

graphicdesign

BASICS FOR
DATA VISUALIZATION

CAMILLE G LEE

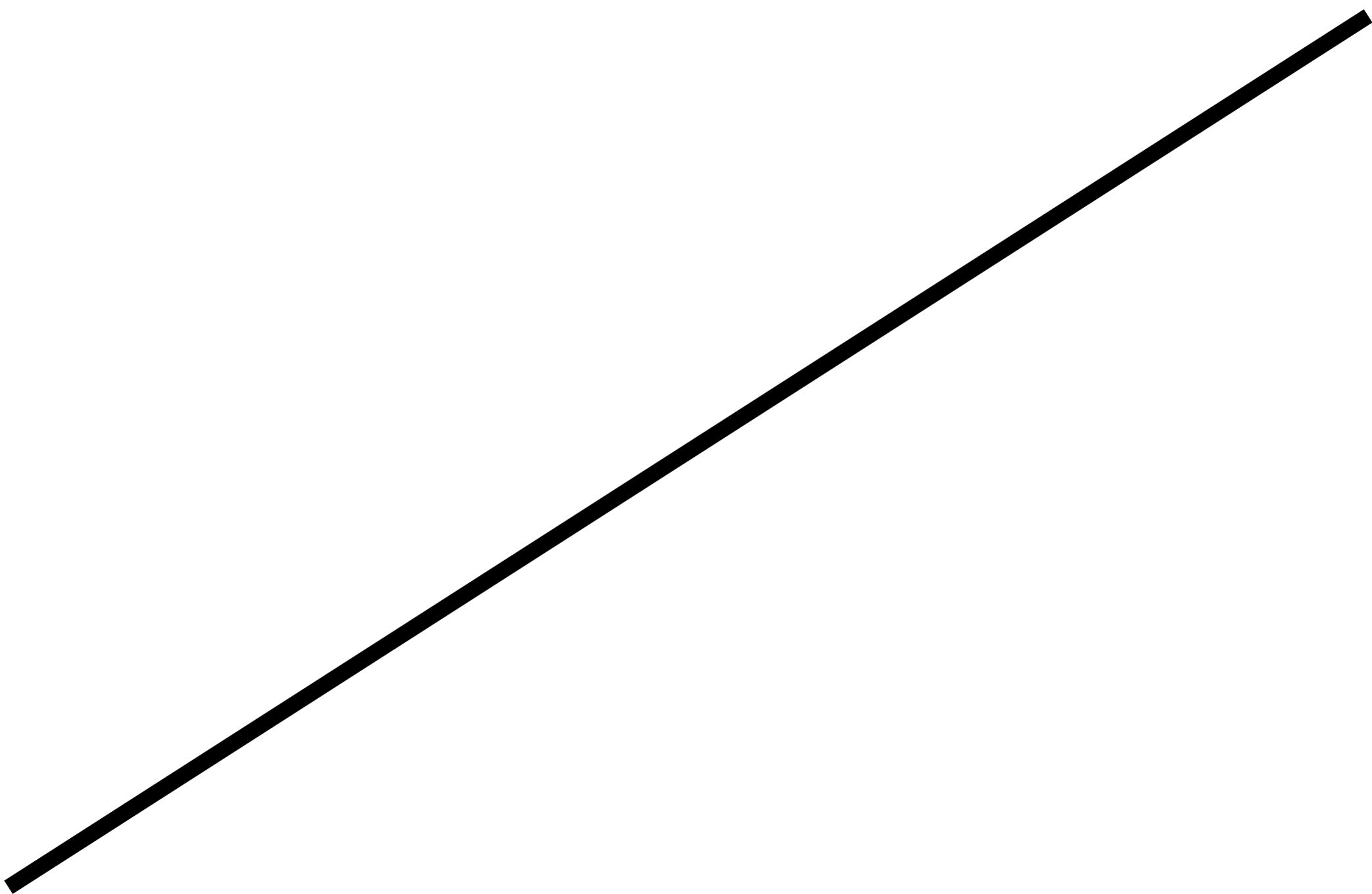
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MONDAY

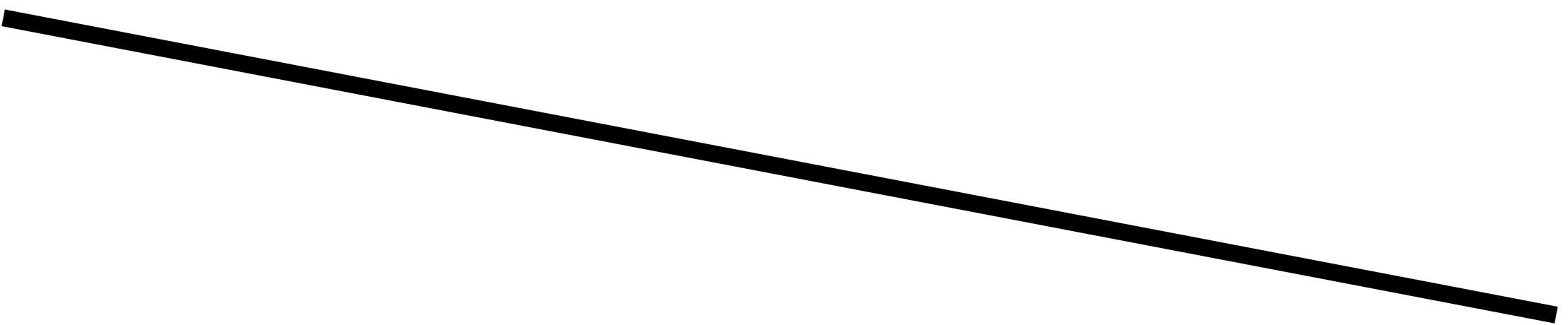
- 1. perceptual processing**
- 2. elements & principles**
- 3. example**

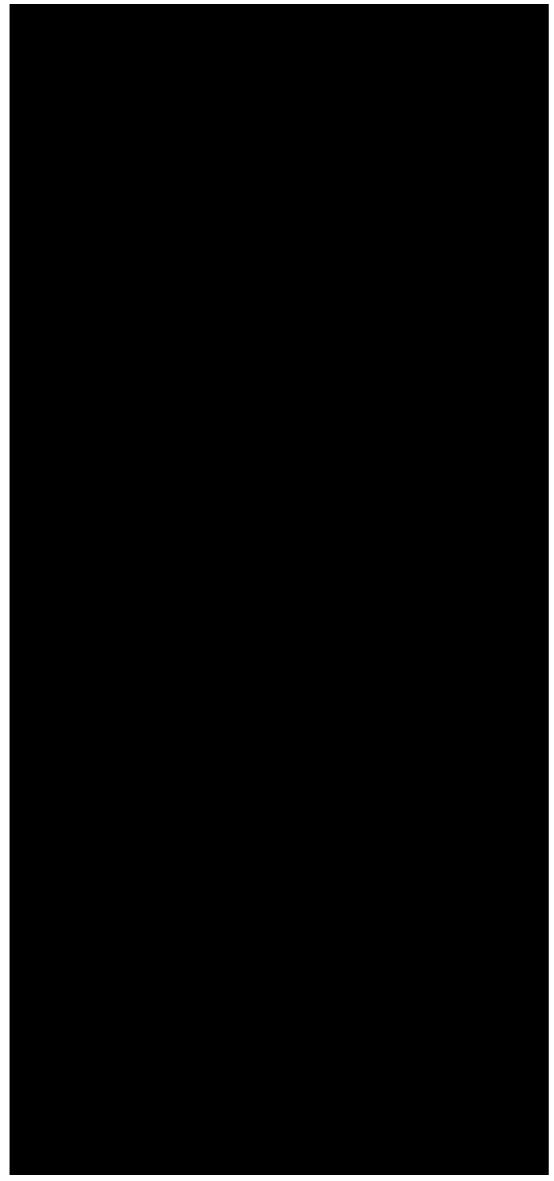
perception
& attention

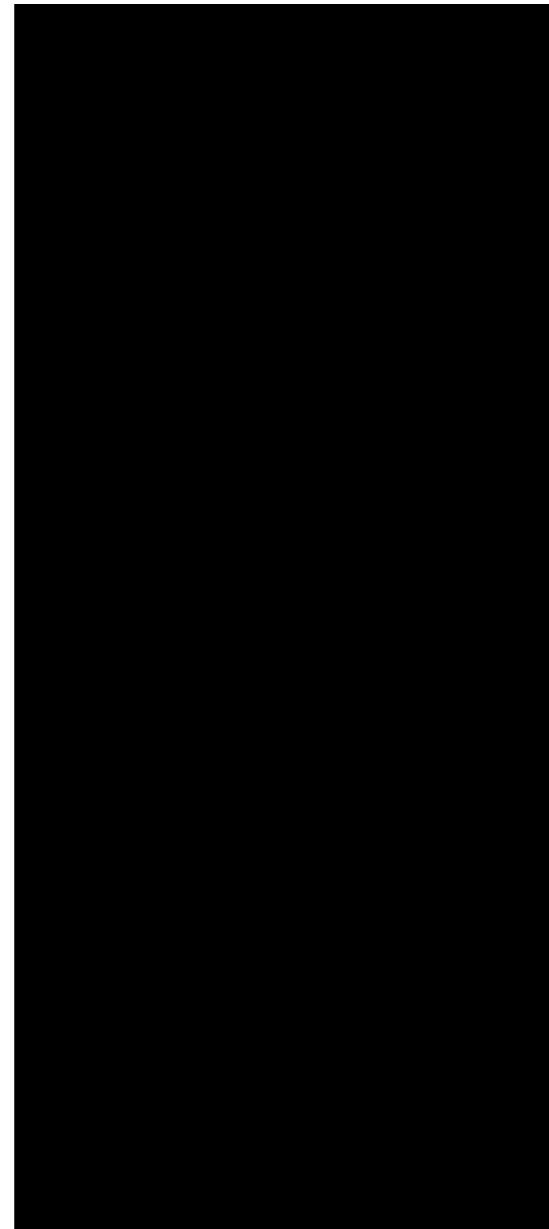
3 STAGES OF PERCEPTUAL PROCESSING

STAGE 1:
Rapid parallel
processing to extract
low level properties
of visual scene into
“feature maps”





