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Two-digit number processing in professional mathematicians reveals the same behavioural signatures as in control samples

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Number processing in professional mathematicians

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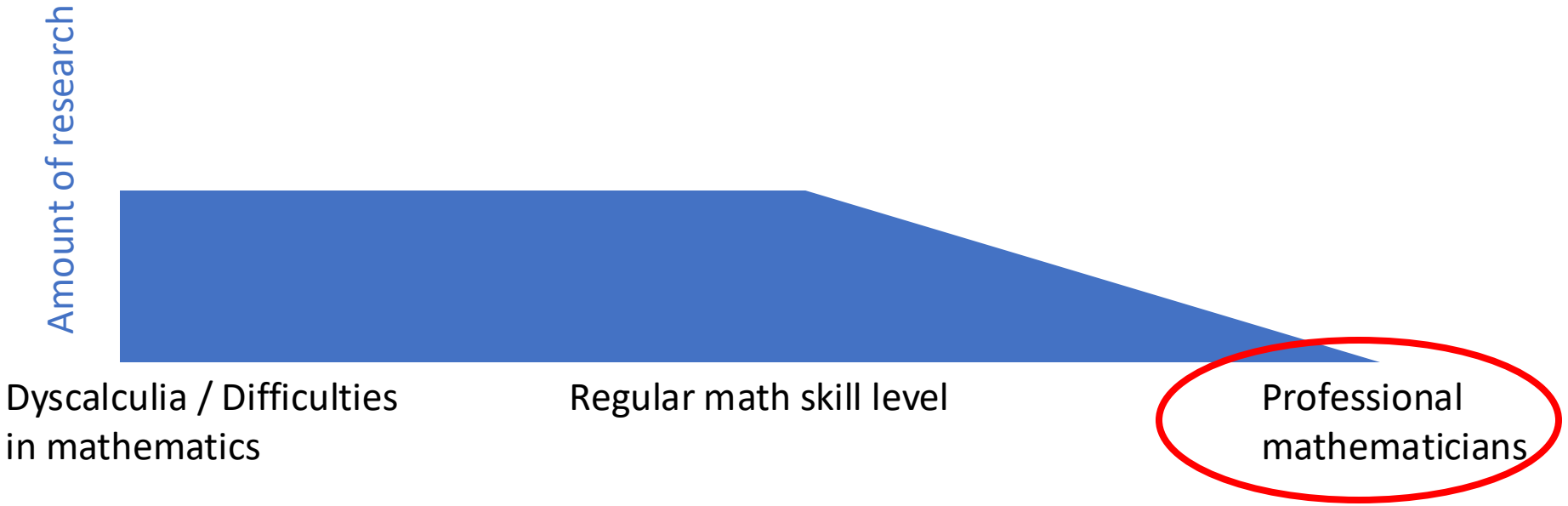

Studies on professional mathematicians

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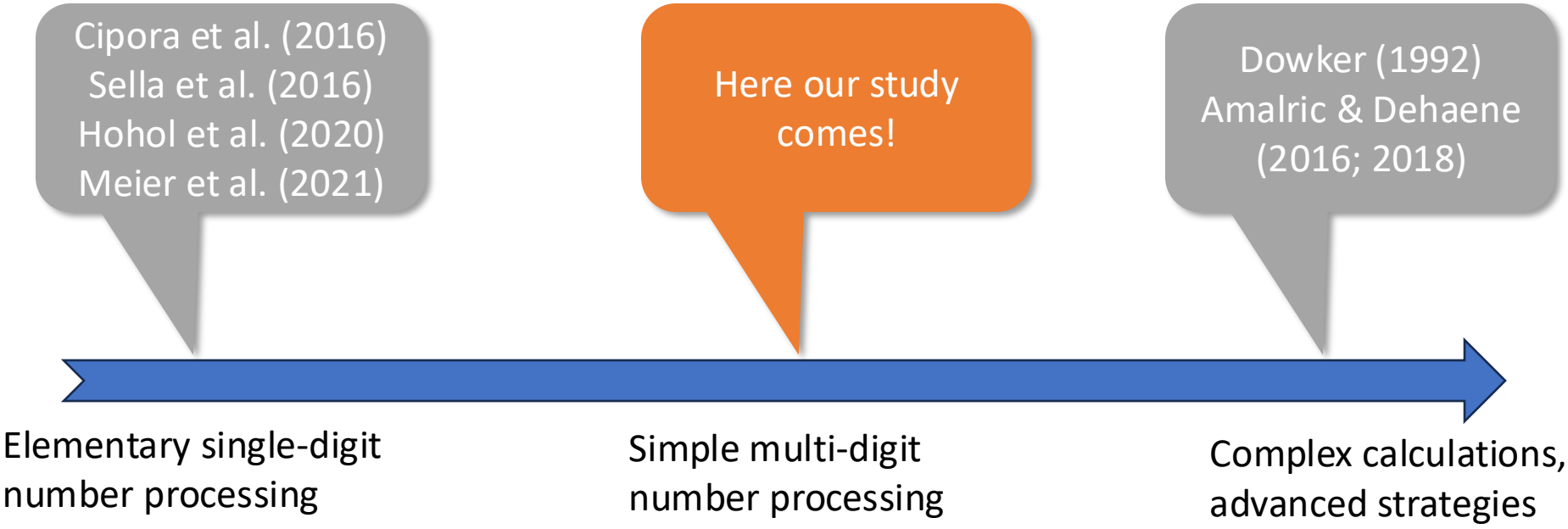

