DLI Accelerated Data Science Teaching Kit

Lecture 7.2 - Human Perception

The Accelerated Data Science Teaching Kit is licensed by NVIDIA, Georgia Institute of Technology, and Prairie View A&M University under the Creative Commons Attribution-NonCommercial 4.0 International License.

Data visualization leverages
human perception

NVIDIA DEEP LEARNING INSTITUTE | Georgia Tech | PRAIRIE VIEW A&M UNIVERSITY

Name the five senses.

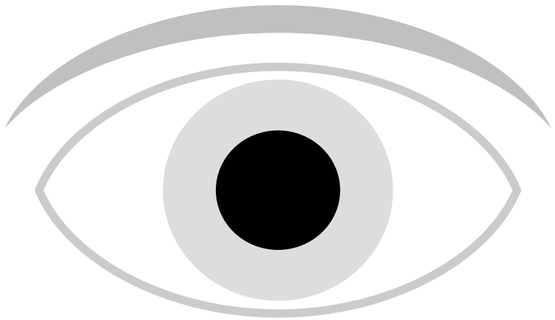
NVIDIA DEEP LEARNING INSTITUTE
Georgia Tech
PRAIRIE VIEW A&M UNIVERSITY

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

NVIDIA DEEP LEARNING INSTITUTE
Georgia Tech
PRAIRIE VIEW A&M UNIVERSITY

A (Simple) Model of Human Visual Perception



Stage 1

Parallel detection of basic features into an iconic store

Stage 2

Serial processing of object identification and spatial layout

NVIDIA DEEP LEARNING INSTITUTE | Georgia Tech | PRAIRIE VIEW A&M UNIVERSITY

Stage 1: Pre-Attentive Processing

Rapid

Parallel

Automatic

(Fleeting = lasting for a short time)

NVIDIA DEEP LEARNING INSTITUTE | Georgia Tech | PRAIRIE VIEW A&M UNIVERSITY

Stage 2: Serial Processing

Relatively Slow

(Incorporates Memory)

Manual

NVIDIA DEEP LEARNING INSTITUTE | Georgia Tech | PRAIRIE VIEW A&M UNIVERSITY

Stage 1: Pre-Attentive Processing

The eye moves every 200ms.

(so this processing occurs every 200ms-250ms)

NVIDIA DEEP LEARNING INSTITUTE | Georgia Tech | PRAIRIE VIEW A&M UNIVERSITY

Example

128176875613897654698450698560498282676298098584582245098564589450984509809435859091030209905959595772564675050678904567884578980982167765487636490856091294968610

NVIDIA DEEP LEARNING INSTITUTE
Georgia Tech
PRAIRIE VIEW A&M UNIVERSITY

Example

128176875613897654698450698560498282676 2

9809858458224509856458945098450980943585

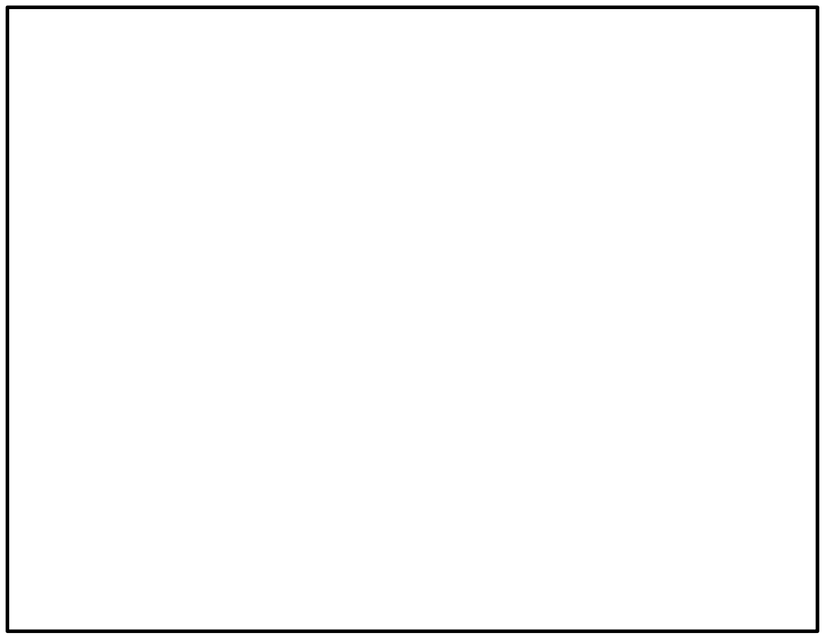
9091030209905959595772564675050678904567

