



Week 4. Learning in the Wild

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A photograph of a grand, multi-story library. The room is filled with tall, dark wood bookshelves that reach up to the ceiling, packed with books. A prominent feature is a black metal spiral staircase that winds through the center of the room. The lighting is warm, with a large, ornate chandelier hanging from the ceiling. In the foreground, the back of a dark leather chair with decorative stitching is visible, suggesting a quiet reading area.

The challenge of learning in contemporary education settings

How do we read

Why Study Reading?

Reading is complex!

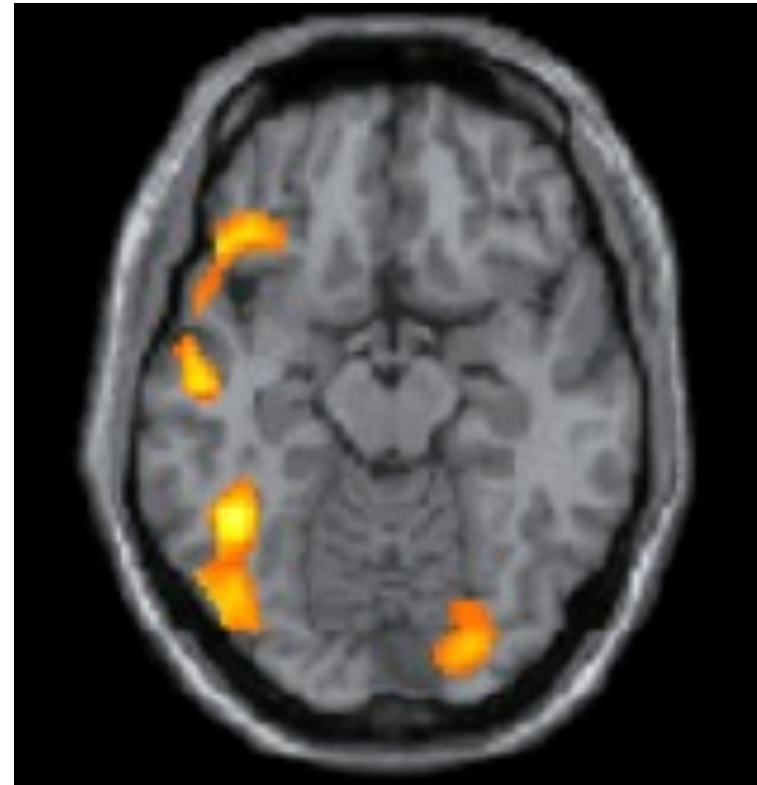
- Recognition of words
- Decoding words into meanings
- Segmenting word sequences into statements
- Inferring connections among statements
- Holding meanings in short-term memory
- Creating coherent representation of the statement processed...

How we read?

Reading is complex!

- Complex neural circuits
(Wolf, 2007 *Proust and the Squid*)

(By comparing literate and nonliterate adults, found that left temporal-occipital area important for reading;
Dehaene et al., 2010)



- **And yet, reading often seems effortless!**
(skill in everyday tasks)

Why Study Reading?

- Reading is pervasive, and needed to fully participate in society
 - Learning to do things (instructions, manuals)
 - Safety (product warnings)!
 - Managing finances
 - Managing health care
 - Sharing information



Why Study Reading?

- Limited literacy = limited function!
 - 44 million adults are functionally illiterate (NALS, 2003).
44% of adults over age 65 have limited reading skills.
 - Reading and “cognitive health”
 - Literacy and onset of Alzheimer’s Disease

Print Perception and Comprehension

- So, HOW do we read???
- How does skill/fluency develop?

Print Perception and Comprehension

bottom-up and top-down processes...

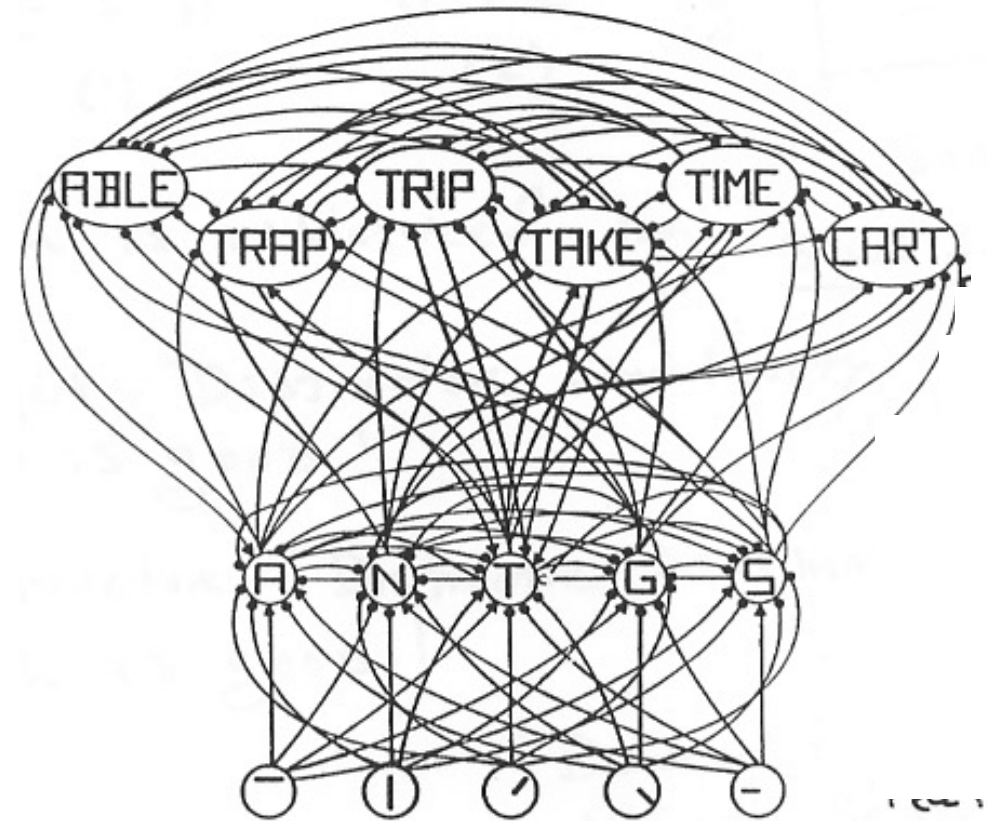
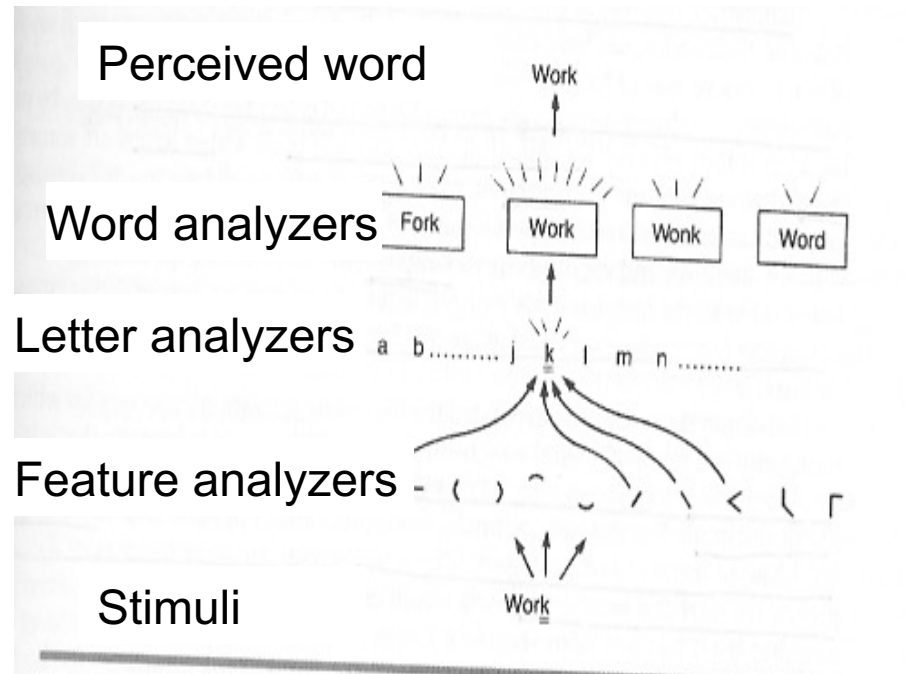


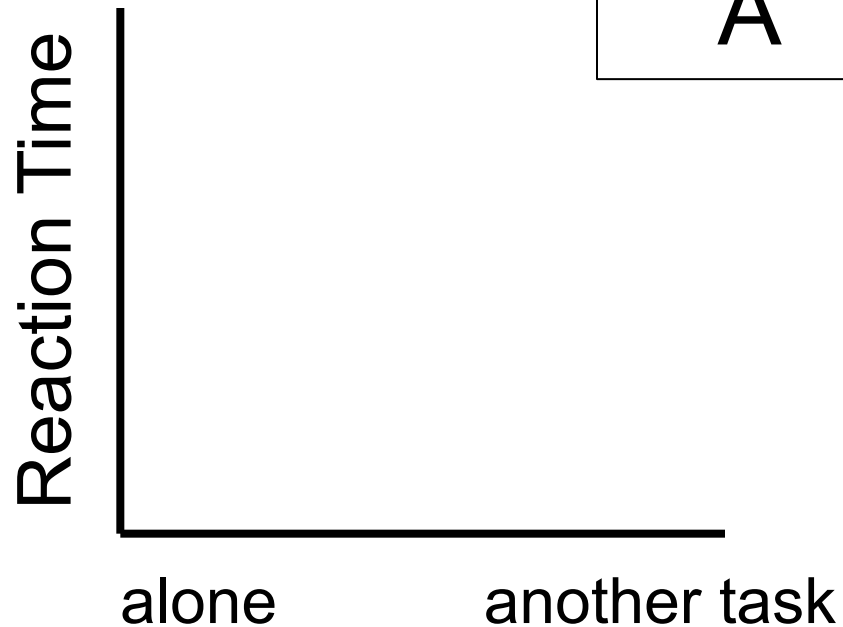
Figure 6.1 Hierarchical Process of word perception

Bottom-up Processes

in Letter Recognition: (Fluent reading)

Special status of letters (not just a bundle of features)

LaBerge (1973)



Same-different matching task:

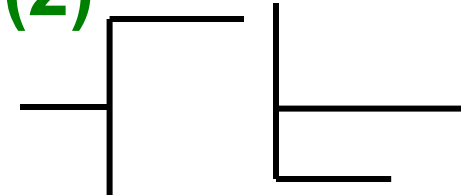
(1)

A

B

or

(2)

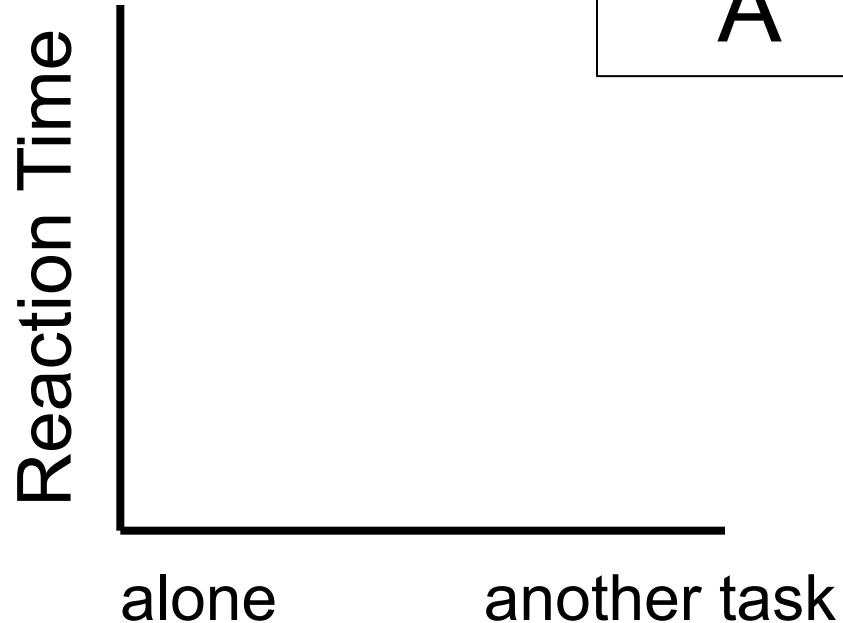


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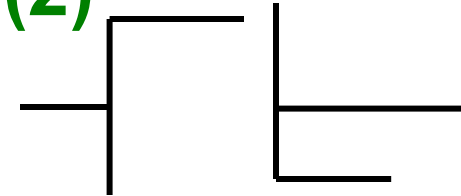
(1)

