SymSys245: Interaction Analysis

Session Session 5: The Eight E's of Instructionless Learning (For the week of Feb 8th)

In SymSys245, we investigate how cognitive processes such as perception, learning, reasoning, and problem solving, inform the design and analysis of complex, interactive systems. We both study these important cognitive processes, and analyze the ways in which they operate in real-world contexts. Major topics include: Cognitive architectures, Analysis of skilled performance, Complex learning and discovery, Adaptive and intelligent interfaces, User assistance systems, and Special topics according to students' interests. We also try to consider issues related to overlooked populations, such as the elderly, people with special cognitive needs (e.g., dyslexia), and children.

The class takes place in an interactive discussion format, and participation in these discussions is crucial to the learning process. In addition to weekly readings, and small in- and out-of-class writing projects, students will produce a (slightly) larger paper examining interactive cognition in a real world setting of their own choosing. Although there are no formal prereqs., exposure to cognitive psychology and/or AI will be helpful.

Here's the audio to go with this deck. Start on the next slides when you start the "tape".

RESOURCES:

- Google doc Discussion Notes
- Course Details
- Notes for the Standing Observational Activity
- Glossary of main concepts notes for the course
- Cognition for Readers With Short Attention Spans
- Final project requirements
- Example project topics from years past

Section Zoom link:
https://stanford.zoom.us/j/6503806306?pwd=NGcvcml4L2oybTZLZW9sZjZ0Qjd6dz09

STOP!

It's important that you have already run your Mystery Machine experiment (that is, you've observed your subject trying to figure out the ? key) BEFORE going through this deck! The discussion in this deck depends on you having seen someone work through the ? key in the Mystery Machine. You do NOT have to have created any reports or even aggregated the data for turning in, but it's important that you have at least watched someone doing this task.

Next Slide @ 00:00

@ ~00:00

Today: *The Third Rule*

1. Everyone is smarter than you think. (Improvisation -- Usage in Real Life!)
2. Everyone Is stupider than you think. (Unexpected effects of Usage in Real Life.)
3. **No one can follow instructions.**

Two aspects (two parts -- this week and next):

This week:

The Most Important Method

INSTRUCTIONLESS LEARNING

also known as

FIGURING THINGS OUT

Next Slide @ ~03:00

@ ~03:00

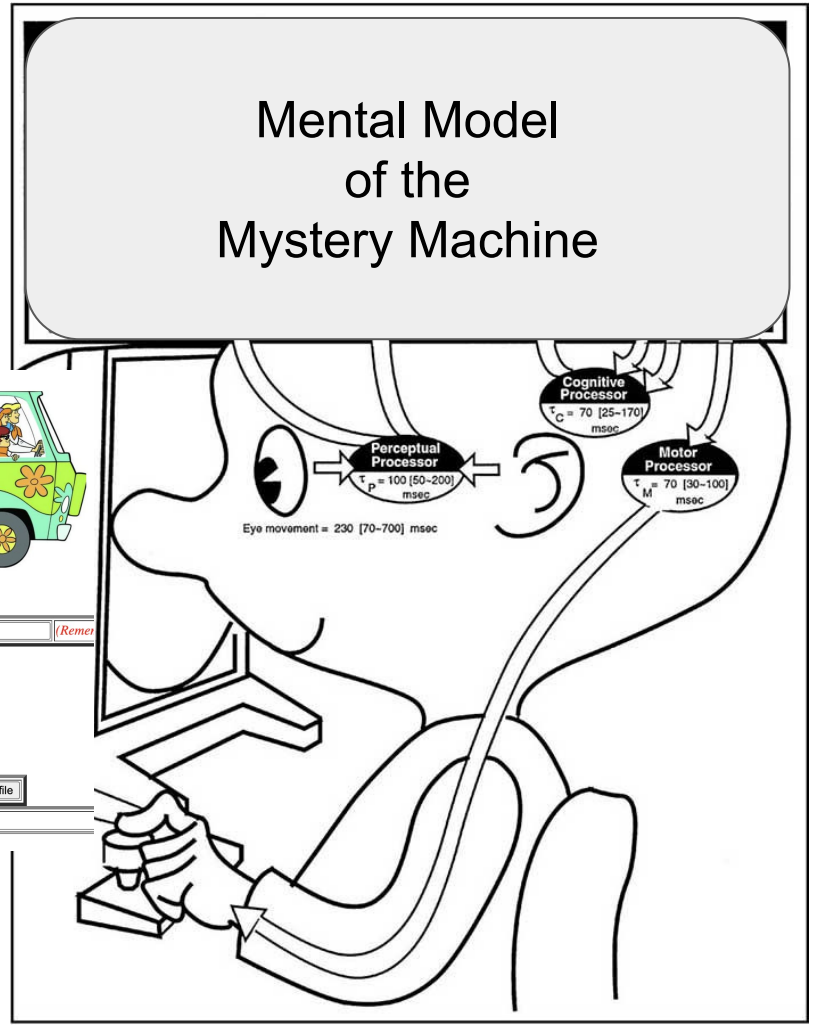
Mental Model of the Mystery Machine

Commands:

+	?	-
1	2	3
4	5	6
7	8	9
CE	0	Go

Click here to save the transcript to a .txt file

History:



Next Slide @ ~04:00

@ ~03:00

Mental Model
of the
Mystery Machine

What the Heck is a Mental Model?

Just a name given to whatever (usually explicitly*) knowledge you have that you use to reason about the system. There are many types of knowledge that can this role. **(* "Explicit" doesn't mean that you necessarily have it in language, or can explain it in language. It may include images and procedures, and is often a combination of many sorts of related knowledge. "Explicit" here just means that you know that you have it, can call upon it, and attend to it explicitly.)**

Next Slide @ ~04:00

@ ~04:00

The Eight E's: Operators of Instructionless Learning:

(This page is for reference. Skip immediately to the next page. You can come back here as need for the definitions of the operators.)

Exploration -- Poking the system with no specific expectation, in order to gather evidence.

Evidence -- Observing/Describing what happened (or appears to have happened) when you poked it.

Explanation -- Figure out what happened and propose model changes.

Editing -- Revise your mental model.

Experimentation -- Try something to test a hypothesis (not entirely sure that you're right).

Expectation -- What you think is going to happen when you poke the system in a particular way.

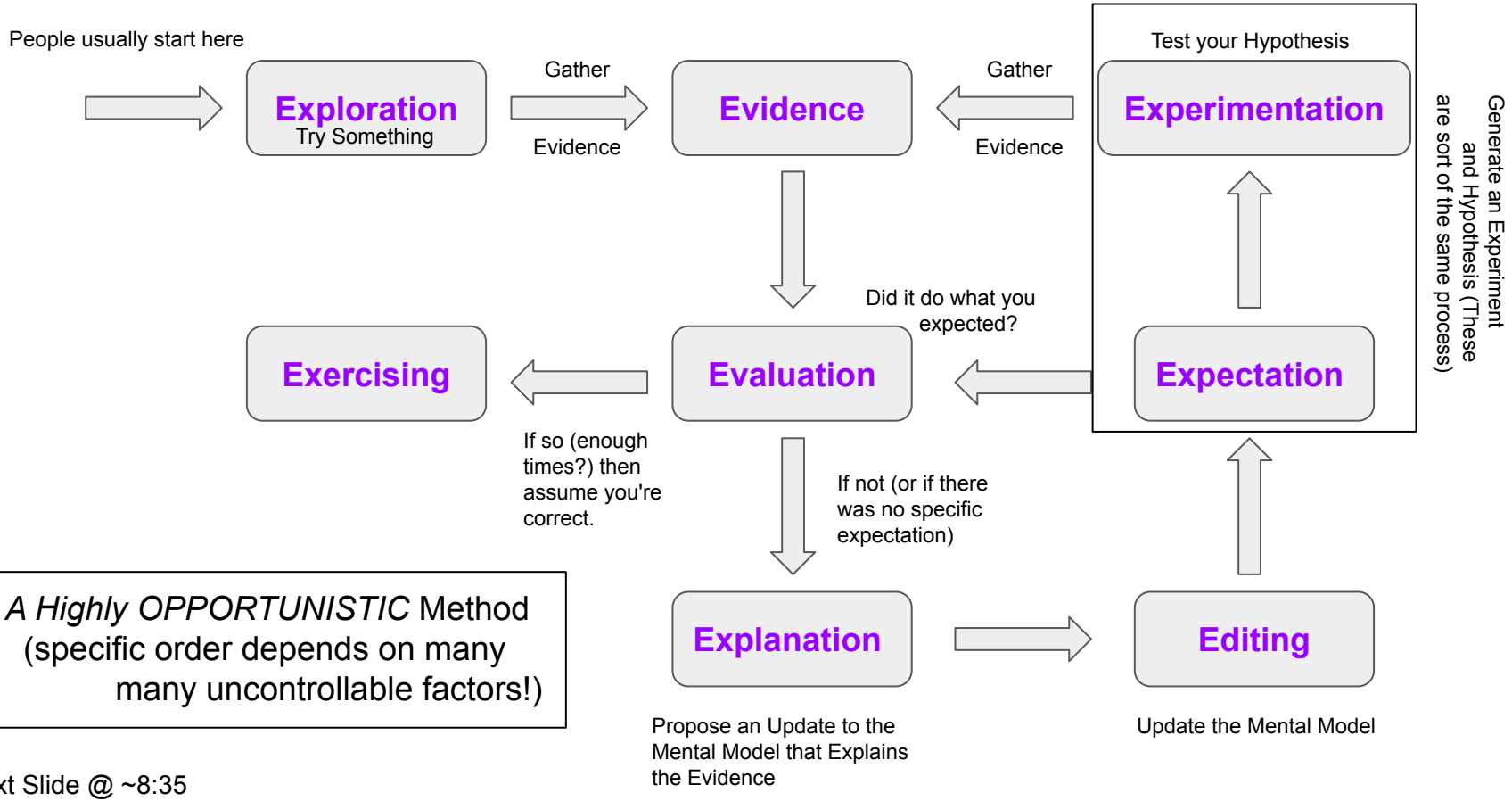
Evaluation -- Decide whether what happened matches your expectation.

