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DLI Accelerated Data Science Teaching Kit

# Lecture 7.2 - Human Perception



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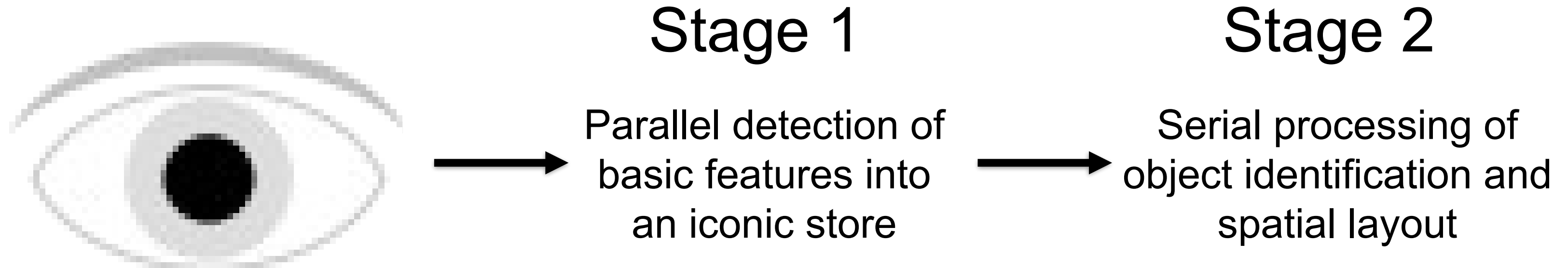
# Data visualization leverages human perception

# Name the five senses.

Sense	Bandwidth (bits/sec)
Sight	10,000,000
Touch	1,000,000
Hearing	100,000
Smell	100,000
Taste	1,000

<http://www.britannica.com/EBchecked/topic/287907/information-theory/214958/Physiology>

# A (Simple) Model of Human Visual Perception



# Stage 1: Pre-Attentive Processing

- Rapid
- Parallel
- Automatic
- (Fleeting = lasting for a short time)

# Stage 2: Serial Processing

- Relatively Slow
- (Incorporates Memory)
  - Manual



# Stage 1: Pre-Attentive Processing

- The eye moves every 200ms.
- (so this processing occurs every 200ms-250ms)

# Example

- 1281768756138976546984506985604982826762
- 9809858458224509856458945098450980943585
- 9091030209905959595772564675050678904567
- 8845789809821677654876364908560912949686

# Example

- 12817687561**3**8976546984506985604982826762
- 980985845822450985645894509845098094**3**585
- 90910**3**0209905959595772564675050678904567
- 8845789809821677654876**3**64908560912949686

