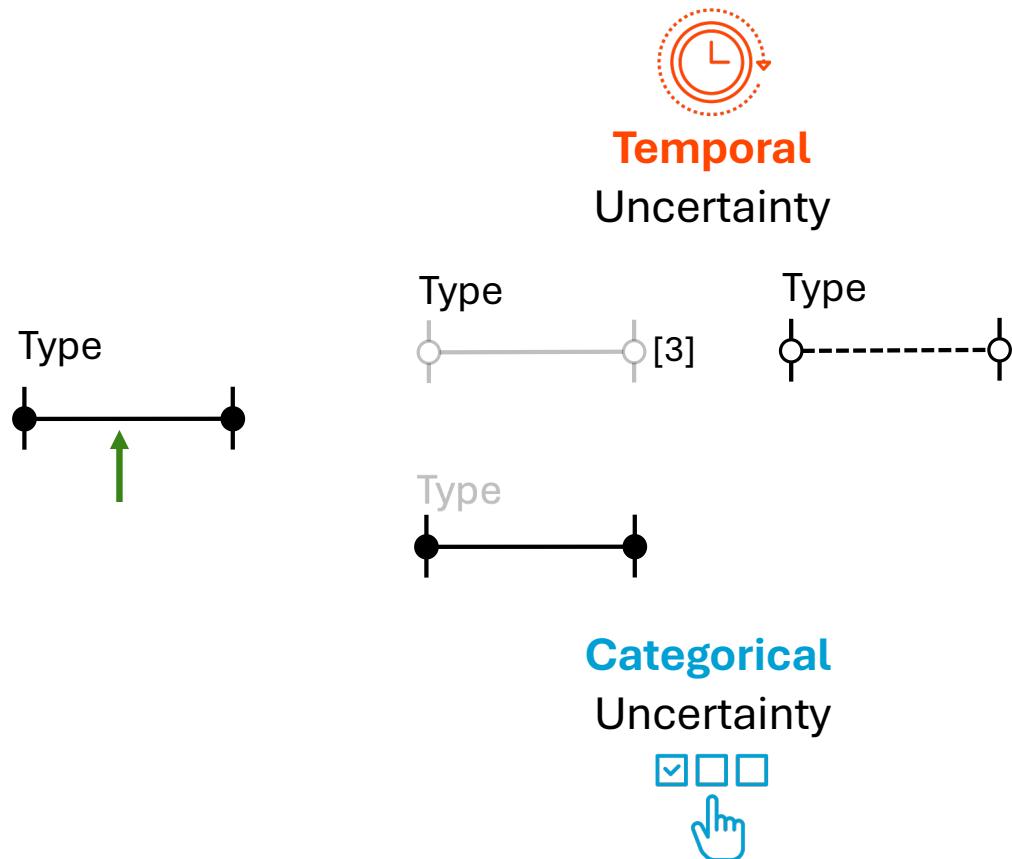


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Our Uncertainty Encodings

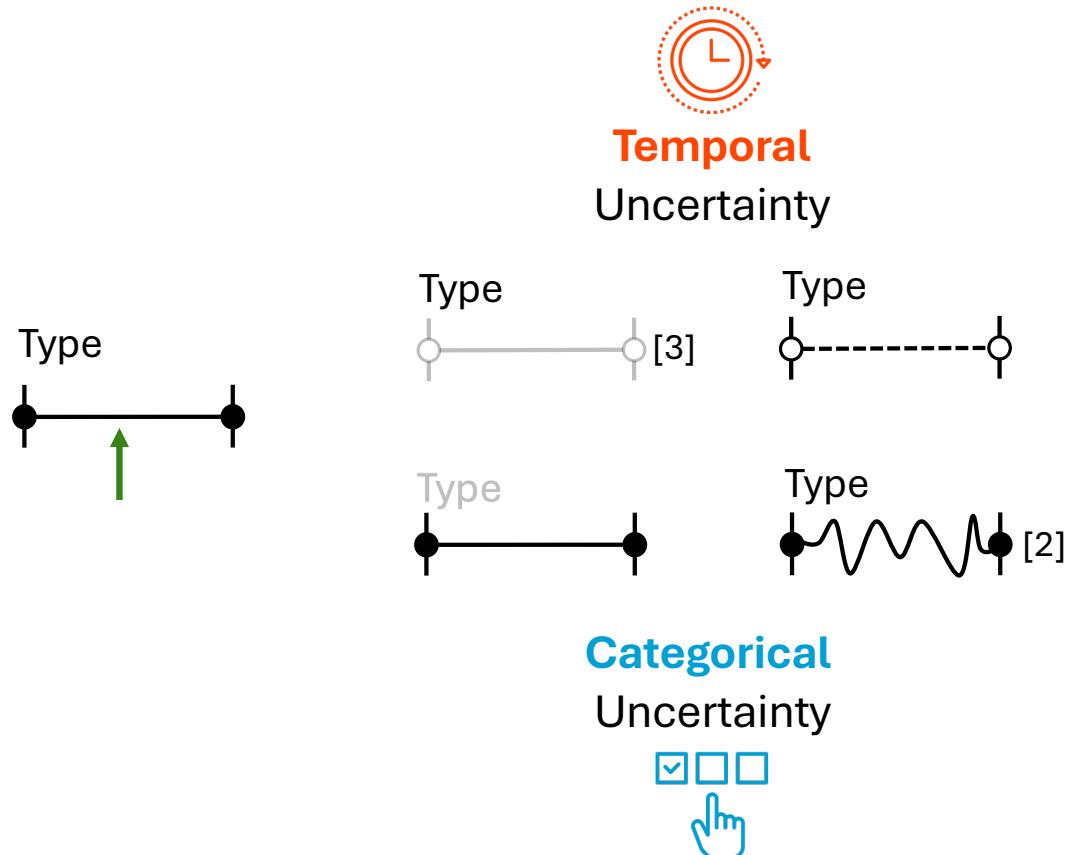