Exercising -- Try something with the expectation that it will work.

Next Slide @ ~04:30

@ ~04:30

The Eight E's: Operators of Instructionless Learning:

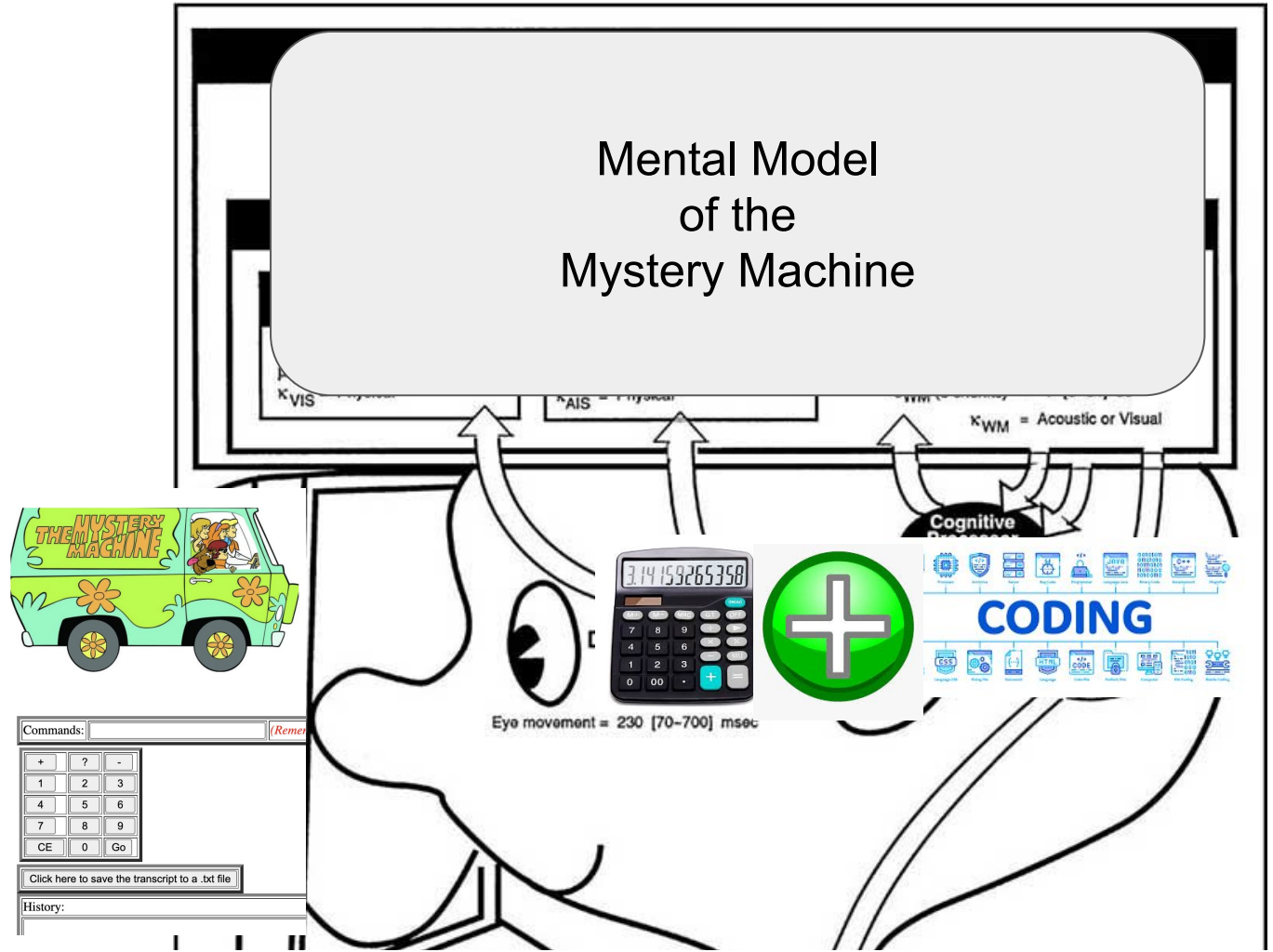


A Highly OPPORTUNISTIC Method
(specific order depends on many many uncontrollable factors!)