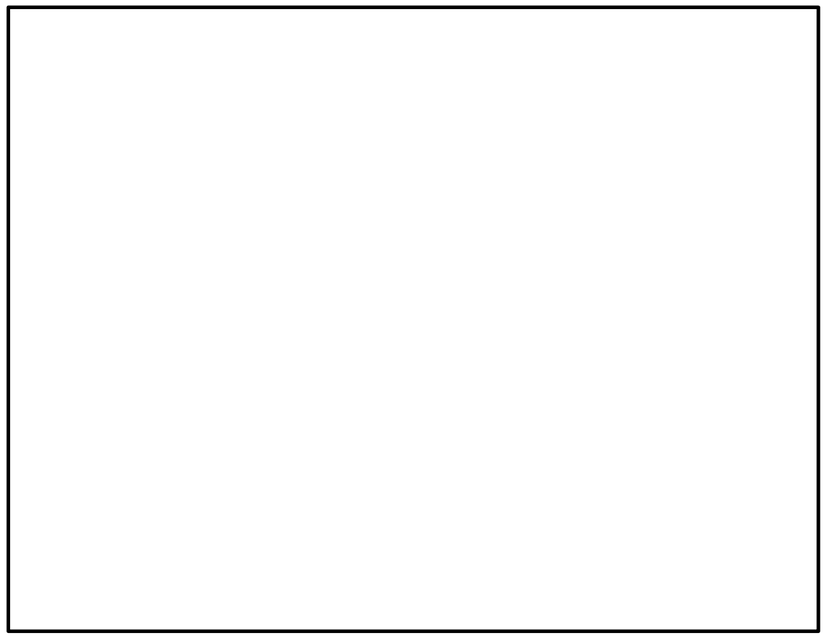
8845789809821677654876364908560912949686