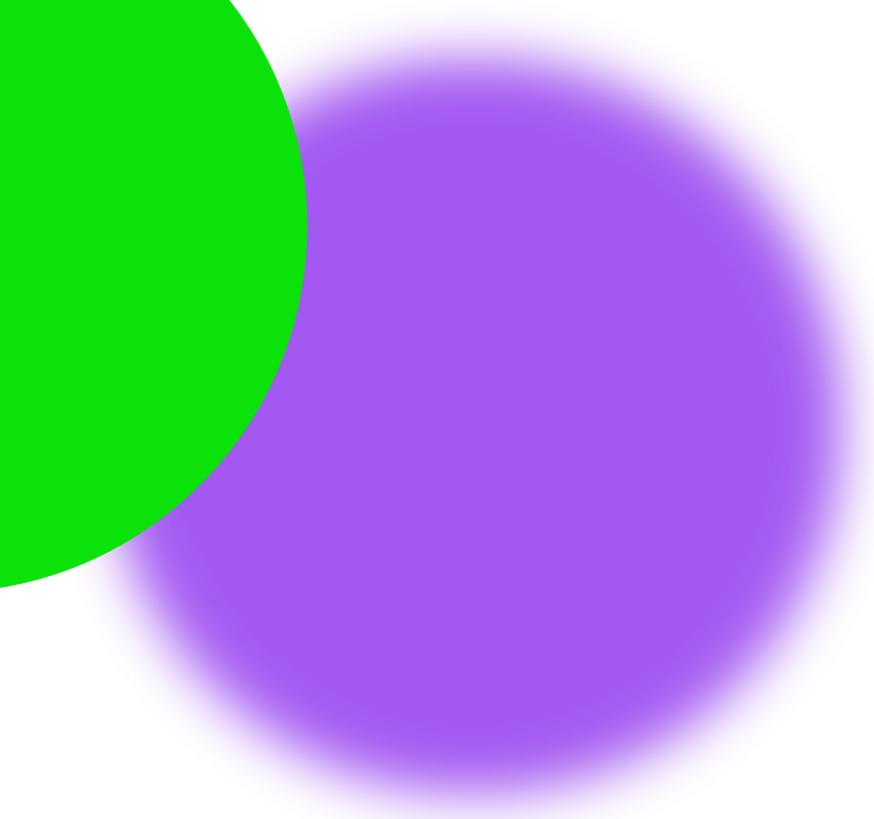
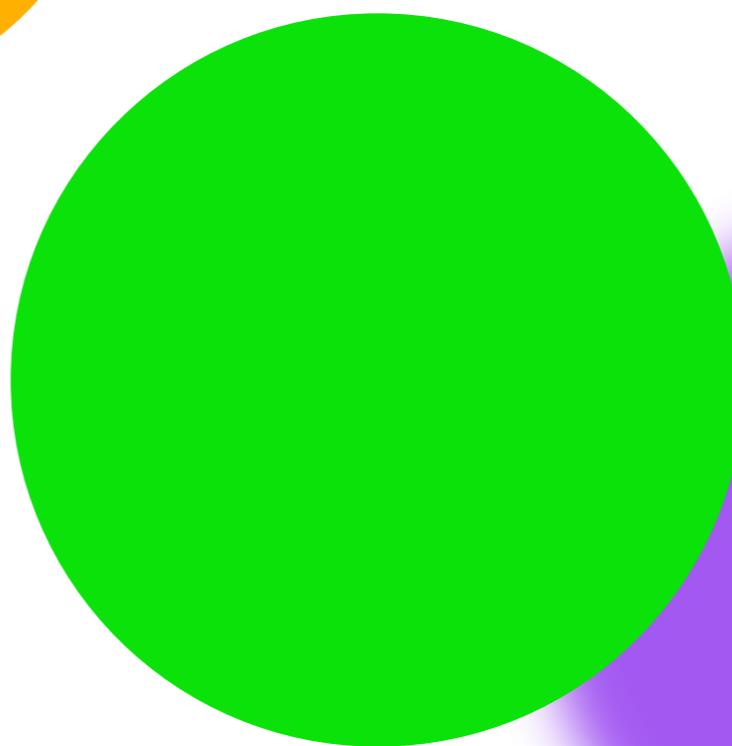
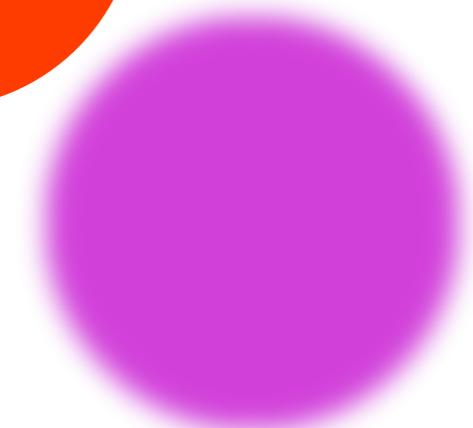
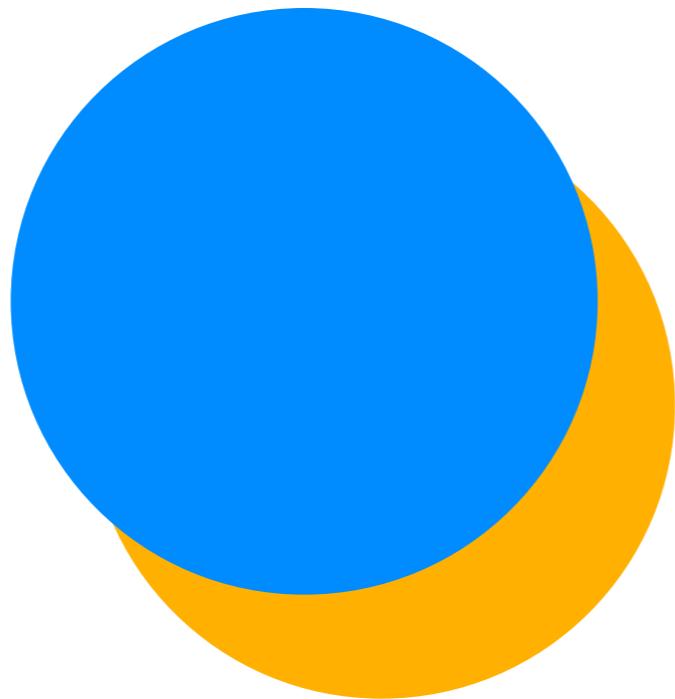
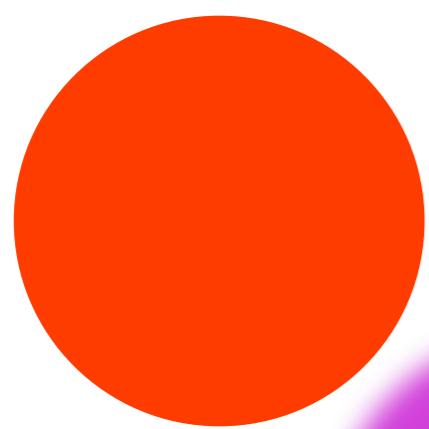


