Who I am?

- Hokyoung Ryu. ph.D.
  - A HCI practitioner
    - Mobile Learning (Innovative Mobile Learning)
    - Mobile User Interface (Mobile User Interface Analysis and Design)
      - Cognitive Psychology and Its Implications in Interface Design (*in progress*)
    - UI designer for *Samsung mobile*
  - An Academician
    - Currently, a Senior Lecturer at Massey

Cognitive Science and Its Implications in Mobile UI design

What is HCI?

Understanding **users** and their surrounding environment,
that we can design better mobile user interface

A mobile interface?

However, there are too many issues to be addressed in mobile UI design

My main research focus is on how to use psychological understandings in mobile UI design...
It is a theory-based approach, rather than practical...

1950: Piaget “Introduction to genetic epistemology”

.....

1956: Miller “The magic number seven”

.....

1958: Newell and Simon “General Problem Solver - Model of Human Processing”

.....

1961: the first textbook on Cognitive Psychology

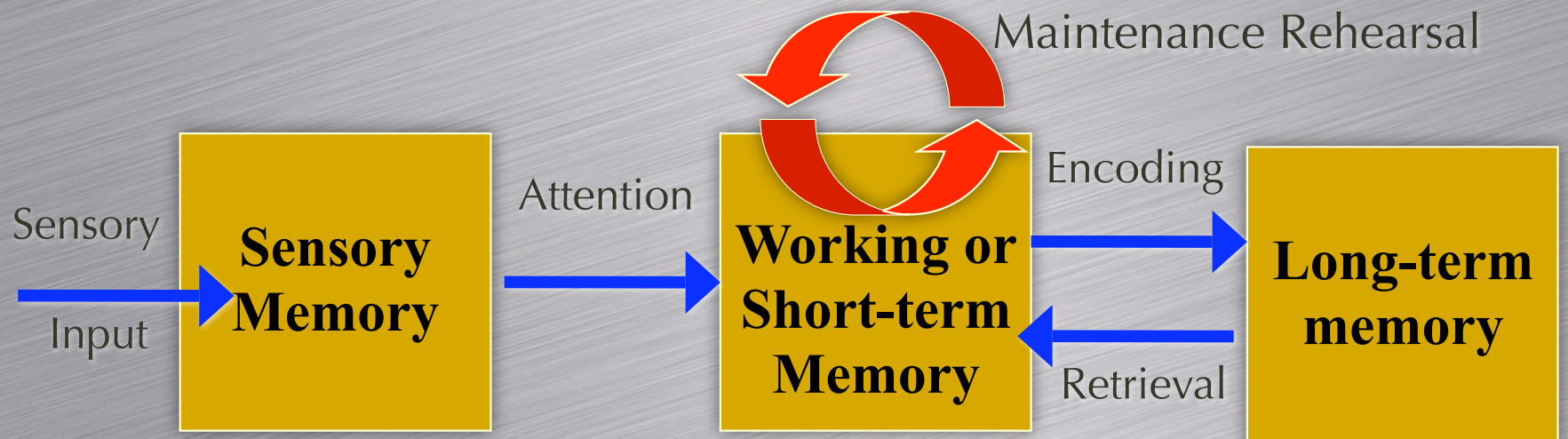
.....

Cognitive science is a relatively new field of scientific enquiry focussing on the mind and its capacities. It is built upon various disciplines including Psychology, Artificial Intelligence, Linguistics, Neuroscience, Anthropology, and Philosophy.

Goal(s): to understand how people are able to learn, understand, and reason; so will be able to design systems that are coherent to human information processing.

Basic assumptions:
- information can be processed and stored (recalled), retrieved, changed, communicated and turned into action
- there are rules (logical or otherwise) by which information is manipulated or processed

Model of the Mind



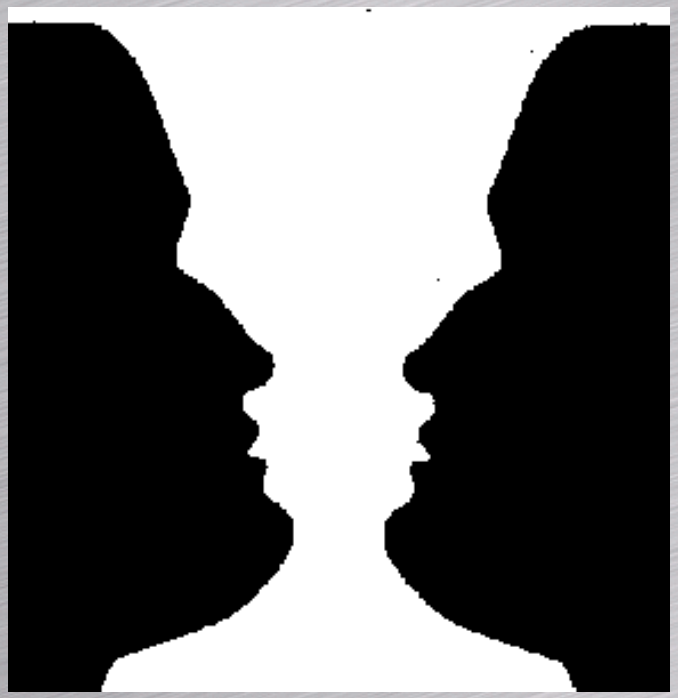
Perception

- information made available by the environment is processed by a series of human perceptive systems
  - **visual**
  - **auditory**
  - olfactory
  - tactic
  - taste...and of course our sixth sense

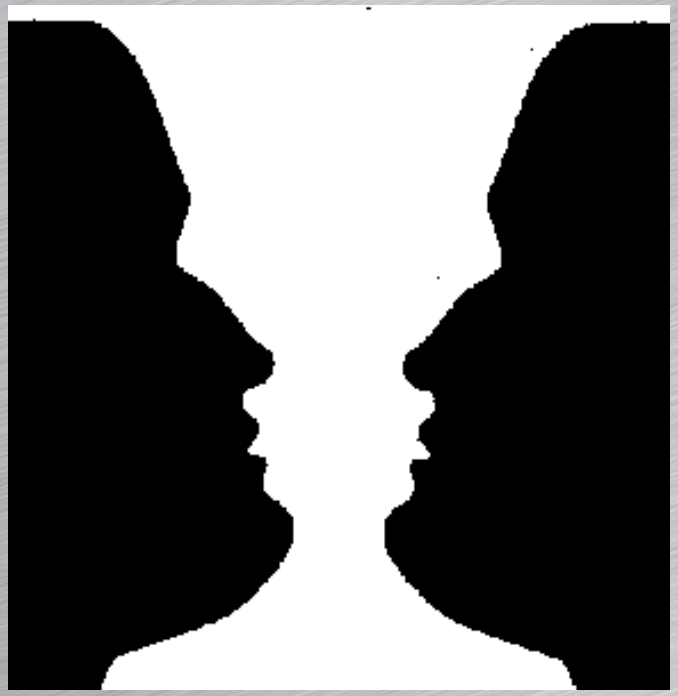
Visual perception

- What you see is NOT what is out there in the outside world, instead what has been CREATED all inside of your brain as the nervous system's response to external stimuli.
- Very little is known on these computational processes.
- Perhaps it is one of your jobs in the near future.