NVIDIA DEEP LEARNING INSTITUTE
Georgia Tech
PRAIRIE VIEW A&M UNIVERSITY

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

NVIDIA DEEP LEARNING INSTITUTE
Georgia Tech
PRAIRIE VIEW A&M UNIVERSITY





Left Side

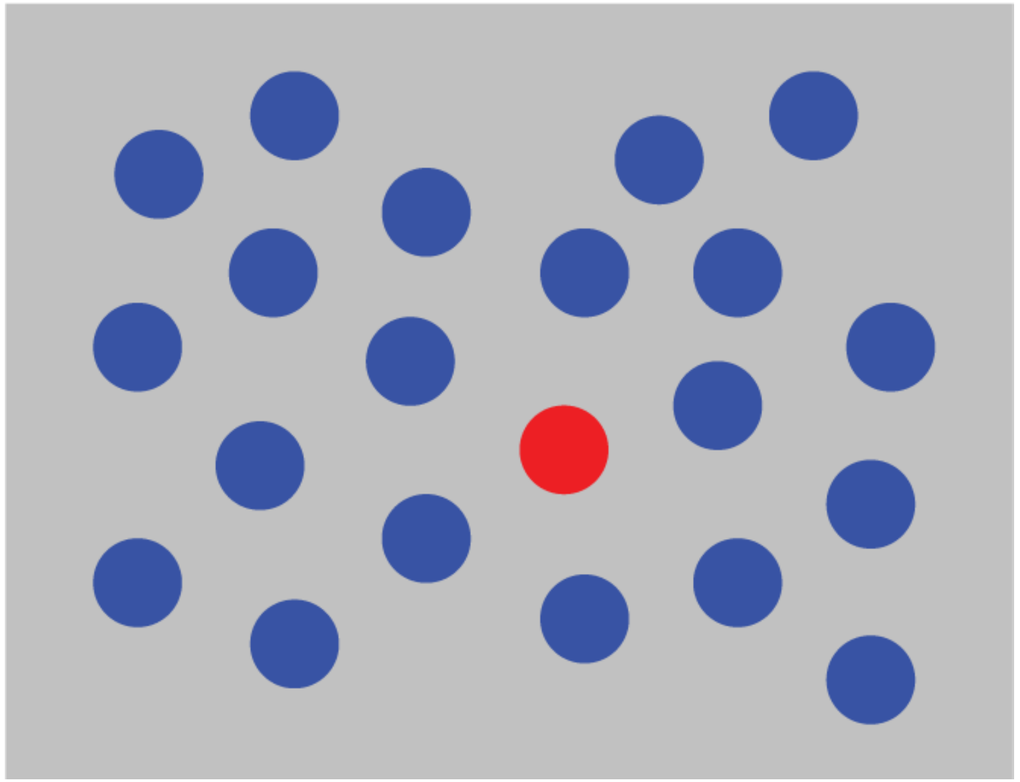
Right Side

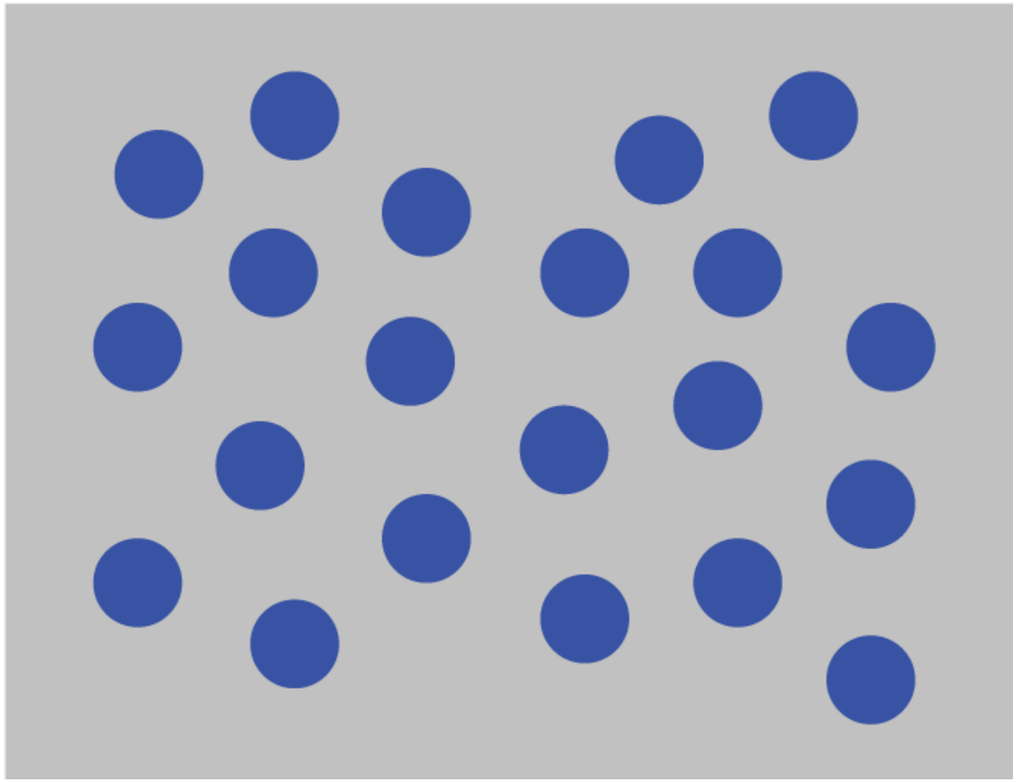
NVIDIA DEEP LEARNING INSTITUTE
Georgia Tech
PRAIRIE VIEW A&M UNIVERSITY

Where is the RED DOT?

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

NVIDIA DEEP LEARNING INSTITUTE
Georgia Tech
PRAIRIE VIEW A&M UNIVERSITY





NVIDIA DEEP LEARNING INSTITUTE
Georgia Tech
PRAIRIE VIEW A&M UNIVERSITY

Where is the RED DOT?

