Designing Interactive Systems 1

Lab 1: Fitts' Law, CMN Model, Assignment 1: Fitts' Law

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http://hci.ac/dis

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Fitts' Law

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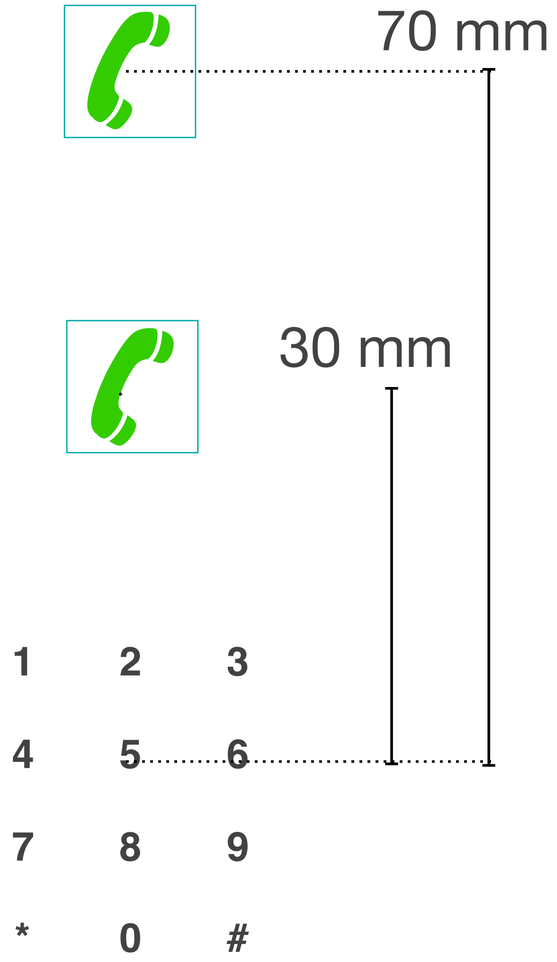
In-Class Exercise 2

- How much faster does calling become by moving the “call” button from **70 mm** distance to **30 mm** distance, measured from the middle of the keypad? The size of the call button is **10 x 10 mm**
- Shannon’s formulation: $T_{pos} = a + b \cdot \log_2\left(\frac{D}{W} + 1\right)$
- Use **a = 0 ms, b = I_M =100 ms/bit**



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Solution

$$T_{pos1} = I_M \cdot \log_2\left(\frac{D_1}{W} + 1\right)$$

$$T_{pos2} = I_M \cdot \log_2\left(\frac{D_2}{W} + 1\right)$$

$$T_{pos1} - T_{pos2} = I_M \cdot \left(\log_2\left(\frac{D_1}{W} + 1\right) - \log_2\left(\frac{D_2}{W} + 1\right)\right)$$

$$= 100\frac{ms}{bit} \cdot \left(\log_2\left(\frac{70}{10} + 1\right) - \log_2\left(\frac{30}{10} + 1\right)\right) bit$$

$$= 100\ ms \cdot (\log_2 8 - \log_2 4)$$

$$= 100\ ms \cdot (3 - 2)$$

$$= 100\ ms$$

⇒ Moving the call button speeds up each call by an average of about 100 ms.

