

## The hollow face illusion



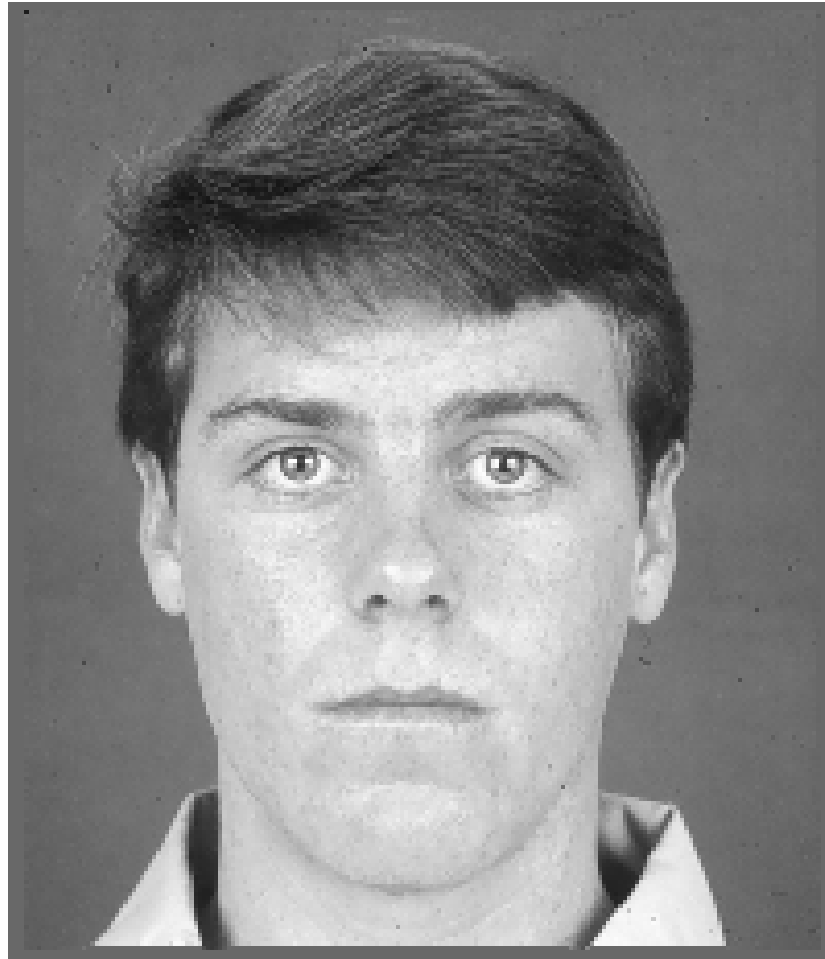
<http://www.richardgregory.org/experiments/index.htm>