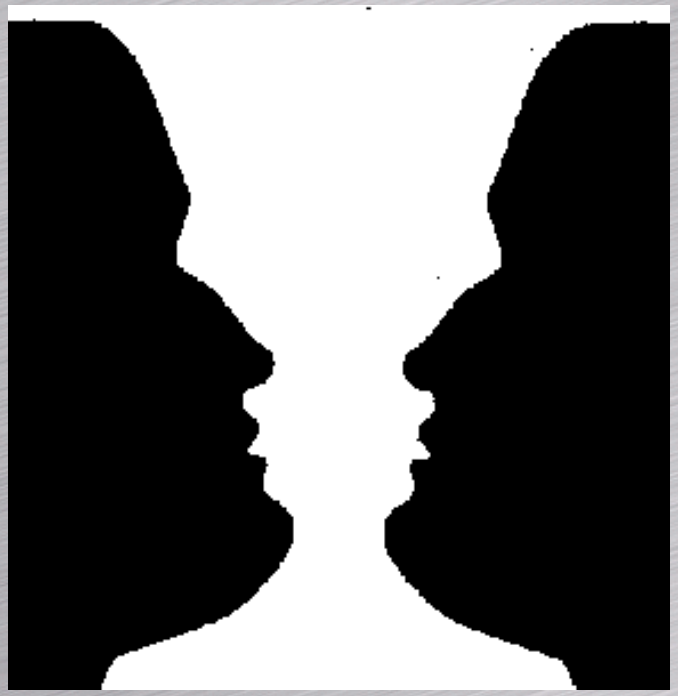
Visual perception



Visual perception



Visual perception



An implication

- Exit off motorway design
- Psychological understanding of speed
  - Ratio of information passing through your eyes
  - More information processing leads to the perception of higher speed
- Reduce the number of death toll by this simple design

Stroop Effect

Green

Stroop Effect

Green

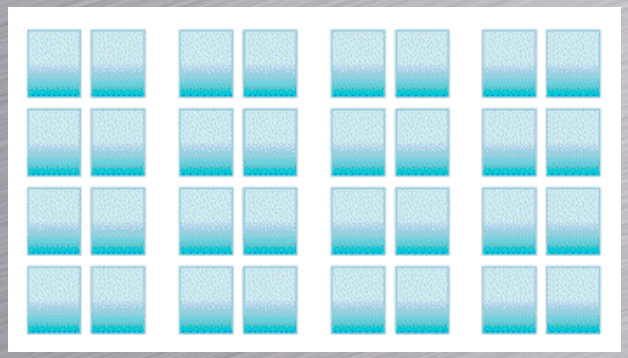
Stroop Effect: Its implication

italics

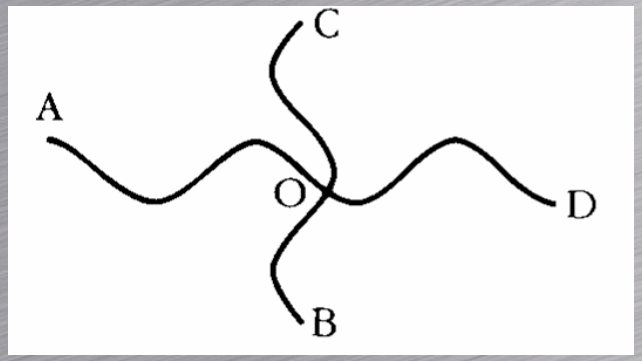
BOLD

Underline

Gestalt psychology



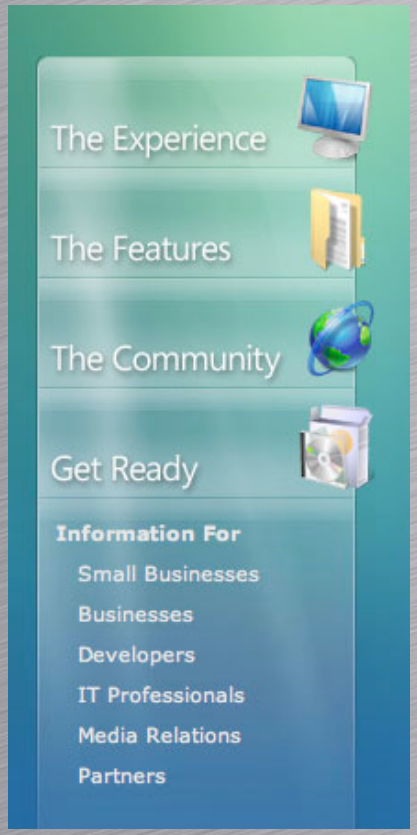
Proximity and similarity



Good continuation

Closure

its implications



Proximity

Similarity

Proximity and Closure

its implications

Good continuation

its implications

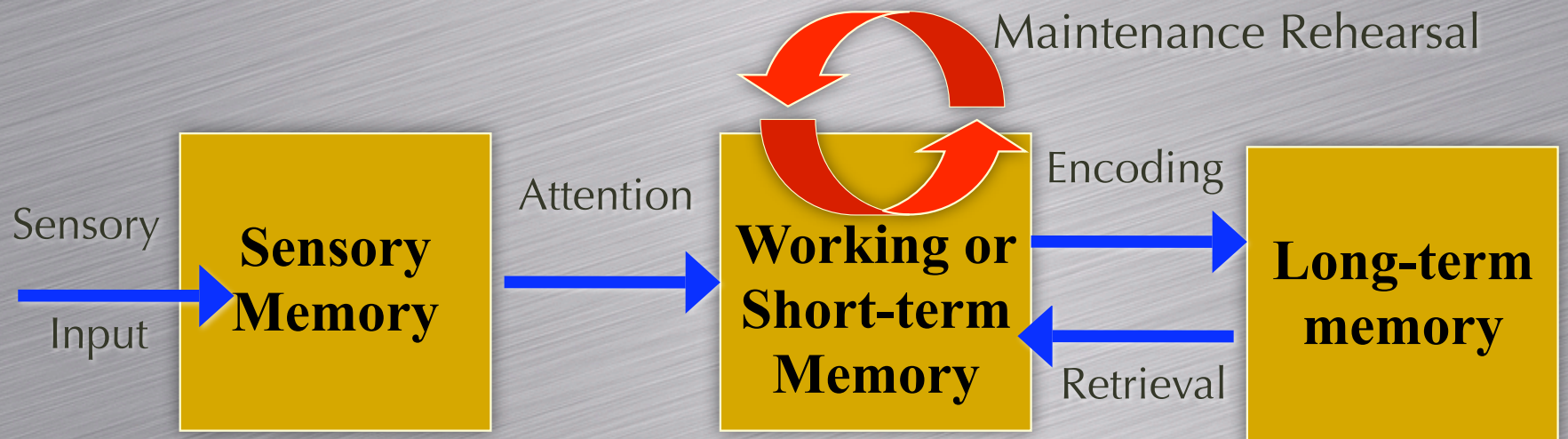
sherbert	75
toffee	120
chocolate	35
fruit gums	27
coconut dreams	85

Good continuation

Auditory perception

Sound-induced illusory flash

Model of the Mind



Why is important?

