

# Human Computer Interaction CS449 – CS549

Week 7-1

Psychology of HCI-Cont..

---

KÜRŞAT ÇAĞILTAY

2023

# Today

---

- Continue with Psychology of HCI
- CogTool Demo

# Assignment Reminder – 40 students!

---



## Assignment-3 Cognitive Modeling in HCI



Not available unless: The activity **Assignment-3 prerequisite** is marked complete

This is your 3rd assignment - Compare two shopping sites by cognitive modeling. Due date November 26th

---



## Assignment-3 prerequisite

[Make a submission](#)

In order to submit Assignment-3, first you have to make this assignment. Simply, install Cogtool software to your computer, make sure it works and submit screenshot of it. The grading is PASS/FAIL. If you have difficulty to install please contact with course assistant. Details of the assignment is in the file.

---

# Can an interface design kill a person?

---

- Whose fault?
- Interactive system designer?
- User?

# The Interface that Killed Jenny

---

- Under cancer treatment
- After the medicine was administered,
  - the nurses were to be responsible for entering all the required information into the charting software and
  - using this software to follow up on the patient's status and
  - make interventions
- They missed the critical information about her three-day hydration requirements
- The day after her treatment, Jenny died of toxicity and dehydration

**Hyperspace - Production - DUBLIN PEDIATRICS**

Desktop Action Patient Care Referrals Reports Tools Weblinks Help

Back Fwd Home Schedule In Basket Chart Encounter Tel Enc Refill Orders Only Staff Msg Sec Pt Msg Print Secure Log Out

**Epic** Home **Zztest, Ad** EpicCare

**Zztest, Ad** MRN: 18774711 DOB: 4/15/1950 Age: 60 yea Sex: M Allergies: No Known Allergies PCP: NO Type: (None)\* PH: \* FSC: BX35, HN35 Online: Basic Alerts: **HM**

**SnapShot** ADVANCE DIRECTIVE/CODE STATUS Report: SnapShot

**Demographics**

AD ZZTEST 123 Easy St  
60 year old male Xxx, XX 99999  
Home: 999-999-9999

**Problem List** Chronic

ESOPHAGEAL REFLUX  
Other  
ASTHMA NOS W/O STATUS ASTHM  
ESSENTIAL HYPERTENSION NOS  
ERRONEOUS ENCOUNTER

**Health Maintenance** Overdue Due On Due Soon

CREATININE	04/15/1950
INFLUENZA VACCINE	09/01/2010
LIPID SCREENING	04/15/1985
PNEUMOCOCCAL VACCINE (PNEUMOVAX)	04/15/1952
POTASSIUM	04/15/1950
TDAP VACCINE	04/15/1961
UNIVERSAL HIV SCREENING DISCUSSION	04/15/1963
VARICELLA ZOSTER VACCINE (ZOSTAVAX)	04/15/2010
COLORECTAL CANCER SCREENING DISCUSSION	08/02/2011

**Reminders and Results**

None

**Allergies**

No Known Allergies

**Medications** Long-Term

PREVPAC Pack  
lisinopril (PRINIVIL, ZESTRIL) 10mg Tab  
tramadol (ULTRAM) 50mg Tab  
fluticasone (FLONASE) 50mcg Nasal Susp  
PREVPAC (PREVPAC) Pack  
ranitidine (ZANTAC) 300mg Tab

**Immunizations/Injections**

None

**Significant History/Details**

Tobacco: Not on File  
Alcohol: Not on File  
3 open orders  
Language: UNKNOWN

**Specialty Comments** Report Show All Edit

No comments regarding your specialty

**Family Comments** Edit

None

**Hotkey List**

Exit Workspace

JODIM CC'd Charts, CC'd Results, Result Notes, Results, Addendum, Charts CC'd To Me, Expiring Ord, Open Charts, 9:54 AM

Start Epic Hyperspace - Product... Microsoft PowerPoint - [...]