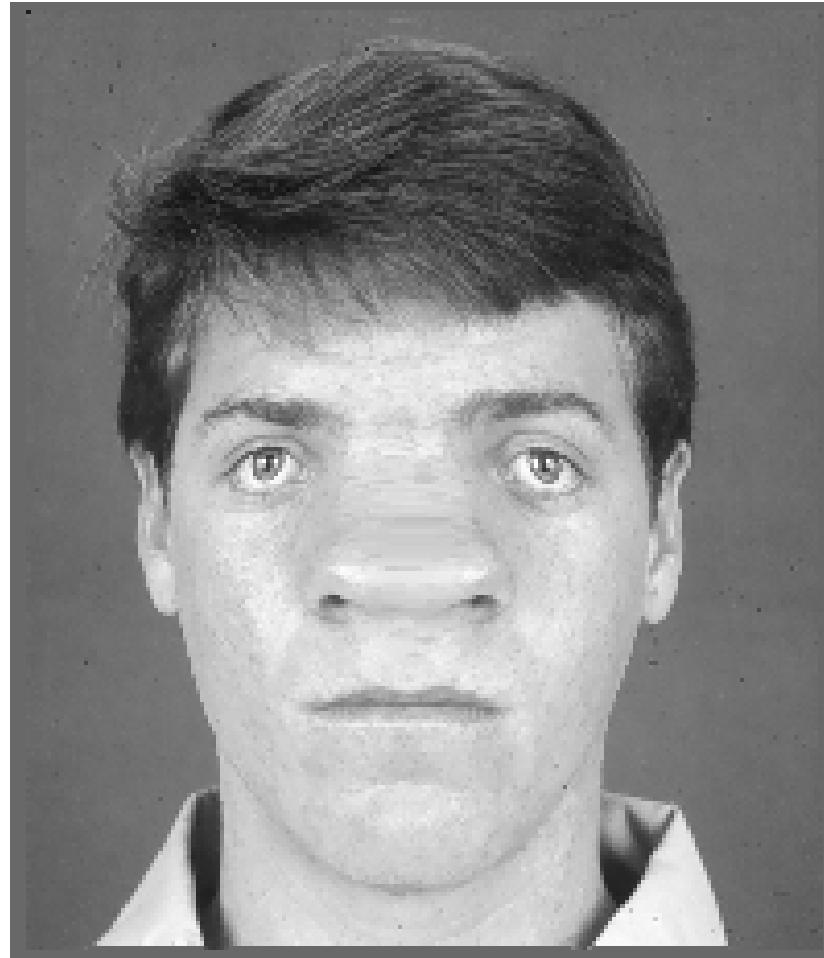
## The Margaret Thatcher Illusion



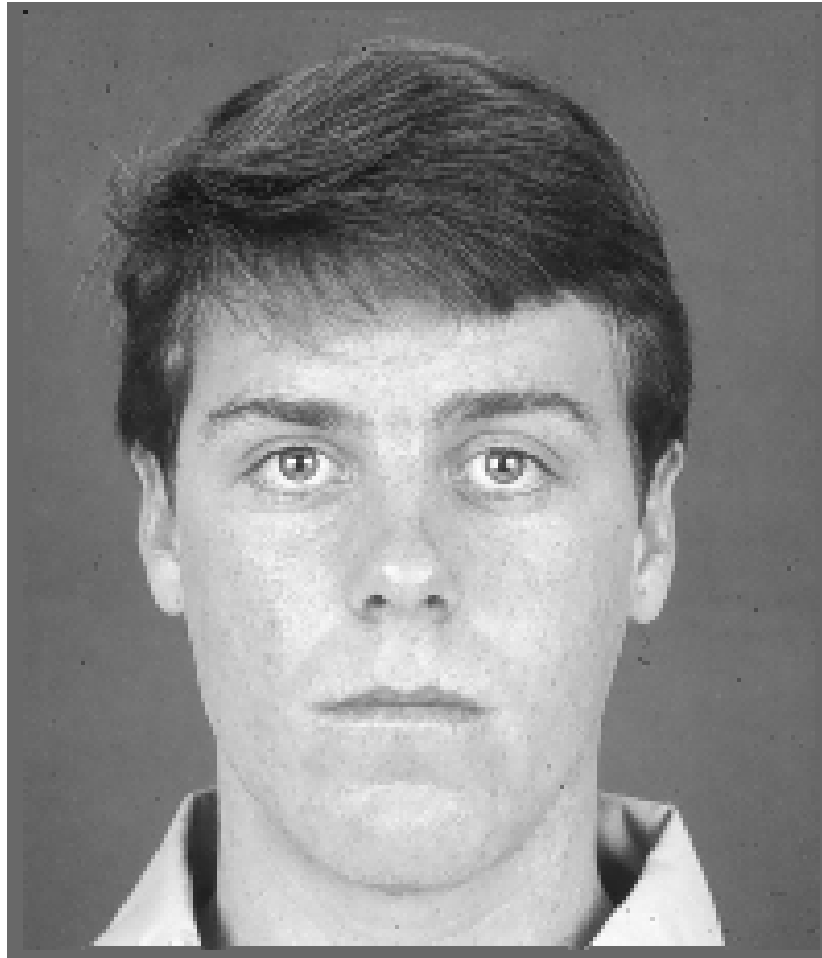


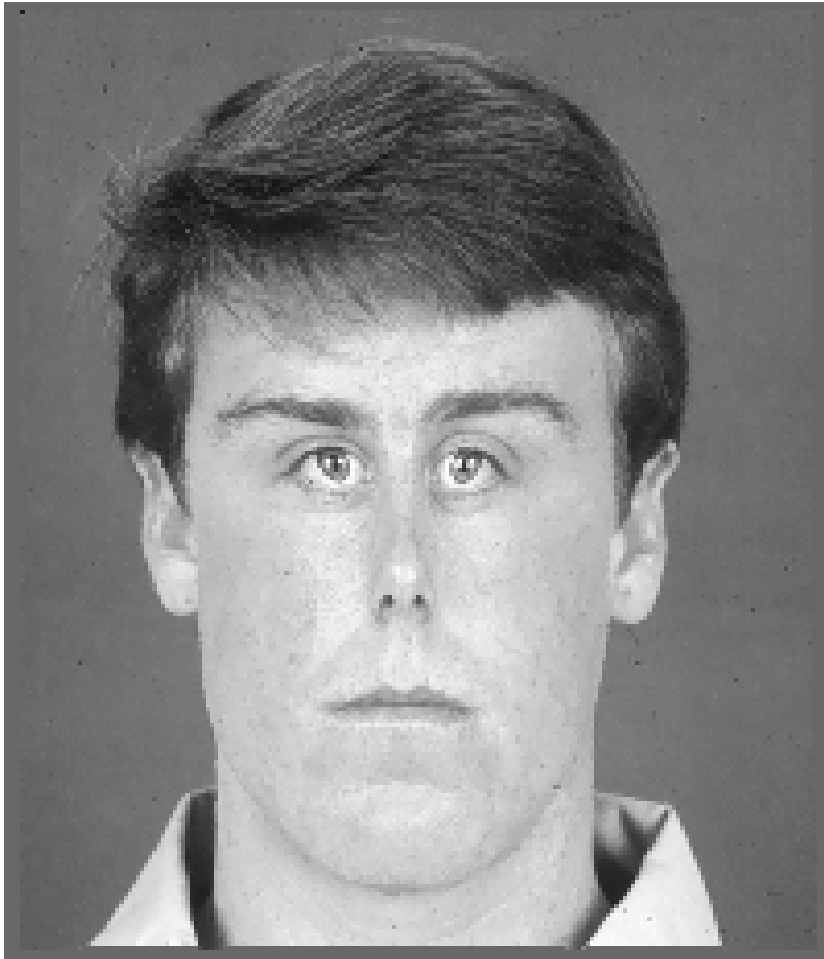
## Adaptation to faces



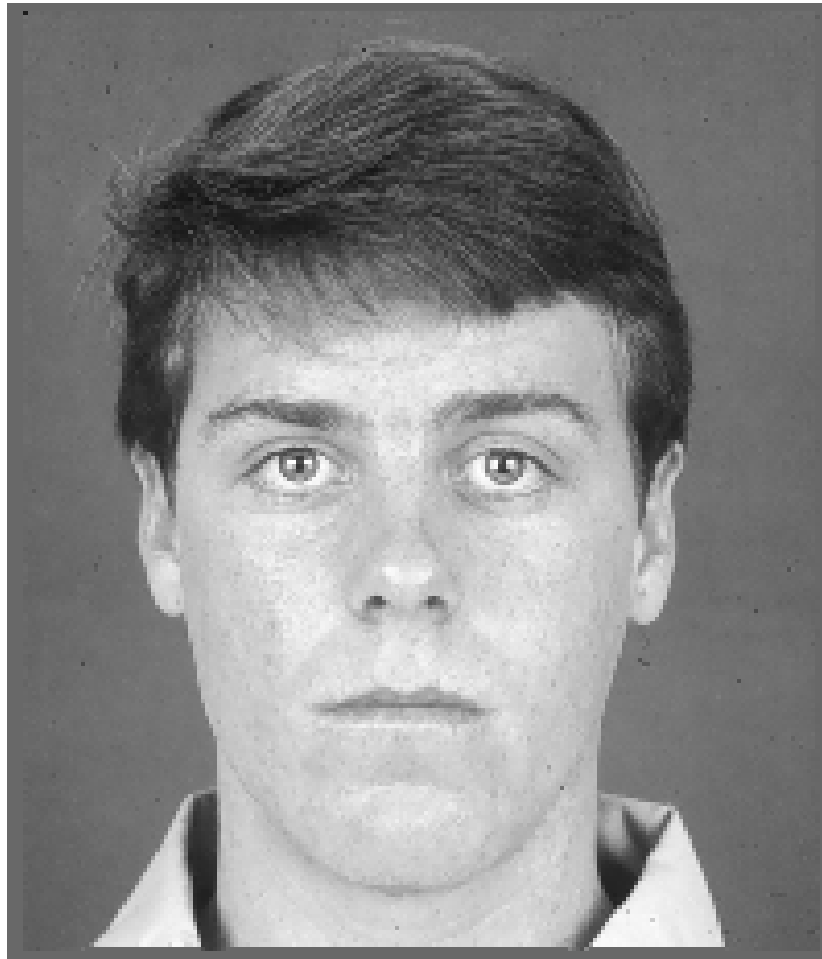


## Adaptation to faces





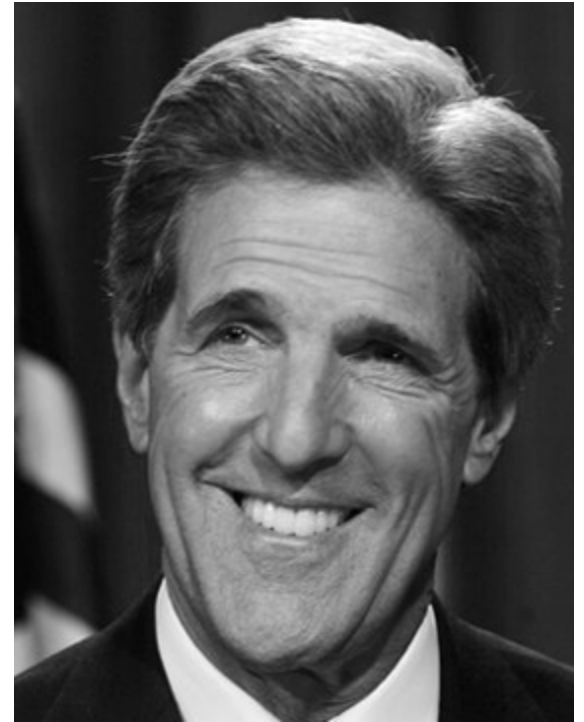
## Adaptation to faces





# Identity Aftereffects

The identity of the middle image is ambiguous