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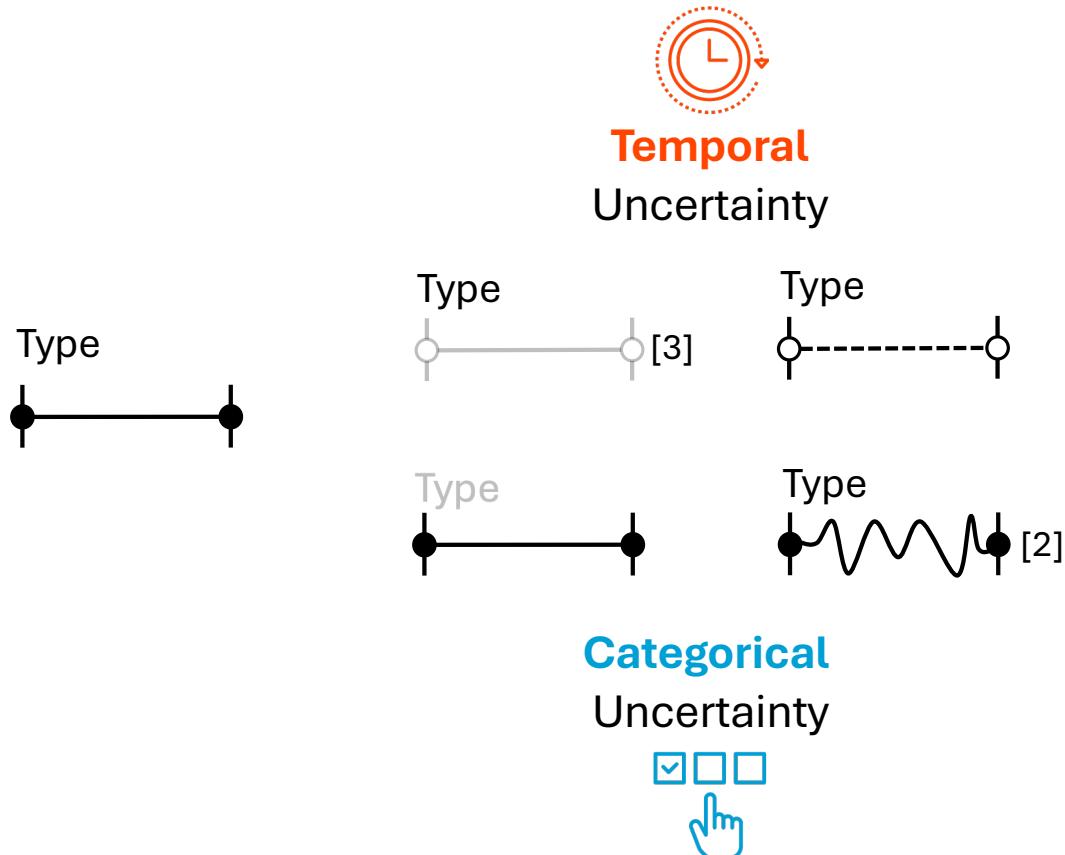
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