THE ASSOCIATION BETWEEN VIDEO GAME EXPERTISE AND PROCESSING SPEED, TASK MIXING AND SWITCHING IN COUNTER-STRIKE PLAYERS

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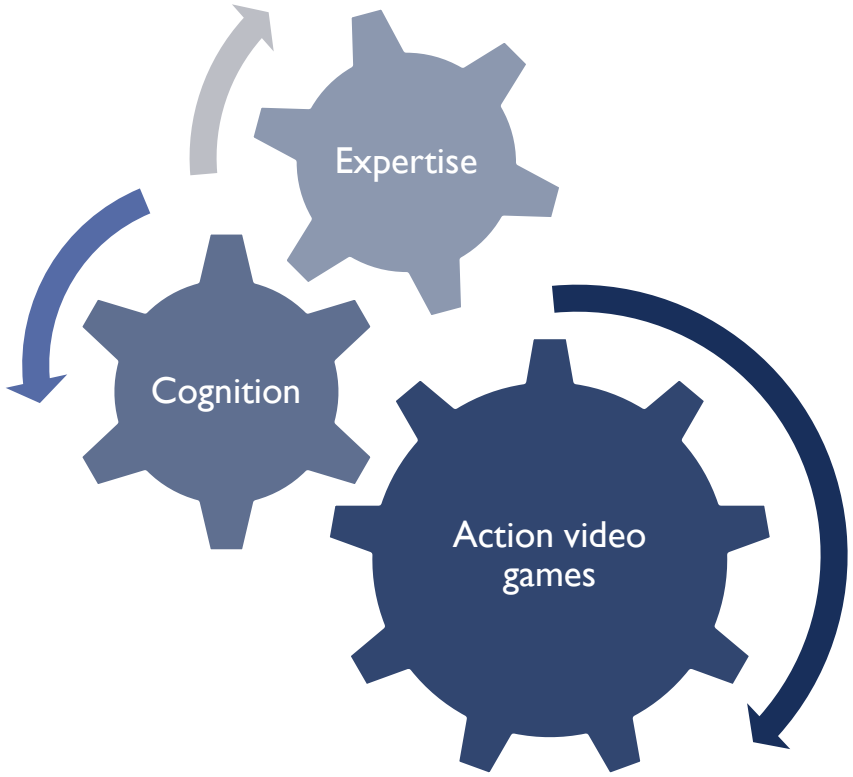
ACTION VIDEO GAMES (AVGS)



BACKGROUND

Processing Speed: general ability to process, understand and respond to information.

- Dye, Green & Bavelier (2009) and Van Ravenzwaaij et al. (2014).

Task Mixing and Switching: executive function allowing us to perform several tasks at once (mixing) and switch between them (switching).

- Cain, Landau & Shimamura (2012) and Green et al. (2012).

Stricter definitions of AVGs	Measure of AVG expertise	Larger and more diverse samples	Longer training or more expertise
Counter-Strike (CS)	How to measure expertise?	N = 250+	10 to 10,000 total hours

STUDY 1: INTERVIEWS

- **Participants:** three CS players who self-identified as being a casual, expert or professional player.
- **Player statistics:**
  - Total hours playtime: 2,000, 2,000, 10,000.
  - Weekly hours playtime: 0, 58, 100.

Measures of Expertise:

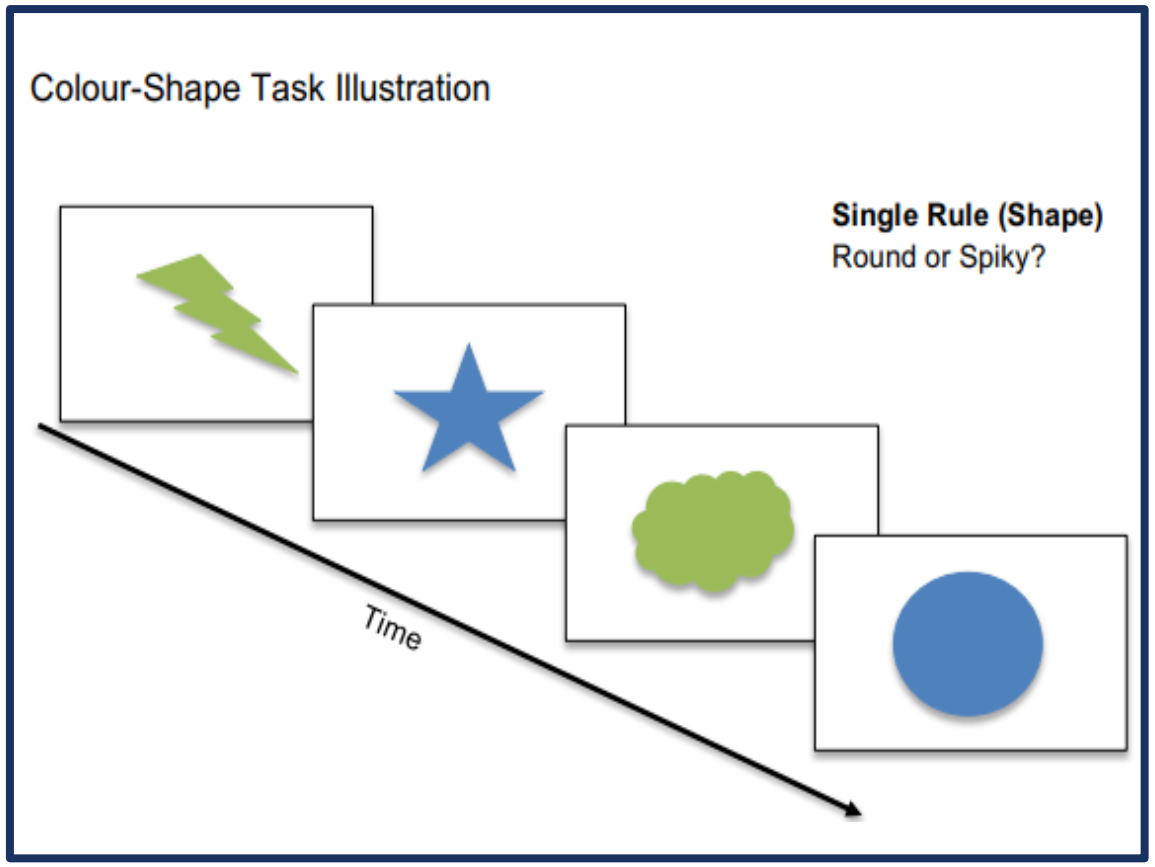
1. Total hours playtime
2. Weekly hours playtime
3. Self-rated expertise

STUDY 2: CROSS-SECTIONAL

- **Participants:** n = 273
  - 91% male, 8% female and 1% non-binary/other.
  - Age: M = 22.21, SD = 4.77.

- **Method:** online-study ≈30 minutes
  1. **Colour/shape** task via Tatool software (von Bastian, Souza & Gade, 2016) which measured cognitive outcomes.
  2. **Questionnaire** via Qualtrics software (Qualtrics, Provo, UT) measuring CS expertise and experiences.

