Fear-Inducing Stimuli and Emotion-Induced Blindness

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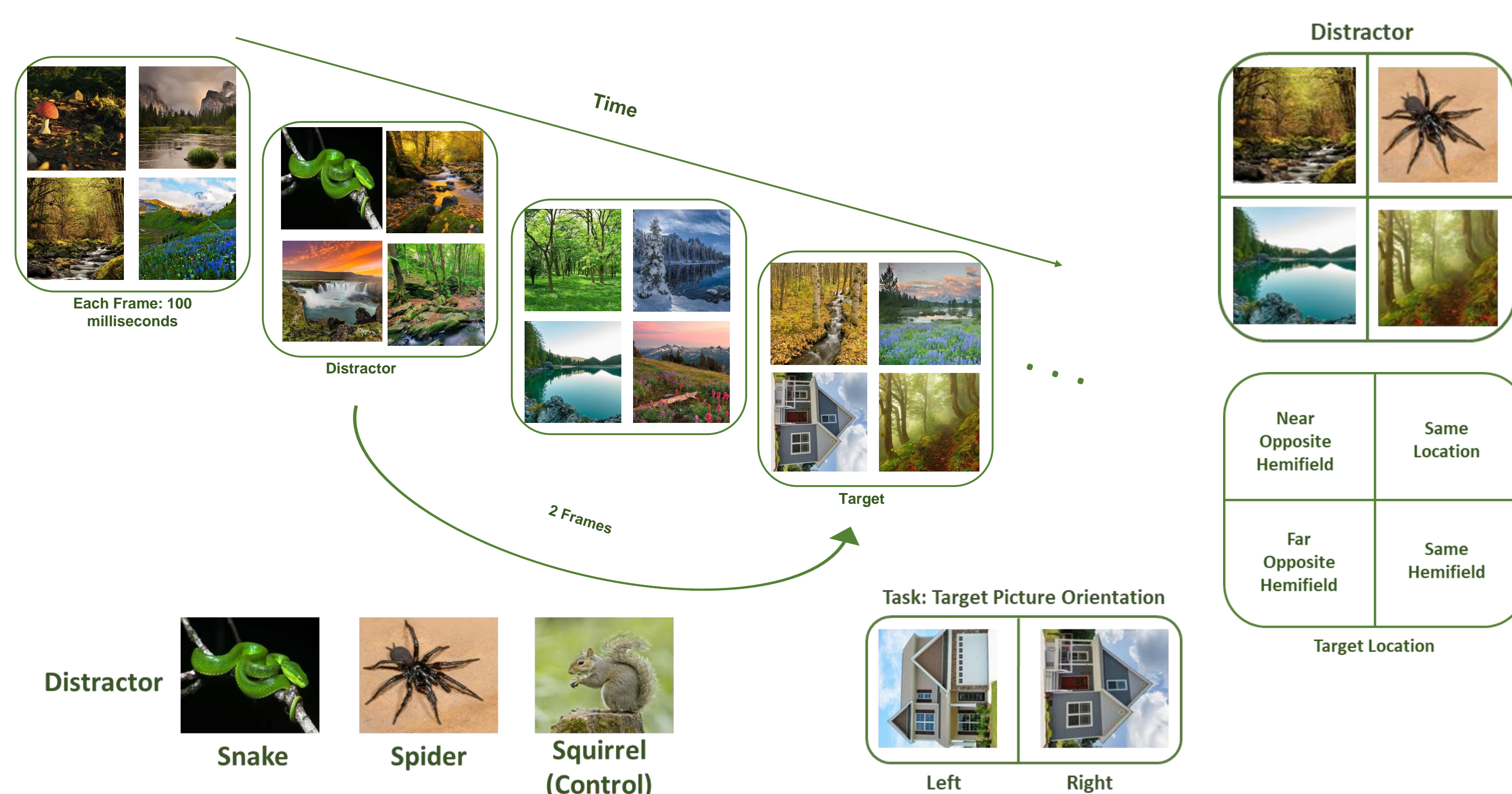SUNY Geneseo, Department of Psychology

Background:

- Most et al. (2005) introduced the Emotion-Induced Blindness (EIB) task. The EIB task uses a rapid serial visual presentation (RSVP) of pictures. Participants must identify key features of a target picture (e.g., orientation, color, content) amongst distractor and filler pictures.