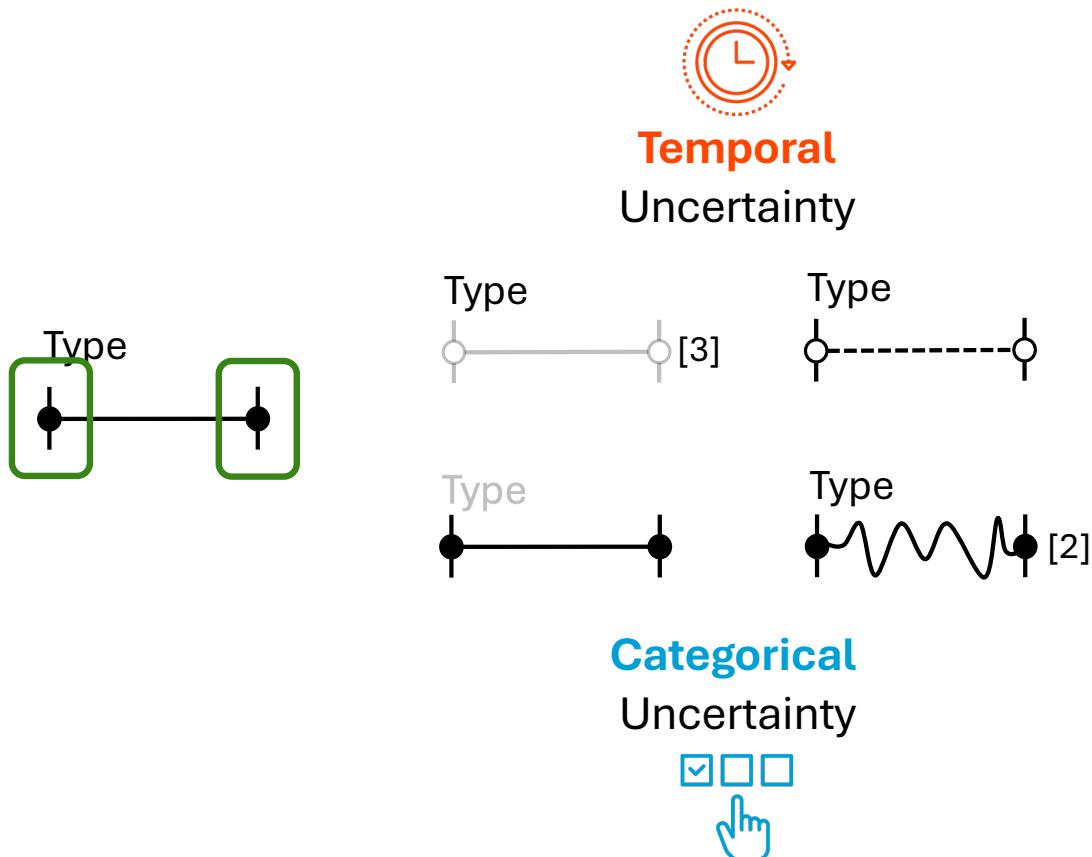
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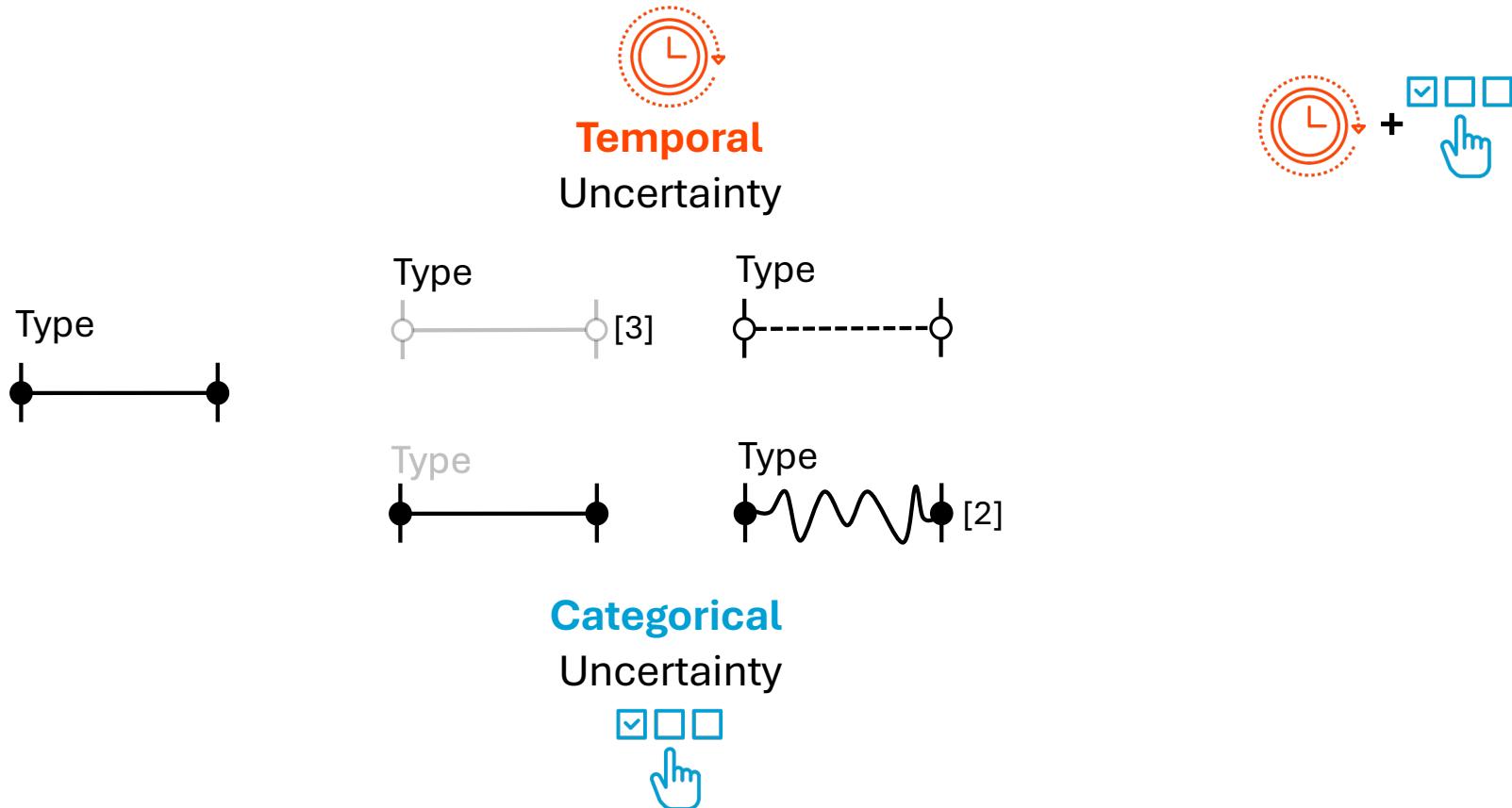