Next Slide @ ~8:35

@ ~08:35

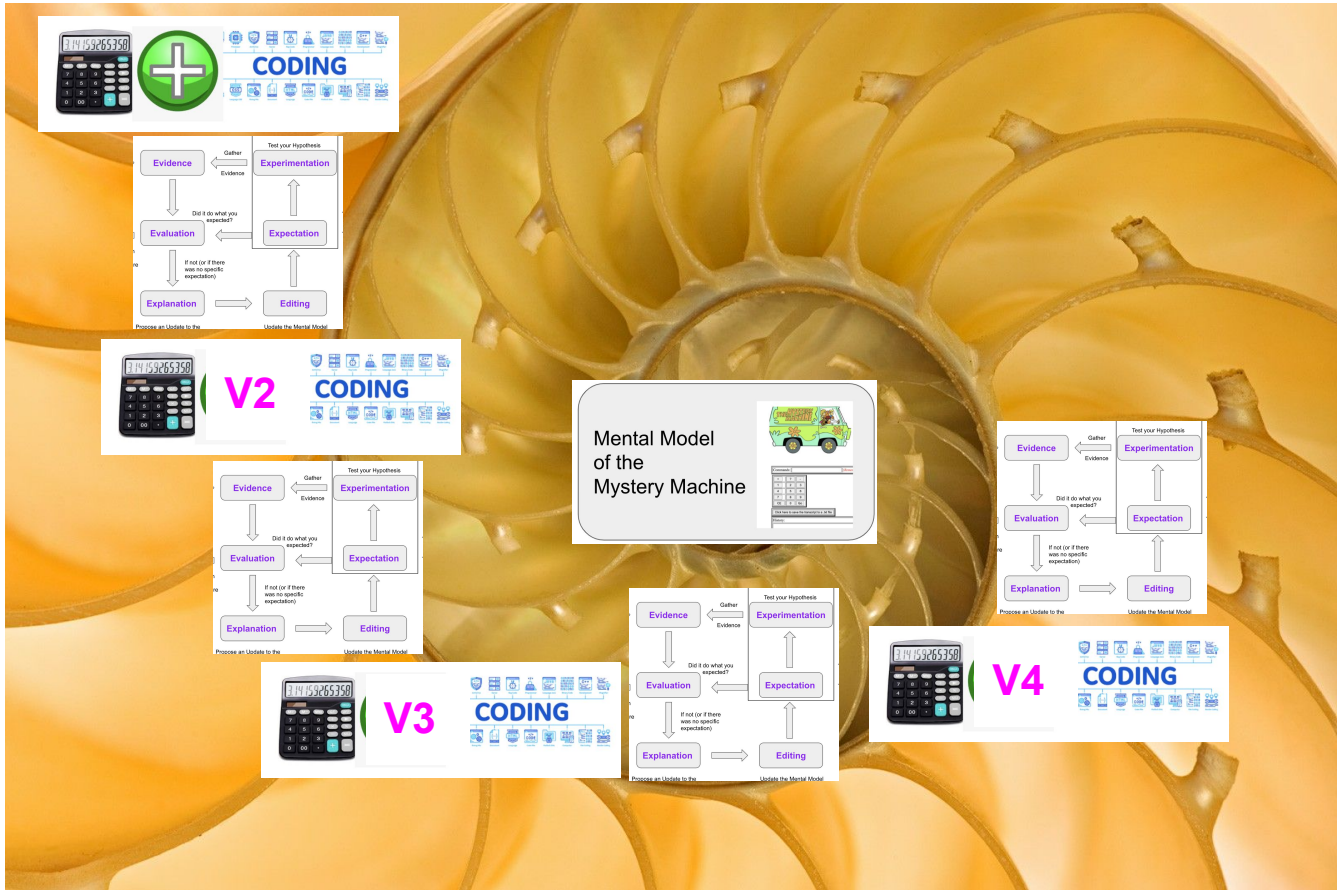
Preliminary model of the Mystery Machine likely is some composition of the concept of a calculator and the concept of programming (i.e., some sort of programmable calculator)