- how many things can we attend at once?
  - limited or unlimited?
  - e.g., making-up while driving
- how fast can we detect things in succession?
  - would it be possible for us to attend continuously to an object that does not change?
  - e.g., video clip [Rensink, 1995]

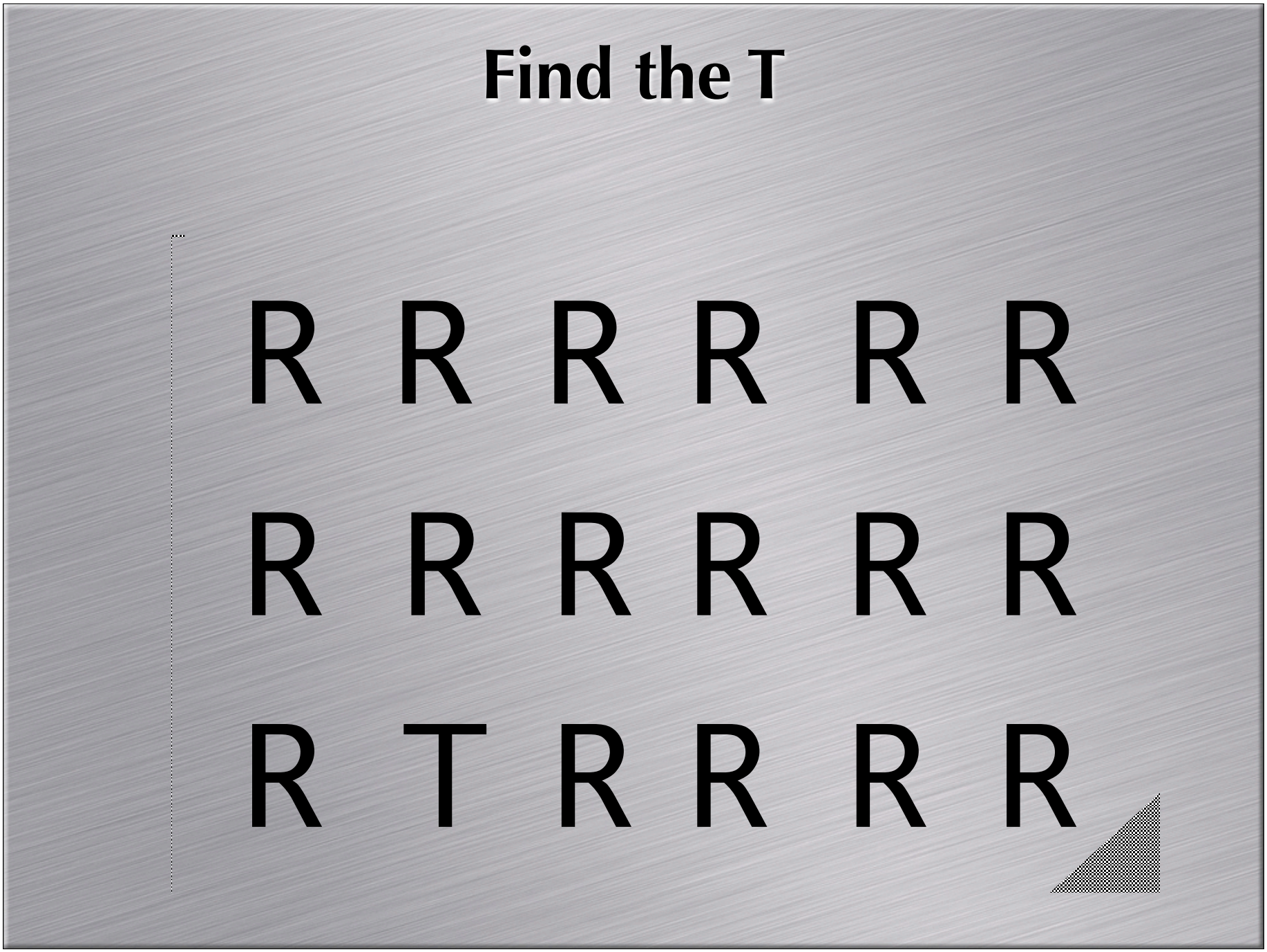
a worst case scenario would be ...

How can we effectively use this limited attention resource?

A series of experiment with me!

