

# Location Masking Stimuli on Perceived Centroid

Ngoc Hoang My Bui  
Advisor: Dr. Charles E. Wright

## Background

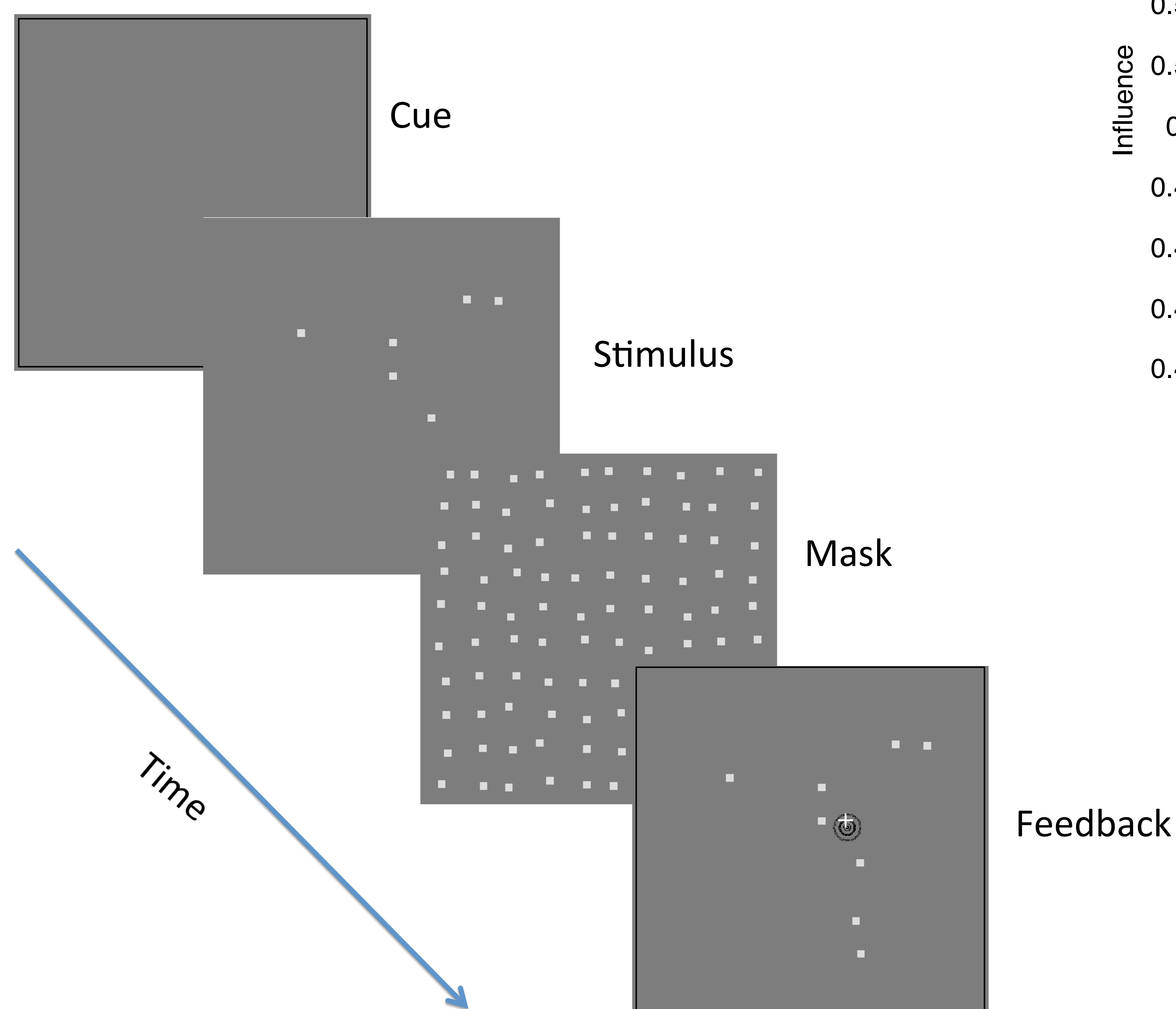
- The ability of people to attend to particular features is called feature-based attention.
- The centroid paradigm is a tool to study feature-based attention.
- Masking is commonly used as part of the centroid paradigm with the idea that it limits access to external visual information without changing it.

## Aims

- This experiment investigates whether mask elements change the perceived location of stimulus elements.
- Specifically, we hypothesized that
  - **Aligned stimuli** – i.e. those presented at the same location as a subsequent mask element – should be perceived accurately.
  - **Displaced stimuli** – i.e., those presented near the location of a subsequent mask element – might be perceived as if they were pulled toward the location of the subsequent mask element.

## Experiment

- 3 participants
- Centroid task
  - View stimuli – little white squares
  - In different sessions, the mask appears after a SOA (stimulus onset asynchrony): 83 ms, 116 ms, 166 ms, or 233 ms
  - Participant moves the mouse to the perceived centroid of the stimulus cloud
  - Feedback display shows the stimuli, the true centroid, and the perceived centroid
- Four stimulus conditions, varied across trials
  - 1 aligned stimulus
  - 1 displaced stimulus
  - 8 aligned stimuli
  - 8 stimuli: 4 aligned and 4 displaced
- Displaced stimuli
  - Were displaced by 10 pixels from the location of a mask element
  - On each trial, all displaced stimuli were displaced in a single direction chosen randomly for that trial