A

B

or

(2)




Dual-task:
another task—less
attentional resources

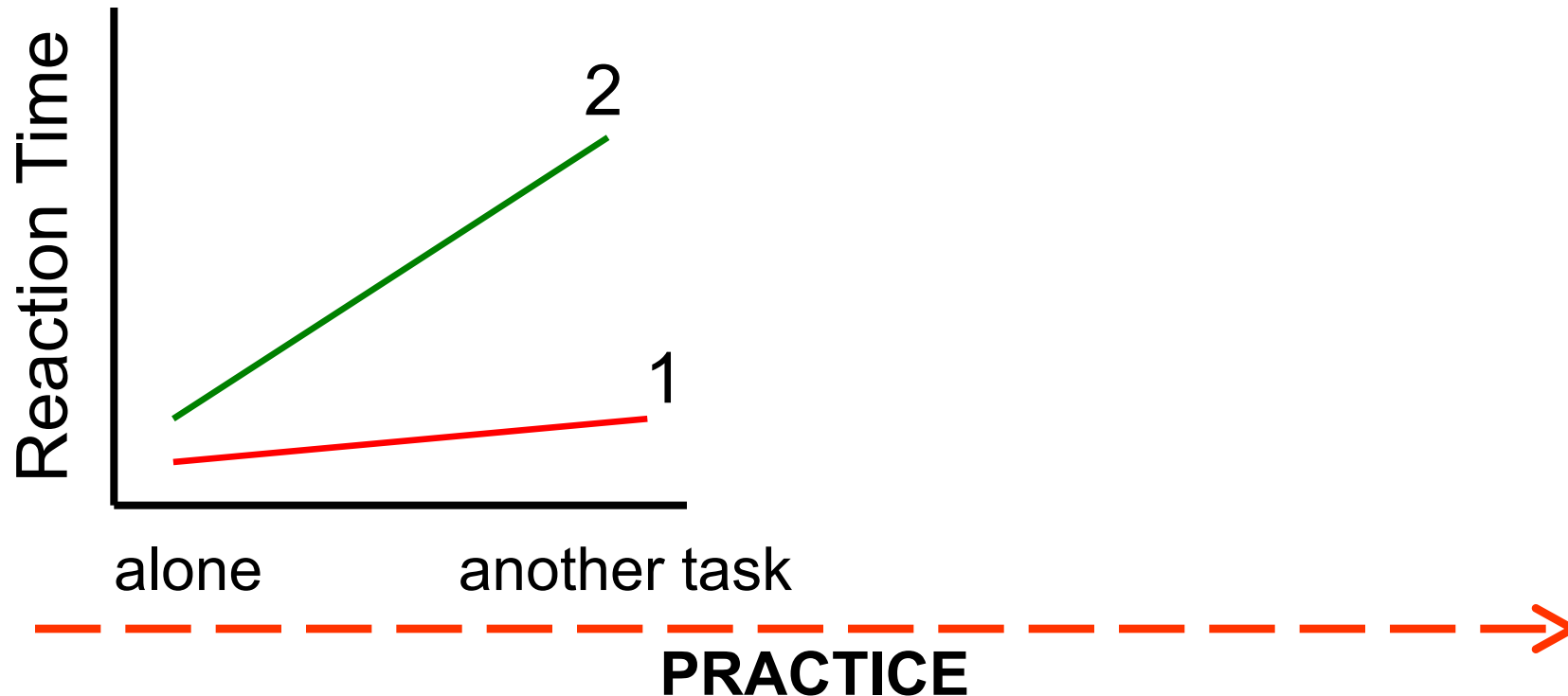
Bottom-up Processes in Letter Recognition:

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(1) A B or (2) 




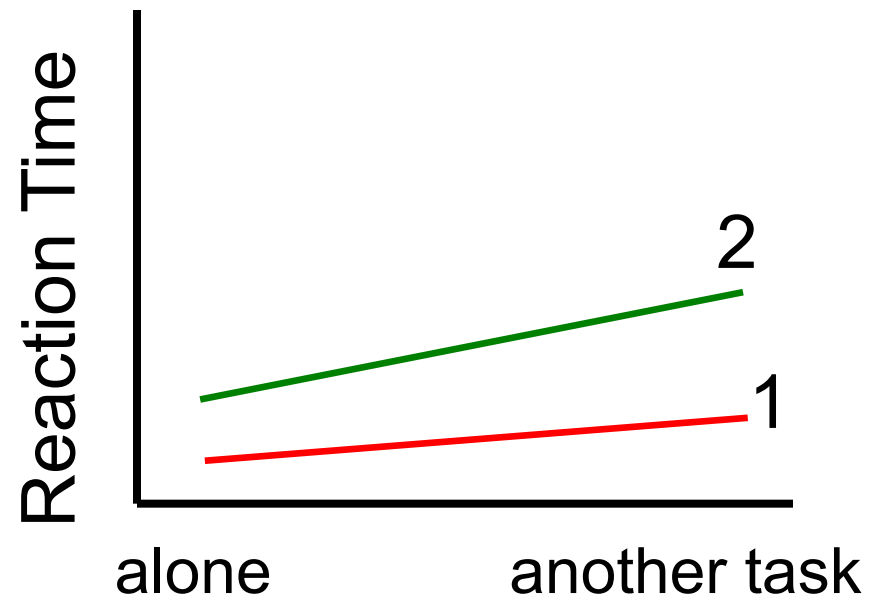
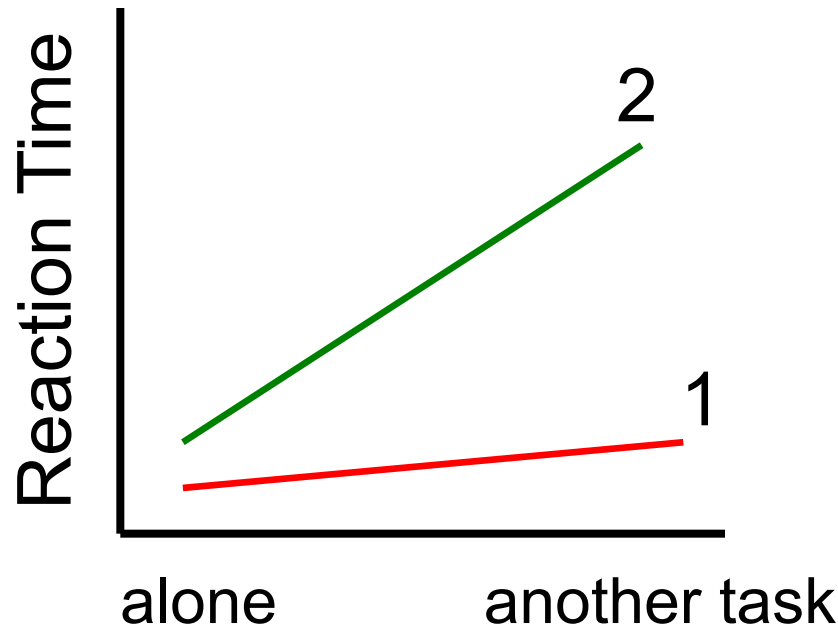
Bottom-up Processes in Letter Recognition:

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Same-different matching task:

(1) A B or (2) 



PRACTICE →

Bottom-up Processes in Letter Recognition:

Practice appears to have a fairly general effect on the automatization of processing printed material!

Bottom-up Processes in Word Recognition

- Unfamiliar words such as “zucheto” is processed as bundles of letters
(Correct: zucchetto)



Bottom-up Processes in Word Recognition

- Unfamiliar words such as “zucheto” is processed as bundles of letters (Correct: zucchetto)



- Familiar words such as “the” are processed as **units**

Therefore misspellings are difficult to detect for familiar words. (“tke”)

Bottom-Up Processes in Perception of Words: *Accessing Word Meanings (concepts)*

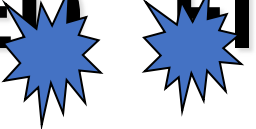
- As words are decoded (orthographic or phonological units), meaning associated with word representation in long-term memory is accessed.
- Word's visual and meaning characteristics often processed as a unit.
- Stroop effect: GREEN vs GREEN

TOP-DOWN PROCESSING in Perception of LETTERS & WORDS

At the letter level

(a) Context of surrounding letters fill in the “gaps” and effectively eliminates many alternatives (top-down processing)....

RED FISH

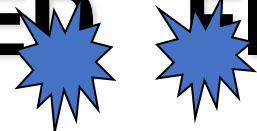


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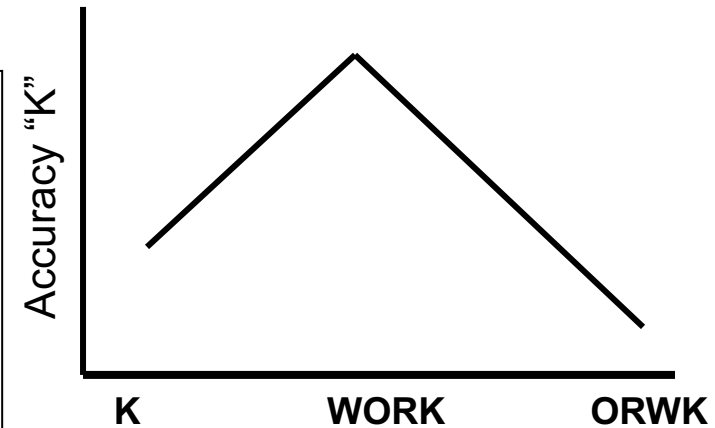