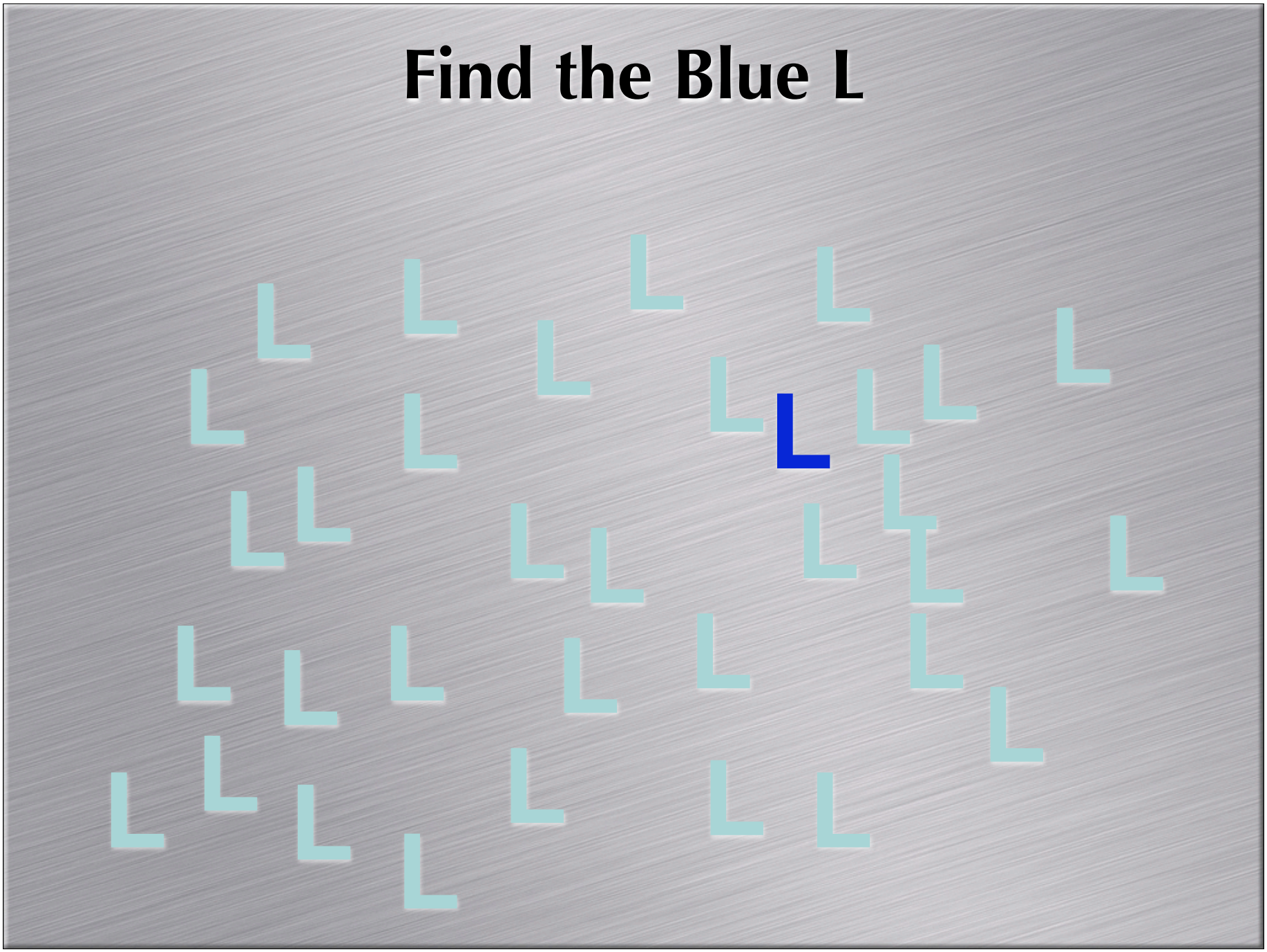
Find the T

Find the T



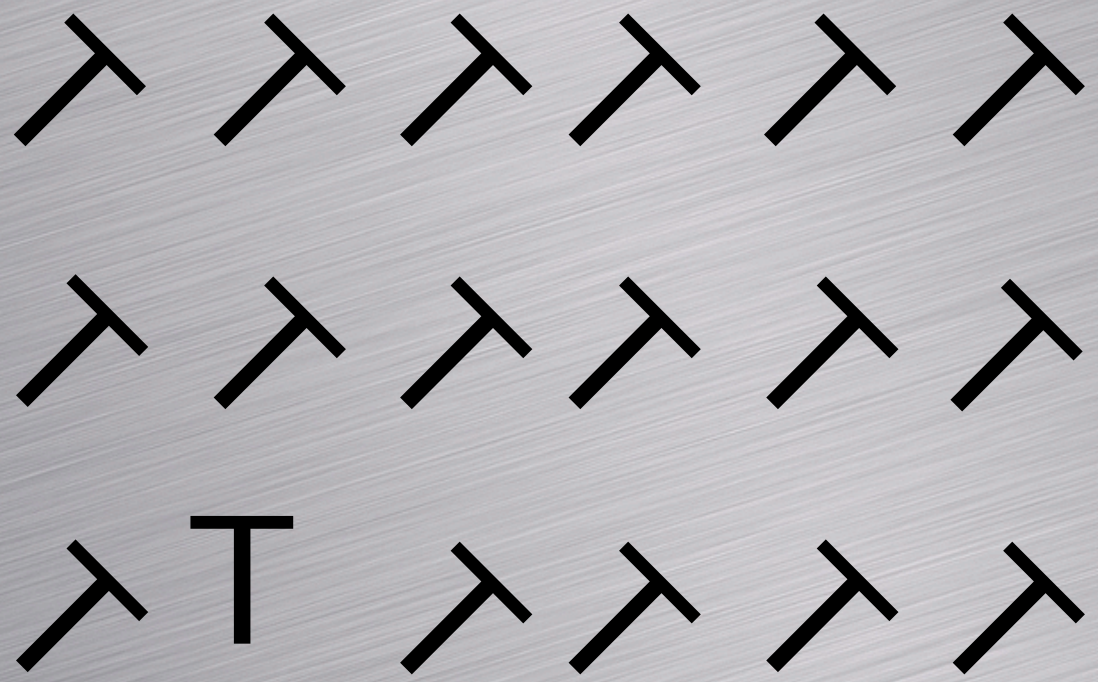
Find the Blue L

Find the Blue L



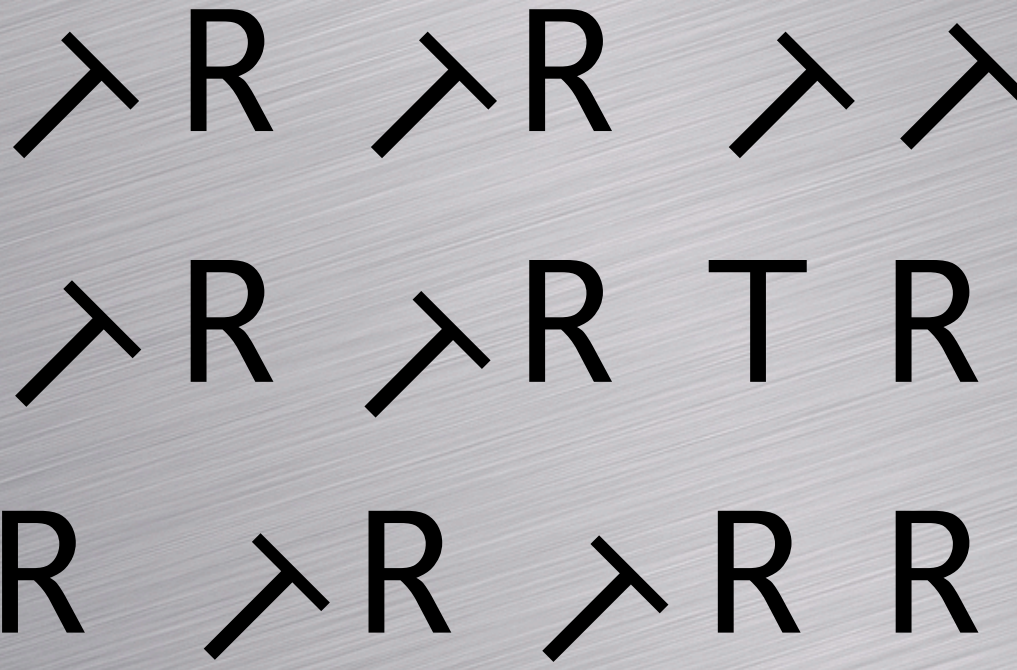
Find the vertical T