pre-adapt



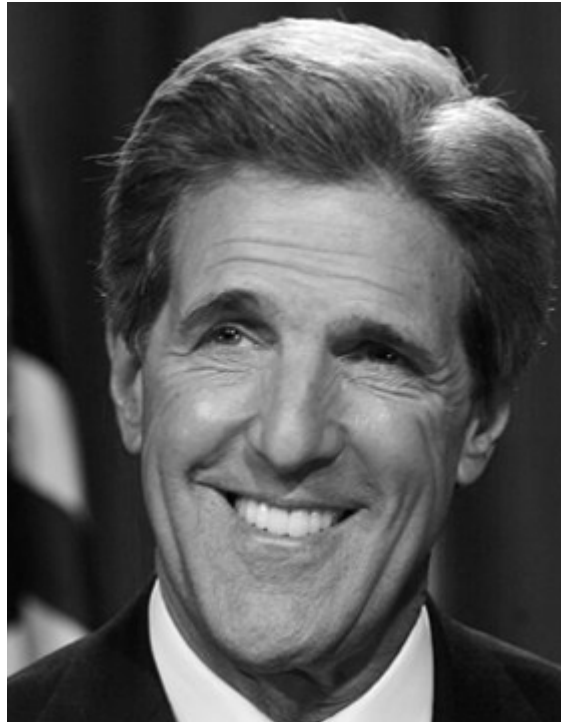
adapt



post-adapt



adapt



post-adapt



# Adaptation to gender



# Adaptation to ethnicity





# Adaptation to expression



These adaptation effects show that there are neurons in the brain that are selective to gender, ethnicity and expression.

The way a face looks to us depends on who we've been looking at recently!