# A few more examples from Prof. Chris Healy at NC State



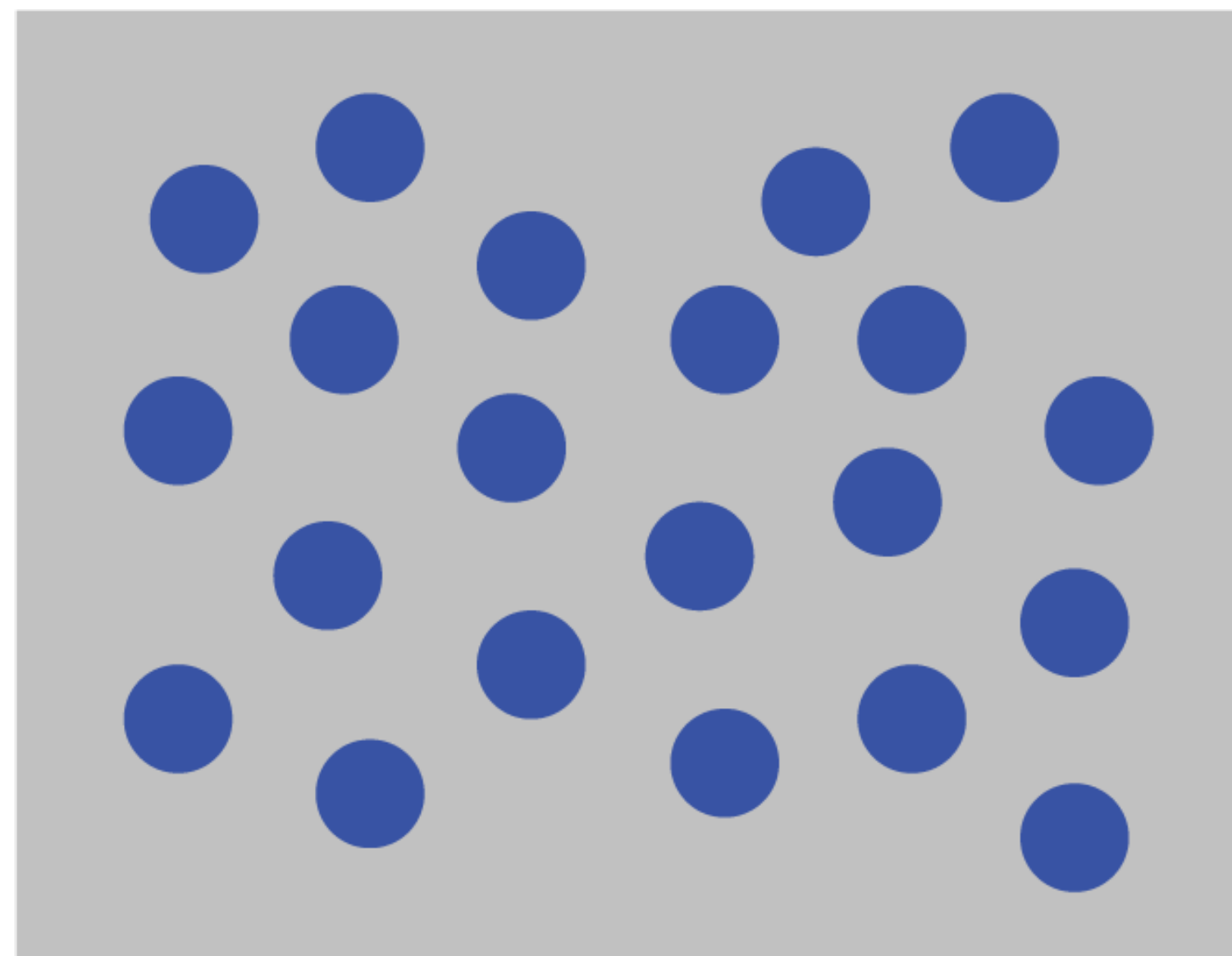
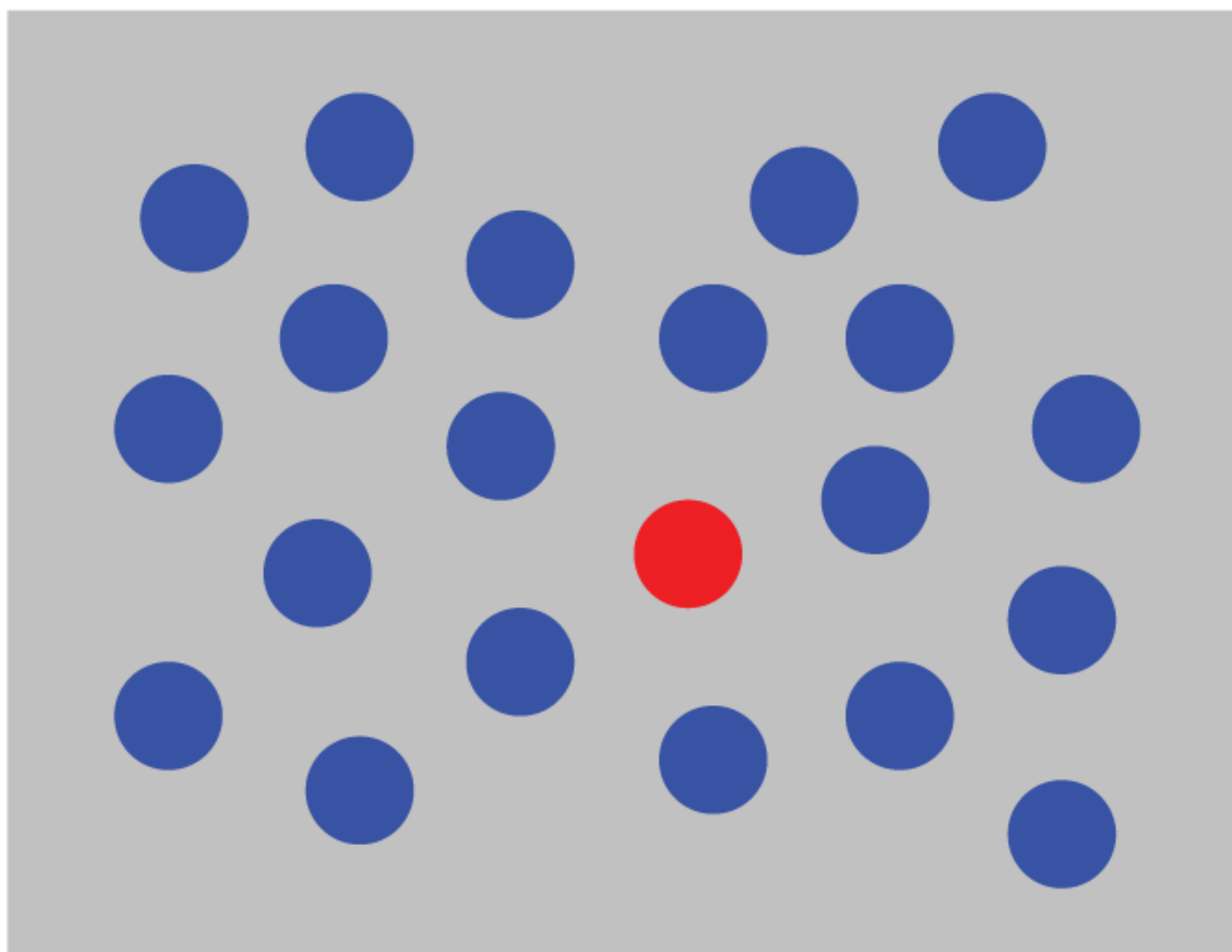
Left Side