Find the vertical T

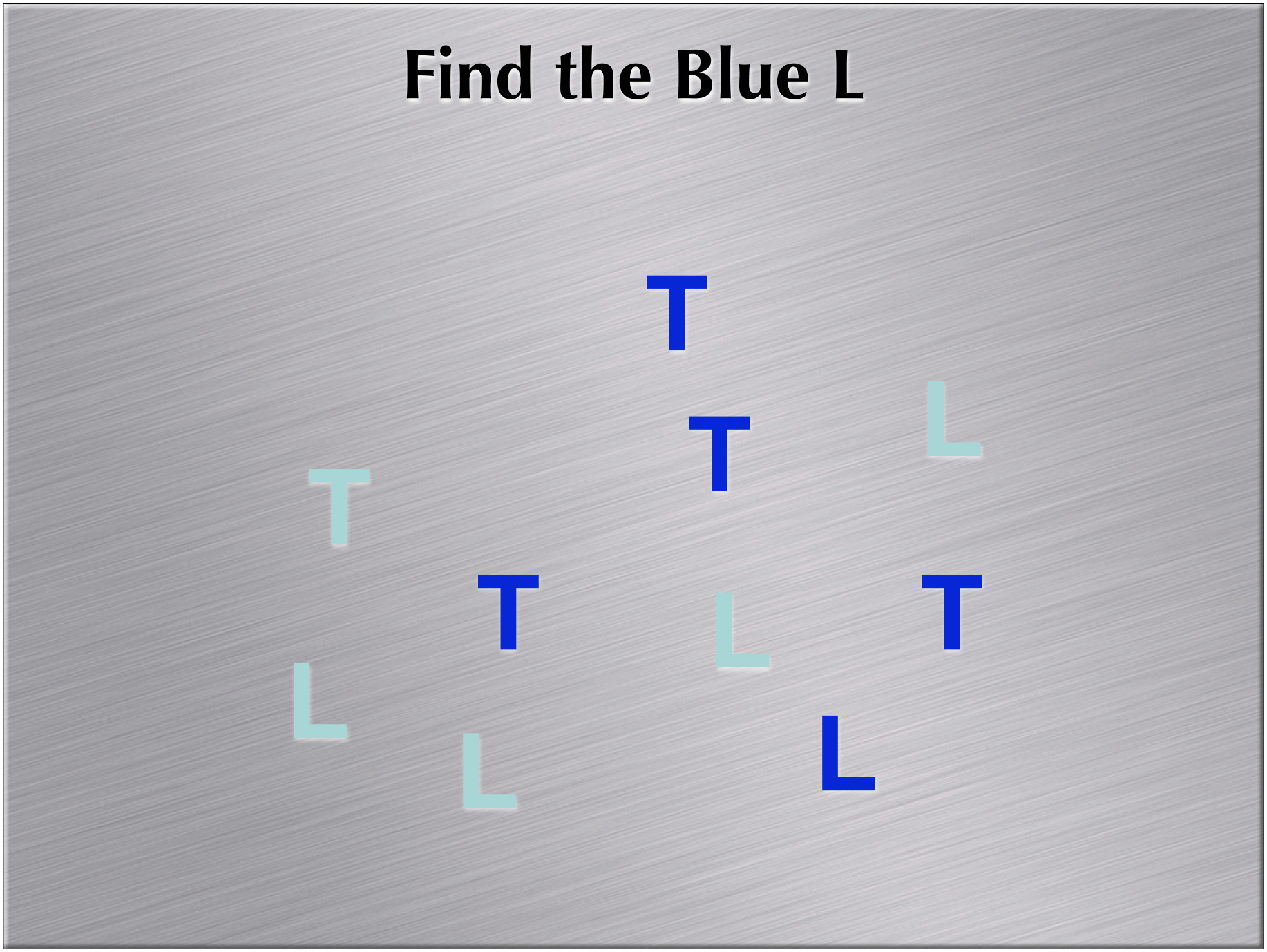


Find the vertical T

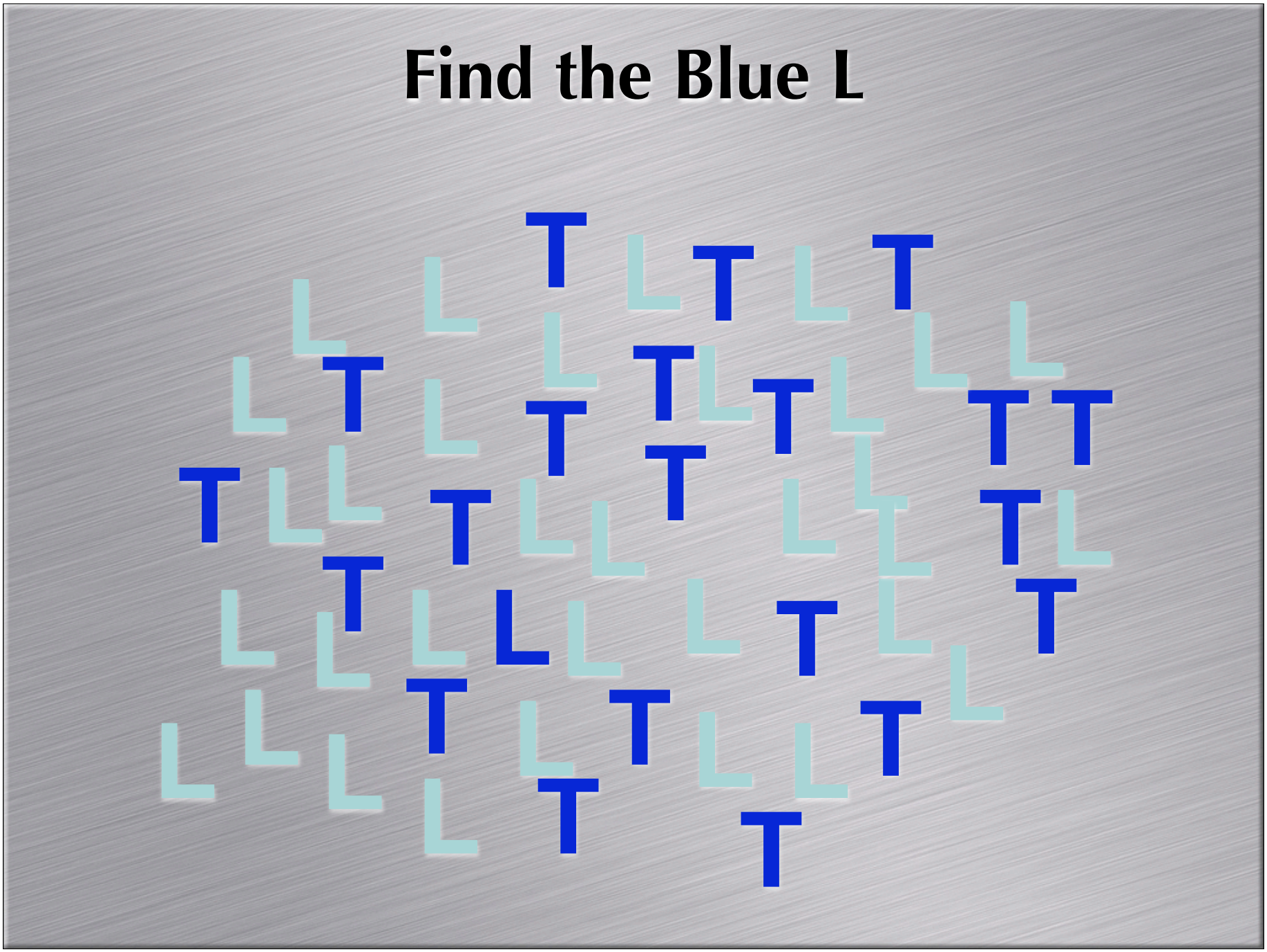
Find the vertical T



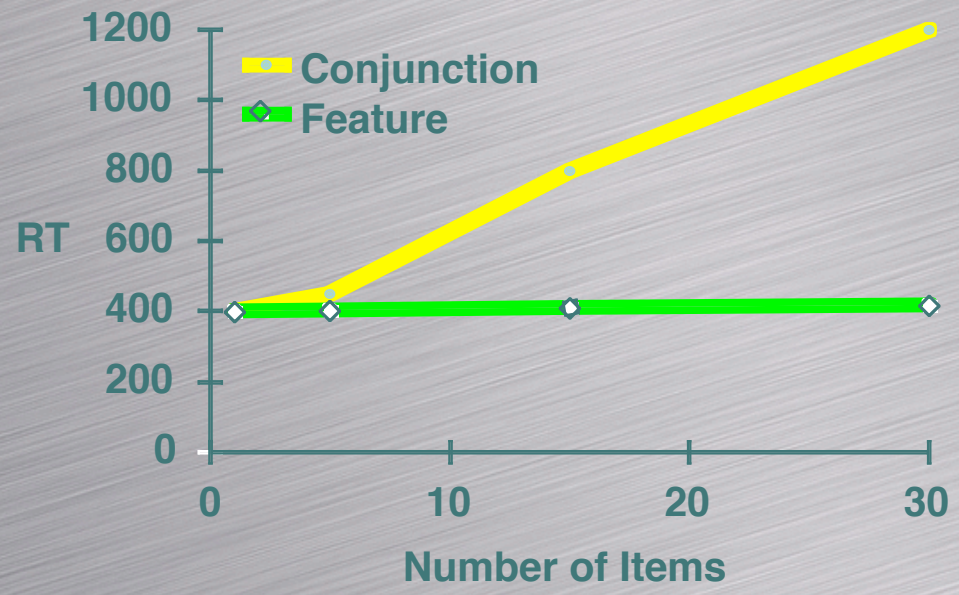
Find the Blue L



