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

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**19th General Meeting
of the European Association
of Social Psychology**

Be(a)ware of my environment:

The effect of threat on attentional control and inattention blindness

Lucas Gautier, Alice Normand, & Jean-Claude Croizet

Symposium: Matthias GOBEL & Alice NORMAND

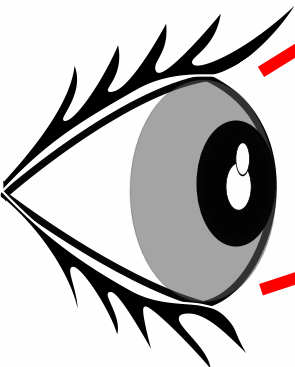
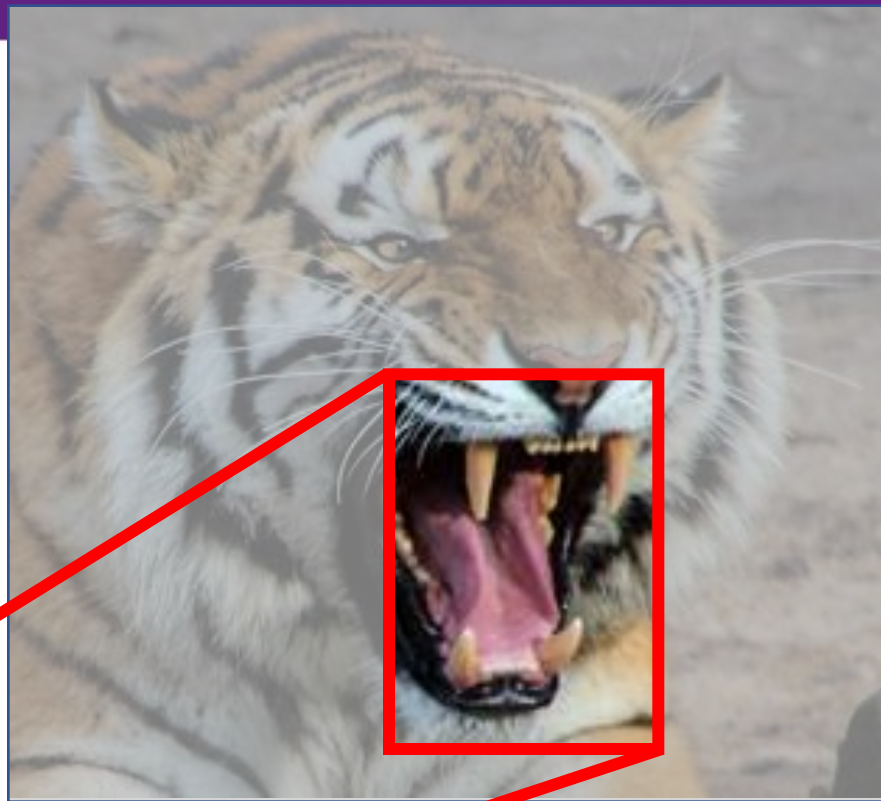


JAGIELLONIAN UNIVERSITY
IN KRAKÓW

EASP EUROPEAN ASSOCIATION
OF SOCIAL PSYCHOLOGY

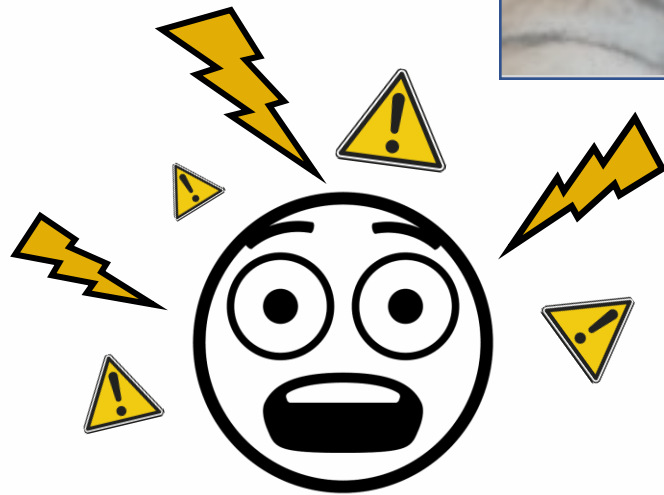
Kraków
June 30th - July 4th, 2023



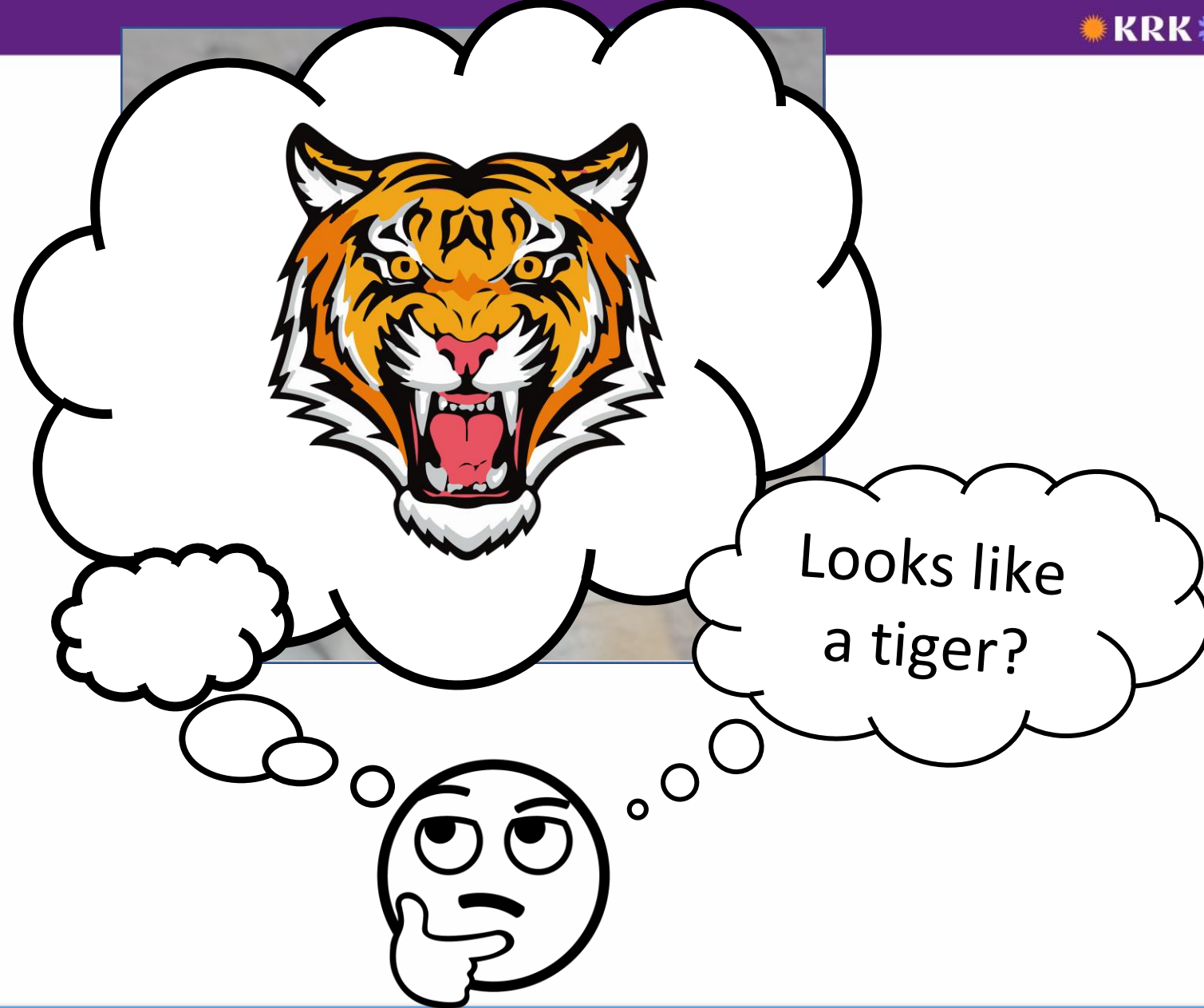


Attention and first perception



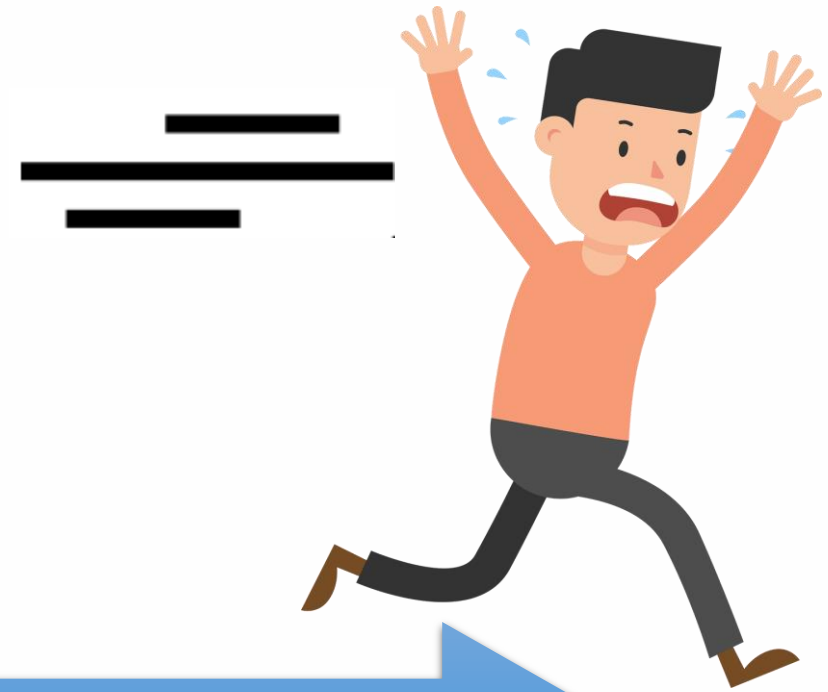


Danger awareness



Interpretation





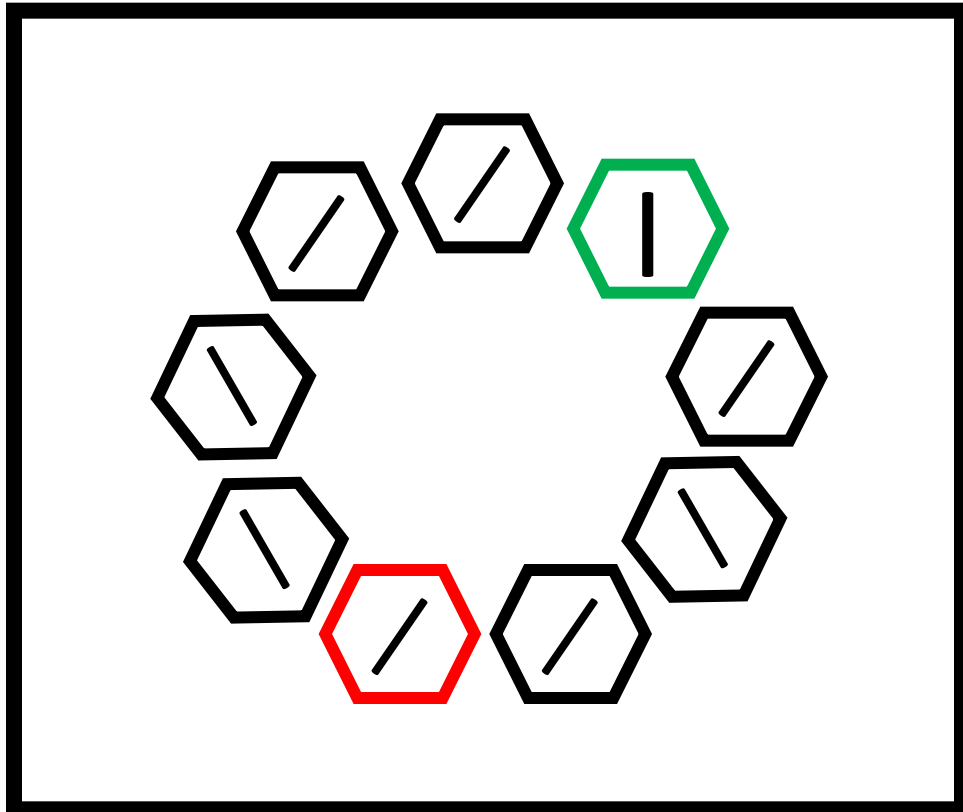
Introduction

- Stressful 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

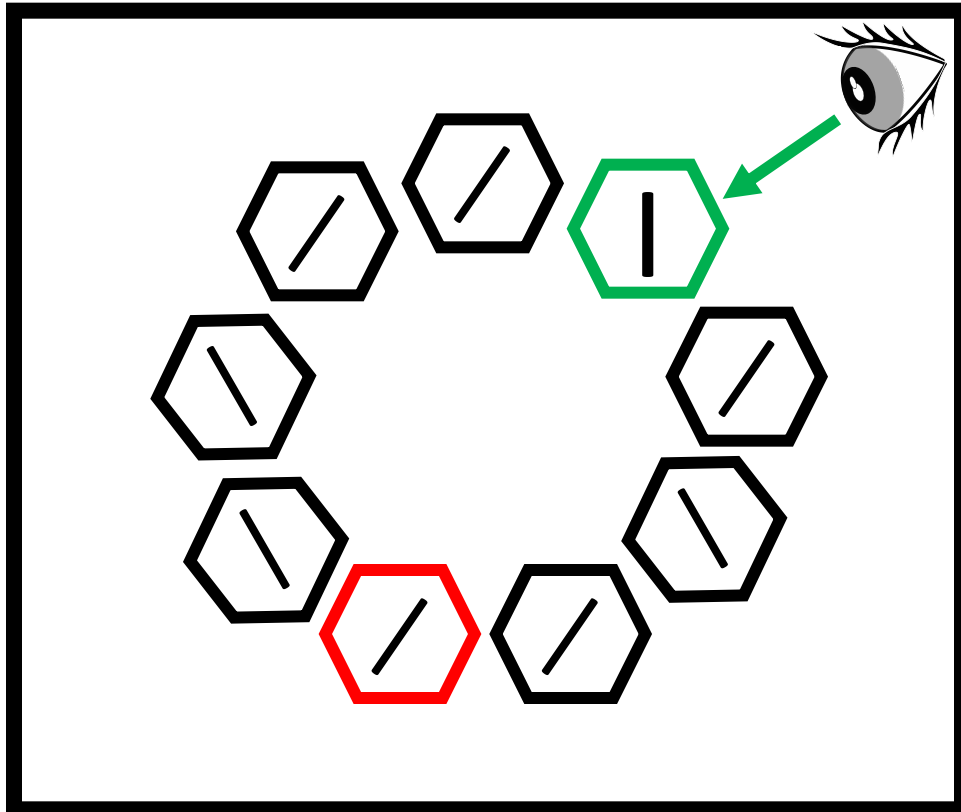
- *Contingent capture Hypothesis* (Folk & Remington, 1998)



- 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

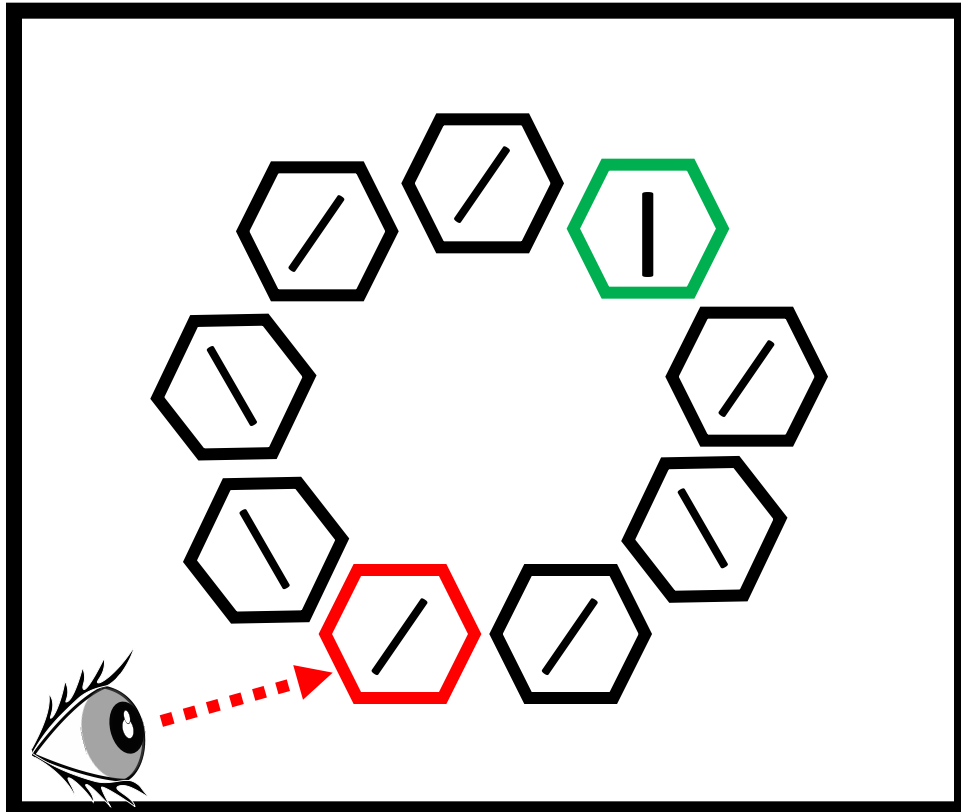
- *Contingent capture Hypothesis* (Folk & Remington, 1998)



