



# Children infer longer collective decision times in more diverse groups and in larger groups

Emory Richardson, Hannah Hok, Alex Shaw, & Frank Keil



## Motivation

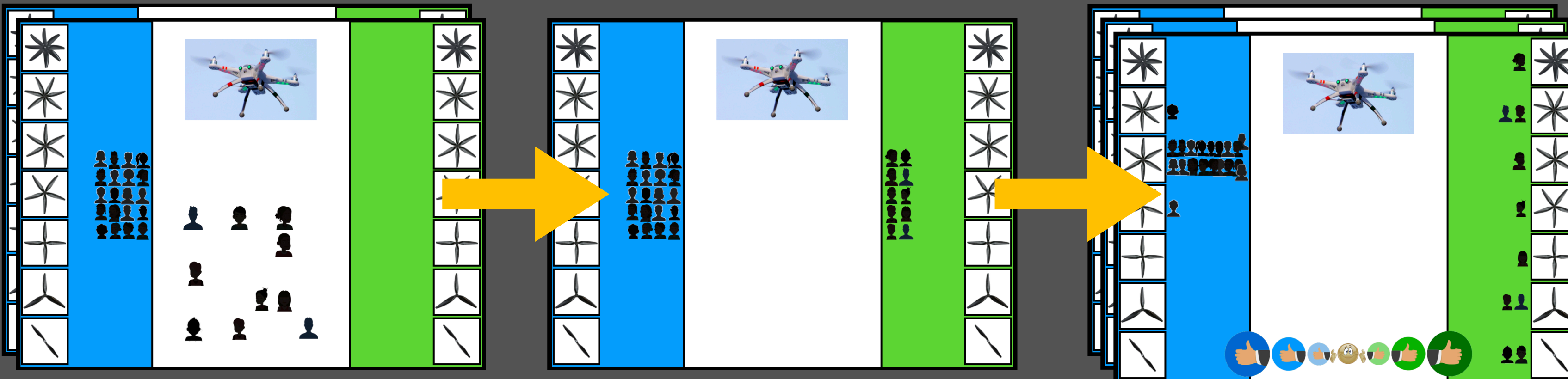
Consensus judgments and decisions are often more accurate than individuals'. However, reaching consensus incurs costs individuals don't face. One cost is that resolving disagreements between individuals takes time. The speed-accuracy tradeoffs may not always be worth the time. How do we estimate the time needed to reach consensus?

In Experiment 1, we focus on two simple cues: the number of agents in a group (size) and the number of disagreements (diversity). We predict that all ages will expect longer decision times in larger groups and more diverse groups, but will treat diversity as a stronger cue than size.

In Experiment 2, we address a potential challenge to reasoning about group size and decision time: factional power. Since collective power is a function of a faction's size relative to another faction, larger groups may have greater power imbalance between factions, but also more potential disagreements. We predict that while adults will expect longer decision times from groups with smaller differences in relative power, children will expect longer decision times from larger groups.

Zhao, X., & Kushnir, T. (2018). Young children consider individual authority and collective agreement when deciding who can change rules. *Journal of Experimental Child Psychology*, 165, 101-116.  
Heck, I. A., Bas, J., & Kinzler, K. D. (2021). Small groups lead, big groups control: Perceptions of numerical group size, power, and status across development. *Child Development*, 93(1), 194-208.  
Schmidt, M. F., Rakoczy, H., Mietzsch, T., & Tomasello, M. (2016). Young children understand the role of agreement in establishing arbitrary norms—but unanimity is key. *Child Development*, 87(2), 612-626.  
Helwig, C. C., & Kim, S. (1999). Children's evaluations of decision-making procedures in peer, family, and school contexts. *Child Development*, 70(2), 502-512.