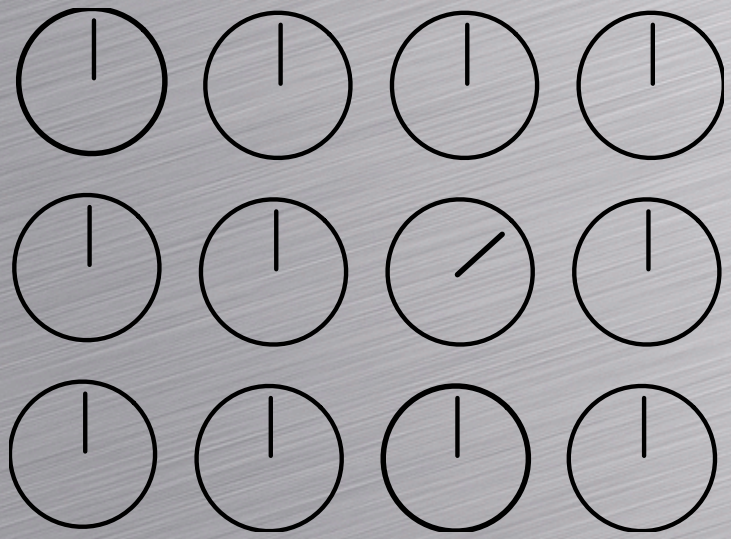
Find the Blue L



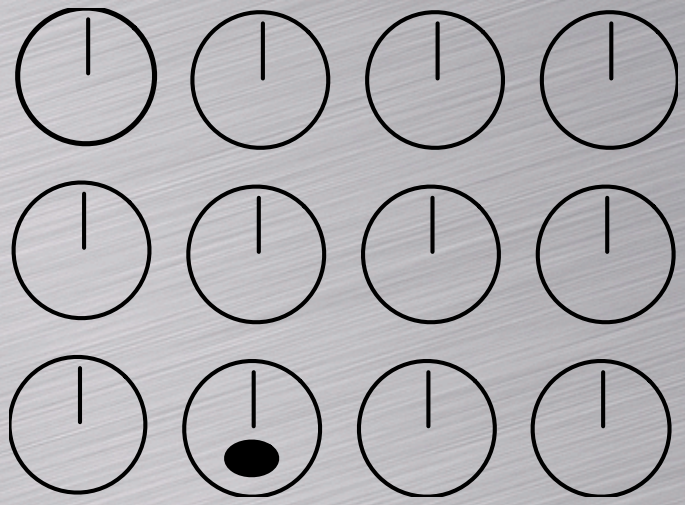
What's Going On?



Implications

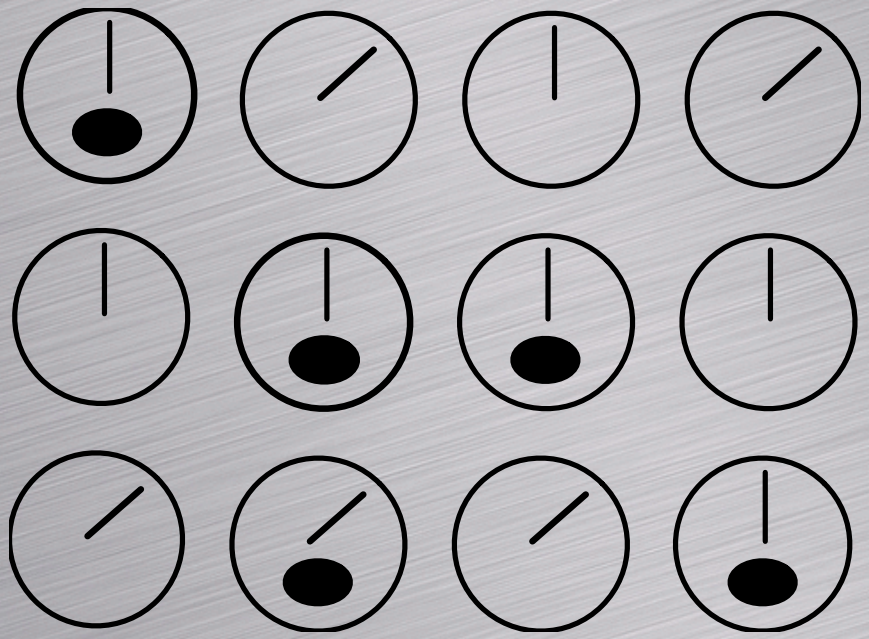


Watch the Dial



Watch for Light

Is there trouble?