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

NVIDIA DEEP LEARNING INSTITUTE
Georgia Tech
PRAIRIE VIEW A&M UNIVERSITY

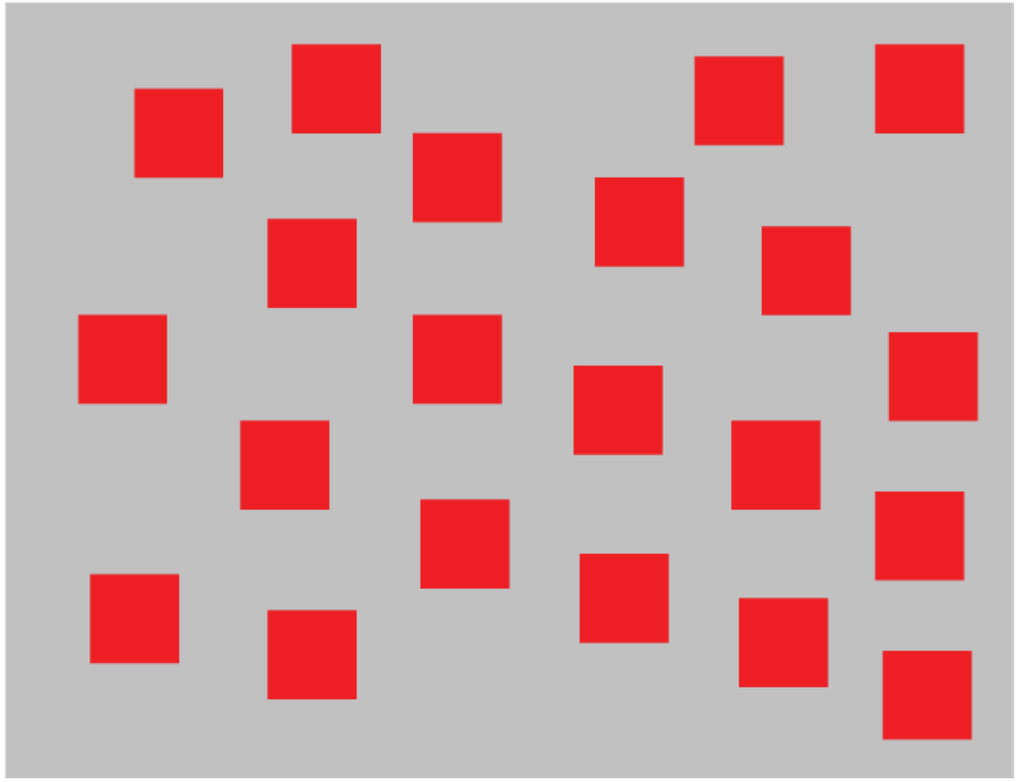
Color (hue) is pre-attentively processed.

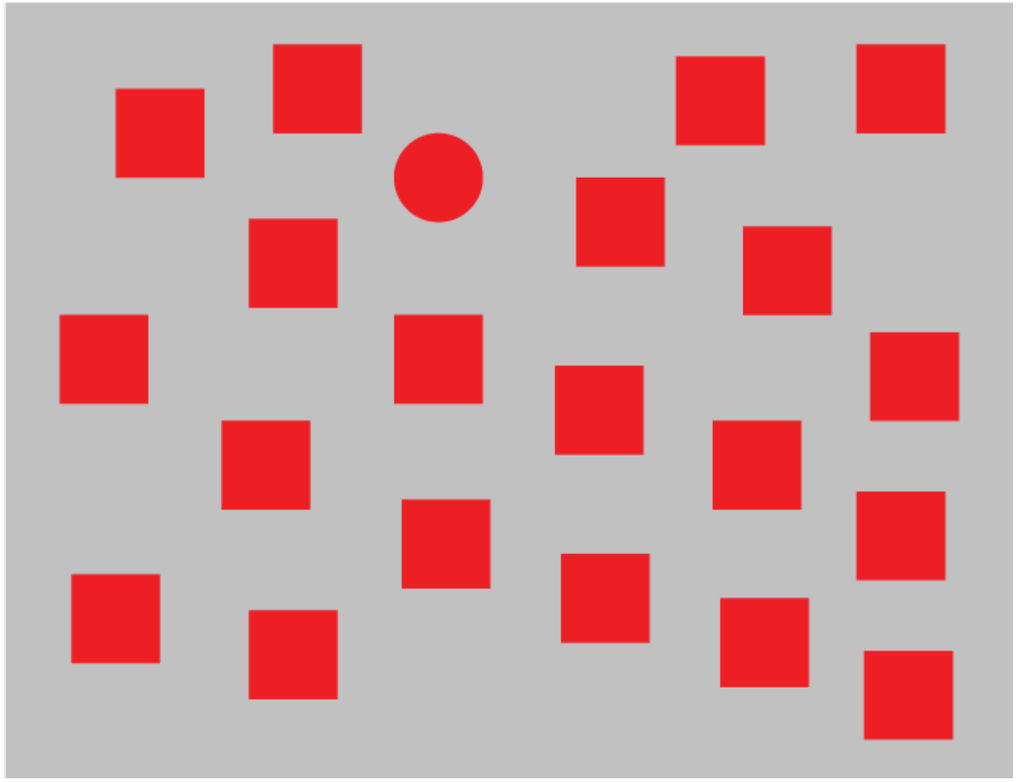
NVIDIA DEEP LEARNING INSTITUTE
Georgia Tech
PRAIRIE VIEW A&M UNIVERSITY