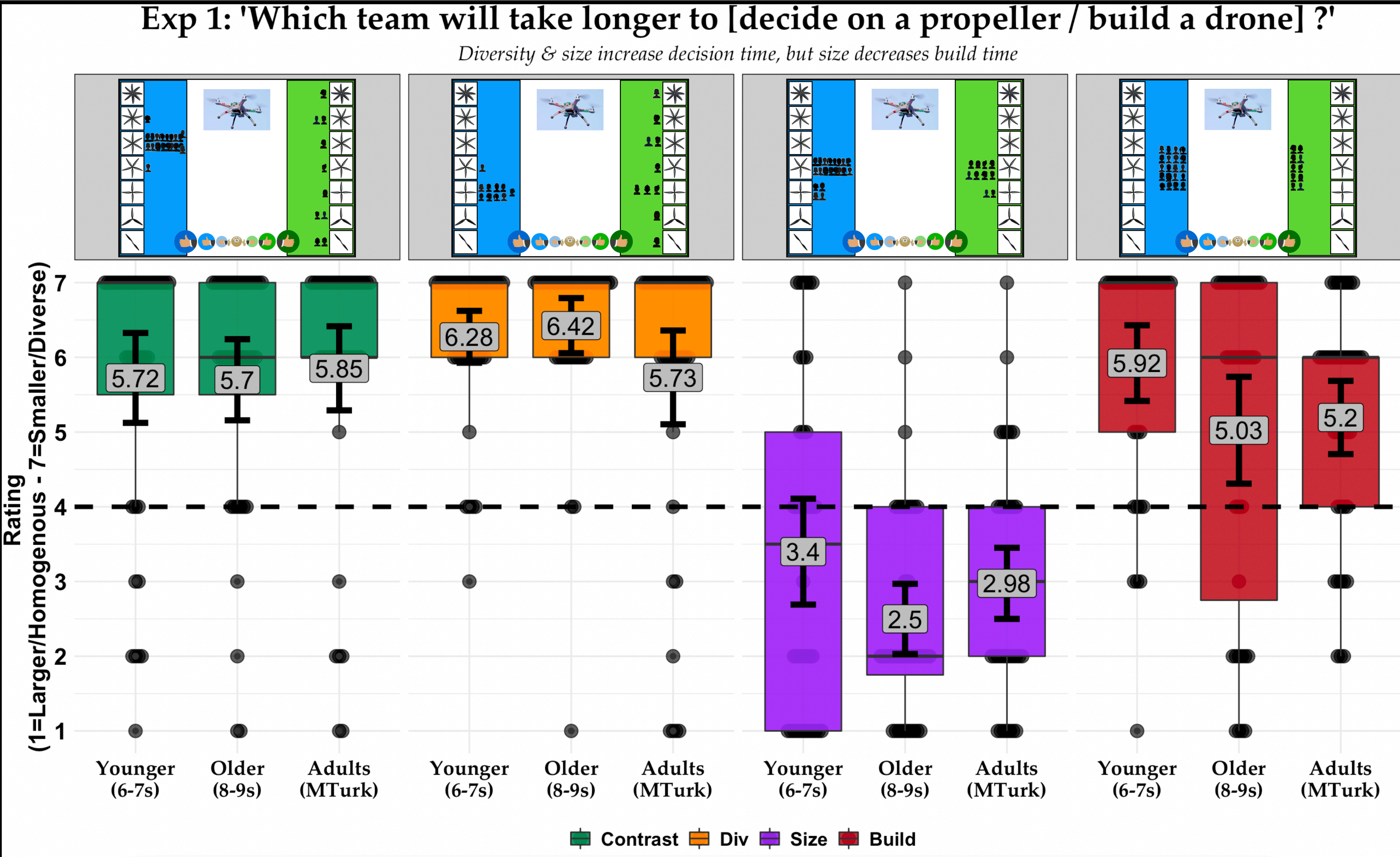
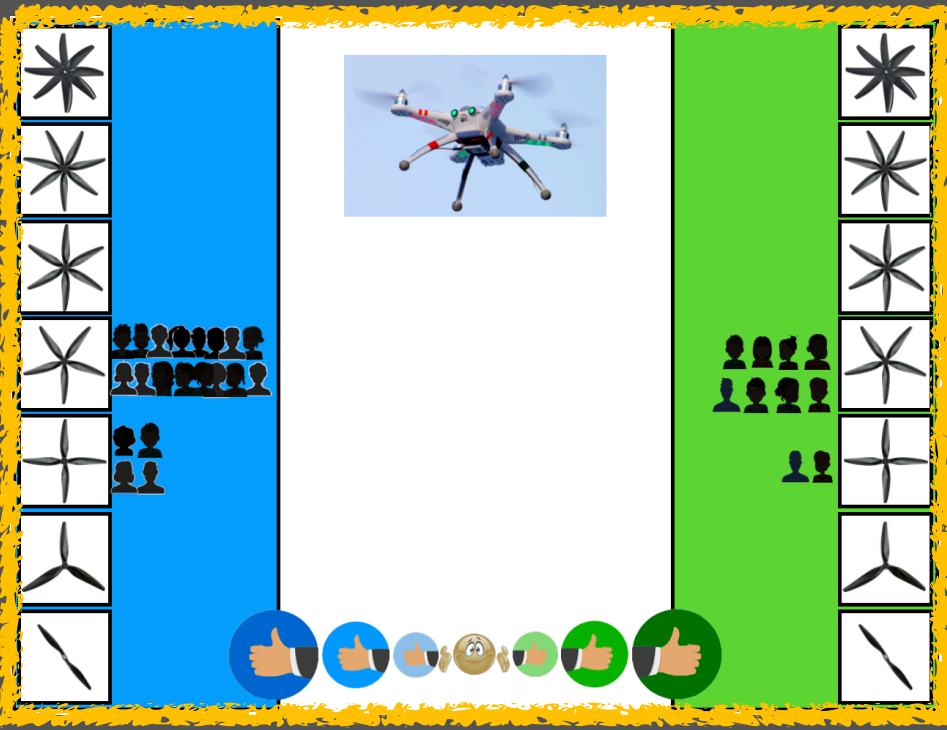
## Procedure: Exp 1