- 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

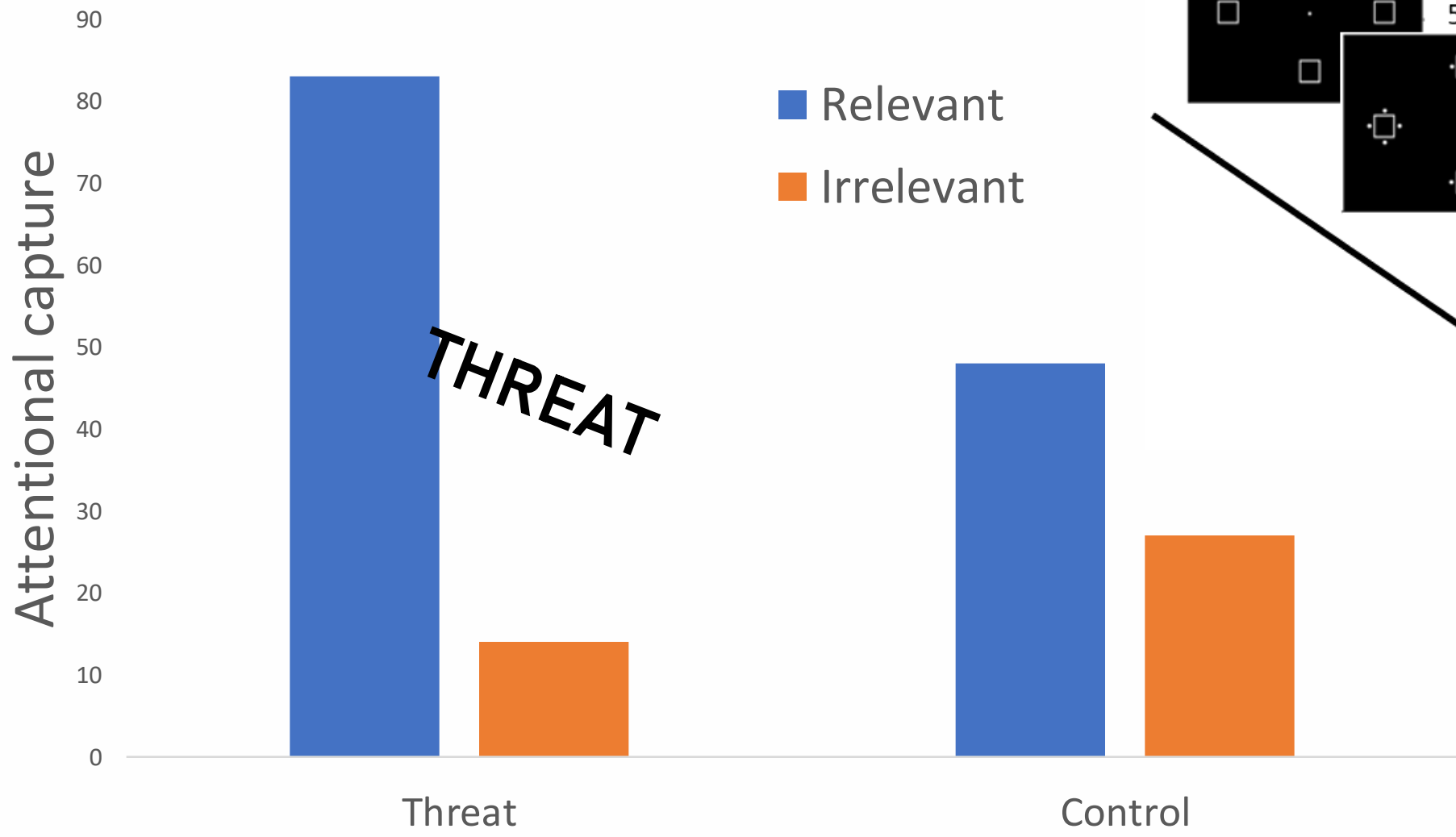
- *Contingent capture Hypothesis* (Folk & Remington, 1998)



- 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

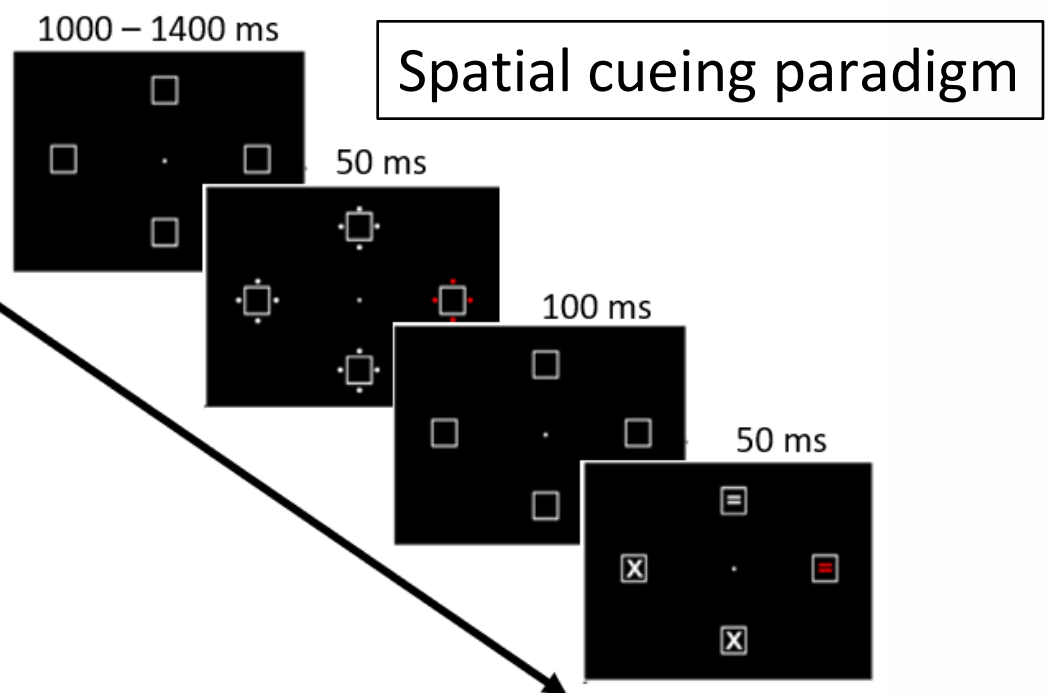
Early attentional processing and threat

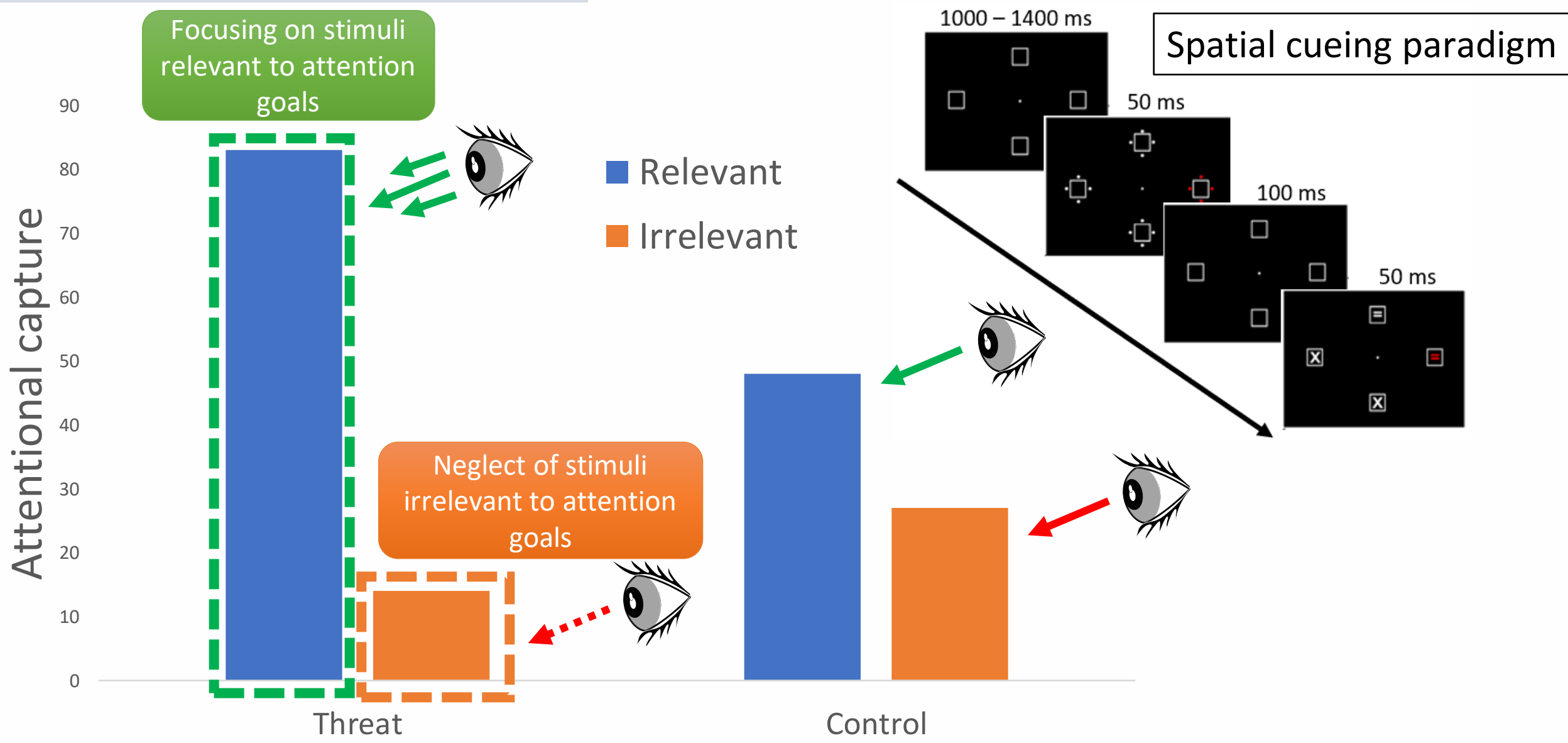
- *Contingent capture Hypothesis* (Folk & Remington, 1998)
- Threat => attentional settings are reinforced (Chajut et Algom, 2003 ; Normand, Bouquet, & Croizet, 2014)
 - **Attentional capture + + +** on stimuli relevant with the attentional set
 - **Attentional capture - - -** on stimuli irrelevant with the attentional set



THREAT

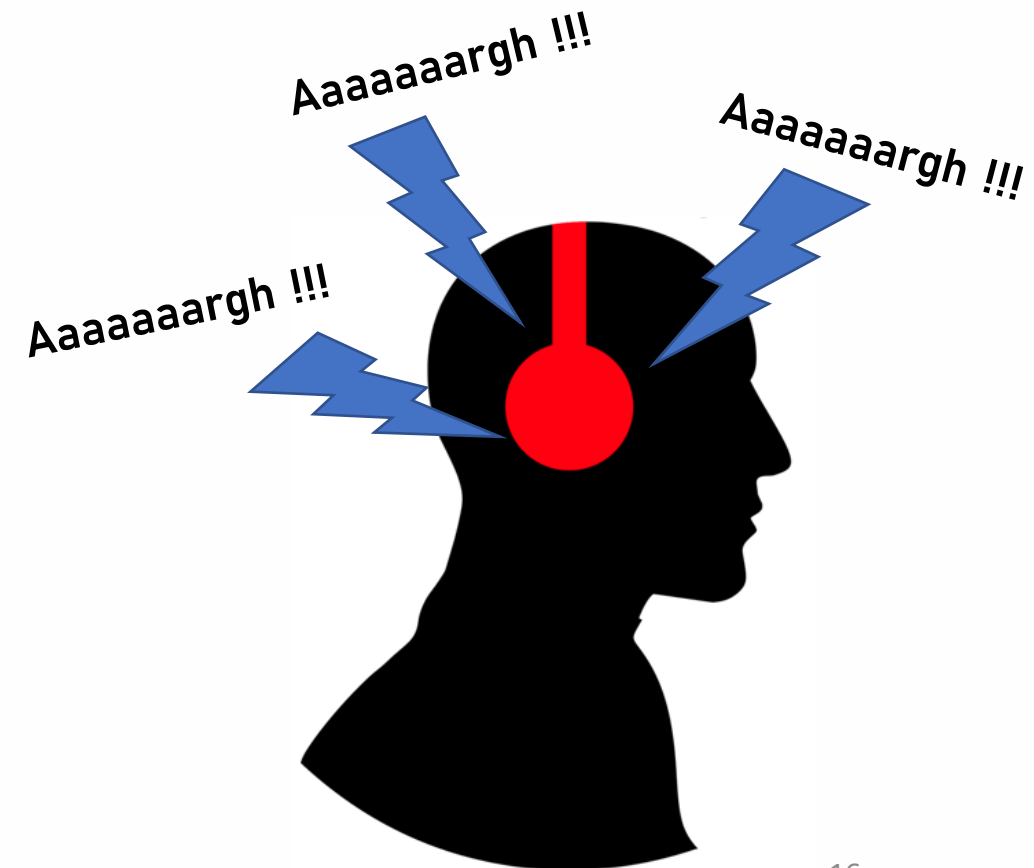
■ Relevant
■ Irrelevant





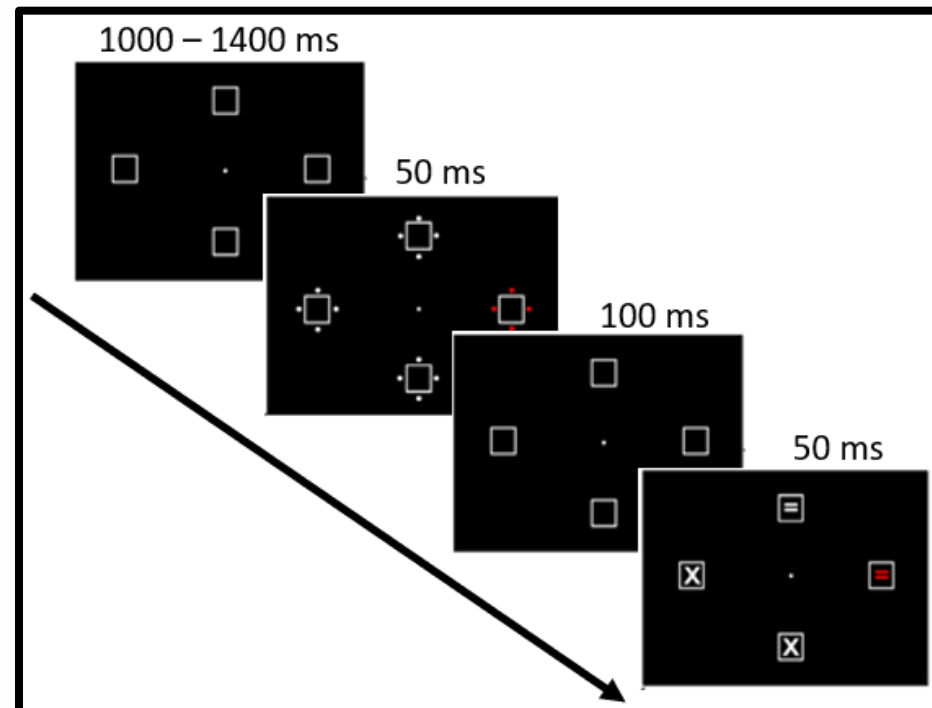
Study 1

- *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)