COLOUR/SHAPE TASK



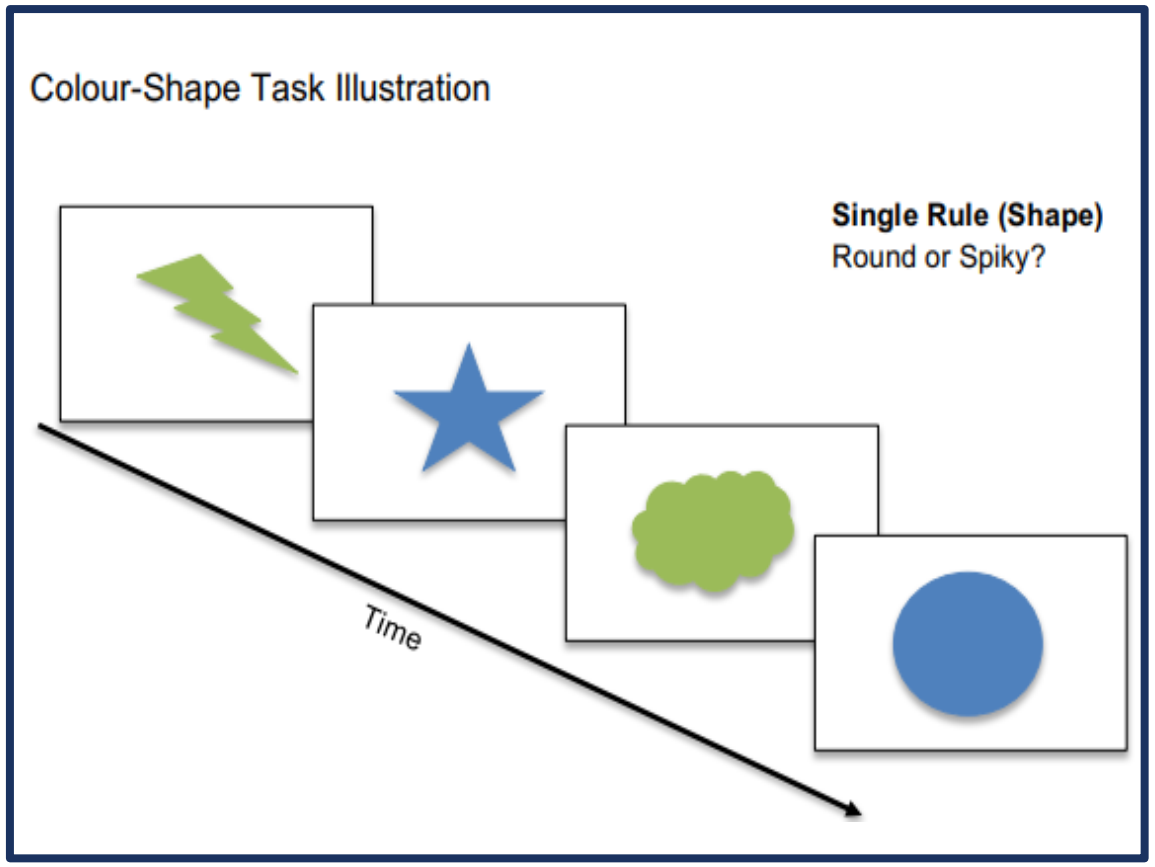
Three Blocks:

- **Single-rule 1:** shape then colour
- **Mixed-rule:** switching from shape and colour
- **Single-rule 2:** colour then shape