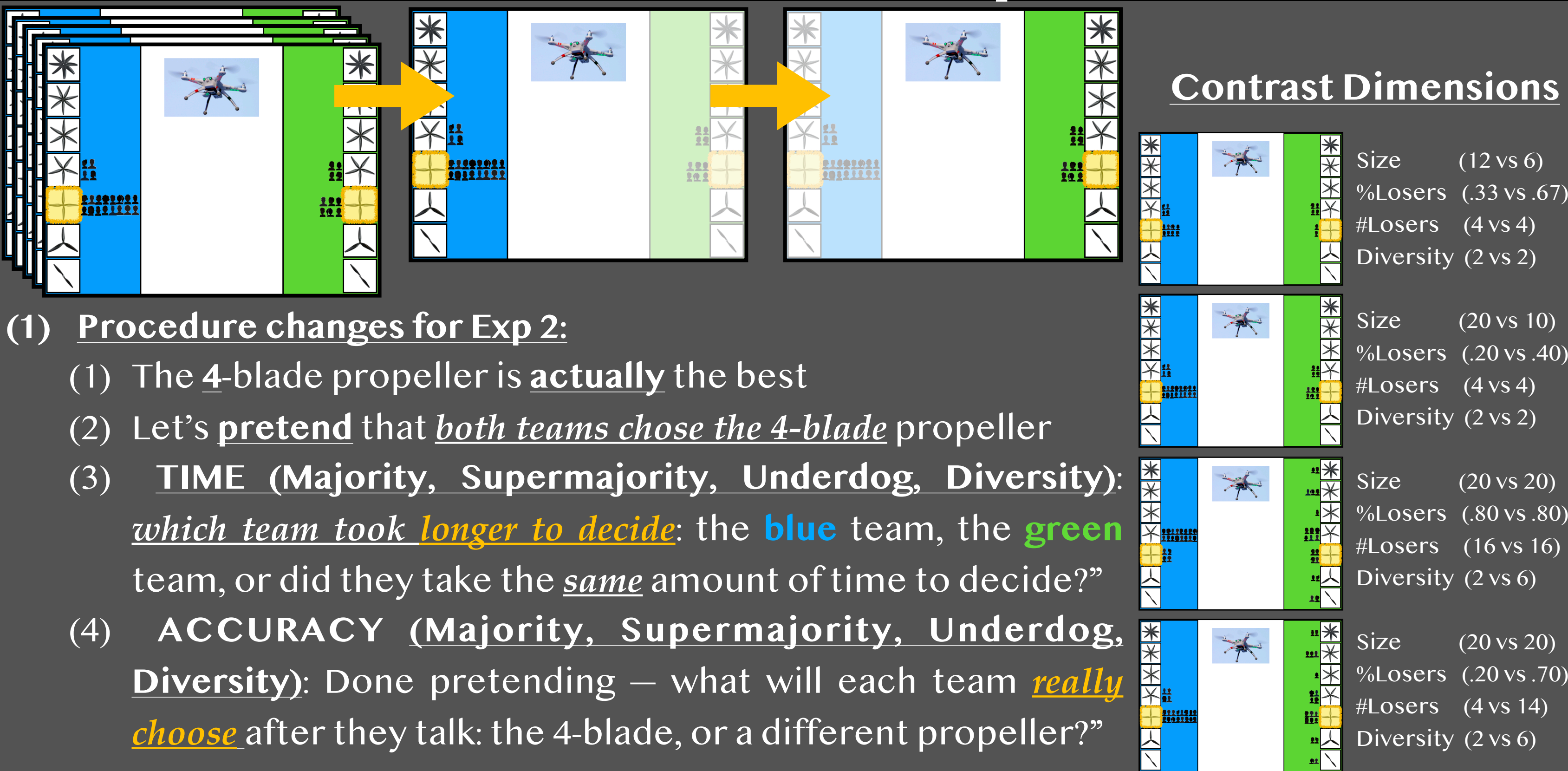
- TIME DV (Conditions: Div, Size, Contrast)**
  - Show the **number** of people on each team
  - Show what **each** person on each team **thinks** is best
  - The teammates have to talk together to decide which propeller to use
  - "But *which team will take longer to decide*: the **blue** team, the **green** team, or will they take the same amount of time to decide?" \*
- BUILD DV (Condition: Size):**
  - Show the **number** of people on each team
  - The team has **already decided** which propeller to use, so they all agree
  - Each team will start building at the **same time**
  - "But *which team will take longer to build their drone*: the **blue** team, the **green** team, or will they take the same amount of time to decide?" \*