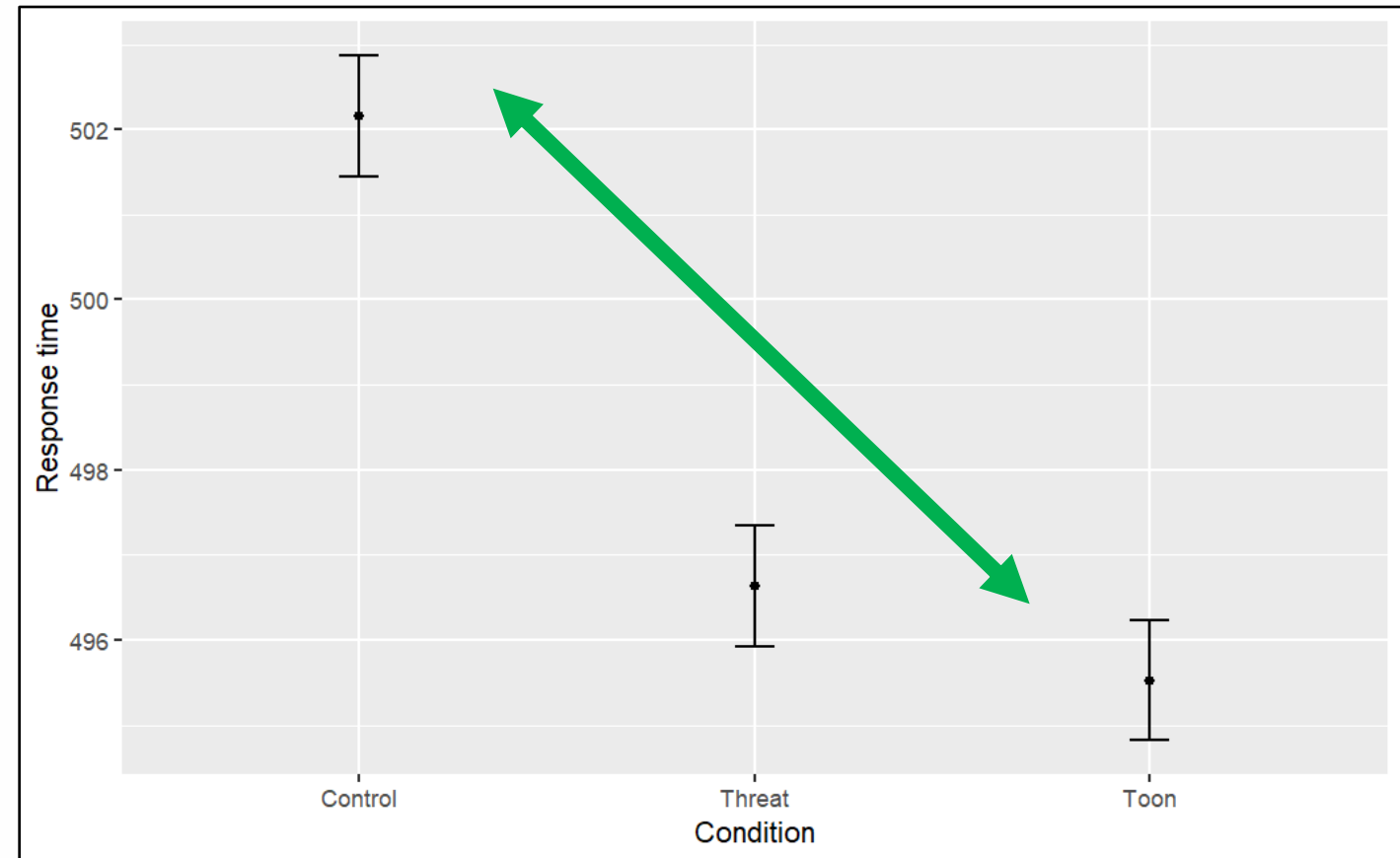
Study 1

- *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



Study 1: Results

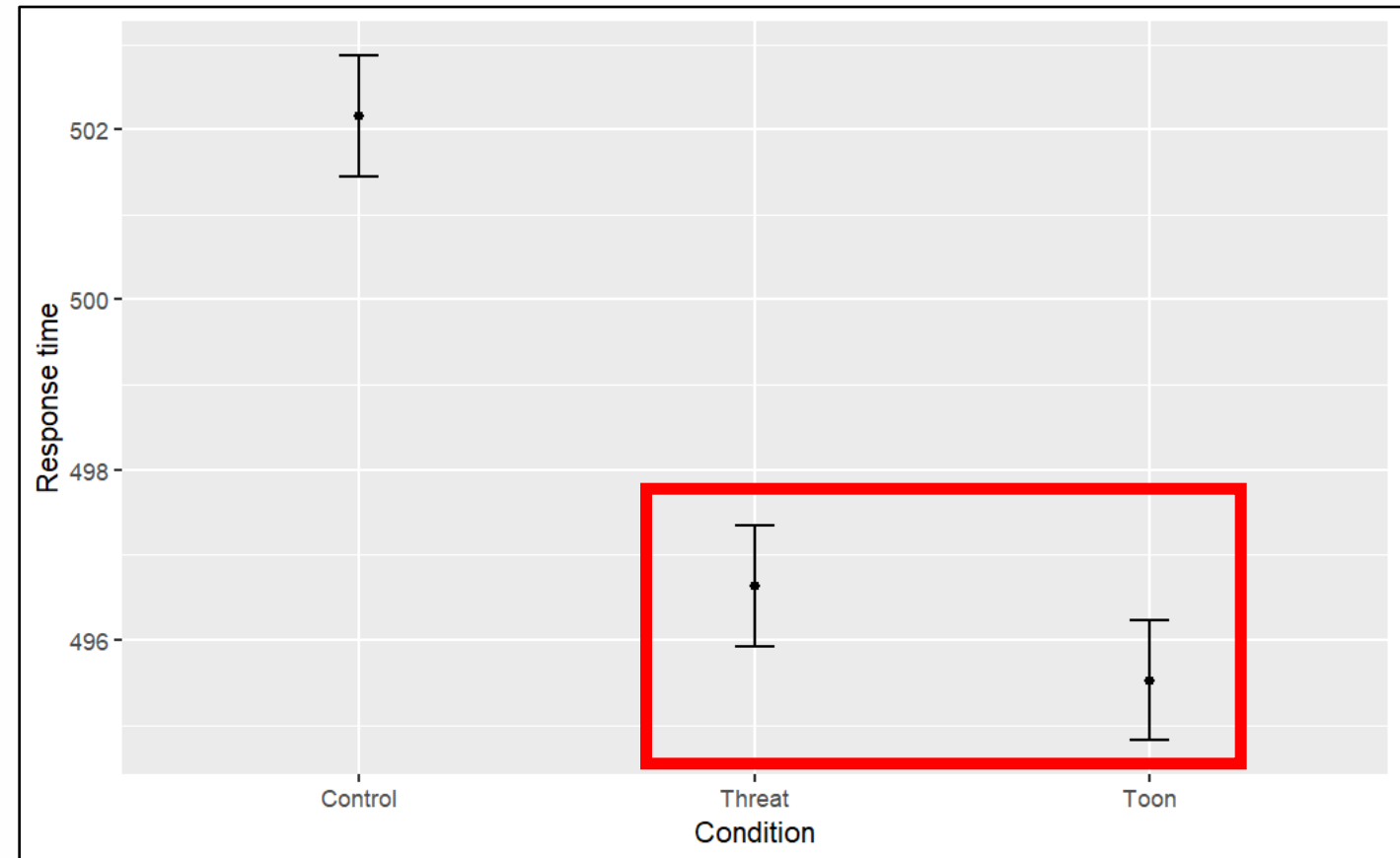
- Main effect of Condition



$$b = 7.85, p = 0.006$$

Study 1: Results

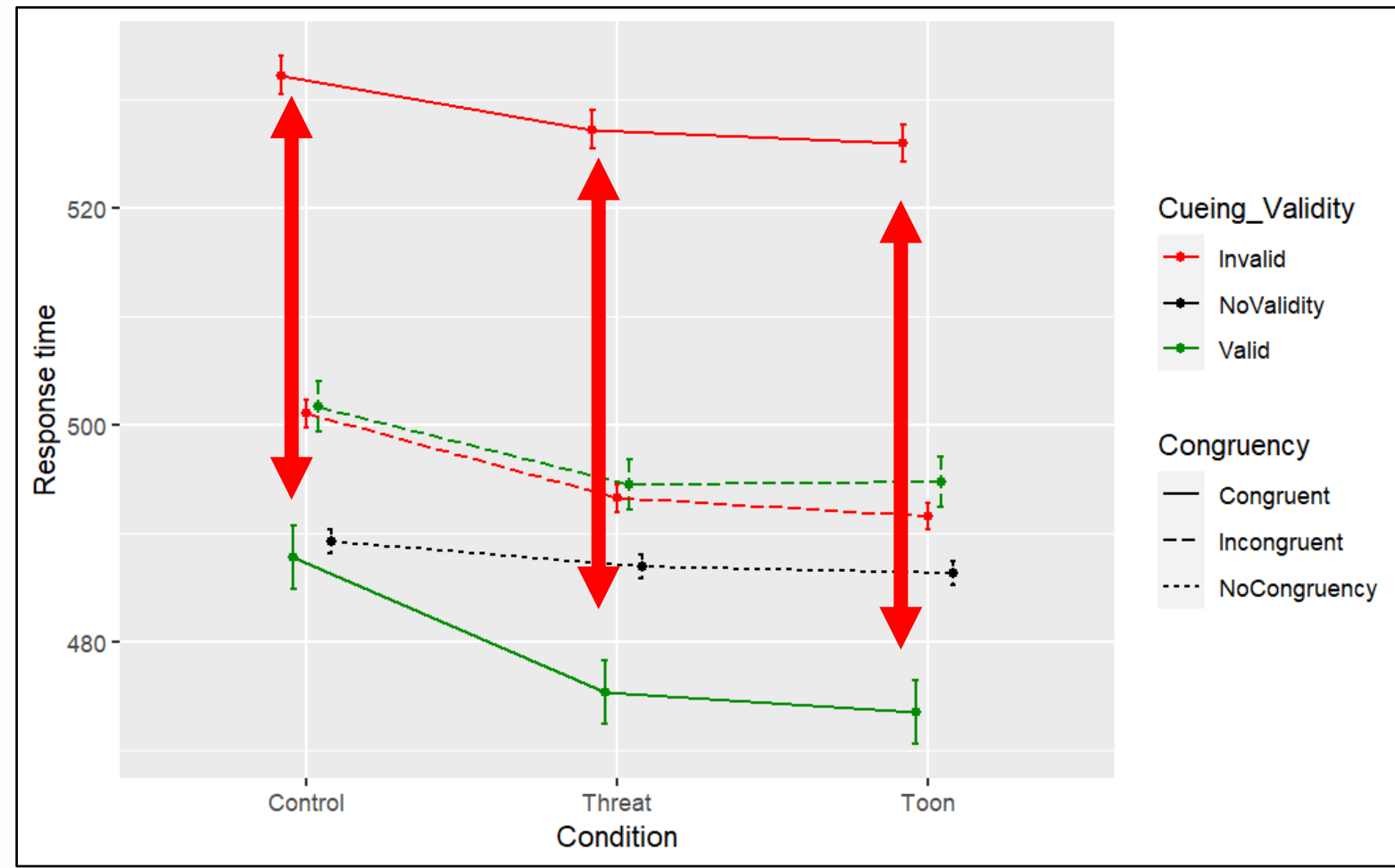
- Main effect of Condition
- **No difference** between *Neutral* and *Threat* Conditions



$$b = -1.58, p = 0.77$$

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 exclusion

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

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.

- N = 258 participants



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?**

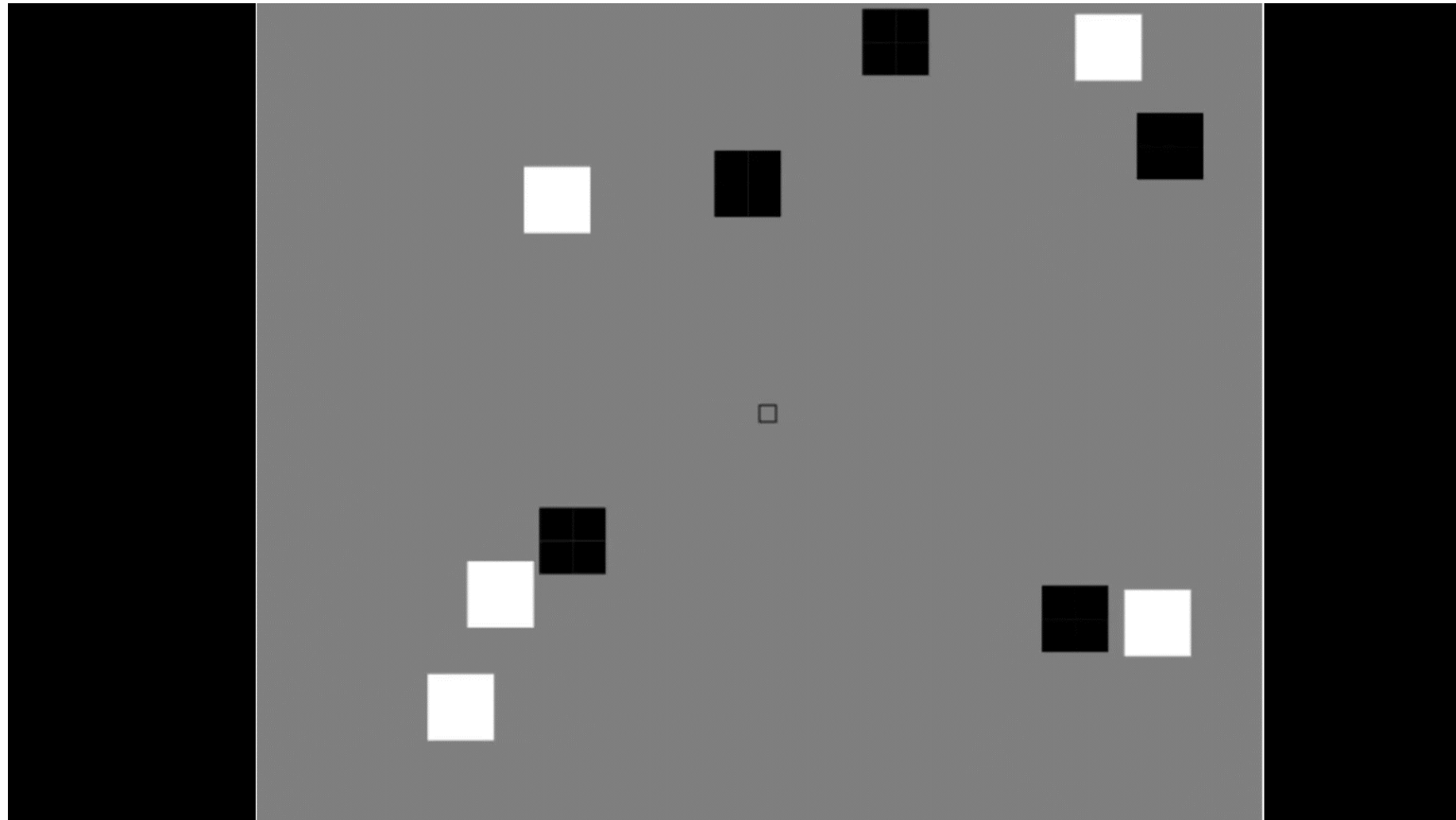


Inattentional Blindness

- 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.



