Be(a)ware of my environment: The effect of threat on attentional control and inattentional blindness

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The effect of threat on attentional control and inattentional blindness

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Symposium: Matthias GOBEL & Alice NORMAND

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EASP EUROPEAN ASSOCIATION OF SOCIAL PSYCHOLOGY

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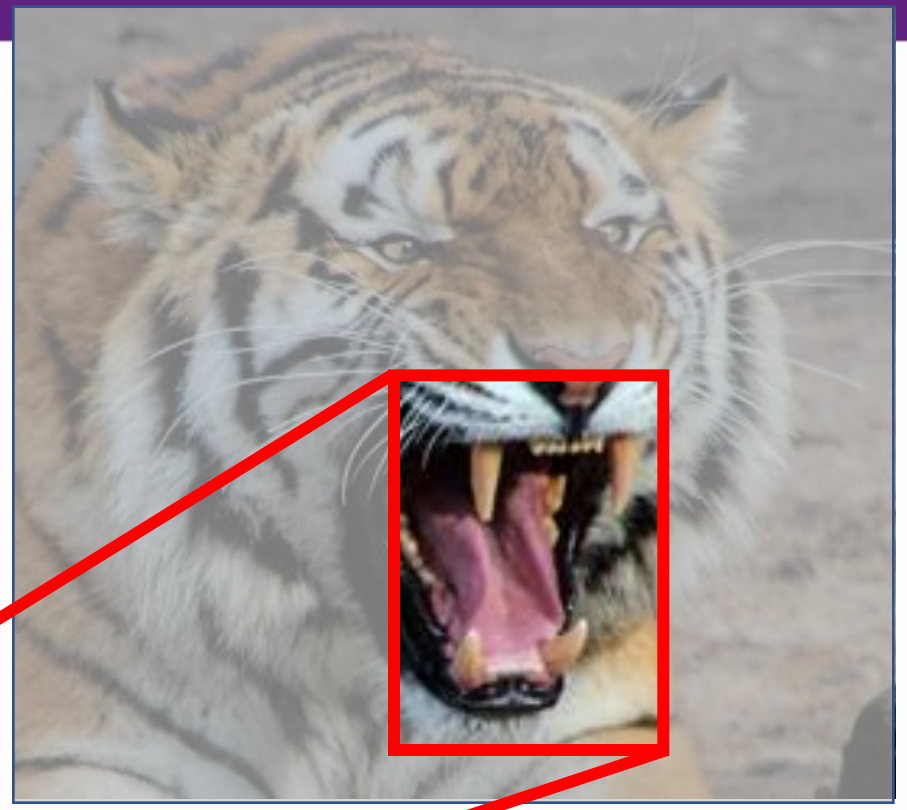
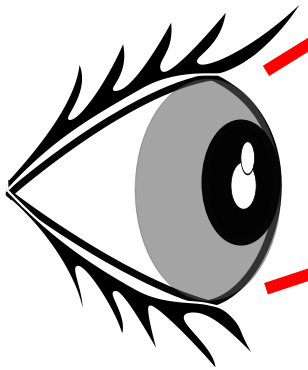
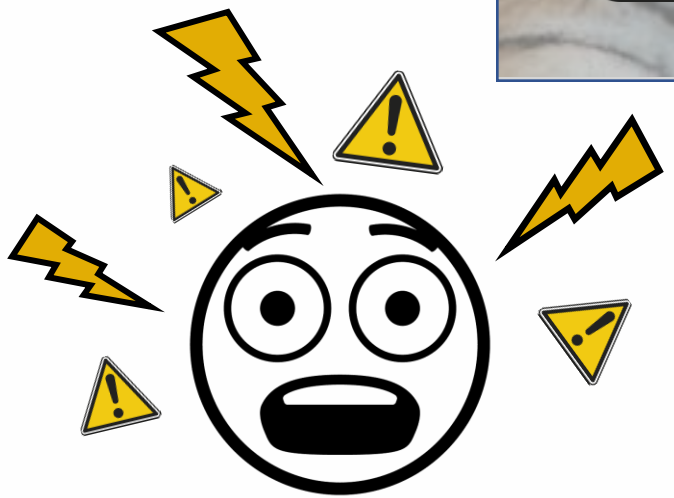




Attention and first perception



Danger awareness

Interpretation

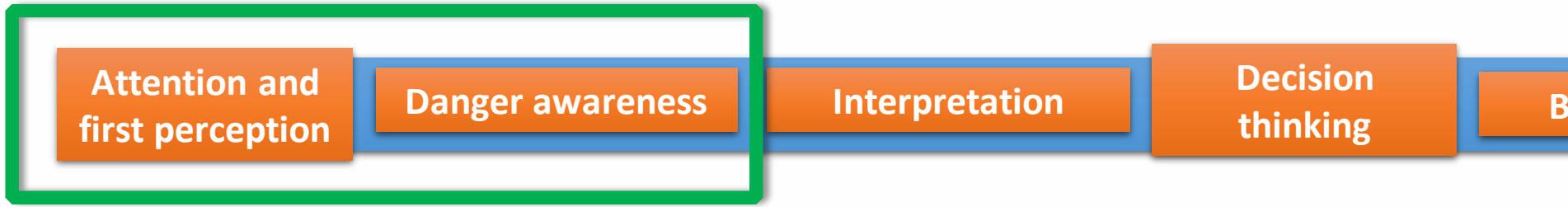
Decision thinking

Behaviour

Introduction

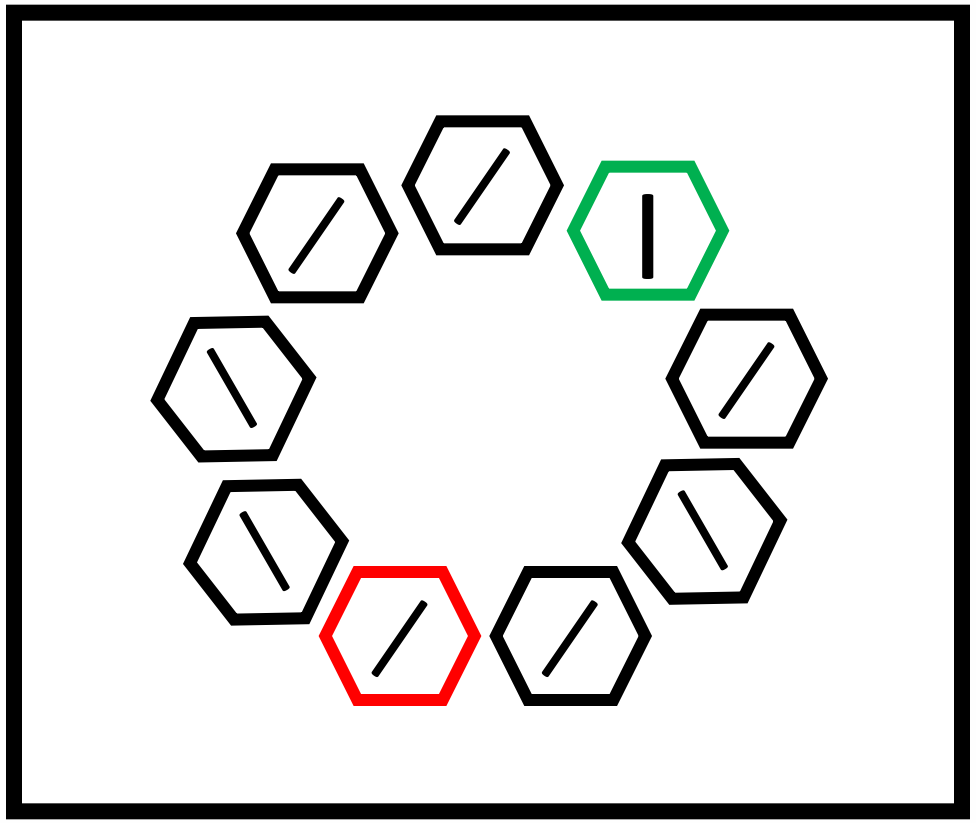
- Stressfull situations: make brief decision based on what we perceive
- How threat modulates early attentional processing?

- Topic: Effect of a threatening context on attention orientation and awareness



Early attentional processing

- *Contingent capture Hypothesis* (Folk & Remington, 1998)

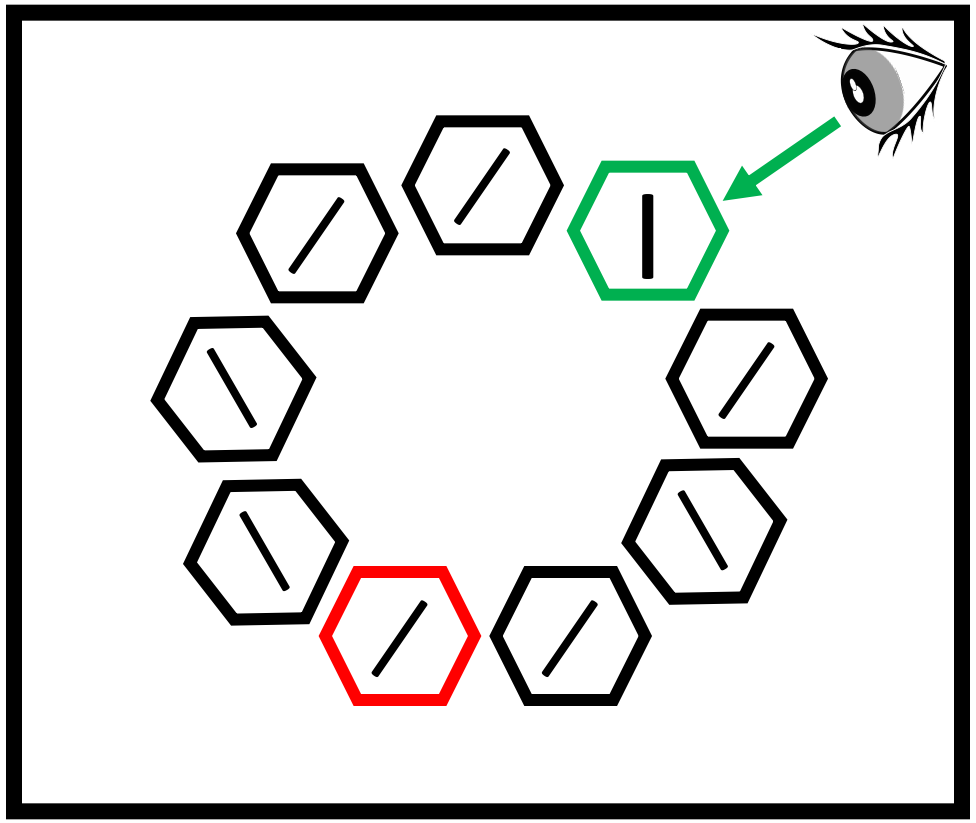


- People are better to identify and respond to stimuli that match their goals and motivations in a specific task
  => attentional priorities/attentional set

- If you are searching for **green** information, you will be better to

Early attentional processing

- *Contingent capture Hypothesis* (Folk & Remington, 1998)

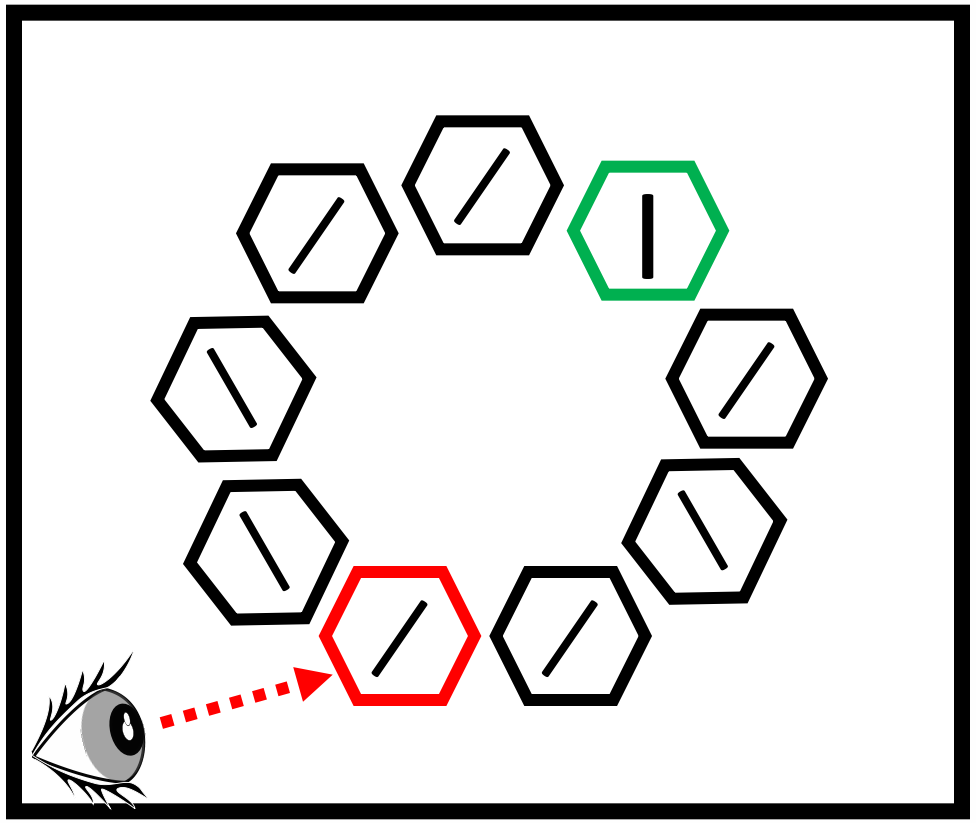


- People are better to identify and respond to stimuli that match their goals and motivations in a specific task
  => attentional priorities/attentional set

- If you are searching for **green** information, you will be better to
  - **Identify green information**

Early attentional processing

- *Contingent capture Hypothesis* (Folk & Remington, 1998)



- People are better to identify and respond to stimuli that match their goals and motivations in a specific task
  => attentional priorities/attentional set

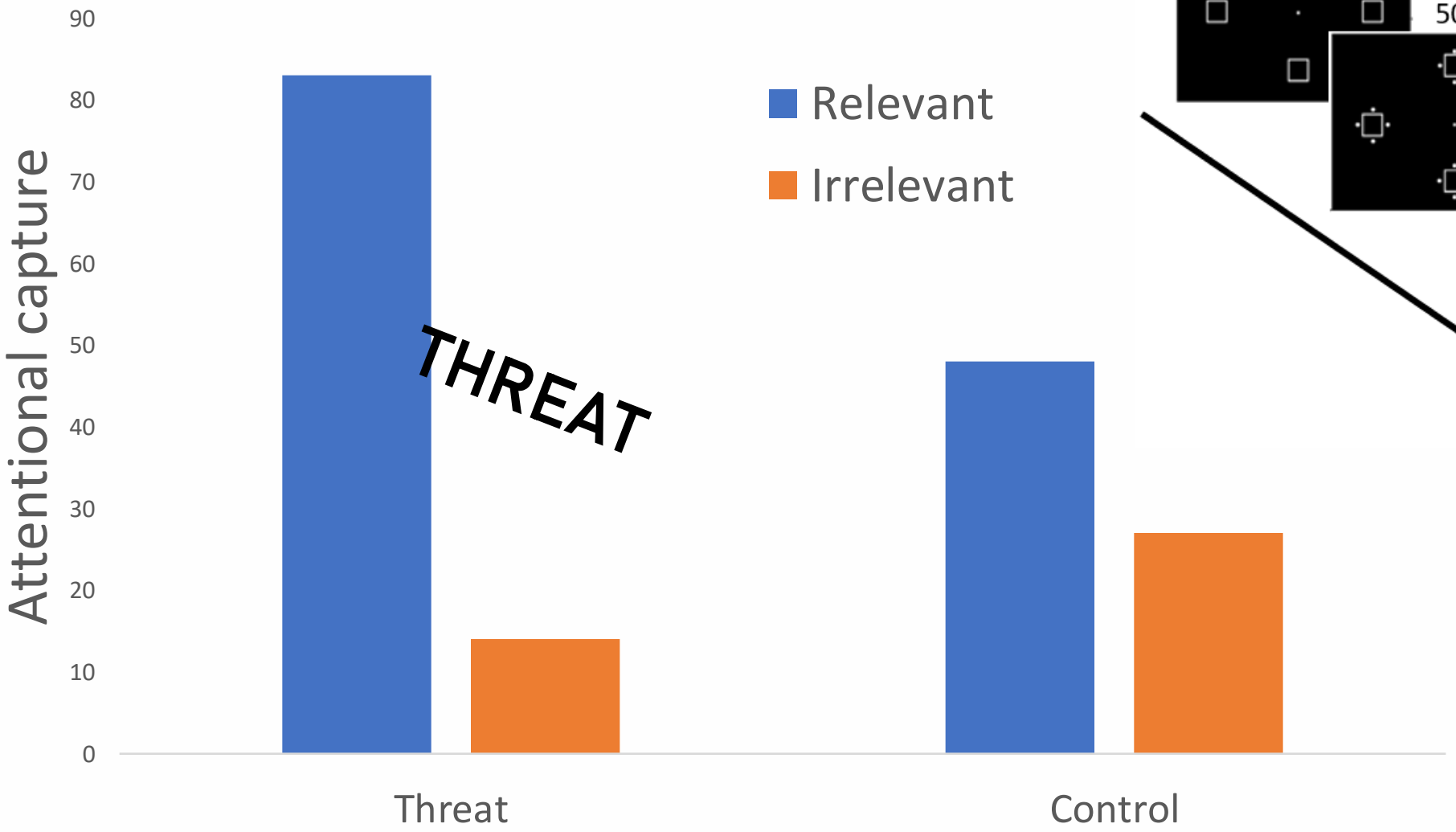
- If you are searching for **red** information, you will be better to
  - Identify green information
  - **Neglect other information**