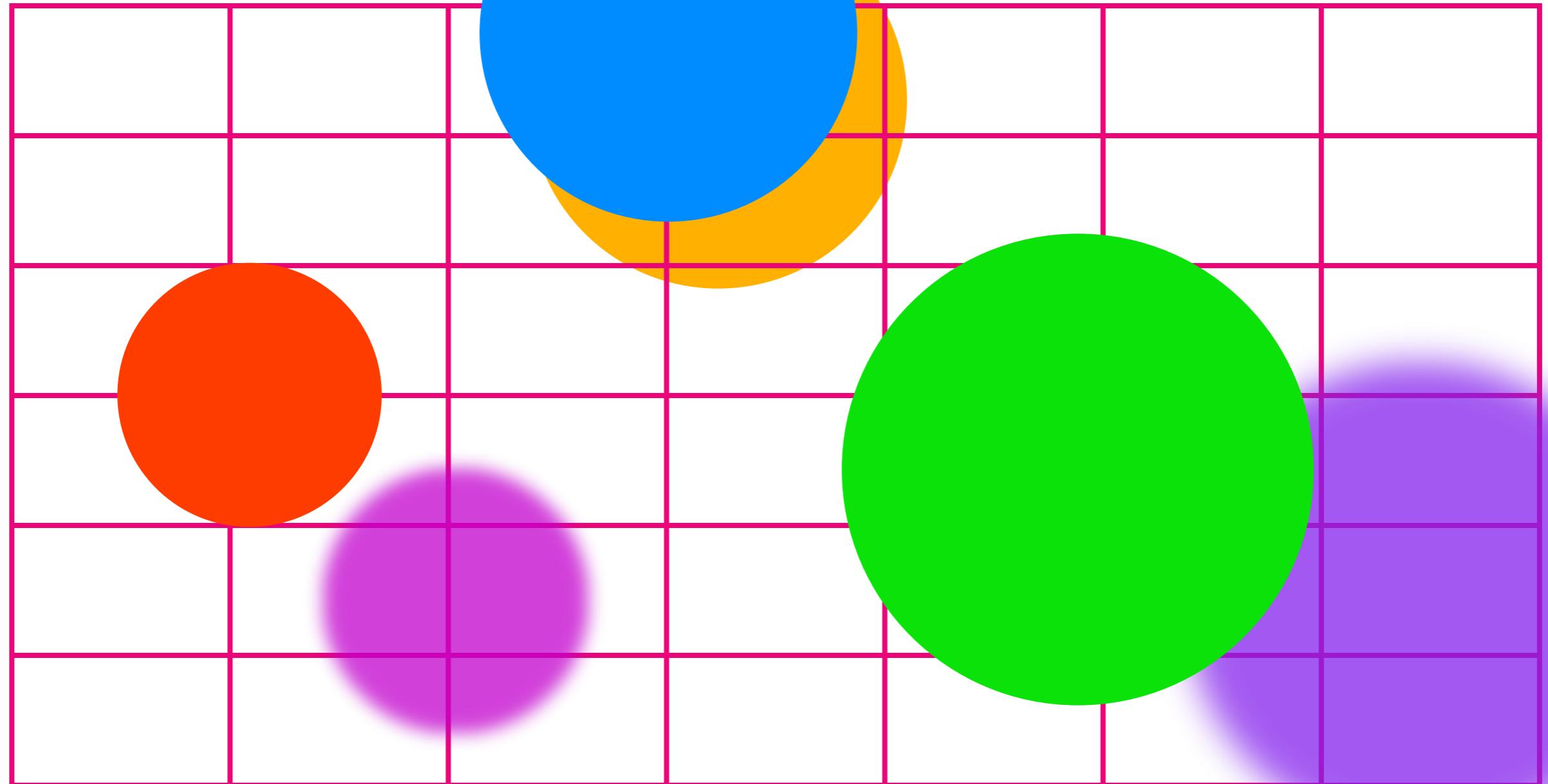


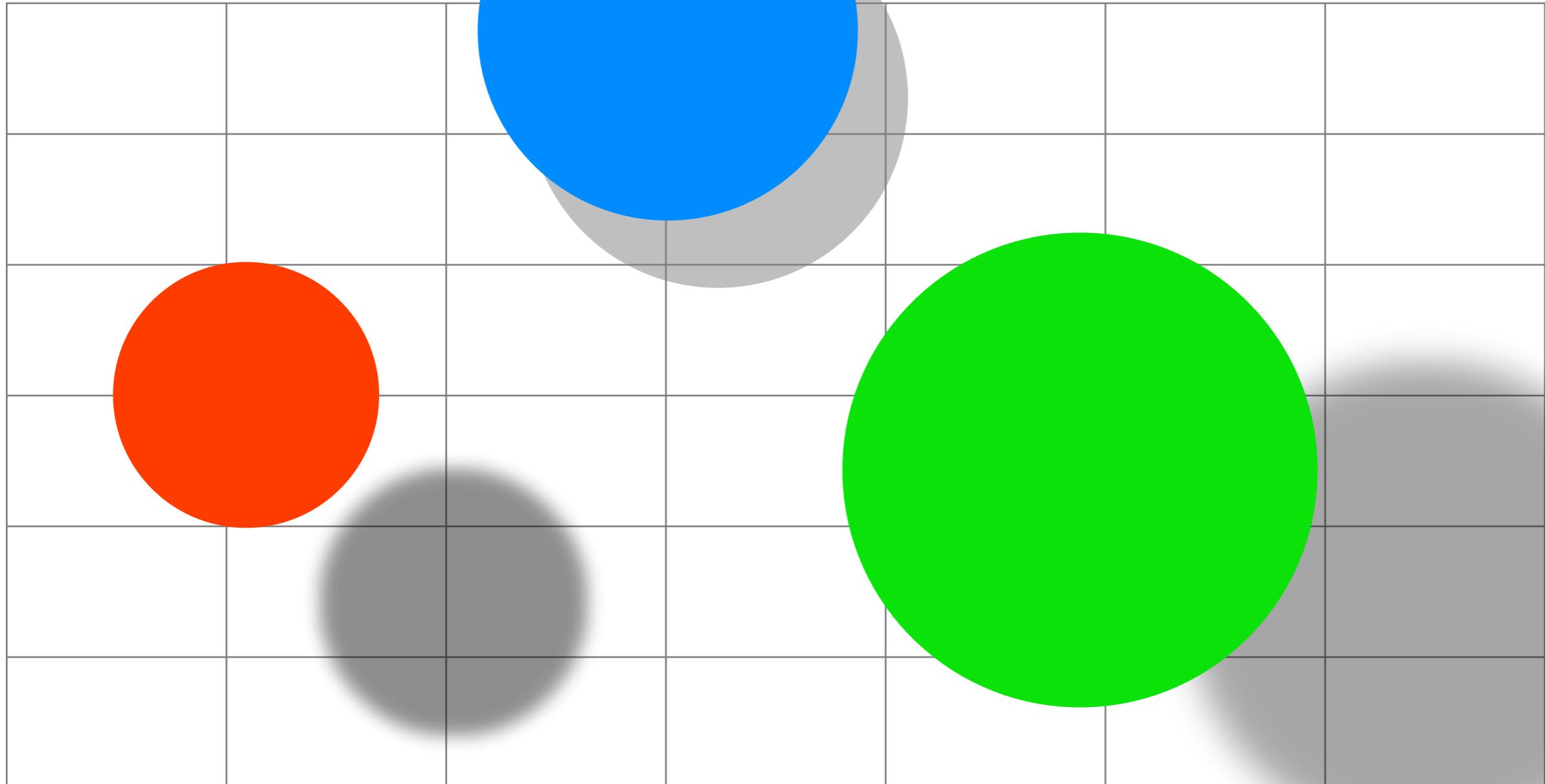
3 STAGES OF PERCEPTUAL PROCESSING

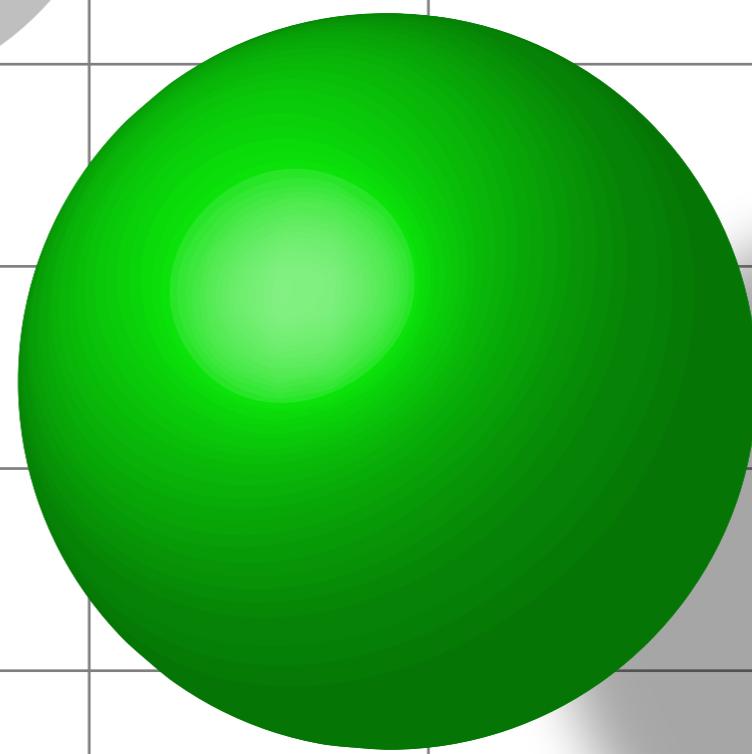
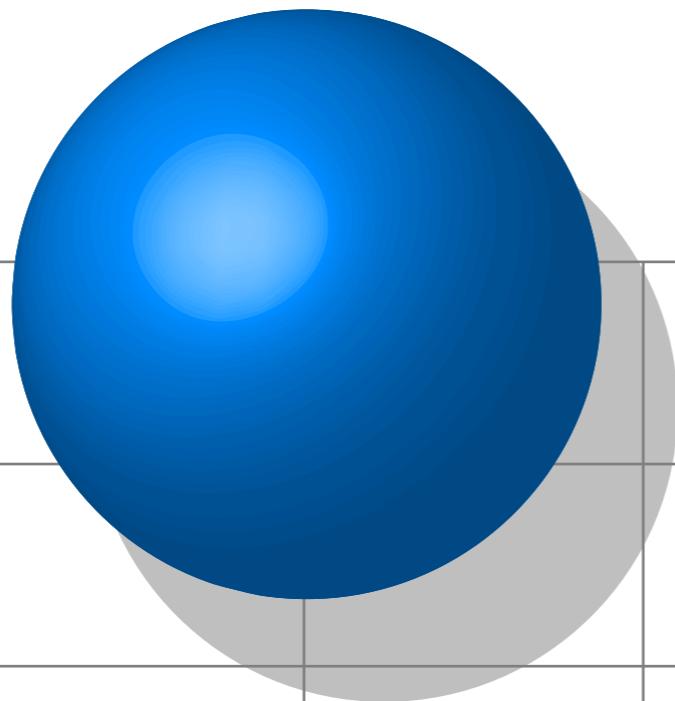
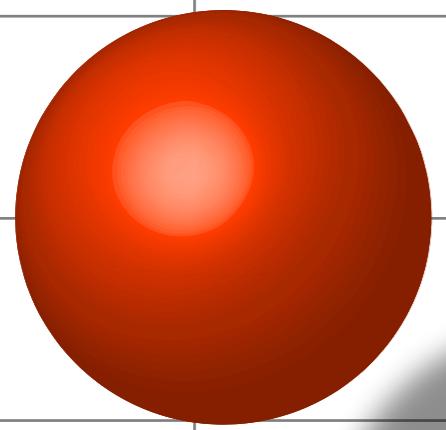
STAGE 2:

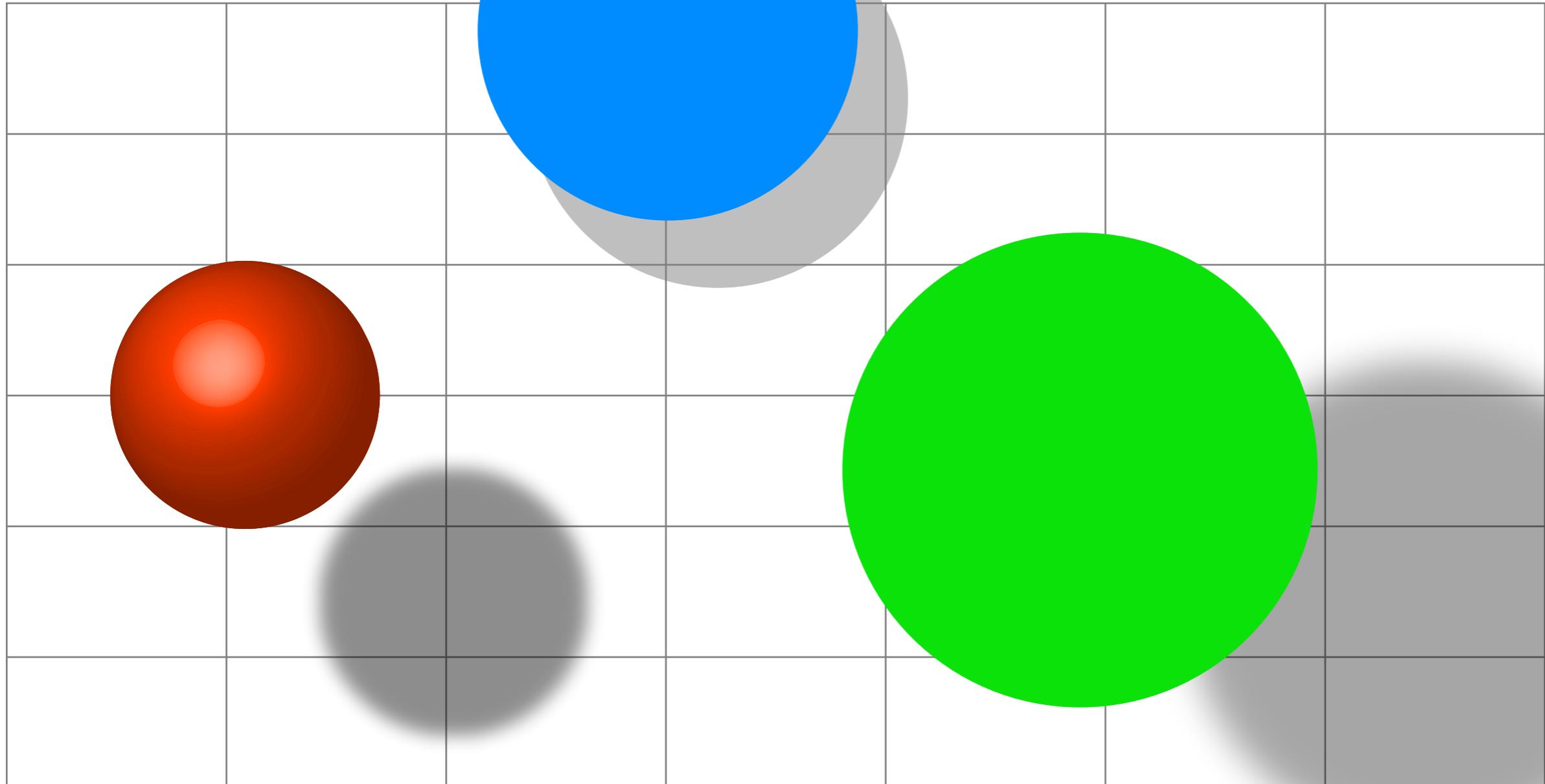
**Slower, top-down serial
processing of patterns
in feature maps; object
and spatial recognition**

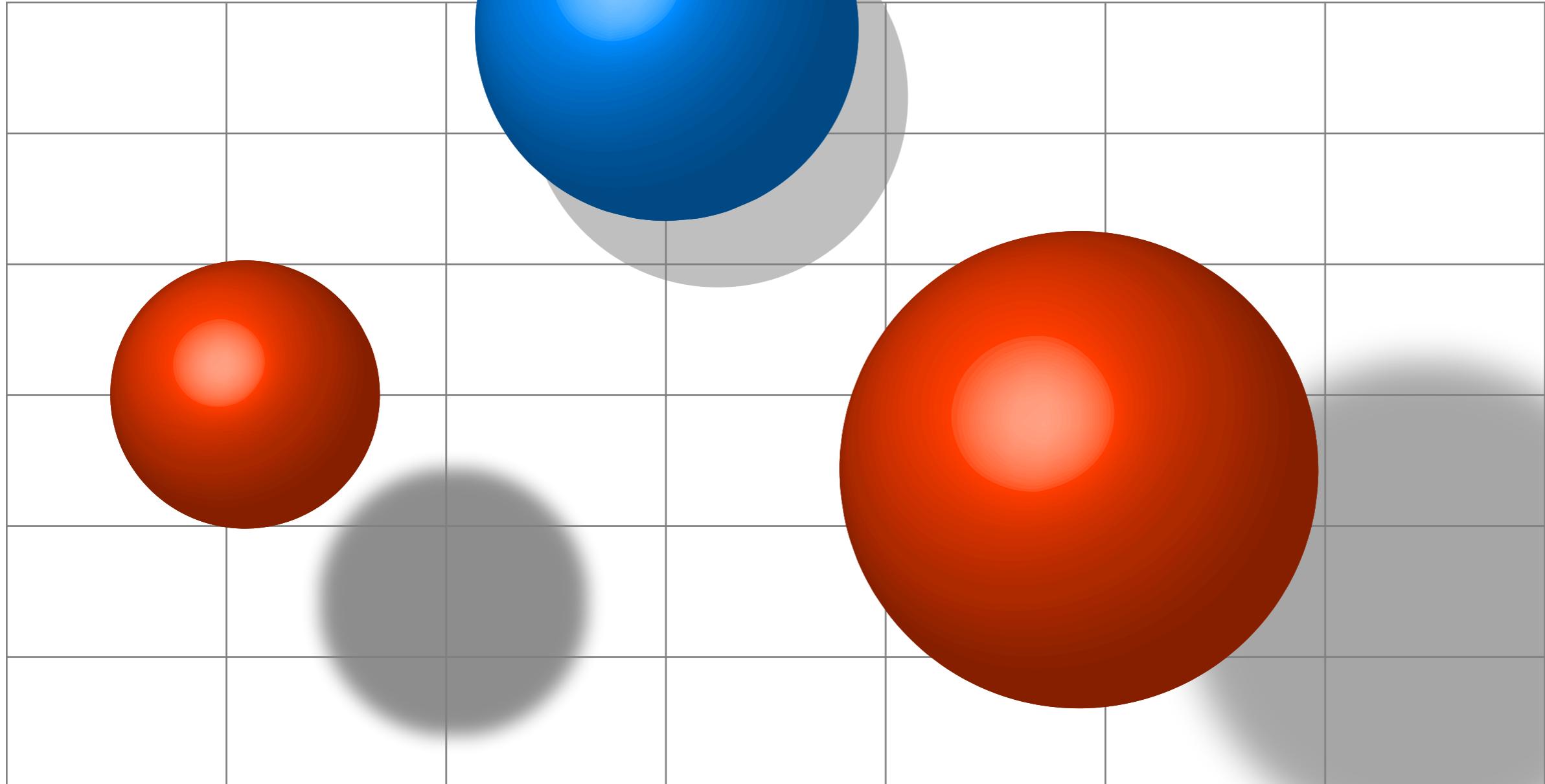


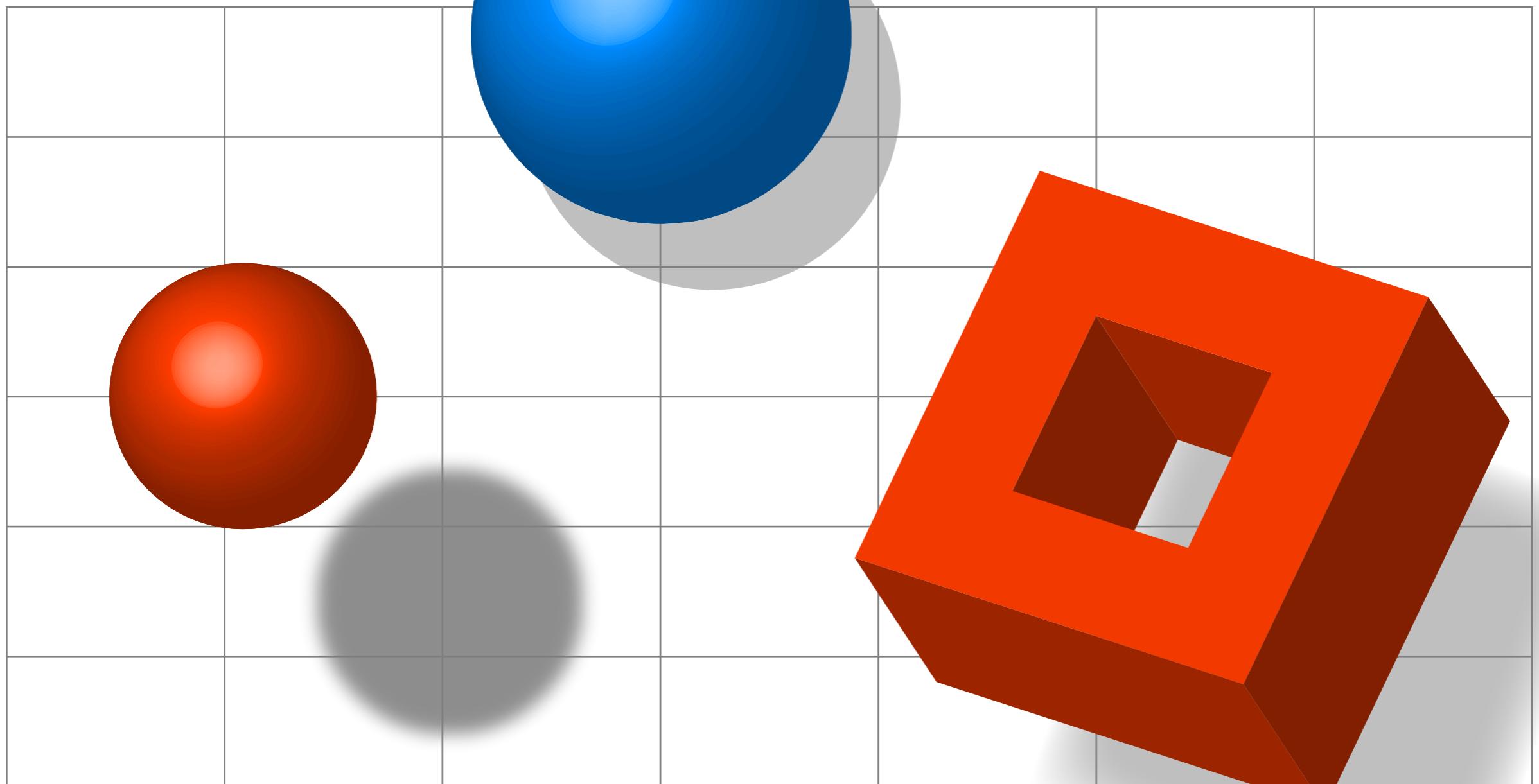












3 STAGES OF PERCEPTUAL PROCESSING

STAGE 3:
Objects are held in
visual working memory
while long-term
memory is queried for
understanding

