

Information Visualizations as Organizing Systems

Amy Rae Fox
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Amy Rae Fox
UCSD Cognitive Science

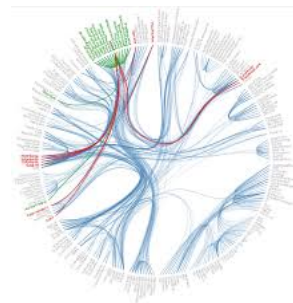
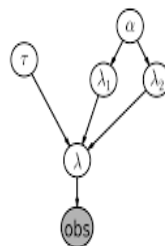
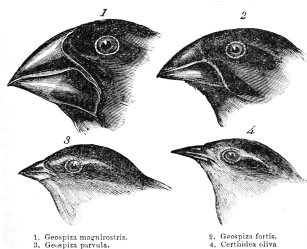
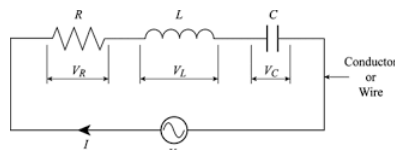
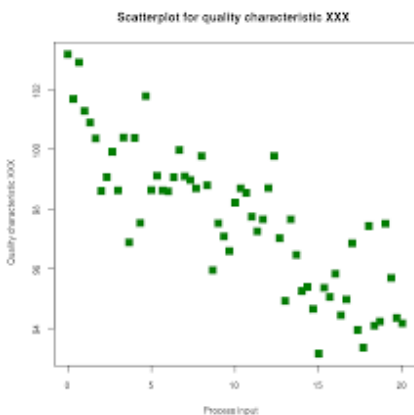
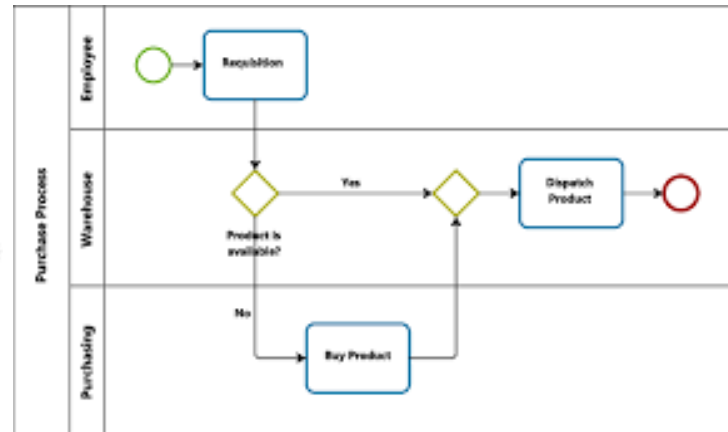
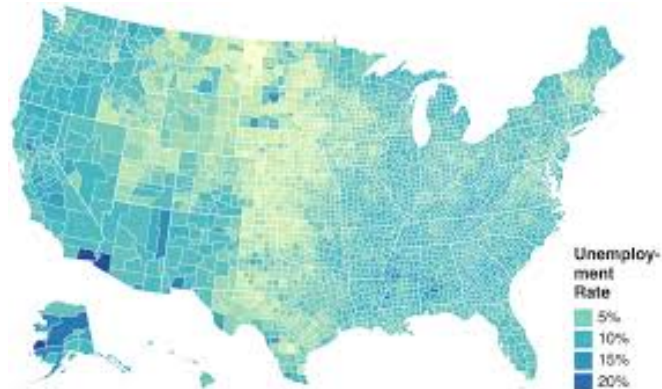
Thinking with *graphic, visuospatial* **v**
External Representations

amyraefox@ucsd.edu

amyraefox.com

 [@thoughtafox](https://twitter.com/thoughtafox)

External Representations are **purposefully** constructed **forms** of information, in the **world**.

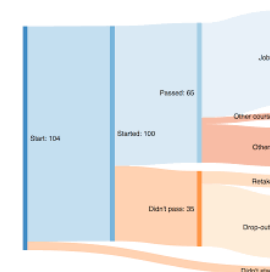


The lovely Spring night may sing how sweet
Wentworth and farewells my heart was beating
He reached a far near the world-beautiful
He who's coming may we have new life
To bring the world's best on how farewell
Now I have the little hut where all beloved lives
Waiting now with wild lips through the leaves
Love's things thought back and not explain you forth
And the best time having her dead comes in the end
How beautiful the witness of this lovely summer night!
Now the old fills with happiness in this place of rest!
I can surely gaze the life, yet never I could hear
A thousand night, like this if my darling granted me