Discussion: "Why was the Size cue weaker than Diversity cue?"

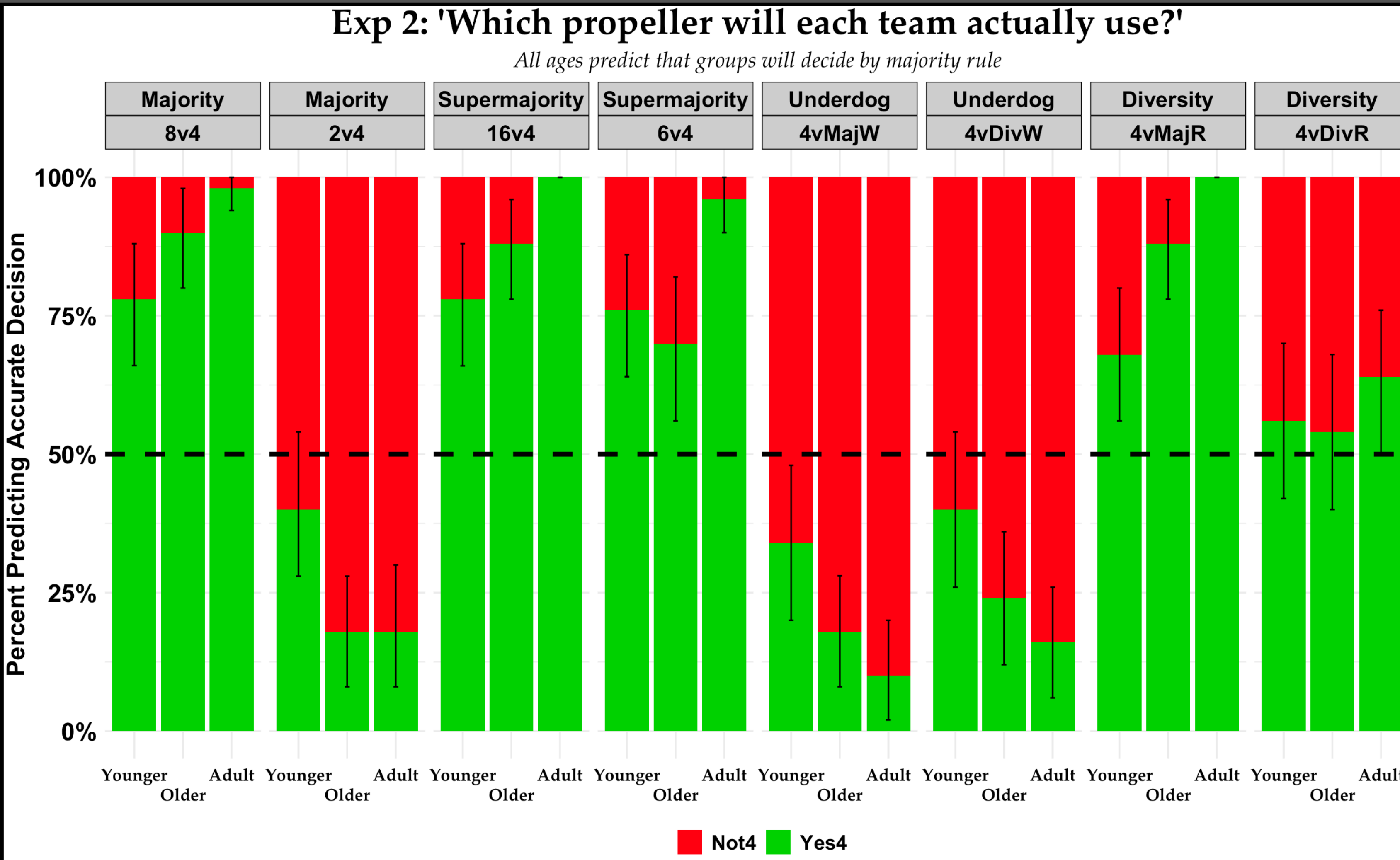
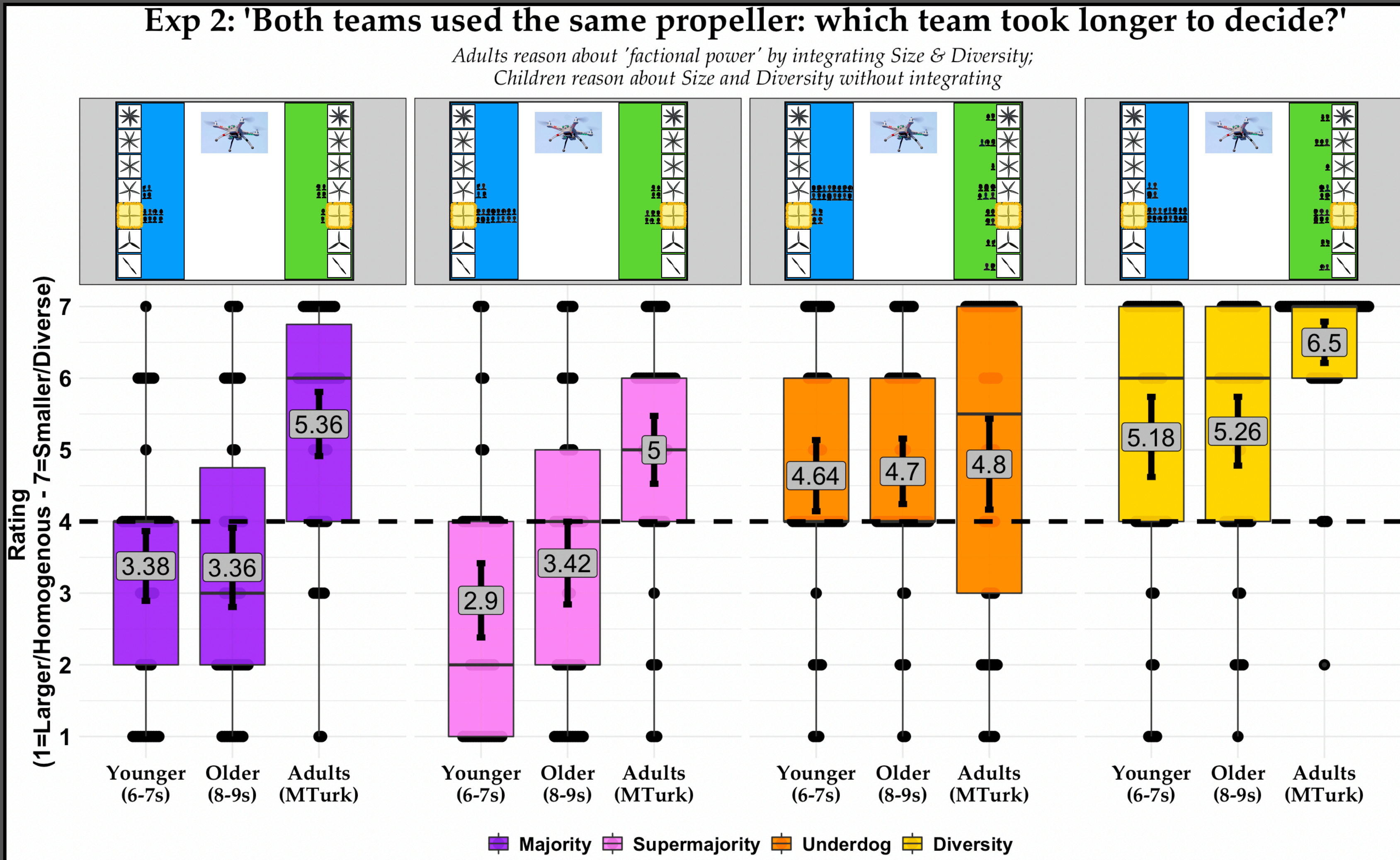
- Blue's** majority has **2x "convincers"** as **Green's**, but **Blue's** minority also has **2x "to be convinced"** as **Green's**
- Does the weaker Size cue reflect reasoning about relative power?