EYE MOVEMENTS

- **saccades**
- **smooth pursuit movements**
- **optokinetic nystagmus**

ATTENTION

- Immediately following the **up-flow of information** there is a **top-down signal** that **consolidates and enhances** what is happening at earlier stages.
- The **entire system is constantly tuned** from top to bottom based on our expectations and on what will be most useful to us.
- The generic name for this is **ATTENTION**.
- Eye movements are acts of **REALLOCATION OF ATTENTION**.

Role of the Designer

The role of the designer is to engineer design elements using design principles in order to **CAPTURE**, **HOLD** and **NAVIGATE** these reallocations of attention toward a particular **goal** for the intended **audience**.

elements
& principles

design ELEMENTS

Building blocks of a graphic

- 1. LIGHT**
- 2. SPACE**
- 3. MATERIAL**
- 4. COMPOSITE**



design ELEMENTS

- ambient
- directional
- spot
- COLOR

Light

color tools

Adobe Kuler

<https://color.adobe.com/create/color-wheel/>

HSL Picker

<http://hslpicker.com/>

TinEye Labs

<http://labs.tineye.com/>

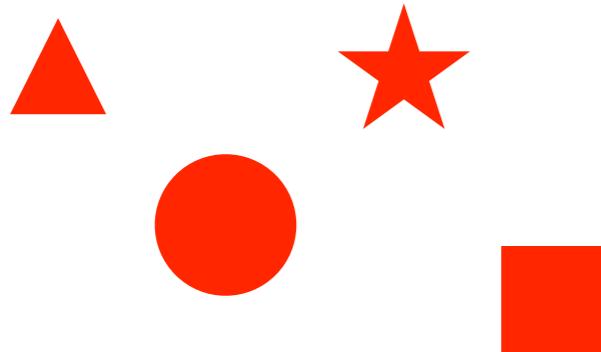
Color Palette Generator

<http://www.cssdrive.com/imagepalette/>

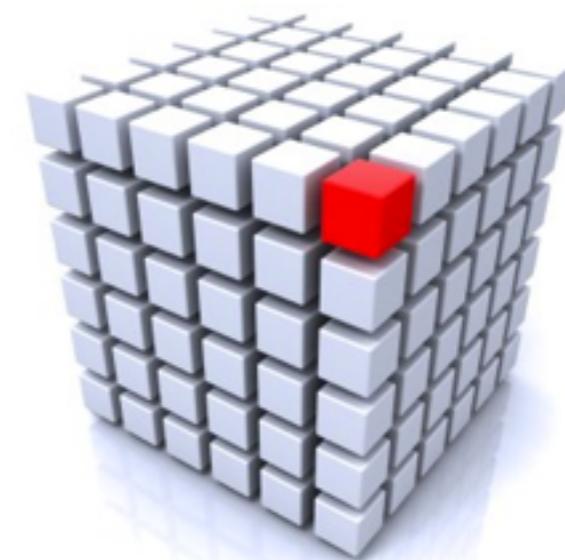
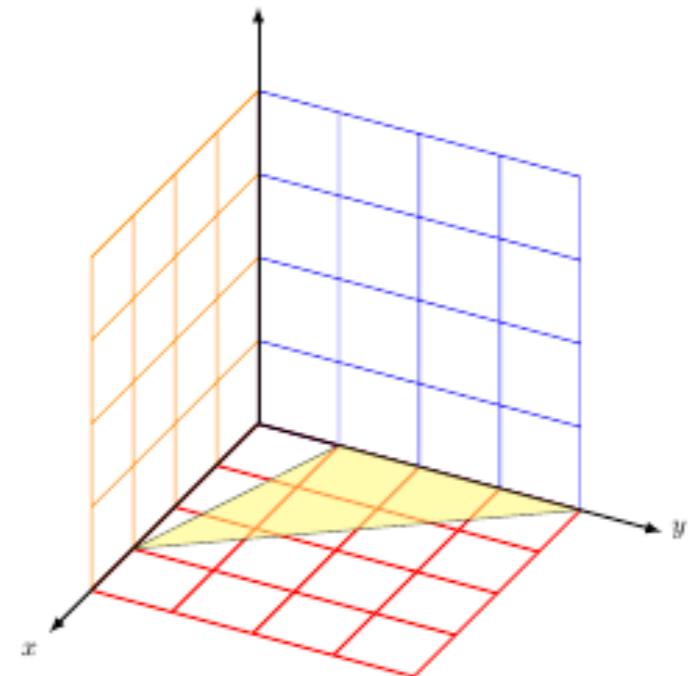
28 Best Tools for Choosing a Color Scheme

<http://www.creativebloq.com/colour/tools-colour-schemes-12121430>

design ELEMENTS



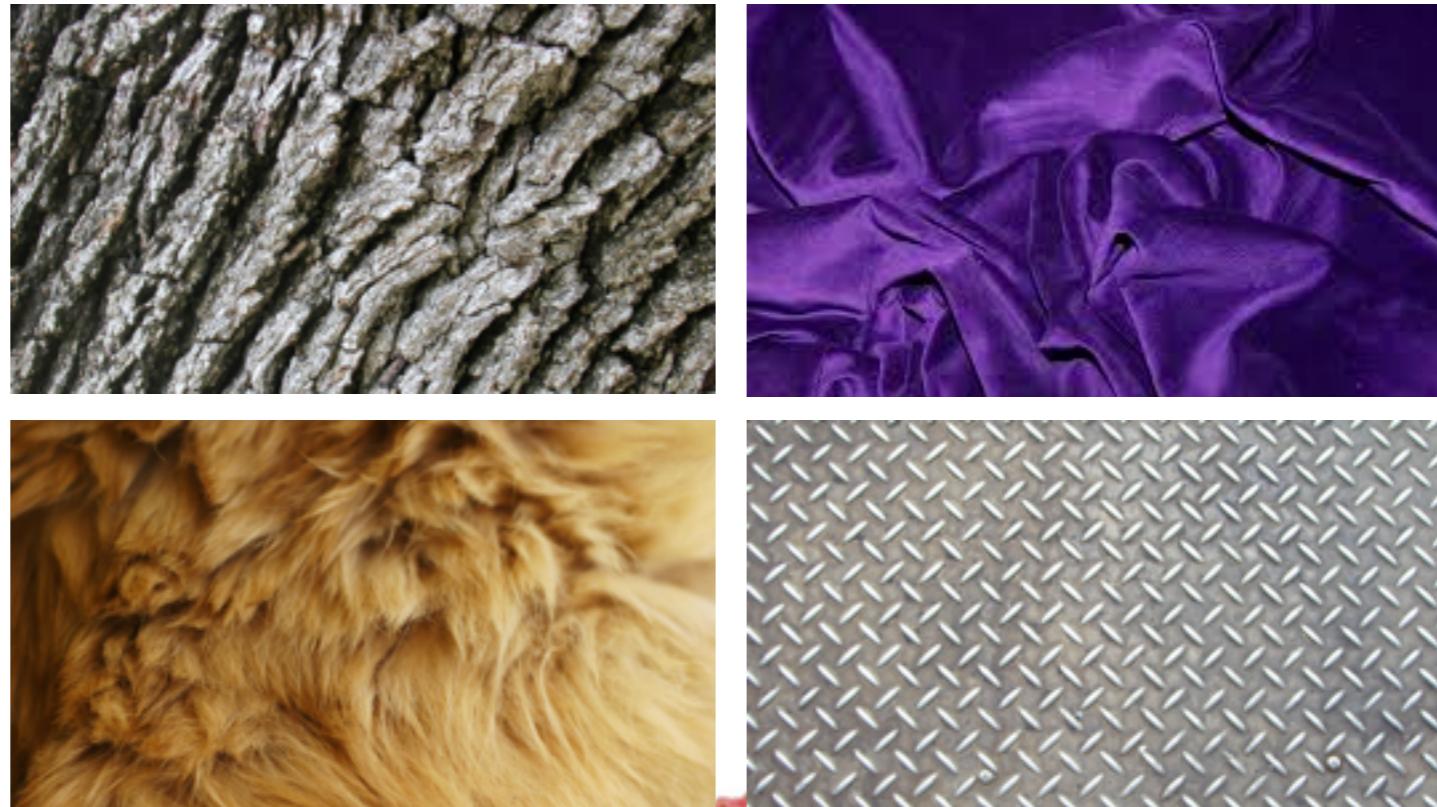
- point
- line
- plane
- volume



Space & FORM

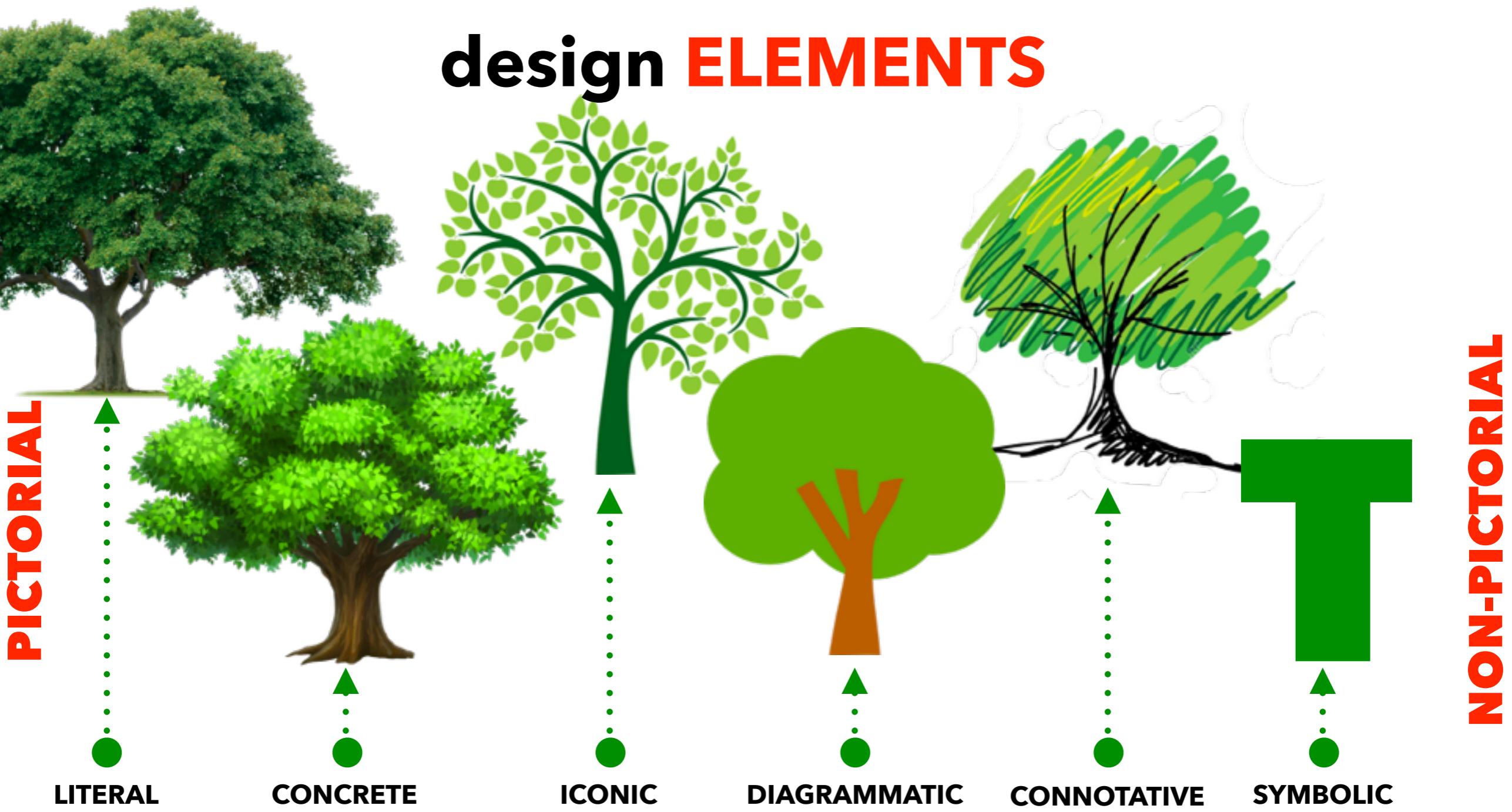
design ELEMENTS

- **texture**
- **pattern**
- **opacity**
- **physics**



Material

design ELEMENTS



Composite ELEMENTS

type-ing partners

think about pairing 2 different typefaces

Combining Fonts

<https://designschool.canva.com/blog/combining-fonts-10-must-know-tips-from-a-designer/>

Google Font Combinations - The Art of Mixing Typefaces

<http://inkbotdesign.com/google-font-combinations-mixing-typefaces/>

Handpicked type from Google Fonts

<http://femmebot.github.io/google-type/>

Font Pair

<http://fontpair.co/>

design PRINCIPLES

Ordering principles applied to design elements when creating a composition. Together, elements and principles create **visual grammar**.