12
ABC
14

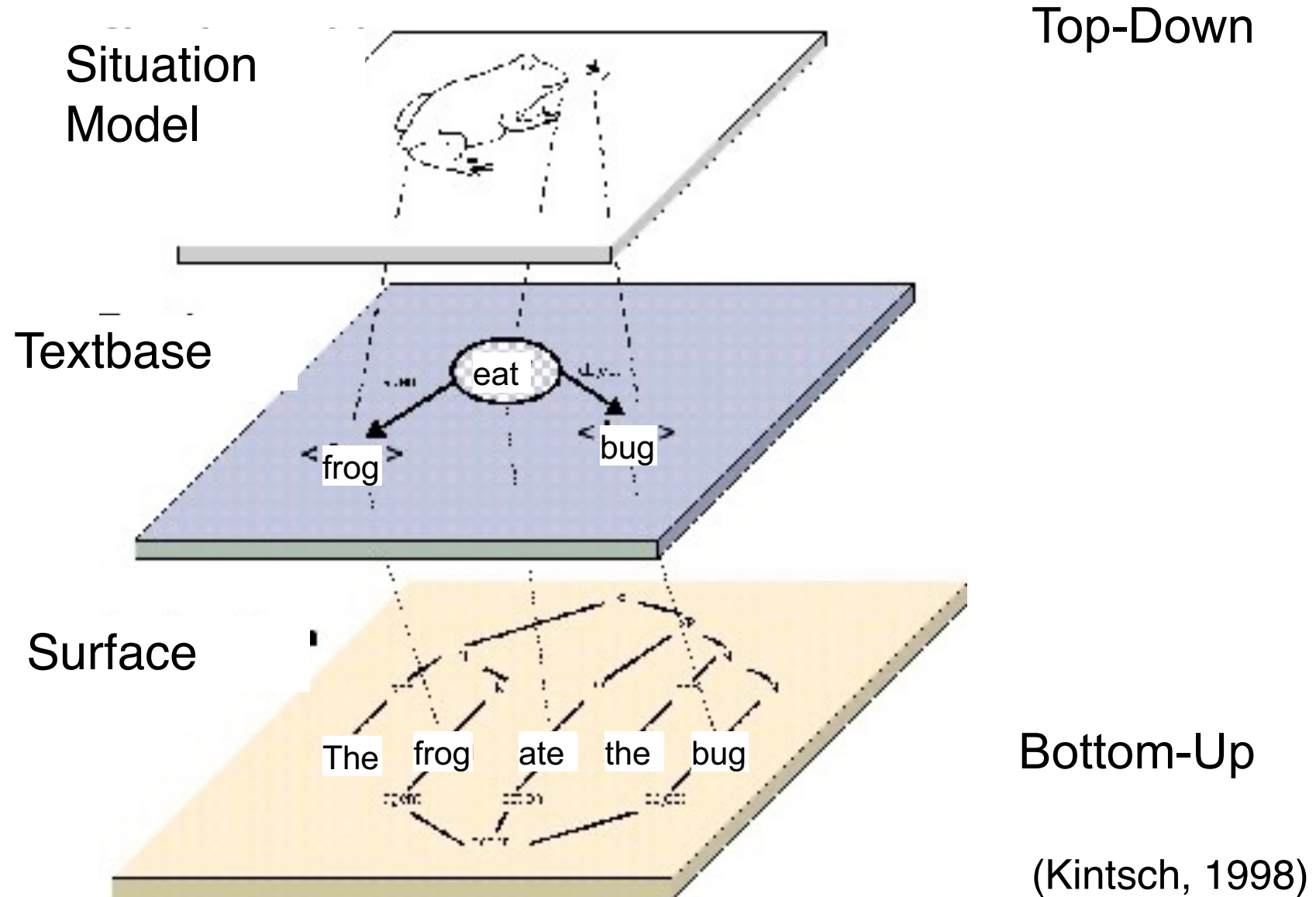
TOP-DOWN PROCESSING in Perception of LETTERS & WORDS

Word Superiority Effect (Reicher, 1969)

STIMULUS	RECOGNITION TEST	ANSWER
1) K		
2) WORK	K or D	K
3) ORWK		



Knowledge Representation (Comprehension)



Reading in the Wild

- Scanning
- Not always linear (design feature)
- On the average Web page, users have time to read at most 28% of the words during an average visit; 20% is more likely.
- Search!

Reading in the contemporary info systems

- Design of reading tech. (such as tablets, smartphones): encouraging scanning behavior
- Design of info layouts (such as email, search results page, websites): skimming through the “text snippets”
- Impact on social media: small chunks of texts (simplification --> misinfo)
- Information Proliferation: selective exposure

Example Study: Satisficer vs. Sampler in Reading

- In a multi-text environments (such as a website), how can we identify readers who tend to “satisfice” to reach good enough performance?

Reader & Payne (2007)

Heart III 14:21

The Heart (Silverstein)

[Page 1](#)
[Page 2](#)
[Page 3](#)
[Page 4](#)

1 You probably think you know what the heart looks like. But you may be wrong. The heart does not look very much like the shapes people draw on Valentine's Day. And it certainly isn't flat, like a paper valentine. A real, live heart is shaped something like an ice-cream cone, with a pointed bottom and a rounded top, like two scoops of ice cream. It is hollow and can fill up with blood. An adult's heart is about the size of a large orange. It weighs a little less than a pound.

The Heart (Davis & Park)

[Page 1](#)
[Page 2](#)
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2 The heart is in the middle of the chest. It fits snugly between the two lungs. But the heart is tipped over, so that there is a little more of it on the left side than on the right. The pointed tip at the bottom of the heart touches the front wall of the chest. Every time the heart beats, it goes 'thump' against the chest wall. You can feel the thumps if you press there with your hand. You can hear them with your ear.

The Heart (Basmajian)

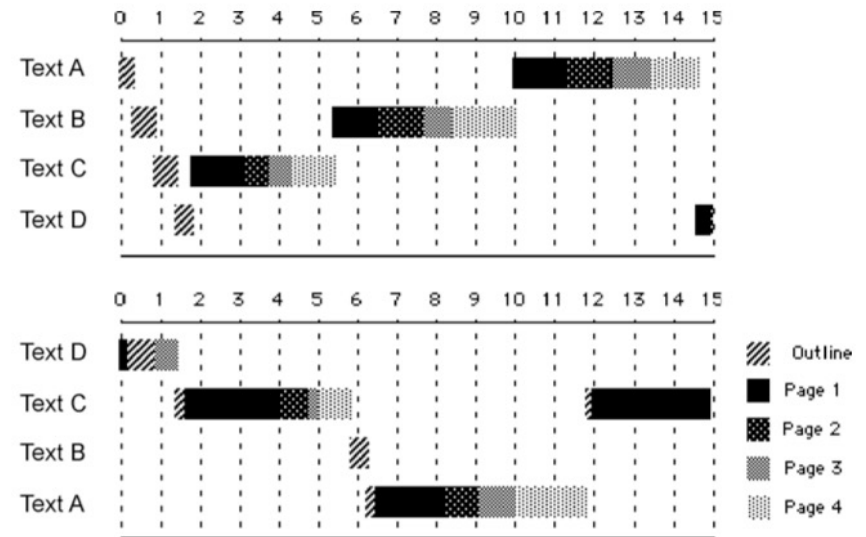
[Page 1](#)
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[Page 3](#)
[Page 4](#)

3 The heart is a pump. Its walls are made of thick muscle. They can squeeze (contract) to send blood rushing out. The blood does not spill all over the place when it leaves the heart. It flows smoothly in tubes called blood vessels. First the blood flows into tubes called arteries. The arteries that leave the heart are thick tubes. The biggest one, called the aorta, is an inch wide. But the arteries soon branch again and again, to form many smaller tubes. These blood vessels carry blood to all parts of the body. The farther from the heart, the more blood vessels there are. The tiniest blood vessels, called capillaries, are so small you would need a microscope to see them. Capillaries join to form larger blood vessels. These tubes carry blood back toward the heart. The bigger ones are called veins. The closer to the heart, the fewer the veins there are, and the larger they are. The largest veins empty into the heart.

The Heart (Gould)

[Page 1](#)
[Page 2](#)
[Page 3](#)
[Page 4](#)

4 So the blood vessels of the body carry blood in a circle: moving away from the heart in arteries, traveling to various parts of the body in capillaries, and going back to the heart in veins. Scientists call the heart and blood vessels the circulatory system. They say that blood circulates in the body. And the heart is the important pump that makes this happen.



Bridging: Text skimming (Duggen & Payne, 2009)

- Adaptive time allocation (Reader & Payne, 2007): Sampling vs Satisficing
 - Experts – higher-level texts
 - Time pressure – easier texts
- By introducing large amounts of text (>10 x 3k), half-text vs skim condition
 - skimmers spend most of the time on the first half of the text for each article → satisficing

Text Skimming vs Foraging

- What are the cues people use to judge their reading?
- Why people continuously do skimming in reading?
- Satisficing happened when they face a drop in information gain
→ **Marginal Value theorem!!**

How do we regulate our learning?

Metacognition – Associative Learning

STUDY

cue- target

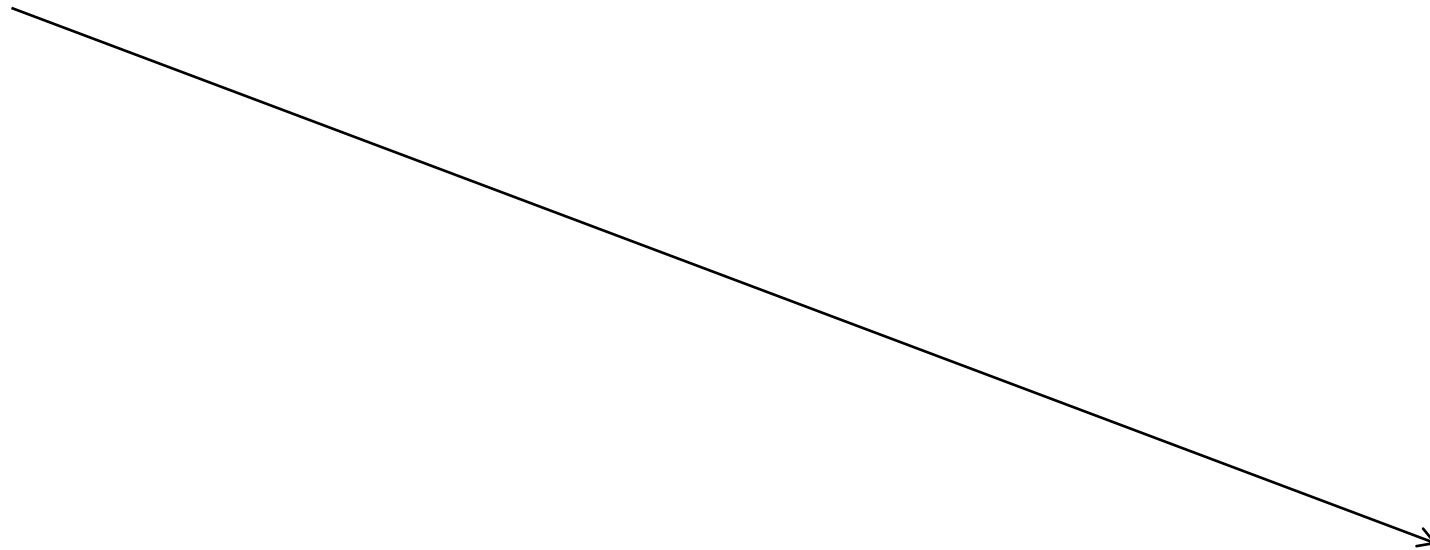
cloud – pen

shoe – watch

bottle – apple

tea – frame

....



Metacognition – Associative Learning

STUDY

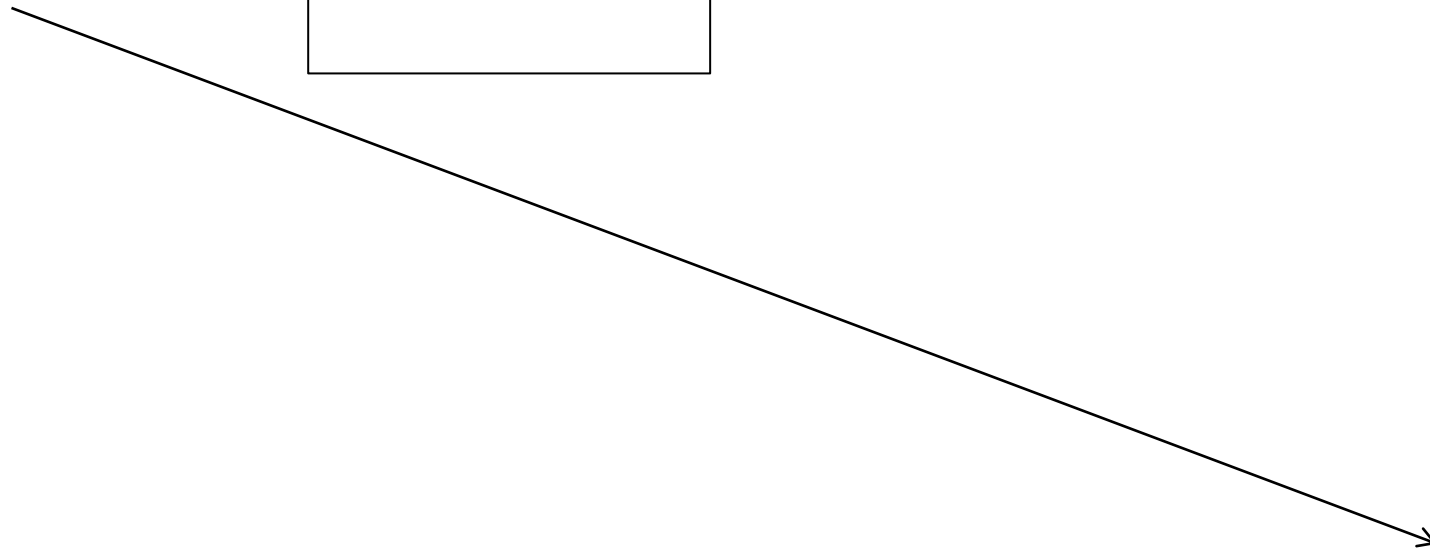
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JUDGMENTS OF LEARNING (JOL)

cue => JOL

cloud => 10%
shoe => 100%
bottle => 50%
tea => 60%
....