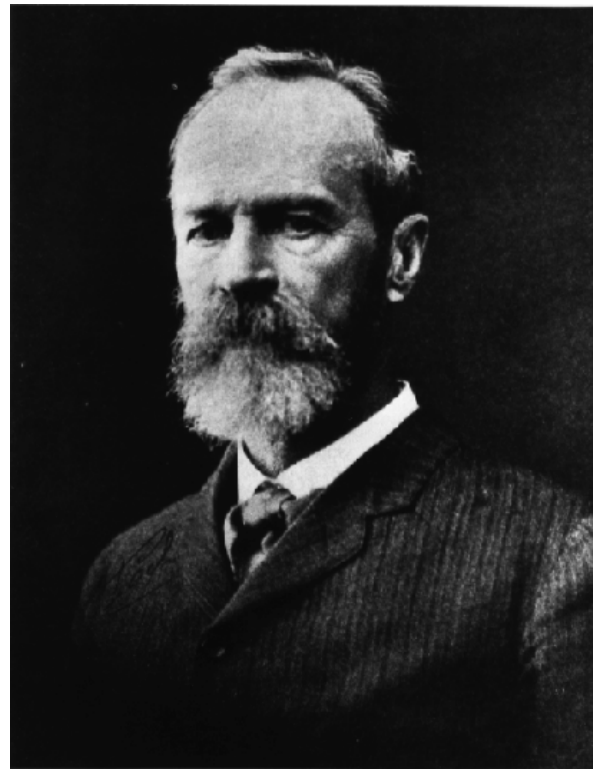
There are large individual differences in face processing, including people with prosopagnosia.



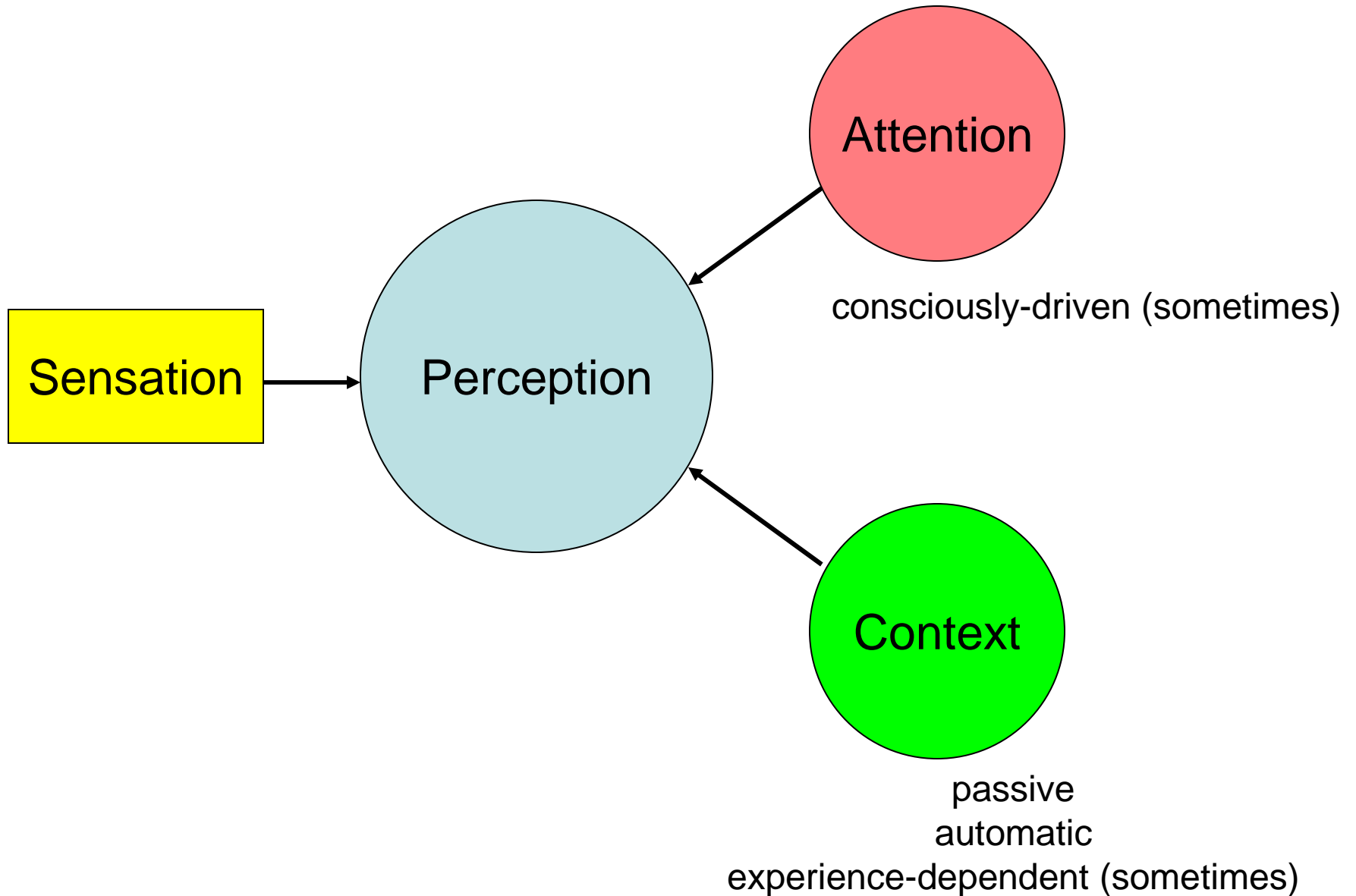
For more on prosopagnosia, see <http://www.faceblind.org/>