- 1. HABITUATION**
- 2. SENSITIZATION**
- 3. HIERARCHY**



energy



high energy

low energy

habituation

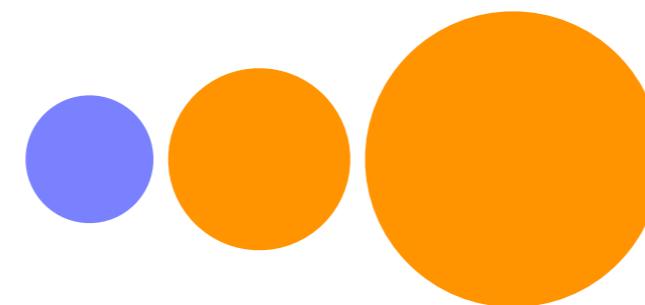
vs.

sensitization

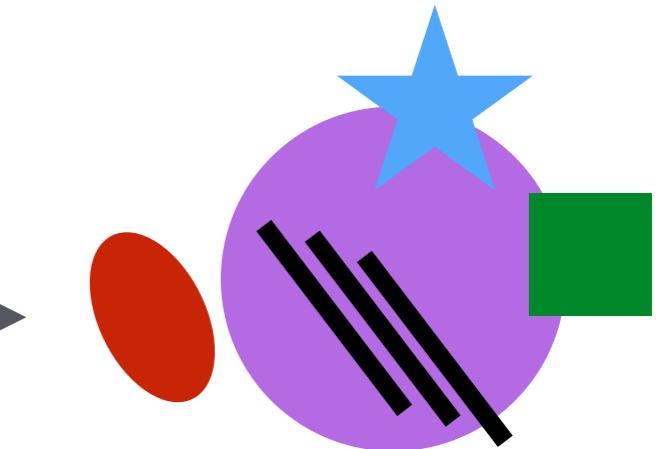
HABITUATION



FINDING BALANCE



SENSITIZATION



similarity



variance

order



disorder

consistency



inconsistency

boredom



over stimulation

habituation

The process of homogenizing design elements to create visual consistency.

Use **Gestalt Laws** to:

- 1. HOMOGENIZE**
- 3. GROUP**
- 4. BALANCE**
- 5. UNITE**

UNITY requires that the whole design be more important than any subgroup or individual part and that all the parts exist to support the visual and conceptual message of the whole.

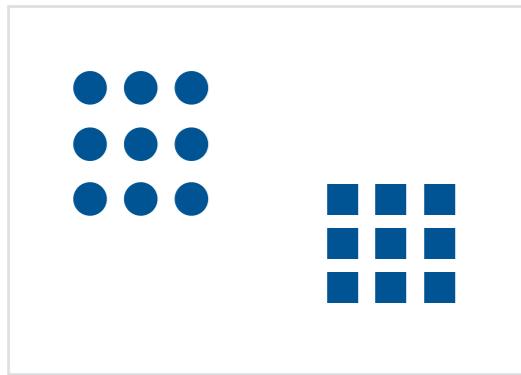


GESTALT LAWS

Rules used to bring **UNITY** to disparate design elements.

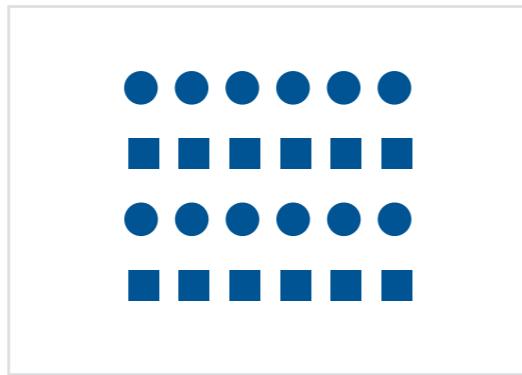
Proximity

- Grouping or relative nearness
- Elements close together are seen as related.



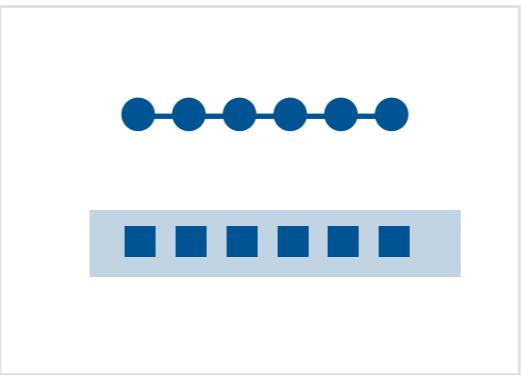
Similarity

- Elements that share similar size, color, shape, position, or texture are seen as alike.



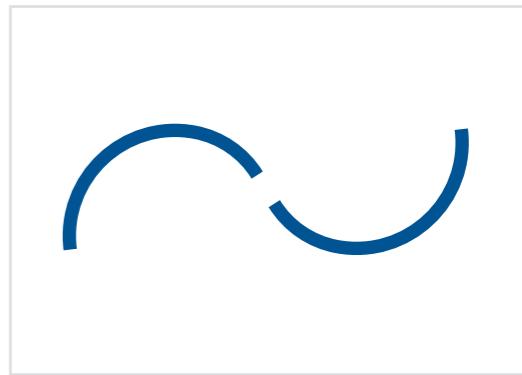
Connectedness

- Connecting related or sequential elements with lines or ribbons of color indicate a strong relationship.



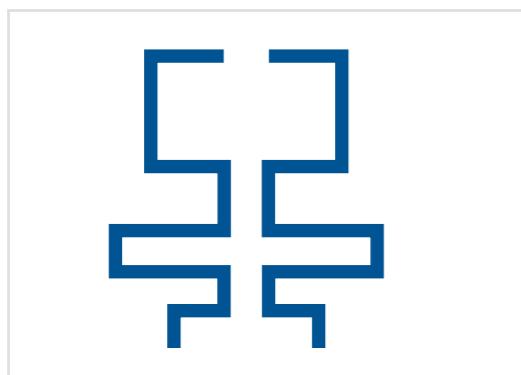
Continuity

- Viewers find it much easier to perceive connections when contours connect smoothly.



Symmetry

- Symmetrically placing elements horizontally or vertically can make pattern comparisons easier.



Closure

- Viewers naturally try to close gaps and complete unfinished forms.

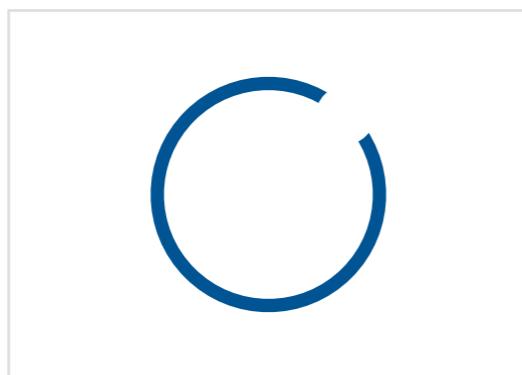
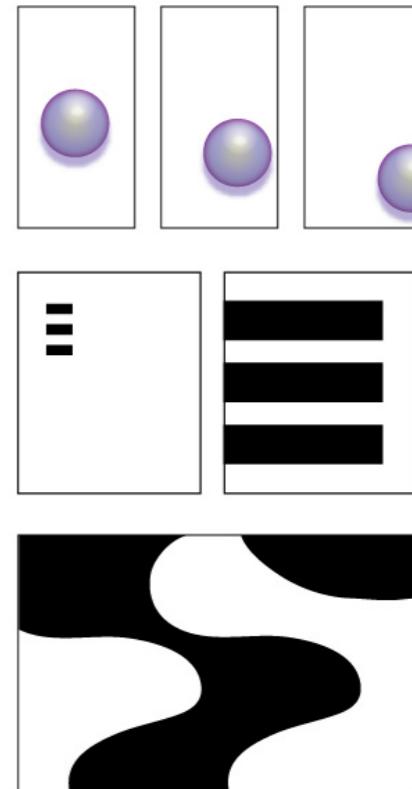
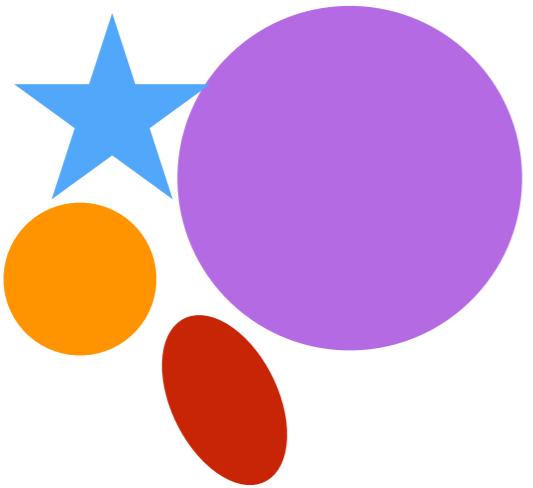


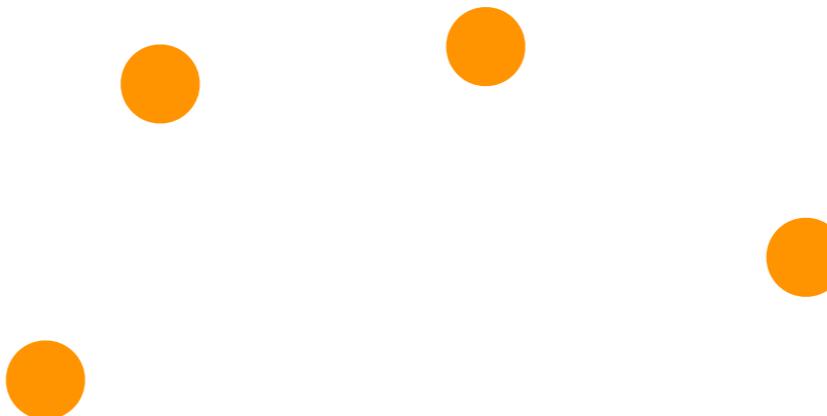
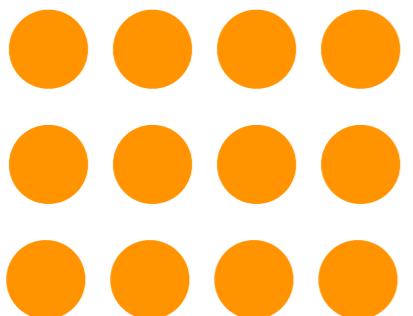
Figure & Ground

- **Stable:** figures obviously placed in front of a background;
- **Reversible:** figure and ground can be seen equally;
- **Ambiguous:** elements may be in both foreground and background at same time;

