

Intro to Psychology Project

Team Psycho

Hypothesis

The Stroop Effect can demonstrate the hierarchy of automaticity across different stimuli
(Direction, Movement and Sound)

Red
Blue
Green

Stroop Effect

In Psychology, the Stroop Effect is the delay in reaction time between congruent and incongruent stimuli.

Random Variables and their Measurement



Time

Time taken to respond to the given stimuli according to the task

Accuracy



The number of correct responses to the stimuli corresponding to the task

Score



Single Blindedness



The Participants are not told about stroop effect, and that the time and accuracy are measured.

Research Design



The research design chosen is within/repeated group, primarily due to the small sample size and there will be no effects from variations in individual differences between conditions



Stimuli

1. Direction
2. Movement
3. Sound

How one stimuli affects the response time for recognition of another stimuli.

We use three possible combinations of the stimuli, taken two at a time.

- 1) Movement + Direction
- 2) Direction + Sound
- 3) Movement + Sound

The task (direction/movement /sound) is identified by a colour associated with it.



If the background of the screen is Blue,
participants are supposed to respond to
Direction as a stimulus.



Movement

If the background of the screen is Red,
participants are supposed to respond to
Movement as a stimulus.

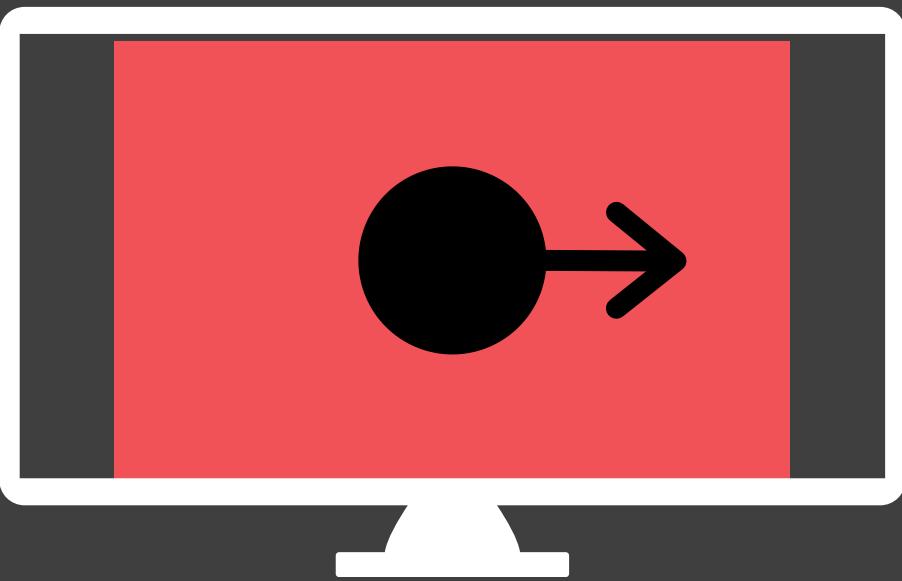


If the background of the screen is Green,
participants are supposed to respond to
Sound as a stimulus.

Neutral cases

Movement

With a red background, a black dot spawns at random locations on the screen and moves to right/ left.

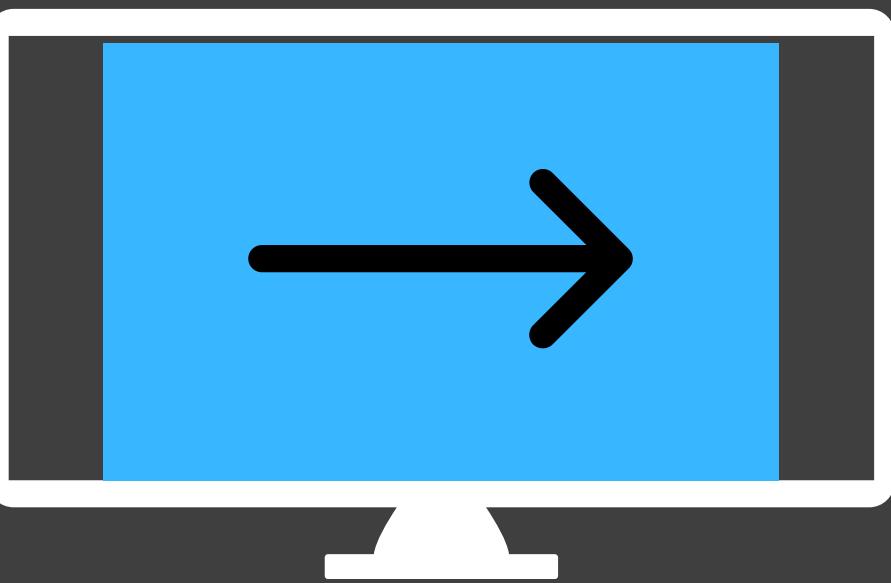


The user has to press the corresponding left/right key.