Where is the RED DOT?

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

NVIDIA DEEP LEARNING INSTITUTE
Georgia Tech
PRAIRIE VIEW A&M UNIVERSITY





NVIDIA DEEP LEARNING INSTITUTE
Georgia Tech
PRAIRIE VIEW A&M UNIVERSITY

Where is the RED DOT?

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

NVIDIA DEEP LEARNING INSTITUTE
Georgia Tech
PRAIRIE VIEW A&M UNIVERSITY

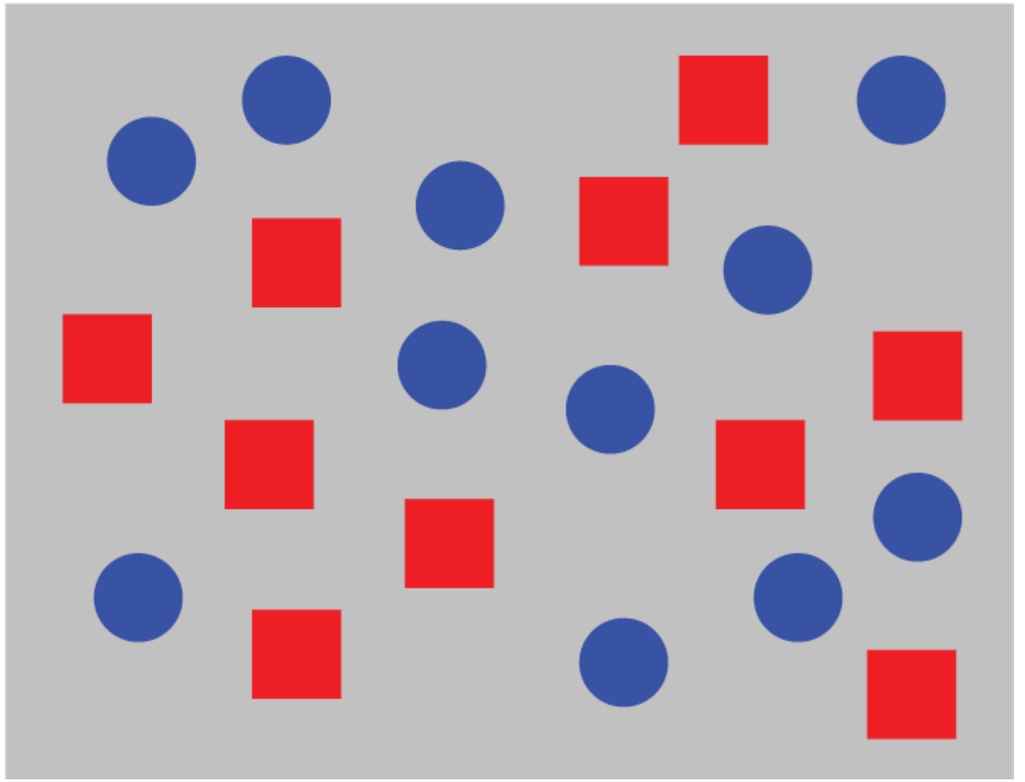
Shape is pre-attentively processed.