Right Side

Where is the **RED DOT**?

On the **left** or on the **right**?



Where is the **RED DOT**?

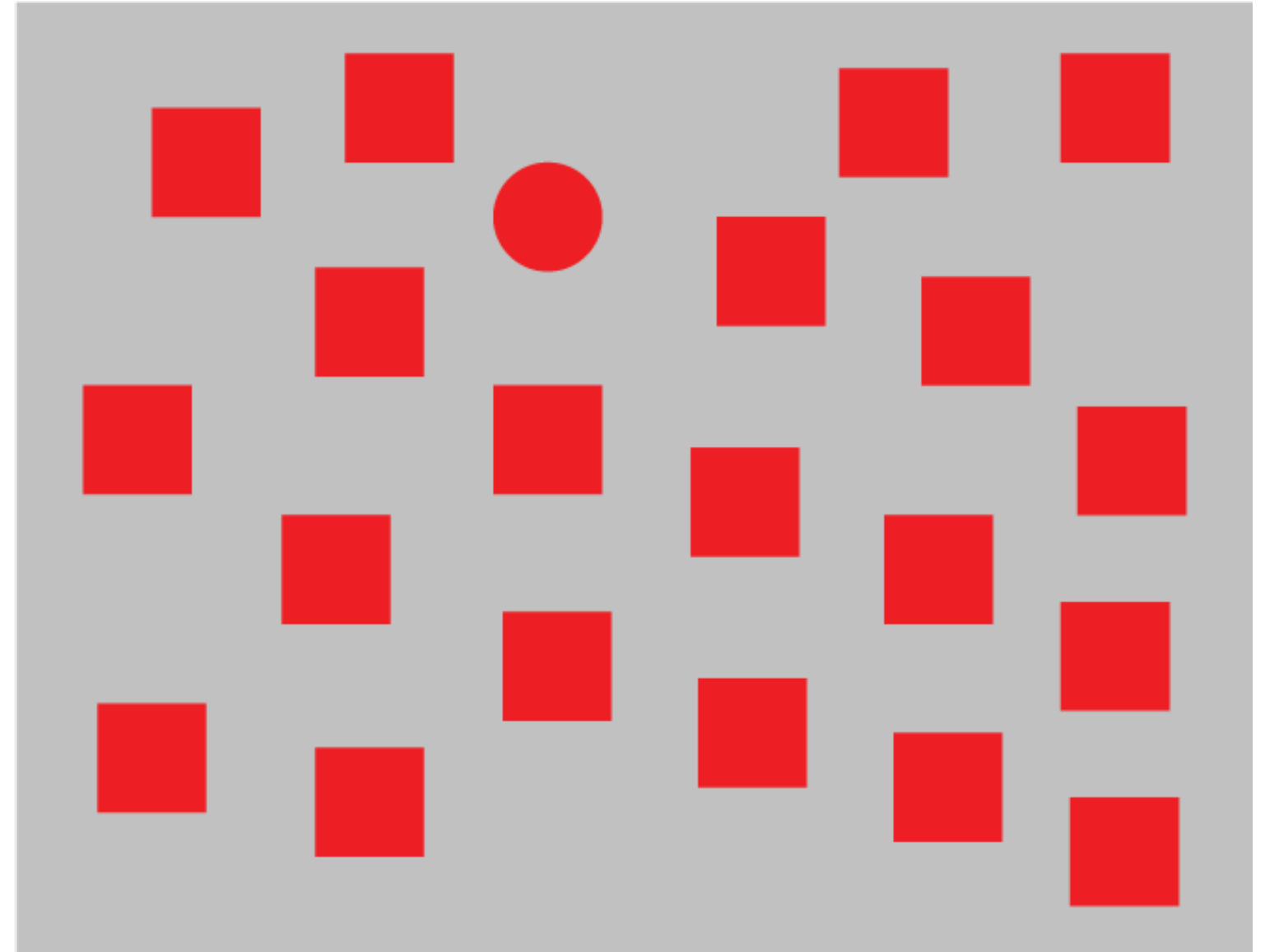
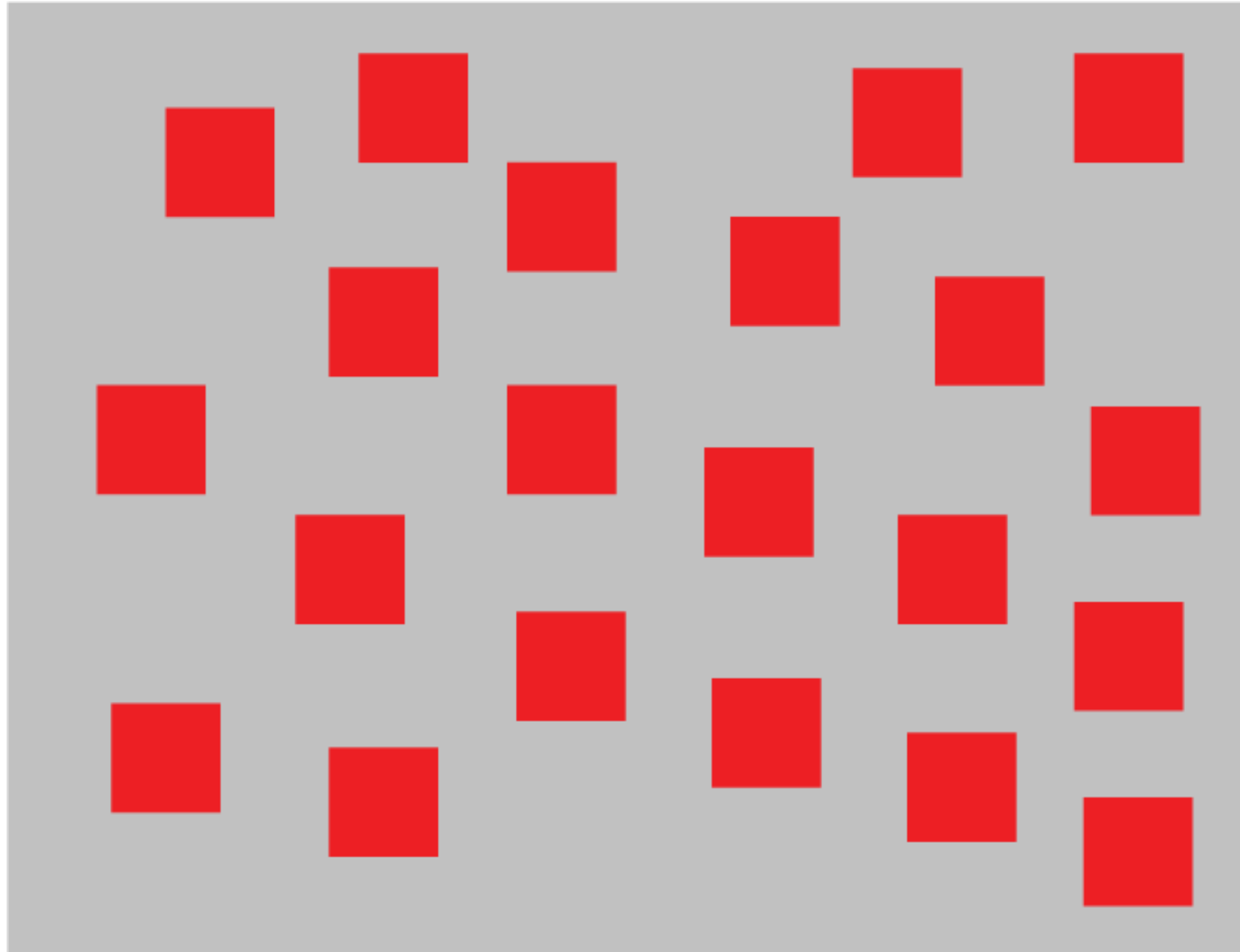
On the **left** or on the **right**?