Neutral cases

Direction

With a blue background, black arrows pointing right/ left spawn at the centre of the screen.



The user has to press the corresponding left/right key.

Neutral cases

Sound

With a green background, input beep is given to the left or right ear at random.



The user has to press the corresponding left/right key.

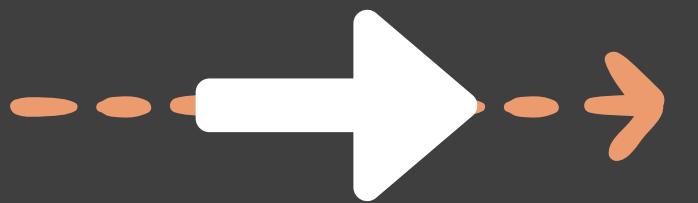


Conflict and Congruent cases

The user has to respond to the stimuli depending on the task which will be conveyed by the background of the screen.

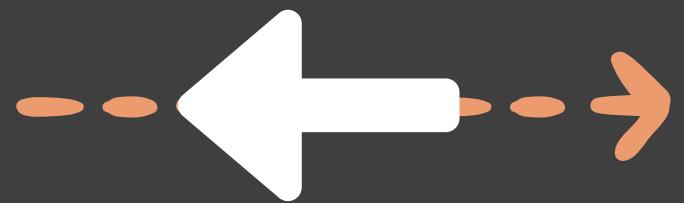
Movement + Direction

Congruent



Arrow sign spawns at random locations on the screen and moves in the direction it is pointing

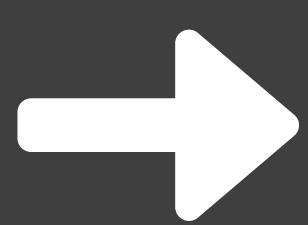
Conflict



Arrow sign spawns at random locations on the screen and moves in the opposite direction to which it points

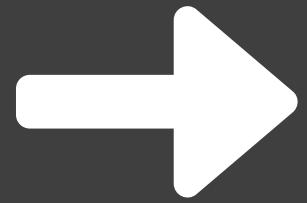
Direction + Sound

Congruent



Arrow pointing left or right spawns on the screen and a beep is given as input to the ear on the same side as of the arrow.

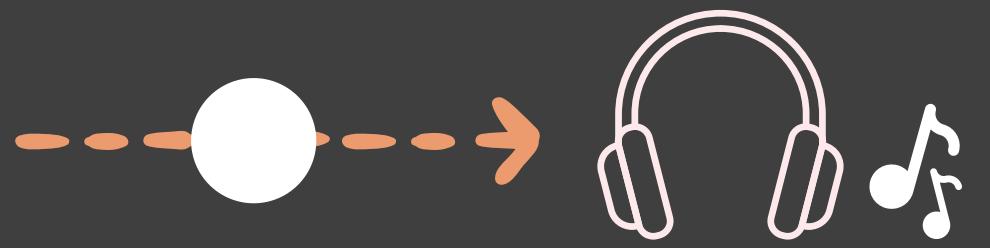
Conflict



Arrow pointing left or right spawns on the screen and a beep is given as input to the ear on the opposite side as of the arrow.

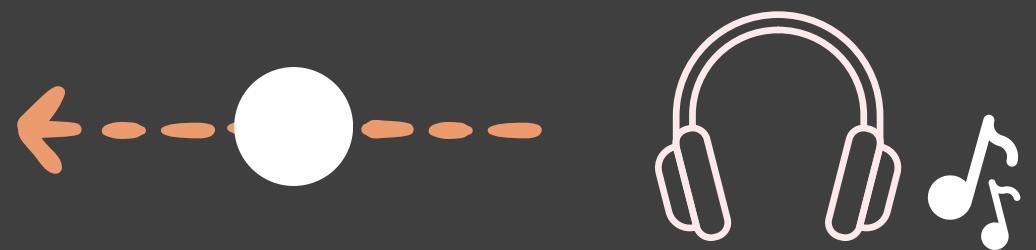
Movement + Sound

Congruent



Dot spawns at random location on the screen moving left/right and a beep is given as input to the ear on the same side as the movement.