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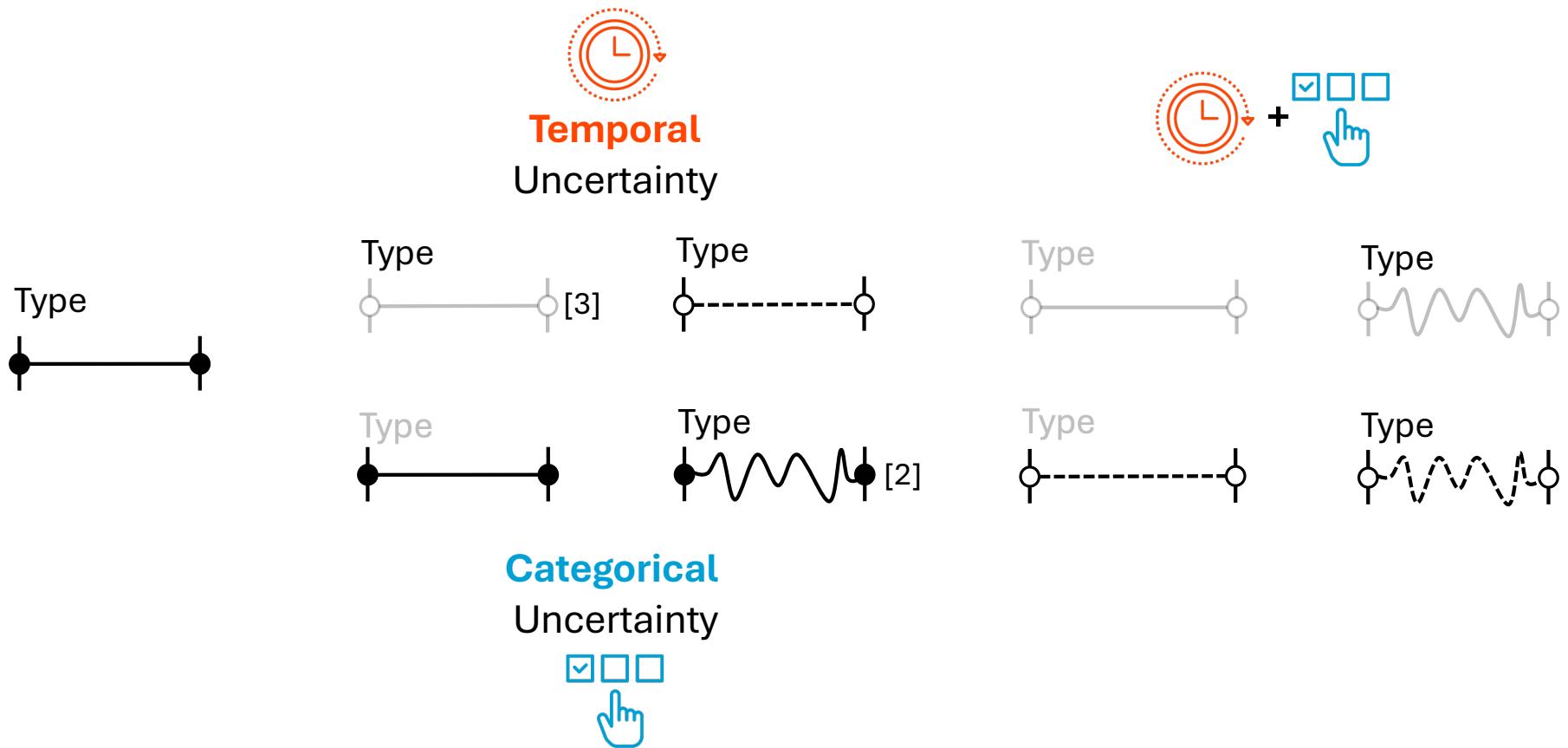
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Our Uncertainty Encodings