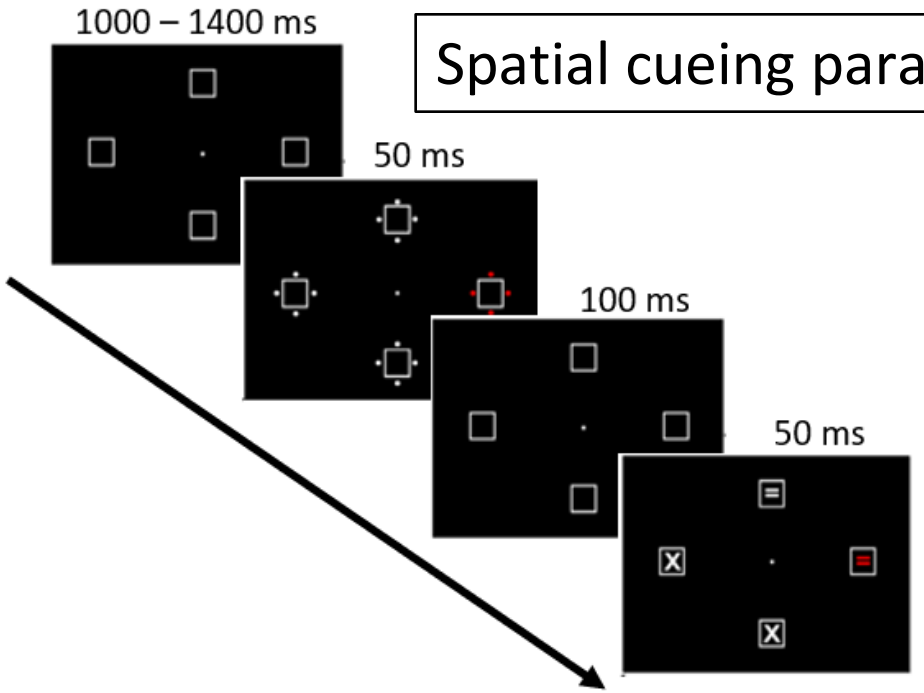
Early attentional processing **and threat**

- *Contingent capture Hypothesis* (Folk & Remington, 1998)

- Threat => attentional settings are reinforced (Chajut et Algom, 2003 ; Normand, Bouquet, & Croizet, 2014)
  - **Attentional capture + + +** on stimuli relevant with the attentional set
  - **Attentional capture - - -** on stimuli irrelevant with the attentional set

Part 1: Early attentional processing

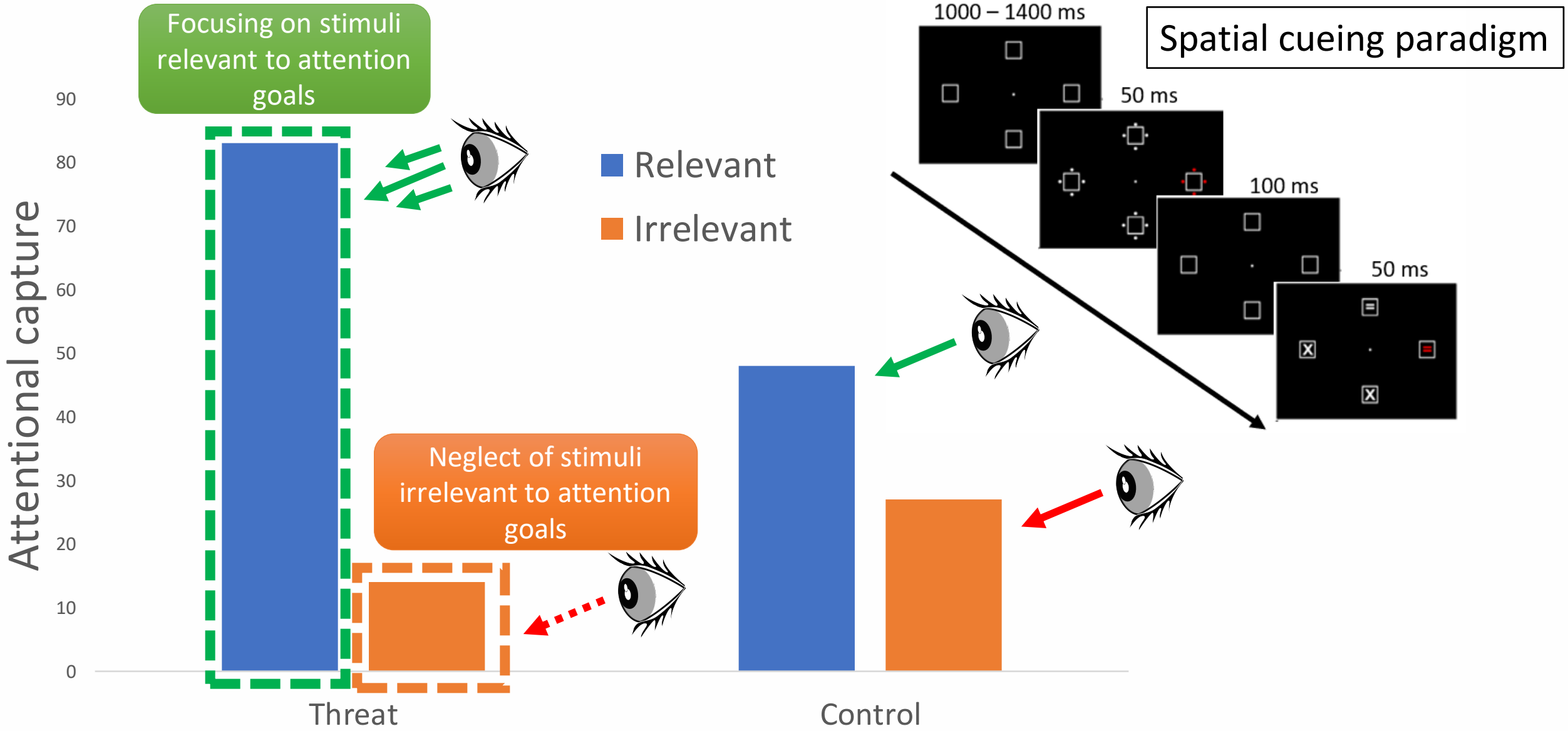




Spatial cueing paradigm

Normand, Bouquet, & Croizet, 2014

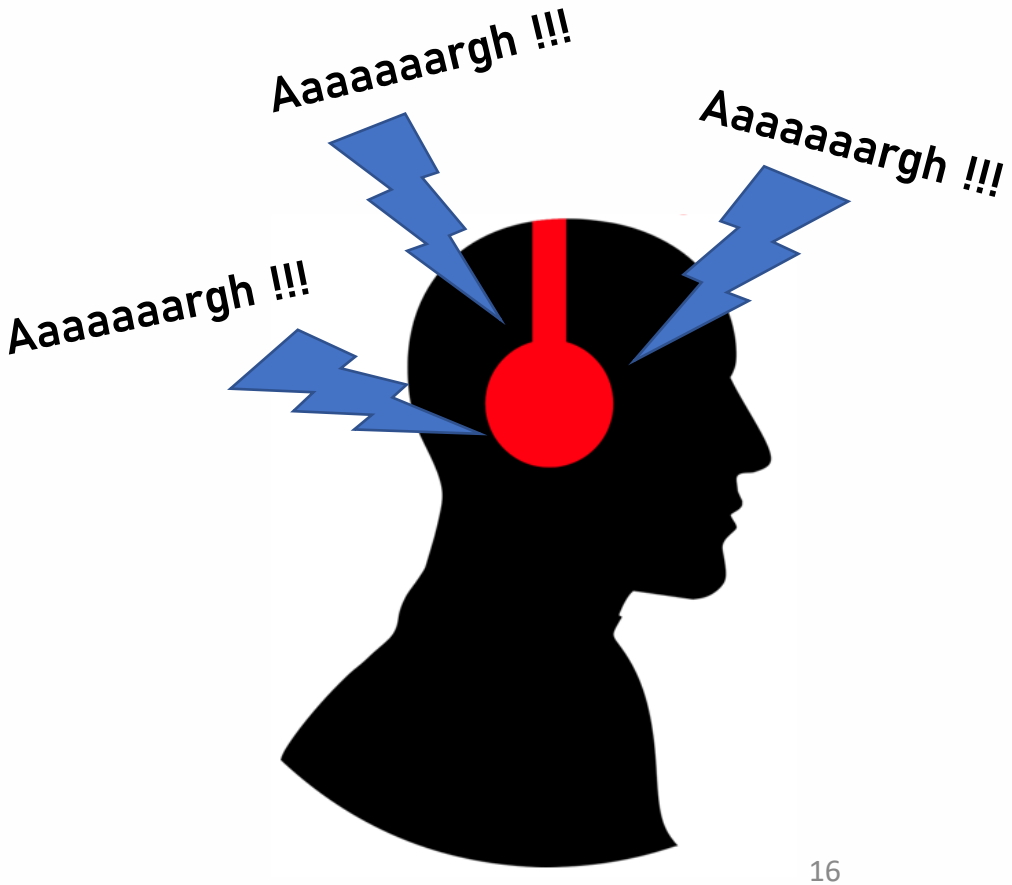
Part 1: Early attentional processing



Normand, Bouquet, & Croizet, 2014

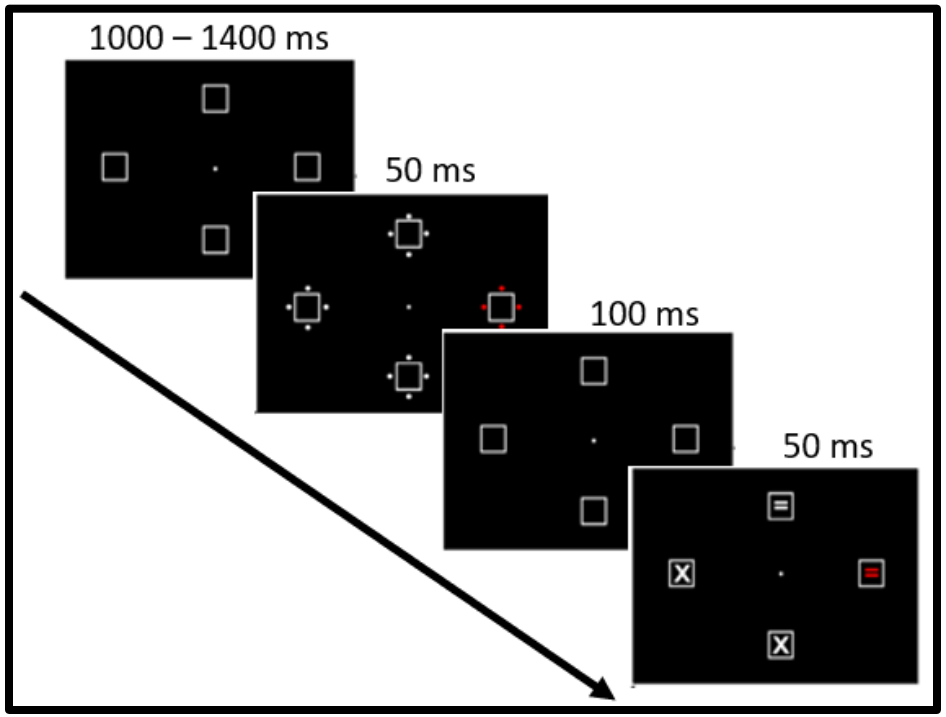
Study 1

- *Threat of screams paradigm* (Beaurenaut et al., 2020)



Study 1

- *Threat of screams paradigm* (Beaurenaut et al., 2020)
- Task: Spatial Cueing paradigm (Folk & Remington, 1998)



Study 1

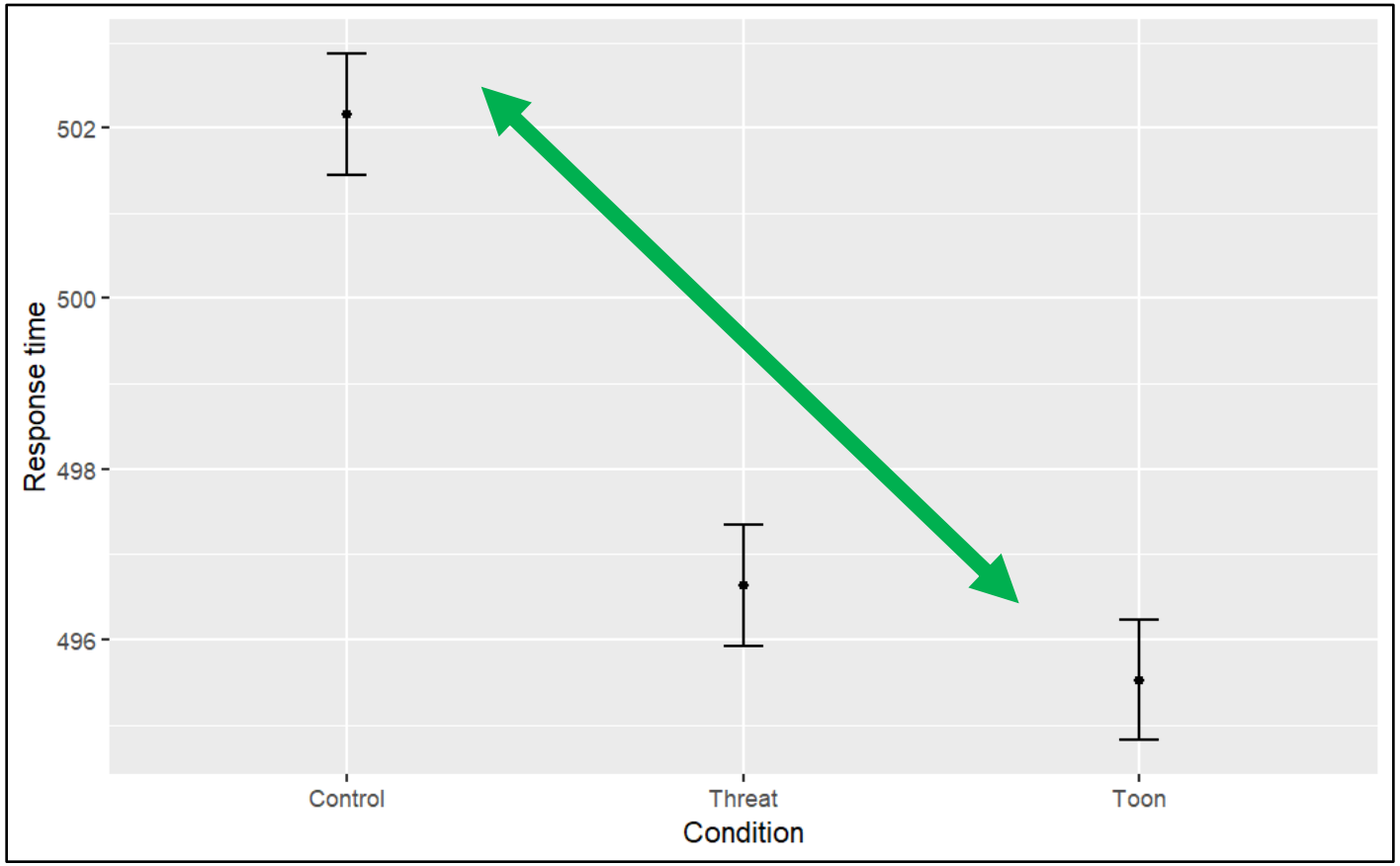
- *Threat of screams paradigm* (Beaurenaut et al., 2020)
- Task: Spatial Cueing paradigm (Folk & Remington, 1998)
- 3 Conditions:
  - No Sound (Control)
  - Screams (Threat)
  - Vocalizations (Neutral)