Is there trouble?

Five general conclusions

- understanding the user's mental model that guides visual attention
  - e.g., expert users for visual search of frequent vs. infrequent functions

Five general conclusions

- understanding the user's visual scanning pattern that guides effective information design

Five general conclusions

- Identify the useful field of view (UFOV)
  - kids or elderly people

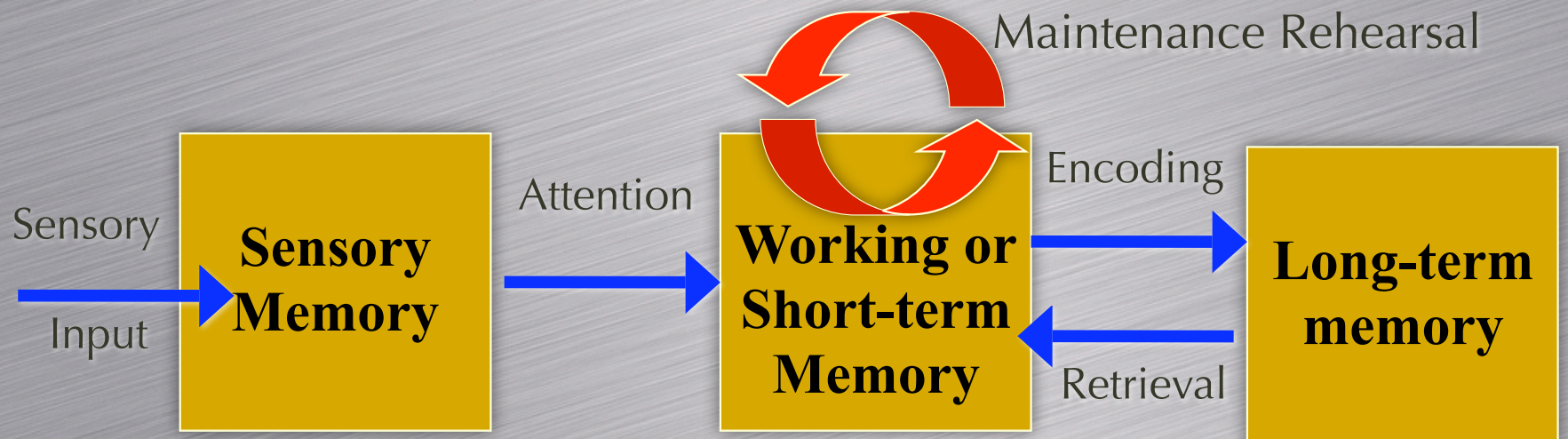
Five general conclusions

- Use preattentive processing and Gestalt organisation

Five general conclusions

- Human memory is imperfect, so design with a recognition-based interaction style

Model of the Mind



Working Memory Store

- Function - conscious processing of information
  - where information is actively worked on
- Capacity - limited (holds 7 +/- 2 items)
- Duration - brief storage (about 30 seconds)
- Dual Code - often based on sound or speech (multi-tasking)

Remember as many letters as you can!!!
Give you 5 secs.