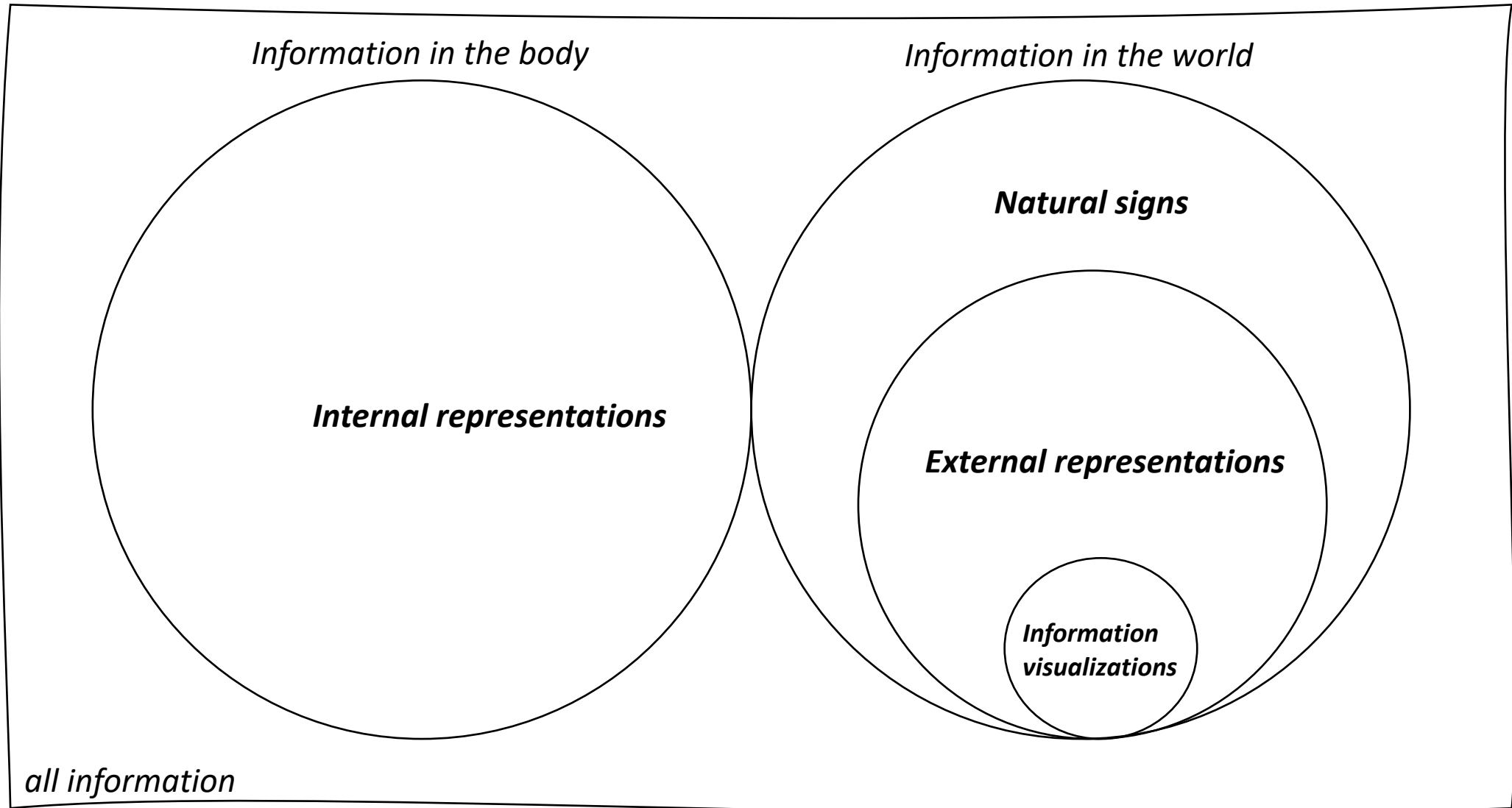
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$$\begin{aligned} f'(3) &= \lim_{h \rightarrow 0} \frac{(3+h)^2 - 3^2}{h} \\ &= \lim_{h \rightarrow 0} \frac{9 + 6h + h^2 - 9}{h} \\ &= \lim_{h \rightarrow 0} \frac{6h + h^2}{h} \\ &= \lim_{h \rightarrow 0} (6 + h) \\ &= 6 \end{aligned}$$