Conflict



Dot spawns at random location on the screen moving left/right and a beep is given as input to the ear on the opposite side as the movement.

Consent Form

We are taking consent from the participants for the experiment from this form. The form contains all the details and the participants are given the choice to withdraw at any time during the experiment.



Form <https://forms.gle/mX2cQMHQgwR8PrRa8>

Predictions

The direction and movement are cognitively more related to each other than sound. The conflict in their case is expected to hamper the results more than the ones which involve sound.

Predictions

Sound > Movement > Direction

This is the ranking of the automaticity of stimuli
that we expect to get from the data that we
collect.

The Experiment

Movement

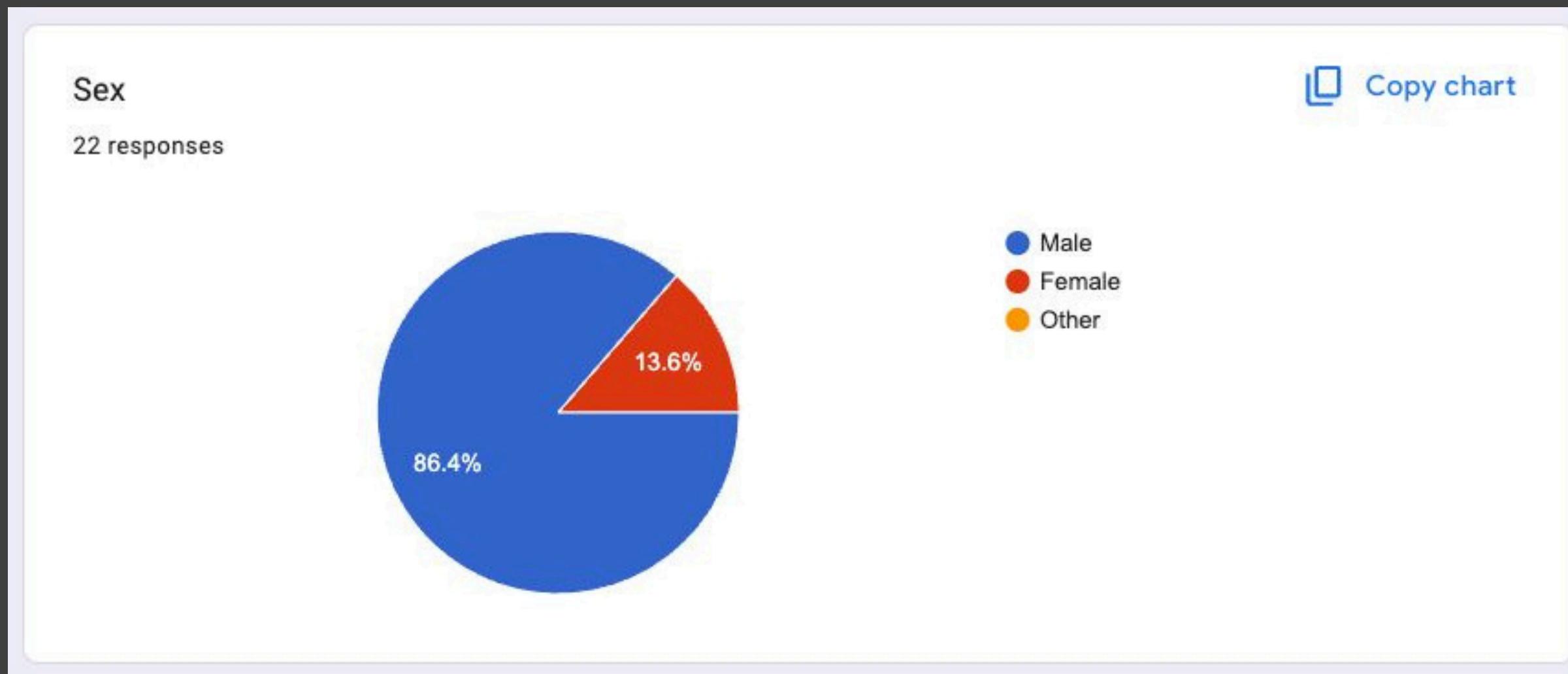
Direction

Sound

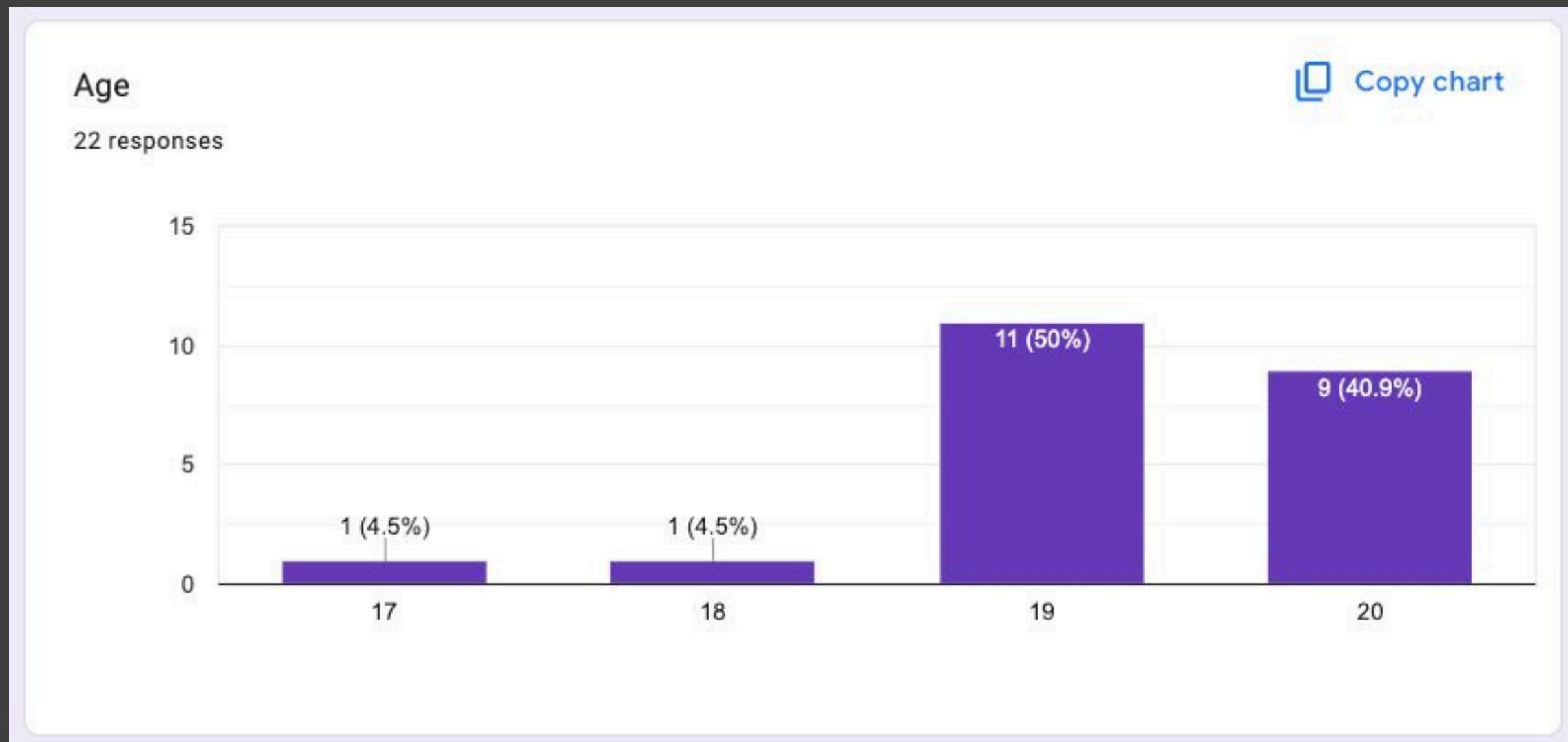
Gallery



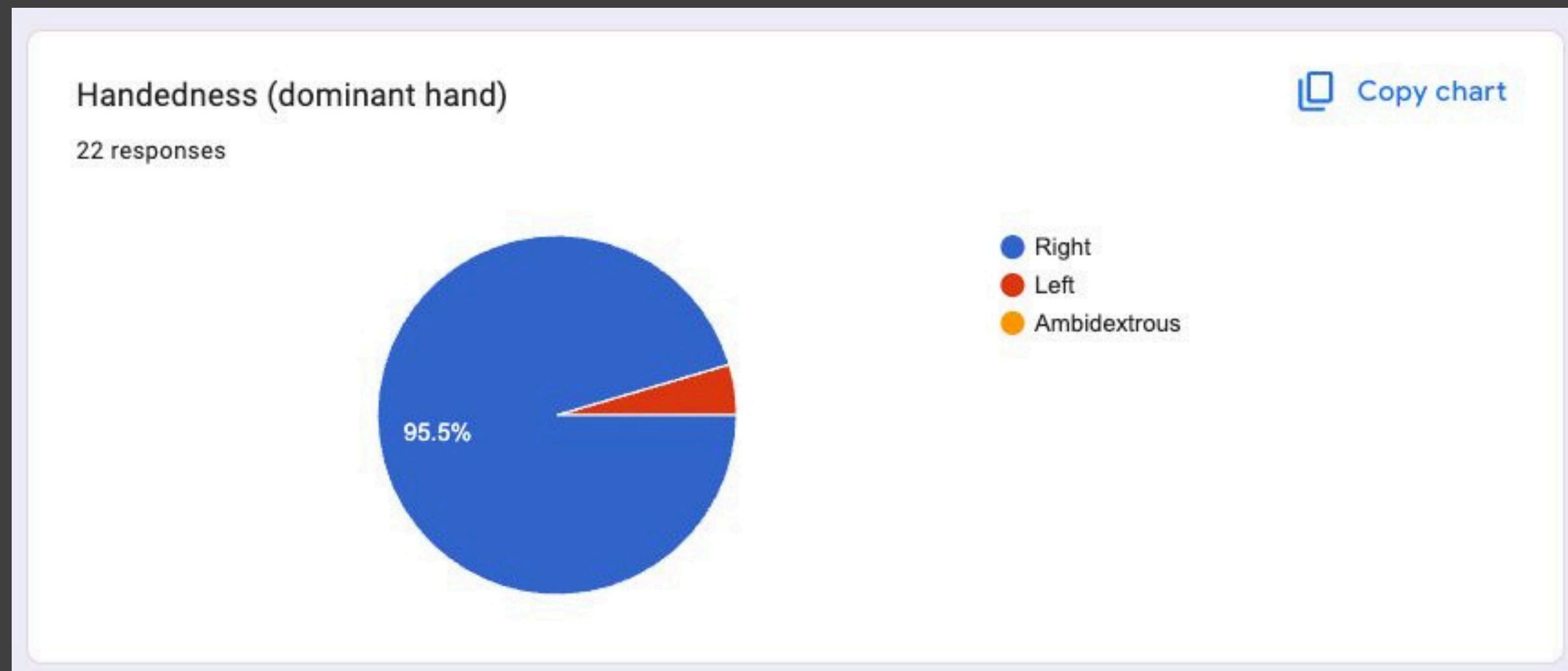
Participant Data



Participant Data



Participant Data



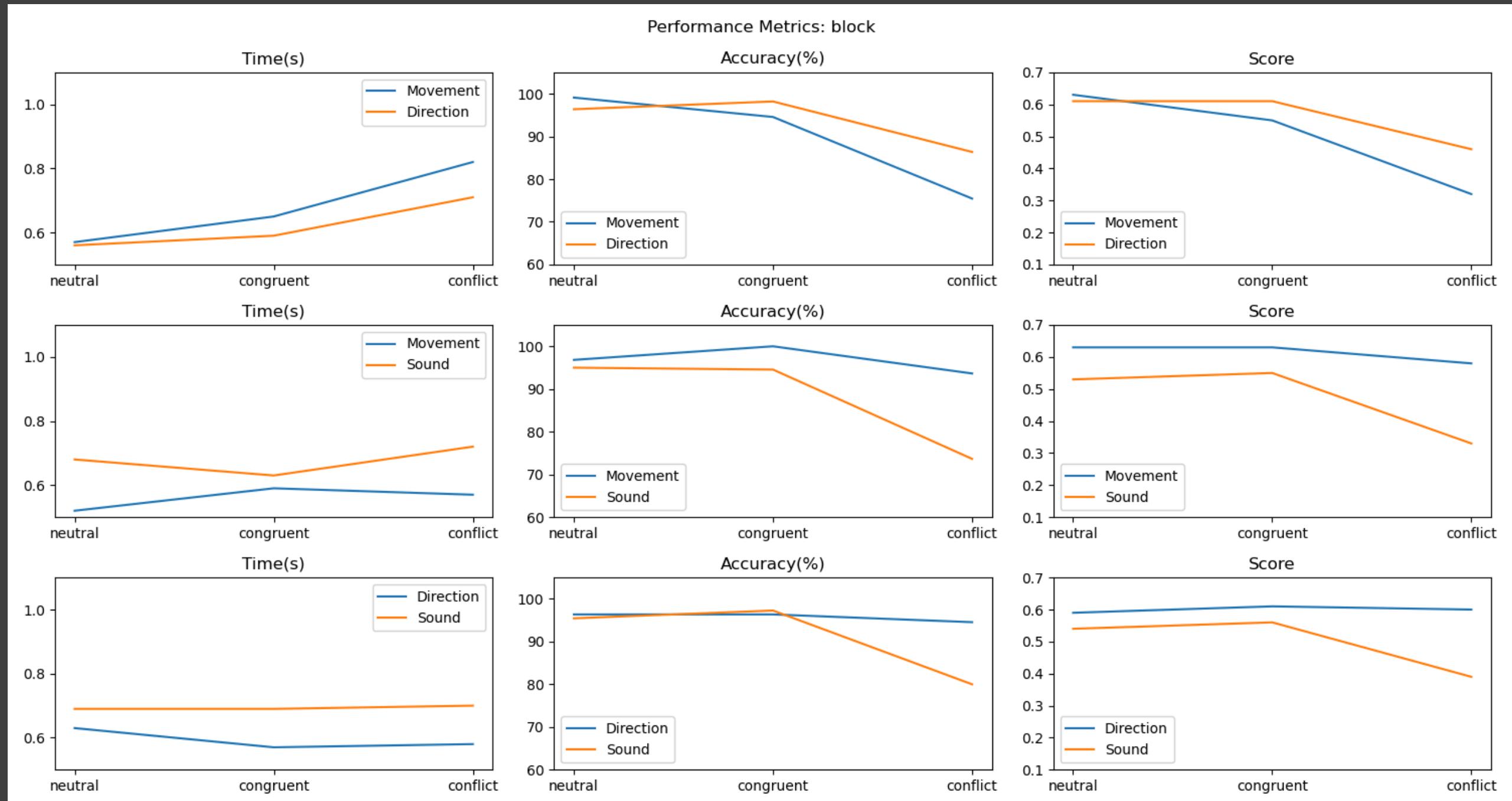
```
{'neutral': {'avg_reaction_time': {'Movement': 0.57, 'Direction': 0.56}, 'accuracy': {'Movement': 99.09, 'Direction': 96.36}, 'score': {'Movement': 0.63, 'Direction': 0.61}}, 'congruent': {'avg_reaction_time': {'Movement': 0.79, 'Direction': 0.75}, 'accuracy': {'Movement': 93.64, 'Direction': 98.18}, 'score': {'Movement': 0.49, 'Direction': 0.54}}, 'conflict': {'avg_reaction_time': {'Movement': 0.91, 'Direction': 0.86}, 'accuracy': {'Movement': 75.45, 'Direction': 88.18}, 'score': {'Movement': 0.29, 'Direction': 0.41}}}
```