Study 3: Competing unexpected stimuli



Study 3: Competing unexpected stimuli

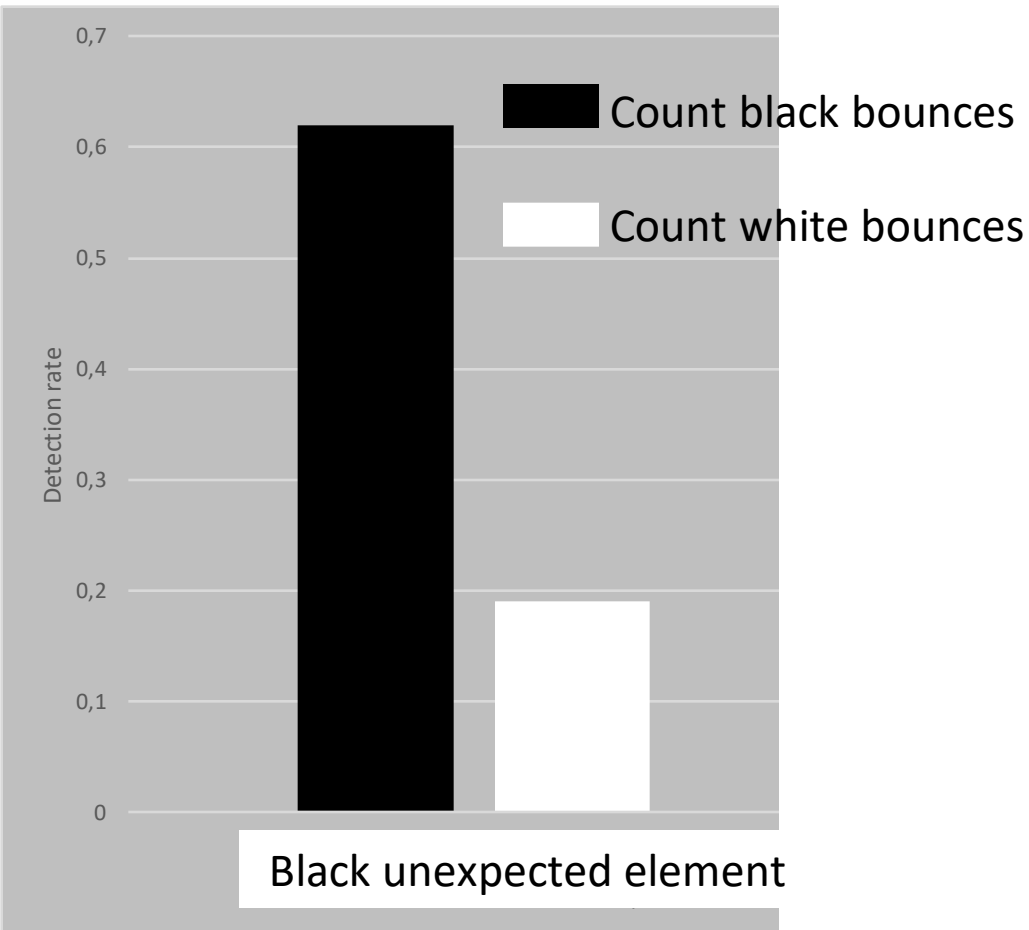


N = 298



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

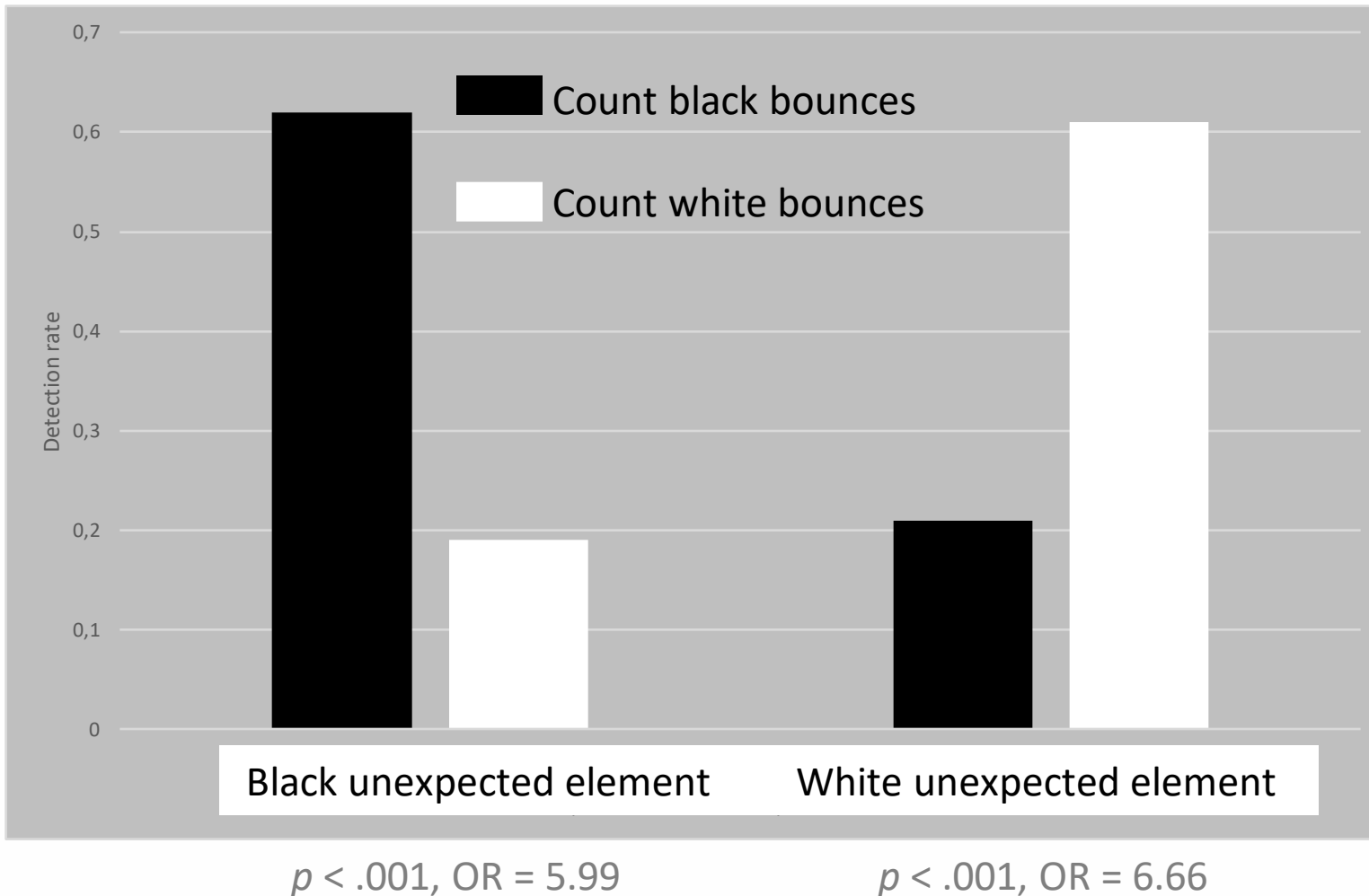
Study 3: Results



$p < .001$, OR = 5.99

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

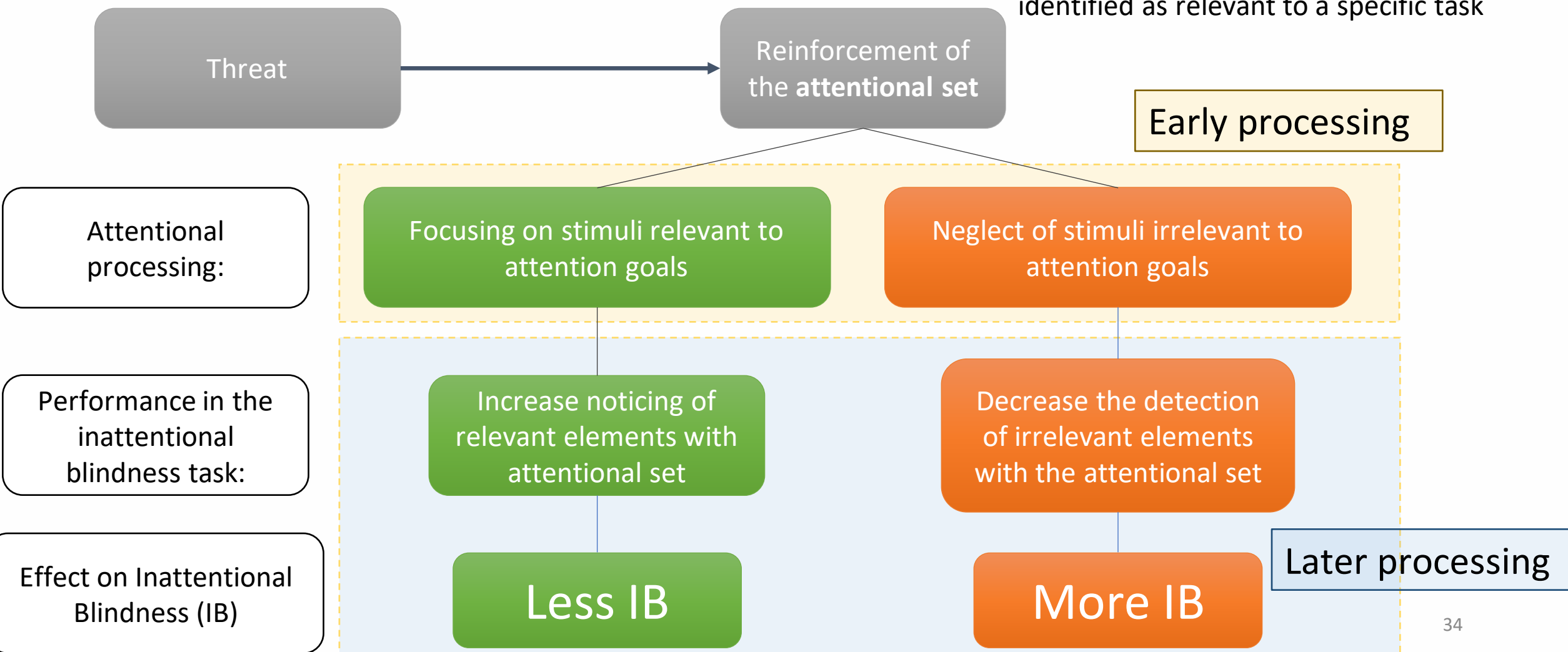
Study 3: Results



- 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 inattention 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

Threat

Reinforcement of the attentional set

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

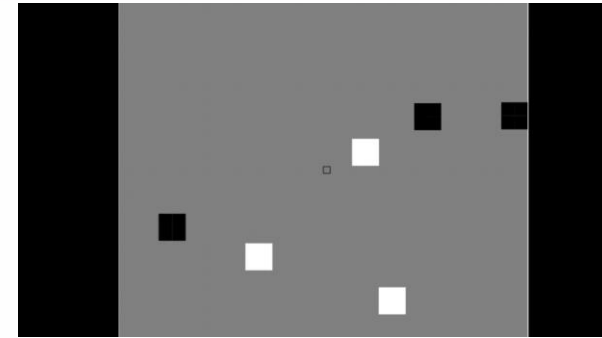
More IB

- Shi & Li, 2020
- Study 4

Study 4

Threat and neglect of irrelevant items

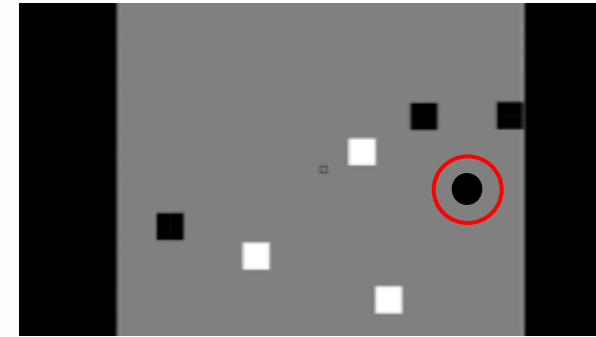
- The same task as study 3, except
 - Only one unexpected item = always **Irrelevant** with the task set



Study 4

Threat and neglect of irrelevant items

- Threat manipulation

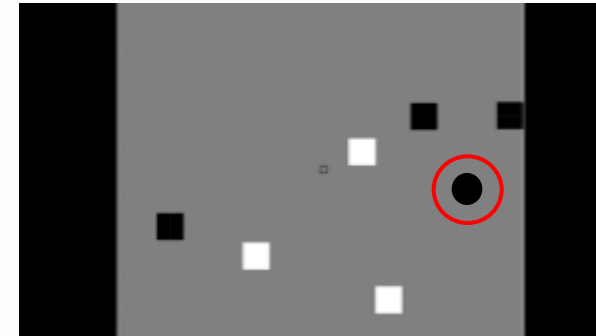


Study 4

Threat and neglect of irrelevant items

- Threat manipulation

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

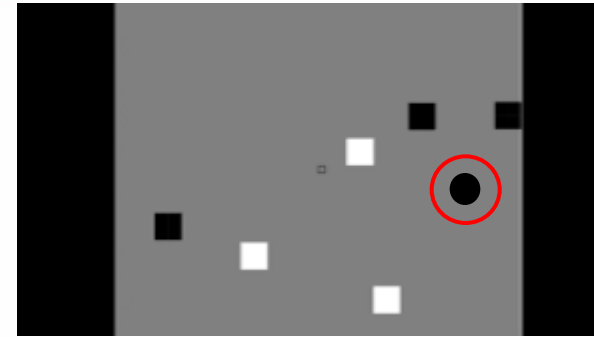


Study 4

Threat and neglect of irrelevant items

- Threat manipulation

+ Measure of self-reported stress



- N = 128

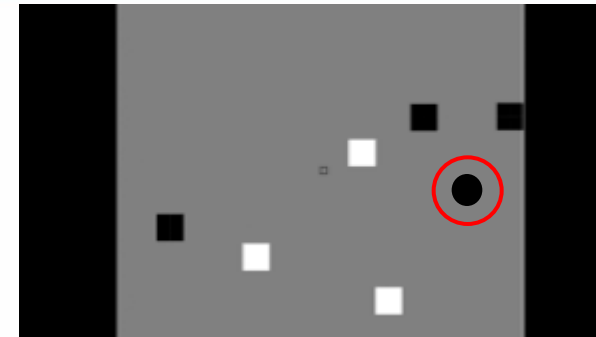
Study 4

Threat and neglect of irrelevant items

- Threat manipulation

+ Measure of self-reported stress

- 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 inattentive blindness [OR = 0.33, 95% CI [0.10, 0.74], $p = 0.025$, $\eta^2 = .047$]*
 - *As stress increases, inattentive 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

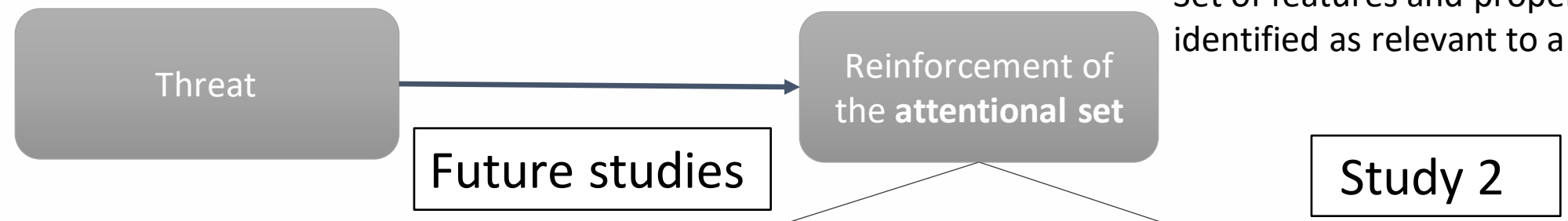
More IB

UNEXPECTED ELEMENT NOTICING



Study 4: Perspectives

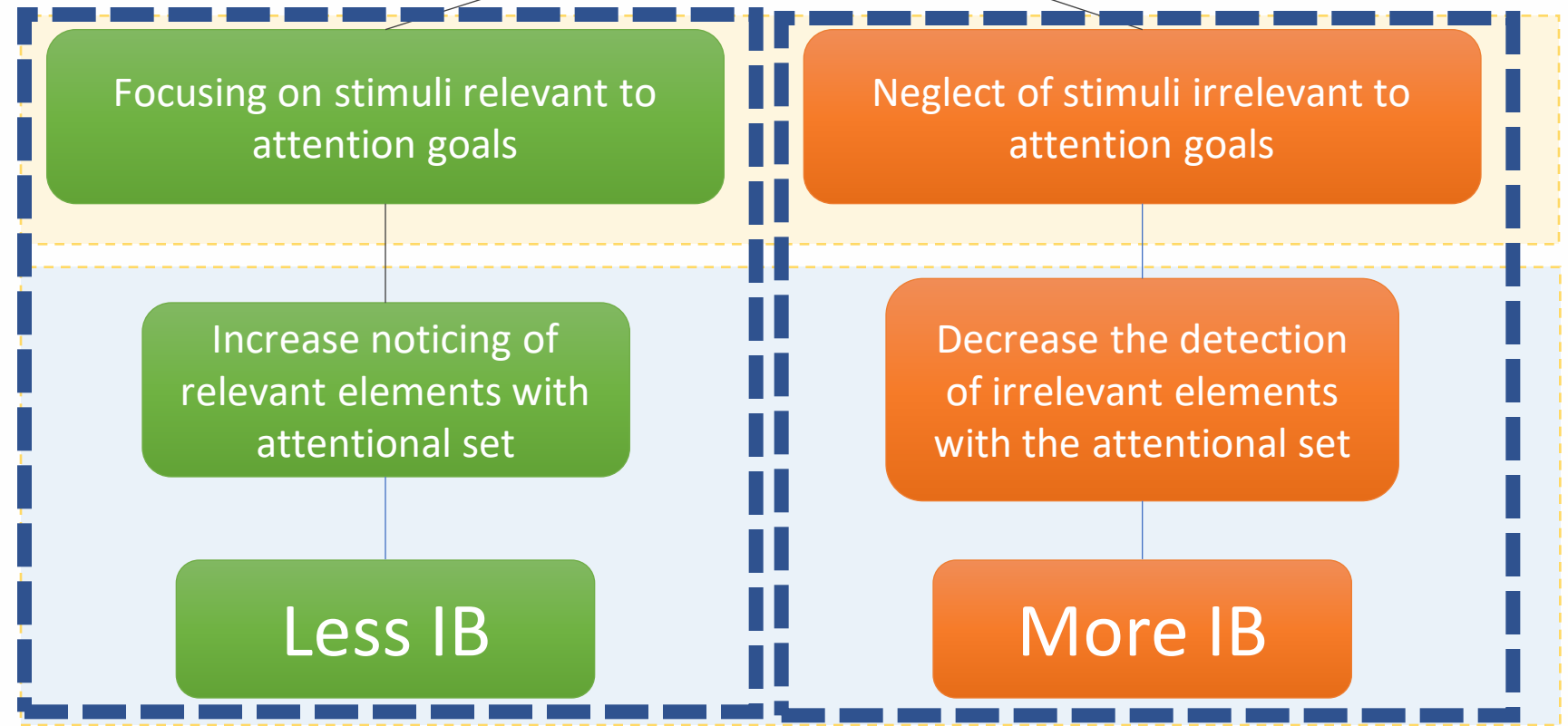
Set of features and properties identified as relevant to a specific task



Attentional processing:

Performance in the inattention blindness task:

Effect on Inattention Blindness (IB)



General discussion

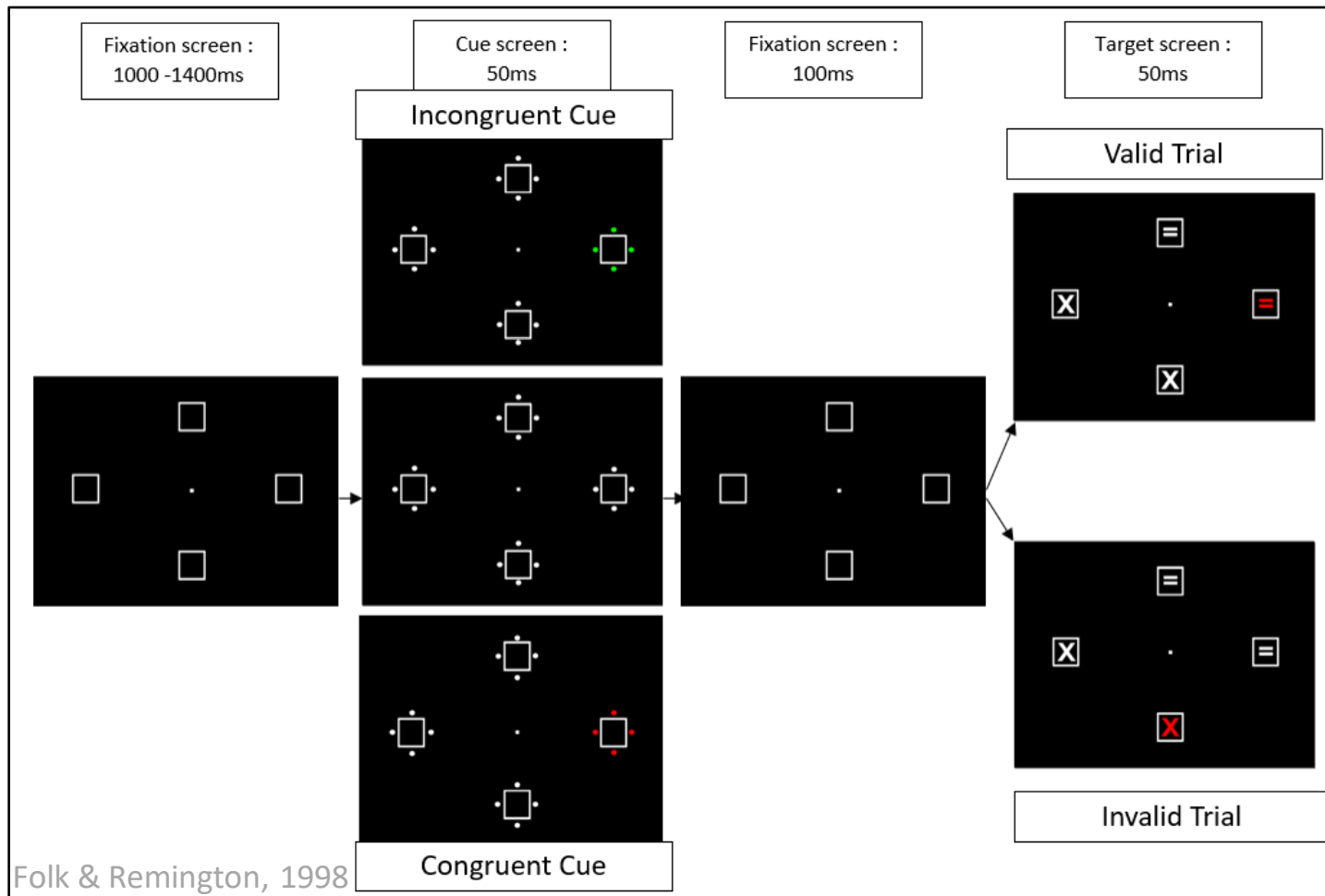
- Self-evaluative threat \neq Threat of screams
- Compatibility between the two sets of studies?
- Implications: Threatening contexts could improve the speed of attention processing but do not seem to protect the neglect of some types of information in our environment.
- All depends on what you set in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

Thanks for your attention !