Within the Mixed-Rule Block:

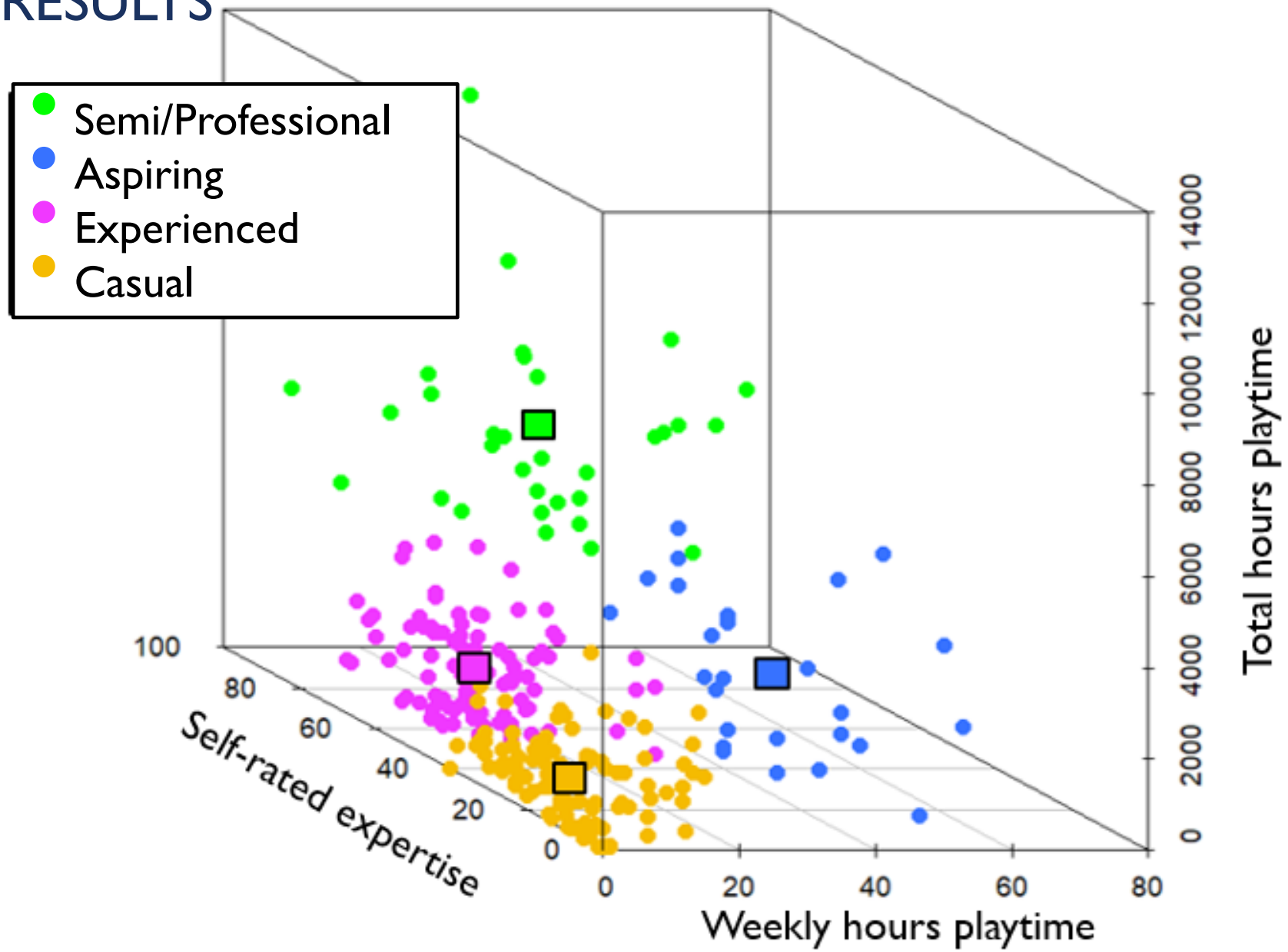
- **Repetition trials:** same rule in successive trials
- **Switch trials:** rules changed from preceding to current trial