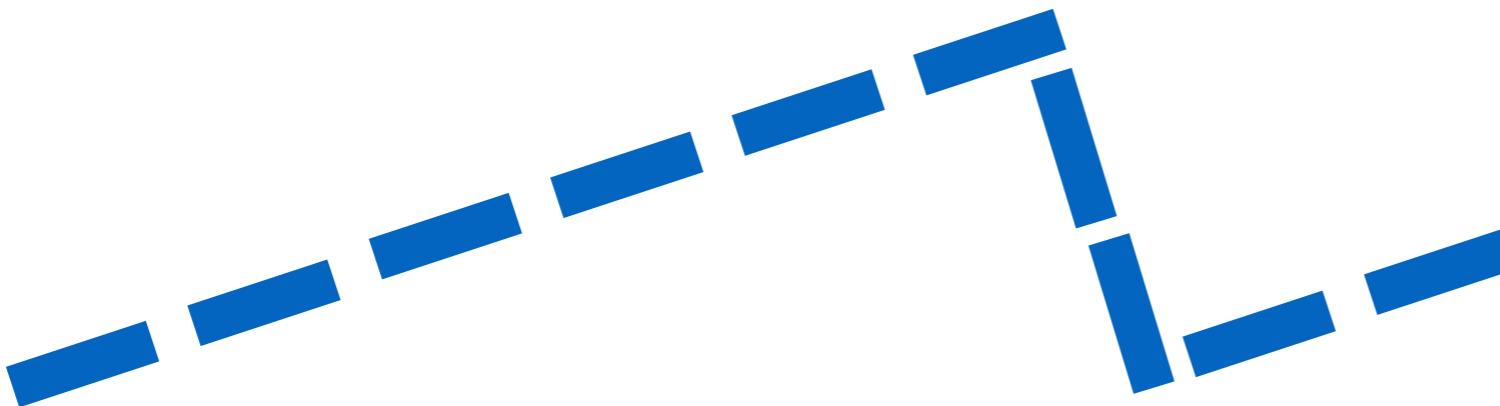




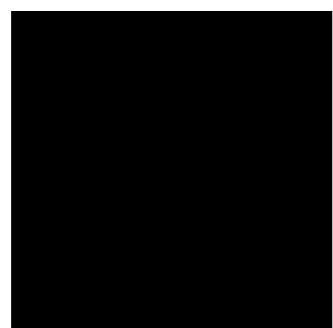
- PROXIMITY

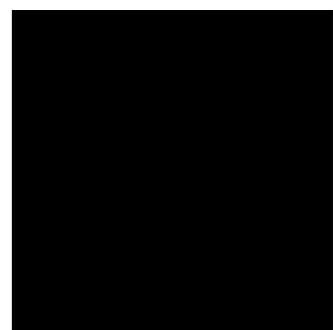
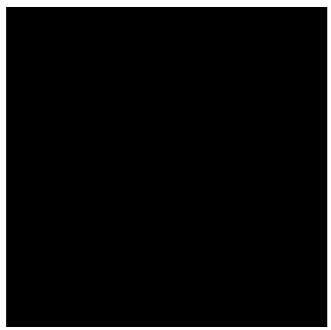


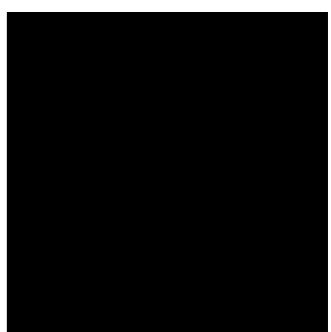
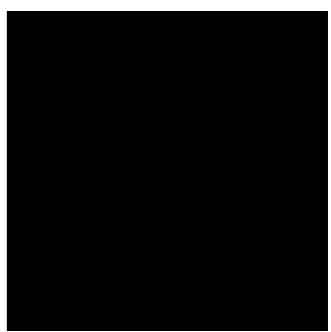
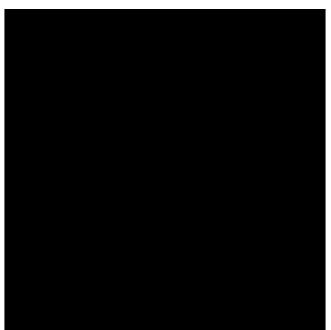
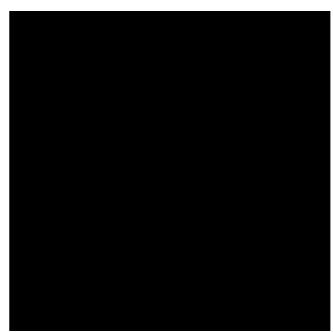
- PROXIMITY
- SIMILARITY

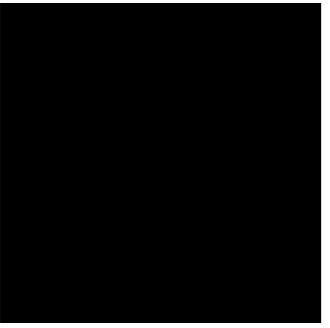
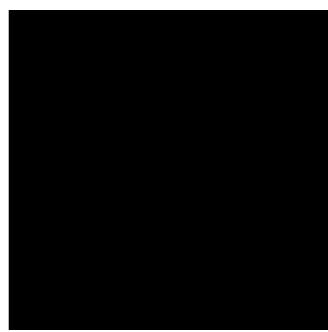
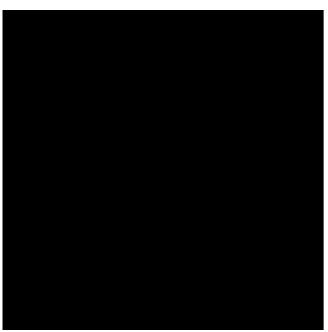
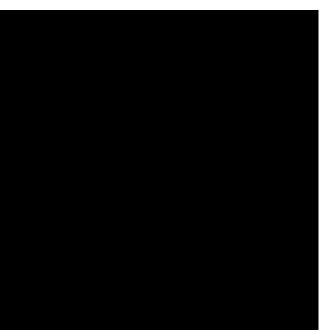
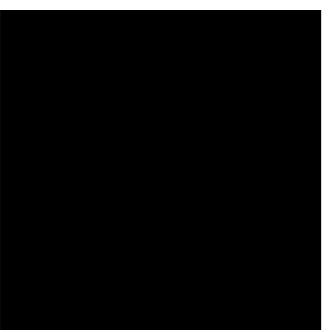


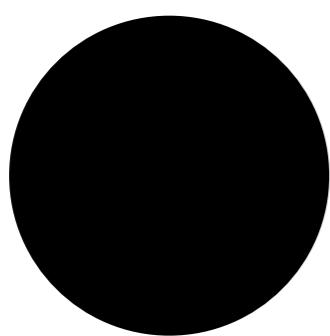
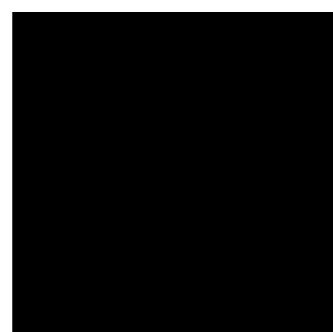
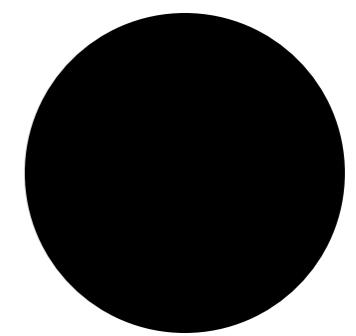
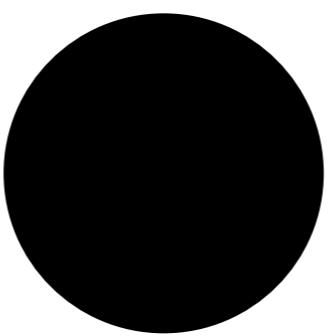
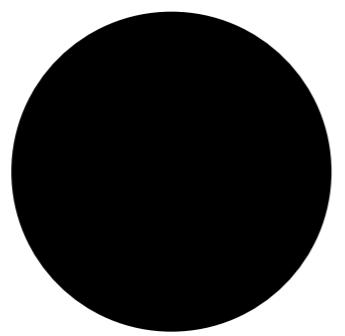
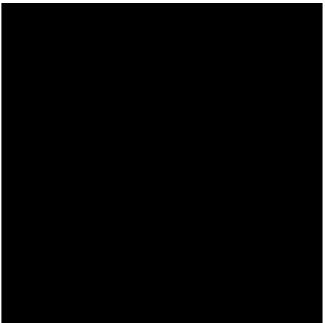
- PROXIMITY
- SIMILARITY
- CONTINUITY

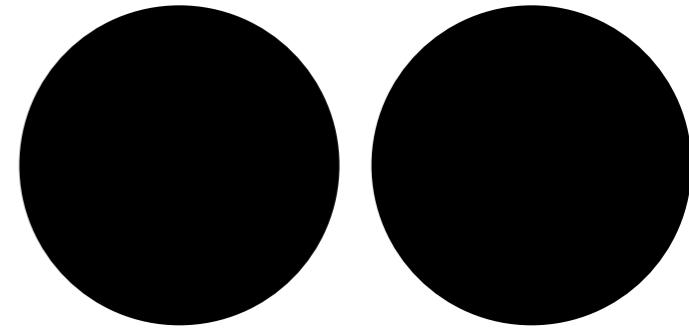
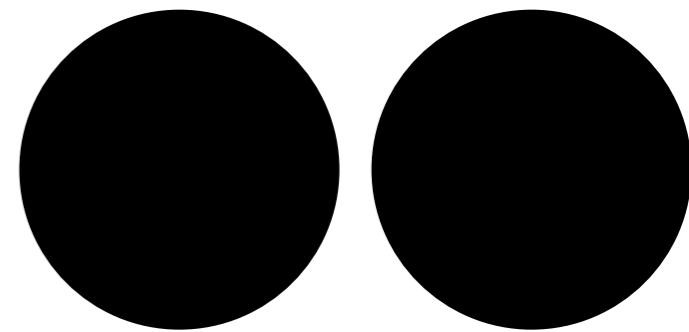
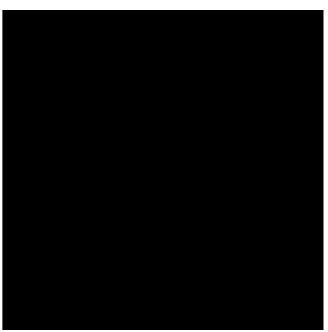
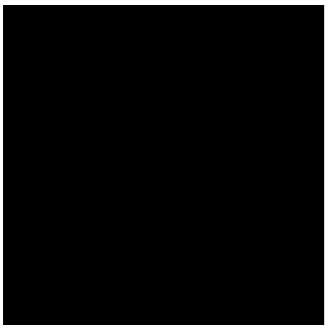
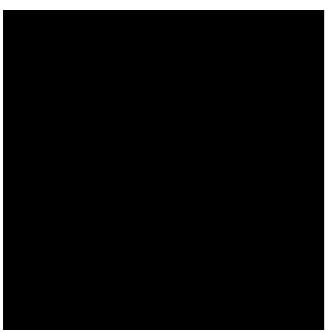












sensitization

The process of differentiating design elements to create visual interest.

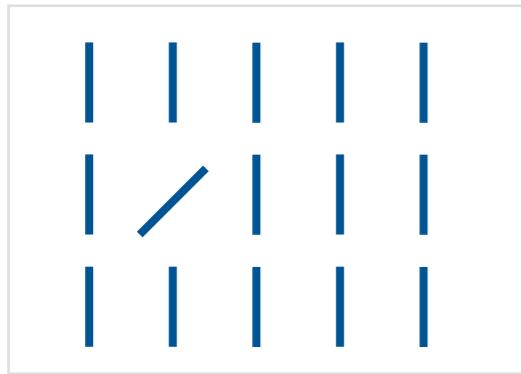
Use pre-attentive attributes to:

- 1. DIFFERENTIATE**
- 2. CONTRAST**
- 3. EMPHASIZE**
- 4. PRIORITIZE**

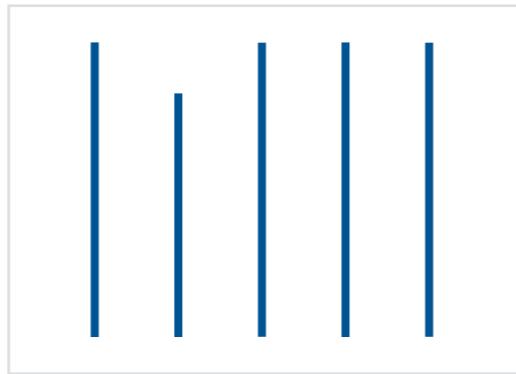
PREATTENTIVE VISUAL ATTRIBUTES

Visual attributes used to **EMPHASIZE** elements thereby increasing **CONTRAST**.