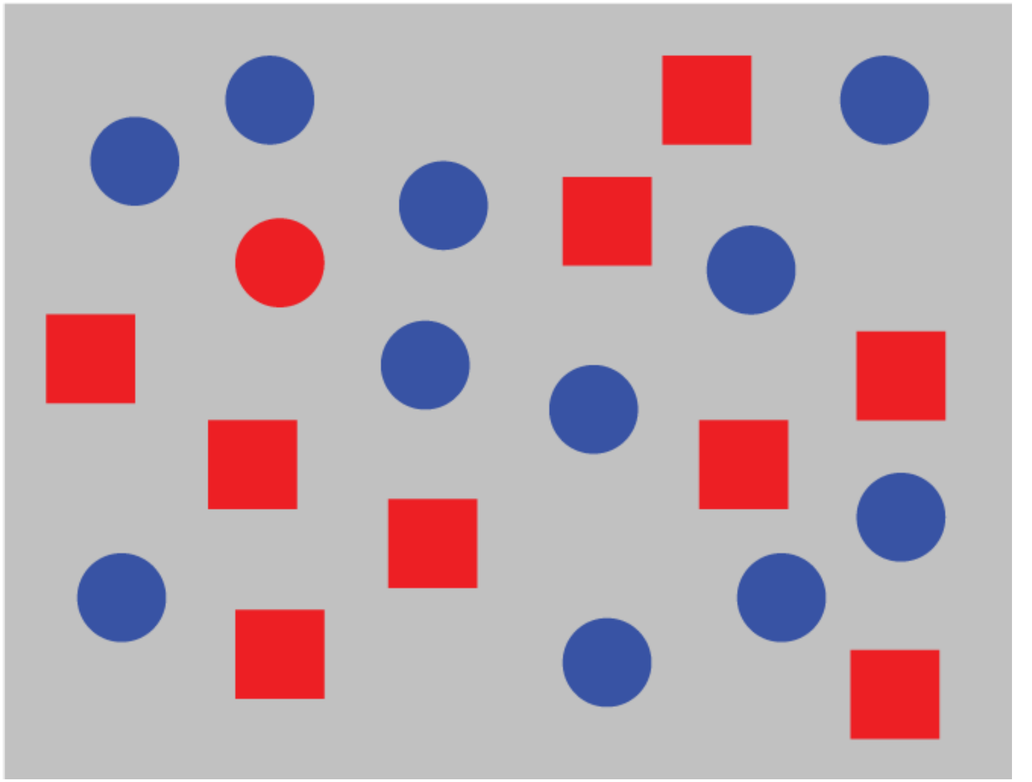
NVIDIA DEEP LEARNING INSTITUTE
Georgia Tech
PRAIRIE VIEW A&M UNIVERSITY

Where is the RED DOT?

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

NVIDIA DEEP LEARNING INSTITUTE
Georgia Tech
PRAIRIE VIEW A&M UNIVERSITY





NVIDIA DEEP LEARNING INSTITUTE
Georgia Tech
PRAIRIE VIEW A&M UNIVERSITY

Where is the RED DOT?

On the left or on the right?