COLOUR/SHAPE TASK

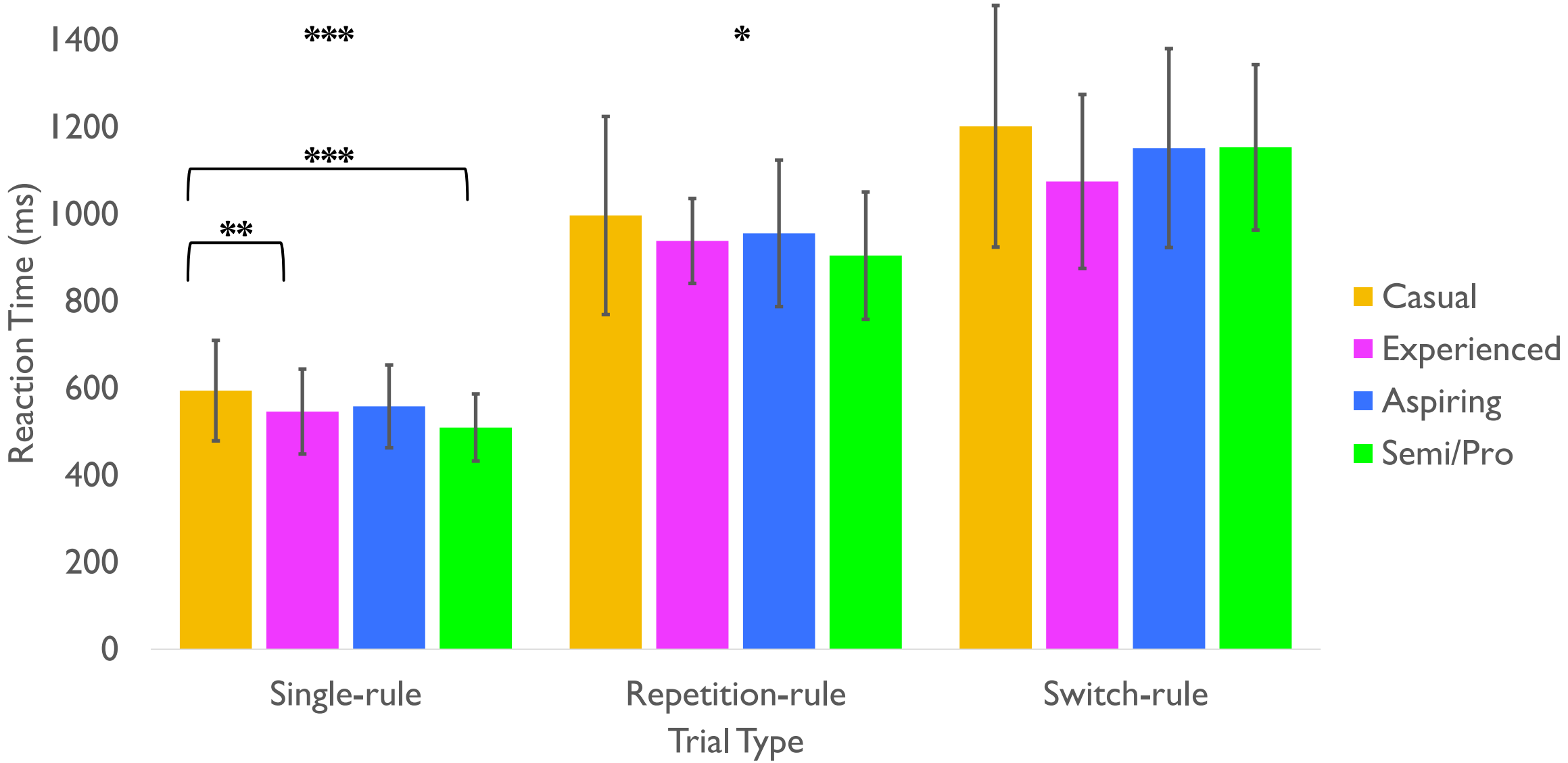


- **Processing Speeds:** average RT in single-rule trials.
- **Mixing Costs**: RT difference between single-rule trials and repetition-rule trials (mixed block).
- **Switching Costs:** RT difference between repetition-rule trials and switch-rule trials (mixed block).