- N = 557 participants

PREREGISTERED

Study 1: Results

- **Main effect of Condition**

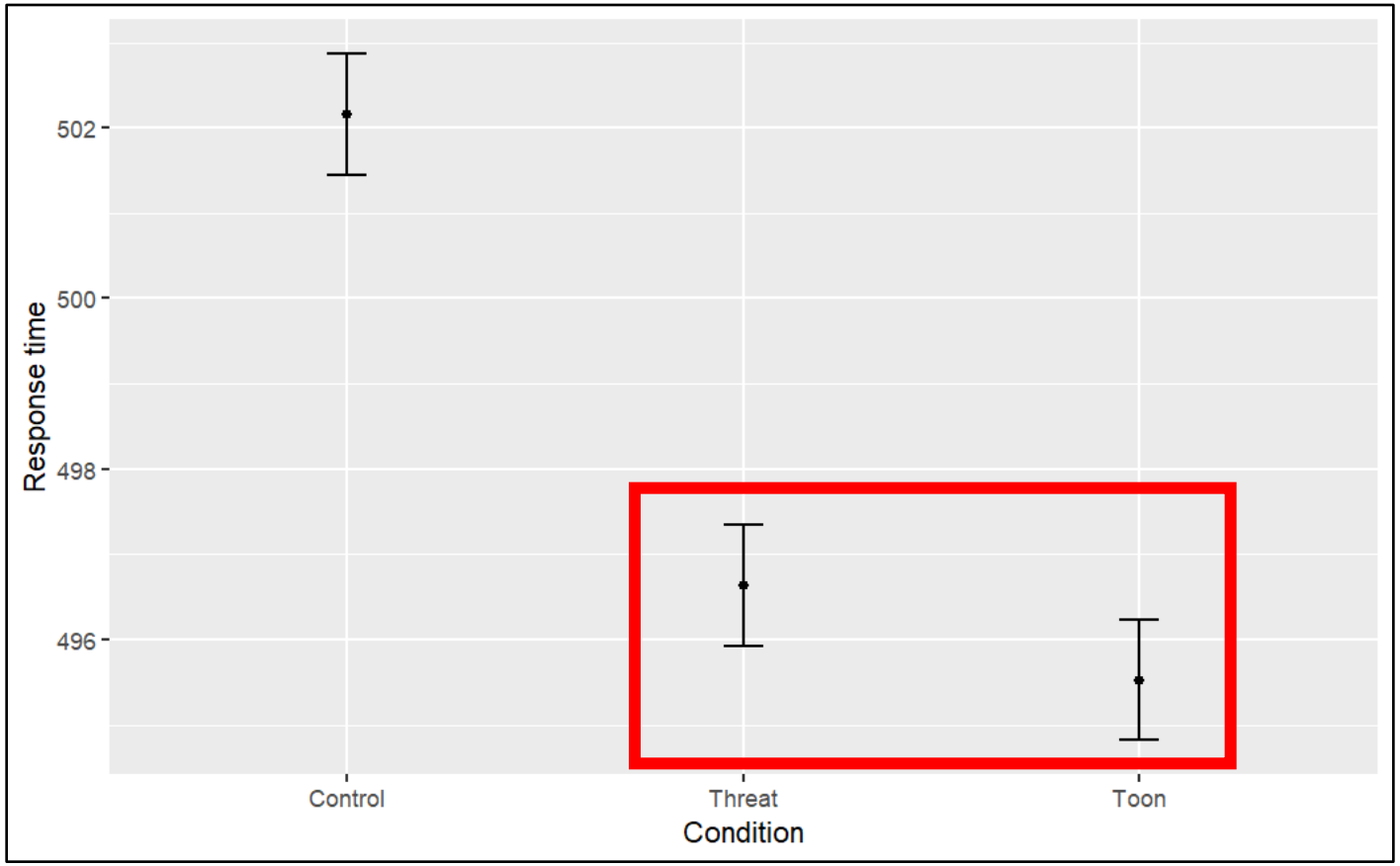


$b = 7.85$, $p = 0.006$

Study 1: Results

- Main effect of Condition

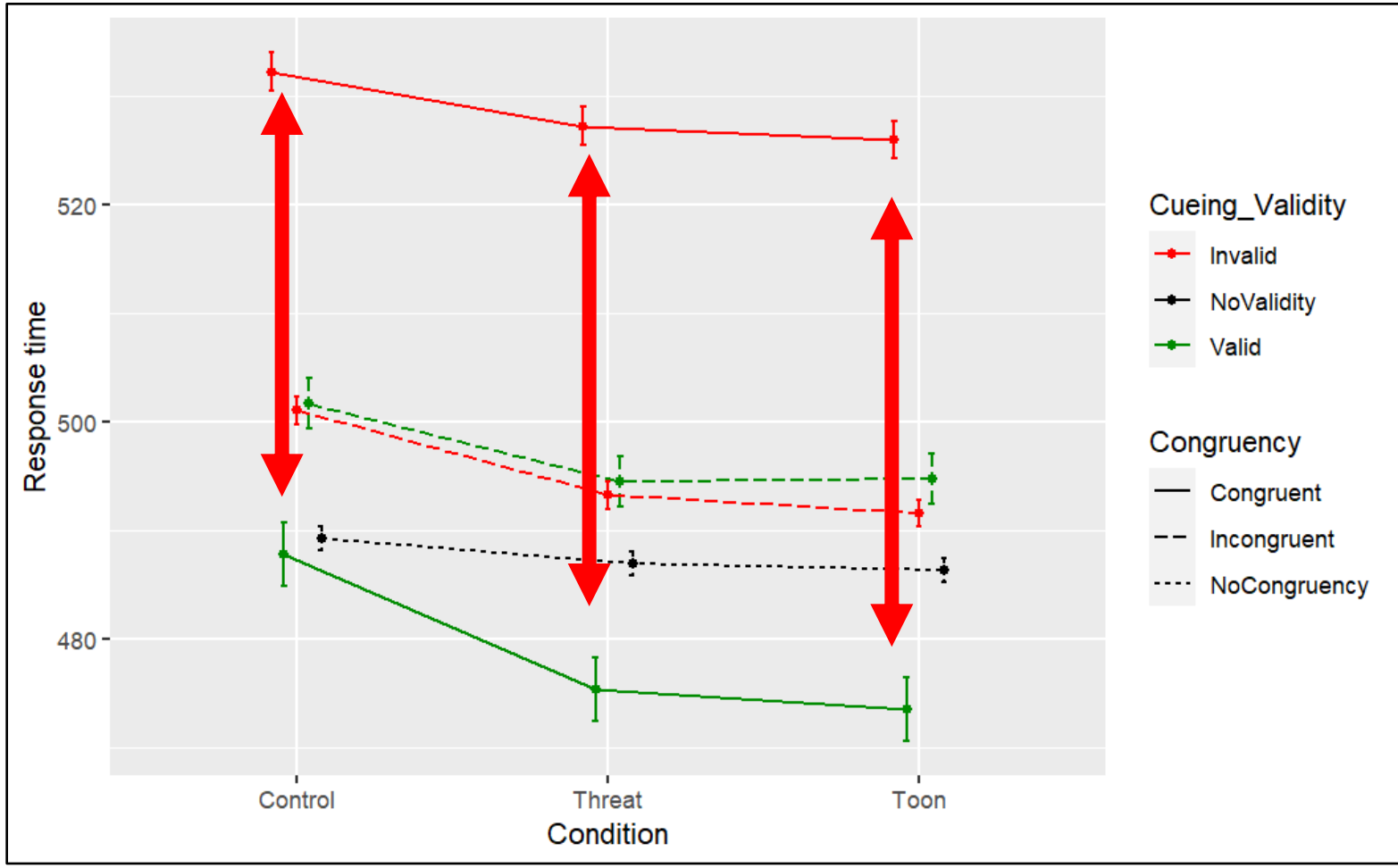
- **No difference between *Neutral* and *Threat* Conditions**



b = -1.58, p = 0.77

Study 1: Results

- Main effect of Condition
- No difference between *Neutral* and *Threat* Conditions
- **Failed replication of attentional settings reinforcement**



$b = 6.61$, $p = 0.17$

After MAD exclsusion

Study 1: Discussion

- Threat inductions differences:
  - *Self-evaluative threat* (Normand et al., 2014): performance is relevant to threat
    VS
  - *Threat of screams*: performance is not relevant to threat

Study 2:

- Study 2: Same paradigm as study 1

- Conditions:
  - Performance relevant to threat
  - Performance irrelevant to threat

Screaming reflects poor performance in the main task. This means that improving your performance will result in less screaming.

VS

Screaming occurs randomly in the main task. This means that your performance has no impact on screaming.

Study 2:

- Study 2: Same paradigm as study 1
- Conditions:
  - Performance relevant to threat
  - Performance irrelevant to threat
- N = 258 participants

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Screaming reflects poor performance in the main task. This means that improving your performance will result in less screaming.

VS

Screaming occurs randomly in the main task. This means that your performance has no impact on screaming.

Study 2: Results

- Same **main effect** of Condition
- **No difference** between *Neutral* and *Threat* Conditions
- **No modulation** of attentional settings by threat relevancy to performance

Discussion: Early processing

- Failed replication of attentional settings modulation under threat

- *Threat of screams* => improve processing speed for each type of information (relevant AND irrelevant)

Discussion: Early processing

- Failed replication of attentional settings modulation under threat
- *Threat of screams* => improve processing speed for each type of information (relevant AND irrelevant)
- At later stages of attentional processing: **Awareness?**

Inattentional Blindness

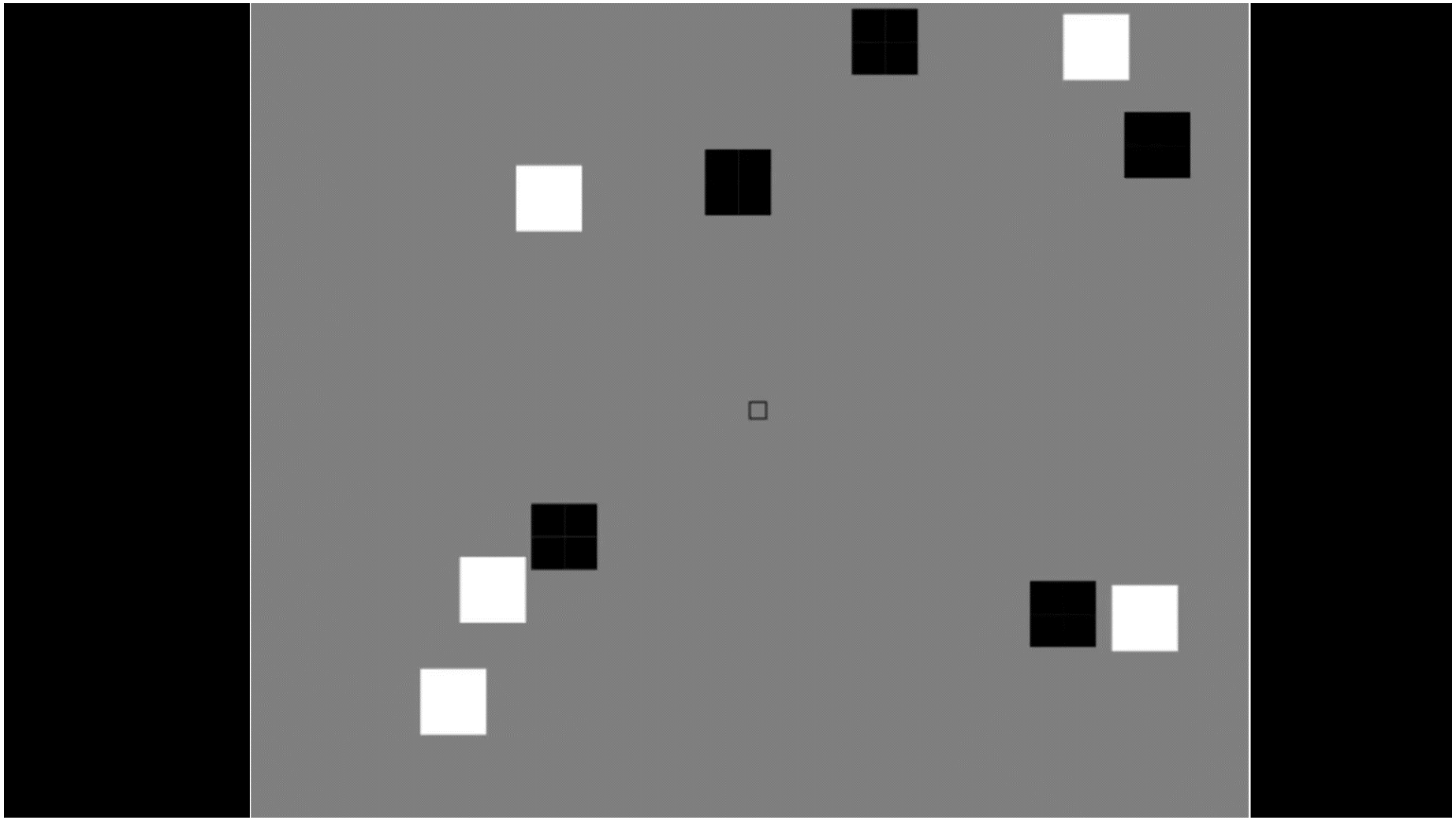
- The phenomenon in which people fail to notice an unexpected but clearly visible stimulus in their environment when they are involved in an attentional task (Mack & Rock, 1998)

- Similar results to Contingent Capture Hypothesis

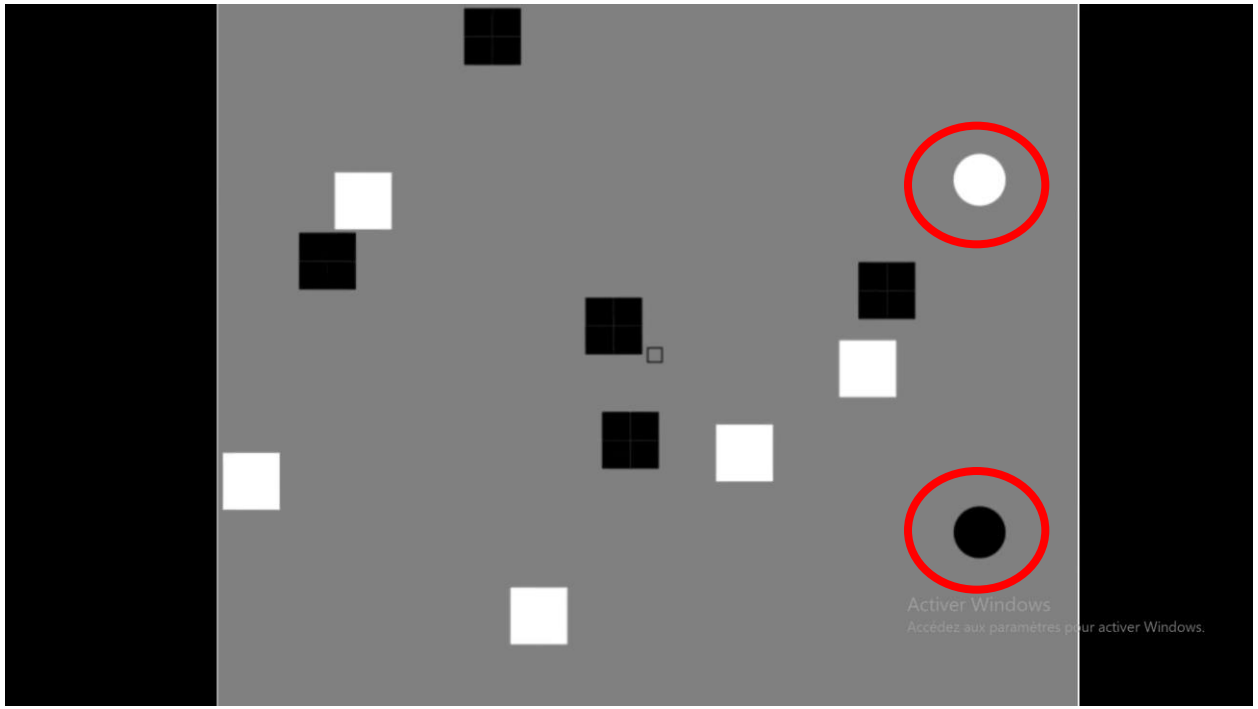
- An unexpected stimulus relevant to the attentional set is more likely to be consciously perceived than an irrelevant one.

Aimola Davies et al., 2013 ; Koivisto et Revonsuo, 2009 ; Most et al., 2005 ; Most, 2013…

Study 3: Competing unexpected stimuli



Study 3: Competing unexpected stimuli



N = 298

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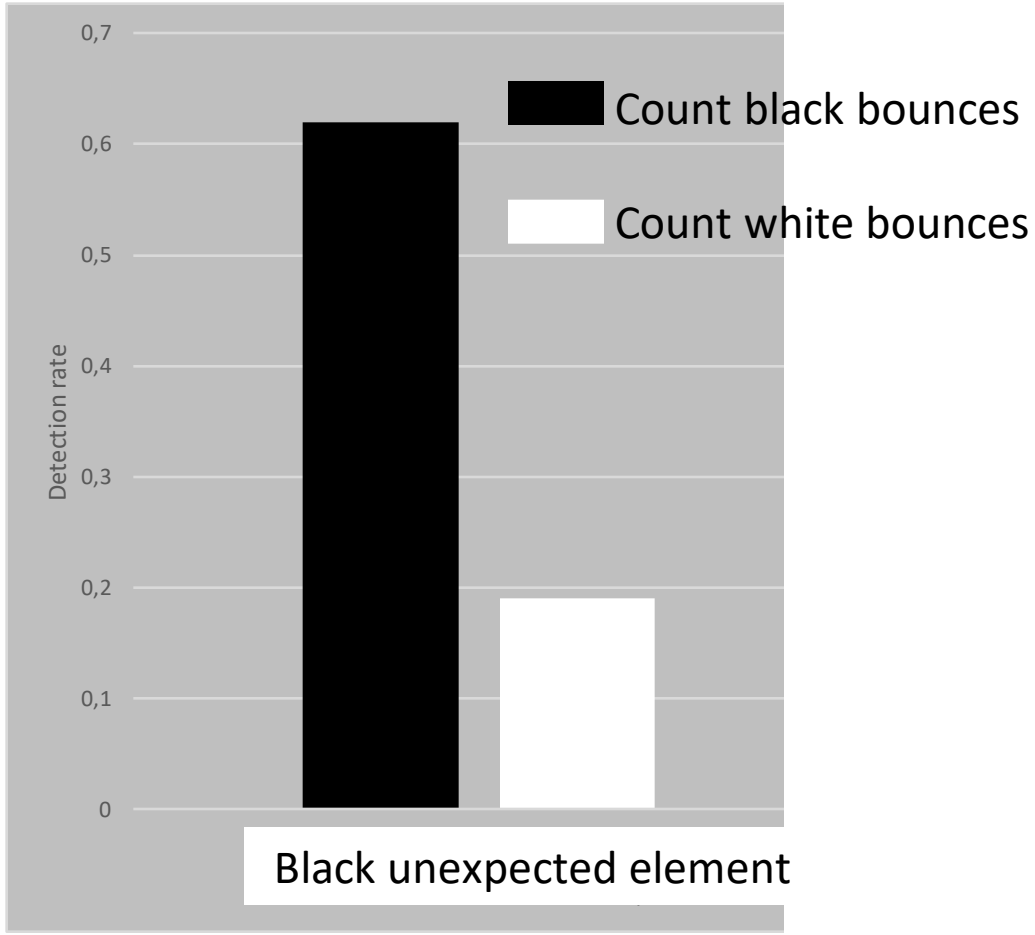
Hypothesis: in face with two simultaneous unexpected stimuli, the stimulus relevant with the attentional set is more likely to be noticed

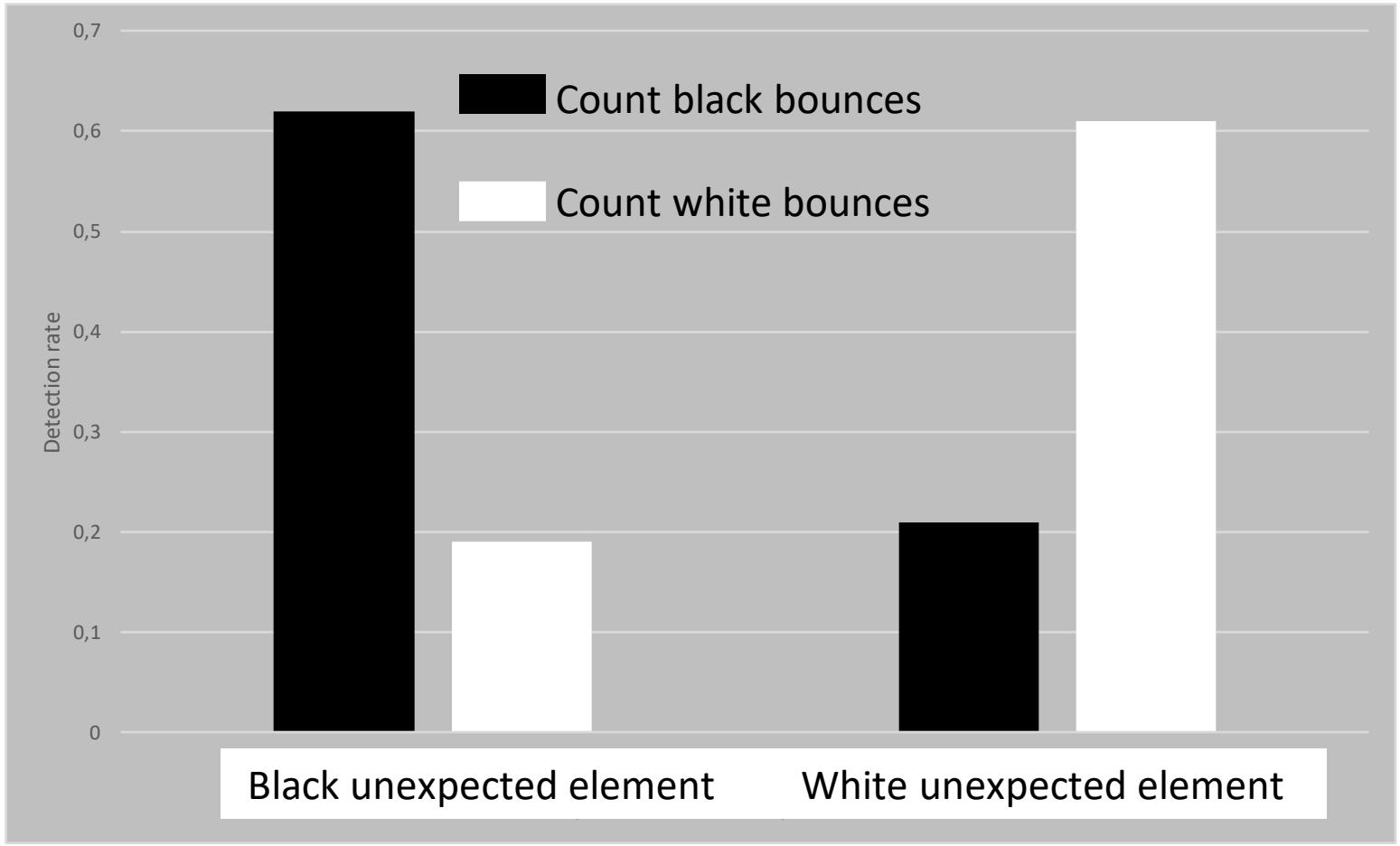
Study 3: Results



$p < .001$, OR = 5.99

- The **unexpected black stimulus** is more detected by participants who count bounces made by **black squares**