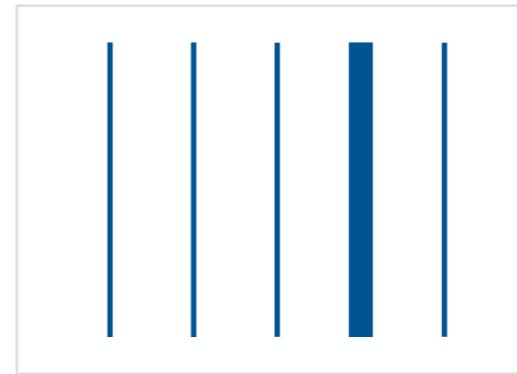
Orientation



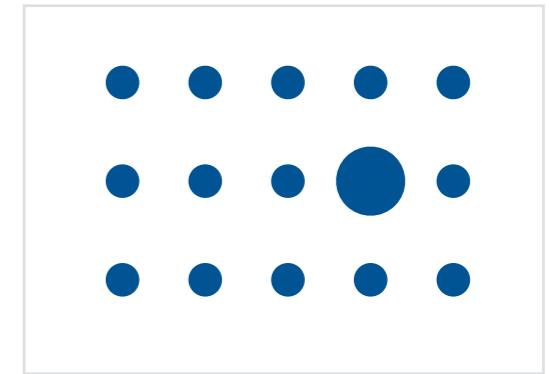
Line Length



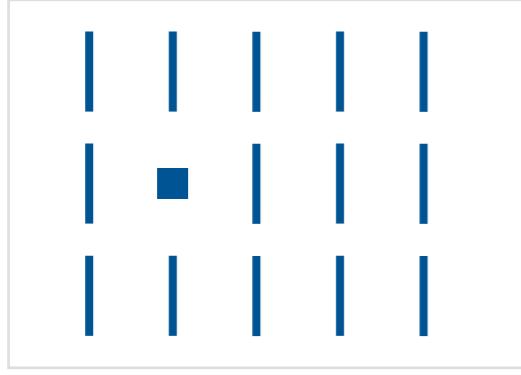
Line Width



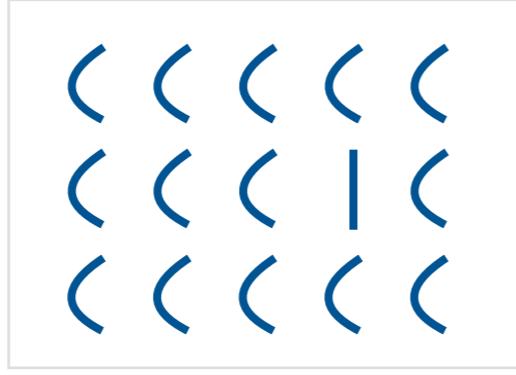
Size



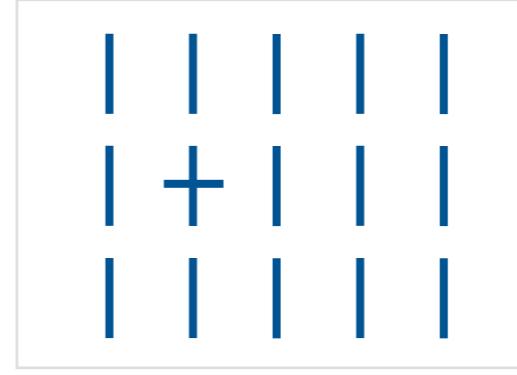
Shape



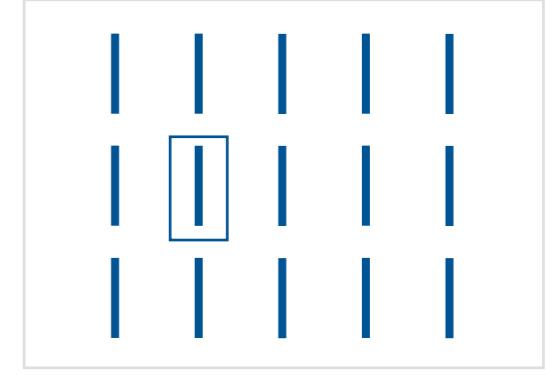
Curvature



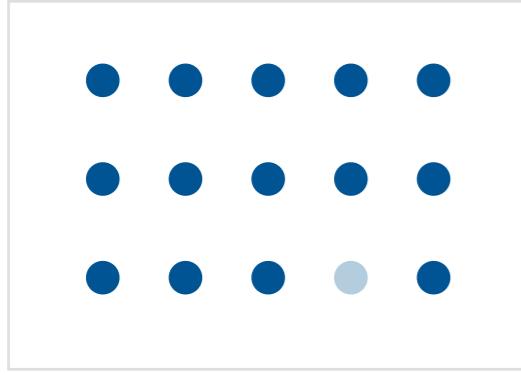
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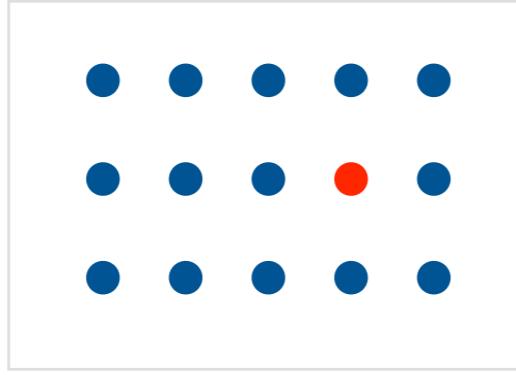
Enclosure



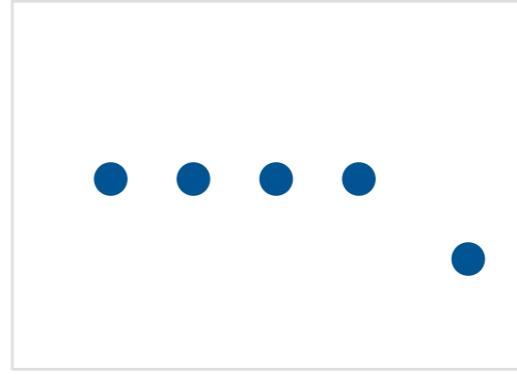
Intensity/Value



Hue



2-D Position



937204828394011638305920393582920392846701289203918746290
489284623143902948648070893318708983432802508383928374892
692738259074638200394838292035948242339878029341647398209
908763827123342953087648708098213243878382919373982010389

- INTENSITY/VALUE

937204828394011638305920393582920392846701289203918746290
489284623143902948648070893318708983432802508383928374892
692738259074638200394838292035948242339878029341647398209
908763827123342953087648708098213243878382919373982010389

- INTENSITY/VALUE
- LINE WIDTH

93720482839401163830**5920393582920392846701289203918746290**
489284623143902948648070893318708983432802**508383928374892**
692738259074638200394838292035948242339878029341647398209
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- INTENSITY/VALUE
- LINE WIDTH
- HUE

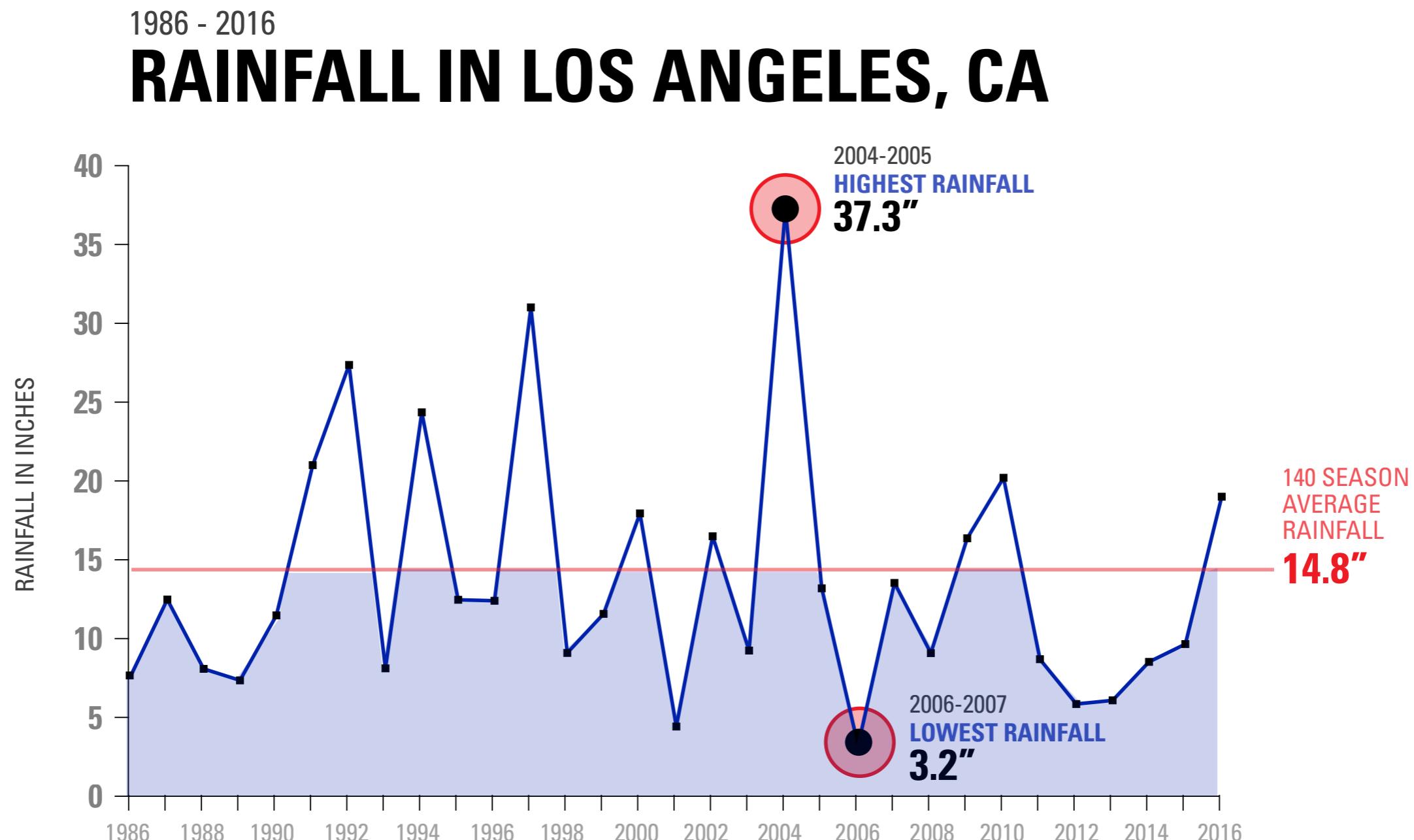
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489284623143902948648070893318708983432802**508383928374892**
692738259074638200394838292035948242339878029341647398209
9087638271233429**53087648708098213243878382919373982010389**

- INTENSITY/VALUE
- LINE WIDTH
- HUE
- ENCLOSURE

93720482839401163830**(5)920393(582920392846701289203918746290**
489284623143902948648070893318708983432802**(508383928374892**
(59074638200394838292035948242339878029341647398209
9087638271233429**(53087648708098213243878382919373982010389**

hierarchy

The system in which visual elements are prioritized.