Results

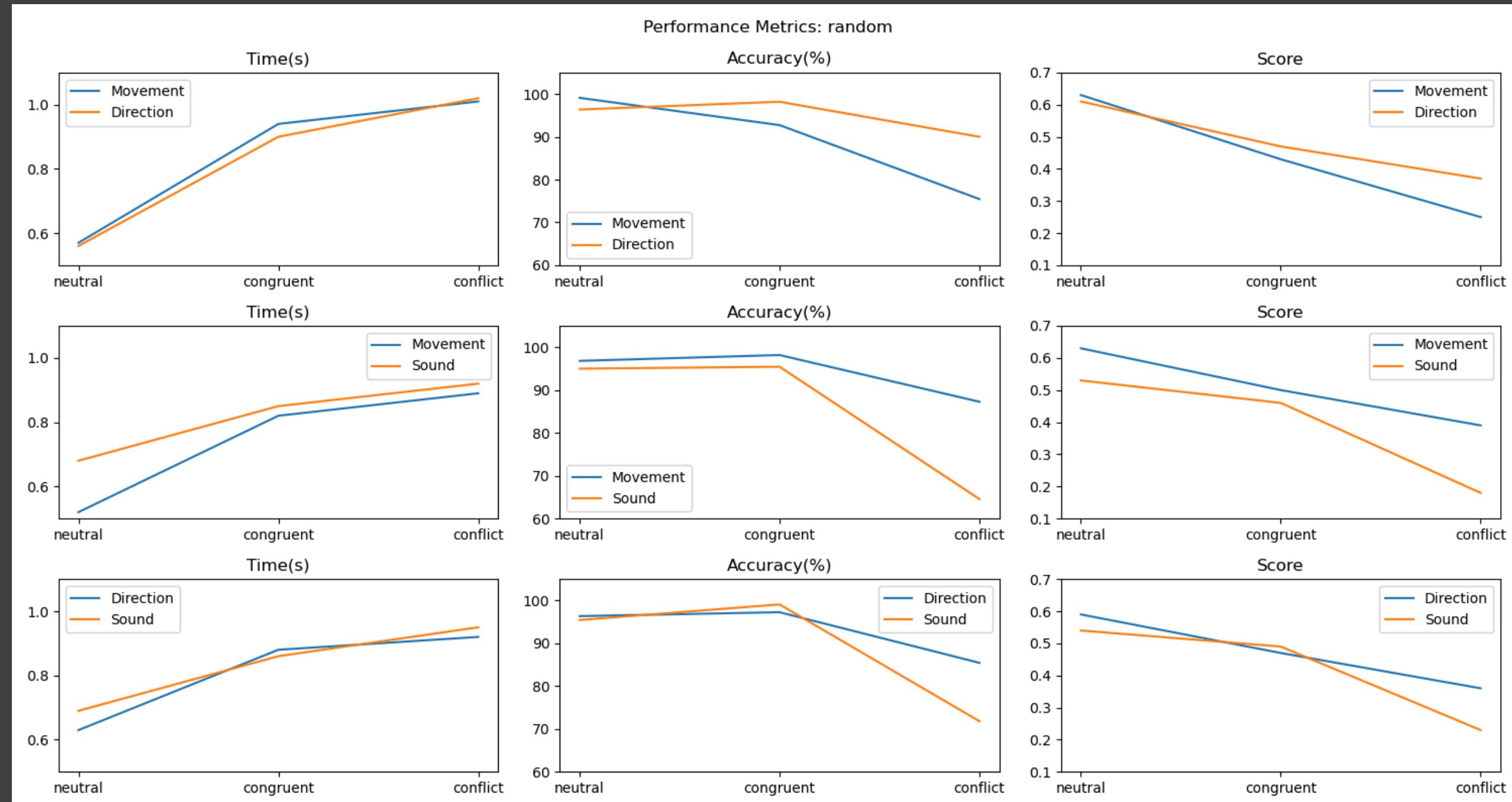
```
{'neutral': {'avg_reaction_time': {'Movement': 0.52, 'Sound': 0.68}, 'accuracy': {'Movement': 96.82, 'Sound': 95.0}, 'score': {'Movement': 0.63, 'Sound': 0.53}}, 'congruent': {'avg_reaction_time': {'Movement': 0.7, 'Sound': 0.74}, 'accuracy': {'Movement': 99.09, 'Sound': 95.0}, 'score': {'Movement': 0.57, 'Sound': 0.51}}, 'conflict': {'avg_reaction_time': {'Movement': 0.73, 'Sound': 0.82}, 'accuracy': {'Movement': 90.45, 'Sound': 69.09}, 'score': {'Movement': 0.49, 'Sound': 0.26}}}
```

```
{'neutral': {'avg_reaction_time': {'Direction': 0.63, 'Sound': 0.69}, 'accuracy': {'Direction': 96.36, 'Sound': 95.45}, 'score': {'Direction': 0.59, 'Sound': 0.54}}, 'congruent': {'avg_reaction_time': {'Direction': 0.73, 'Sound': 0.78}, 'accuracy': {'Direction': 96.82, 'Sound': 98.18}, 'score': {'Direction': 0.54, 'Sound': 0.53}}, 'conflict': {'avg_reaction_time': {'Direction': 0.75, 'Sound': 0.83}, 'accuracy': {'Direction': 90.0, 'Sound': 75.91}, 'score': {'Direction': 0.48, 'Sound': 0.31}}}
```