Study 3: Results



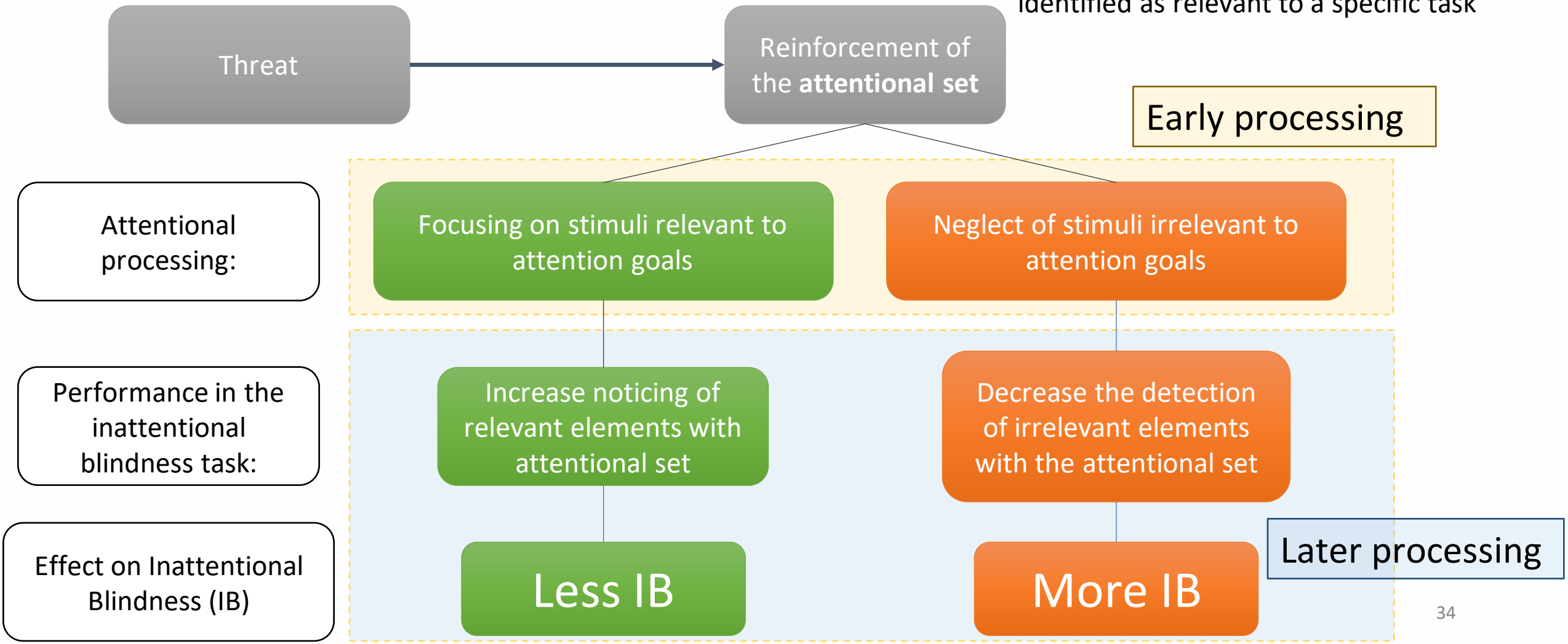
$p < .001$, OR = 5.99

$p < .001$, OR = 6.66

- The unexpected black stimulus is more detected by participants who count bounces made by black squares
- The **unexpected white stimulus** is more detected by participants who count bounces made by **white squares**

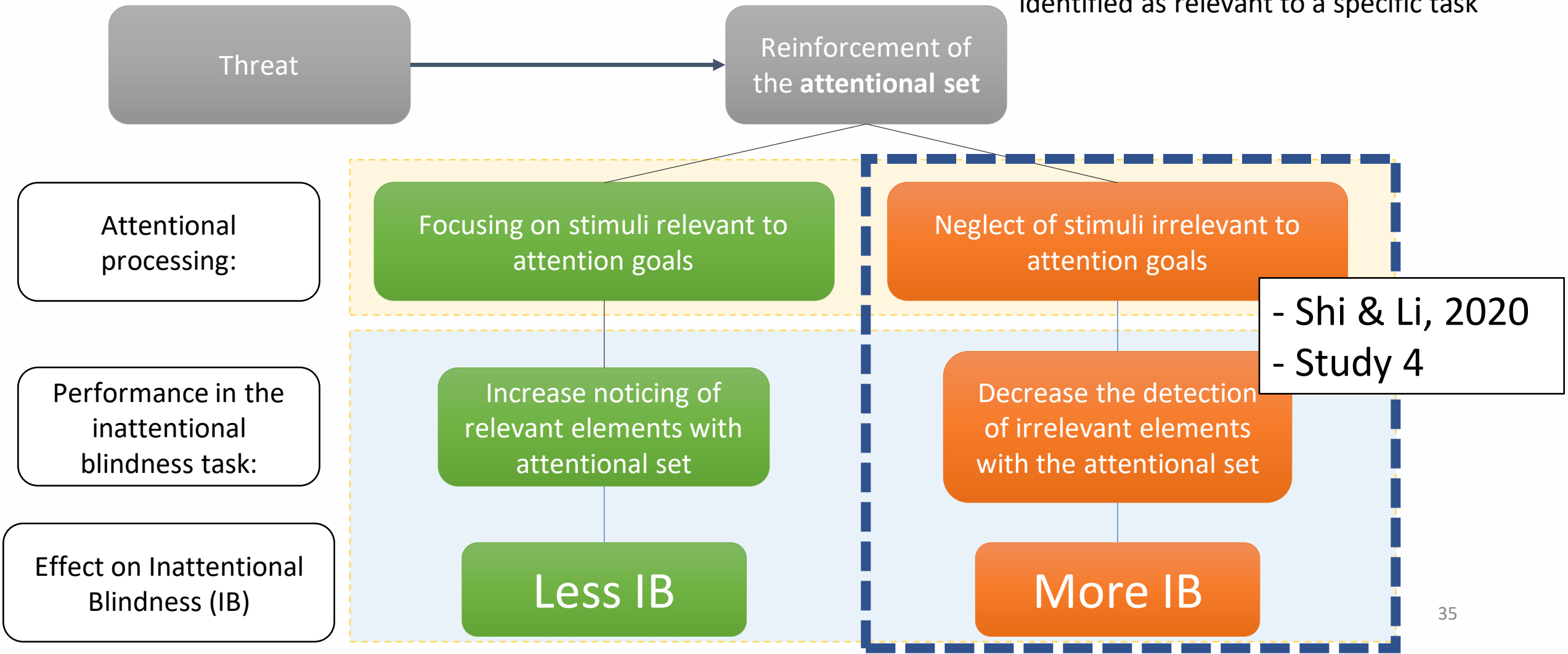
Threat and inattentional blindness

Set of features and properties identified as relevant to a specific task

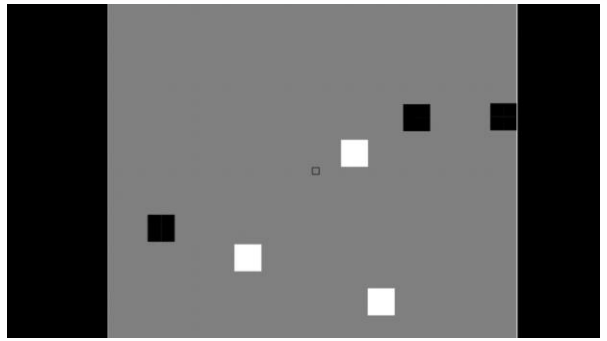


Threat and inattentional blindness

Set of features and properties identified as relevant to a specific task



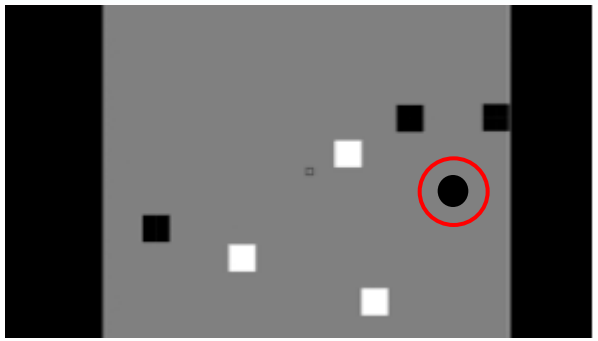
Study 4



Threat and neglect of irrelevant items

- The same task as study 3, except
  - Only one unexpected item = always **Irrelevant** with the task set

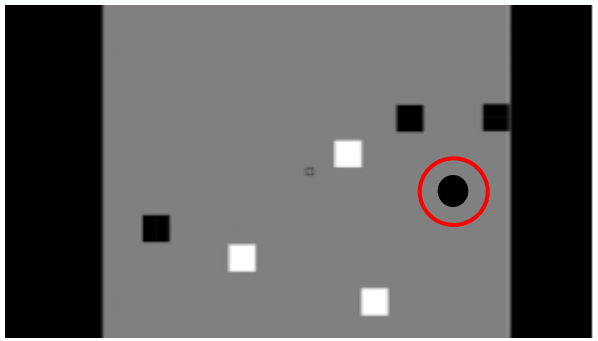
Study 4



Threat and neglect of irrelevant items

- Threat manipulation

Study 4

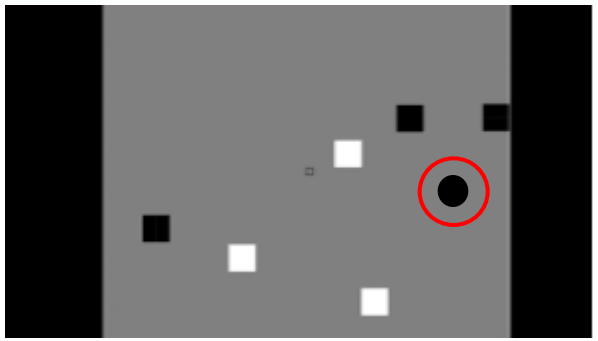


Threat and neglect of irrelevant items

- Threat manipulation

+ Measure of self-reported stress > 5 stress-related items (tense, stressed, nervous, calm, anxious), $\alpha = 0.879$

Study 4



Threat and neglect of irrelevant items

- Threat manipulation

+ Measure of self-reported stress

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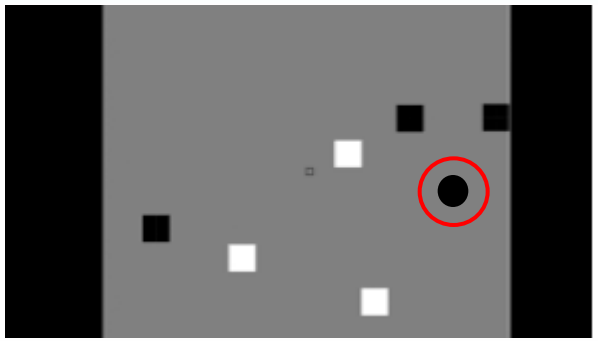
- N = 128

Study 4



Threat and neglect of irrelevant items

- Threat manipulation

+ Measure of self-reported stress

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- N = 128
- Hypothesis: detection of the unexpected (irrelevant) element is lower in the threat condition compared to the control condition

Study 4: Results

- Self-reported stress is higher in the *threat* condition than in the *control* condition [$b = 0.57$, $F(1, 126) = 9.773$, $p = 0.002$, $\eta^2 = .07$]

Study 4: Results

- Self-reported stress is higher in the *threat* condition than in the *control* condition
- No difference in noticing according to the experimental condition
  - Threat: 17% detection
  - Control: 17% detection

Study 4: Results

- Self-reported stress is higher in the *threat* condition than in the *control* condition
- No difference in noticing according to the experimental condition
- *Exploratory analyses :*
  - *Self-reported stress predicts inattentional blindness [OR = 0.33, 95% CI [0.10, 0.74], p = 0.025, η^2 = .047]*
  - *As stress increases, inattentional blindness increases*
    => less detection of the irrelevant unexpected element

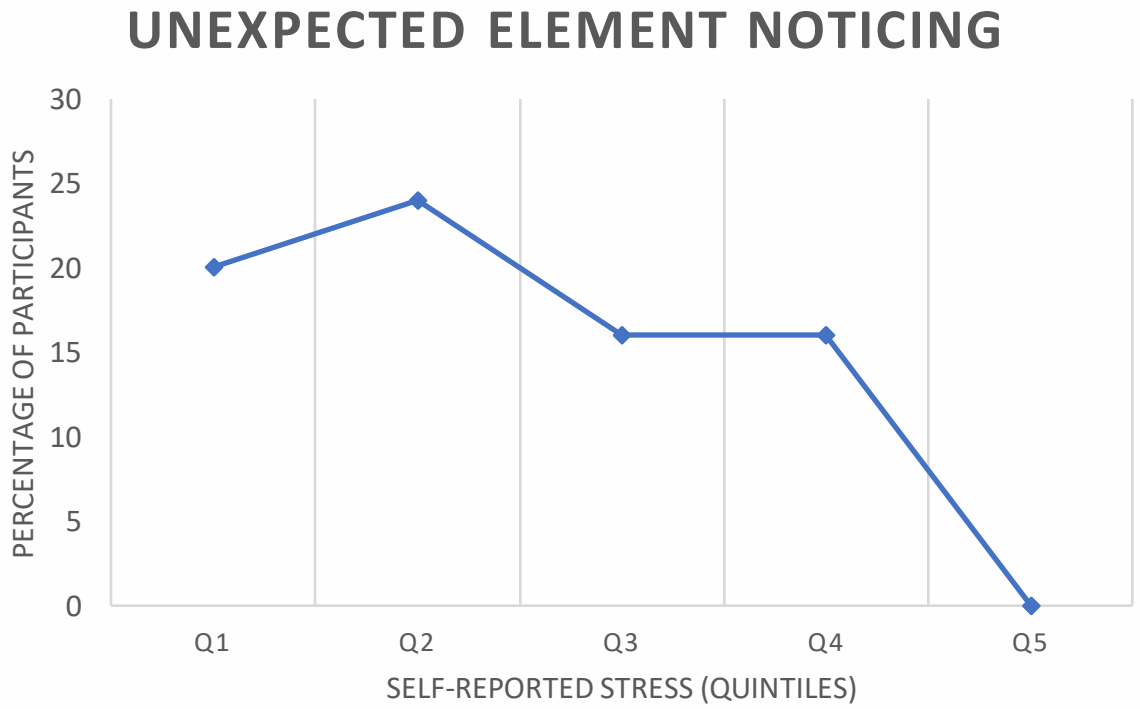
Study 2: OR = .33 = Shi & Li: OR = .34

Study 4: Results

- Self-reported stress is higher in the *threat* condition than in the *control* condition
- No difference in noticing according to the experimental condition
- *Exploratory analyses :*

Threat seems to decrease the conscious perception of elements **irrelevant** to the task set

More IB



Study 4: Perspectives

Threat → Reinforcement of the **attentional set**

Set of features and properties identified as relevant to a specific task

	Future studies	Study 2
Attentional processing:	Focusing on stimuli relevant to attention goals	Neglect of stimuli irrelevant to attention goals
Performance in the inattentional blindness task:	Increase noticing of relevant elements with attentional set	Decrease the detection of irrelevant elements with the attentional set
Effect on Inattentional Blindness (IB)	Less IB	More IB

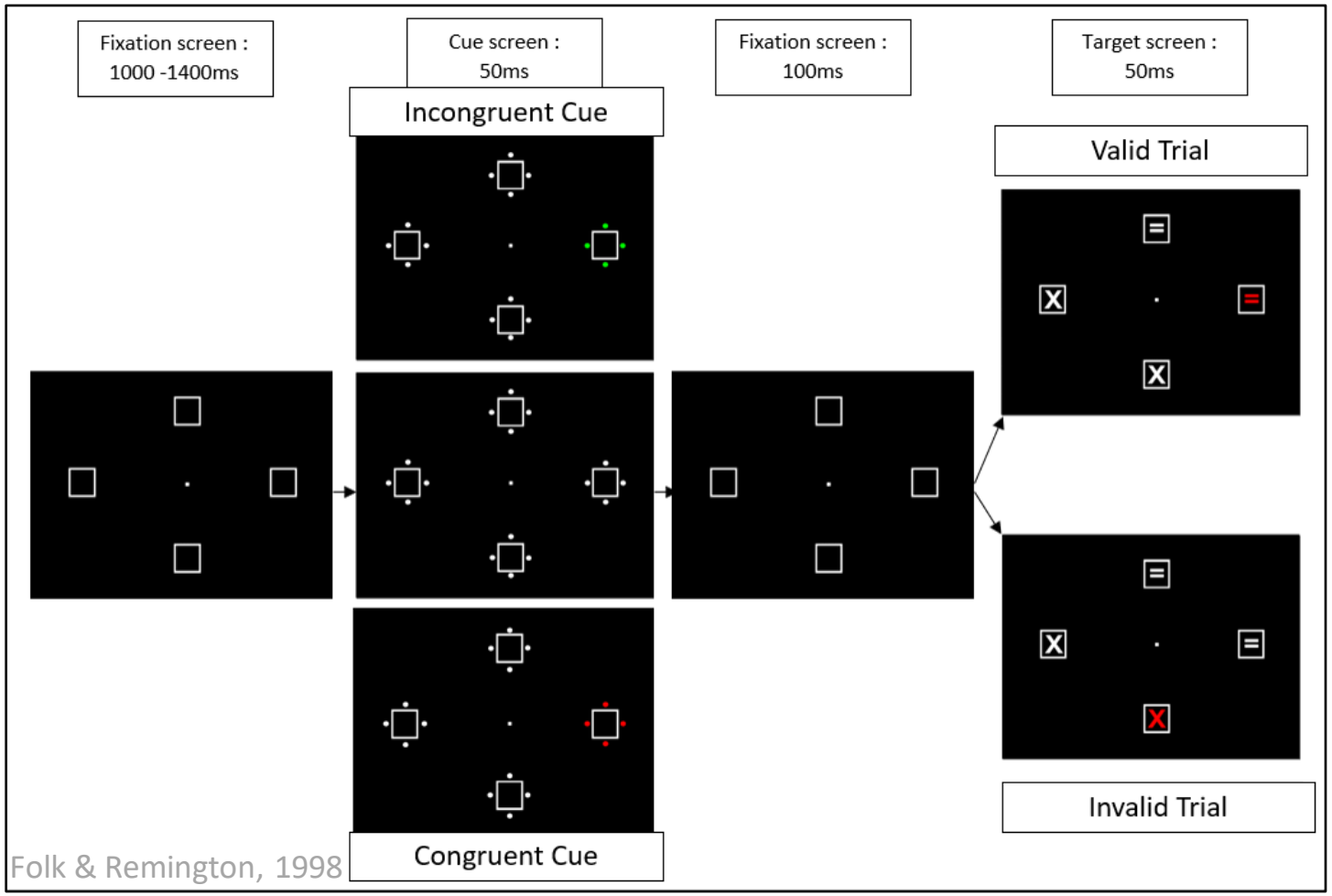
General discussion

- Self-evaluative threat ≠ Threat of screams
- Compatibility between the two sets of studies?
- Implications: Threatening contexts could improve the speed of attention processing but do not seem to protect the neglect of some types of information in our environment.
- All depends on what you set in your attentional priorities!!!