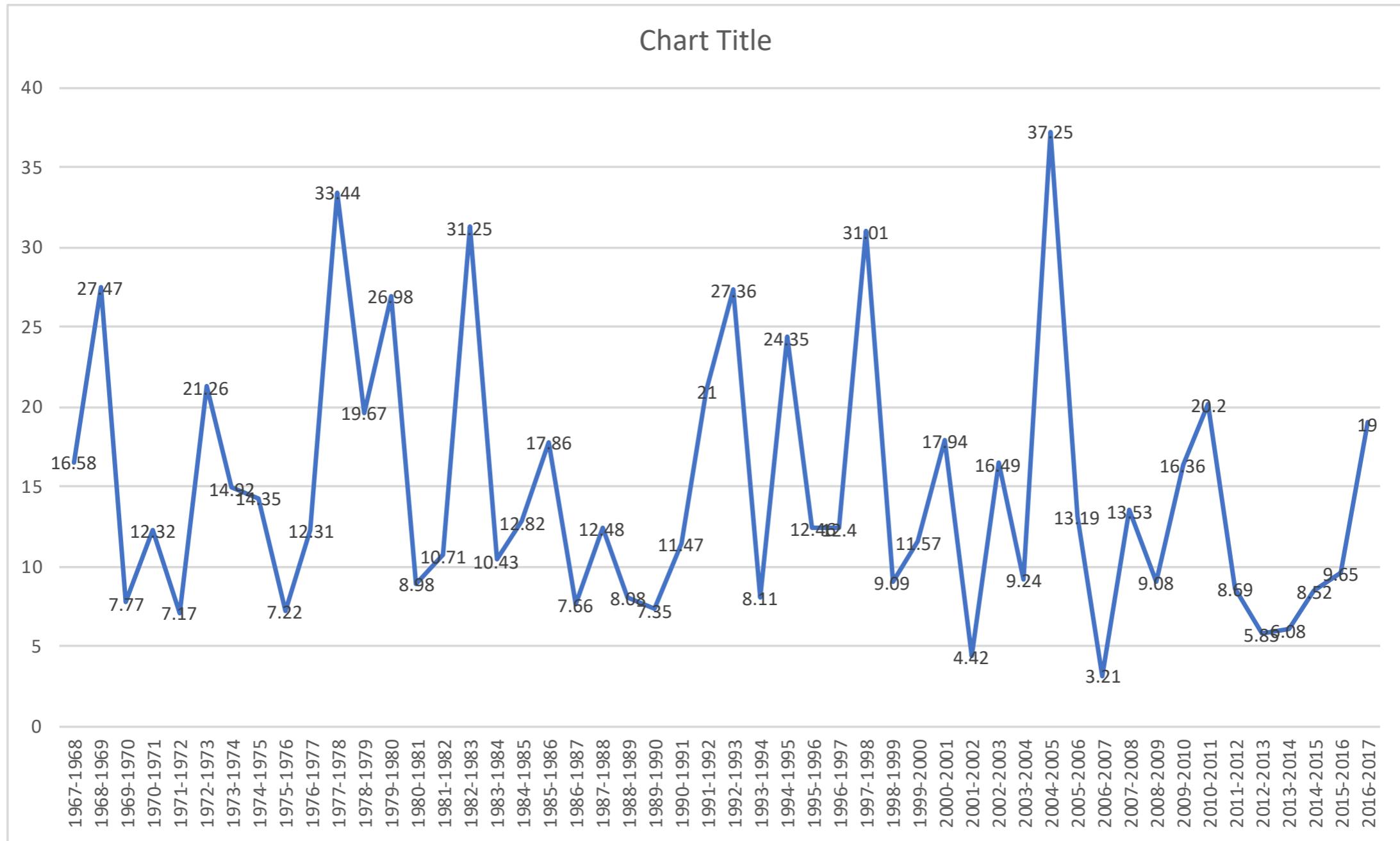


example

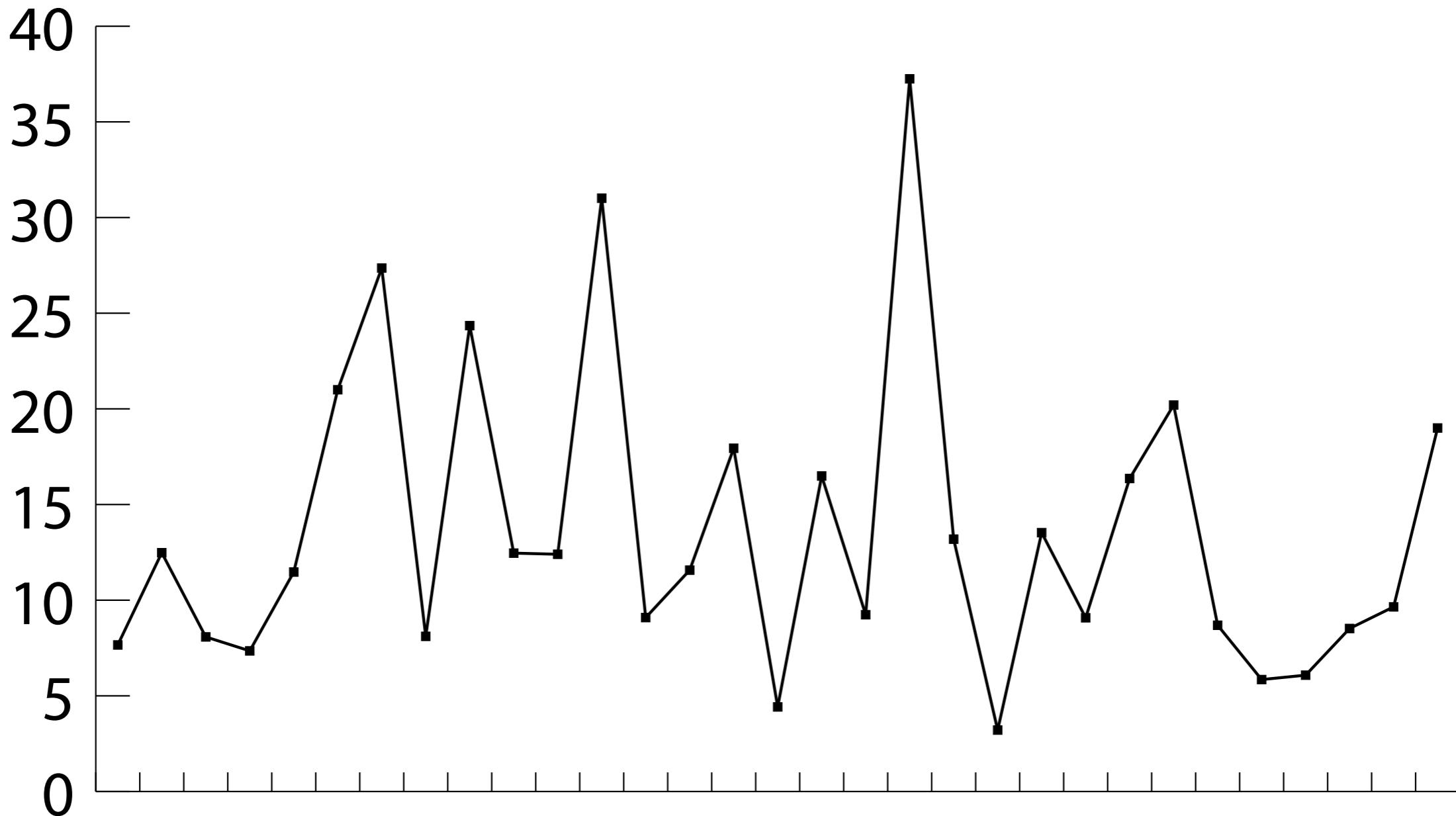
Rainfall in LA

<http://www.laalmanc.com/weather/we13.php>

EXCEL CHART



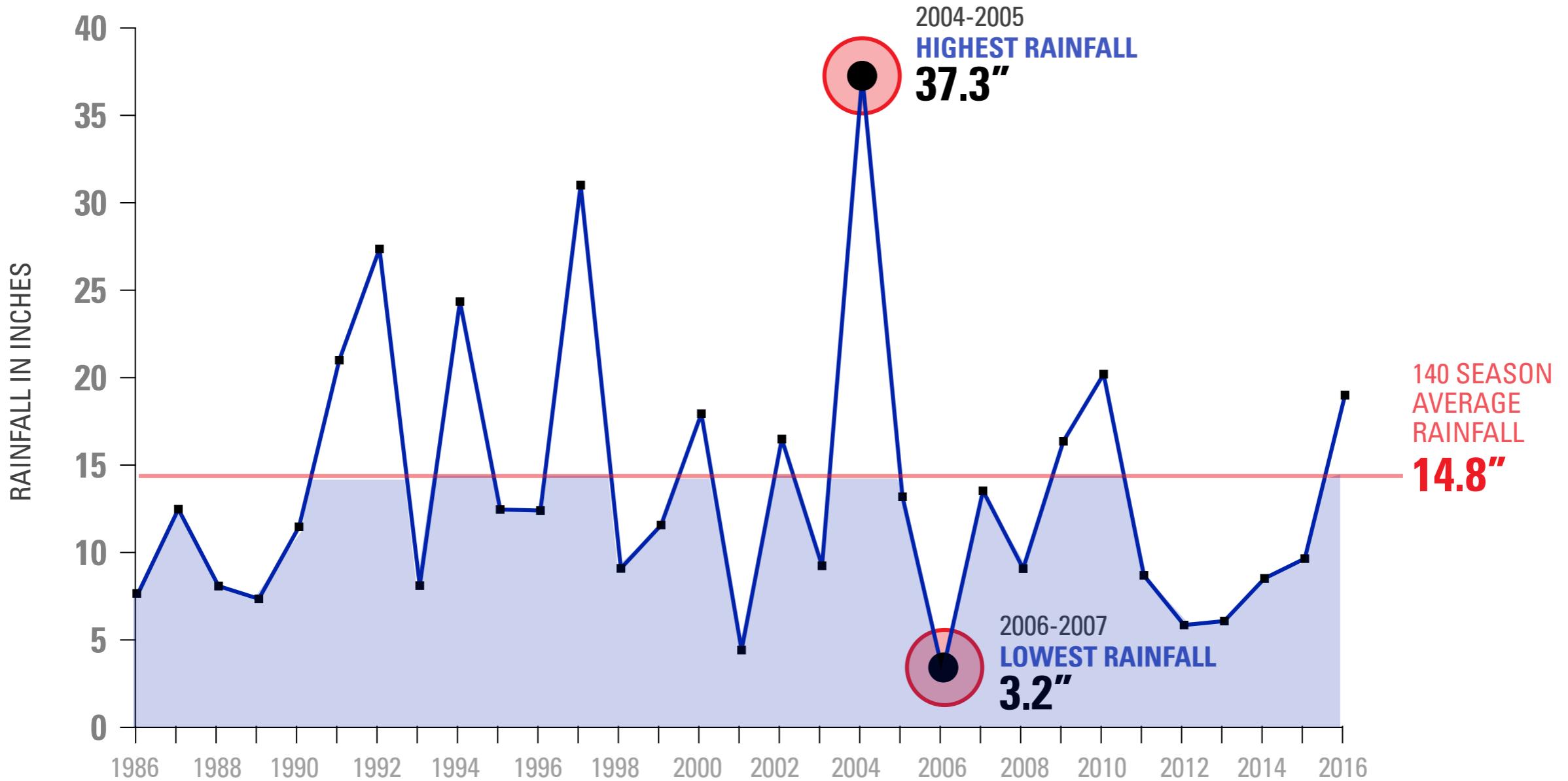
ILLUSTRATOR CHART (before styling)



ILLUSTRATOR CHART (with styling)

1986 - 2016

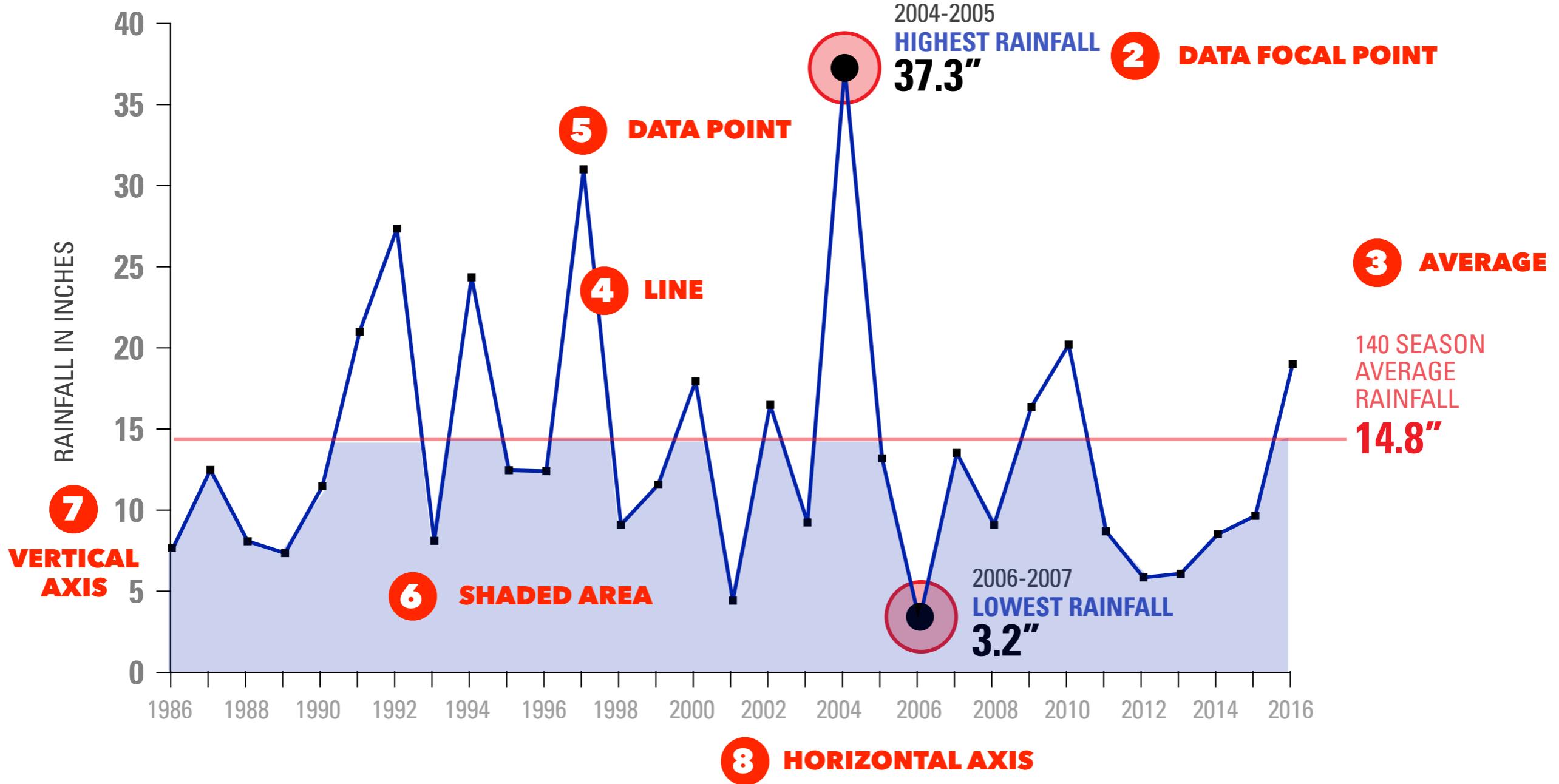
RAINFALL IN LOS ANGELES, CA



HIERARCHY OF VISUAL ELEMENTS

1986 - 2016

RAINFALL IN LOS ANGELES, CA



take aways...

- 1. design with how we see**
- 2. approach data visualization with
an engineering mindset**
- 3. find balance between
habituation and sensitization**

resources

Information Visualization: Perception for Design

<http://www.amazon.com/Information-Visualization-Third-Edition-Technologies/dp/0123814642>

Tapping the Power of Visual Perception

http://www.perceptualedge.com/articles/ie/visual_perception.pdf

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