Next Slide @ ~09:13

@ ~09:13

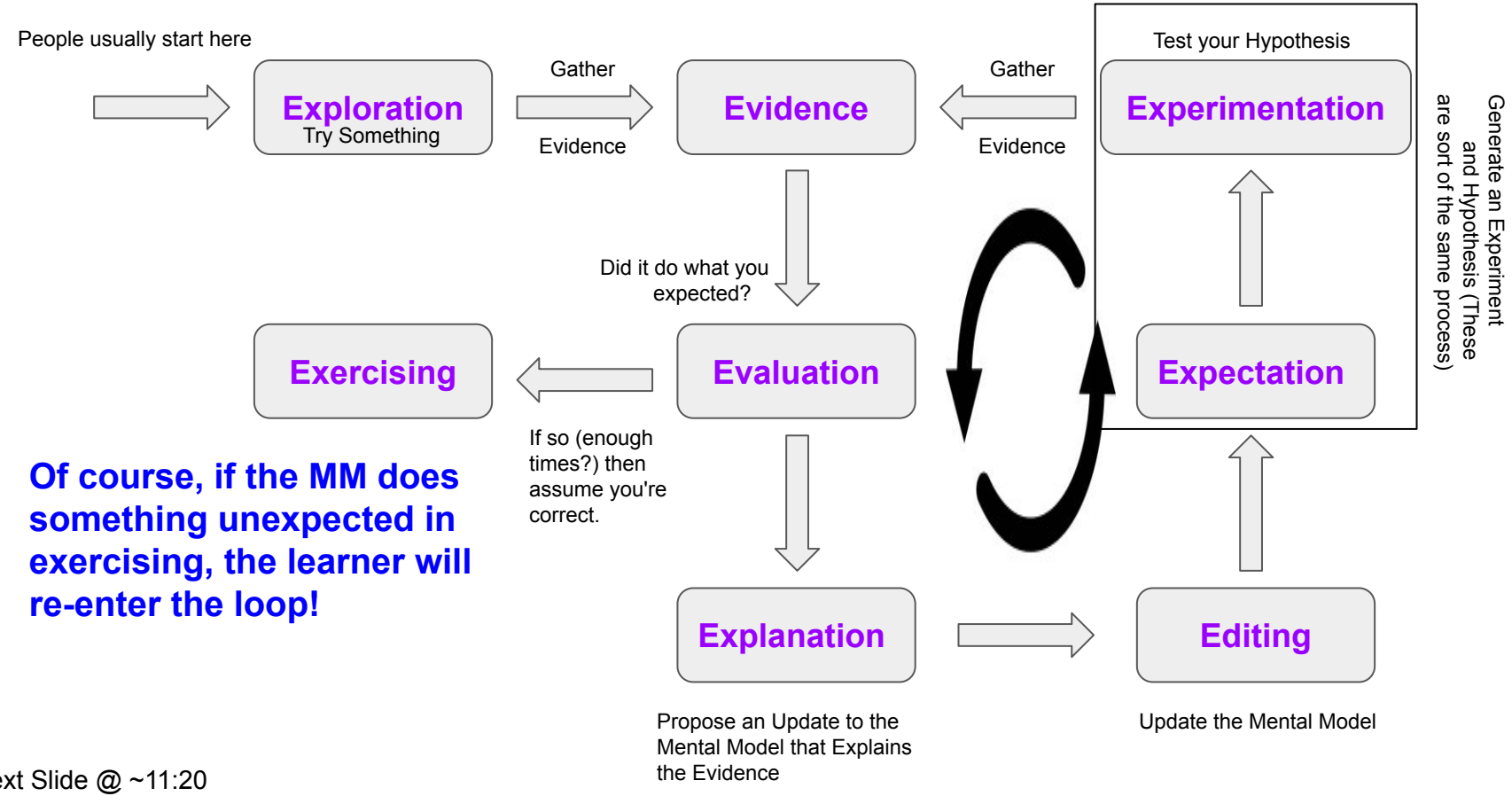
As the process proceeds, you revise your model over and over, sometimes refining parts, sometimes perhaps completely turning it over, but eventually spiral in on a mental model that makes successful predictions.