NVIDIA DEEP LEARNING INSTITUTE
Georgia Tech
PRAIRIE VIEW A&M UNIVERSITY

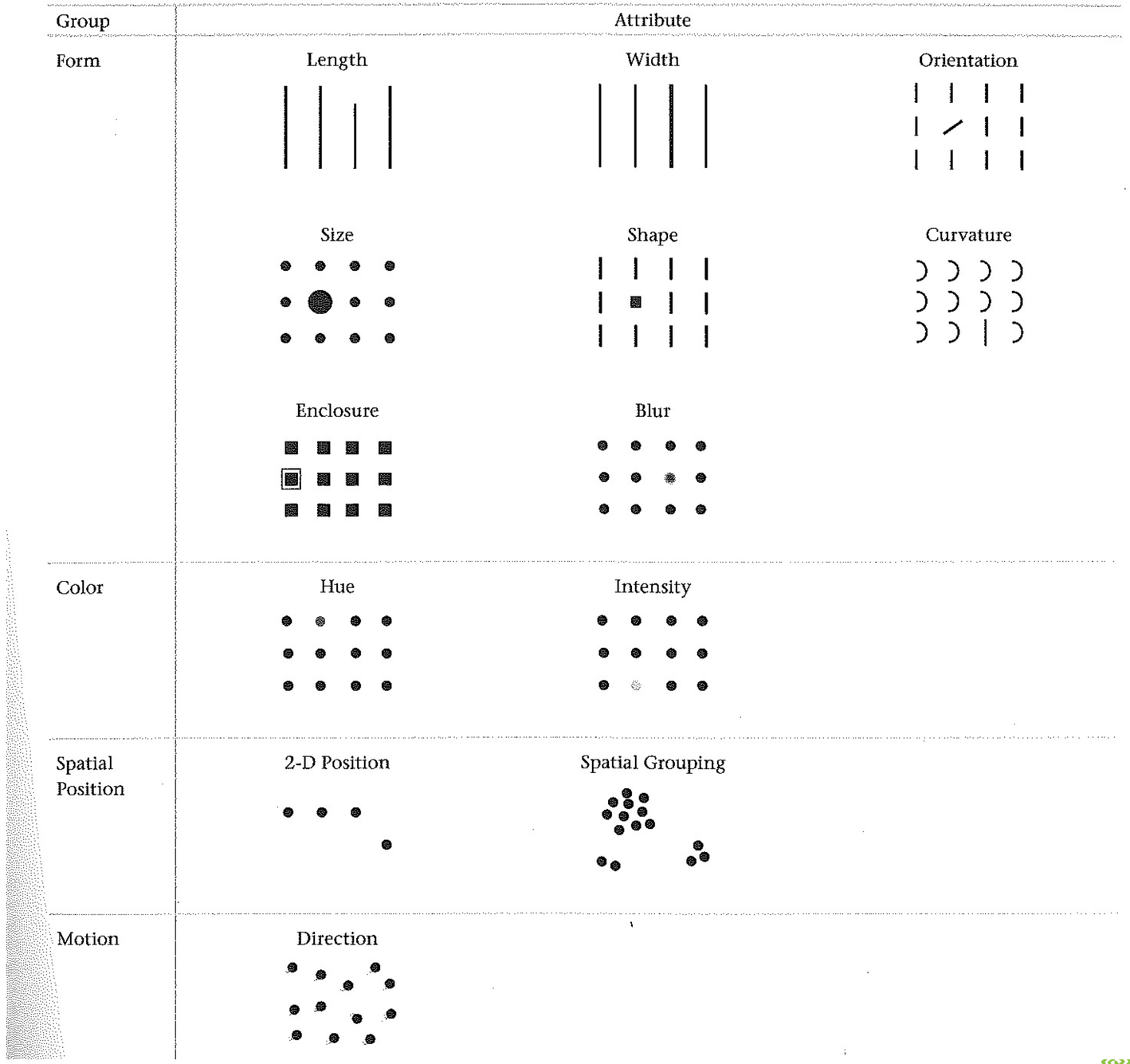
Hue and shape together are NOT pre-attentively processed.

NVIDIA DEEP LEARNING INSTITUTE | Georgia Tech | PRAIRIE VIEW A&M UNIVERSITY

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

NVIDIA DEEP LEARNING INSTITUTE | Georgia Tech | PRAIRIE VIEW A&M UNIVERSITY



Few, S. (2012). Show me the numbers: designing tables and graphs to enlighten. Burlingame, Calif: Analytics Press.

NVIDIA DEEP LEARNING INSTITUTE
Georgia Tech
PRAIRIE VIEW A&M UNIVERSITY

DEEP
LEARNING
INSTITUTE

PRAIRIE VIEW
A&M UNIVERSITY

DLI Accelerated Data Science Teaching Kit

Thank You