Unit-Decade Compatibility Effect (UDCE; Nuerk et al., 2001)

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Faster reactions to compatible than incompatible trials

Within decade filler items increase the UDCE

Typical difference ≈ 40ms

Shows that the multi-digit numbers are processed in a (partially) decomposed way

Highly replicable

Two-digit number comparison – what else is there?

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- Distance effect
  - The greater the difference between the numbers to be compared, the easier it is to compare them
- One aspect of it is the **decade distance**
- Another aspect is the **unit distance:**
- In our study looked at only for within decade fillers
- Overall task performance
  - Reaction times
  - Accuracy

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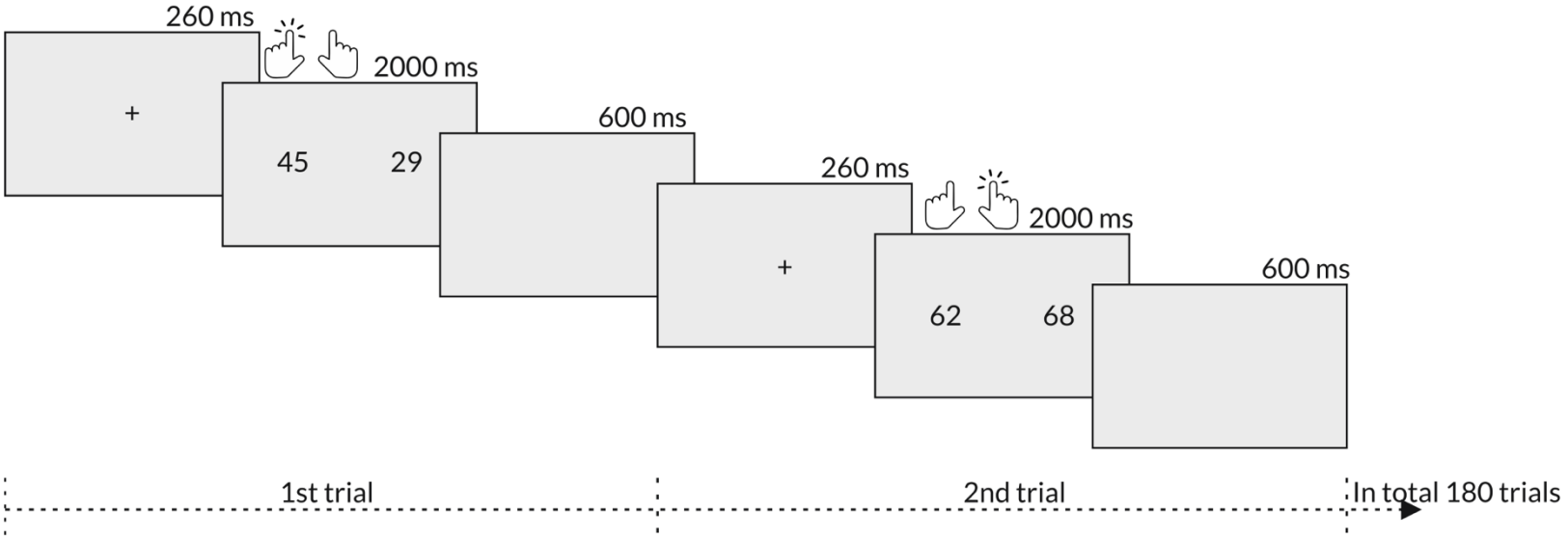
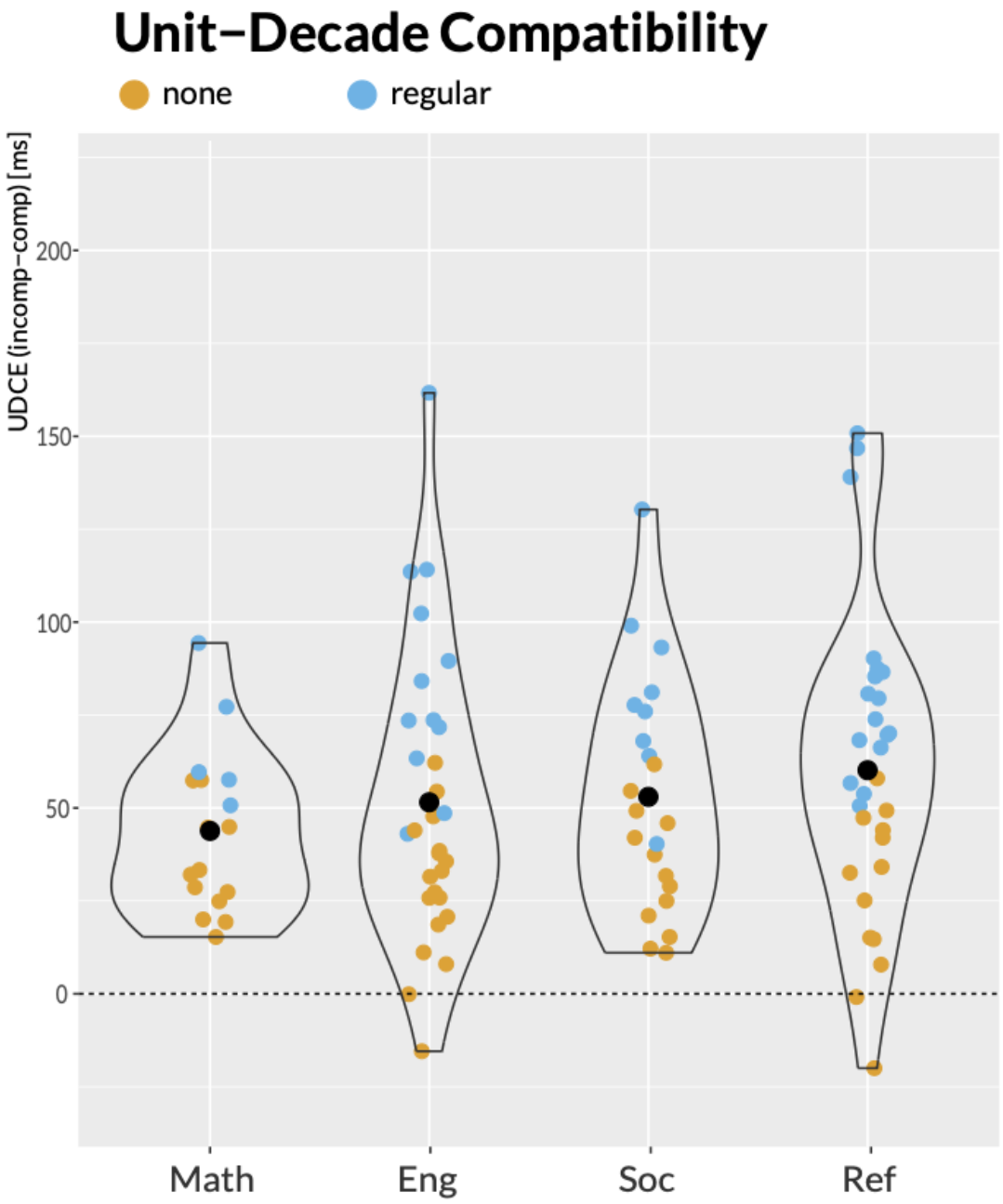
Method



Preliminary data based on 99 participants:

- 17 mathematicians
- 30 engineers
- 22 social scientists
- 30 reference



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- Robust effect in all groups
- No between group differences
- No differences in individual prevalence as tested with bootstrapping methods

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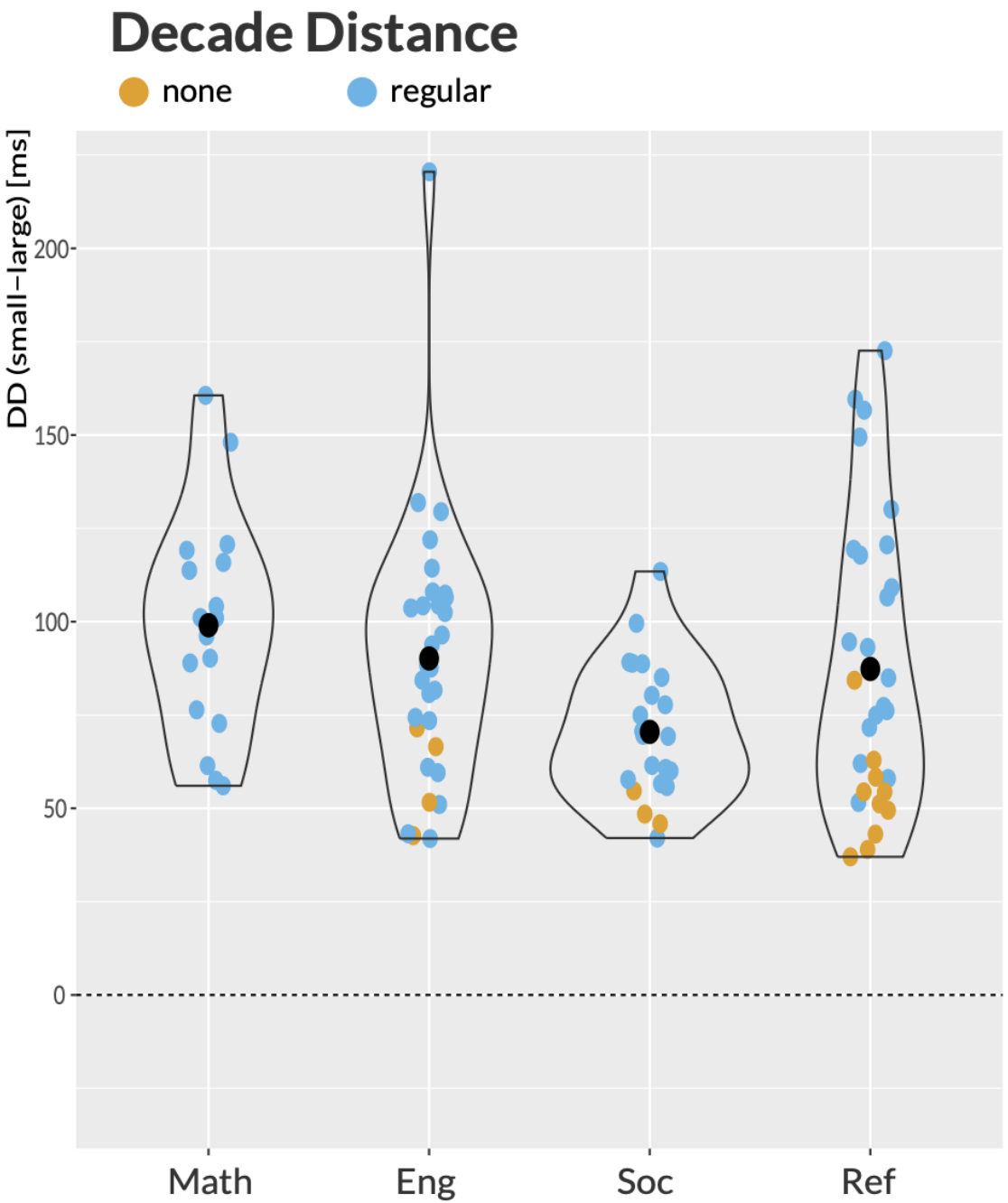

- Robust effect in all groups
- No robust between group differences
- Slightly fewer participants from the Reference group reveal the effect than in case of Mathematicians