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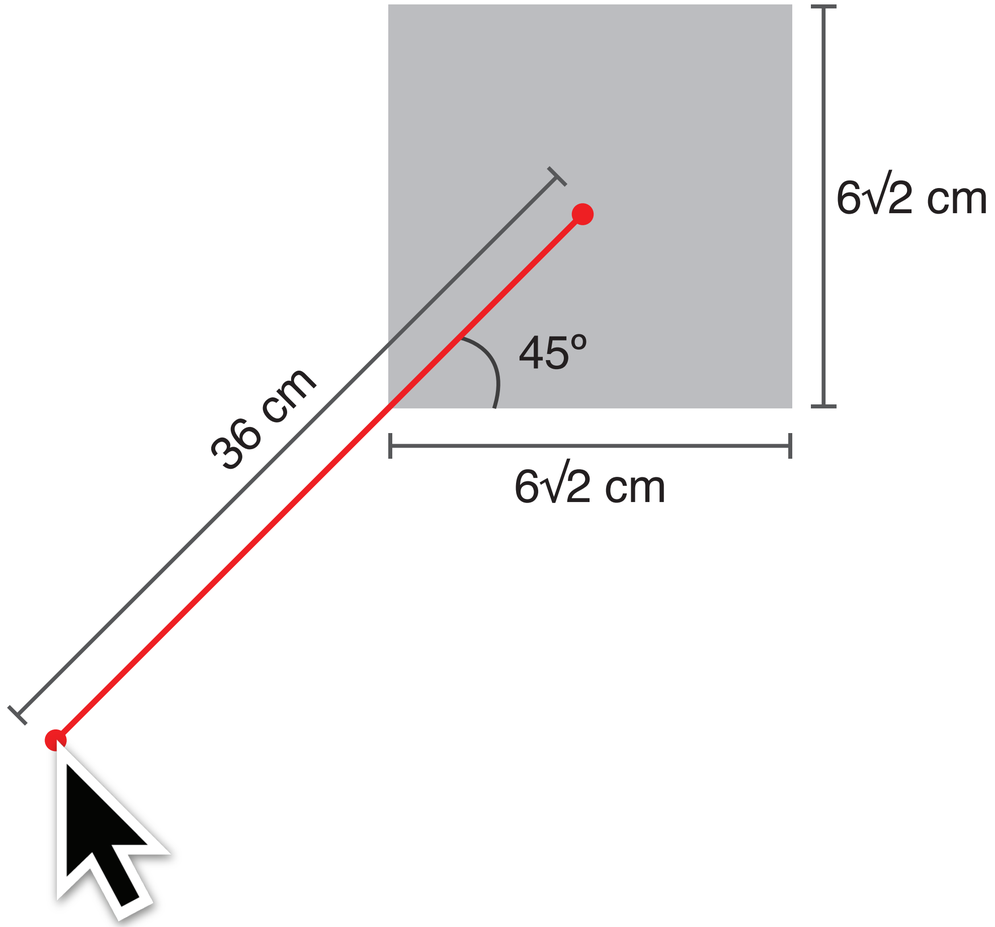
In-Class Exercise 3

- **Task:** Calculate the average time (in *ms*) needed to reach the button.
- You don't need a calculator

$$\text{Shannon's Formula}: T_{\text{pos}} = a + b \cdot \log_2\left(\frac{D}{W} + 1\right)$$

$$a = 0\ ms$$

$$b = I_M = 100\ \frac{ms}{bit}$$