Thanks for your attention !

Study 1

Study 1 https://osf.io/jkt9m/
Study 2 : https://osf.io/ynuc2/



Folk & Remington, 1998

VI1 : Cue congruency
- Congruent with the task set
- Incongruent with the task set

VI2 : Cue validity
- Valid
- Invalid

VI3 : 3 Experimental block
- Control: Without sound
- Neutral (Vocalizations)
- Threat (human screams)

- Study 1:

VI 4 : Task framing
- Localization
- Categorization

- Study 2:

VI 4 : Cotrollability
- Controllable threat
- Random threat

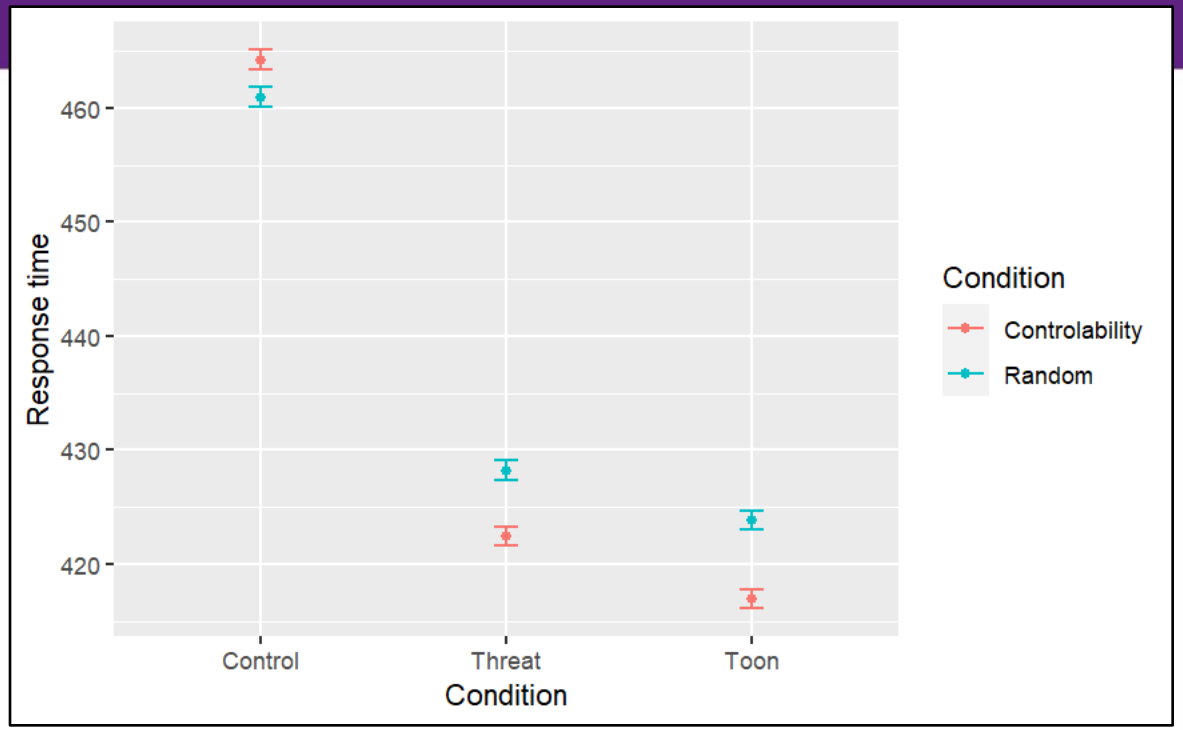
Study 2

```
Fixed effects:
                Estimate Std. Error       df t value Pr(>|t|)
(Intercept)    430.88804    6.39844 56.23288  67.343   <2e-16 ***
Condition_C    -26.71775    1.98835 71.41660 -13.437   <2e-16 ***
Counting_Trial   0.03258    0.01601 72.37440   2.034   0.0456 *
```

Effect of Block (Control, Threat, Toon) controlling for Trial_Counting

```
Fixed effects:
                                        Estimate Std. Error       df t value Pr(>|t|)
(Intercept)                             421.4316     3.4284 249.5134 122.923   <2e-16 ***
Congruency_C                             -3.1300     1.8098 243.2584  -1.729    0.085 .
Validity_C                              -26.9086     1.2455 242.5857 -21.604   <2e-16 ***
Controllability                          -4.1921     6.8568 249.5134  -0.611    0.542
Congruency_C:Validity_C                 -54.5098     2.5482 254.2438 -21.391   <2e-16 ***
Congruency_C:Controllability             -1.9783     3.6197 243.2584  -0.547    0.585
Validity_C:Controllability                3.2303     2.4910 242.5857   1.297    0.196
Congruency_C:Validity_C:Controllability   0.1924     5.0965 254.2438   0.038    0.970
---
```

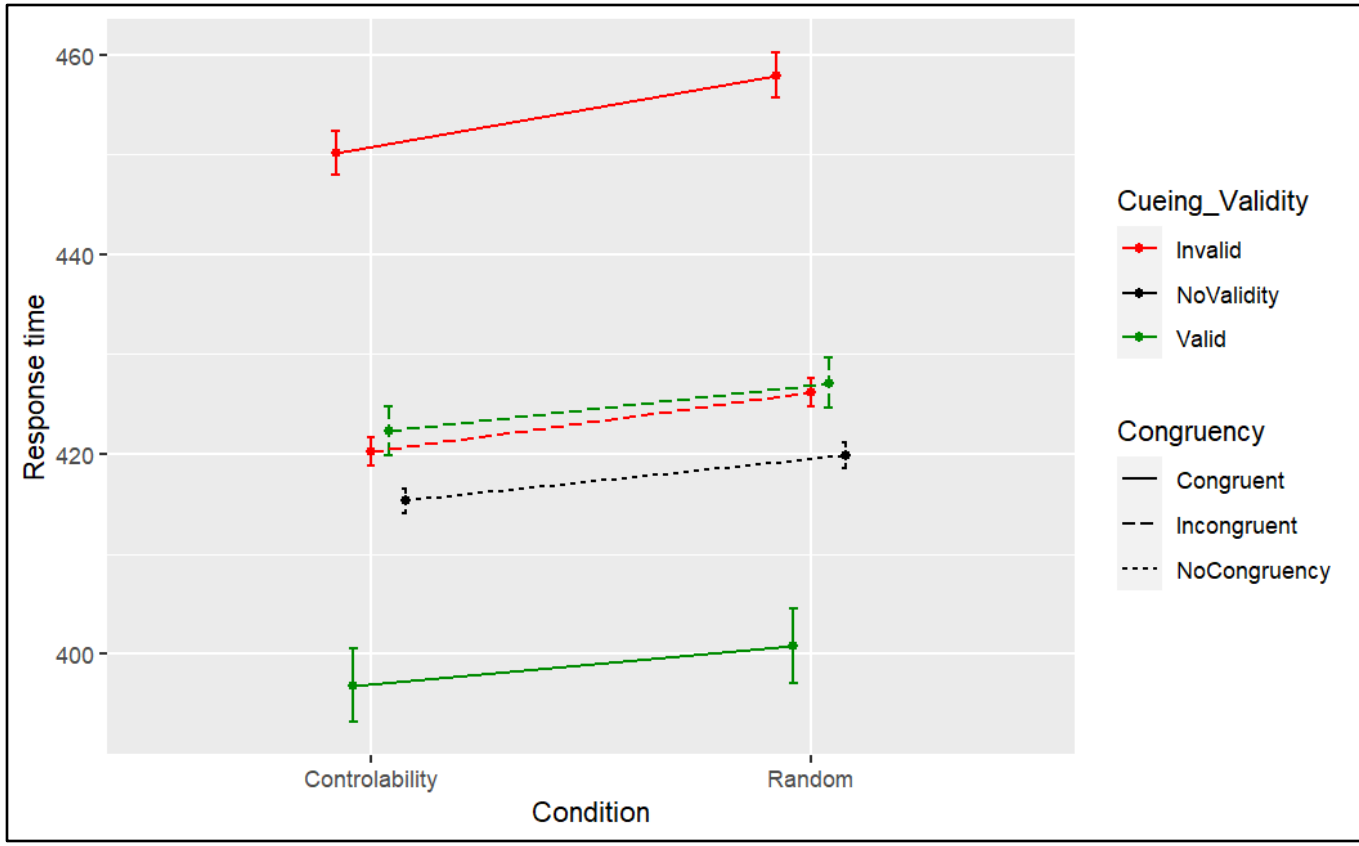
Effect of Controllability on contingent capture combining data from both neutral and threat blocks



Effect of Block (Control, Threat, Toon) on RT

RT ~ Presence of sound * Controllability
b = -19.97, p = 0.028

Study 2



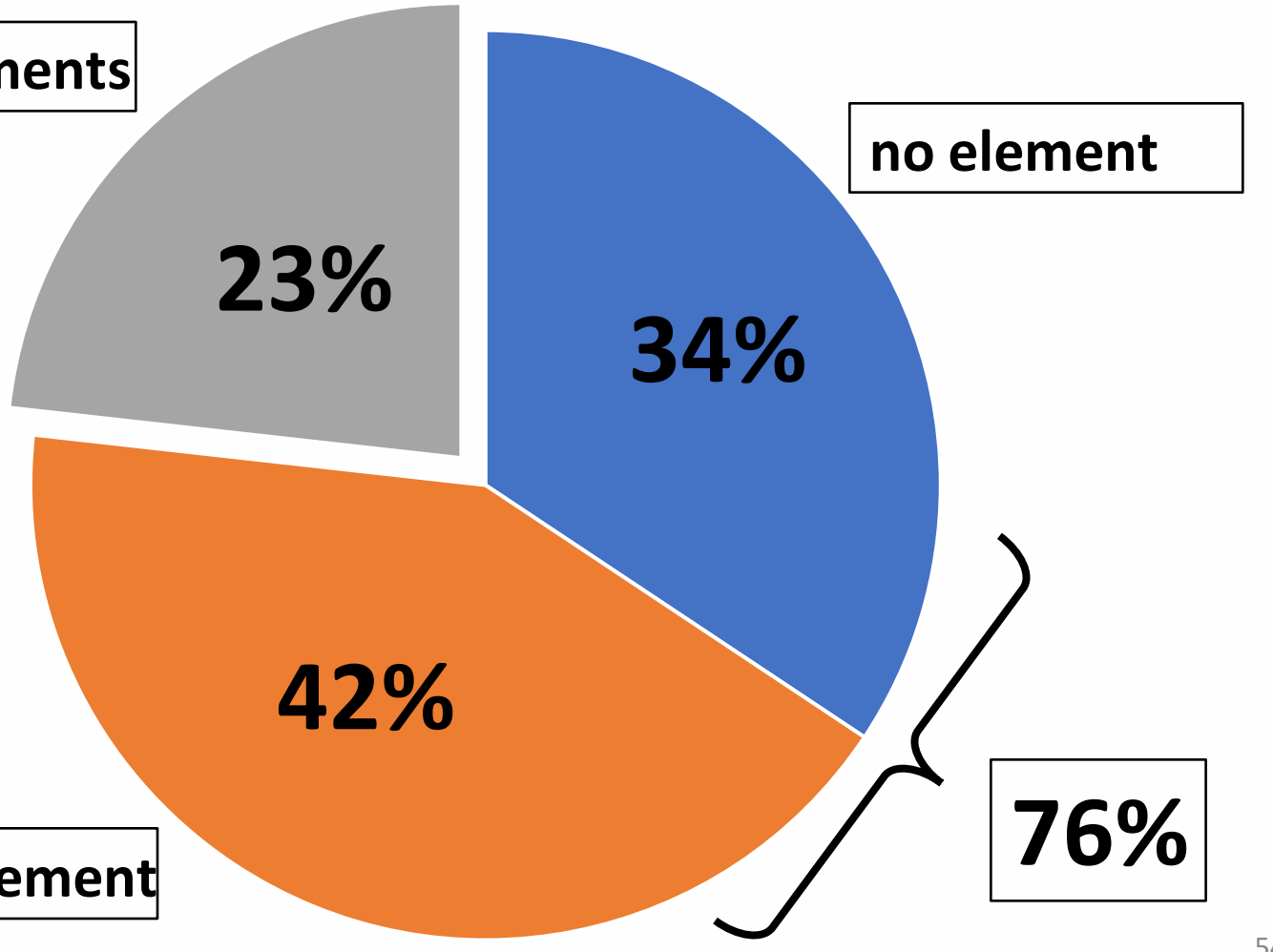
Effect of Controllability on contingent capture combining data from both neutral and threat blocks

Study 3: Competing unexpected Stimuli

- N = 298

- Noticing:

64% show inattentional blindess even if they knew the original paradigm



Study 3: Competing unexpected Stimuli

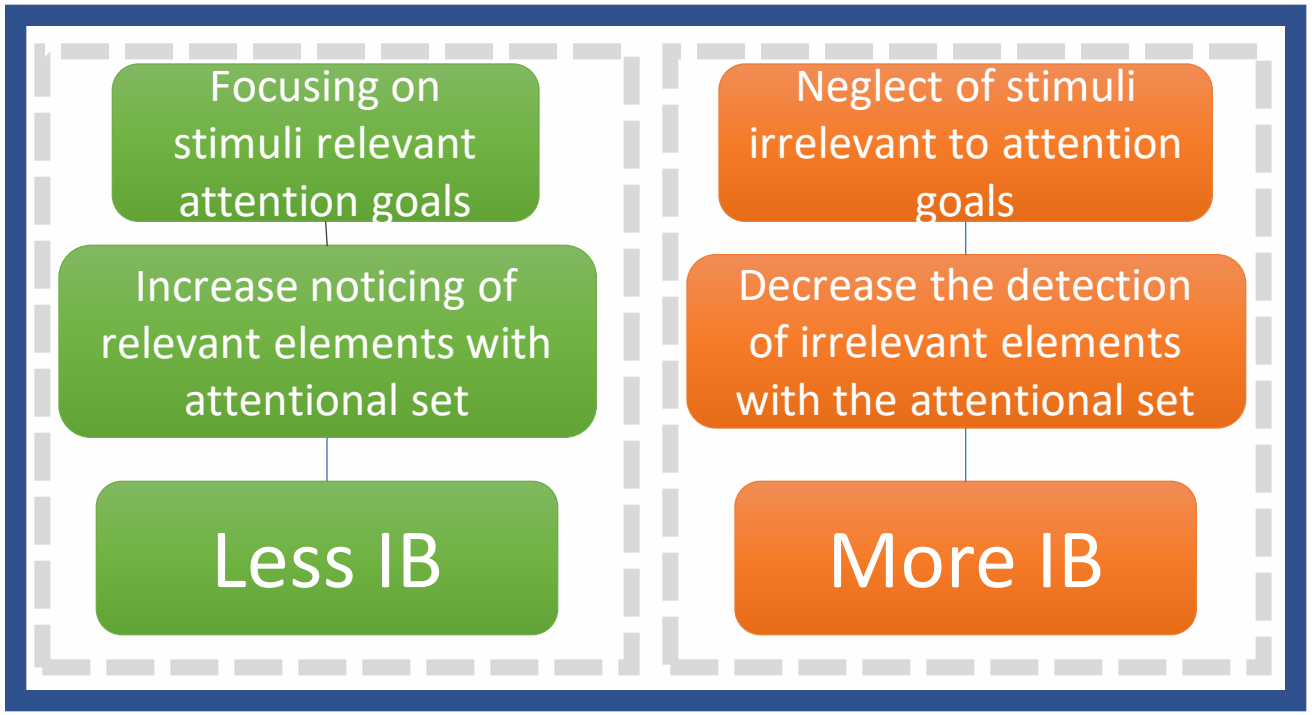
- N = 298

- Noticing: One or several?

