

Midterm Review

Section 8 • 10/16/2015



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Administrivia

PROG02 & group idea (DES04) due tonight 11:59

No extension, ensure that you submit both APKs!

Midterm Thurs 10/22 from 1:10-2:30PM (80 minutes) in
Sibley Auditorium

No cheatsheet

No coding questions!

More info: Piazza post @450

List of Topics

What is Human
Computer Interaction?

Design Cycle

Task Analysis

Contextual Inquiry

Rapid Prototyping

Low Fidelity v. High
Fidelity

Evaluation

Brainstorming

Observation

Personas

Conceptual Models

Modes

Visibility

Mapping

Feedback

Direct Manipulation

Heuristics

Gulf of execution v.
Gulf of evaluation

Experimentation

Cognitive Models

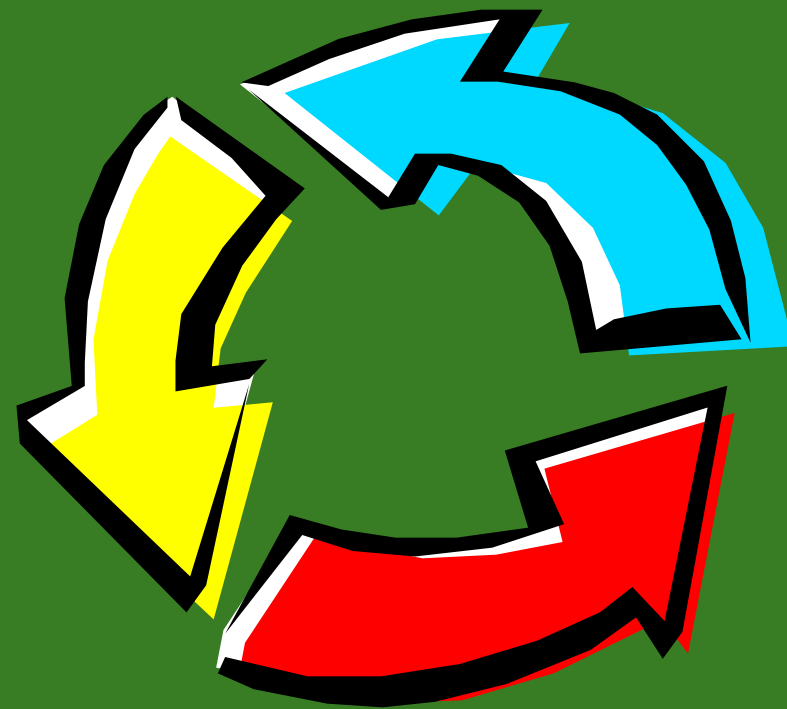
HMP

KLM

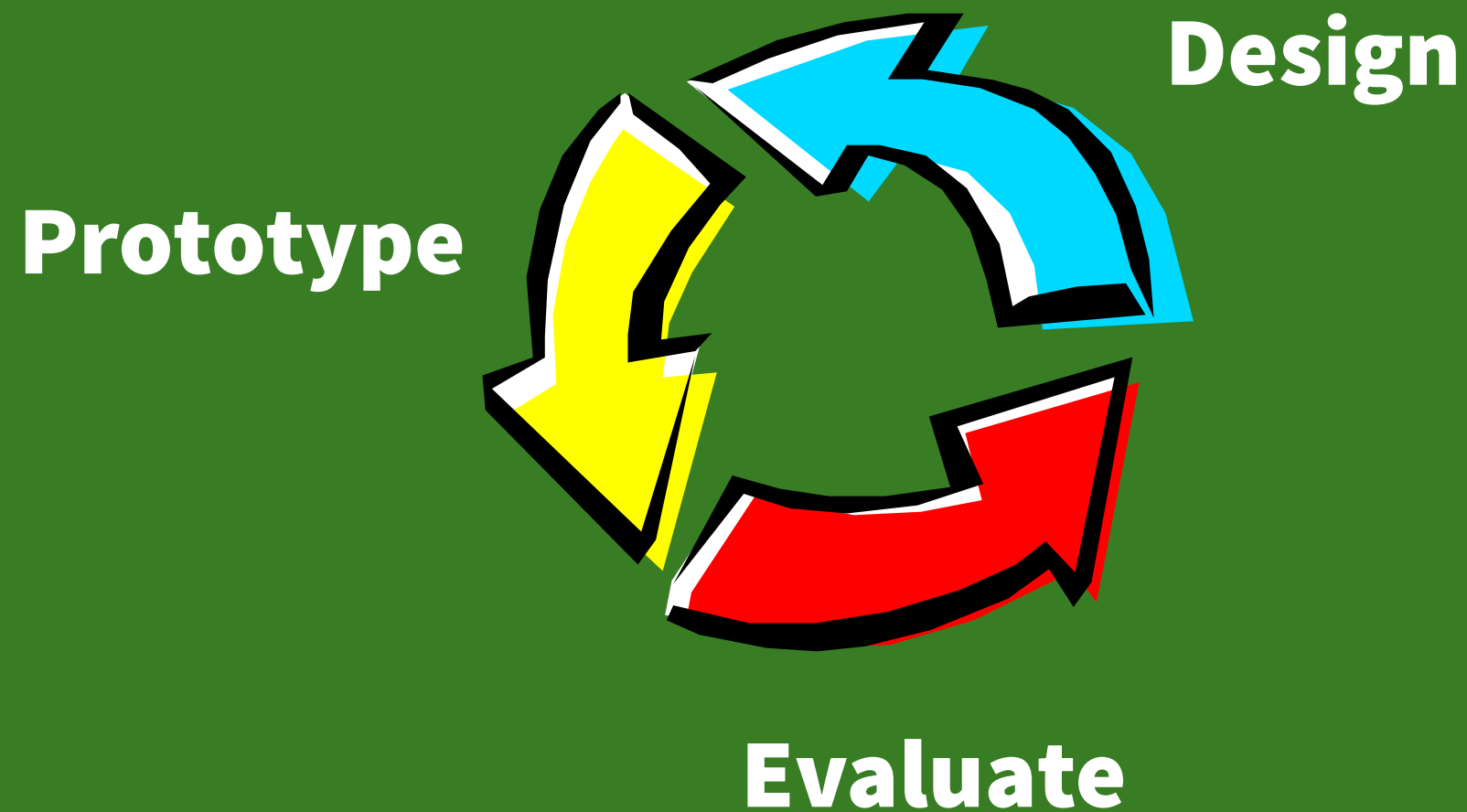
Graphic Design /
Gestalt

*not guaranteed
to be complete*

Design Cycle



Design Cycle



Rapid Prototyping

What are the benefits of low fidelity prototyping?

What are disadvantages of high fidelity prototyping?

Evaluation

Evaluate analytically

Test with target users

- How do we figure out who they are?

Different methods of evaluation

- List all that we've covered so far.

Task Analysis

1. Who is going to use system?
2. What tasks do they now perform?
3. What tasks are desired?
4. How are the tasks learned?
5. Where are the tasks performed?
6. What's the relationship between user & data?
7. What other tools does the user have?
8. How do users communicate with each other?
9. How often are the tasks performed?
10. What are the time constraints on the tasks?
11. What happens when things go wrong?

Contextual Inquiry

Middle ground between pure observation and pure interview

Get inside the user's head and see their tasks the way they do

Qualities: Context, Partnership, Interpretation, Focus

Contextual Inquiry

Contextual Inquiry involves a _____
model:

A: peer/peer

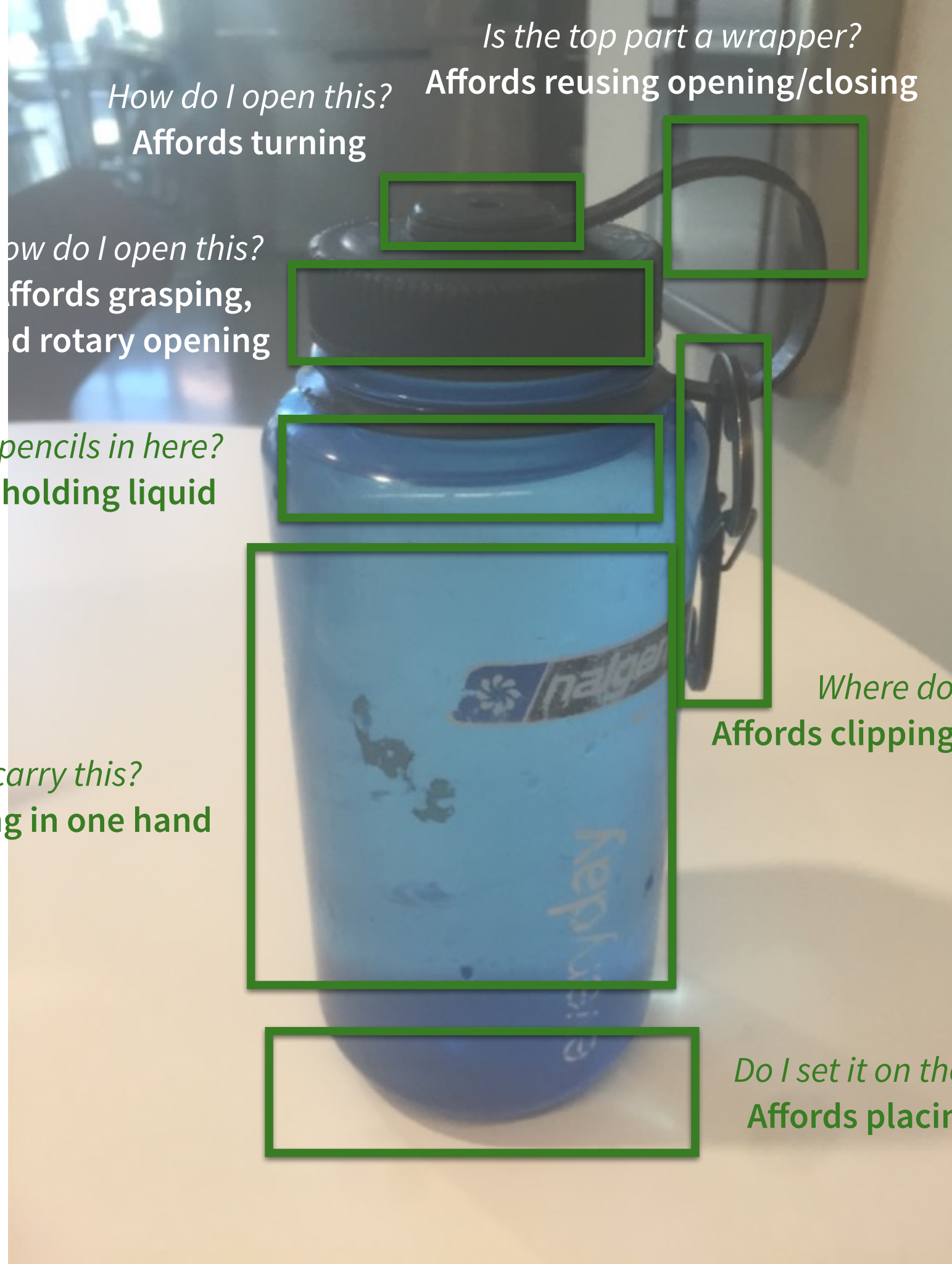
B: master/apprentice

C: interviewer/interviewee

D: clueless user/technology genius

Why is it important to develop personas?

Next slide: identify the affordances with the
water bottle!



Is the top part a wrapper?

Affords reusing opening/closing

How do I open this?

Affords turning

How do I open this?

**Affords grasping,
and rotary opening**

Do I put pencils in here?

Affords holding liquid

How do I carry this?