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Solution

$$\text{Shannon's Formula}: T_{\text{pos}} = a + b \cdot \log_2\left(\frac{D}{W} + 1\right)$$

$$a = 0\ ms$$

$$b = I_M = 100\ \frac{ms}{bit}$$

$$\text{Distance, } D = 36\ cm$$

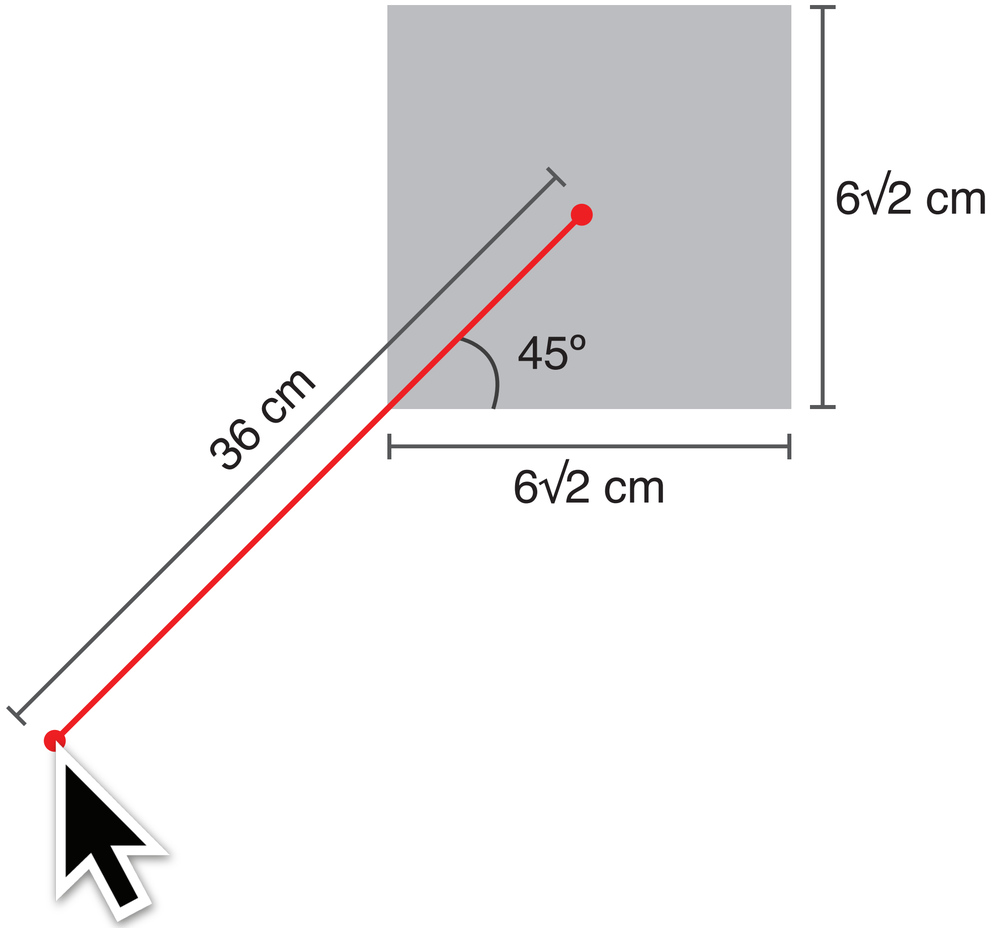
$$\text{Side of the square, } r = 6\sqrt{2}\ cm$$