Study 1

Study 1 <https://osf.io/jkt9m/>

Study 2 : <https://osf.io/ynuc2/>



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:

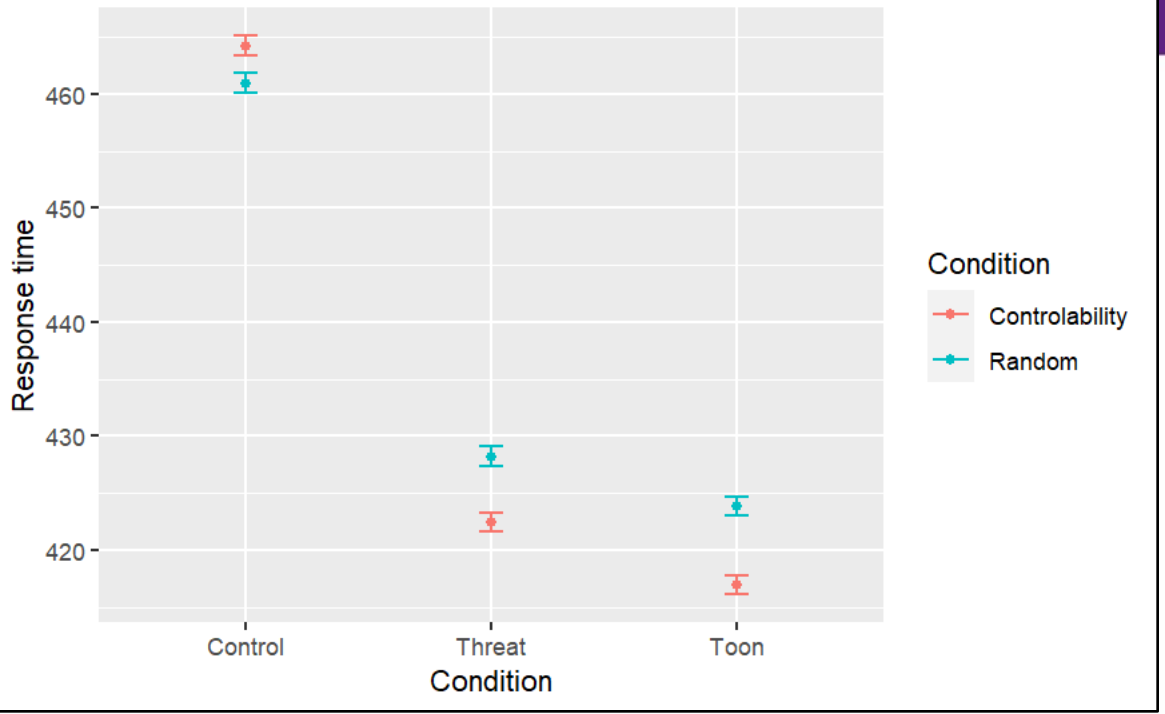
| | Estimate | Std. Error | df | t value | Pr(> t) | |
|---|----------|------------|----------|---------|----------|-----|
| (Intercept) | 421.4316 | 3.4284 | 249.5134 | 122.923 | <2e-16 | *** |
| Congruency_C | -3.1300 | 1.8098 | 243.2584 | -1.729 | 0.085 | . |
| Validity_C | -26.9086 | 1.2455 | 242.5857 | -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

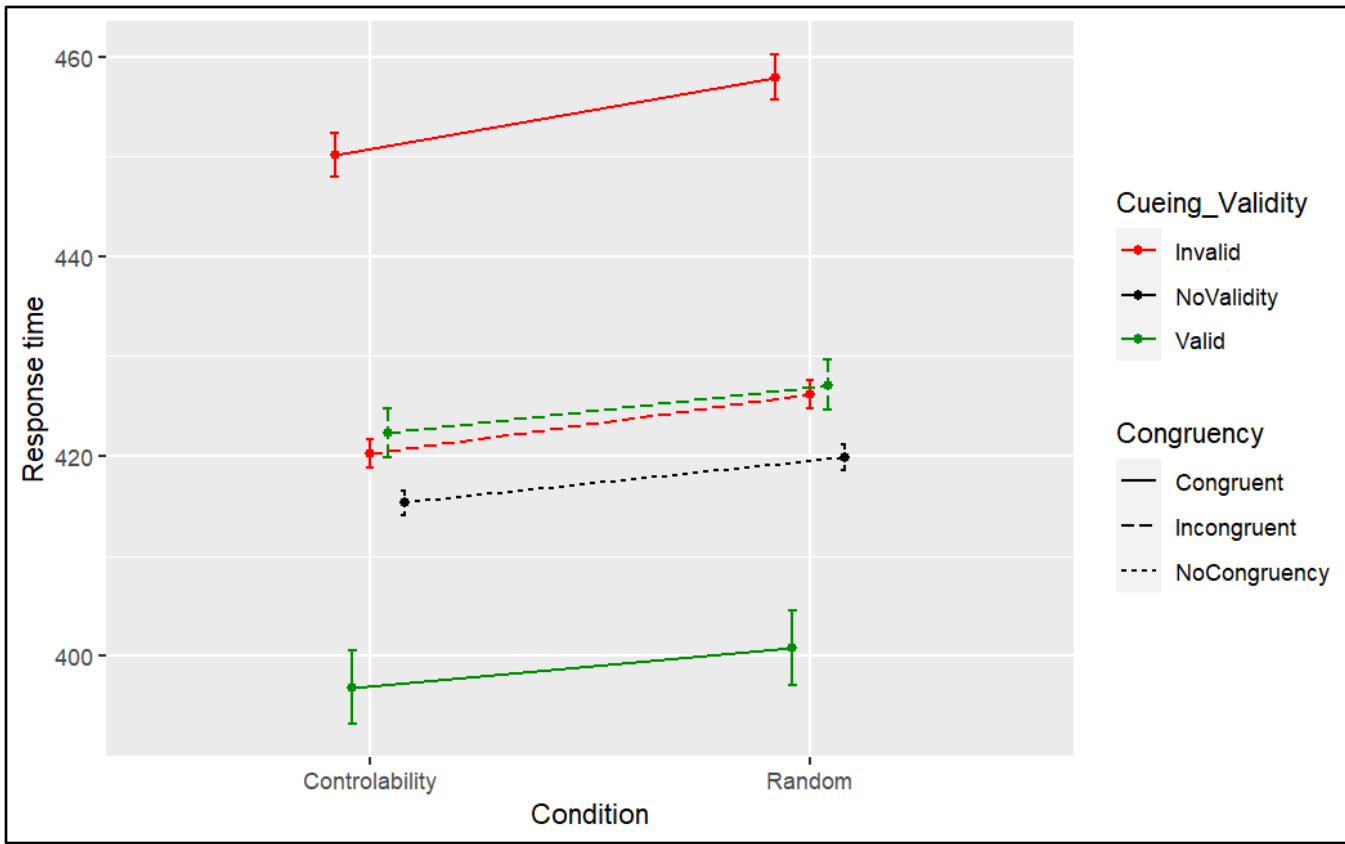
← Effect of Block (Control, Threat, Toon) on RT

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

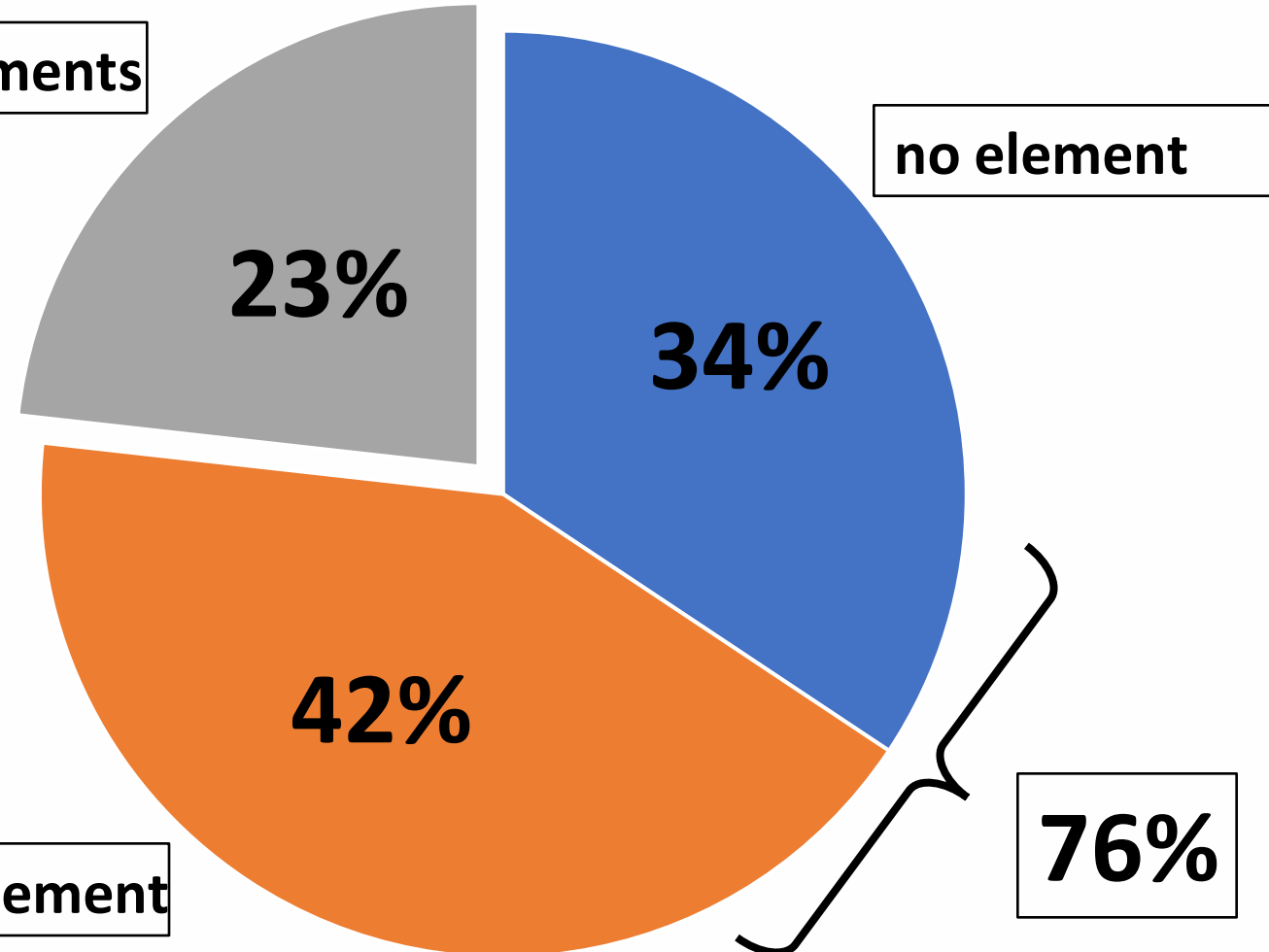
• Noticing:

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

Both elements

no element

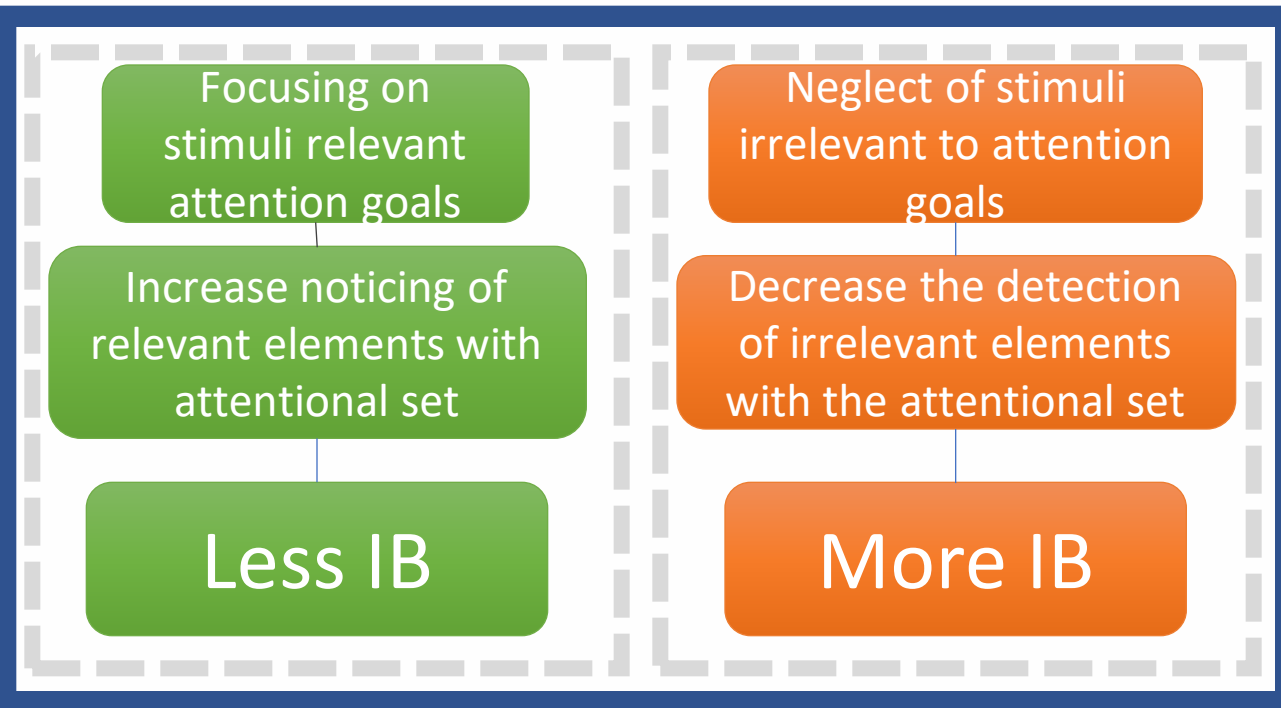
Only one element



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

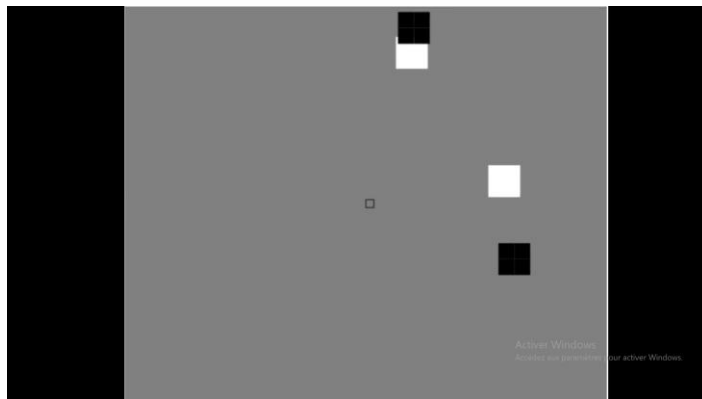
N = 1600

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

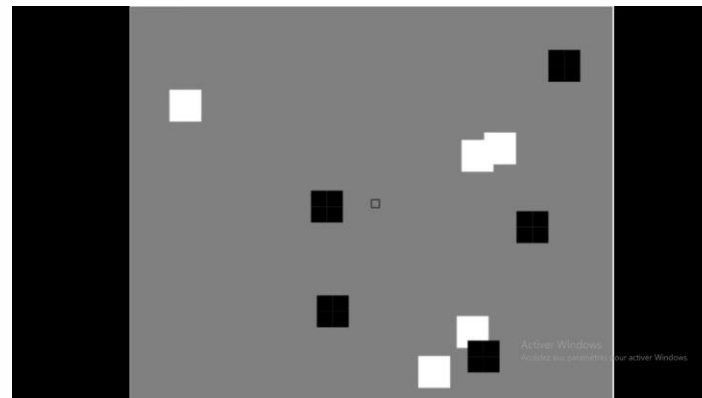
DV: Détection

Supplementary: Perceptual load

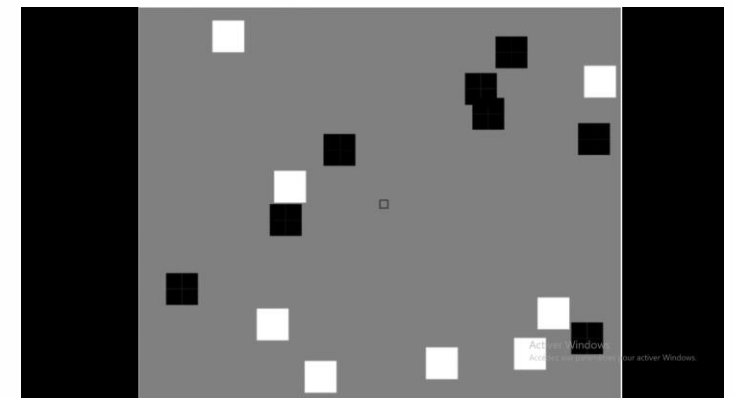
- VI 1 : unexpected element: Congruent VS Incongruent with task set
- VI 2 : perceptual load = number of stimuli in the main task
 - Unexpected element Congruent : 8 VS 10 VS 12 VS 14 VS 16
 - Unexpected element Incongruent : 2 VS 4 VS 6 VS 8