Next Slide @ ~09:35

@ ~09:35

You keep going around the central loop 🔄 until you have a model you believe.



Of course, if the MM does something unexpected in exercising, the learner will re-enter the loop!

Next Slide @ ~11:20

@ ~11:20

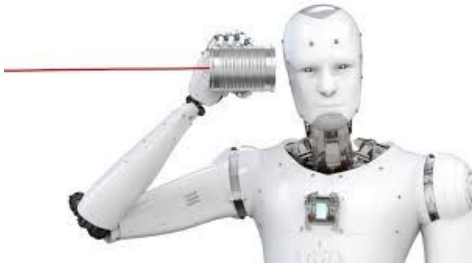
Typical ways of being bad at experimentation:

Too Simple

Too Complex

Don't make the output distinctive (Are there 6 or 7 minuses here: --------)

Mis-read the output (*Model-Based Mis-Interpretation*)
[I just did it to you above!]



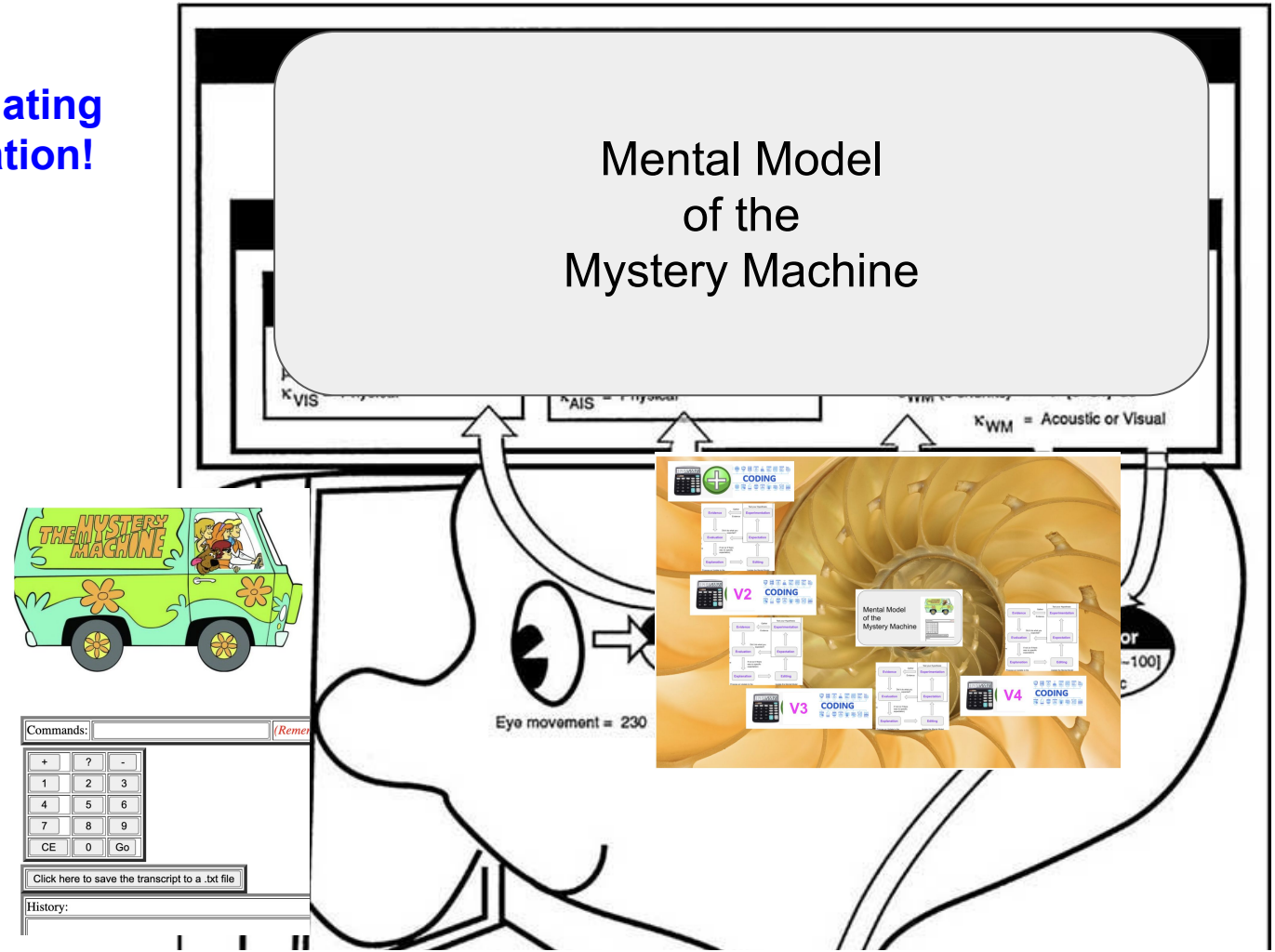
"It's hard to wreck a nice beach."