## Chapter 6: Visual Attention

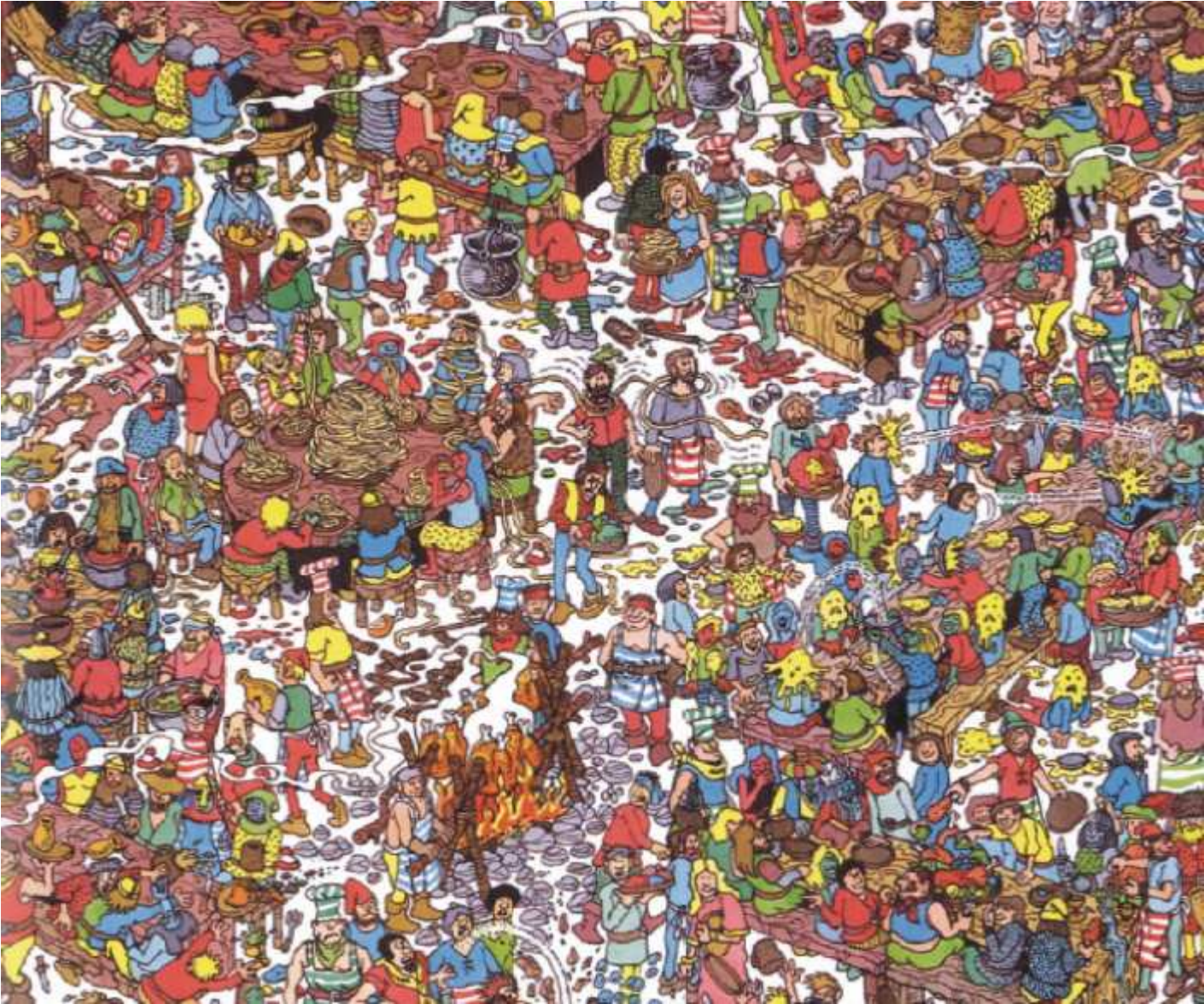
"Everyone knows what attention is. It is the taking possession by the mind in clear and vivid form, of one out of what seem several simultaneously possible objects or trains of thought...It implies withdrawal from some things in order to deal effectively with others." (William James, Principles of Psychology, 1890)



# Factors that influence perception



What automatic and conscious processes are going on when looking for Waldo?



**We are aware of only a small portion of information that is impinging upon us.**

What determines what we attend to?

What happens in the brain when we attend?

<http://viscog.beckman.uiuc.edu/grafs/demos/15.html>

# **Why is Selective Attention Necessary?**

Conscious experience seems to have a limited capacity:  
We can only attend to one thing at a time.

Attention helps us decide where to move our eyes next.

Our perception of a scene is developed by a combination  
of attention, eye movements, and memory.