4 stimuli



10 stimuli



16 stimuli

Etude 4 : Résultats

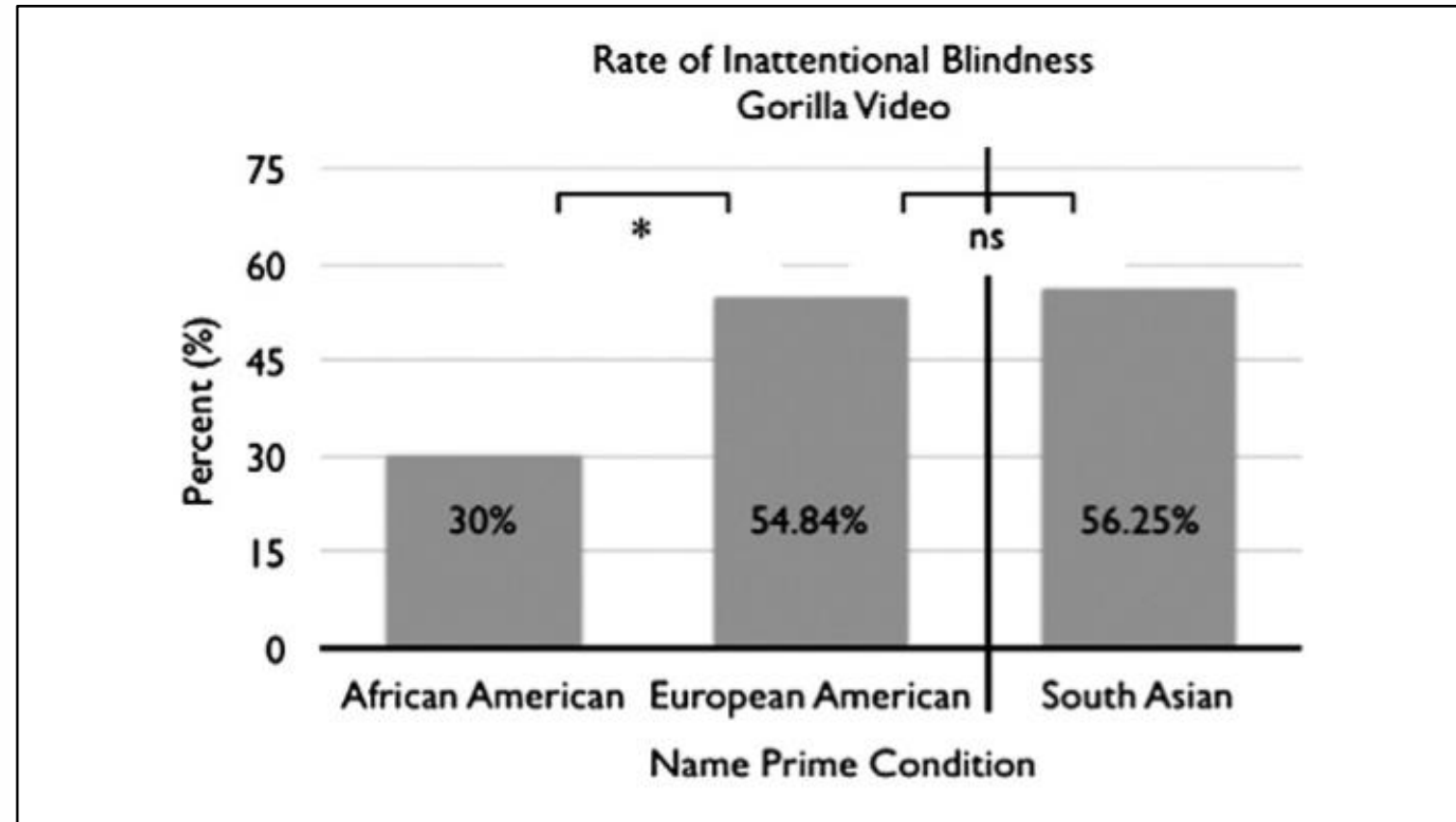
- Sur la performance à la tâche de comptage :
 - Le nombre d'EI détectés ne prédit pas la perf sur l'essai critique
> $p = 0.647$
 - Ni la détection de l'élément congruent, ni de l'élément incongruents ne prédisent la perf sur l'essai critique
> $p = 0.843$ et $p = 0.339$ respectivement
 - La perf moyenne (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 ($\beta = -0.074$, $p = 0.161$)

Inattention blindness: Associative priming

Rattan, & Eberhardt, 2010

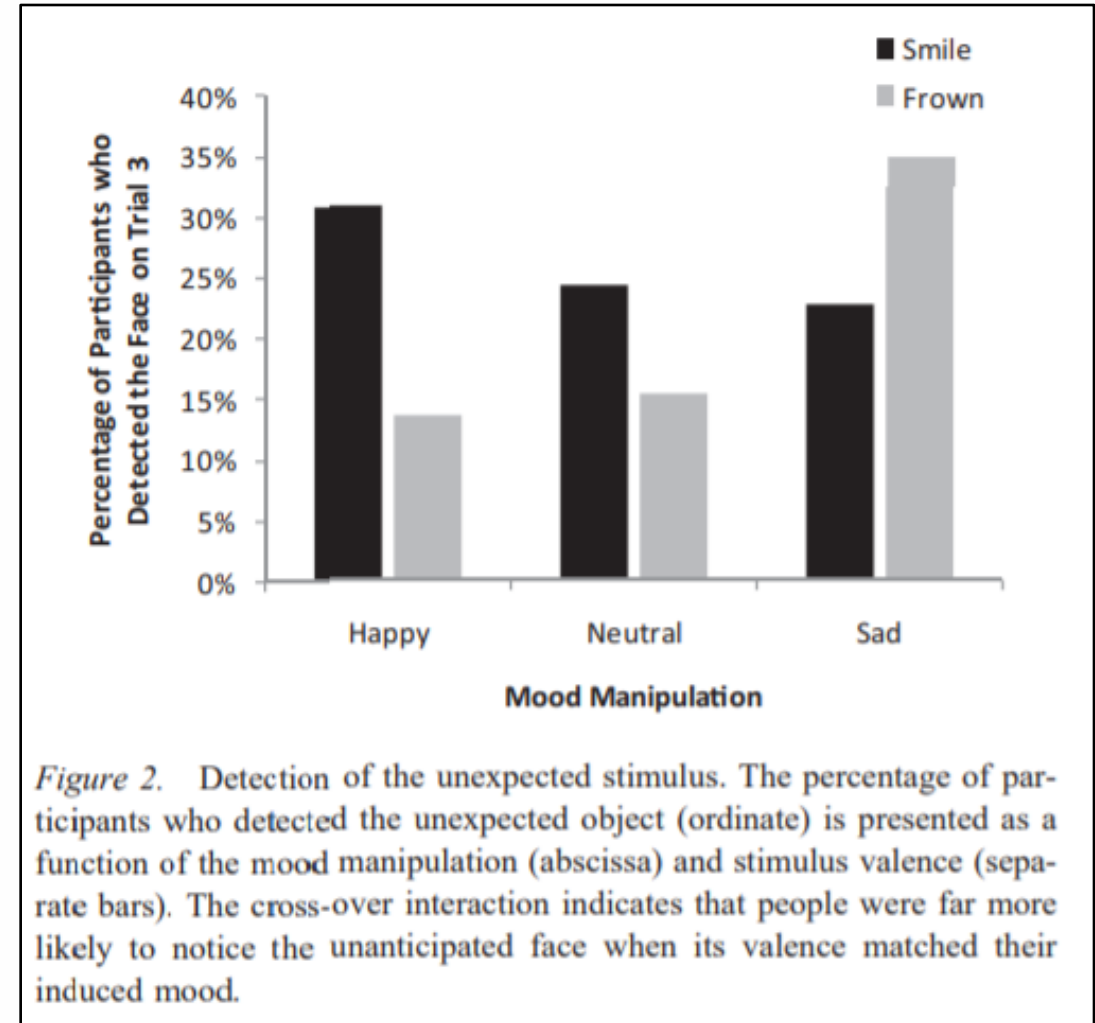
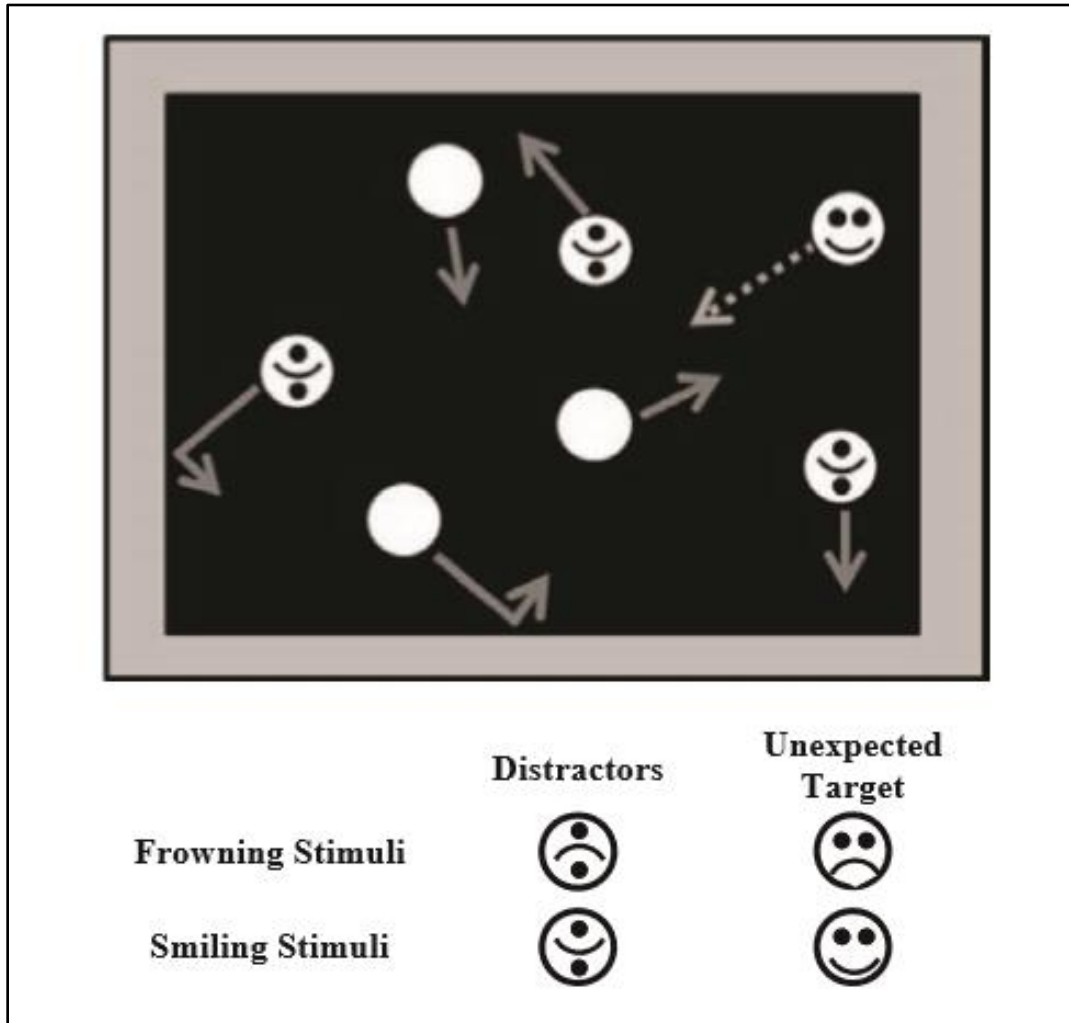
According to Black/monkey association (Goff et al., 2008)

VI : Priming : *African American VS European American*



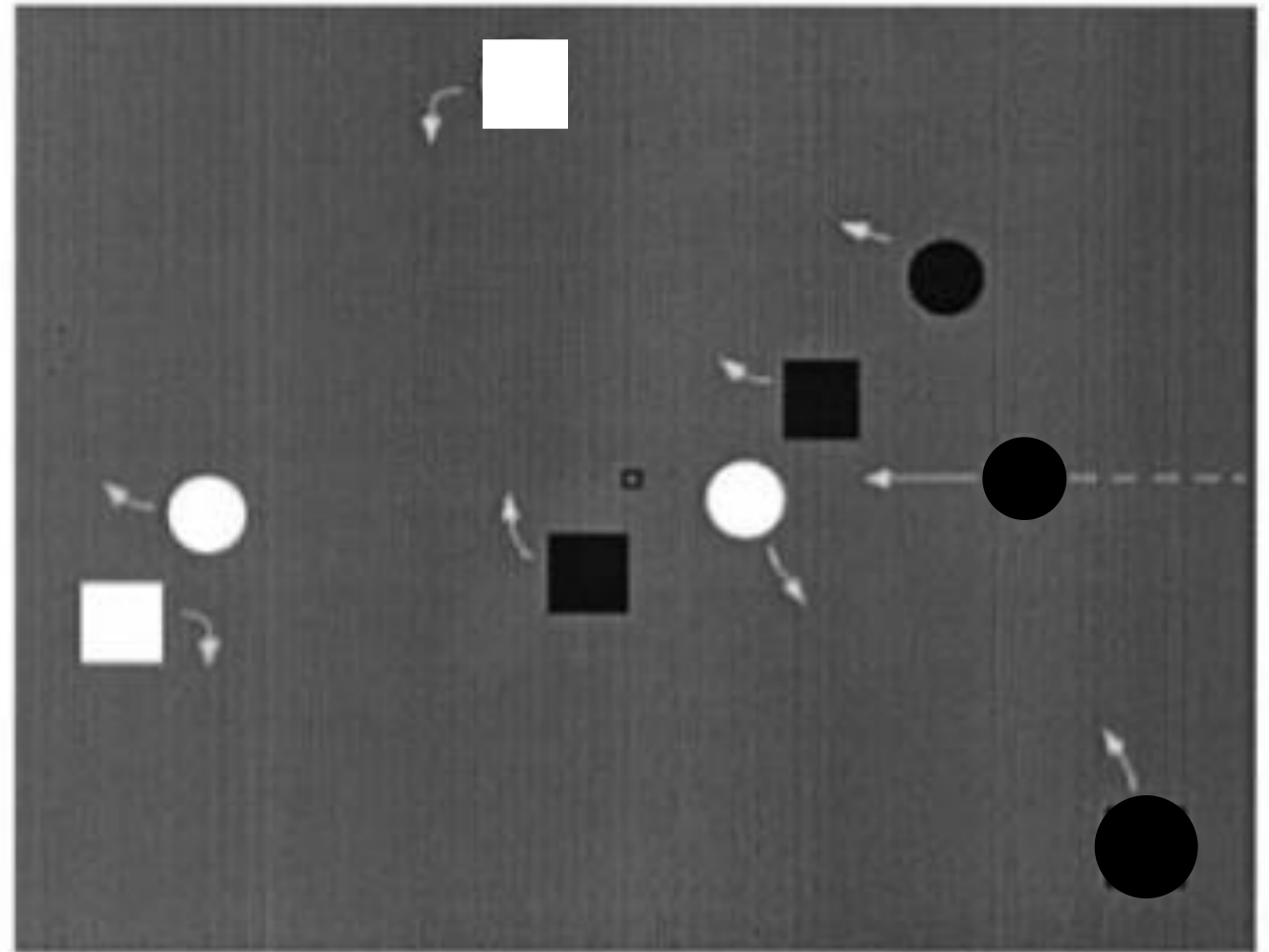
Inattention blindness: Associative priming