Affords holding in one hand

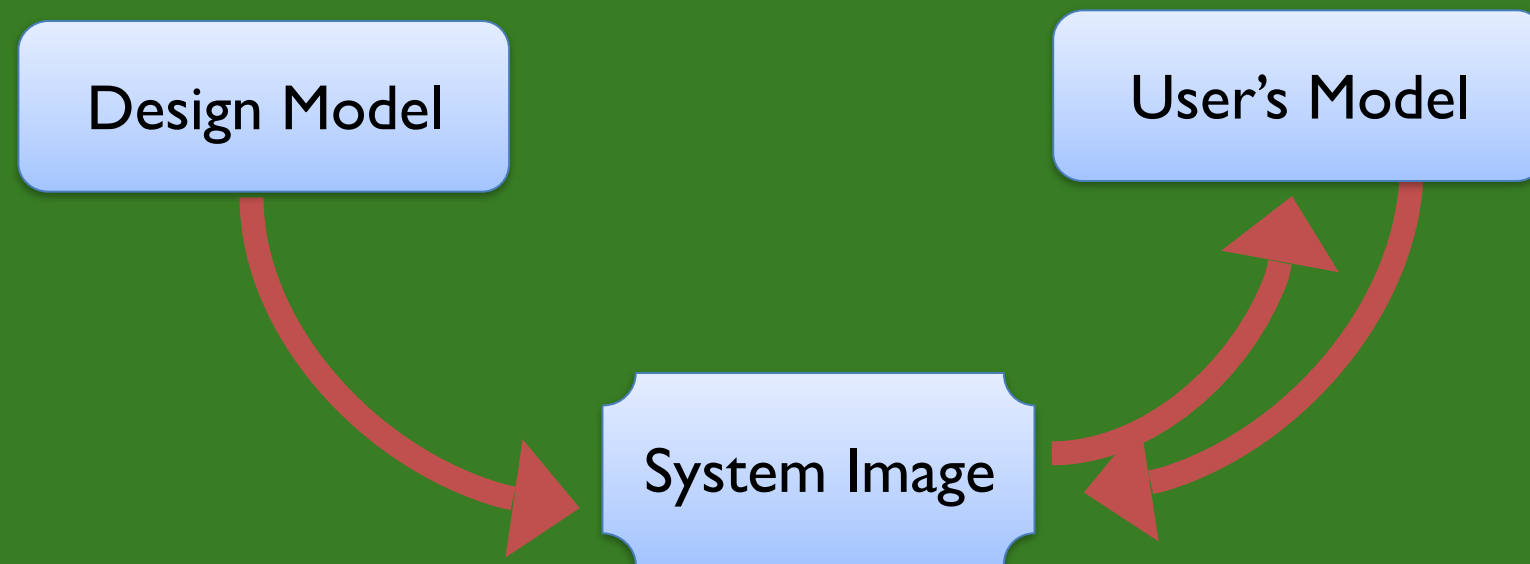
Where do I use this?

Affords clipping onto something

Do I set it on the long end?