DESIGNATED  
SMOKING  
SITE

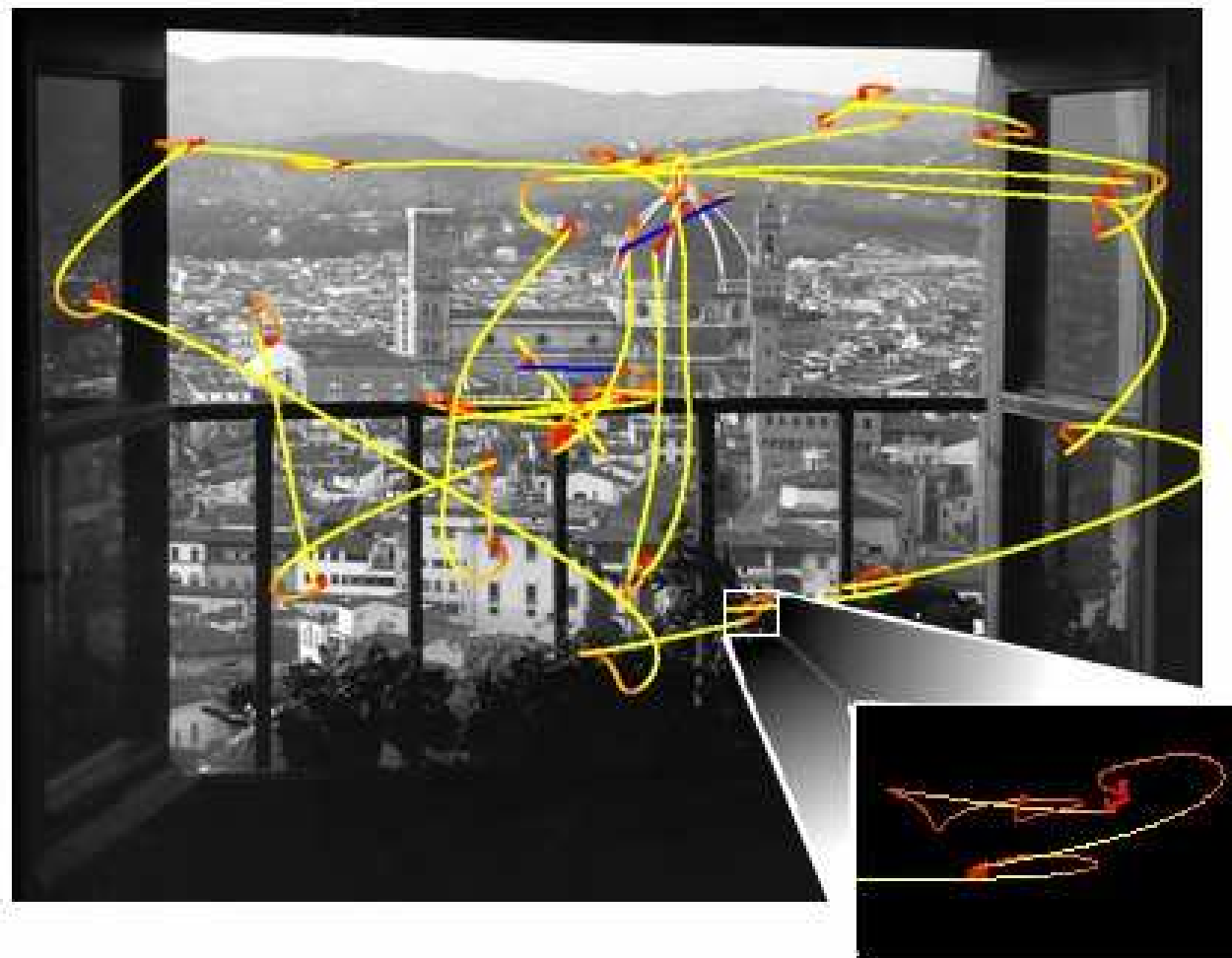


FORGET YOUR FEARS



Saccades: quick eye movements from one fixation location to another.

We make around 3 saccades per second!



# What determines where we look?

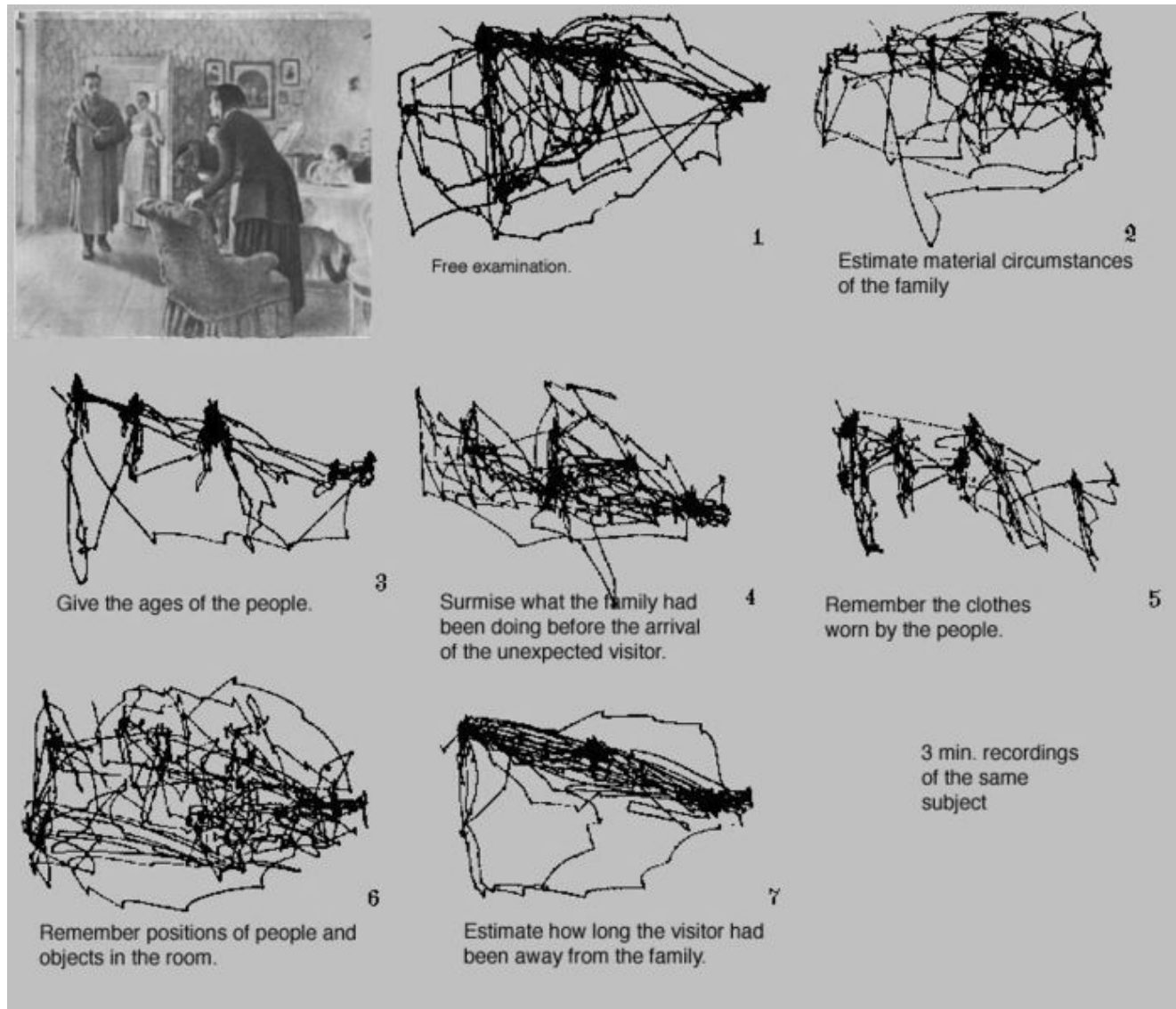
- **Bottom up factors:** Characteristics of the scene:
  - Stimulus salience - areas of stimuli that attract attention due to their properties
    - Color, contrast, and orientation are relevant properties
    - Saliency maps show fixations are related to such properties in the initial scanning process
- **Top down factors:**
  - Task or goals
  - Attention
    - Where to attend (spatial attention)
    - What features to attend to (feature-based attention)