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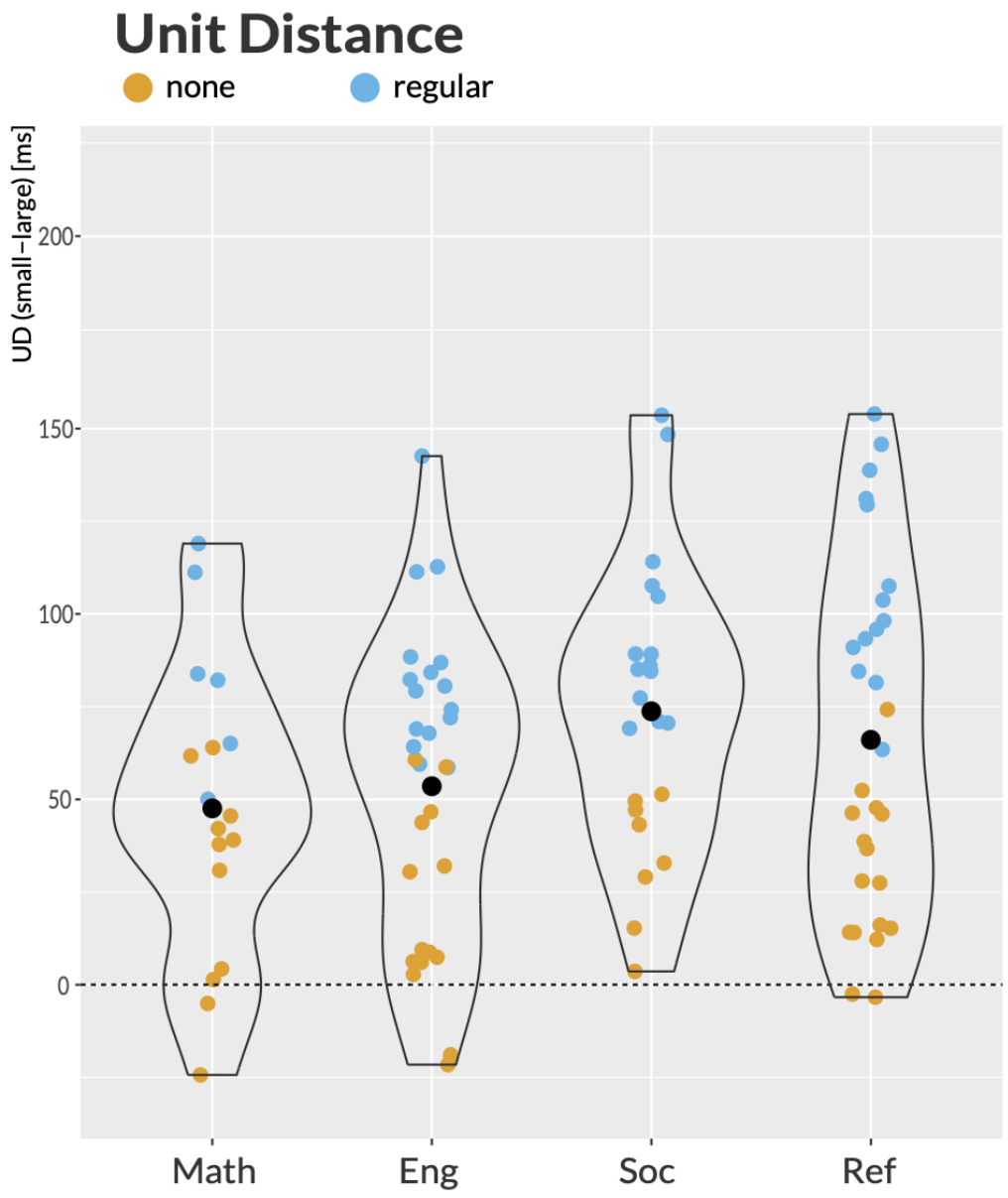

- Robust effect in all groups
- Individual prevalence lower than decade distance
- No between group differences

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Between group differences

- Significant between group differences in the overall task accuracy
  - Mathematicians and Engineers more accurate than Social Scientists/Humanists
- No differences in reaction times

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Conclusions

- Seems that there is no **difference in two-digit number processing** between professional mathematicians and other groups
- Professional mathematicians **process two-digit numbers in a decomposed manner**

- … and despite their interest and long-lasting training in the domain… it still **takes them longer to compare numbers close to each other than numbers that are far apart**

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Thank you for your attention!

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