$$\text{Target width, } W = \sqrt{r^2 + r^2}\ cm$$

$$= r\sqrt{2}\ cm$$

$$= 6\sqrt{2} \cdot \sqrt{2}\ cm$$

$$= 12\ cm$$



$$T_{pos} = 0\ ms\ +\ 100\ \frac{ms}{bit}\ \cdot\ \log_2\left(\frac{36}{12}\ +\ 1\right)\ bit$$

$$= 200\ ms$$

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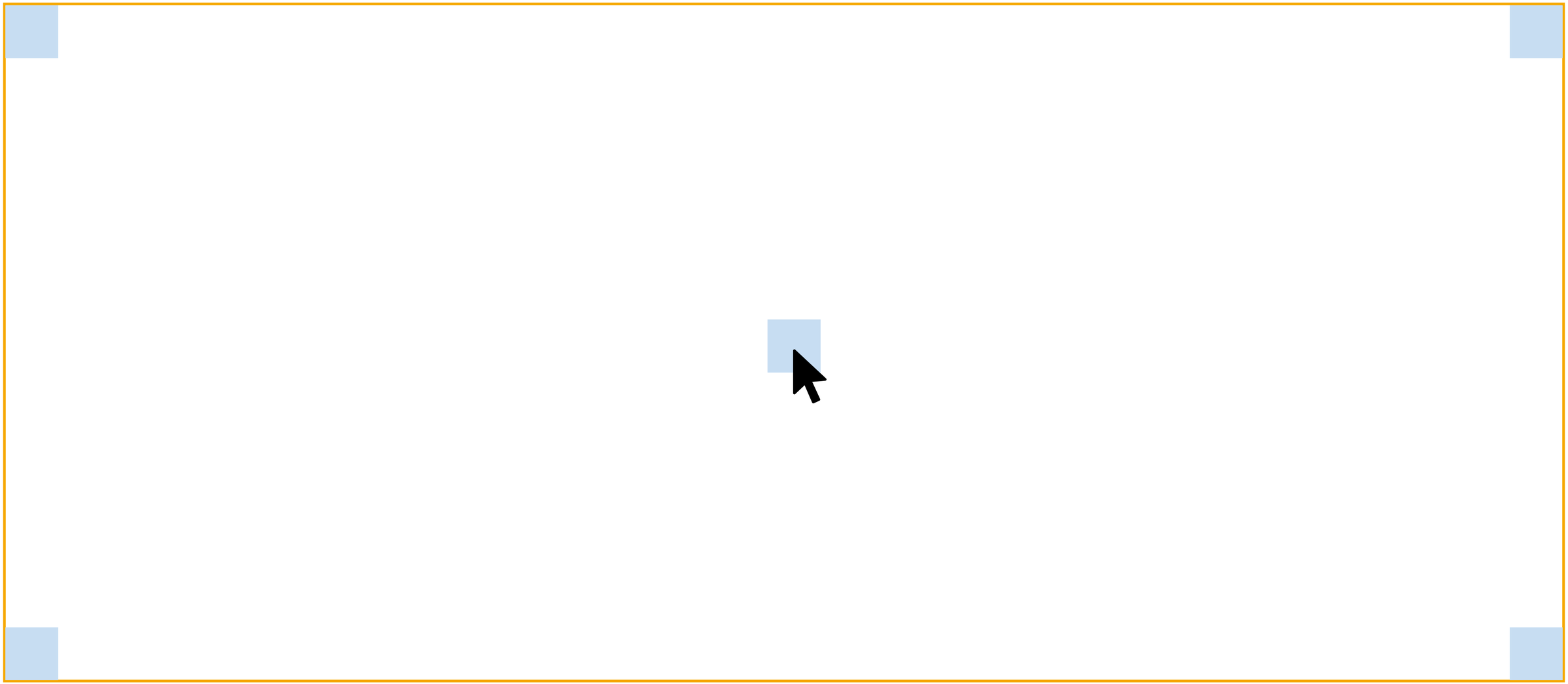
In-Class Exercise #4: Prime Locations for Targets