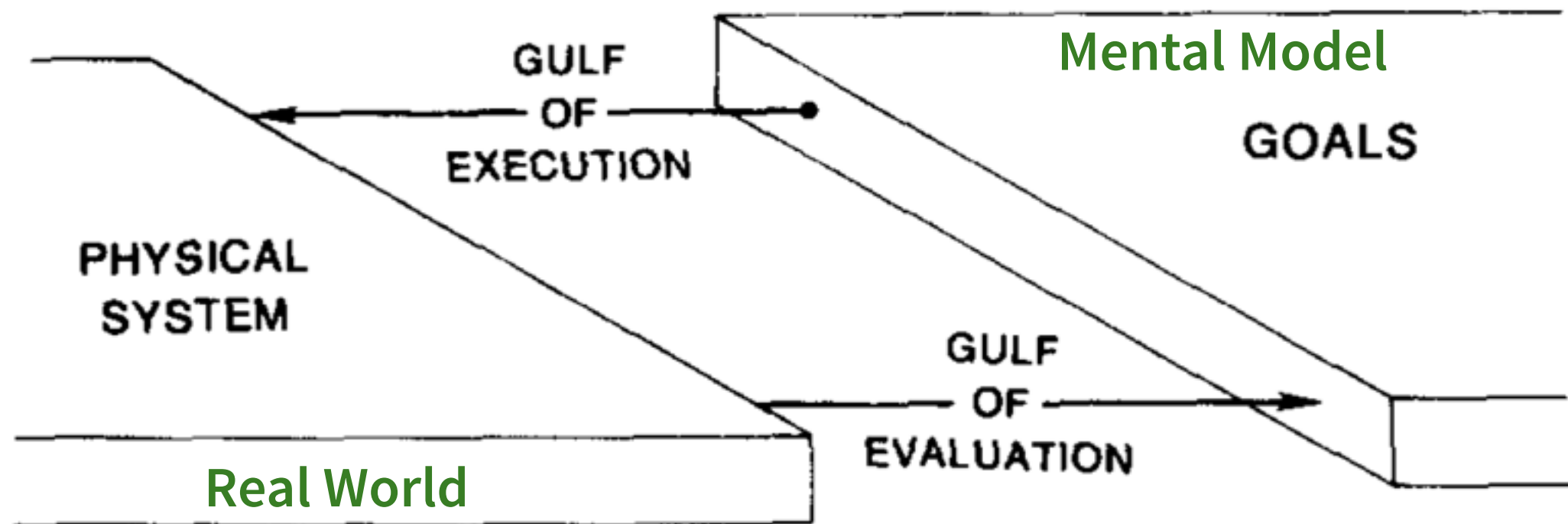
Affords placing upright

Conceptual Models