**Top-down factors:** The task has a strong influence on where you attend and look



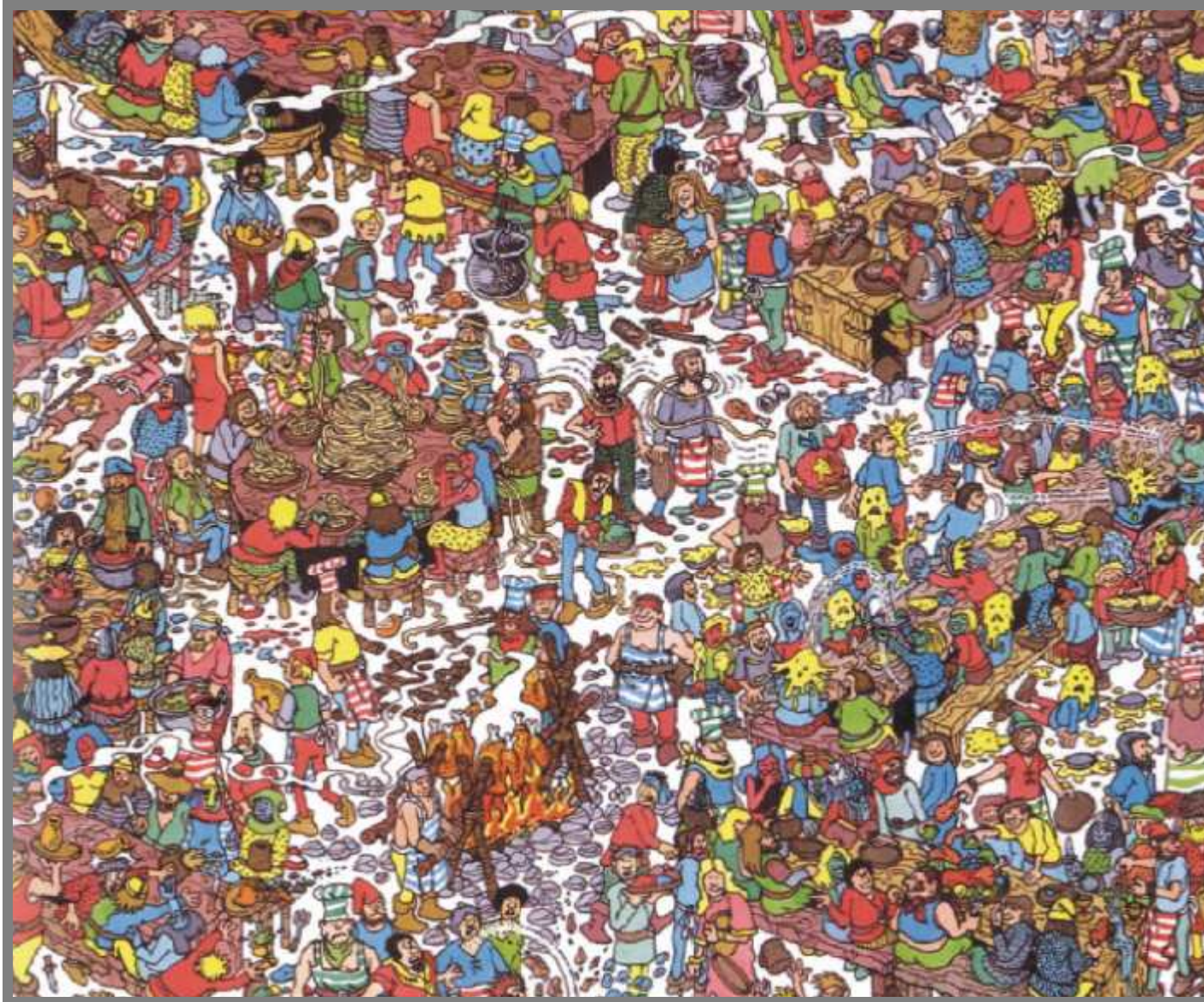
“The unexpected visitor”

**Top-down factors:** The task has a strong influence on where you attend and look



Yarbus, A. L. (1967).

