Designing Interactive Systems I: Lab 10

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http://hci.rwth-aachen.de/dis

Exam

- What to bring
  - BlueCard or Photo ID with English name (e.g., Passport, Personalausweis)
  - Pens (not red)
    Pencil writing will not be graded

- Regulation
  - Mobile phone rings ⇒ fail the exam
  - Cheating ⇒ fail the exam

- 60 minutes 60 points ⇒ 35% of the total points

  - Points reflect difficulties of the question
  - Point distribution can be roughly estimated by the time we spent in the lecture for each topic

Final Exam Question Sequence

- Pre-midterm content

- Human performance models, e.g., CMN, Fitts's

- Interface efficiency, GOMS

- Notation, e.g., state machine, petri net

- History

- Vision

- Evaluation with/without users

- Statistics: Until non-parametric method

Typographical Clue

- **Bold** face indicate what to do, number of answers expected, or information that is essential to the question

- "Quotation marks" indicate the concept in question

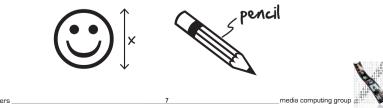- Space between questions indicates how long the answer is expected

GOMS

Gestures	Initial operator sequences
Hand ⇒ mouse, point "OK", click	HPK
Hand ⇒ keyboard, type "hello"	H 5K
…	…

After applied rule…	Operators
Initial	H P K H 5K
0	…
1	
2	
3	
4	
5	

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1. [3 points] **Name** and briefly **describe** the function of three human processors according to "CMN model"

1 MM
MM
MM
Perceptual processor: stores sensor signals in memory
2 MM
MM
Cognitive processor: process information in
MM
long/short term memory
3 MM
MM
Motor processor: activates muscles
MM

Question Styles

- Short answers: Name…, Describe…, Give an example…

- Diagrams: Draw…, Sketch…, Annotate…, Complete…

- Numerical: Calculate…
  - No calculator needed, leave answer in, e.g., log()

pencil

x

Example Questions

- **Describe** the physical, semantic, and logical constraints of a jigsaw puzzle. [3 points]

- Answer: Parts must fit, image must make sense, all parts needed

- Chat is at IKEA, at the cashier with a large shelf and a flower pot. He places the pot on the conveyor belt to be scanned, but leaves the shelf in the cart. After paying, Chat leaves with the cart, accidentally leaving the flower pot behind. **What kind of slip** did he make? **Justify** your answer. [2 points]

- Answer: Premature conclusion, ...

- The German government has decided to upgrade the monitoring equipment at various nuclear power plants across the country and hired you as a usability consultant. There is a choice of using either analog or digital displays for monitoring the temperature of the reaction chamber. **Describe** the advantage of each type. [2 points]

- Answers:
  - Analog: Trends are visible ⇒ quickly react to changes!

  - Digital: Precise measurement easy to perceive ⇒ accuracy

- On some operating systems, it is possible to set "hot-spots" at the corner(s) of the screen to quickly activate the screensaver. **Why** did the designers choose these positions? [1 point]

- Answer:
  - Fitts' Law: points = targets have "infinite width"

- **Explain** the difference between "Fitts' Law" and "Welford's Law" and how one improves on the other. [2 points]

- Answers
  - Fitts: ID = log(2D/W), Welford: ID = log(D/W + 0.5)
  - Welford has better curve fit, no "NAN" when D/W = 0

- A round "emergency eject" button with radius 50 mm is located on an aircraft control panel. Assuming that your hand is normally on the joystick 0.75 m away from the button. Use "Welford's formula" to **calculate** how long would it take to push this button? [2 points]

  You may leave your answer in log()

$$T_{pos} = I_M \cdot \log_2 \left(\frac{D}{W} + \frac{1}{2} \right)$$

- Answer:
  - $100 * \log_2((750/100) + 0.5) = 100 * \log_2(8) = 300$ ms

- Write a **regular expression** to capture the following action sequence for drawing a polygon. [3 points]
  1. Click on a polygon item on the toolbar
  2. Click at the first point
  3. Click at the next points
  4. Double click at the last point to finish

- Answer:
  - `select-polygon click click* double-click`

- **Explain, with examples**, the difference between "command-line" and "graphical user interfaces" with respect to knowledge in the world and knowledge in the head. [2 points]

- Answer:
  - CLI: all in the head: efficient for pros, saves screen space, long learning curve
  - GUI: commands all visible (especially before "trying them out"), more screen space, good for beginners, high learning curve (spatial memory)

Cheese	● Mozzarella	○ Jack	○ Swiss
Meat:	○ Sausage	● Ham	○ Pepperoni
Spiciness:	○ Mild	○ Medium	● Hot
Crust:	○ Whole Wheat	● White	○ Sourdough

- Describe what is **wrong** with the above interface. [1 point]

- Answer:
  - Gestalt laws: Radio buttons in this layout are differently grouped by the user (proximity)
  - looks like these were not mutually exclusive radio buttons...

- Read the following experiment description:
  - A research team examining which angle of touchscreen from the table that users can type faster

- **Choose** and **justify** "experimental design". **Name** "independent variables" and "dependent variables". **Describe** concretely how to measure each dependent variables. [4 points]

- Answer:
  - Design: within-groups: each user's typing speed varies
  - IV: touchscreen angle, e.g., 0, 45, and 90 degrees
  - DV: Time the user takes in typing a specified sentence, starting from the first key until Enter is pressed