# Why

---

- it's impossible to scan for critical information quickly
- colors distracting, prevent any critical information from being highlighted
- any critical treatment or drug information should receive special treatment
- recording the information after each visit, known as “charting,” requires too much time and attention to complete in a timely manner

# LONG-TERM MEMORY

$$\delta_{LTM} = \infty$$

$$\mu_{LTM} = \infty$$

$$\kappa_{LTM} = \text{semantic}$$

## WORKING MEMORY

### VISUAL IMAGE STORE

$\delta_{VIS} = 200$  [70~1000] msec  
 $\mu_{VIS} = 17$  [7~17] letters  
 $\kappa_{VIS} = \text{Physical}$

### AUDITORY IMAGE STORE

$\delta_{AIS} = 1500$  [900~3500] msec  
 $\mu_{AIS} = 5$  [4.4~6.2] letters  
 $\kappa_{AIS} = \text{Physical}$

$\mu_{WM} = 3$  [2.5~4.1] chunks

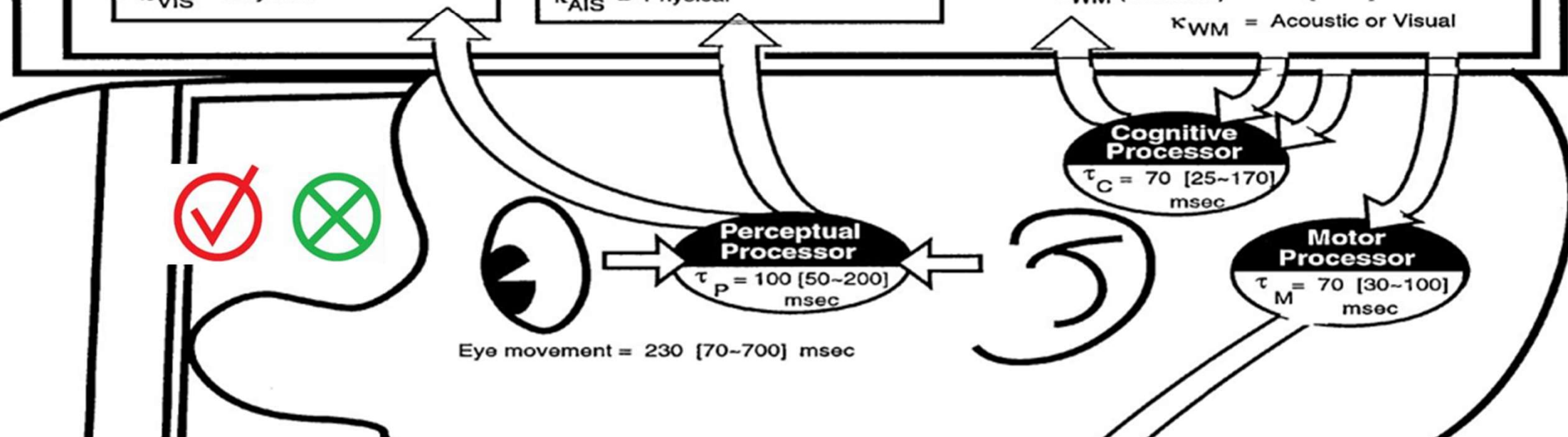
$\mu_{WM^*} = 7$  [5~9] chunks

$\delta_{WM} = 7$  [5~226] sec

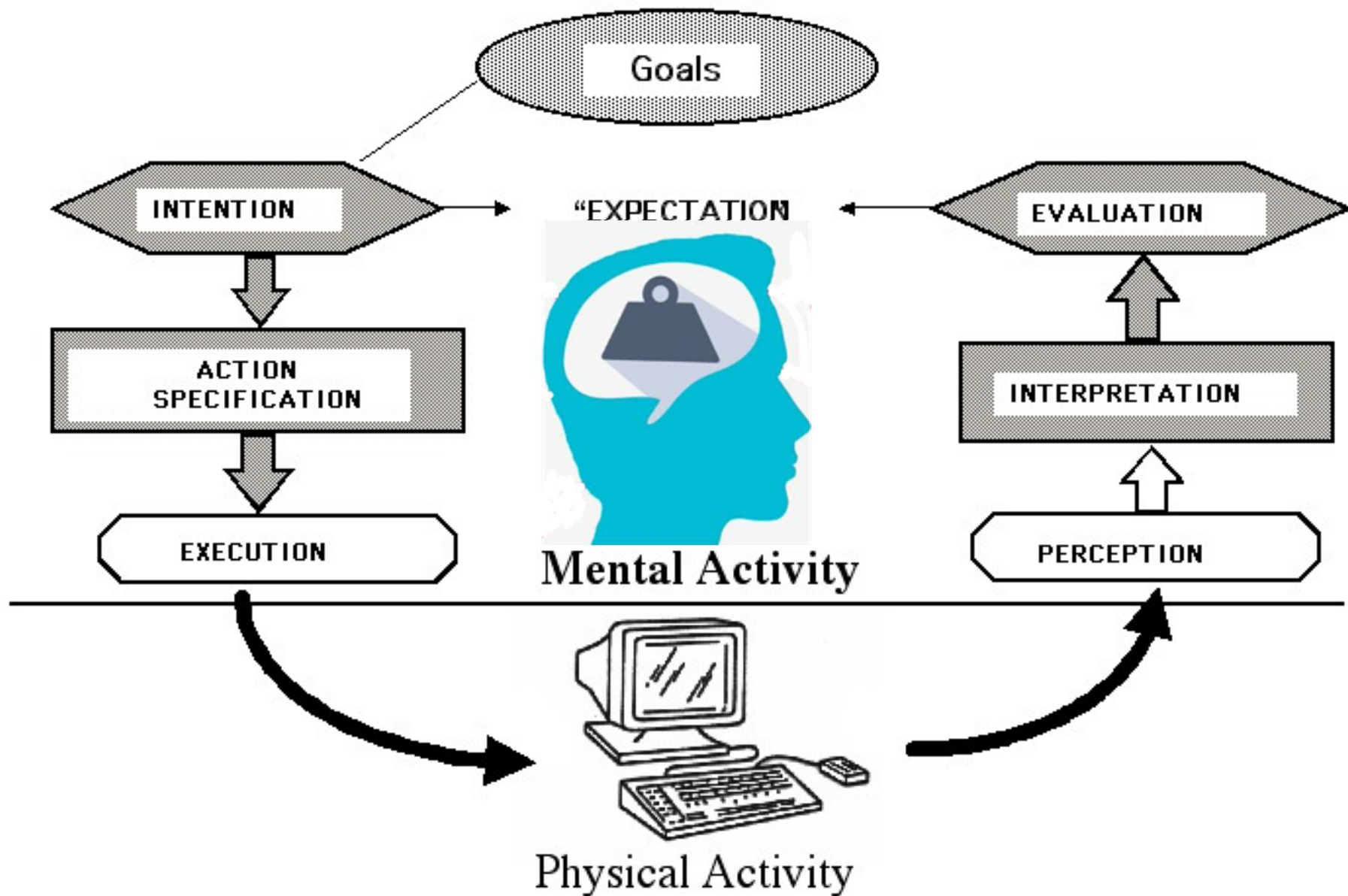
$\delta_{WM} (1 \text{ chunk}) = 73$  [73~226] sec

$\delta_{WM} (3 \text{ chunks}) = 7$  [5~34] se