**Top-down factors:** we use attention to determine where to saccade next.



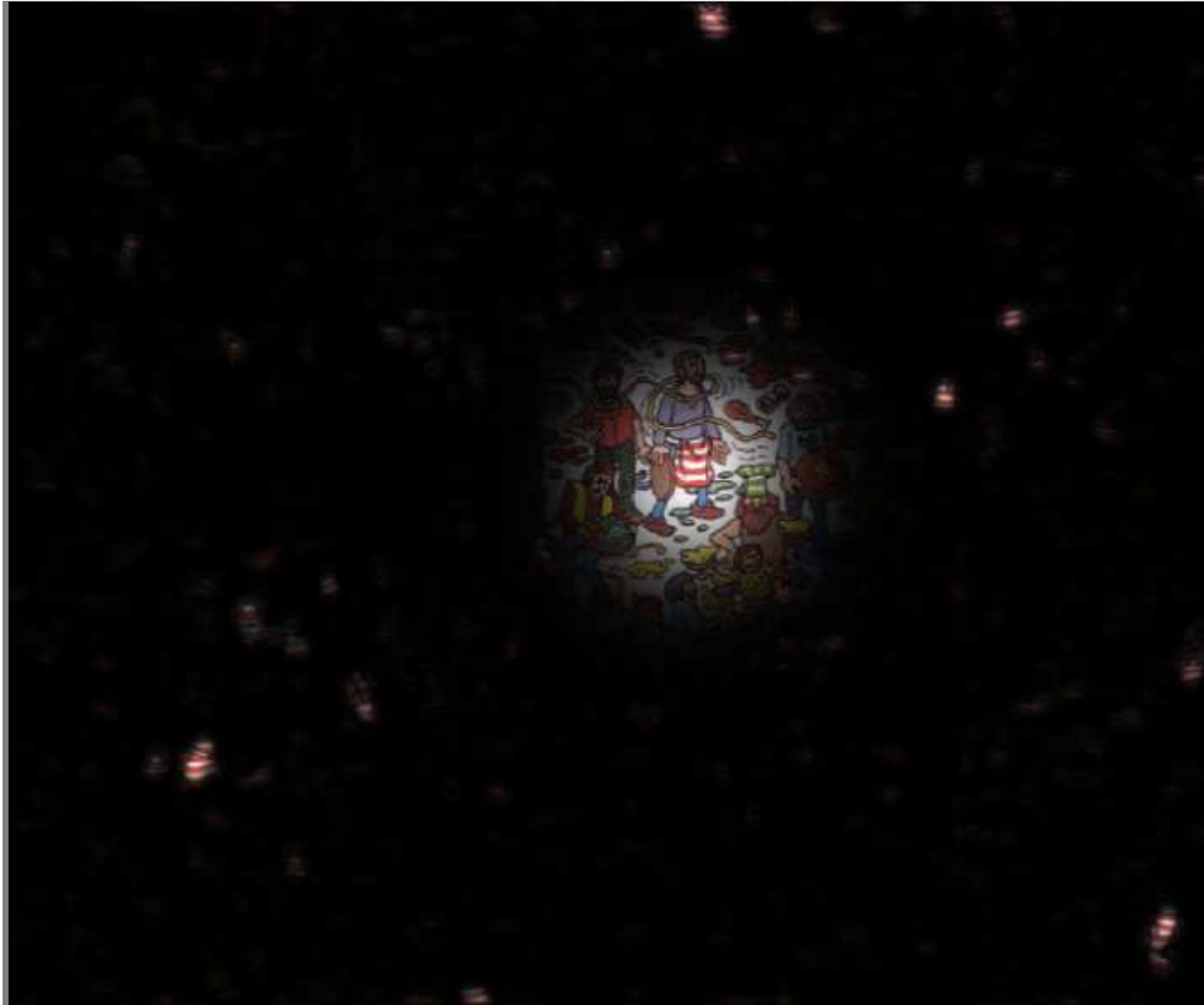


We use **feature-based attention** to highlight specific features throughout a scene.



Where are the horizontal red stripey things?

We use **spatial attention** to highlight everything at a particular location







Attention, eye movements, and memory allow you to 'paint' a coherent scene in your mind.



But this assumes that things aren't changing outside the focus of attention.

- **Change blindness**

- Observers are shown a picture with and without a missing element in an alternating fashion with a blank screen
- Results show that the pictures had to alternate a number of times before the change was detected

# Change blindness demos

## Spatial attention:

Direction of attention to a particular region of space

**Two ways that spatial attention can be directed:**

**Endogenous:** voluntary, or by instruction in laboratory experiments: “attend left”

**Exogenous:** involuntary, often by a flash, sound or any sudden change.

## Feature-based attention:

Direction of attention to a particular feature, anywhere in space

**Features include:**

- Direction of motion
- Color
- Orientation