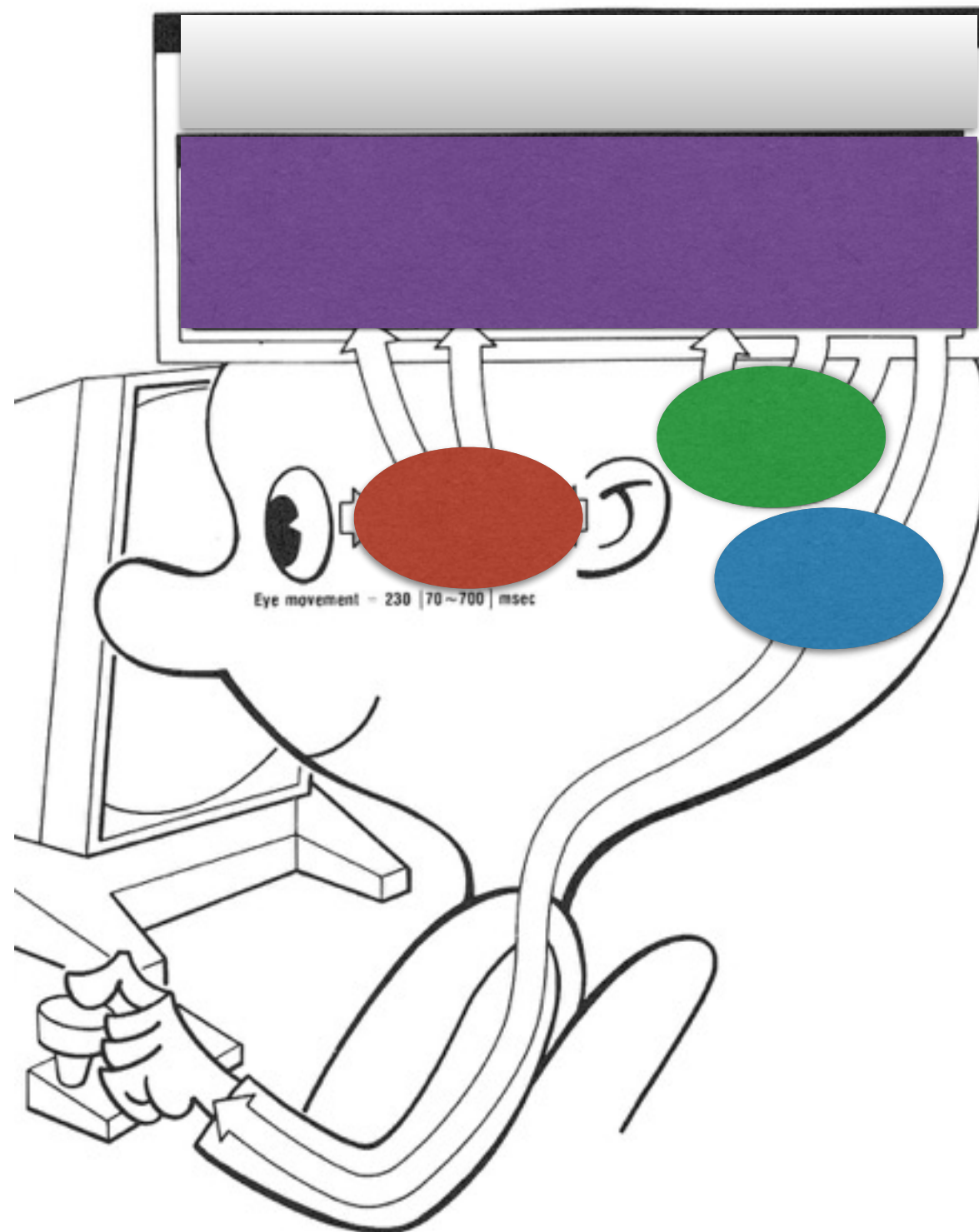
What if the two don't match?