**Color (hue) is pre-attentively processed.**

Where is the **RED DOT**?

On the **left** or on the **right**?



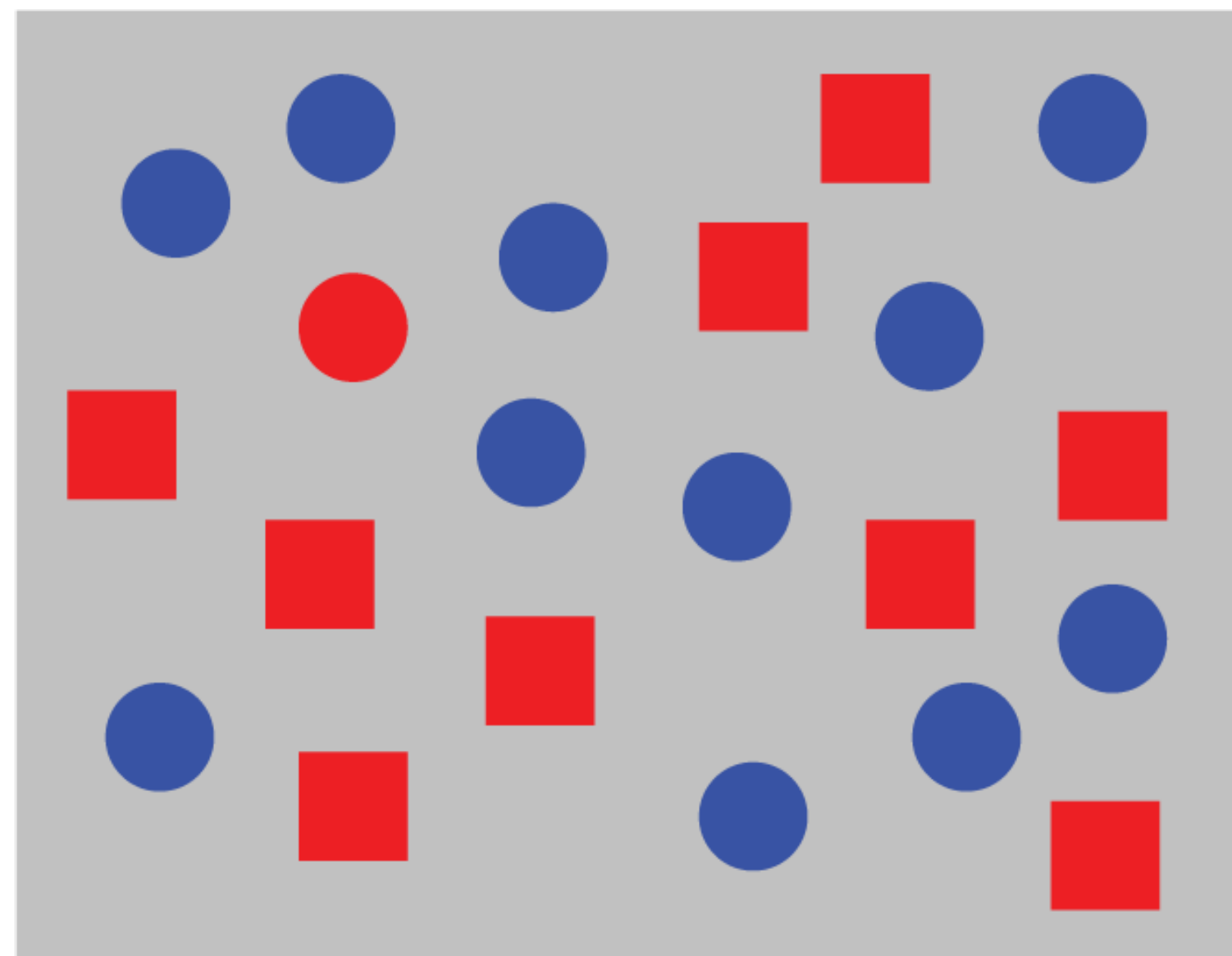
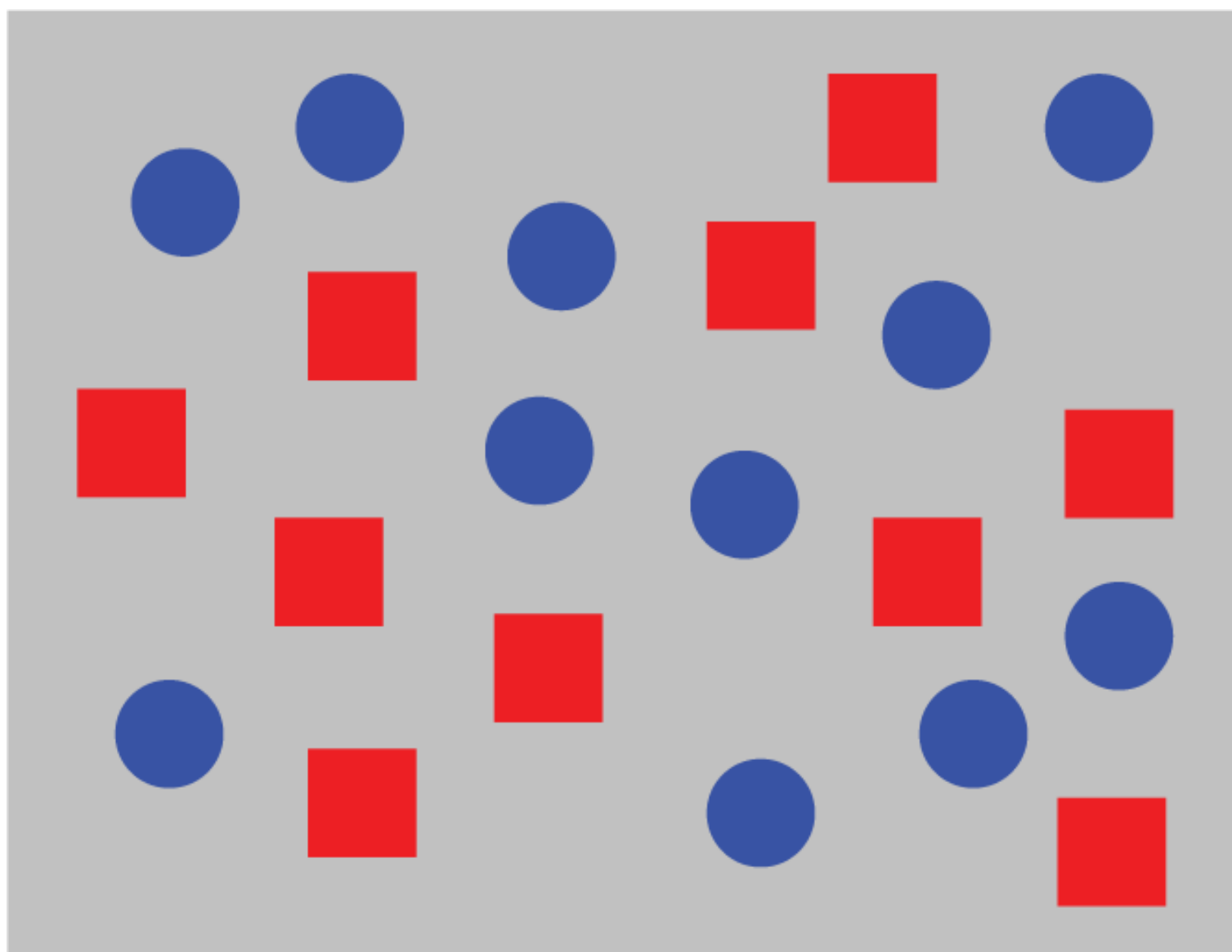
Where is the **RED DOT**?

On the **left** or on the **right**?

# Shape is pre-attentively processed.

Where is the **RED DOT**?

On the **left** or on the **right**?



Where is the **RED DOT**?

On the left or on the right?



**Hue and shape together are NOT pre-attentively processed.**

# Pre-Attentive Processing

- length
- width
- size
- curvature
- number
- terminators
- intersection
- closure
- hue
- lightness
- flicker
- direction of motion
- binocular luster
- stereoscopic depth
- 3-D depth cues
- lighting direction

Group	Attribute			
	Form	Length	Width	Orientation
Color				
Spatial Position				
Motion				



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# Thank You