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1

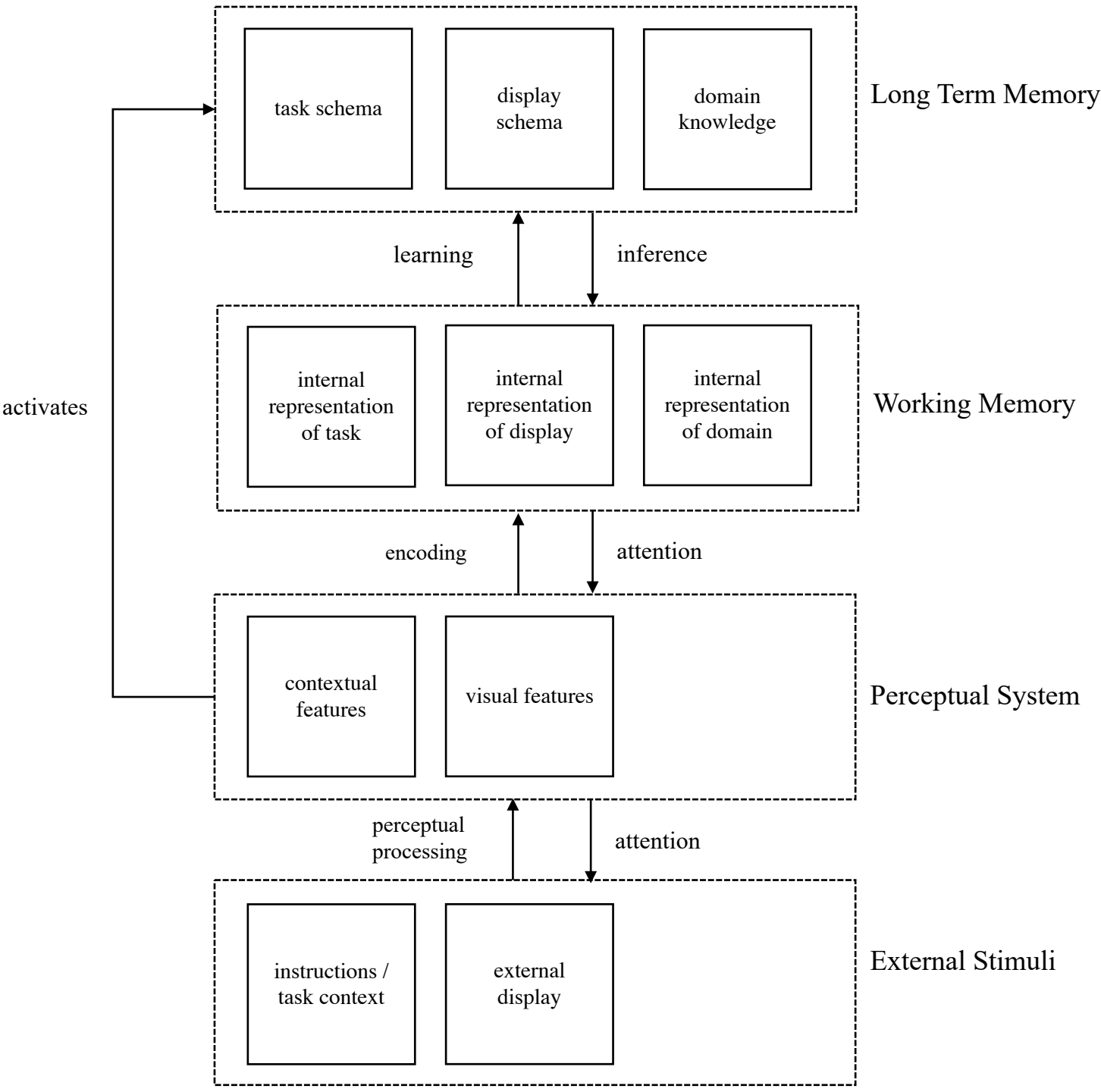
Cognition with Visualizations

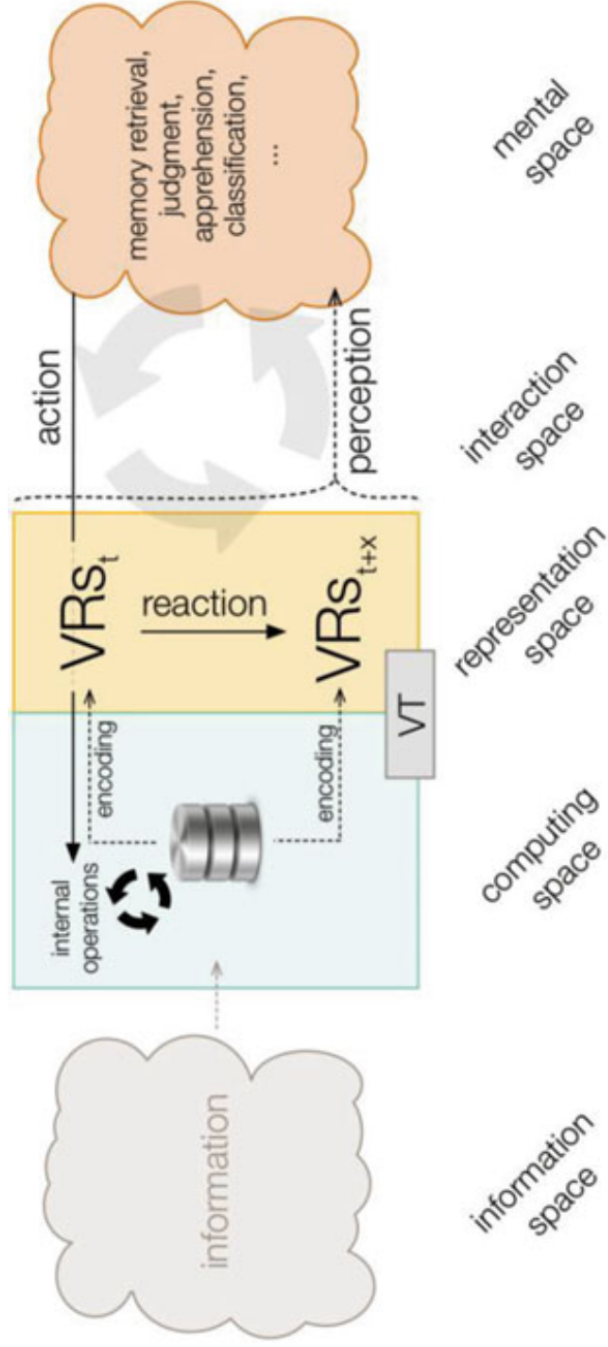