Metacognition – Associative Learning

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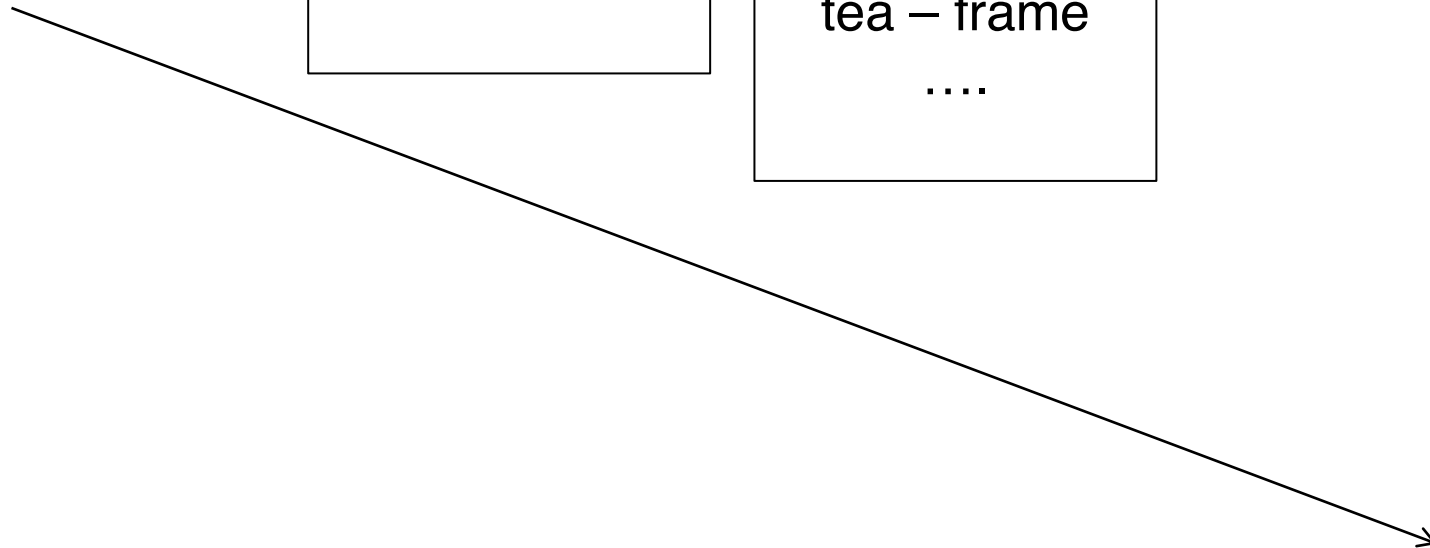
cue => JOL

cloud => 10%
~~shoe => 100%~~
bottle => 50%
tea => 60%
....

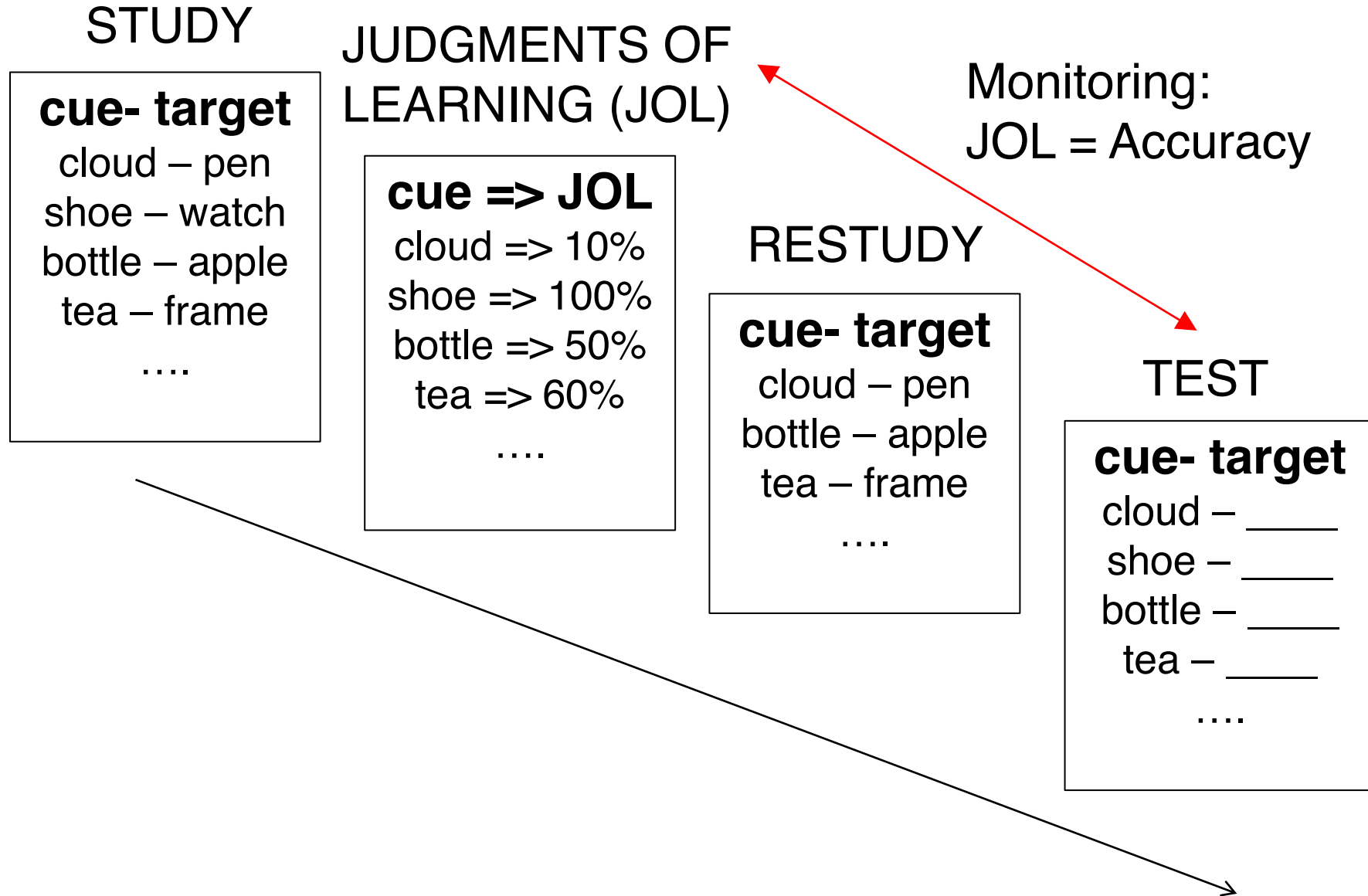
RESTUDY

cue- target

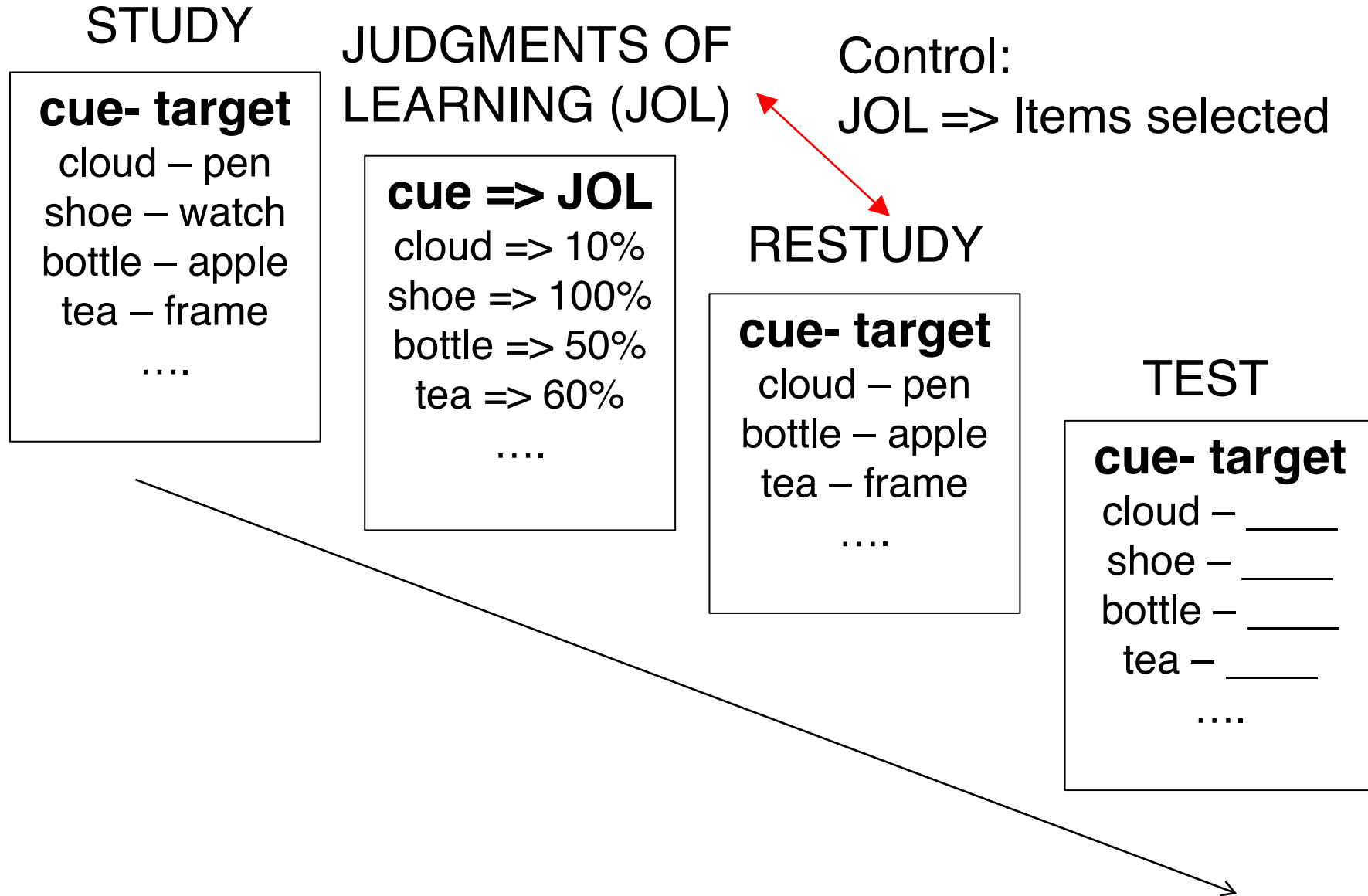
cloud – pen
bottle – apple
tea – frame
....



Metacognition – Associative Learning



Metacognition – Associative Learning



Self-Regulated Learning

- Monitoring: How well do I learn? → Judgments of learning (JOLs)
- Control: What and how long should I learn?

What are the cues that learners use to assess their learning?

- Cues for making JOLs (Koriat, 1997)
 - mnemonic cues: encoding fluency (how easy for someone to process the information)
- Although JOLs are highly correlated with encoding fluency
 - Correlations between actual recall and JOLs/encoding fluency are low. (Dunlosky et al., 2006)
 - Regardless of age, people are poor at monitoring their learning!