Becker, & Leininger, 2011



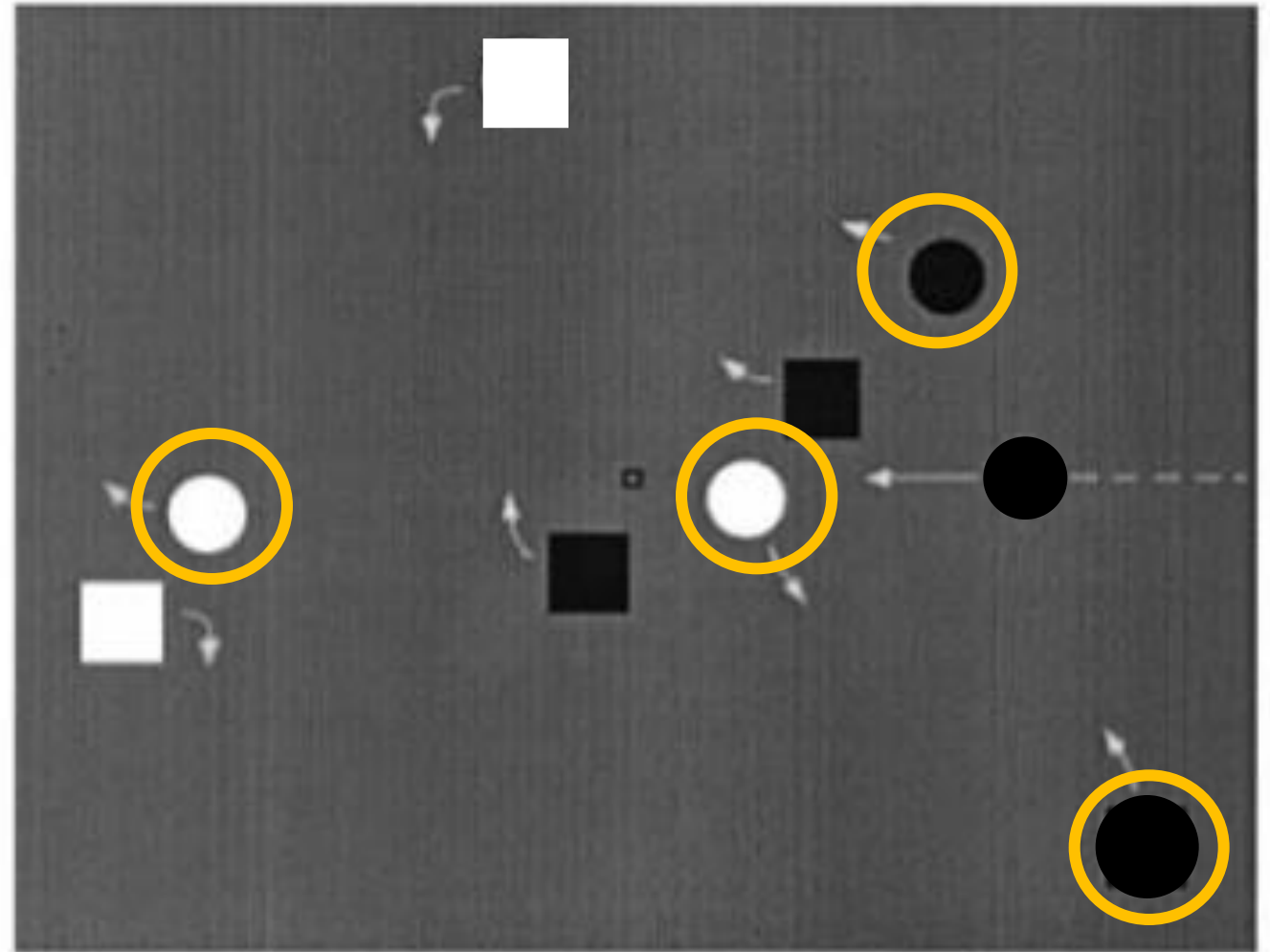
Inattentional Blindness

Instructions: Count bounces of



Inattentional Blindness

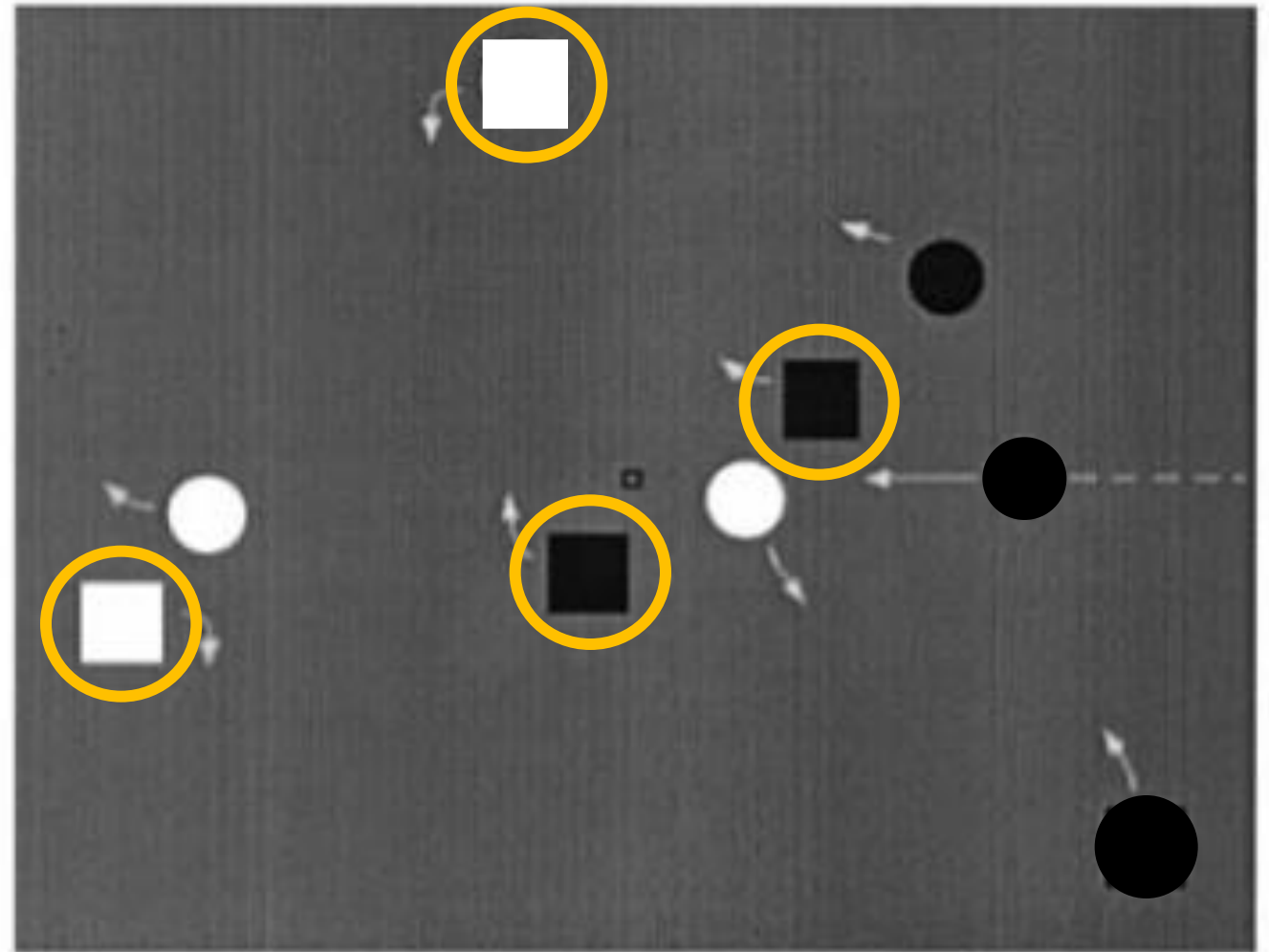
Instructions: Count bounces of
- **Circles**



Inattentional Blindness

Instructions: Count bounces of

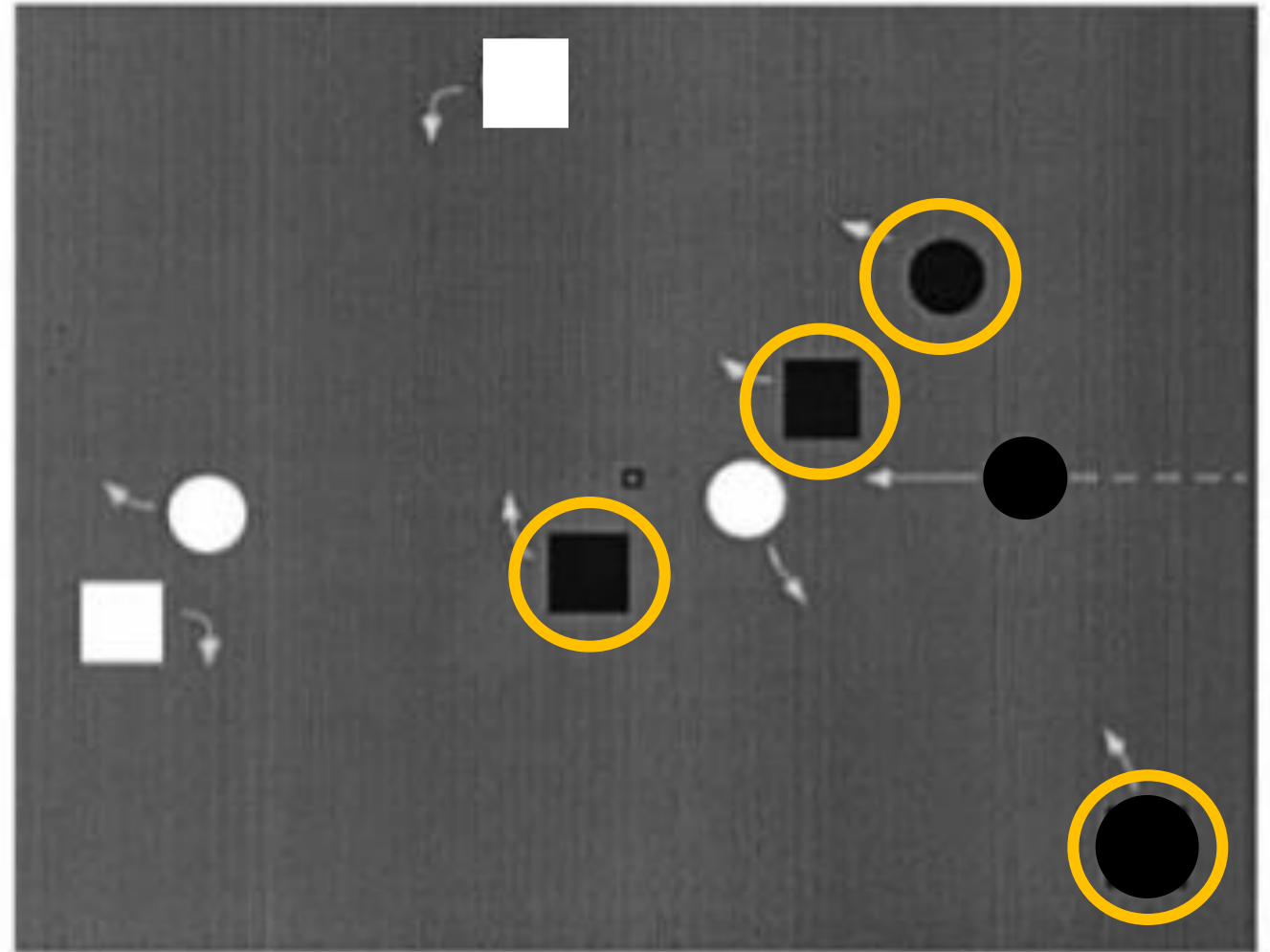
- Circles
- **Squares**



Inattentional Blindness

Instructions: Count bounces of

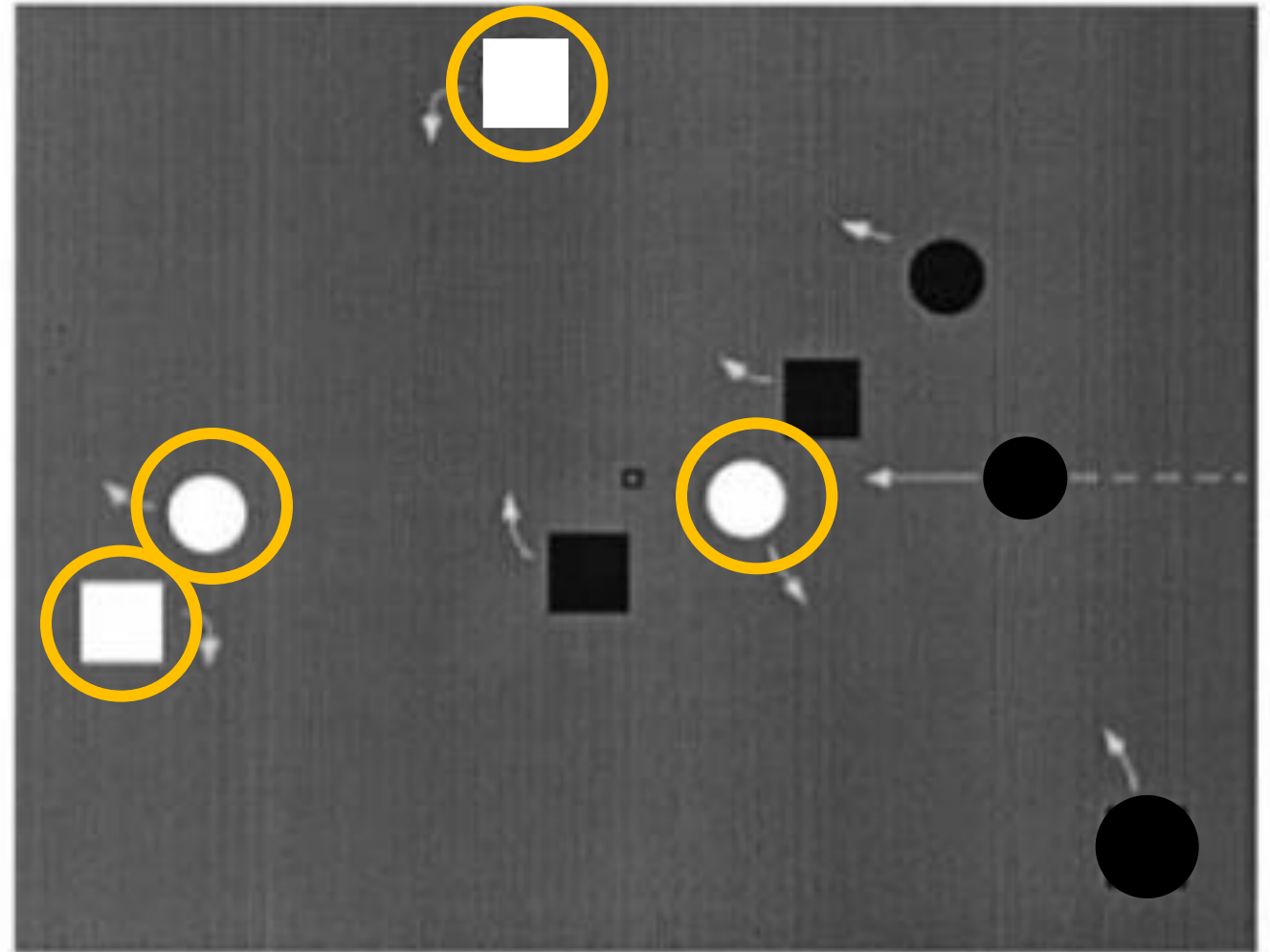
- Circles
- Squares
- **Black elements**