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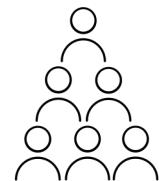
Our Uncertainty Encodings



[2] Boukhelifa et al. (2012), [3] Gschwandtner et al. (2016)

Mixed-Methods Evaluation Study

81 Participants

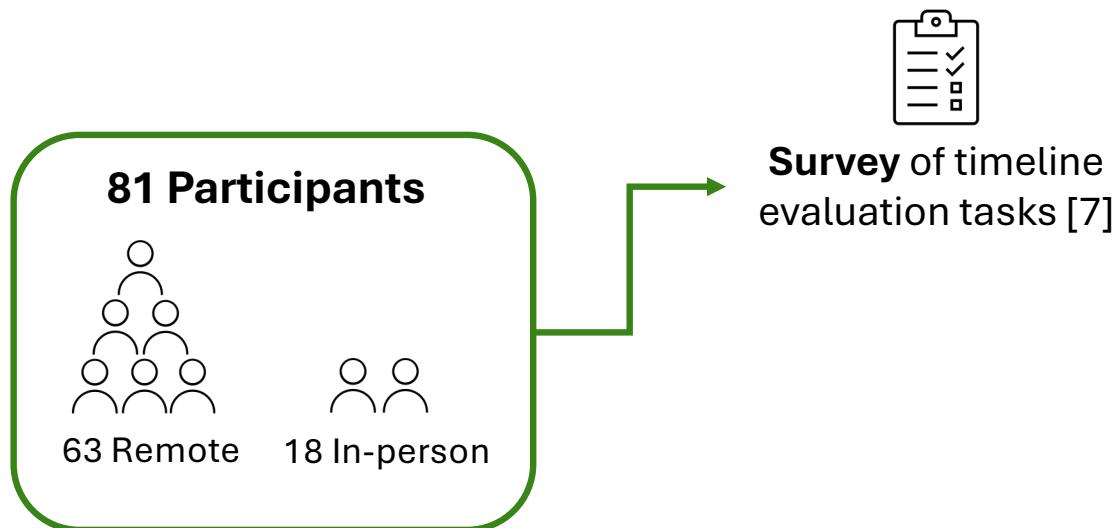


63 Remote



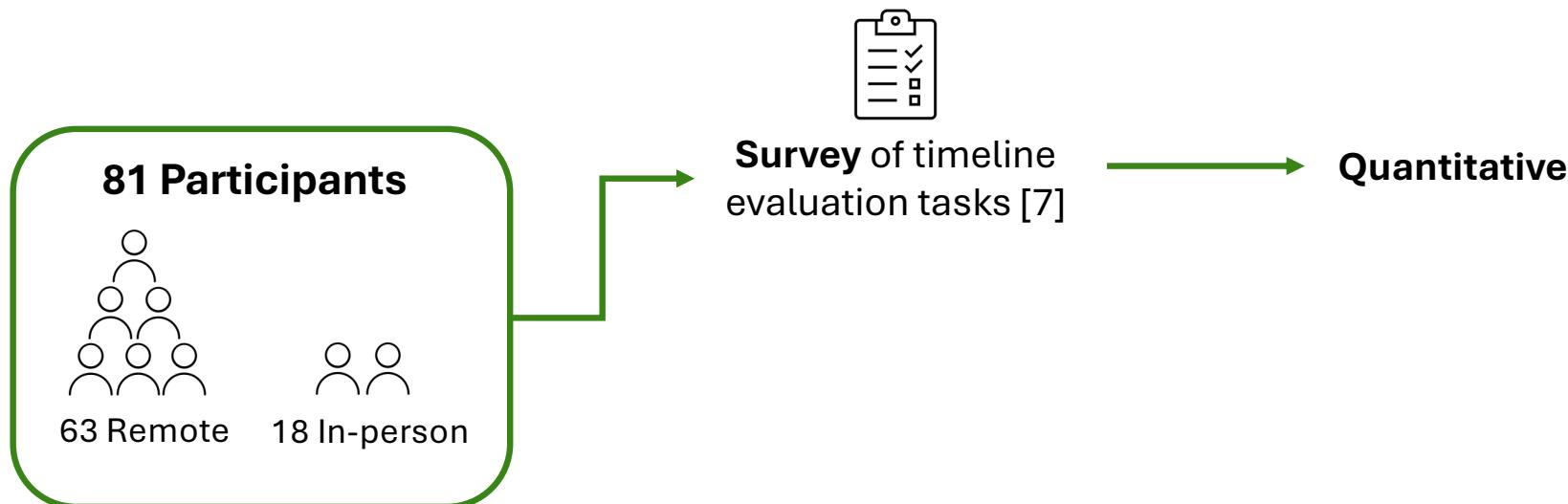
18 In-person

Mixed-Methods Evaluation Study



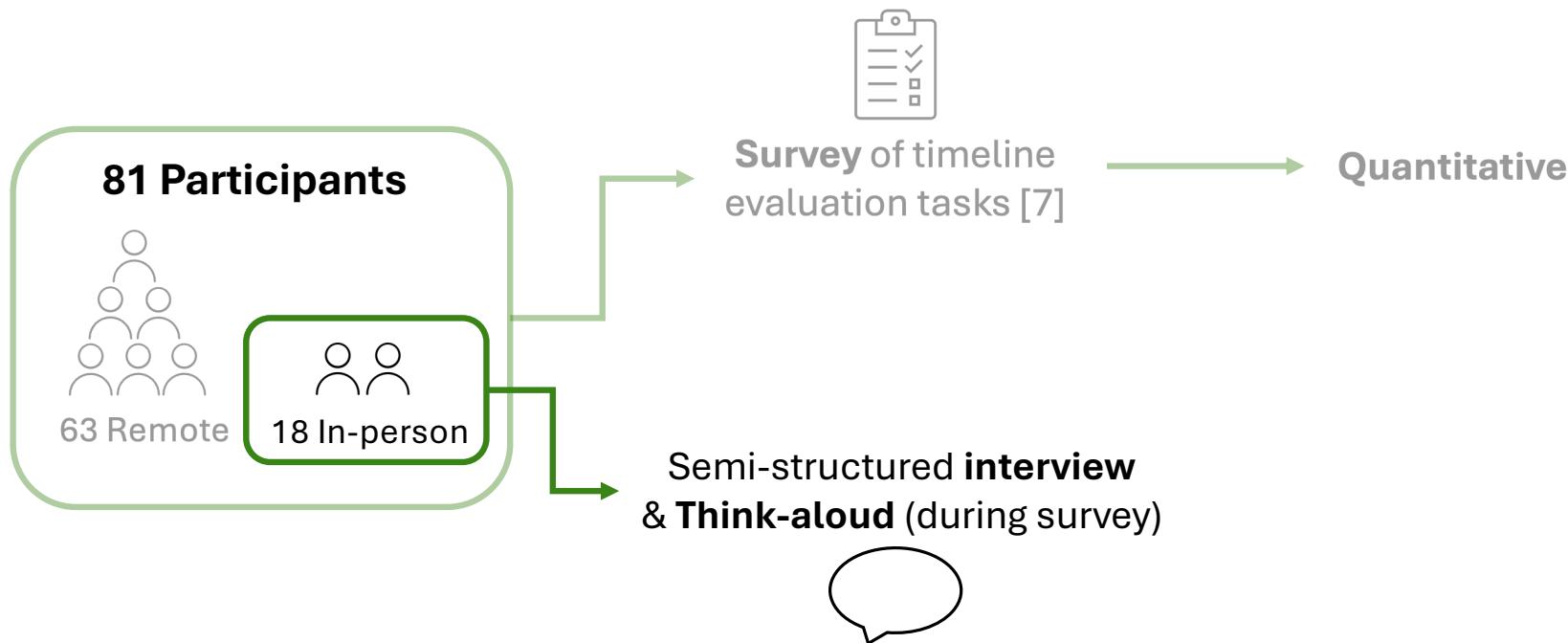
[7] Di Bartolomeo et al. (2020)