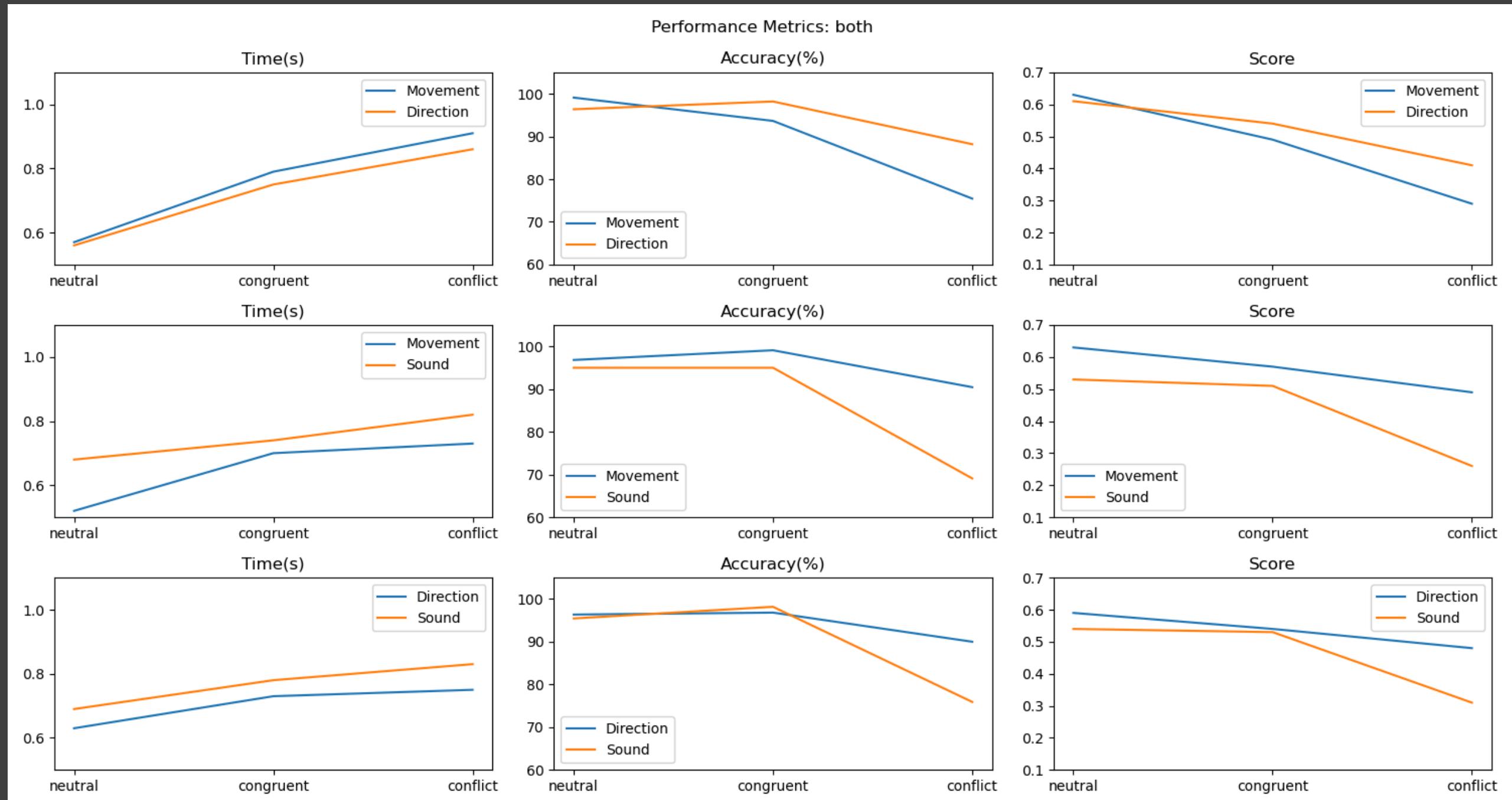
Stroop (Block)



Random



Combined



Observations

Direction > Movement > Sound

LoL

Analysis

Based on our understanding of cognitive processes
and interpretation of the data collected ...

Analysis

- Movement takes more time and gives less accuracy than direction because direction can be instantaneously recognized by just looking at the arrowhead. In contrast, movement requires observing how the position changes over time to understand where it is heading, which involves more processing.

Analysis

- Sound takes longer response time and has less accuracy because the task starts with a visual input (like the color green), which the brain processes first. Then, attention shifts to the sound through the auditory senses, adding extra steps. This delay and additional processing reduce speed and accuracy in responding to the sound.

Code base

We have built the experimental setup from scratch using pygame. The collected data has been logged well, for detailed analysis.

Github <https://github.com/gerameet/PsYcho>

Thank you :)

Meet Gera 2022102039

Abhinav Raundhal 2022101089

Soham Vaishnav 2022112002

Team Psycho