76%

  - 34% of participants do not detect any unexpected element (n = 102)
  - 42% of participants detect only one unexpected element (n = 126)
  - 23% of participants detect the two unexpected elements (n = 70)

Future study



Future studies

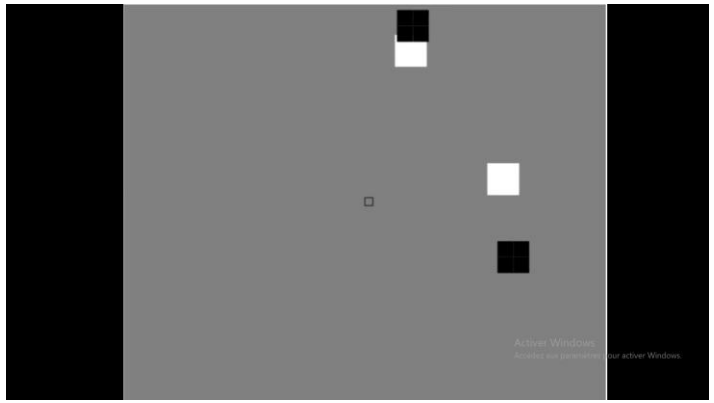
N = 1600

- Relevance:
  - Relevant
  - Irrelevant
- Condition:
  - Threat
  - Control

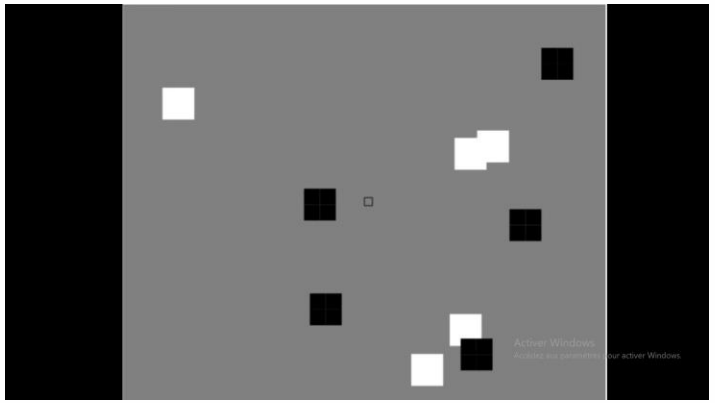
DV: Détection

Supplementary: Perceptual load

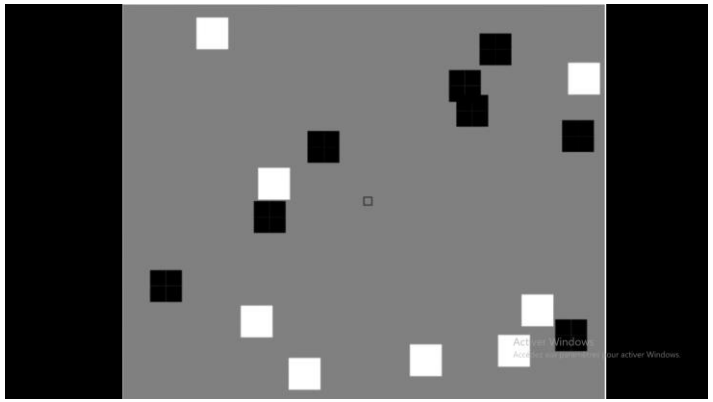
- VI 1 : unexpected element: Congruent VS Incongruent with task set
- VI 2 : perceptual load = number of stimuli in the main task
  - Unexpected element Congruent : 8 VS 10 VS 12 VS 14 VS 16
  - Unexpected element Incongruent : 2 VS 4 VS 6 VS 8



4 stimuli



10 stimuli



16 stimuli

Etude 4 : Résultats

- Sur la performance à la tâche de comptage :

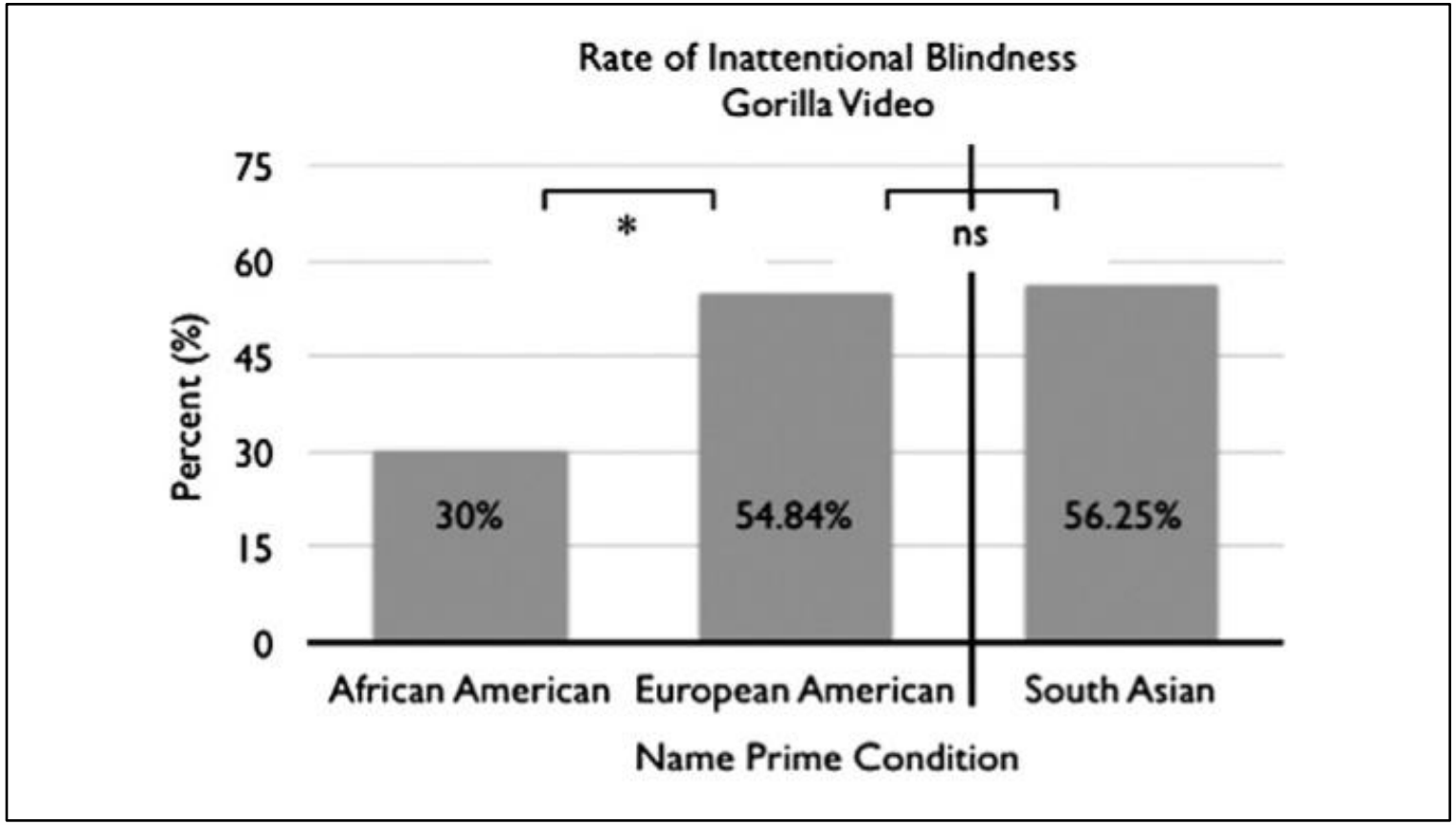
- Le nombre d'EI détectés ne prédit pas la perf sur l'essai critique
  > $p = 0.647$
- Ni la détection de l'élément congruent, ni de l'élément incongruents ne prédisent la perf sur l'essai critique
  > $p = 0.843$ et $p = 0.339$ respectivement
- La perf moyenne (sur l'ensemble des essais) ne prédit ni la détection de l'élément inattendu congruent ($\beta = -0.076$, $p = 0.071$), ni la détection de l'EI incongruent ($\beta = -0.074$, $p = 0.161$)

Inattentional blindness: Associative priming

Rattan, & Eberhardt, 2010

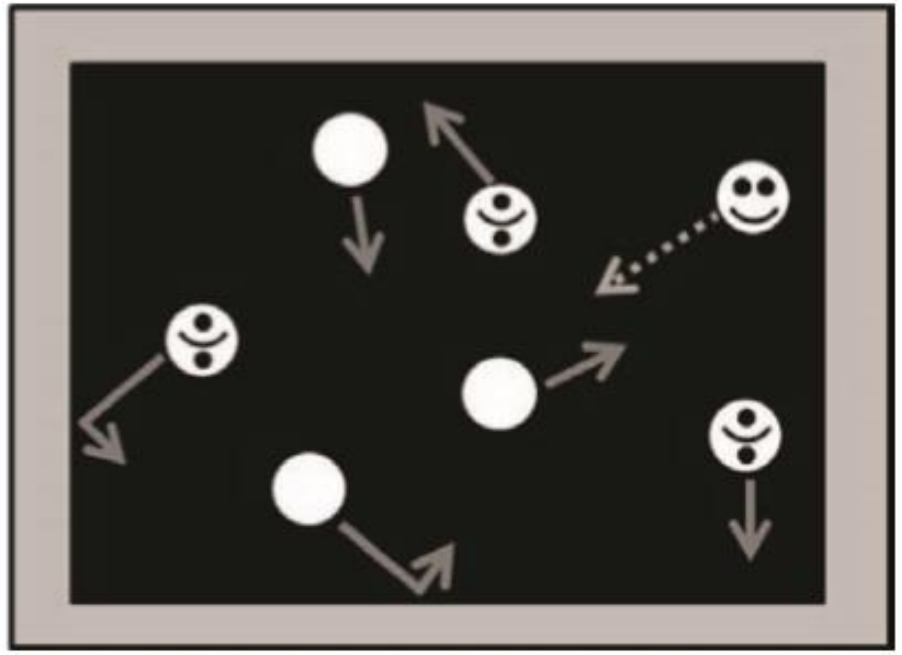
According to Black/monkey association (Goff et al., 2008)

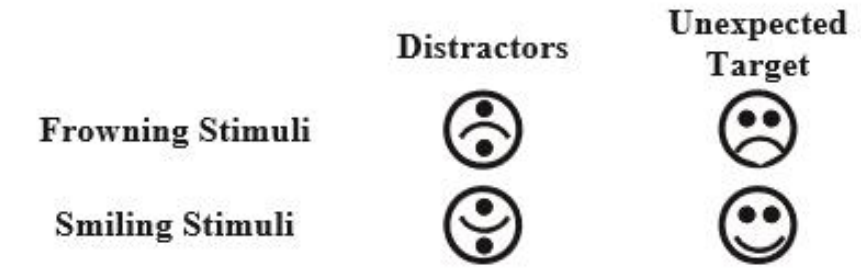
VI : Priming : *African American* VS *European American*



Inattentional blindness: Associative priming

Becker, & Leinenger, 2011





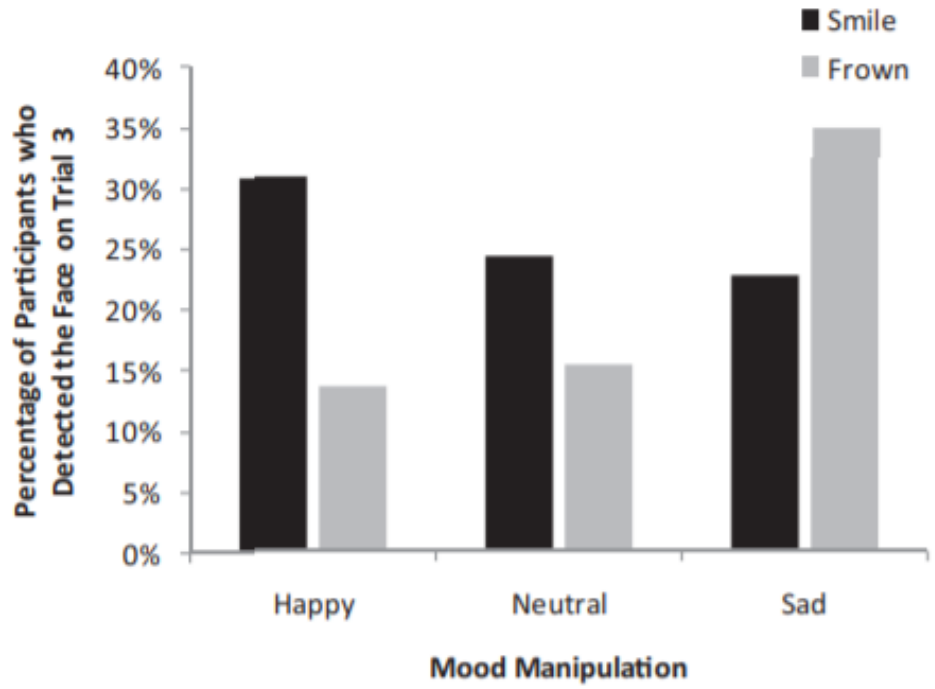
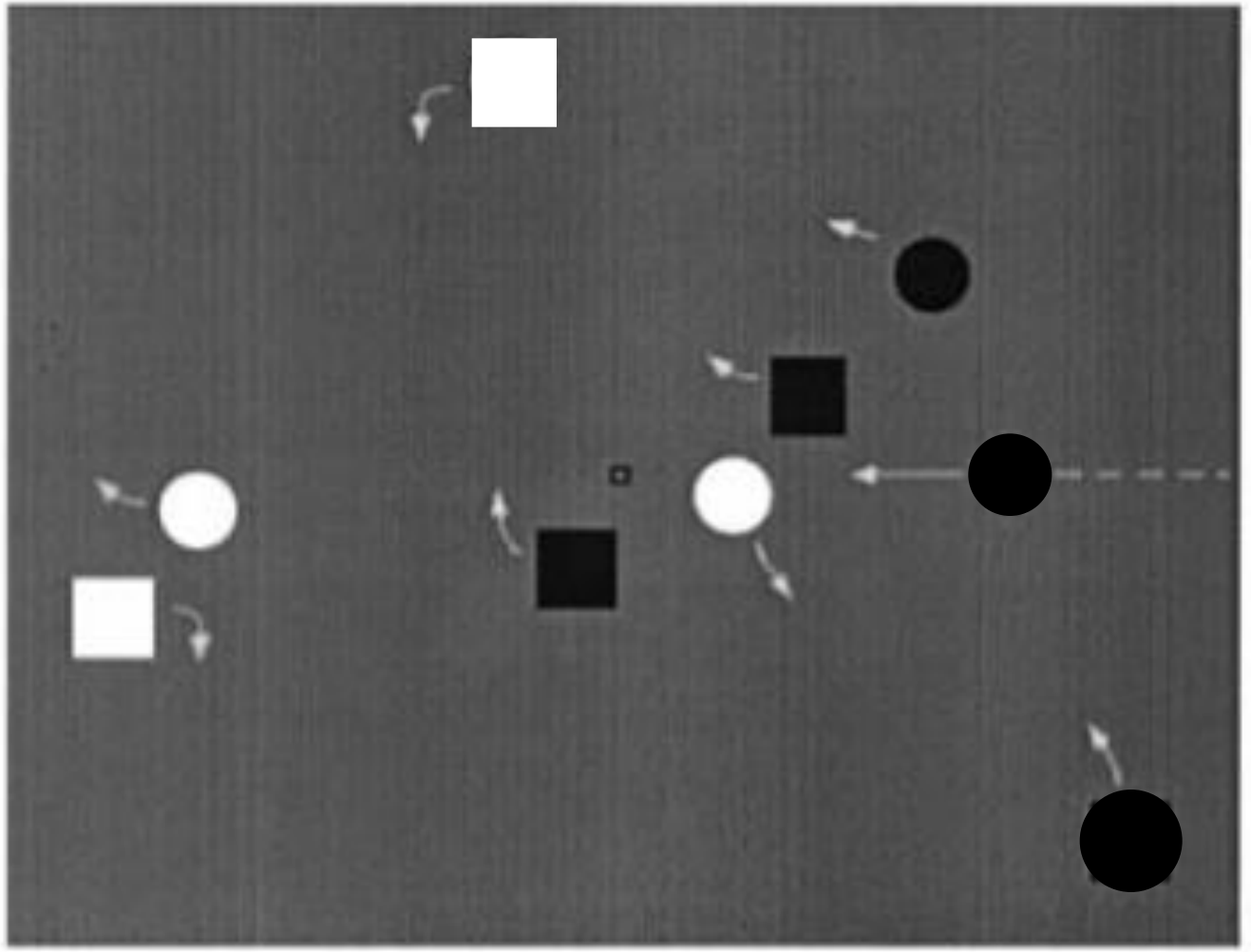


Figure 2. Detection of the unexpected stimulus. The percentage of participants who detected the unexpected object (ordinate) is presented as a function of the mood manipulation (abscissa) and stimulus valence (separate bars). The cross-over interaction indicates that people were far more likely to notice the unanticipated face when its valence matched their induced mood.