Self-Regulated Learning (II)

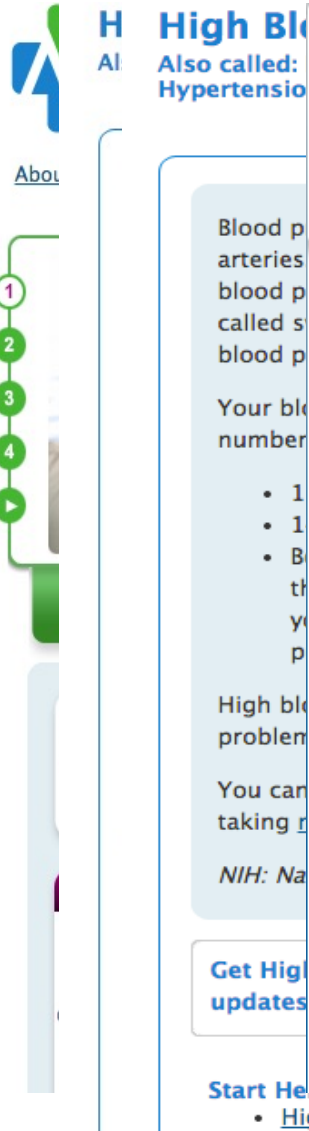
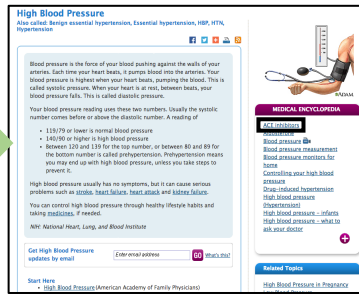
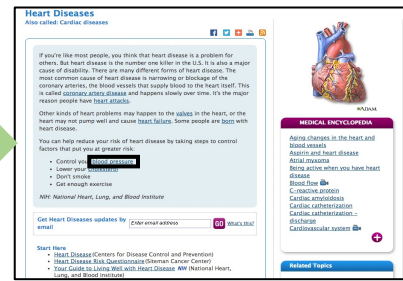
What to learn?

From the most difficult? Or the easiest?

Older learners are likely to use

- The region of proximal learning (RPL) (Metcalfe, 2002; Metcalfe & Kornell, 2005)
- Choosing the materials that are close to their learning levels

How about learning in the wild?



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ACE inhibitors

Angiotensin-converting enzyme (ACE) inhibitors are medicines. They treat heart, blood vessel, and kidney problems.

How ACE Inhibitors Help You

ACE inhibitors are used to treat heart disease. These medicines make your heart work less hard by lowering your blood pressure. This keeps some kinds of heart disease from getting worse. Most people who have [heart failure](#) take these medicines.

These medicines treat high blood pressure, strokes, or heart attacks. They may help lower your risk for stroke or heart attack.

They also are used to treat diabetes and kidney problems. This can help keep your kidneys from getting worse. If you have these problems, ask your doctor if you should be taking these medicines.

Types of ACE Inhibitors

There are many different names and brands of ACE inhibitors. Most work as well as another. Side effects may be different for different ones.

Taking Your ACE Inhibitors

ACE inhibitors are pills that you take by mouth. Take all of your medicines as your doctor told you to. Try to take them at the same time, or times, each day. Do not stop taking your medicines without talking with your doctor first.



MedlinePlus Topics

- [Blood Pressure Medicines](#)
- [Chronic Kidney Disease](#)
- [High Blood Pressure](#)
- [Kidney Diseases](#)

Read More

- [Diabetes and kidney disease](#)
- [Heart Failure Overview](#)
- [High blood pressure](#)
- [Type 2 Diabetes](#)

Patient Instructions

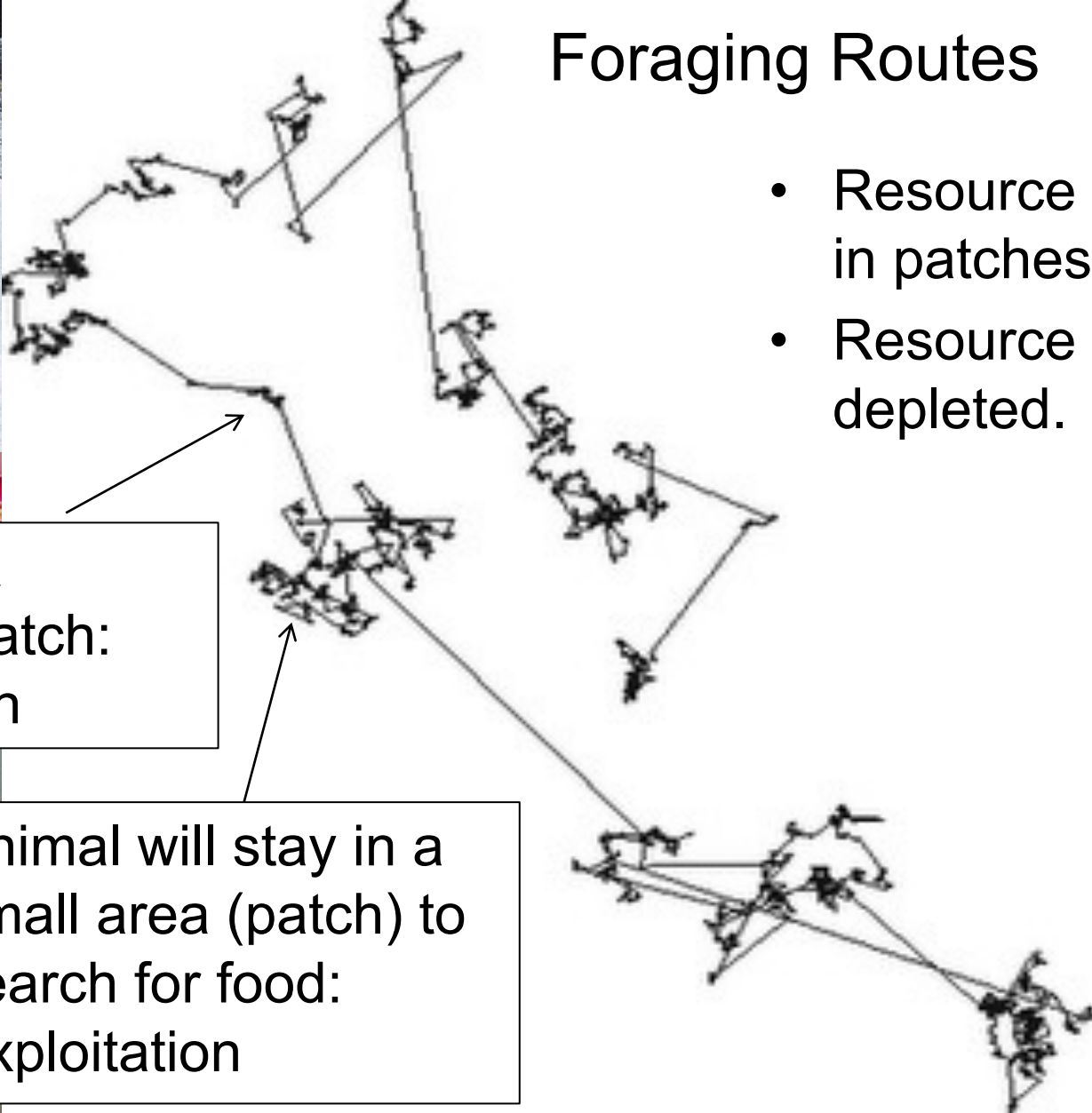
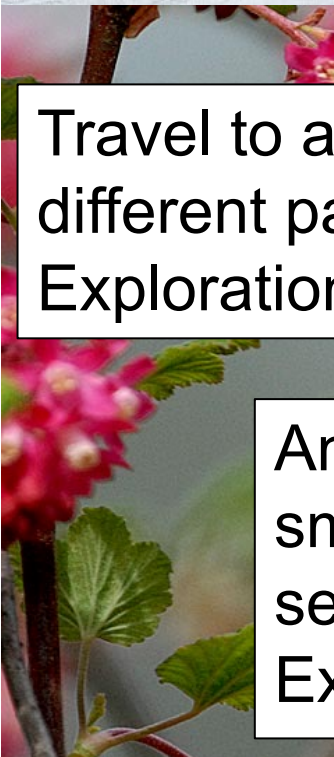
- [Angina – discharge](#)
- [Angioplasty and stent – heart – discharge](#)
- [Aspirin and heart disease](#)
- [Being active when you have](#)

Start Here

- [High Blood Pressure](#) (American Academy of Family Physicians)

[High Blood Pressure in Pregnancy](#)

Animal Foraging



Foraging Routes

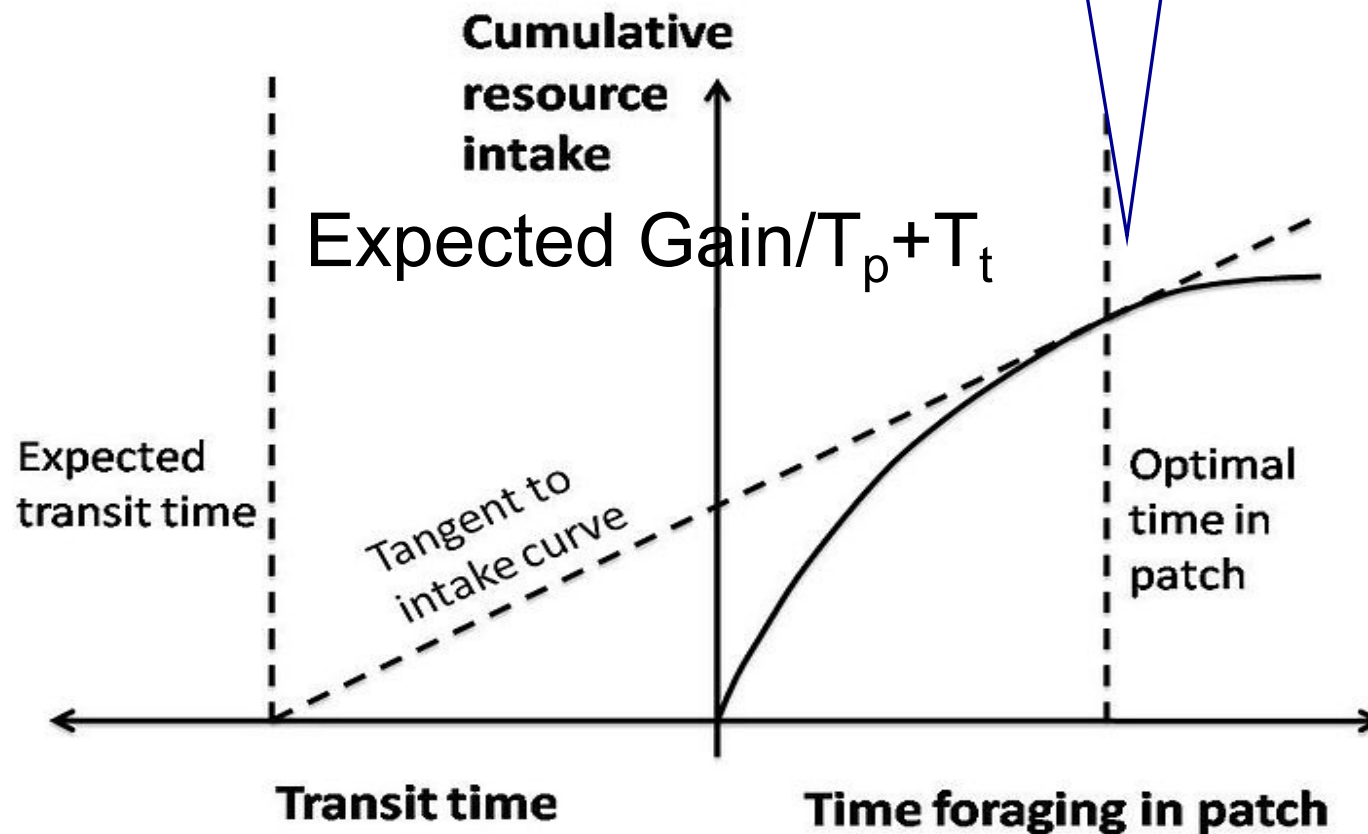
- Resource is clustered in patches.
- Resource can be depleted.