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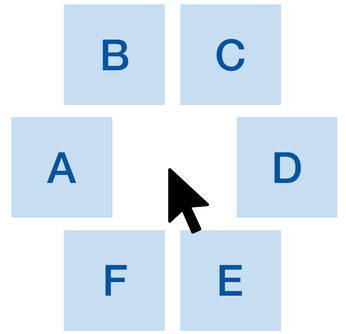
In-Class Exercise #5: Pop-up Menus

- Which of the following pop-up menus lead to a faster selection time?

Vertical

Horizontal



Radial

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Applying Fitts' Law In Interface Design

- Move targets closer

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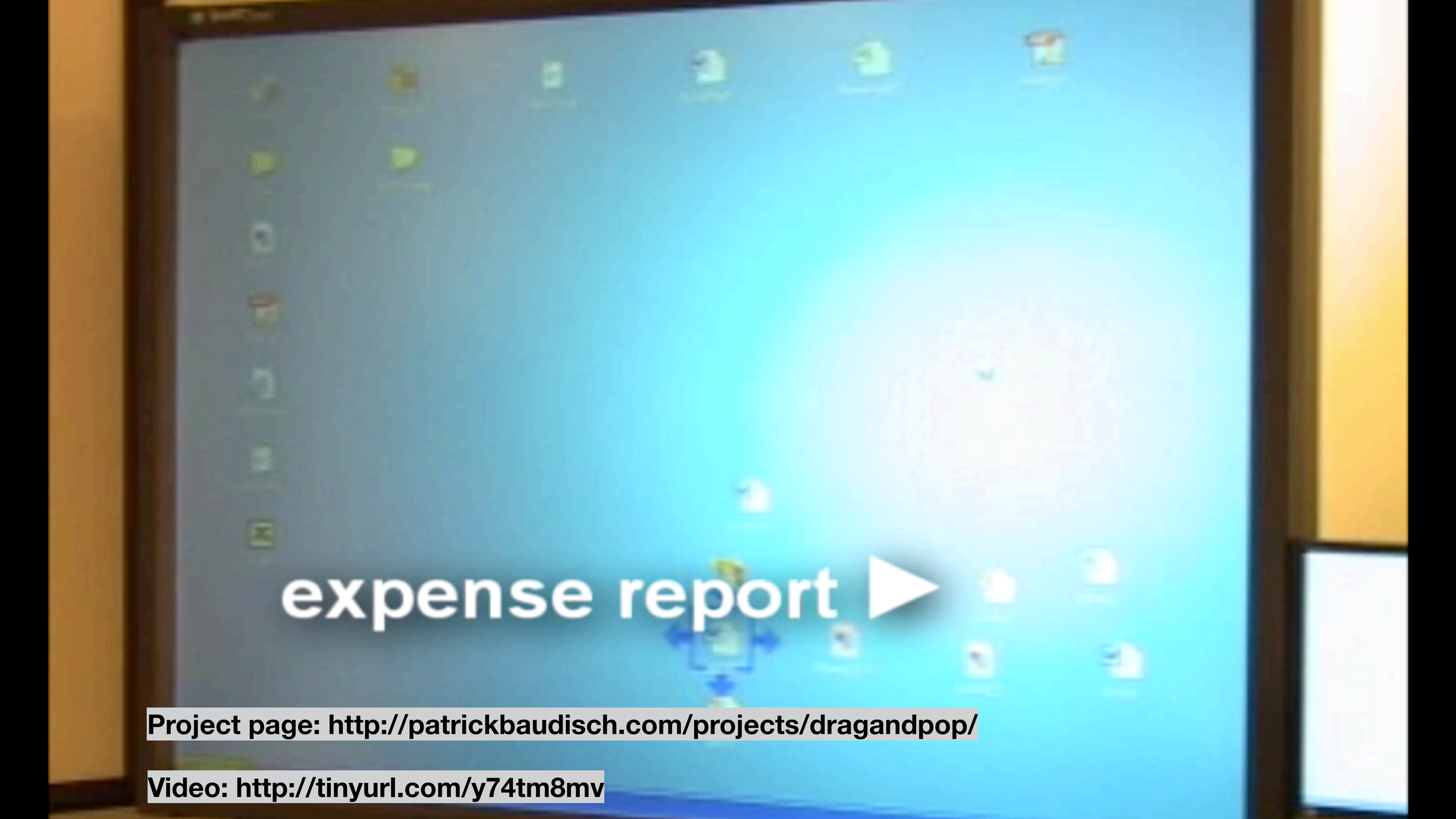