The picture can't be d

Conceptual Model of Comprehension of Visualizations

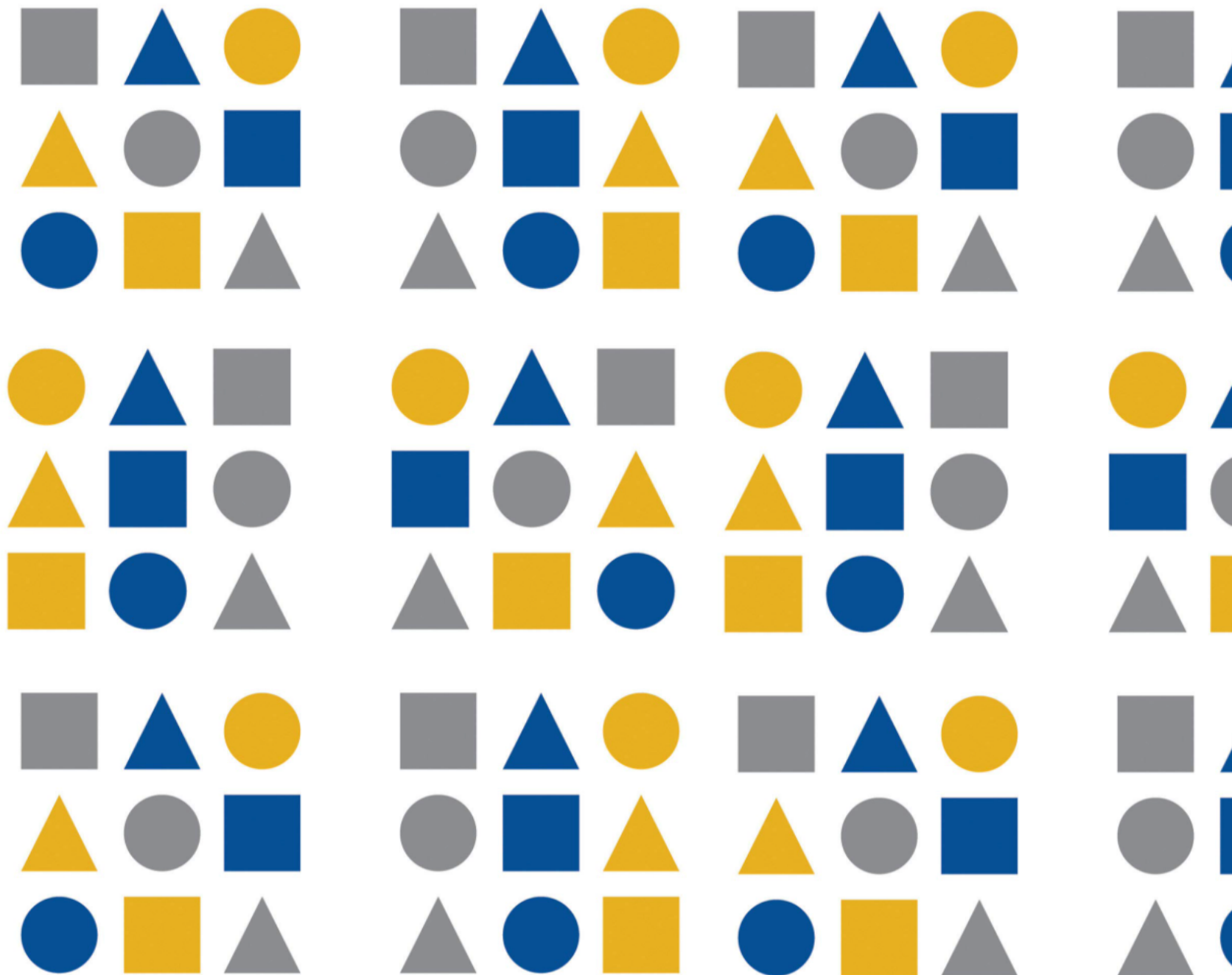
(in diagrammatic form)