Mixed-Methods Evaluation Study



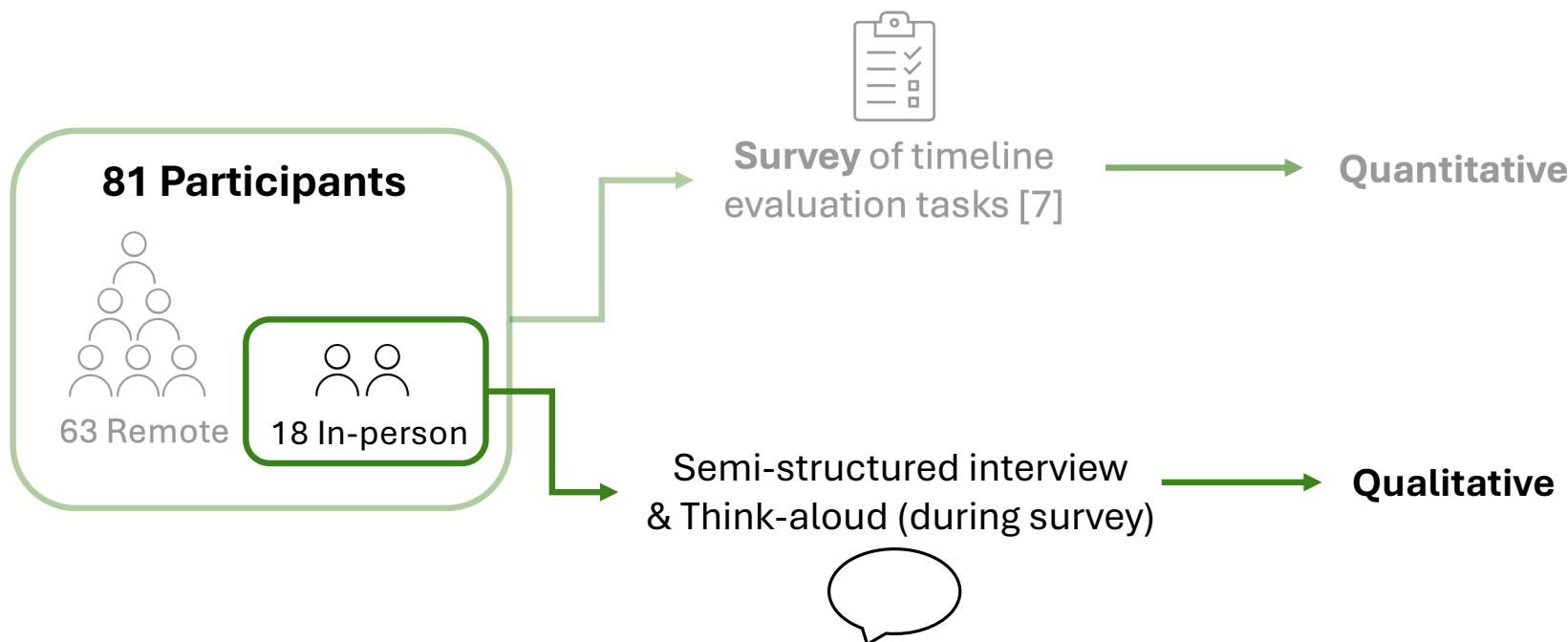
[7] Di Bartolomeo et al. (2020)

Mixed-Methods Evaluation Study



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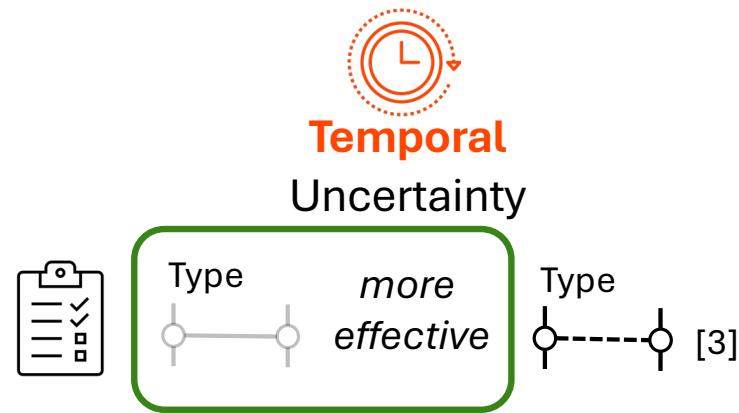
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Results and Key Takeaways

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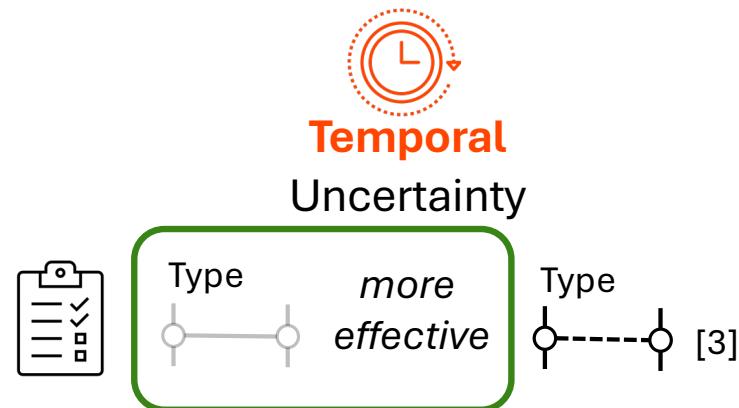


Results and Key Takeaways



[3] Gschwandtner et al. (2016)