vs. "It's hard to recognize speech."

Next Slide @ ~15:14

@ ~15:14

Terrific **at Model Updating and Hypothesis Creation!**



Next Slide @ ~15:40

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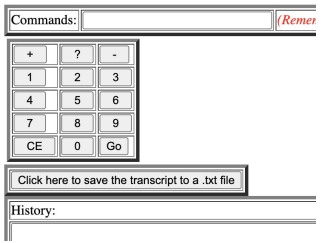
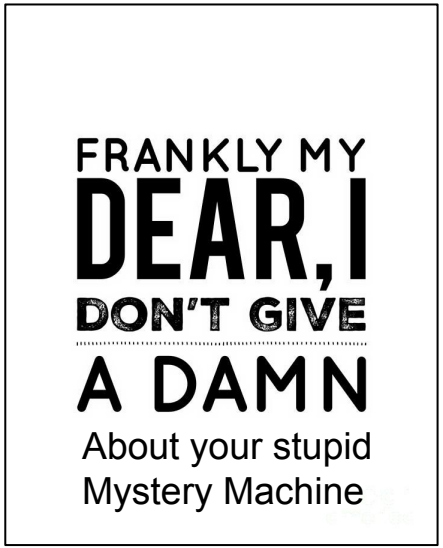
Satisficing

What is Satisficing?

Satisficing is making decisions that are good enough, not necessarily optimal.

sufficing + satisfying





Because the MM is a low cost, high observability problem where there's likely to be a solution, it turns out to be efficient to not think very hard about how good your experiments are.

Next Slide @ ~20:10

@ ~20:10

1. Everyone is smarter than you think. (Improvisation -- Usage in Real Life!)
2. Everyone Is stupider than you think. (Unexpected effects of Usage in Real Life.)
3. No one can follow instructions.

In a Satisficing sense:
In a highly-observable (rapid feedback)...
Non-dangerous world...
Where experiments are cheap...
And the answer is probably simple...
Stupidity is efficient!

Next Slide @ End of Audio

@ End of Audio

Checklist for Next Week (i.e., before your section meets in the week of Feb 15th):

___ **NO Standing Observational Activity (do the Mystery Machine Report Instead)**

___ **MM report:** Be sure to check out this example transcript with comments. You do NOT have to stick to this exact format. And you do NOT have to transcribe really boring experiments. Focus on the places before and after critical events, where the subject realized something important, including the possibly important fact that they have a really wrong theory (often punctuated by cursing! :-)

Only analyze, say, two or three events. NOT THE WHOLE PROTOCOL!

___**Listen to this podcast:** Listen to Stephen Neale on Meaning and Interpretation (Stephen Neale discusses questions of meaning and interpretation in everyday life and in the law in this episode of the *Philosophy Bites* podcast. How relevant are intentions? Do words carry their meanings independently of the contexts in which they are used?)

THERE IS NO DECK FOR NEXT WEEK; IT WILL BE A LIVE LECTURE (WITH A COOL DEMO!)

See you all next week!

Section Zoom link:
https://stanford.zoom.us/j/6503806306?pwd=NGcvcml4L2oybTZLZW9sZjZ0Qjd6dz09