Gulf of Evaluation & Execution



What is a mode? Give an example.

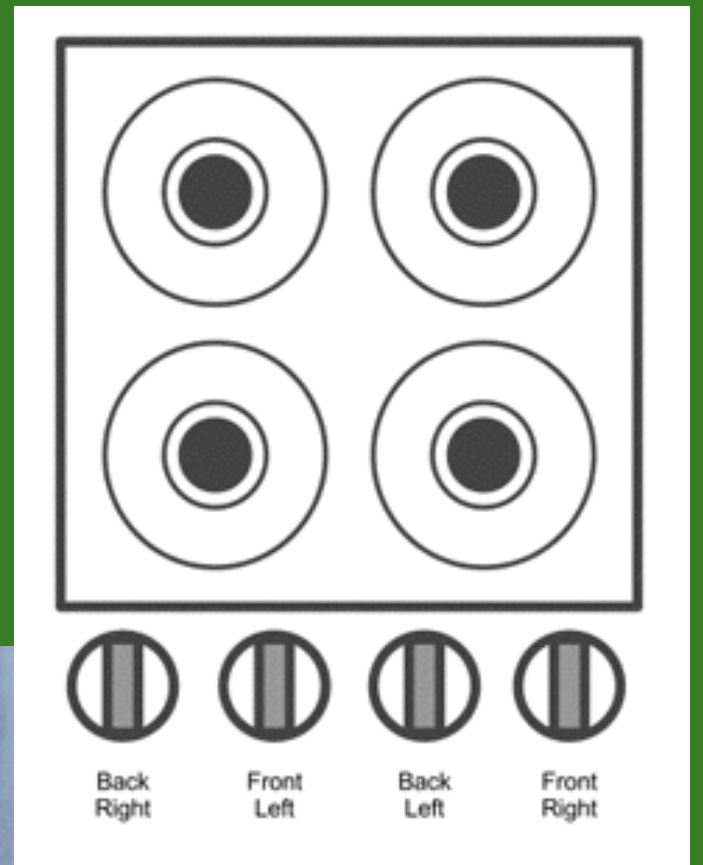
Human Model Processor



Preventing Conceptual Model Mismatch

Don Norman's Design Principles

1. Make controls visible
2. Make mapping clear
3. Provide feedback

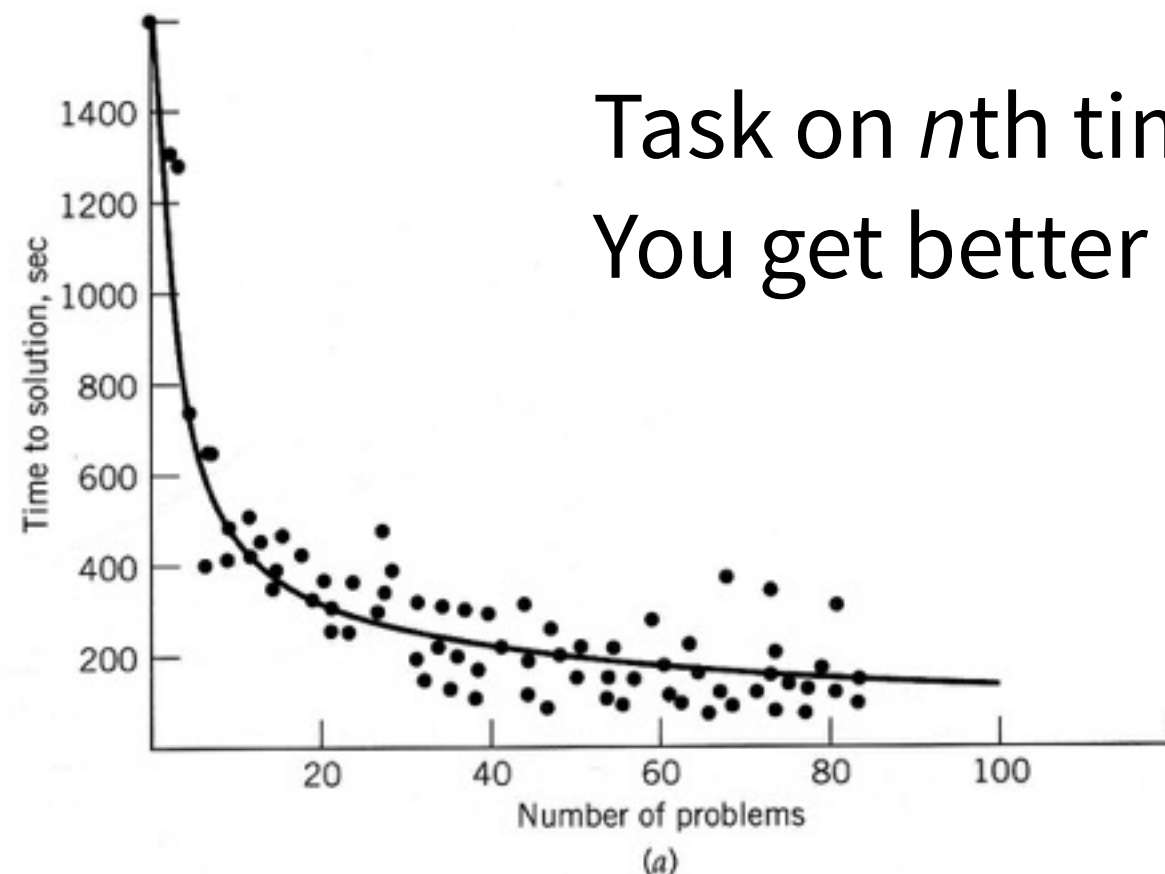


*Does pressing more than once do anything?
How do we know?*

What is *direct manipulation* and how does it pertain to *conceptual models*?

Power Law of Practice

$$T_n = T_1 n^{-a} + c$$



Task on n th time follows a power law.
You get better the more you do something!

Fitts' Law

$$T = a + b \log_2(D / S + 1)$$

a, b = constants (empirically derived)