Project page: http://patrickbaudisch.com/projects/dragandpop/

Video: http://tinyurl.com/y74tm8mv

Applying Fitts' Law In Interface Design

- Move targets closer
- Make targets bigger

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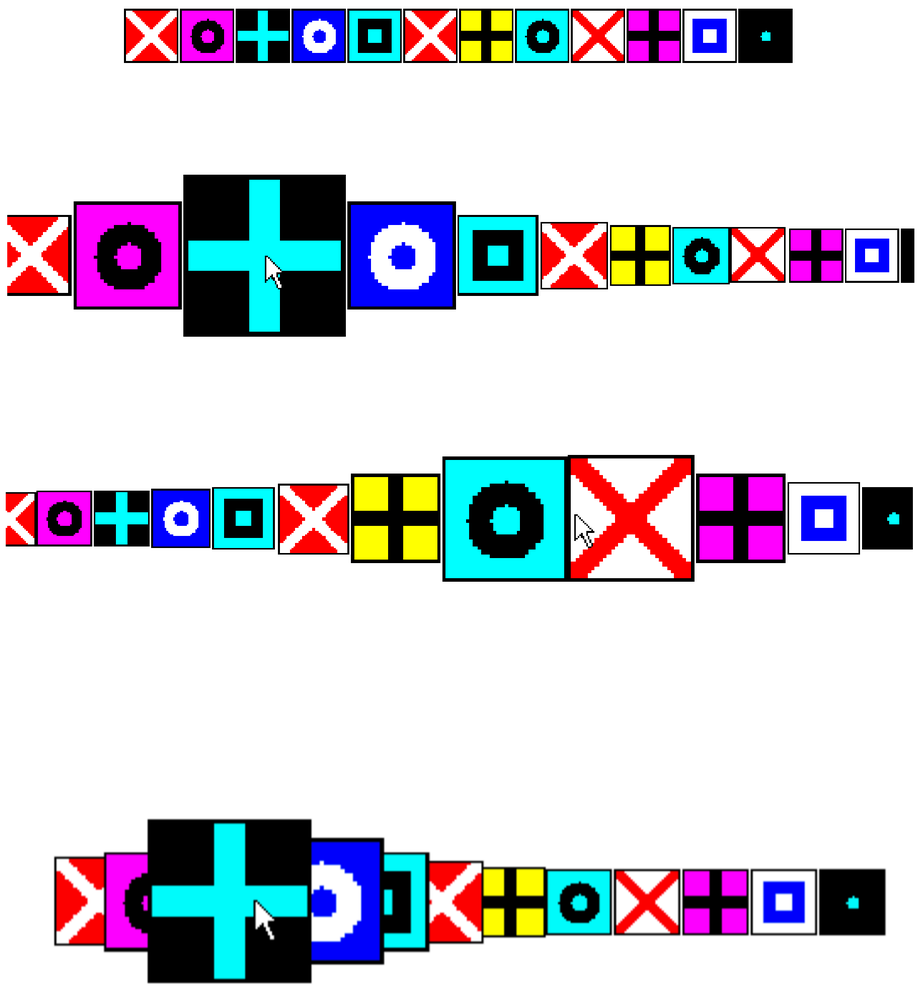
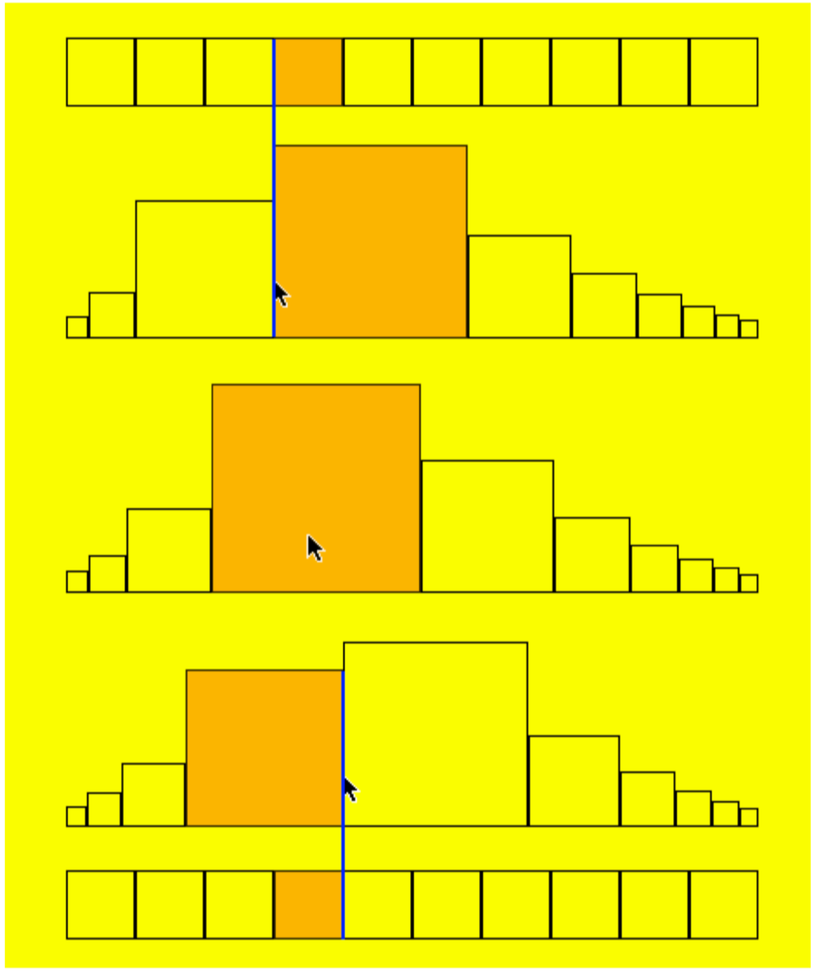


[McGuffin & Balakrishnan, CHI ’02]



[Zhai et al, CHI ’03]

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Applying Fitts' Law In Interface Design

- Move targets closer
- Make targets bigger
- Cursor acceleration?

For more Fitts' law fun: **https://www.asktog.com/columns/022DesignedToGiveFitts.html**

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Assignment I: Fitts' Law

- **Objective:** Learn how to apply Fitts' law in interface design
- Assignment is available online on RWTHmoodle now!
- Deadline: Next **Tuesday, Oct. 29, 9:00 am**
- Use **RWTHmoodle** to submit (1 submission per group); do not send us your solution via email
- Submissions after deadline will be graded **5.0**
- A few of you will be asked to present your solution during the next lab

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Groups for Assignments

- Fixed group size of **three**
- Form groups using RWTHmoodle **now**

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Week 2: Gestalt Laws, Information Content, Visibility, Affordances, Signifiers