Travel to a different patch:
Exploration

Animal will stay in a small area (patch) to search for food:
Exploitation



Optimal Foraging Model (Marginal Value Theorem; Charnov, 1976)



- T_p = Time in patch, T_t = Travel Time

Similarities between metacognition and foraging

Metacognition – Associative Learning

STUDY

cue- target

cloud – pen
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....

JUDGMENTS OF LEARNING (JOL)

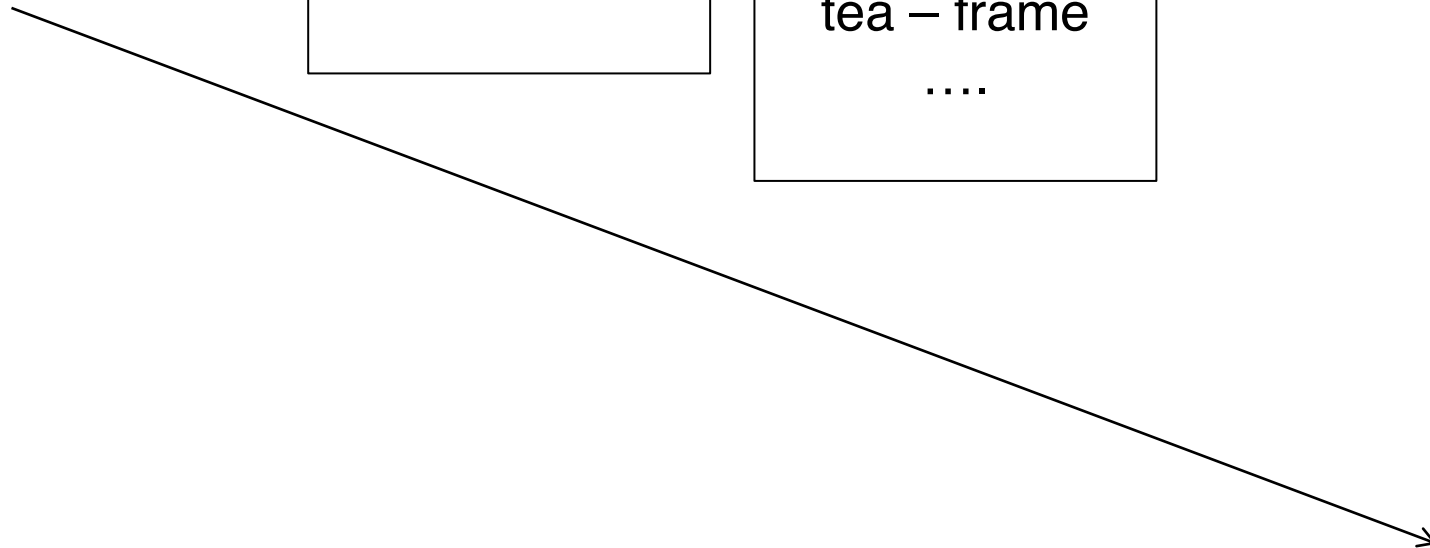
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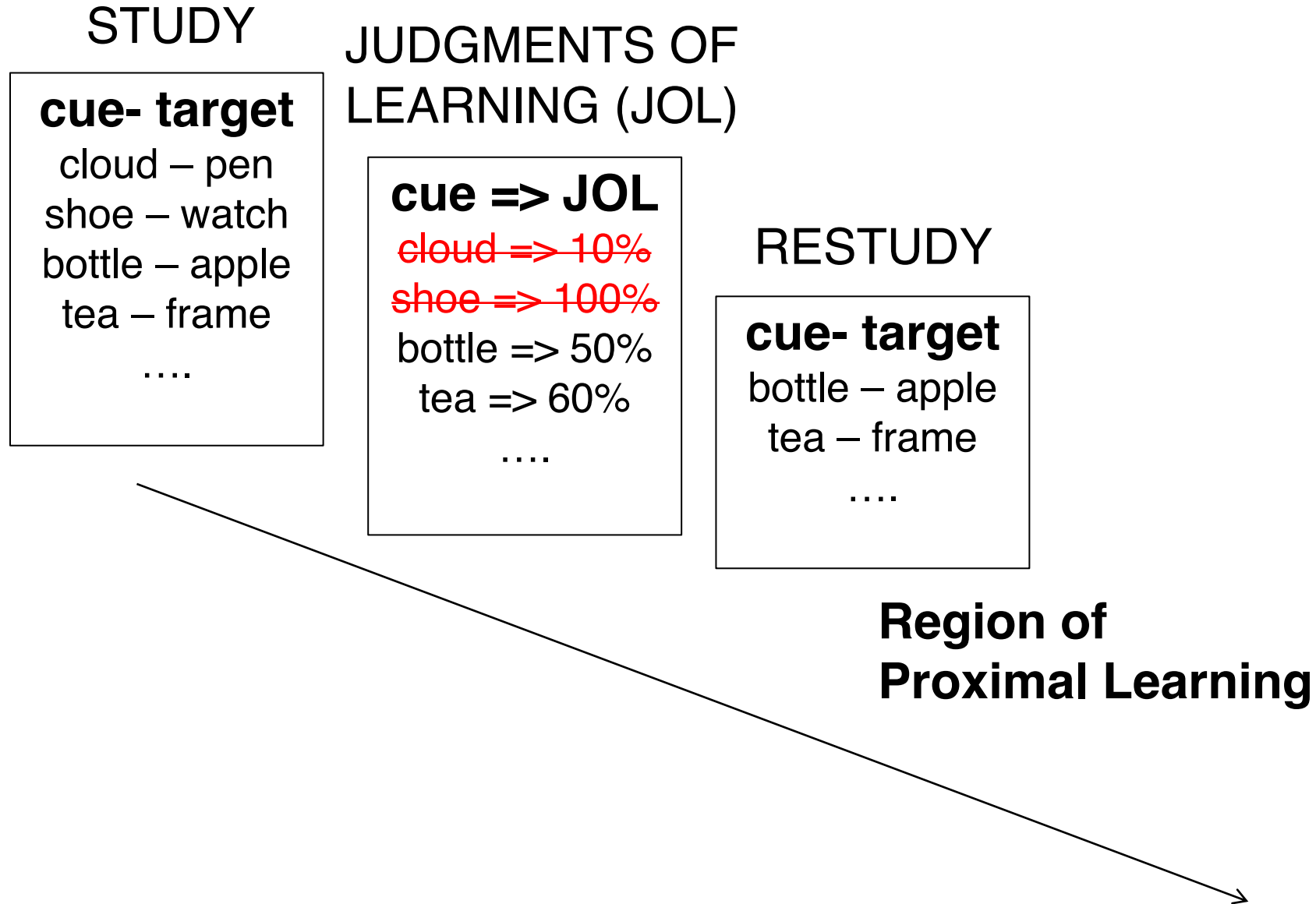


Metacognition and Foraging (1)



Metclafe & Jacobs (2010)

Metacognition – Associative Learning

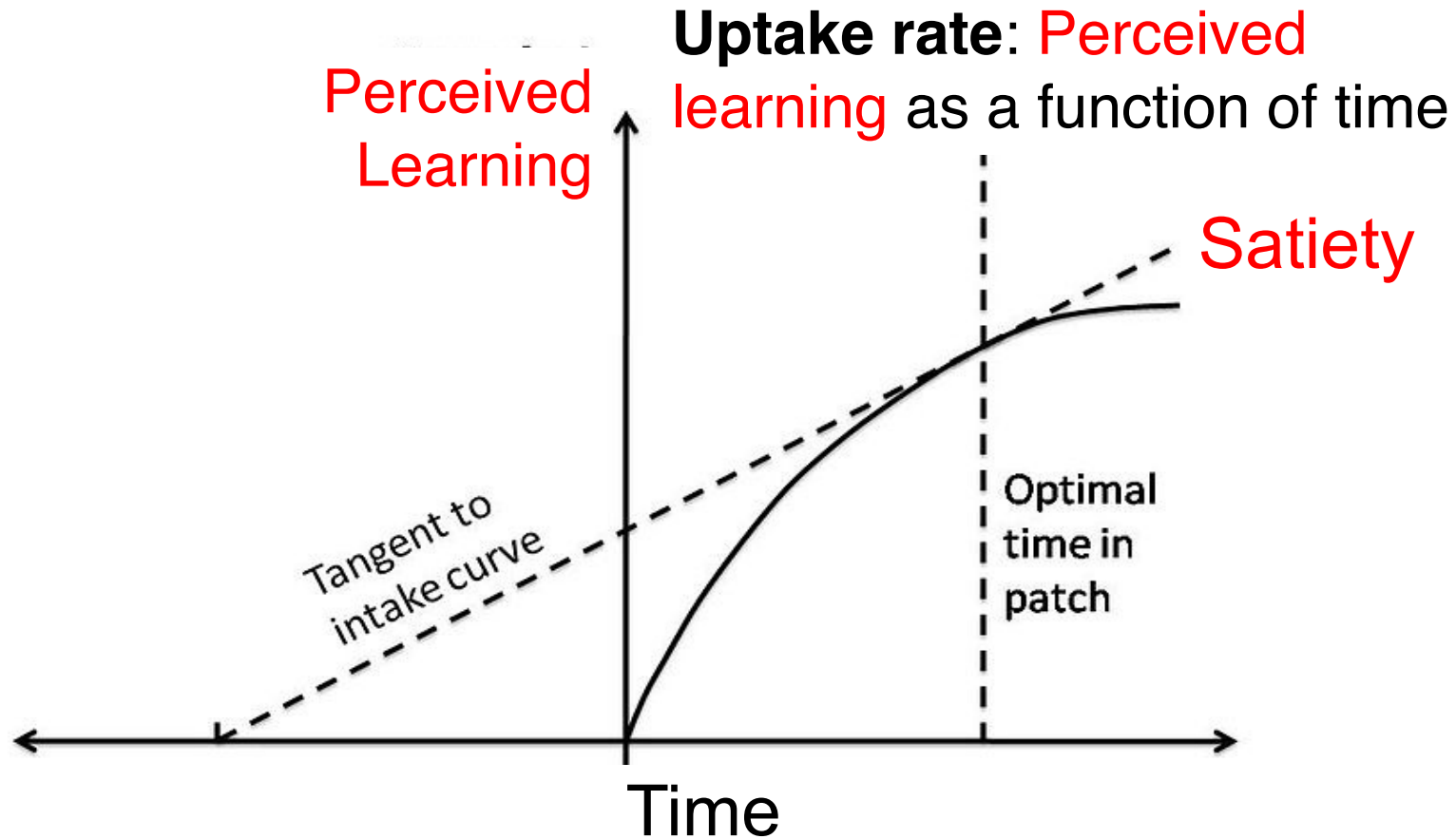


Metacognition Foraging (2)



Metclafe & Jacobs (2010)