D = distance

S = size

ID is Index of Difficulty = $\log_2(D/S+1)$

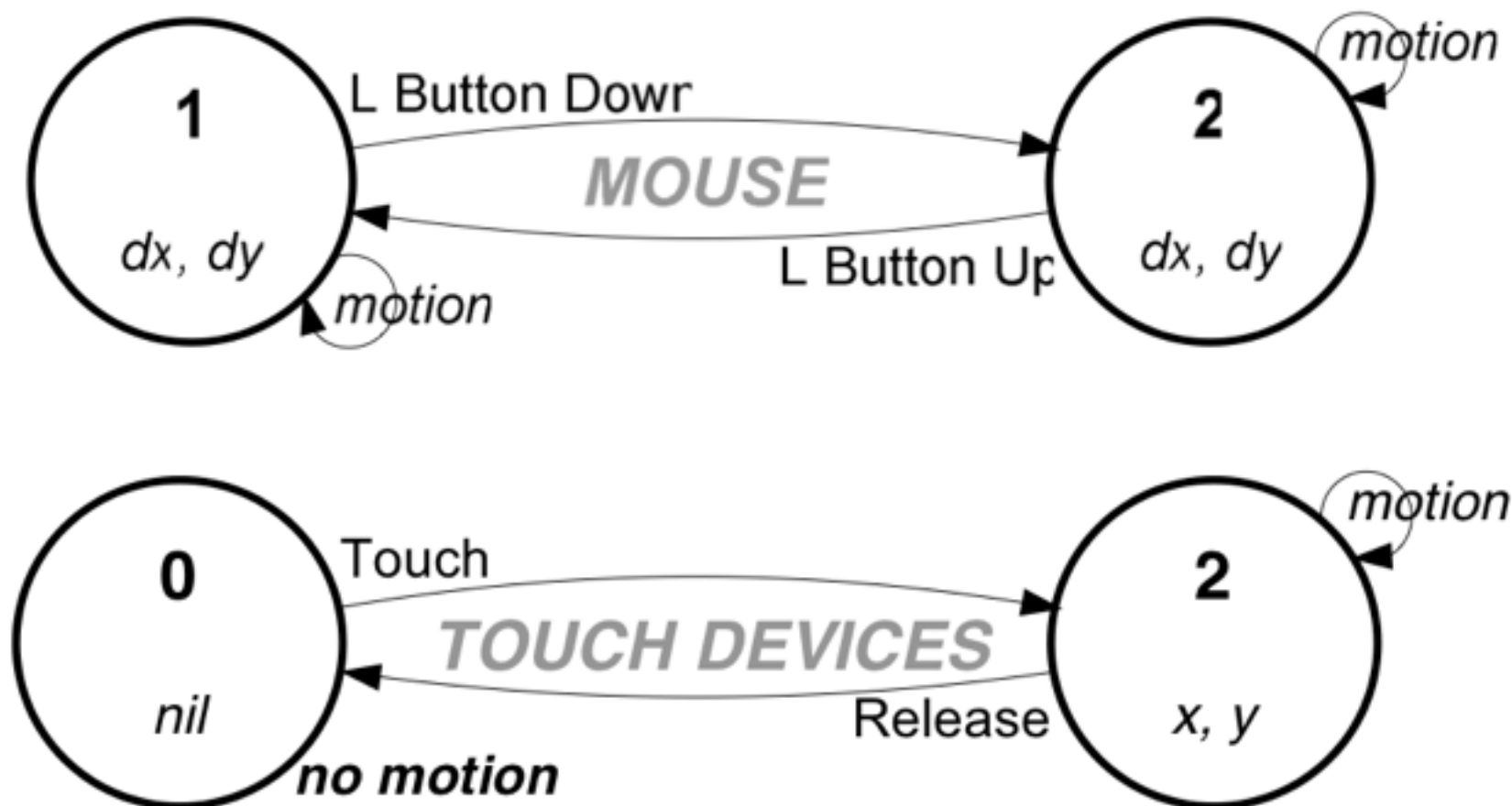
Models well-rehearsed selection task

T increases as the *distance* to the target increases

T decreases as the *size* of the target increases

3-Stage Model of Input

State	Description
0	<i>Out Of Range:</i> The device is not in its physical tracking range.
1	<i>Tracking:</i> Device motion moves only the cursor.
2	<i>Dragging:</i> Device motion moves objects on the screen.



Overall Genres of Assessment

Automated : usability measures computed by software

Inspection : based on skills/experience of evaluators

Formal : models/formulas to calculate measures

Empirical : usability assessed by testing with real users

Nielsen's Usability Heuristics

1. Visibility of system status
2. Match between system and the real world
3. User control and freedom
4. Consistency and standards
5. Error prevention
6. Recognition rather than recall
7. Flexibility and efficiency of use
8. Aesthetic and minimalist design
9. Help users recognize, diagnose, and recover from errors
10. Help and documentation

These do not describe every usability issue!
They are broad rules that cover common cases.

Designing an Experiment

1. State a lucid, testable hypothesis

2. Identify variables

(independent, dependent, control, random)

3. Design the experimental protocol

4. Choose user population

5. Apply for human subjects protocol review

6. Run pilot studies

7. Run the experiment

8. Perform statistical analysis

9. Draw conclusions

Designing an Experiment

Testable hypothesis

Precise statement of expected outcome

Independent variables (factors)

Attributes we manipulate/vary in each condition

Levels – values for independent variables

Dependent variables (response variables)

Outcome of experiment (measurements)

Usually measure user performance

Designing an Experiment

Control variables

Attributes that will be fixed throughout experiment

Confound – attribute that varied and was not accounted for

Problem: Confound rather than IV could have caused change in DVs

Confounds make it difficult/impossible to draw conclusions

Random variables

Attributes that are randomly sampled
Increases generalizability

Between vs. Within Subjects

Between Subjects

Each participant uses one condition

Pros and cons?

- +/- Participants cannot compare conditions
- + Can collect more data for a given condition
- Need more participants

Within Subjects

All participants try all conditions

Pros and cons?

- + Compare one person across conditions to isolate effects of individual diffs
- + Requires fewer participants
- Fatigue effects
- Bias due to ordering/learning effects