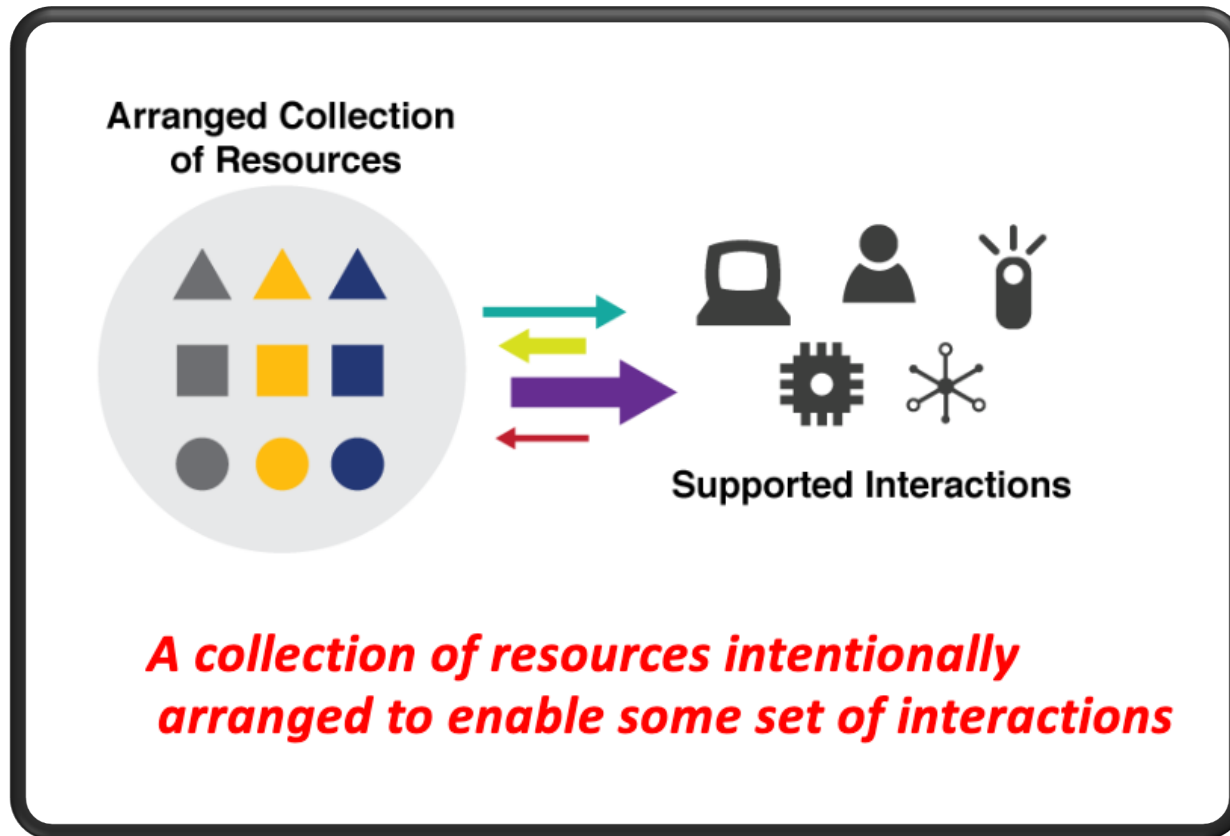




2

Visualizing as Organizing





A visuospatial representation of information intentionally designed to support some task(s)