P K S

J H L

Y M O

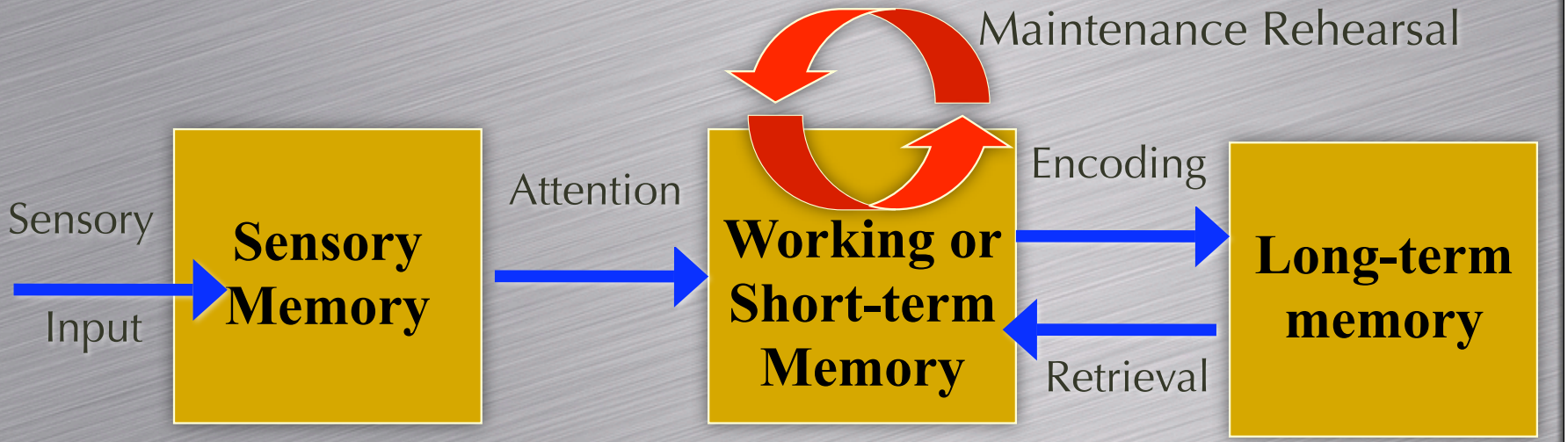
B I G
O L D
M A N

WM limitation: its implications

- consistency
- chunking against WM limitation
- spatial vs. verbal WM

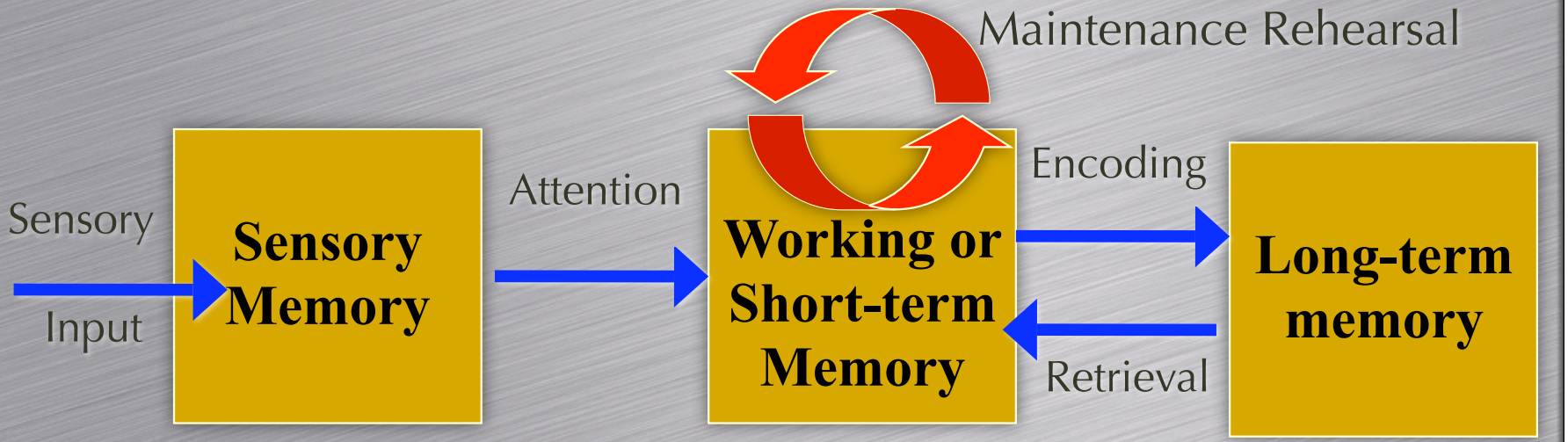
Long-Term Memory Store

- Function - organises and stores information
  - more passive form of storage than working memory
- Unlimited capacity
- Duration - thought by some to be permanent



Long-Term Memory Store

- Encoding - process that controls movement from working to long-term memory store
- Retrieval - process that controls flow of information from long-term to working memory store

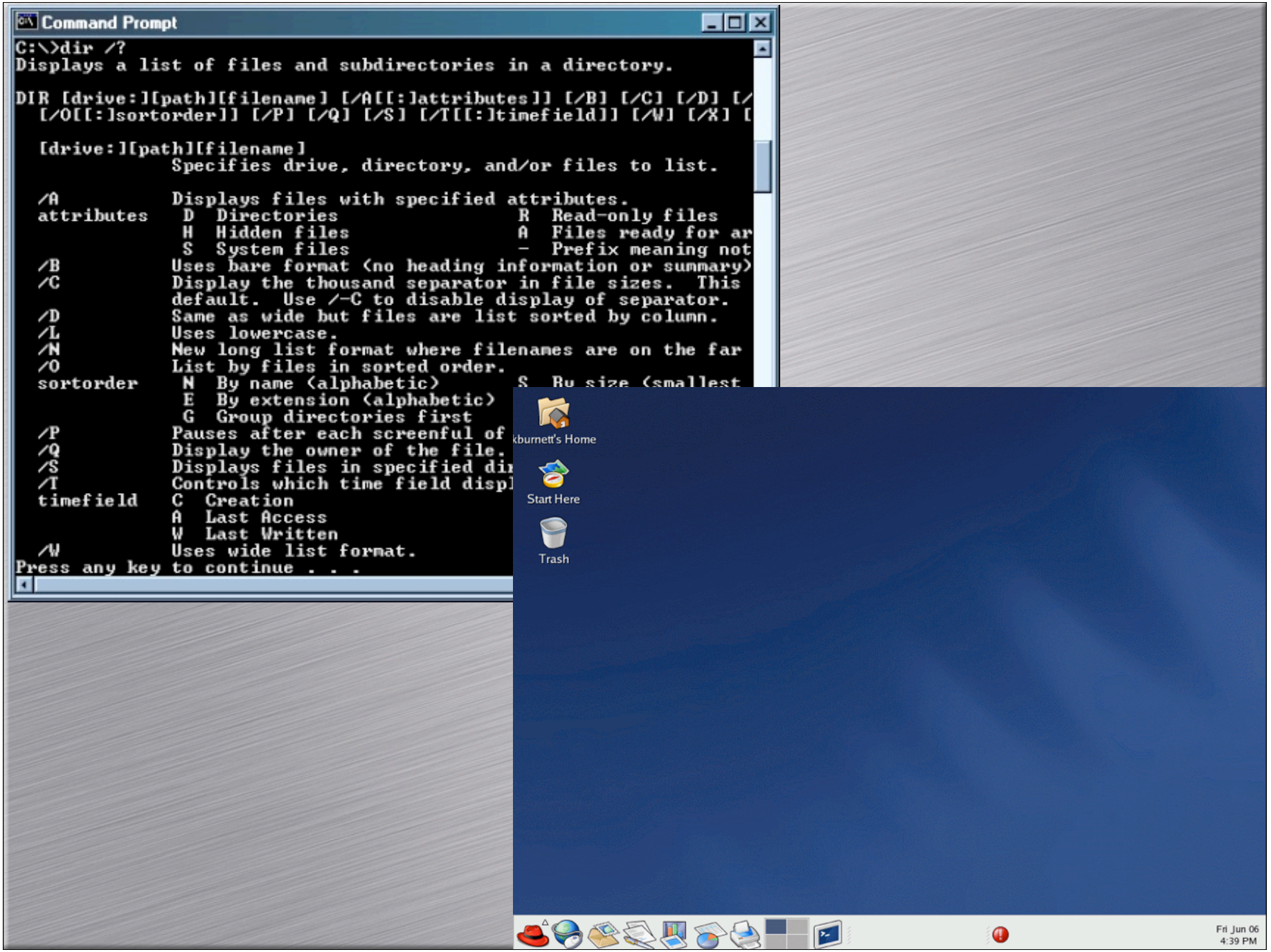


Mental representation of knowledge

- pictures - visual perception
  - real-world object
  - it captures concrete and spatial information
  - it conveys all features simultaneously
- words - imagined perception
  - symbolic representations
    - it is simply arbitrary
  - it captures abstract and categorical information
  - it conveys information sequentially

Retrieval and its implications

- Cued recall in computer systems design
  - command line interface vs. graphic user interface


Command Prompt
C:\>dir /?
Displays a list of files and subdirectories in a directory.
DIR [drive:][path][filename] [/A[[:]attributes]] [/B] [/C] [/D] [/
[/O[[:]sortorder]] [/P] [/Q] [/S] [/T[[:]timefield]] [/W] [/X] [
[drive:][path][filename]
Specifies drive, directory, and/or files to list.
/A
Displays files with specified attributes.
attributes
D Directories
R Read-only files
H Hidden files
A Files ready for ar
S System files
- Prefix meaning not
/B
Uses bare format (no heading information or summary)
/C
Display the thousand separator in file sizes. This
default. Use /-C to disable display of separator.
/D
Same as wide but files are list sorted by column.
/L
Uses lowercase.
/N
New long list format where filenames are on the far
/O
List by files in sorted order.
sortorder
N By name (alphabetic)
E By extension (alphabetic)
G Group directories first
/P
Pauses after each screenful of
/Q
Display the owner of the file.
/S
Displays files in specified dir
/T
Controls which time field displ
timefield
C Creation
A Last Access
W Last Written
/W
Uses wide list format.
Press any key to continue . . .
kburnett's Home
Start Here
Trash
Fri Jun 06
4:39 PM

That's all!!!

It seems to be so much condensed, please make sure that this is only part of cognitive science.

Thanks!