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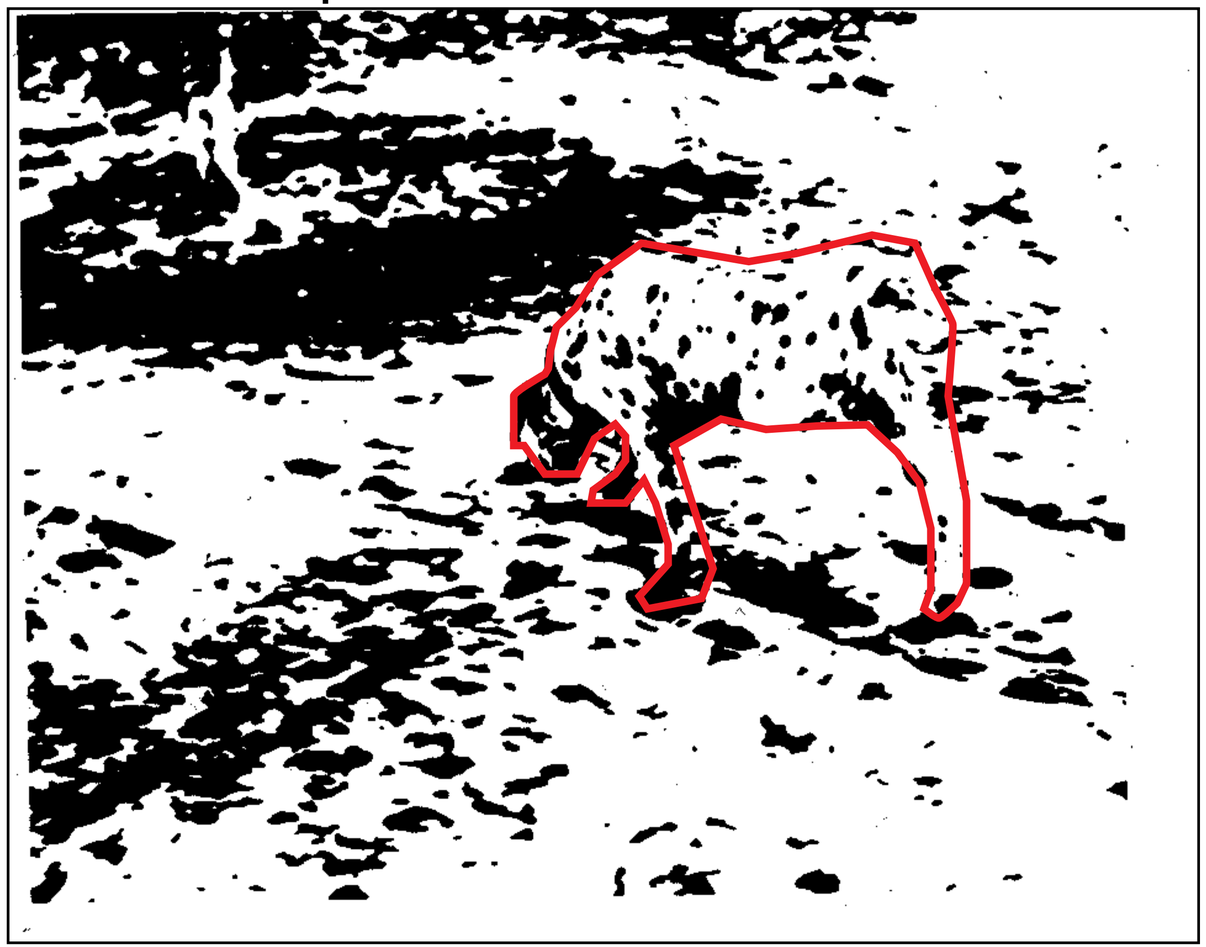
Perception

- Our brains are wired to make sense of what we perceive.