Inattentional Blindness

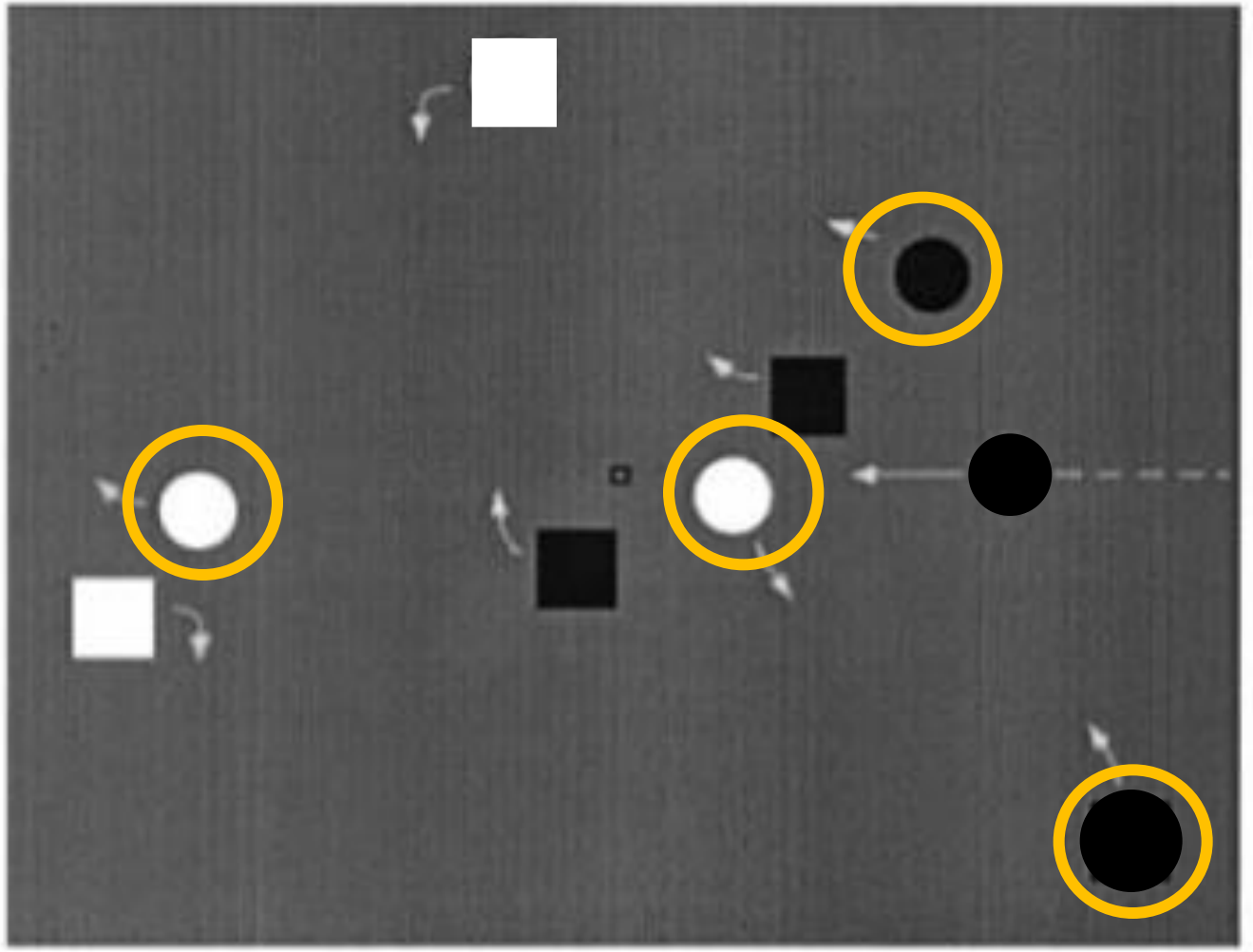
Instructions: Count bounces of



Most et al., 2005

Inattentional Blindness

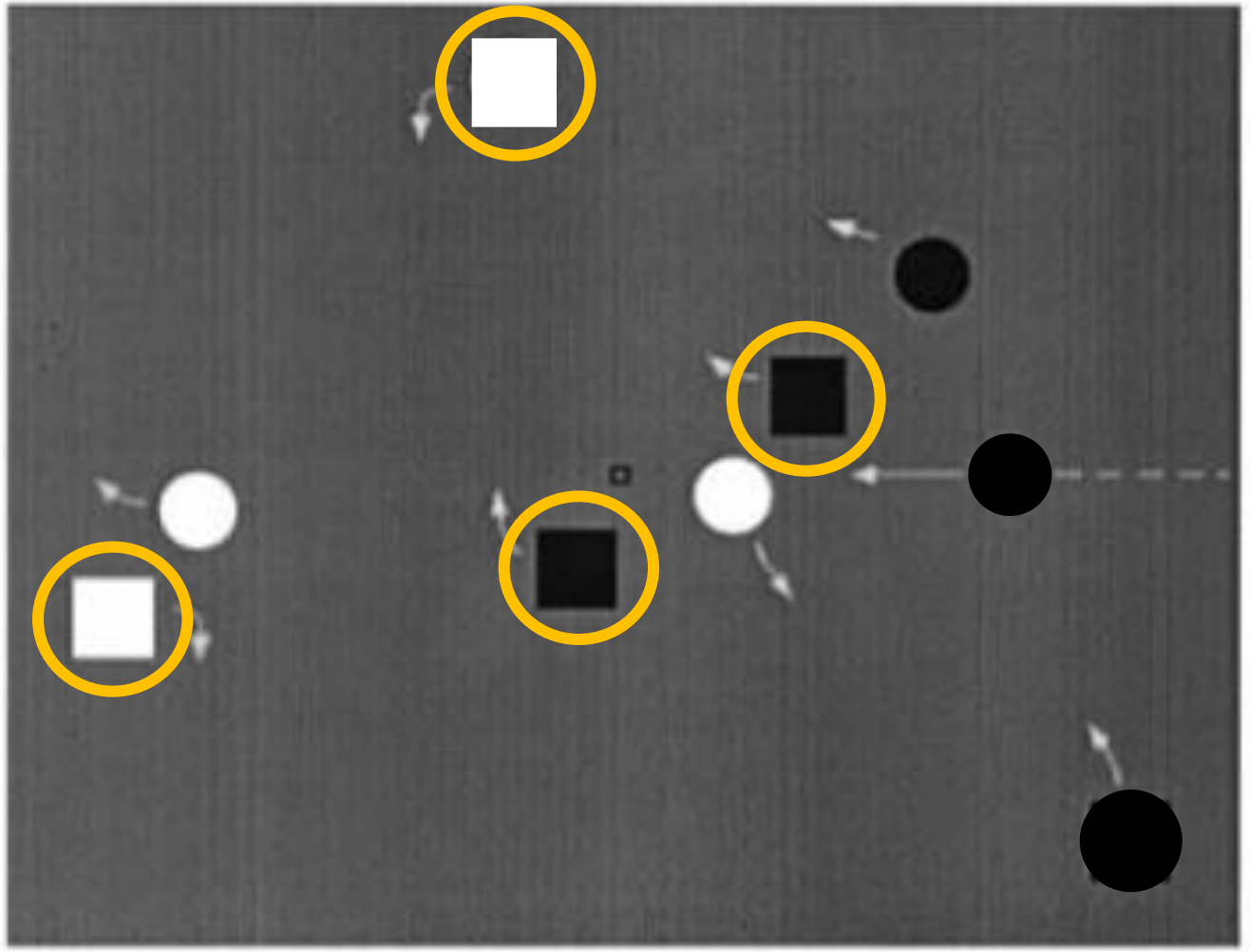
Instructions: Count bounces of
- **Circles**



Most et al., 2005

Inattentional Blindness

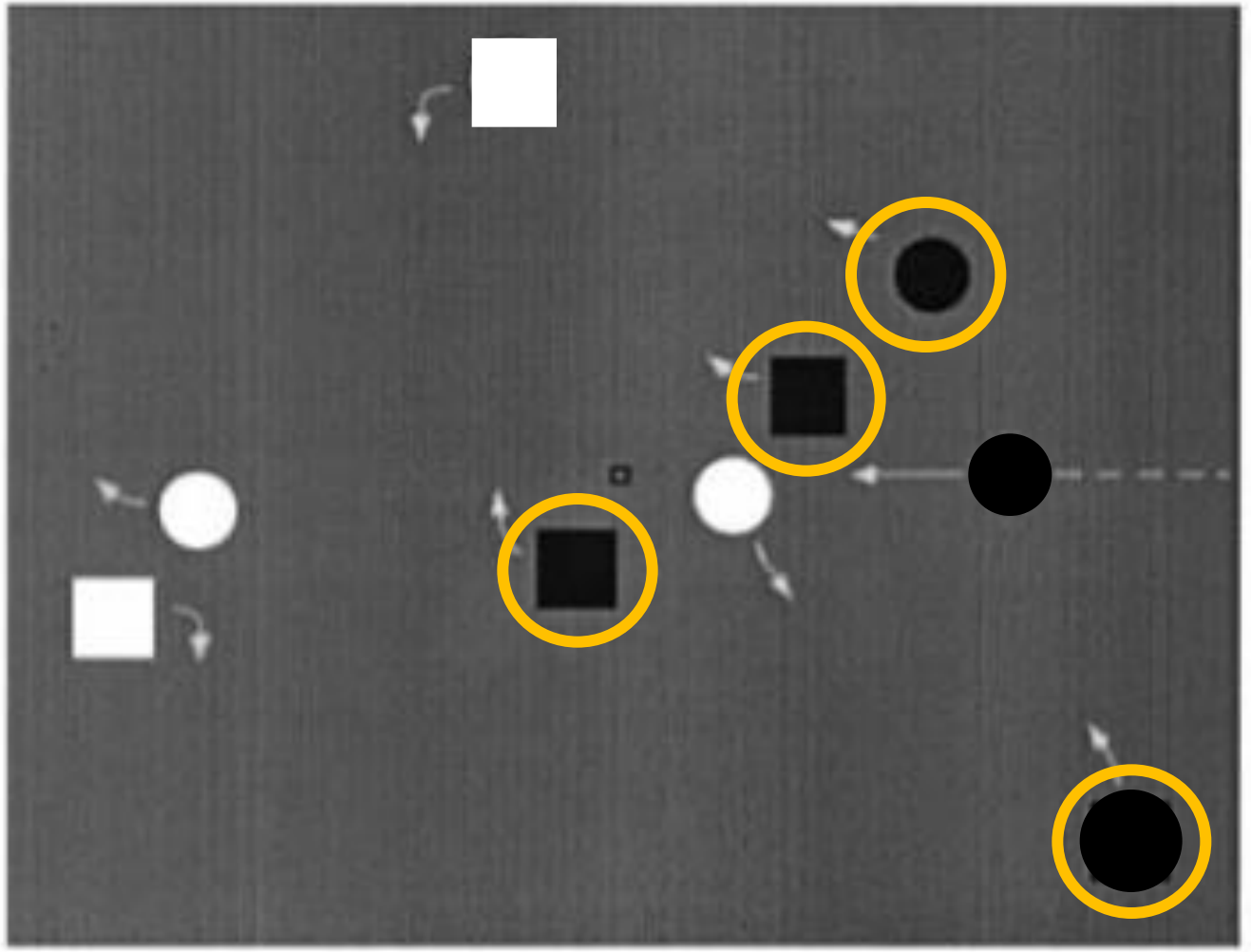
Instructions: Count bounces of
- Circles
- **Squares**



Most et al., 2005

Inattentional Blindness

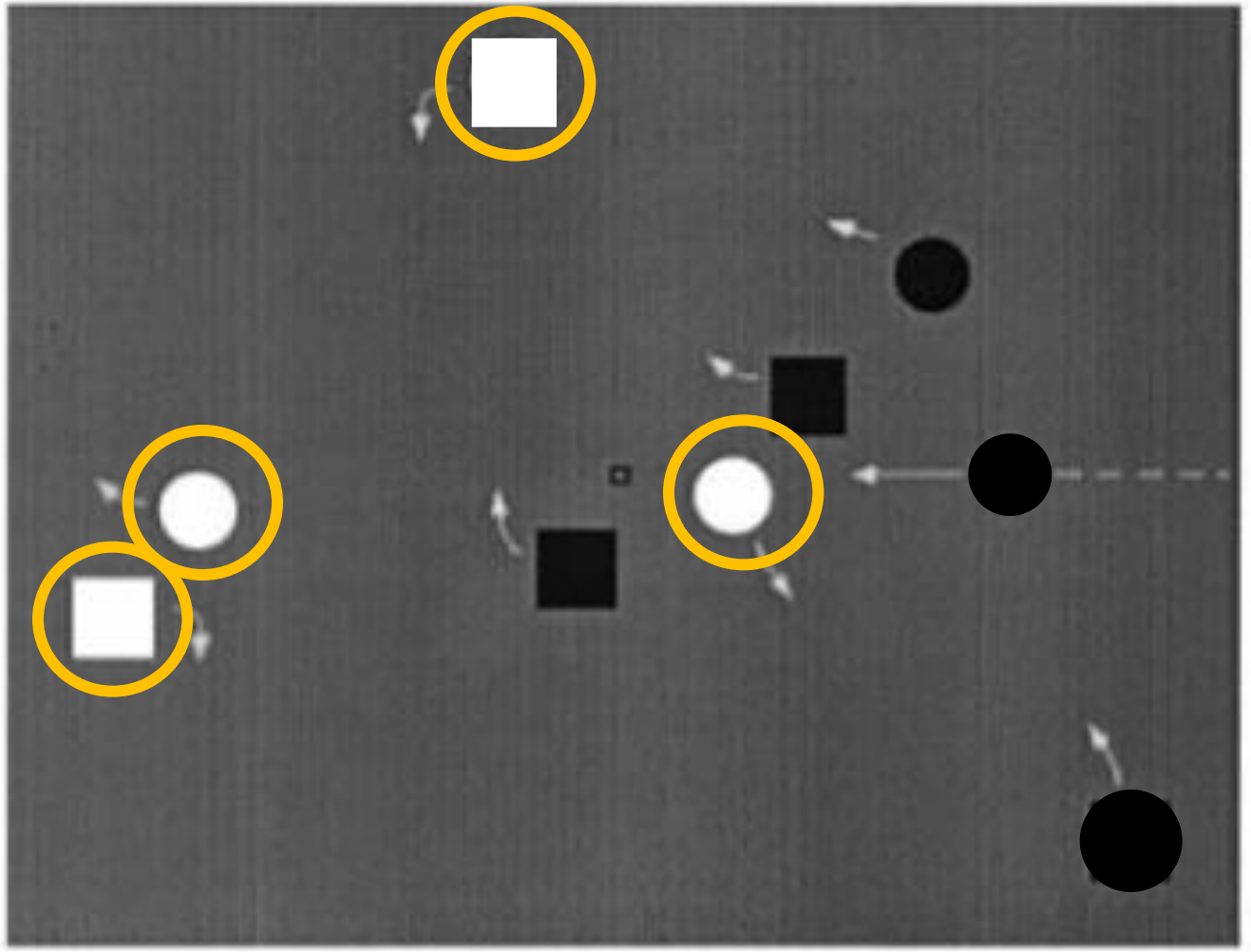
Instructions: Count bounces of
- Circles
- Squares
- **Black elements**



Most et al., 2005

Inattentional Blindness

Instructions: Count bounces of
- Circles
- Squares
- Black elements
- **White elements**

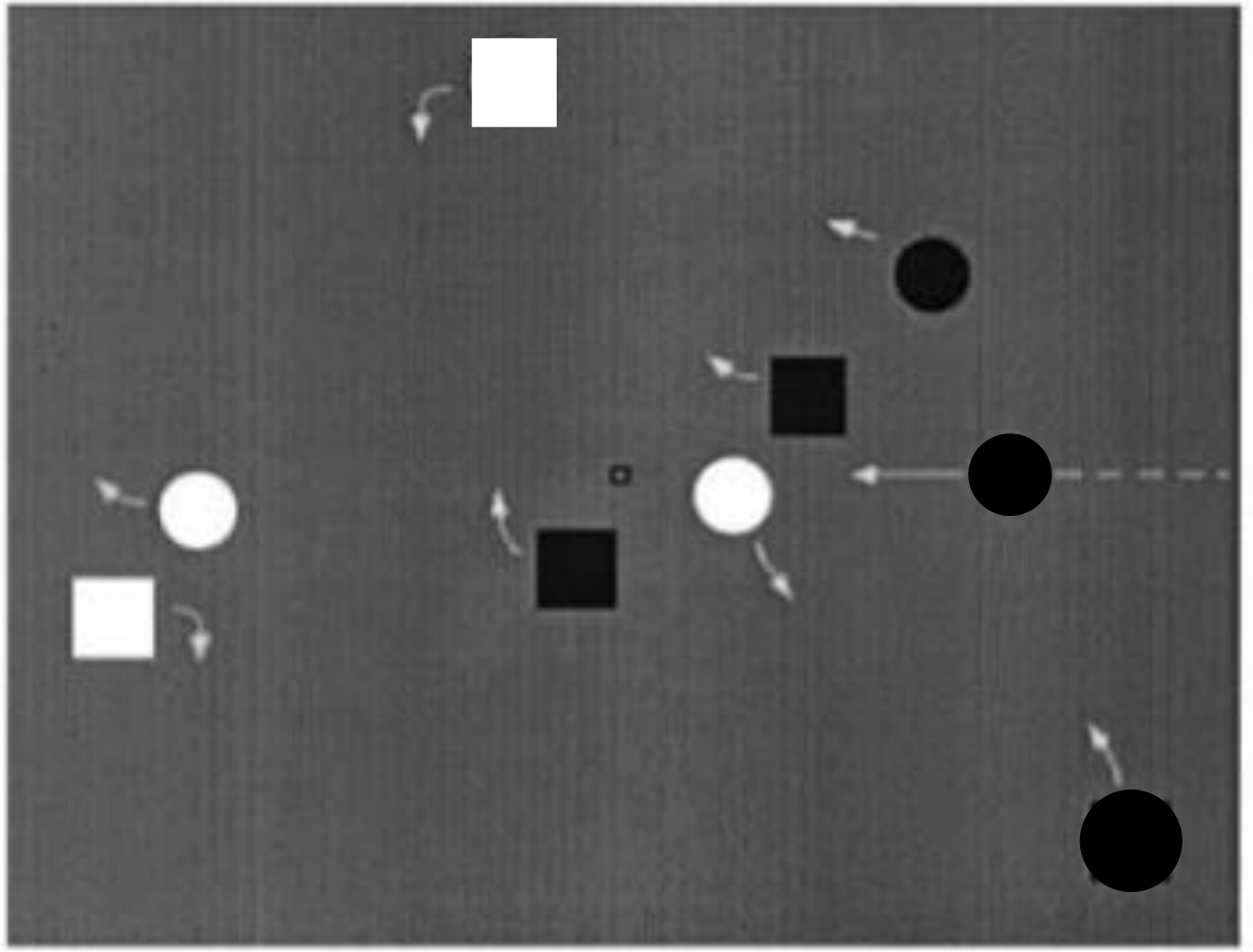


Most et al., 2005

Inattentional Blindness

Instructions: Count bounces of
- Circles
- Squares
- Black elements
- White elements

Unexpected element (UE):