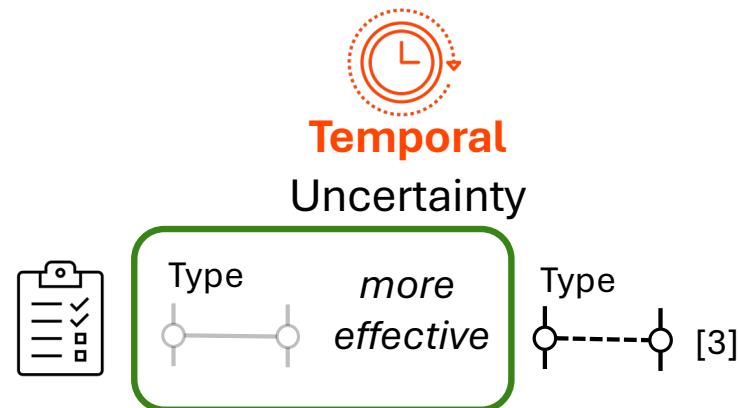
Results and Key Takeaways



Preference ≠ Performance

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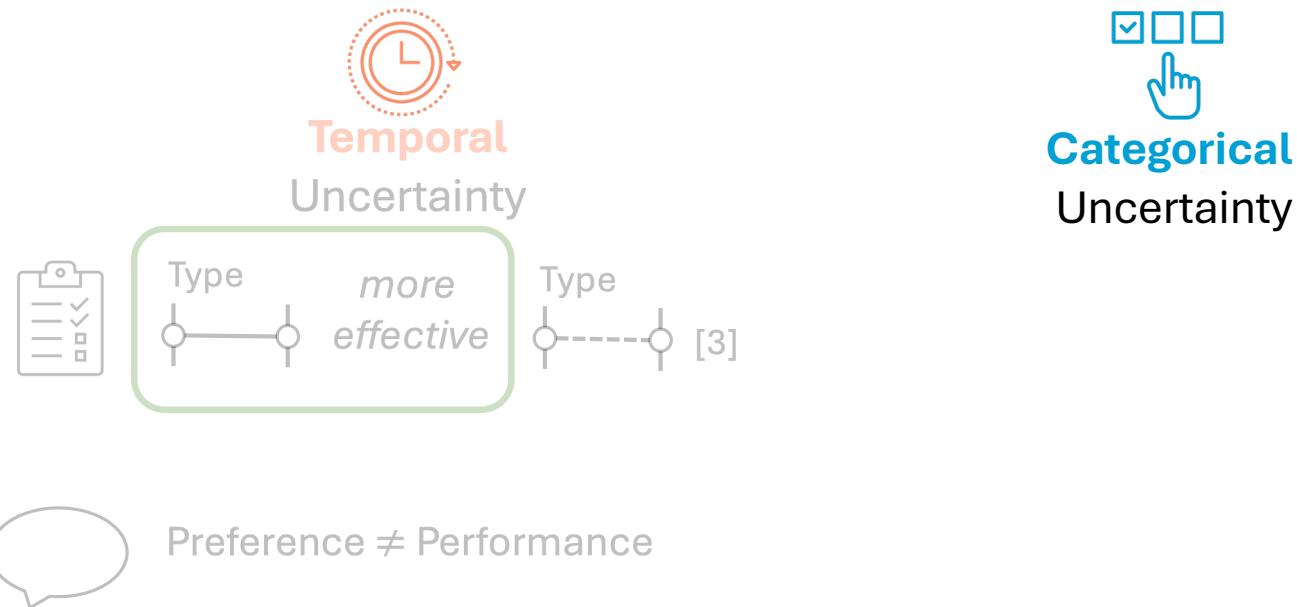
Results and Key Takeaways



Preference ≠ Performance

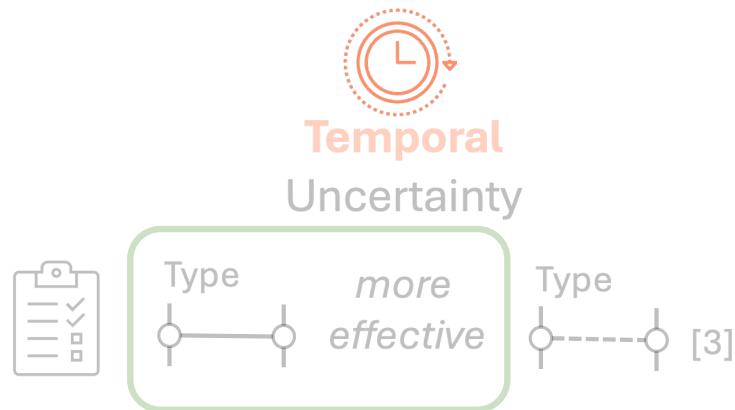
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Results and Key Takeaways



[3] Gschwandtner et al. (2016)