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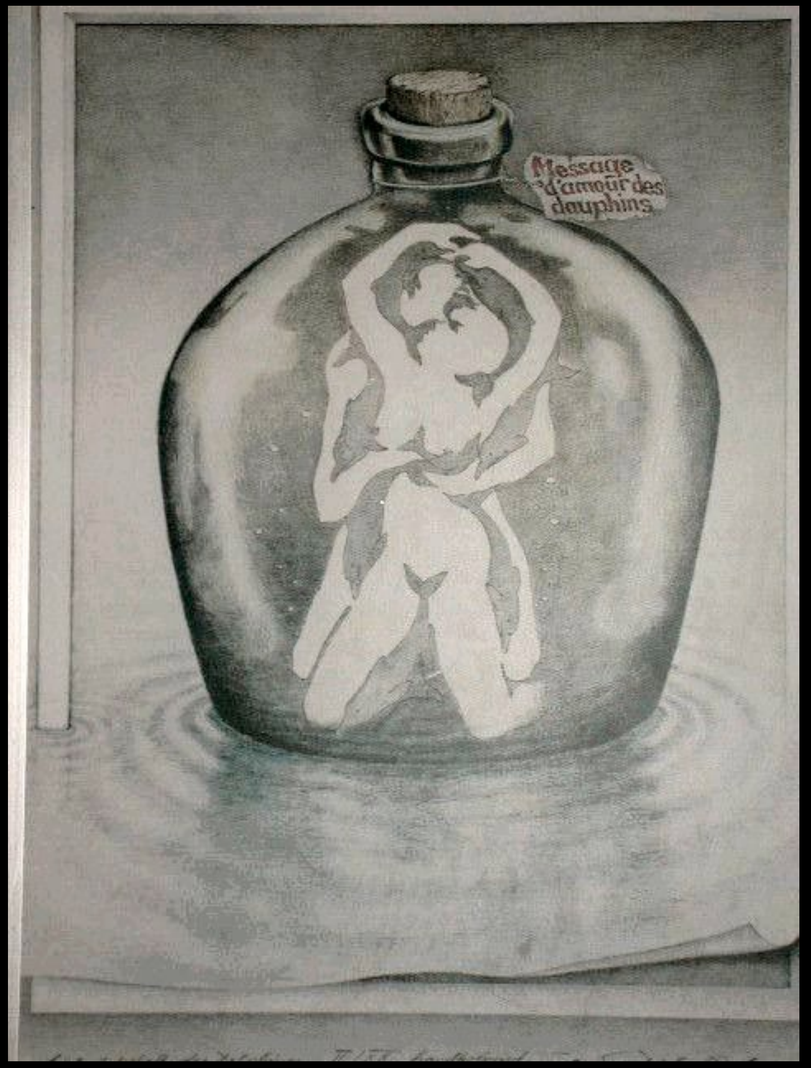

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In-Class Experiment

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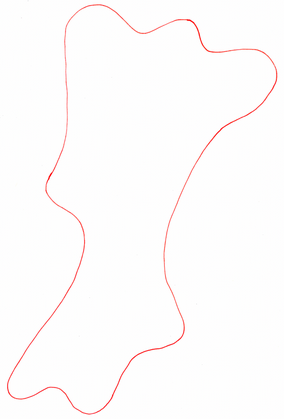

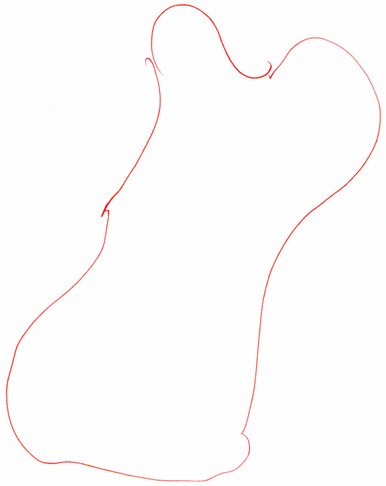

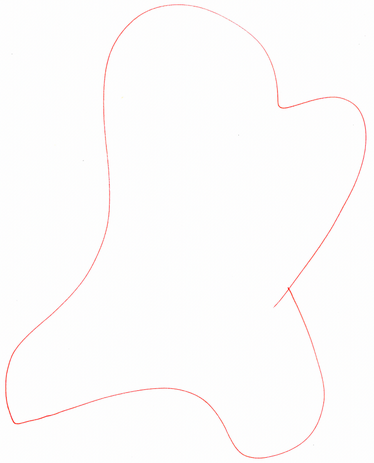

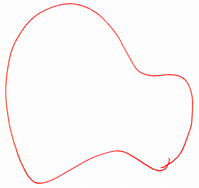

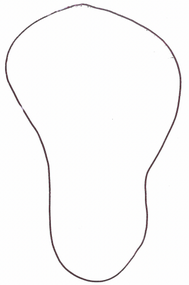

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What to Do Next

- Before next **Tuesday, Oct. 29:**
  - Finish **watching** videos for the **first and second week** on YouTube, see **http://hci.ac/dis**
  - **Buy** Don Norman's *The Design of Everyday Things* (2nd edition, 2013) (required read)
  - **Read** Dix' *Human-Computer Interaction,* chapter "The Human" (pp. 11–59) (PDF will be made available on Moodle)
  - **Submit** Assignment 1 via RWTHmoodle before **9 am**

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