- Emotion-Induced Blindness occurs when visual processing of the target is impaired following an emotionally salient distractor picture.

- Most & Wang (2011) used a 2 stream (top and bottom) RSVP EIB task. Participants had to identify orientation of the target picture (an architectural scene), which could appear in the same stream, or the opposite stream, relative to an emotionally salient distractor (depictions of medical or interpersonal trauma).

- Most & Wang (2011) found that emotionally salient distractors impaired processing more when the target and distractor were presented in the same stream as opposed to opposite streams.

- Most & Wang (2011) proposed that when an emotionally salient distractor captures attention, it recruits visual processing resources from neighboring locations for an extended period of time. This prioritized processing of the emotionally salient stimulus's ability to process competing stimuli in close spatial or temporal proximity to the distractor.

- If Most & Wang's (2011) explanation for EIB (i.e., based on spatially localized attentional competition) is correct, then this competition should be stronger within the same visual field compared to the opposite visual field (Mounts & Gavett, 2004). This is because the receptive fields of most visually responsive neurons are restricted to one visual field or the other.

- In the current experiment, we use a 4 stream (as opposed to Most & Wang's 2 stream) EIB task, and we utilized fear-relevant stimuli (spiders, snakes) for the emotionally salient distractors, and fear-neutral stimuli (squirrels) as a control distractor.

- Kawai (2019) found that snakes capture and hold attention more than spiders do, despite both being fear-relevant stimuli. Their Snake Detection Theory (SDT) holds that snakes have been a threat throughout human evolution, so we have evolved special detection mechanisms for this threat.

- The studies reviewed above suggest that when snakes appear as the distractor, they should inhibit target processing more strongly than do spiders or squirrels, and this effect should be more pronounced within the same visual field compared to the opposite visual field

Methods:

- The subjects were 113 SUNY Geneseo students who received extra credit through the SUNY Geneseo Psychology Department's participant pool. Two subjects were dropped from analysis due to a performance that was at or below chance levels.
- The subjects first completed a questionnaire that asked questions about their fear and overall anxiety for snakes, spiders, and squirrels. Then, they completed a practice phase that consisted of 12 trials in which they learned to identify the target pictures. Then, they completed the actual experiment that included distractor pictures. The experiment phase consisted of 8 blocks of 28 trials.
- The participant's task was to find the picture of a house within a stream of landscape images and determine whether the house was rotated to the left or right.
- On distractor trials, a picture of either a snake, spider, or squirrel was presented two frames before the target picture. On baseline trials, no distractor was present
- The squirrel pictures were used as a non-threatening control distractor, while the snake and spider pictures were fear-inducing stimuli.
- The distractor and target pictures appeared at each location equally often, and thus could appear in the same location, same hemifield, near opposite hemifield, or far opposite hemifield.
- Overall, this experiment took around 35 minutes to complete.

Results:

For each subject, we subtracted target accuracy rates for each combination of distractor type and relative location from the baseline condition (no distractor). A 4 (Relative Location) X 3 (Distractor Type) Repeated-Measures ANOVA was performed on these difference scores.
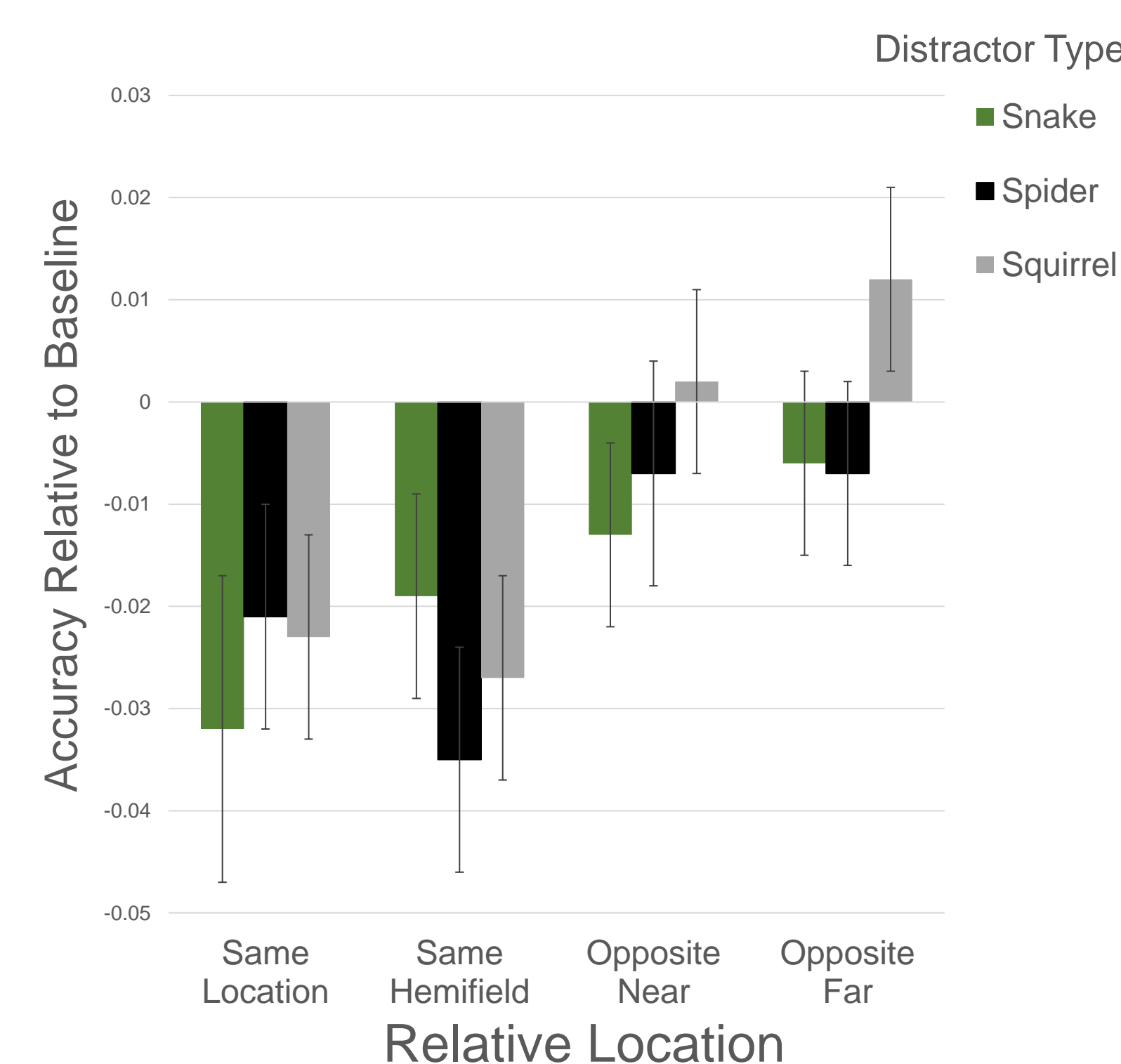
The ANOVA revealed:
- A main effect of Relative Location: F(3,330) = 4.118, p = .007
- No main effect of Distractor Type: F(2,220) = .108, p = .898
- No interaction between Distractor Type and Relative Location: F(6,660) = .732, p = .624

Follow-up t-tests revealed:
- Performance between the Same and Opposite Hemifield conditions were statistically different from one another.
- There was no statistical difference between the pair of Same Hemifield conditions, nor was there a difference between the pair of Different Hemifield conditions.

Analyses including the effect of fear level for specific distractor types revealed no main effects of fear level and no interactions between fear level and the relative location of the target and distractor

Implications:

- Distractors preceding the target led to diminished target identification performance.

- As in Most & Wang (2011), this interference was spatially localized.

- This interference was most pronounced for locations within the same hemifield, consistent with attentional competition for visual processing resources (Mounts & Gavett, 2004).

- Contrary to the predictions of SDT, snake distractors did not lead to greater interference.

- Contrary to previous studies finding greater interference for emotional pictures, there was no difference between threatening and non-threatening animal distractors. This suggests that it was the novelty of the animal distractors that captured attention in this task, not their perceived threat.

References:

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