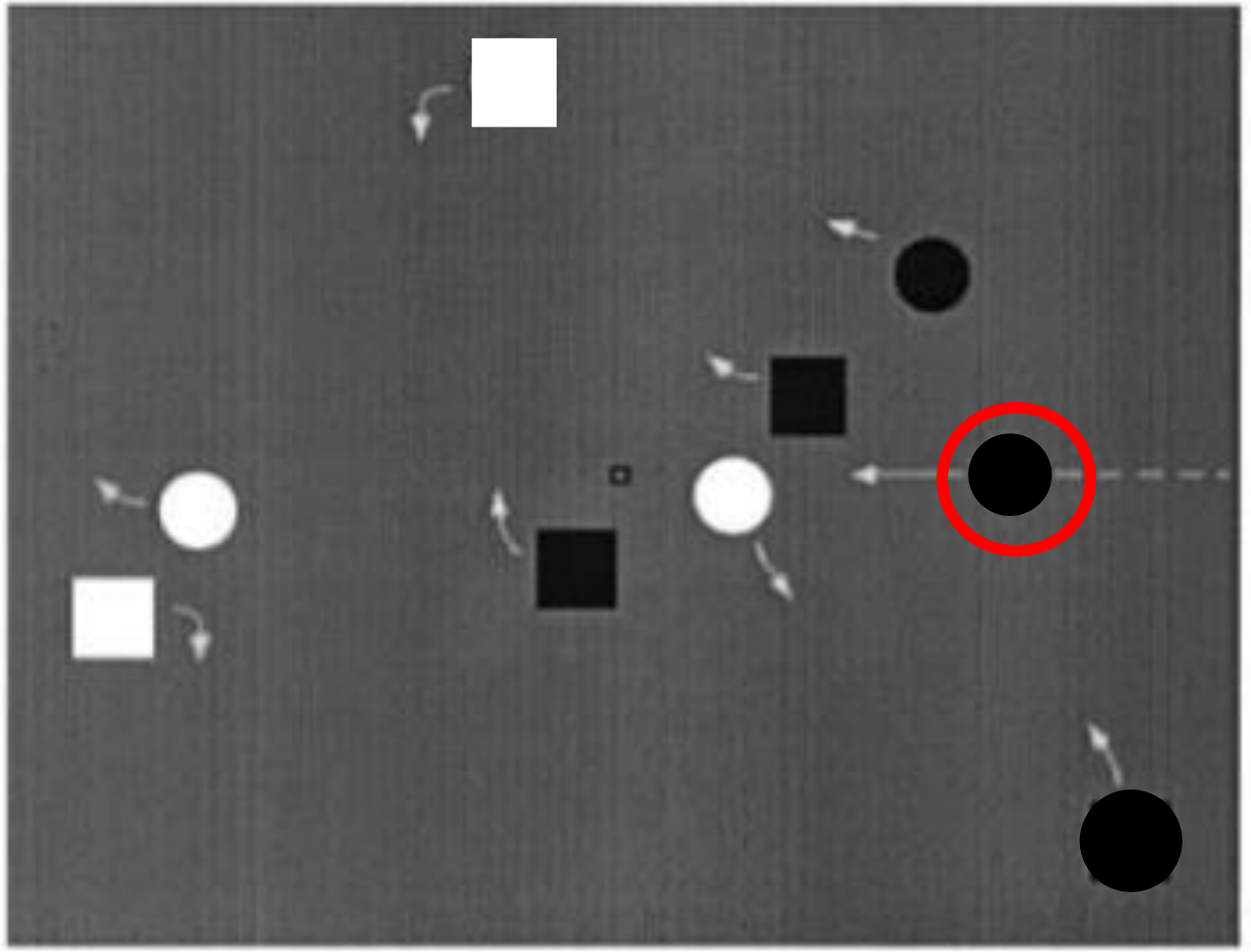


Most et al., 2005

Inattentional Blindness

Instructions: Count bounces of
- Circles
- Squares
- Black elements
- White elements

Unexpected element (UE):
- A **black circle**

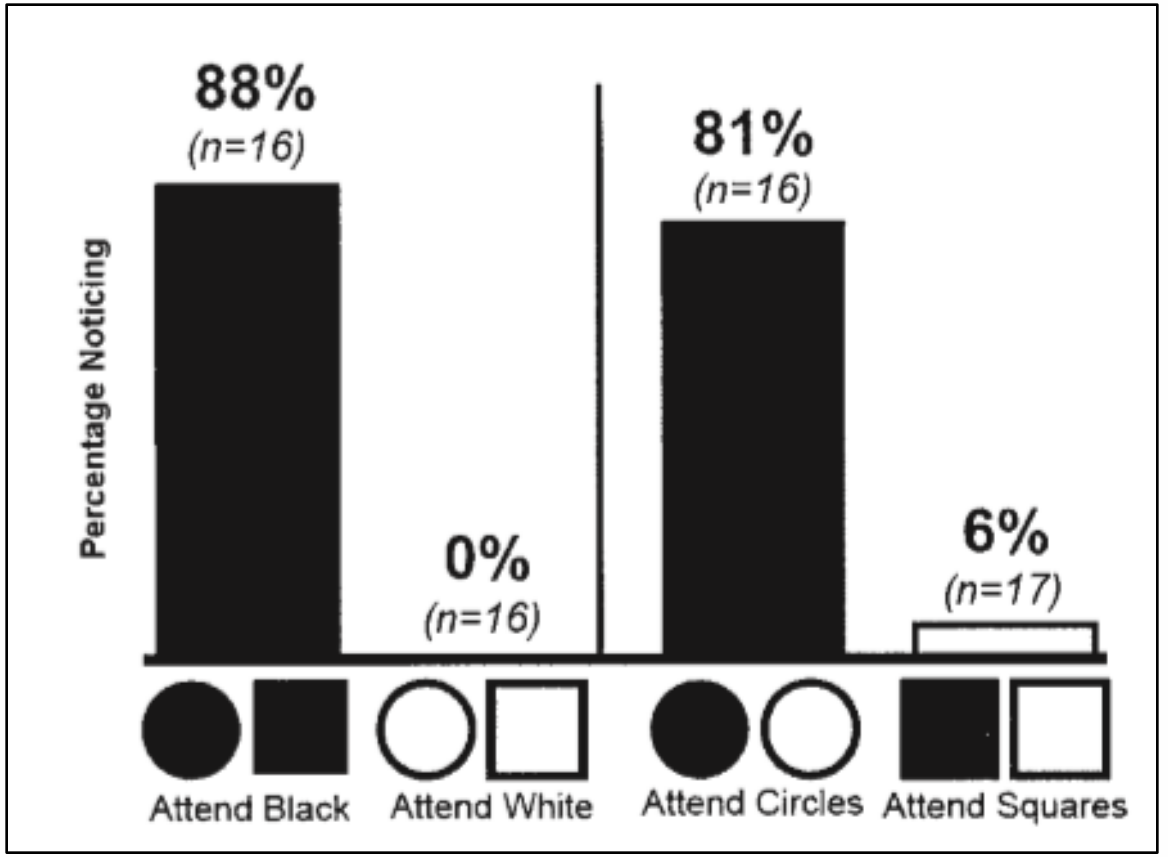


Most et al., 2005

Inattentional Blindness

Task set:

- **Circle :**

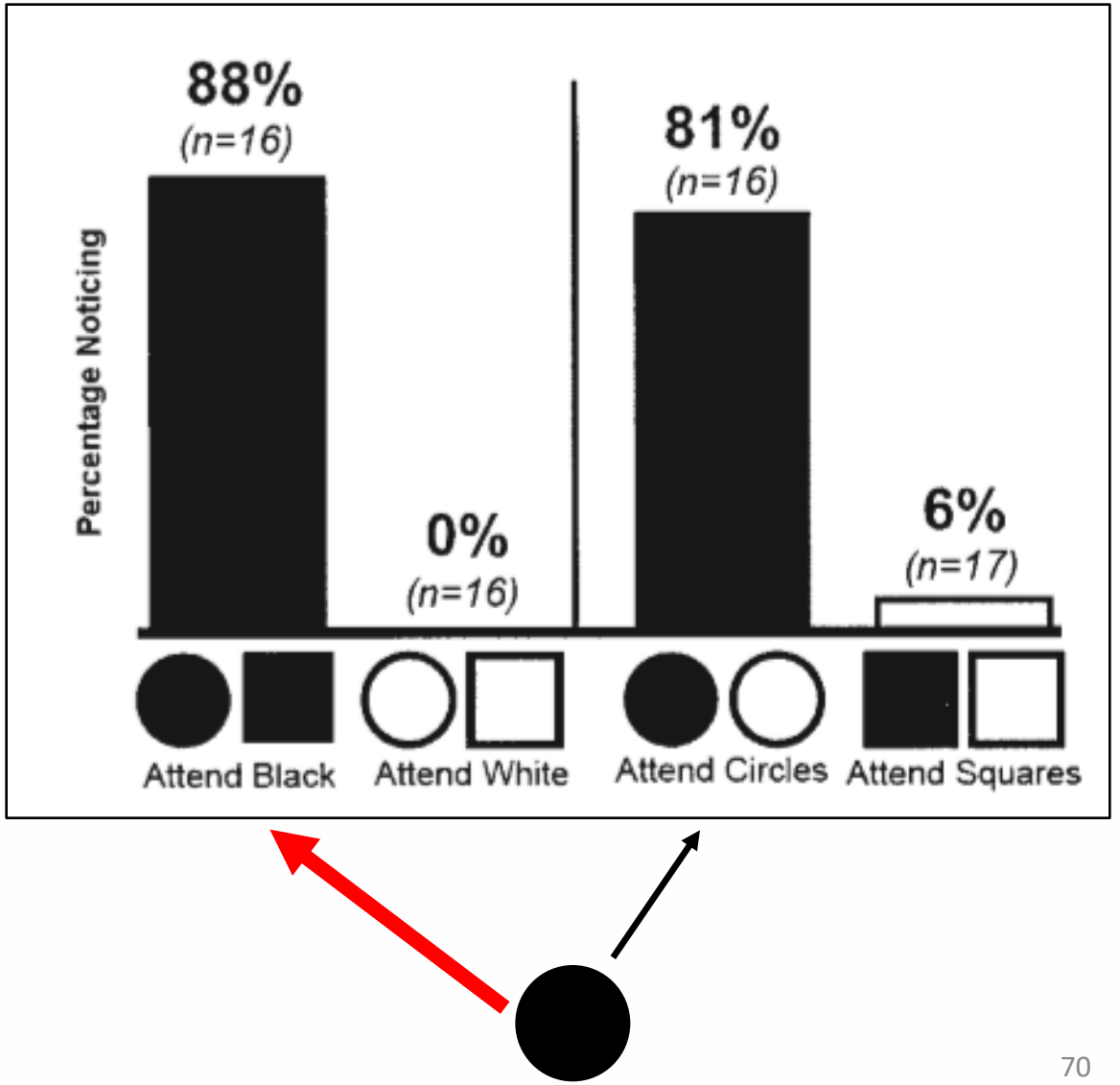


Most et al., 2005

Inattentional Blindness

Task set:

- Circle: 
  +
- **Black:** 



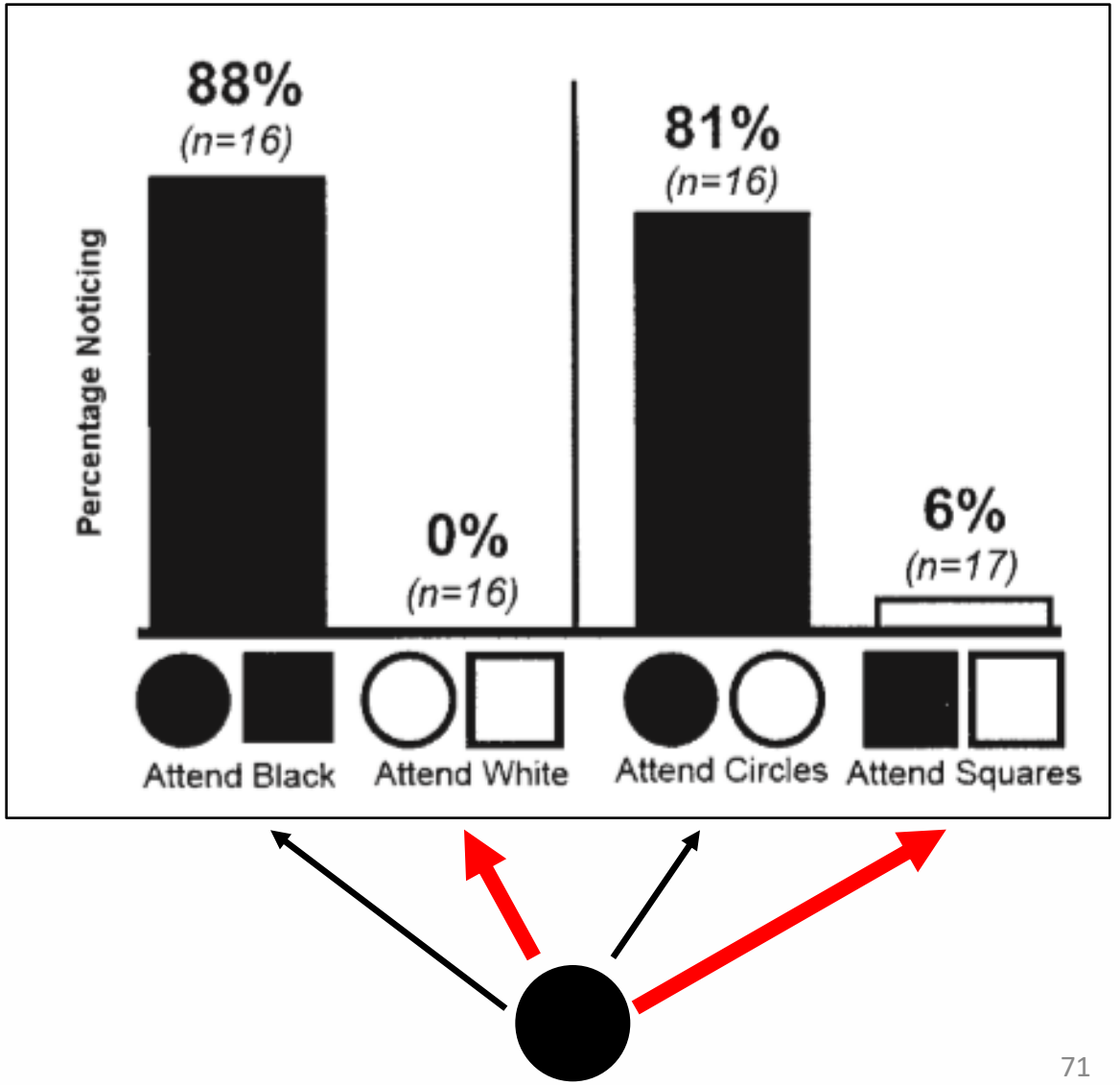
Most et al., 2005

Inattentional Blindness

Task set:

- Circle:
  +
- Black:

- Neither **square** nor **white**



Most et al., 2005

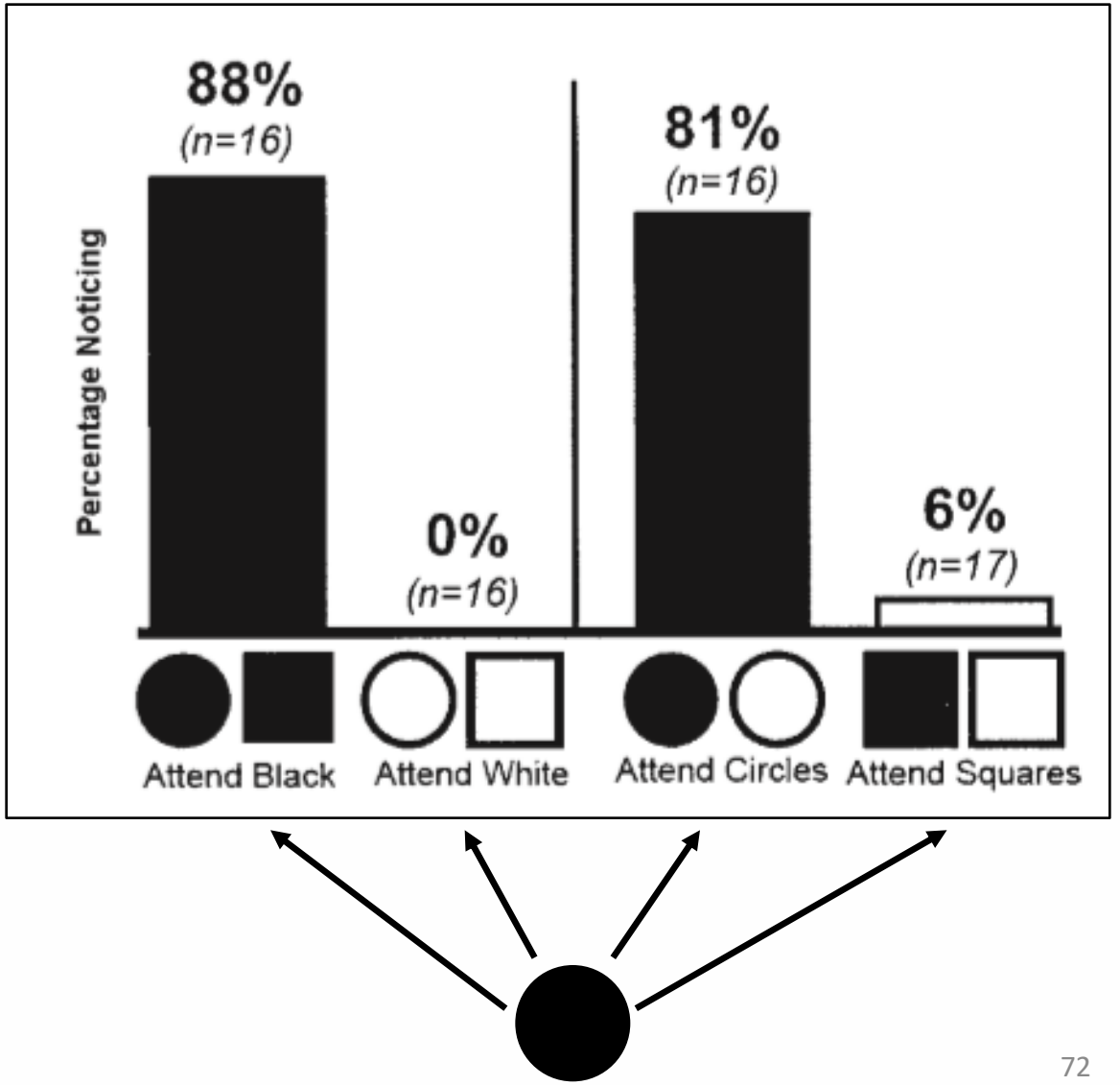
Inattentional Blindness

Task set:

- Circle:
  +
- Black:

- Neither square, nor white

Congruency effect between task set and features of the unexpected stimulus.



Most et al., 2005