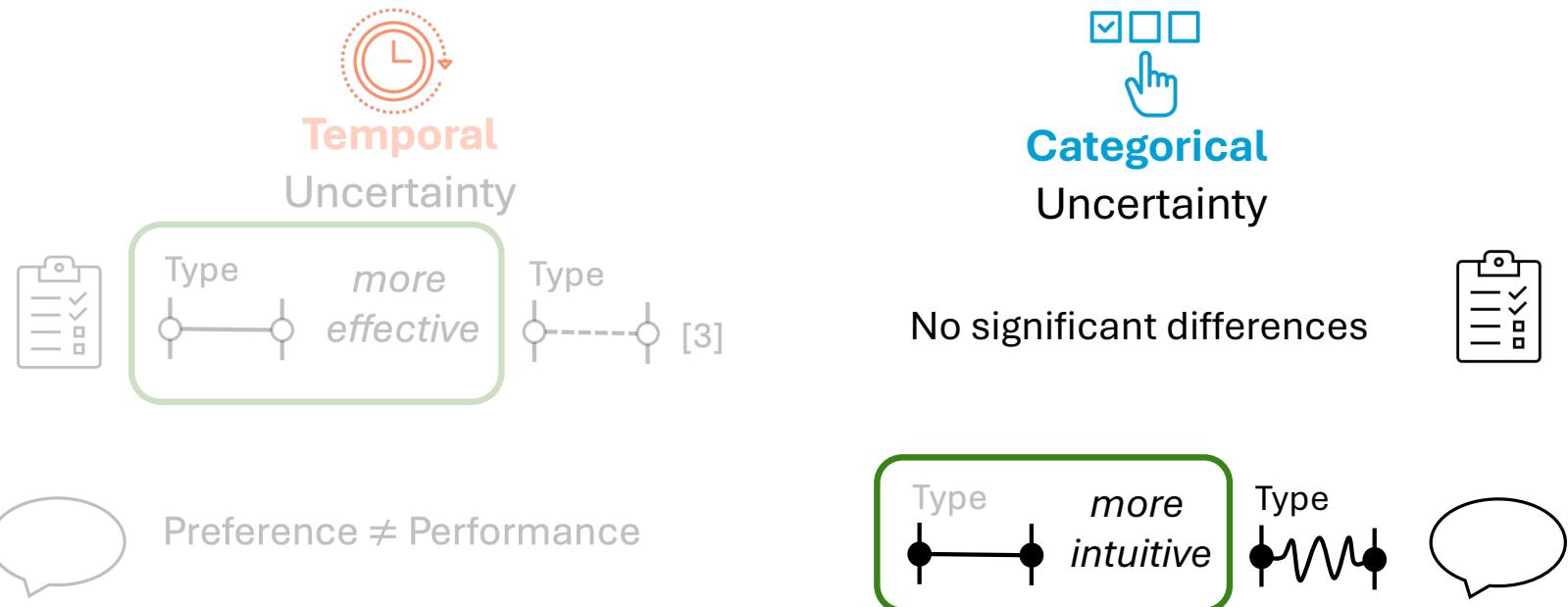
Results and Key Takeaways



No significant differences

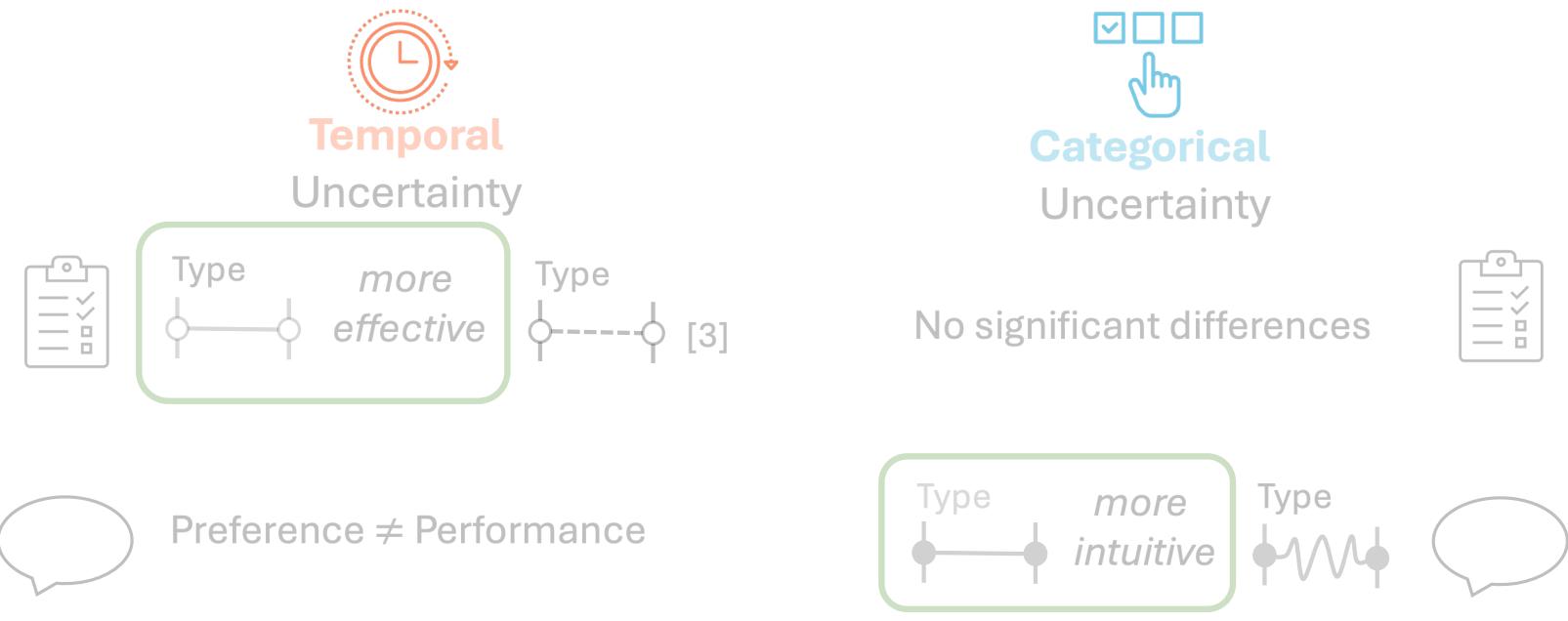
Preference ≠ Performance

Results and Key Takeaways



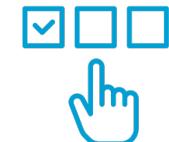
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Results and Key Takeaways



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Thank you!



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Preprint

References

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- [2] N. Boukhelifa, A. Bezerianos, T. Isenberg, and J.-D. Fekete. Evaluating sketchiness as a visual variable for the depiction of qualitative uncertainty. *IEEE Transactions on Visualization and Computer Graphics*, 18(12):2769–2778, 2012. doi: 10.1109/TVCG.2012.220
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