Inattentional Blindness

Instructions: Count bounces of

- Circles
- Squares
- Black elements
- **White elements**

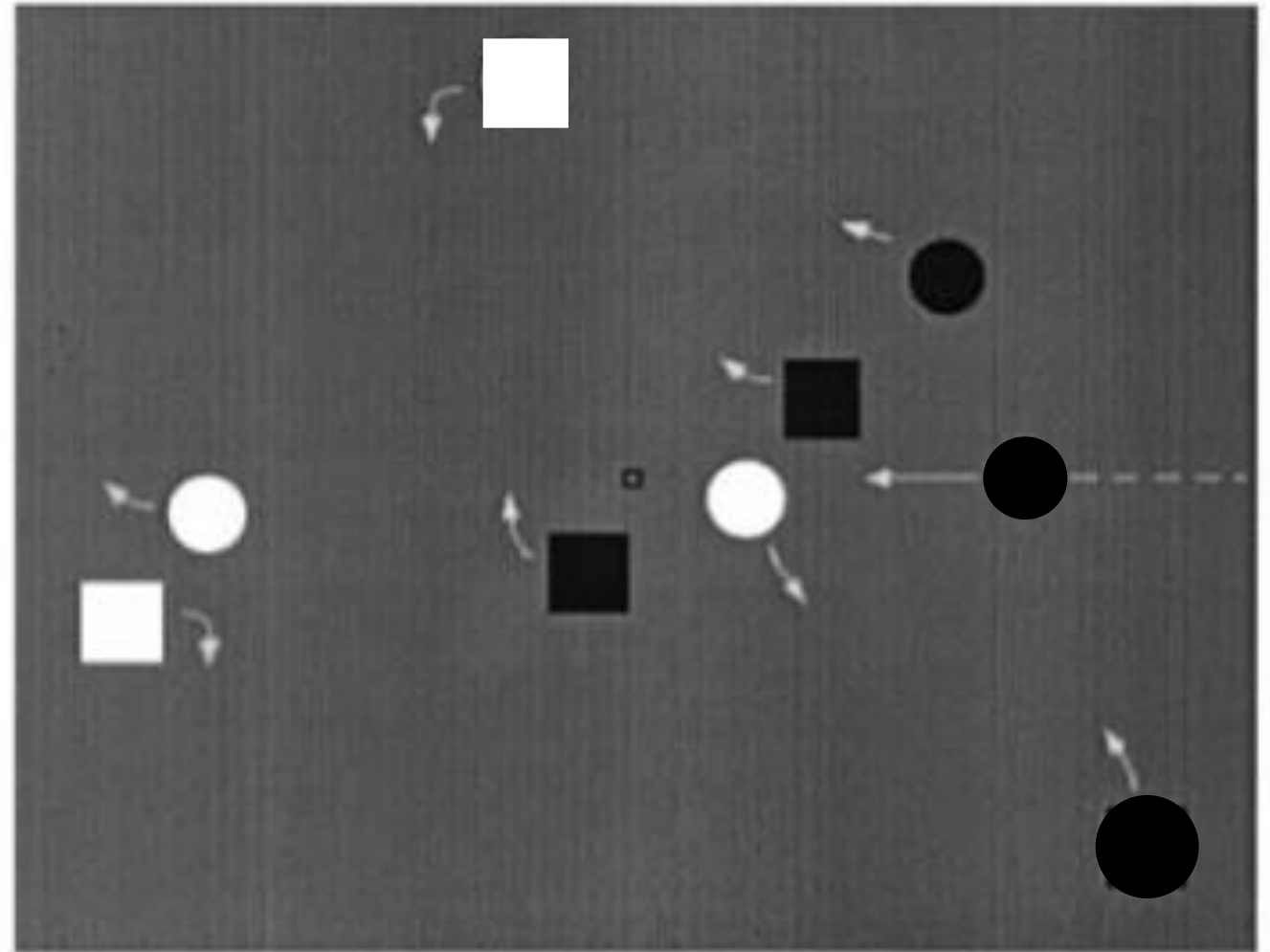


Inattentional Blindness

Instructions: Count bounces of

- Circles
- Squares
- Black elements
- White elements

Unexpected element (UE):



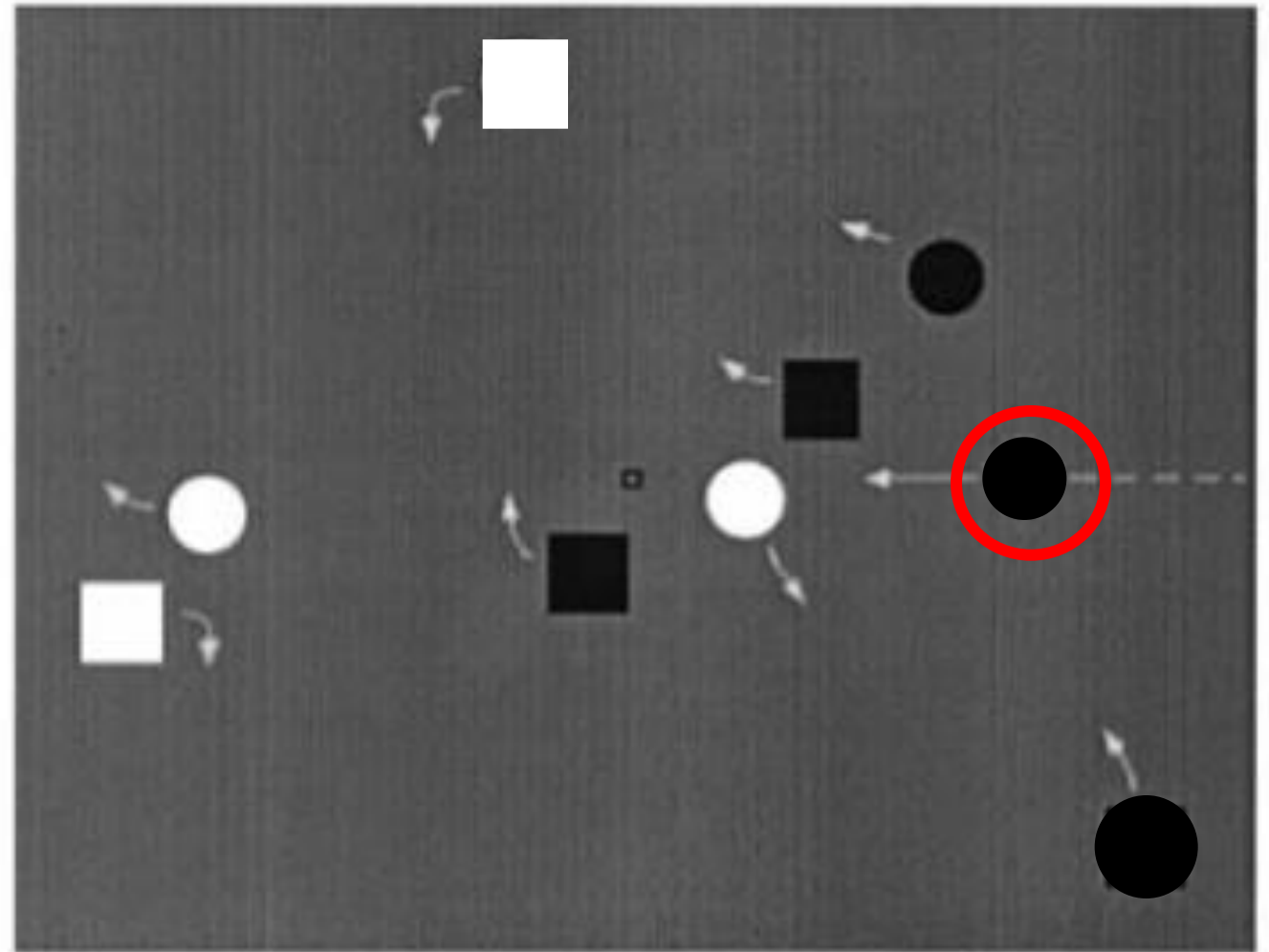
Inattentional Blindness

Instructions: Count bounces of

- Circles
- Squares
- Black elements
- White elements

Unexpected element (UE):

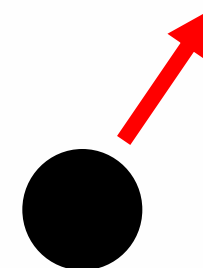
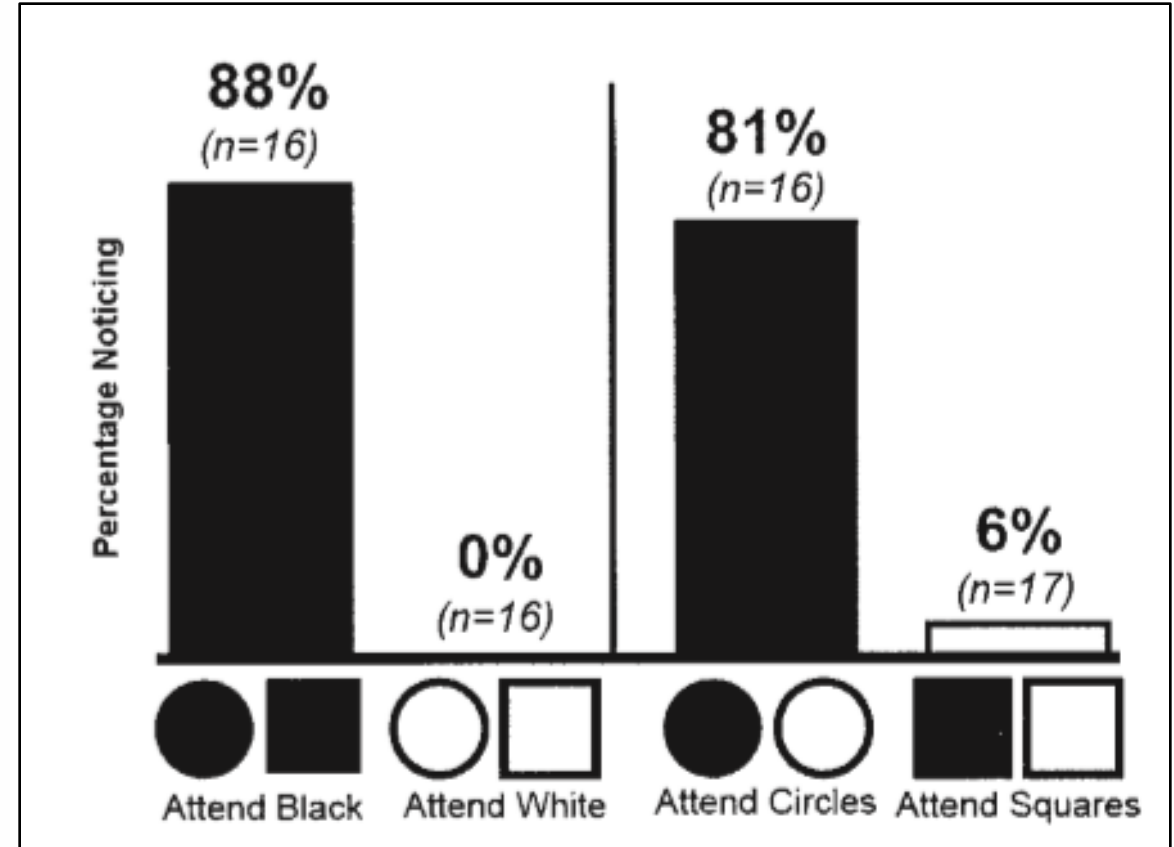
- A **black circle**



Inattentional Blindness




Task set:

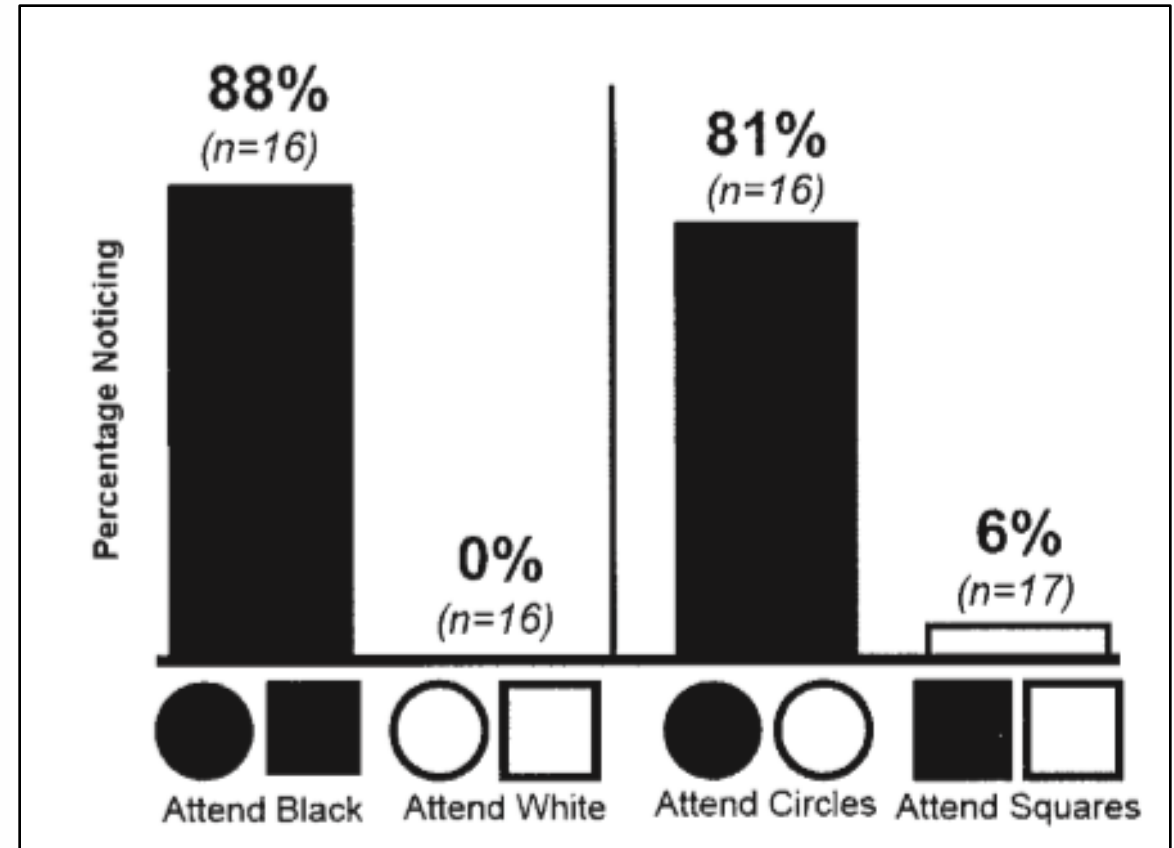
- Circle : 



Inattentional Blindness



Task set:

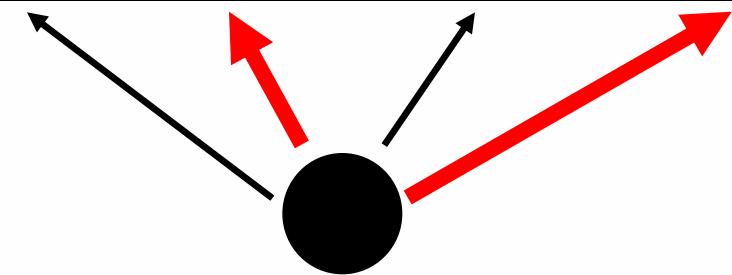
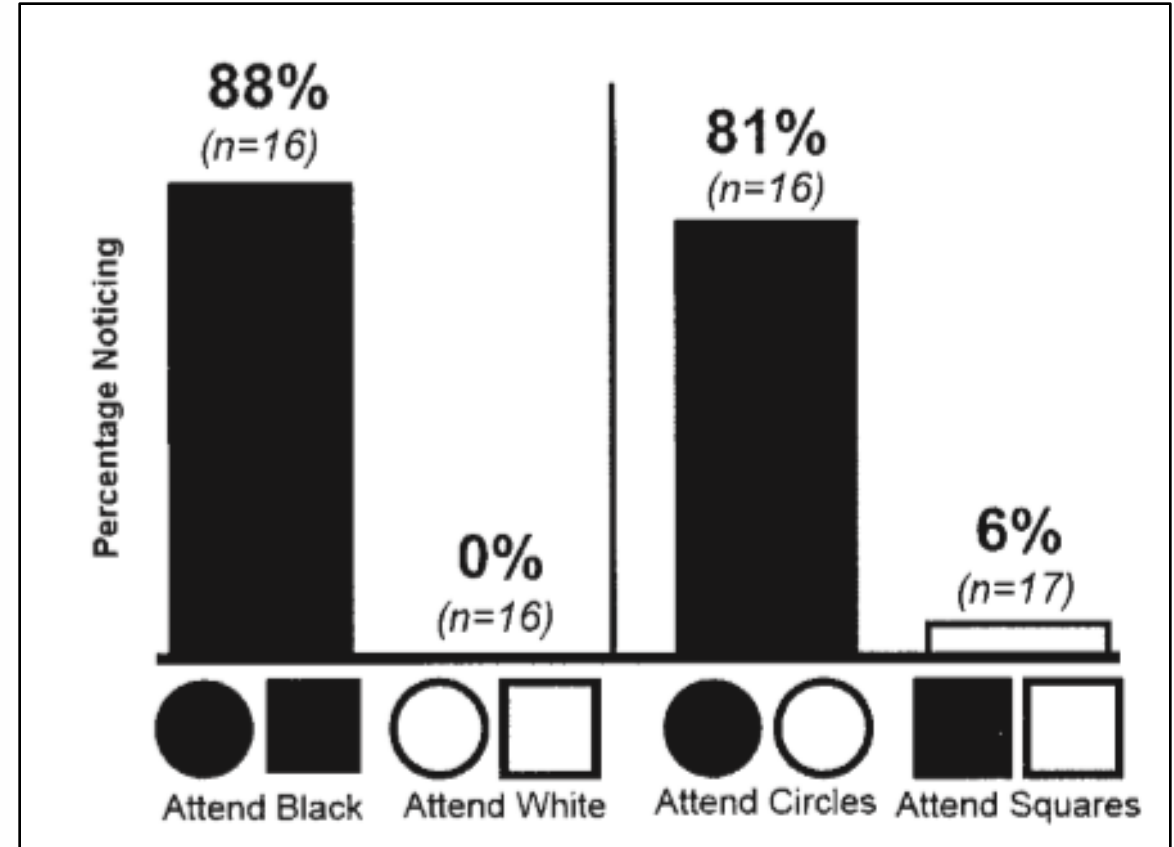
- Circle: 
- + 
- Black: 



Inattentional Blindness




Task set:

- Circle: 
- +
- Black: 
- Neither **square** nor **white**



Inattentional Blindness

Task set:

- Circle: 
- + 
- Black: 
- Neither square, nor white

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