Learning: Revisiting Marginal Value Theorem

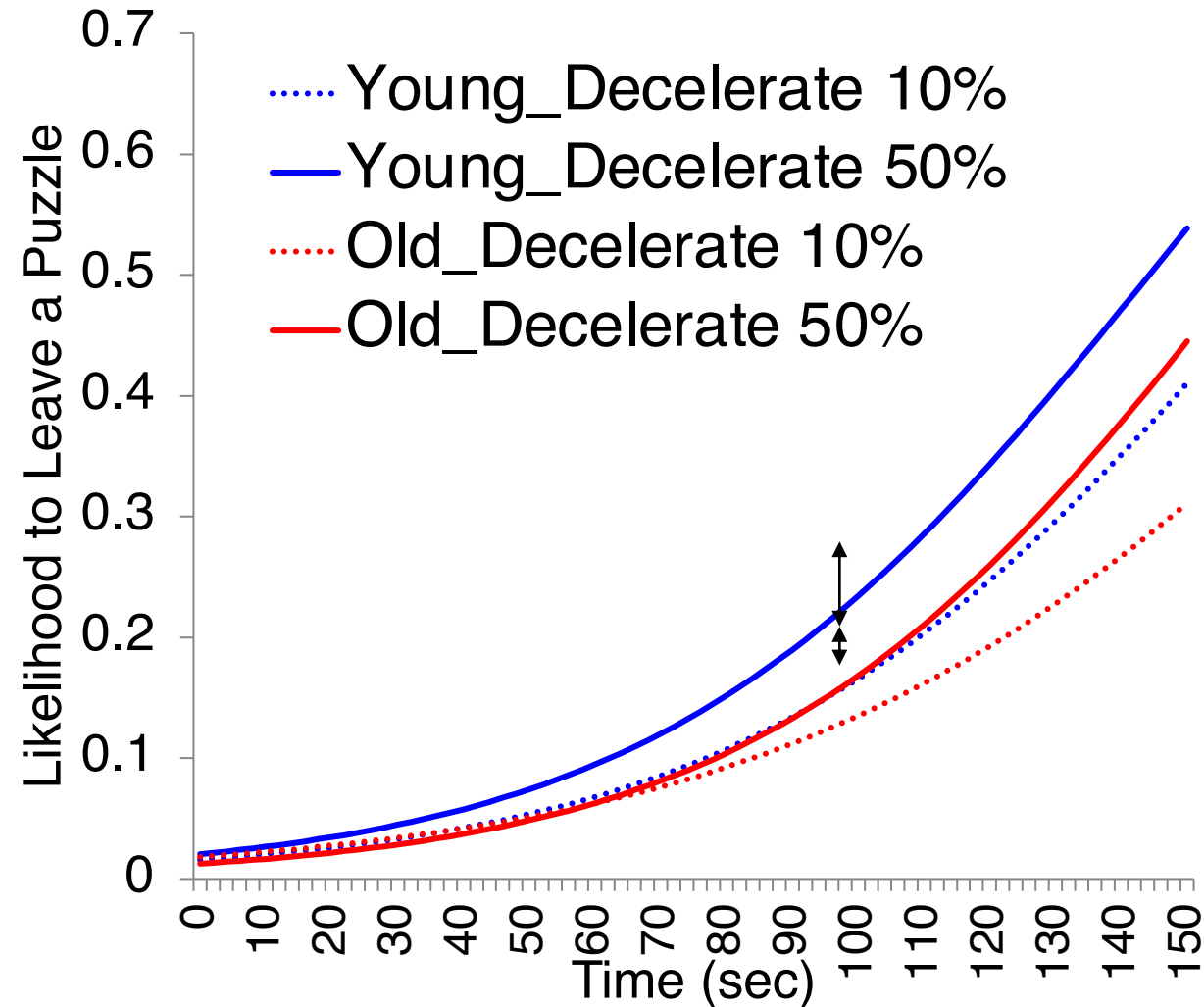


What makes people feel they are learning?

Comparing search and learning

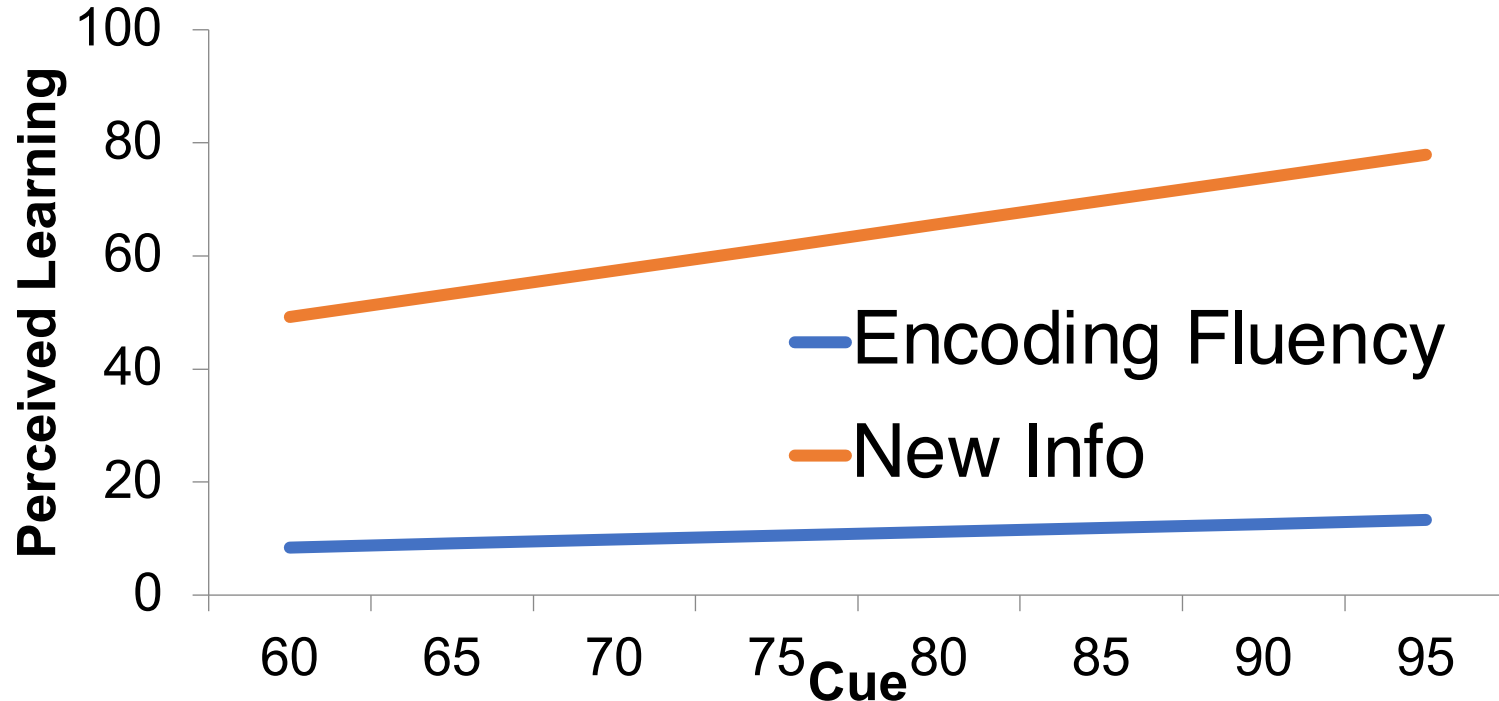
	Foraging	Learning
Goal	Resources uptake	Knowledge building
Determinants of uptake rates	Profitability of patch	Both texts and the ability of the learners
Resources	can be depleted	cannot be depleted
Satiety mechanism/ stopping rules	Rate of gain	unclear

Both younger and older learners stop learning when their perceived learning decrease



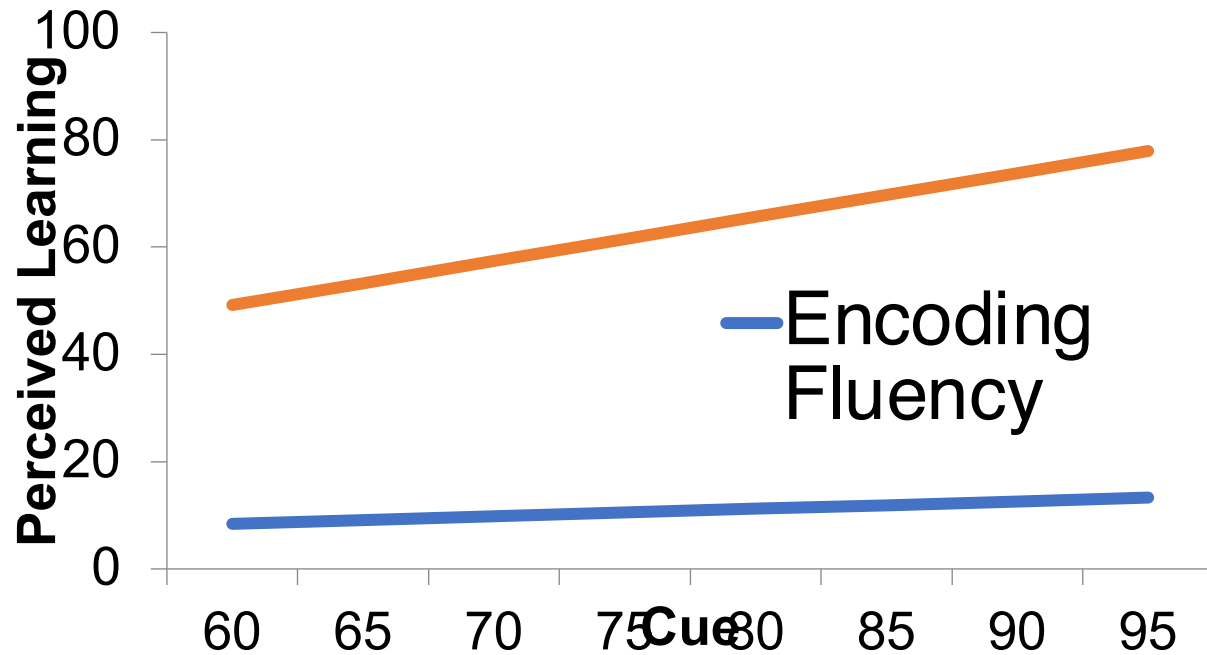
Foraging for information gain (learning)

We continue learning if we feel that there is a lot of information in the text patch. However, for older adults with lower cognitive resources, “encoding fluency” is also important.



Foraging for information gain (learning)

We continue learning if we feel that there is a lot of information in the text patch. However, for people with lower cognitive resources, “encoding fluency” is also important.



Echoing “cognitive selection” in Week 2:

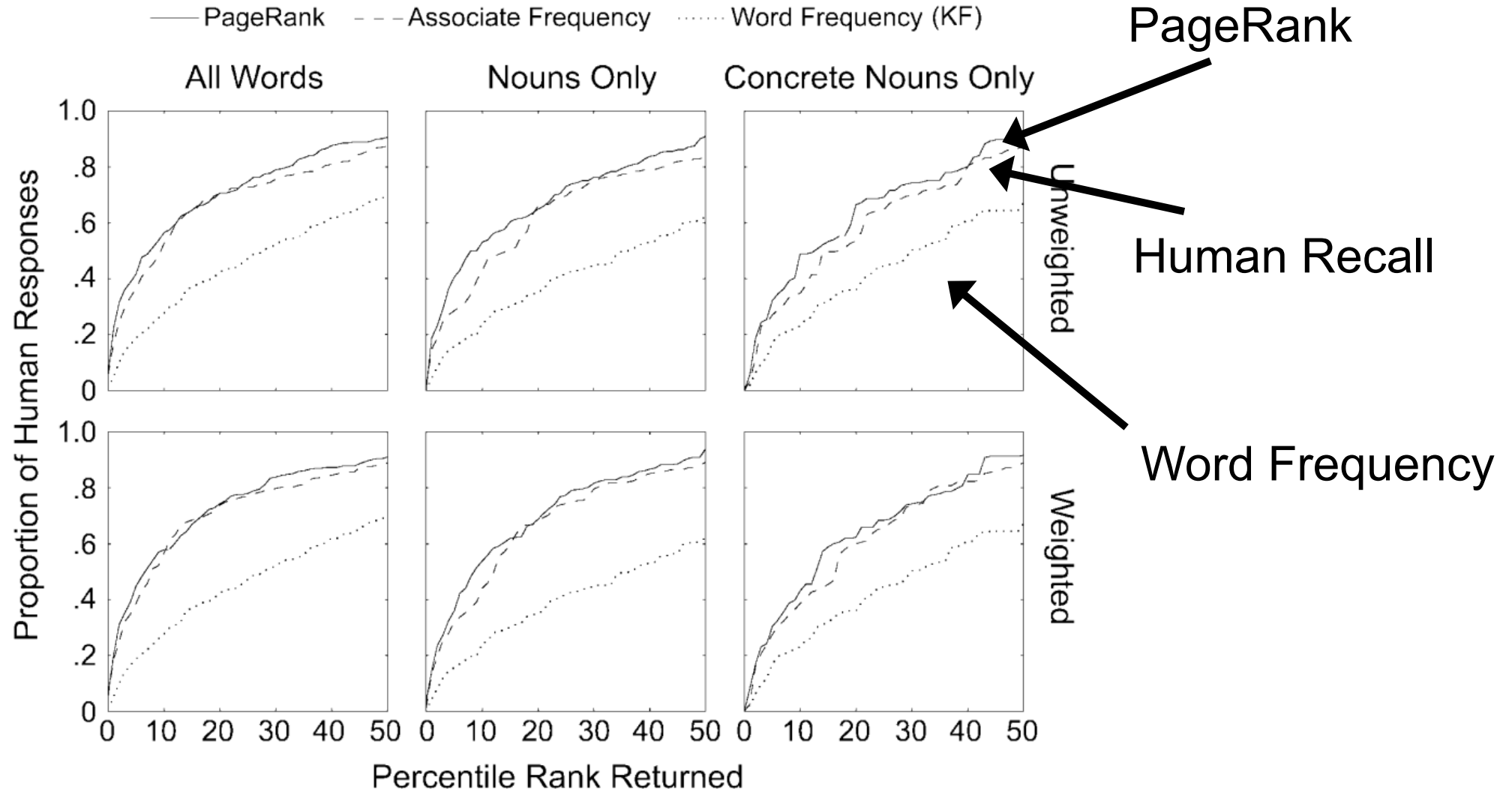
Some information might have more advantages to be regarded as being “informative”/“rewarding” than others e.g., belief-consistent info

Summary

- Reading relies on both top-down/bottom-up processes
- Learning requires both monitoring and control
 - However, this is not accurate!
- We learn based on our own perceptions of learning
 - What makes you feel more informative?
- Search is critical to determine the learning performance.