A visualization is an *instance* of an organizing system

"see",
make sense of,
explore,
learn,
analyze
manipulate,
solve problems with,
record, store

designing

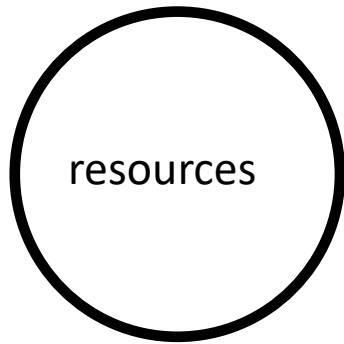
encoding

Organizing

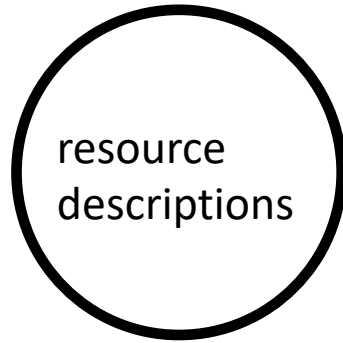
***Creating
capabilities by
intentionally
imposing order
and structure***



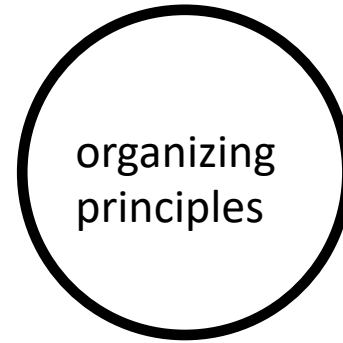
By visualizing information, we are *organizing* information



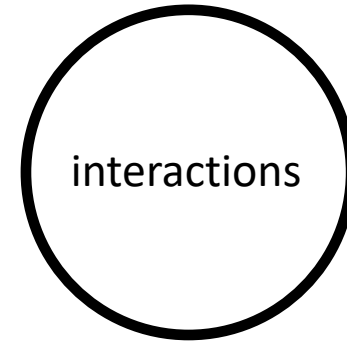
The data/
information



Attributes
of the data



Encodings (ie. mappings)
visualization "type"



Interactions



6 Dimensions of an **Organizing** System

1. What is being organized?
2. Why is being organized?
3. How much is being organized?
4. When is it being organized?
5. Who (or what) is organizing it?
6. Where is it organized?



6 Dimensions of **Representational System**

1. What is being **represented**?
2. Why is being **represented**?
3. How much is being ***computed***?
4. When is it being ***computed***?
5. Who (or what) is ***computing*** it?
6. Where is it **represented**?



6 Dimensions of **Representational System**

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1

In what (sensory) modality?

Visual?
Auditory?
Tactile?

In what medium?

On paper?
On a screen?
Dynamic?
Interactive?
Immersive?



6 Dimensions of **Representational System**

1. What is being **represented**?
2. Why is being **represented**?
3. How much is being **computed**?
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6. Where is it **represented**?

2

What information do we have?

*A table of raw data?
A corpus of text?
A process?
A physical structure?*

What aspects of the information do we need to communicate?

*Specific data values?
Change over time?
Parts of a system?
Logical relations?*



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3. How much is being **computed**?
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6. Where is it **represented**?

3

For whom are we representing?

A novice?
An expert?

For what purpose are we representing?

To record?
To inform?
To educate?
To solve a problem?
To analyze?
To persuade?
To entertain?



6 Dimensions of **Representational System**

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3. How much is being **computed**?
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6. Where is it **represented**?

4

What computations need to be afforded?

*“reading” off the page
inferring a trend..
learning a concept..
simulating a process..
forming a judgement..
making a decision...*

What is the distribution of computation?

*How much is explicit/in the artifact
in the mind
In the interaction*

3

Designing Visualizations



Factors that Influence Visualization Design

Display Factors

Individual Factors

Situational Factors

tinyurl.com/BobIsOrganized

4

You are a
Visualization
Designer



tinyurl.com/designForBob