## Results

### Response Error

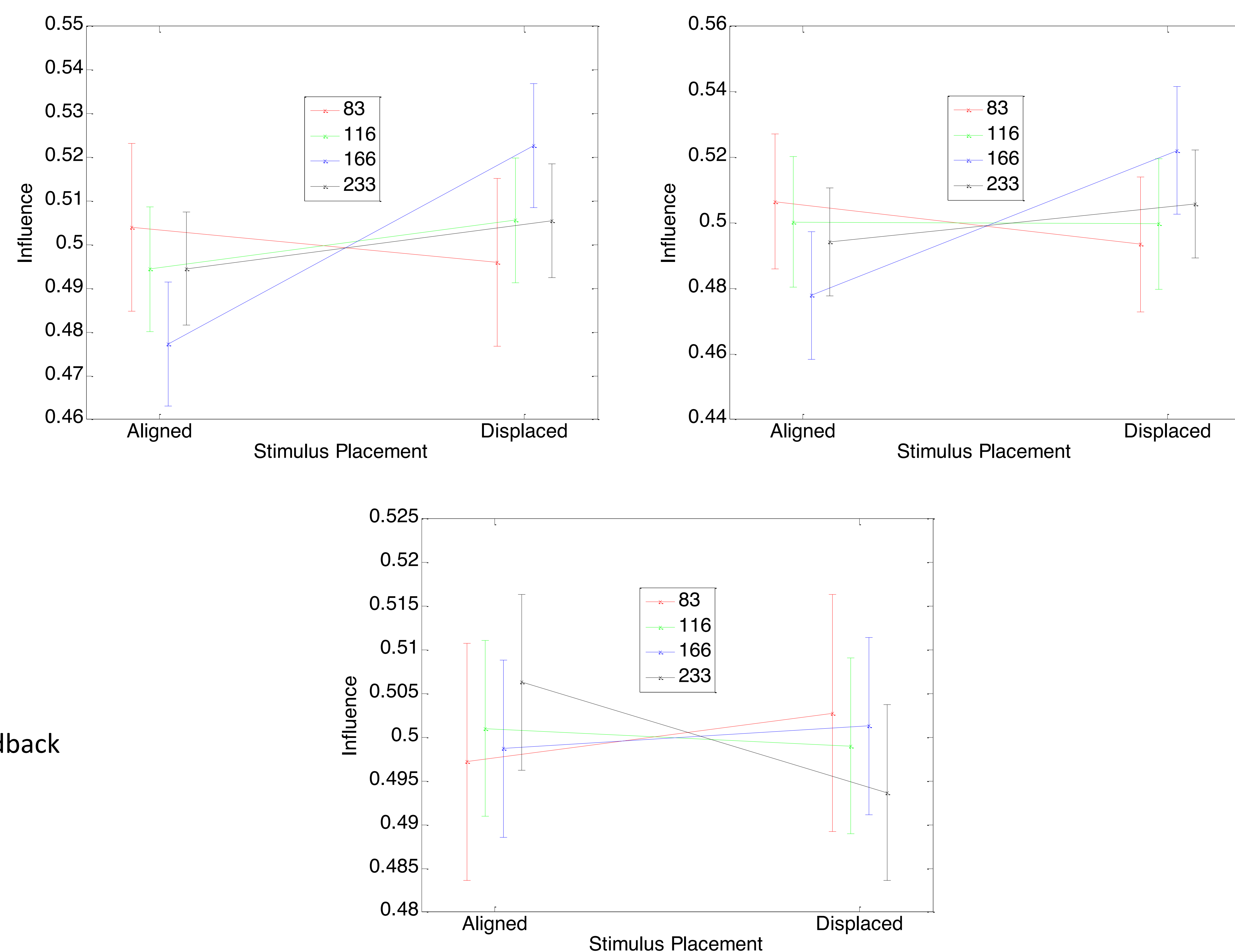
- Response error is the distance between the perceived centroid and the actual centroid
- For trials with displaced stimuli, if those stimuli were perceived at the location of the nearest subsequent mask element, then we would expect response error to increase compared with that for trials with no displaced stimuli.
- Since stimuli were displaced by 10 pixels
  - On trials with 1 stimulus, the maximum response error increase would be 10 pixels
  - On trials with 8 stimuli, the maximum response error increase would be 5 pixels
- The table below summarizes these results for all three participants

### Response error difference: condition with displaced stimuli minus condition with all aligned stimuli

SOA	1 Stimulus				8 Stimuli			
	P1	P2	P3	Mean	P1	P2	P3	Mean
83 ms	-2.0	-11.6	0.5	-4.4	-1.9	1.2	-0.6	-0.4
116 ms	-2.0	-3.5	1.0	-1.5	0.4	-0.6	0.1	0.0
166 ms	-1.0	-3.0	-4.5	-2.8	-1.3	1.5	-0.2	0.0
233 ms	-2.0	-3.0	-8.0	-4.3	1.9	-1.8	-0.6	-0.2

### Influence of the Aligned and Displaced Stimuli

- For the trials with 8 stimuli, 4 aligned and 4 displaced, we can compute the relative influence of the aligned and the displaced stimuli on the reported centroids
- If our hypothesis is correct, displaced stimuli should have less influence than aligned stimuli.
- The figures below shows summaries of this analysis for all three participants.



## Conclusion

- Contrary to our hypothesis, response error with 8 stimuli was close to zero across conditions, suggesting that the mask did not change the perceived location of the stimuli.
- The influence analysis echoes this conclusion.
- On trials with a single stimulus, the response error was actually smaller when the stimulus was displaced. This might be because aligned stimuli are missed more often and, with only a single stimulus, if the stimulus is missed all the participant can do is guess.

### Acknowledgment

Thanks to the members of the Chubb-Wright lab for their support.