Adaptive Minds and Information Overload

Week 1. Cognition and environments are dependent

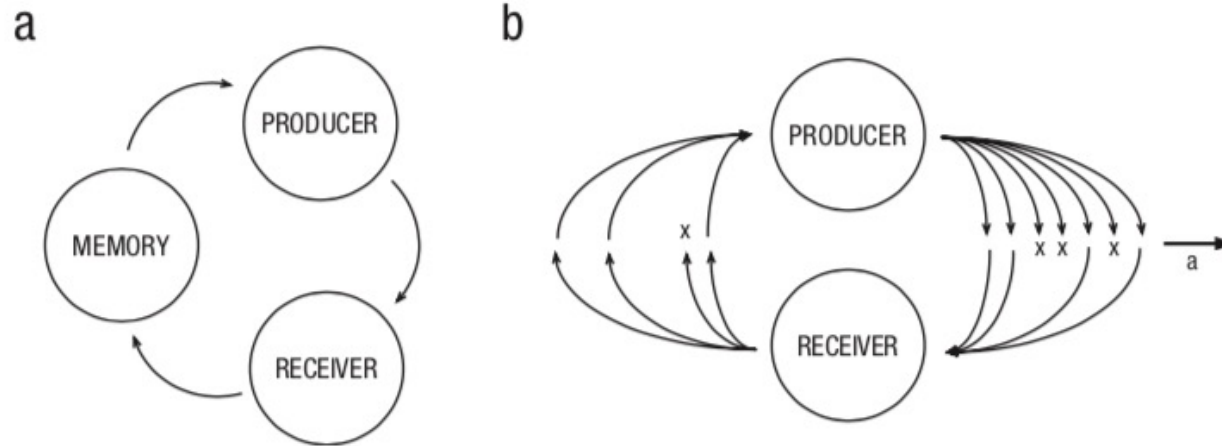


Griffiths, T. L., Steyvers, M., & Firl, A. (2007). Google and the mind: Predicting fluency with PageRank. *Psychological Science*, 18(12), 1069-1076.

Week 2. Not all information weigh equally

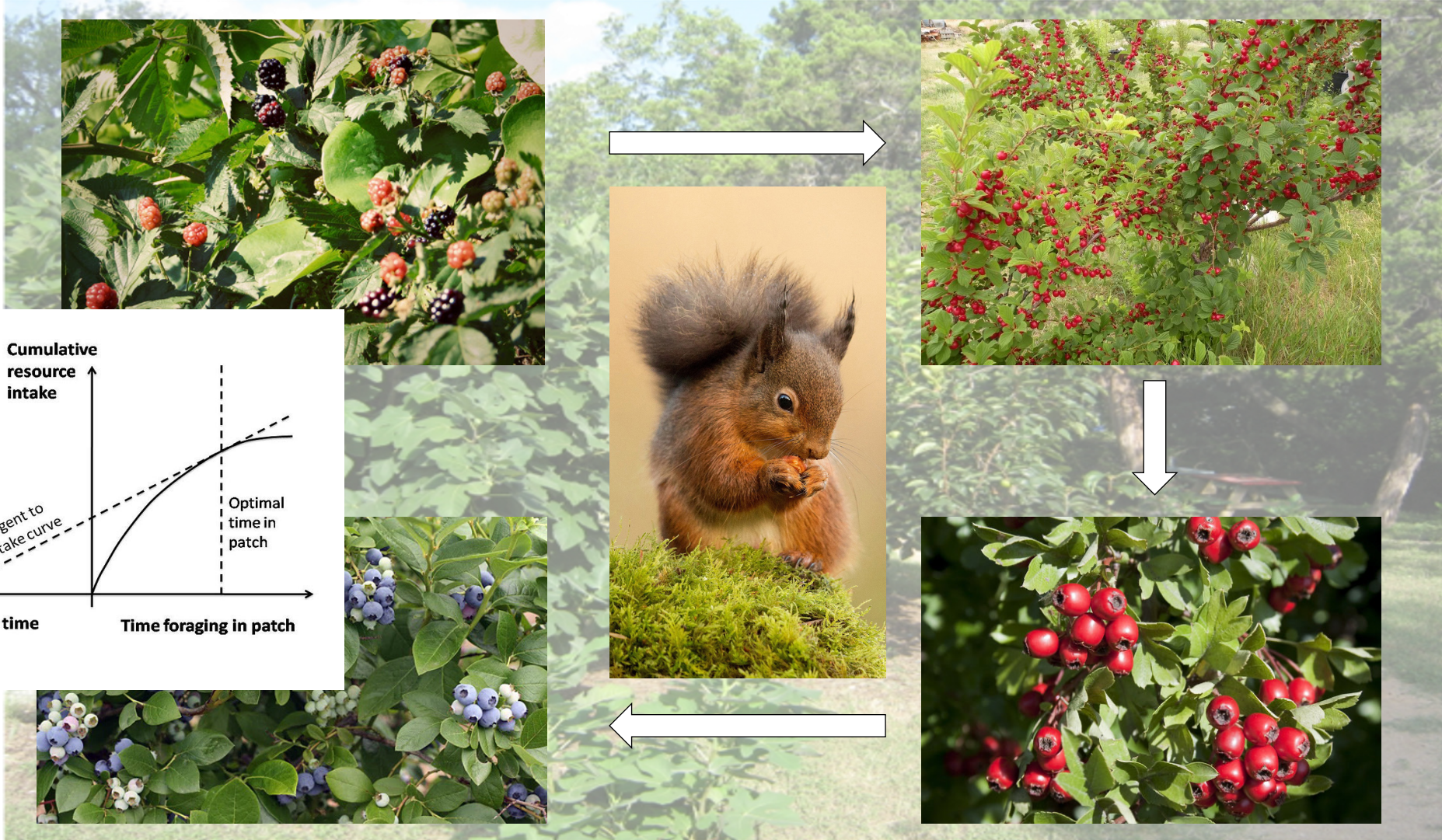
The cognitive lifecycle of information is accelerated:

- Cognitive selection happens

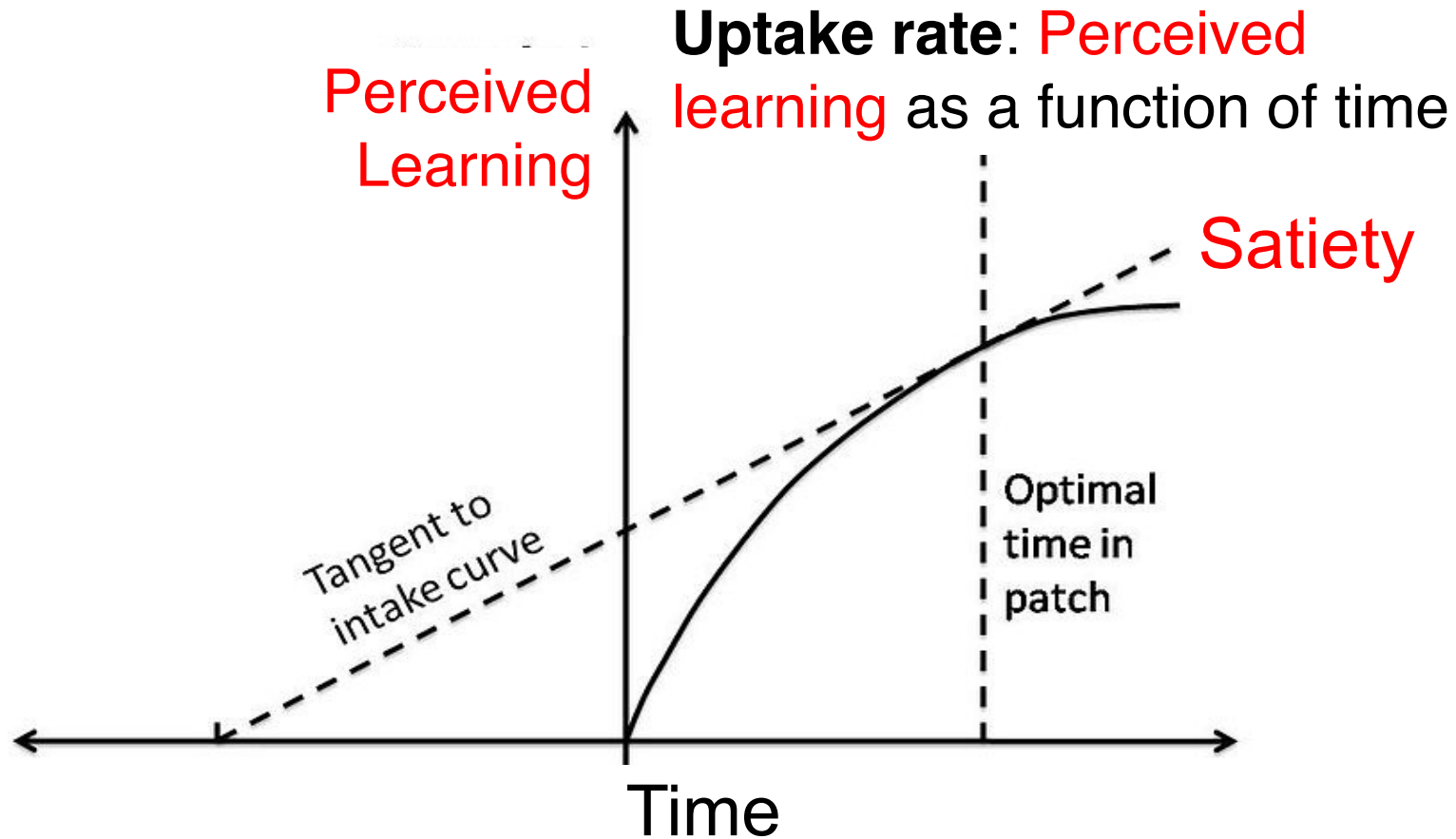


- Certain information has more advantages, belief-consistent, negative, and social → social media misinformation
- The

Week 3. Search: adapt to the environment through tradeoff between exploitation and exploration



Week 4. We continue learning based on our perceived learning.



More "informative": learning more

Thank you very much!

- Jessie Chin's contact information
- chin5@illinois.edu
- Adaptive Cognition and Interaction Design Lab
- <https://jessiechinlab.ischool.illinois.edu/>