## Procedure: Exp 2



- Procedure changes for Exp 2:**
  - The **4-blade** propeller is **actually** the best
  - Let's **pretend** that *both teams chose the 4-blade* propeller
  - TIME (Majority, Supermajority, Underdog, Diversity):** *which team took longer to decide*: the **blue** team, the **green** team, or did they take the same amount of time to decide?"
  - ACCURACY (Majority, Supermajority, Underdog, Diversity):** Done pretending — what will each team *really choose* after they talk: the 4-blade, or a different propeller?"



## Conclusions & Questions

- By age 6-7, children infer decision times from group diversity ad group size
- Decision time inferences ≠ Physical build time inferences
- Adults may integrate size and diversity to reason about factional power
- All ages expected majority rule, but not necessarily plurality rule

Intuitions about size and diversity may help learners predict whether collaboration is worth the time before joining a group.

These intuitions may also help structure group decision-making: if agents believe that overturning a majority will be too time-consuming, they may defer to the majority decision simply to save time.

Weaker expectations of plurality rule may give groups more time to explore minority views by reducing pressure to quickly reach consensus. This may make more diverse groups more accurate; however, people did not expect an accurate minority in a diverse group to be any more likely to win over their group than an accurate minority facing an overwhelming majority.

van Leeuwen, E. J. C., Cohen, E., Collier-Baker, E., Rapold, C. J., Schäfer, M., Schütte, S., & Haun, D. B. M. (2018). The development of human social learning across seven societies. *Nature Communications*, 9(1), 2076. <https://doi.org/10.1038/s41467-018-04468-2>