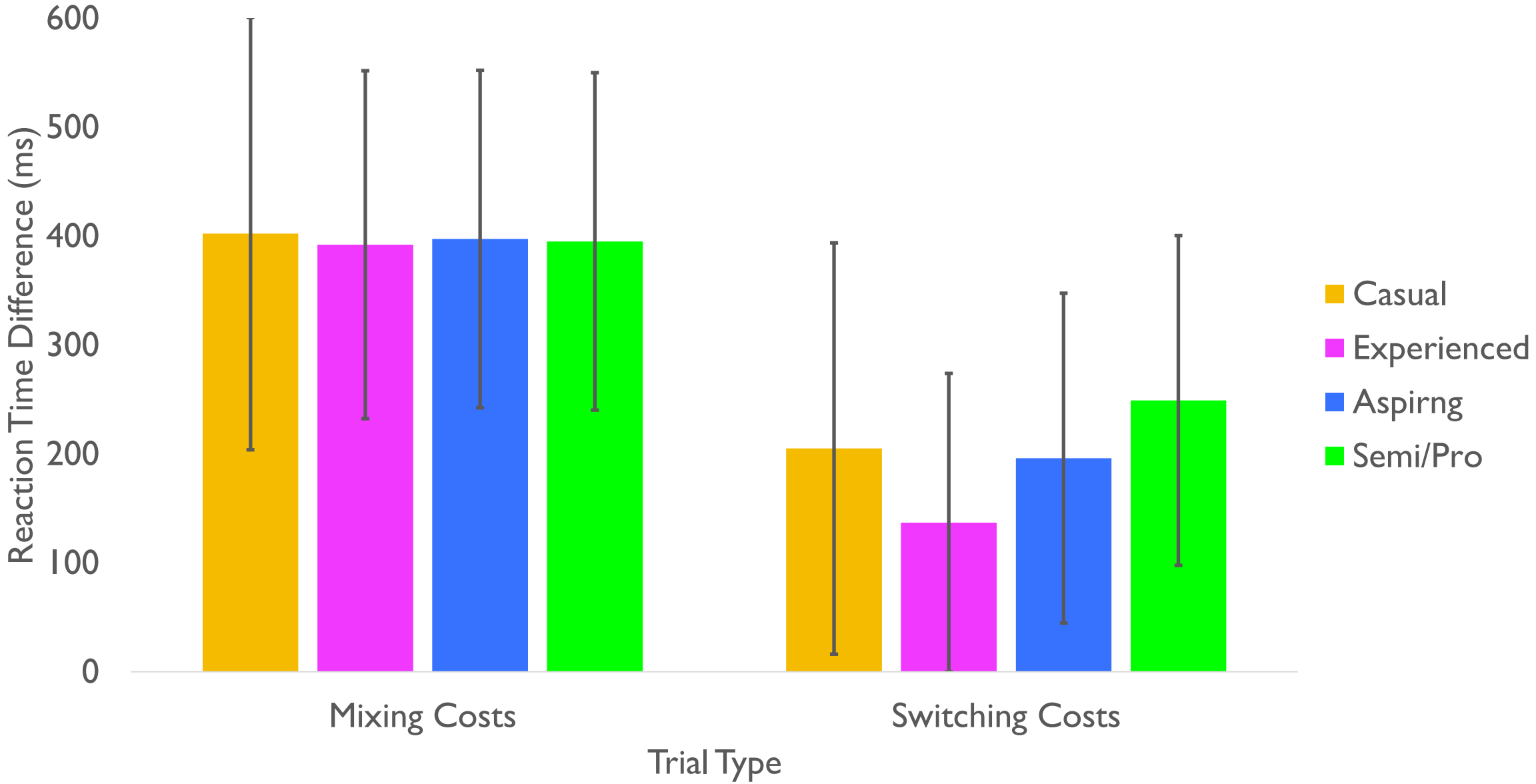
CLUSTER ANALYSIS RESULTS



MEAN SPEEDS ACROSS EXPERTISE CLUSTER GROUPS

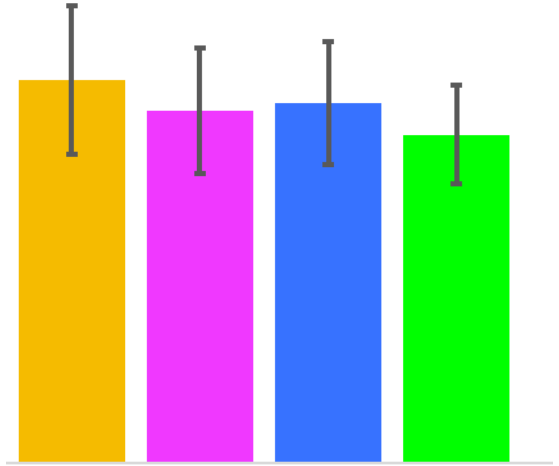


MEAN COSTS ACROSS EXPERTISE CLUSTER GROUPS



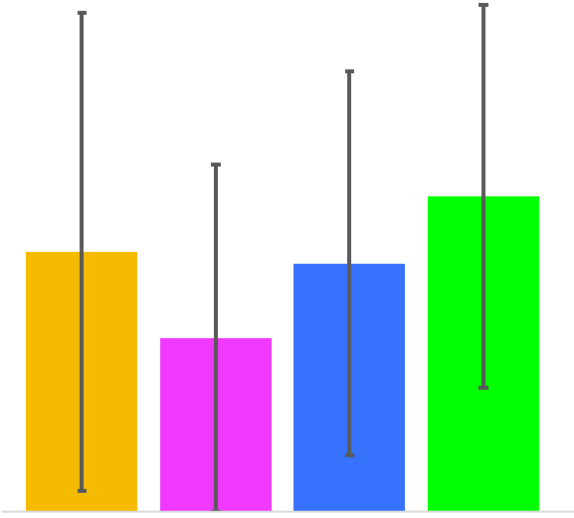
SUMMARY

- Processing speed abilities were enhanced in highly expert CS players.
  - → Supports: Dye, Green & Bavelier, 2009 and Green et al., 2012.
  - → Further Investigations: large interventions with long training periods.



Single-rule

- Mixing and switching performance was **not** enhanced in highly expert CS players.
  - → Schenk et al. (2020) eye-tracking of AVG players during a cognitive task, AVG players use different **stimulus exploration strategies.**
  - → Explanation: expert players use a **focused** attentional strategy, less expert players, use a **divided** attentional strategy.



Switching Costs

CONCLUSIONS

- Large scale cross-sectional investigation of processing speed, mixing and switching performance in varyingly expert CS players.
  - → Improved method: small samples of casual AVG players.
- Quantify CS expertise with a novel multivariable measure and k-means cluster analysis method.
  - → Applied to other well-defined AVGs in future investigations.
  - → Improvement: single measure of AVG expertise.

NEXT STEPS

- Drift Diffusion Model (DDM) on reaction time distributions (Ratcliff, 1987).
  - → Allows decomposition of observed RTs and accuracy scores into decision making processes.

- Future Study: **why** do CS players have improved processing speed performance, in terms of the 'Learning to Learn' theory and possible enhancements in probabilistic inference.

THANK YOU!

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