$\kappa_{WM} = \text{Acoustic or Visual}$







Seven stages of user activities involved in task performance  
Don Norman *The Design of Everyday Things*.

# Model Human Processor Limitations

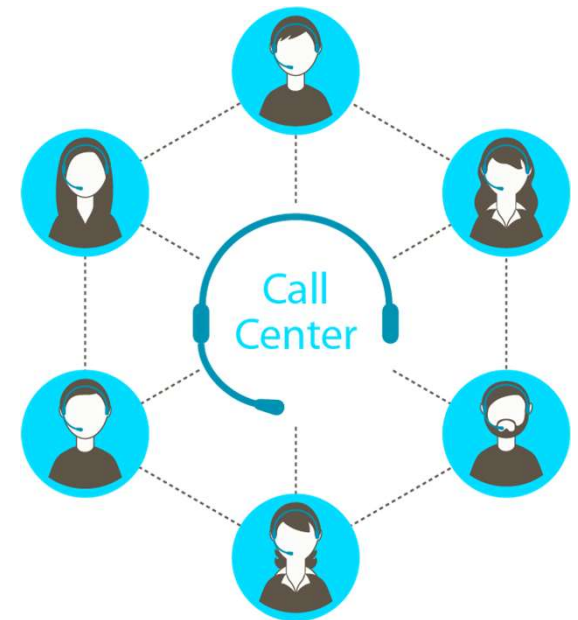
---

- **Processors**
  - Perceptual-100ms
  - Cognitive- 70 ms
  - Motor- 70 ms
- **Visual Image Store**
  - Keeps 200 ms
  - 17 items
- **Auditory Image Store**
  - Keeps 1500ms
  - 5 items
- **Working Memory**
  - Capacity 7+/-2
  - 7 sec

# NYNEX: Saving 2 Million USD

---

- Call center analysis with cognitive modeling
  - Before: We need more hardware
  - Analysis showed performance problems
  - Processes improved, no new hardware
  - Yearly 2 million USD saving
- 
- Wayne D. Gray and Bonnie E. John and Michael E. Atwood, “Project Ernestine: Validating a GOMS analysis for predicting and explaining real-world task performance”, in Human Computer Interaction, No. 8, pp. 237-309.
  - <http://www-ihm.lri.fr/~mbl/ENS/FONDIHM/2014/papers/Gray-HCI93.pdf>



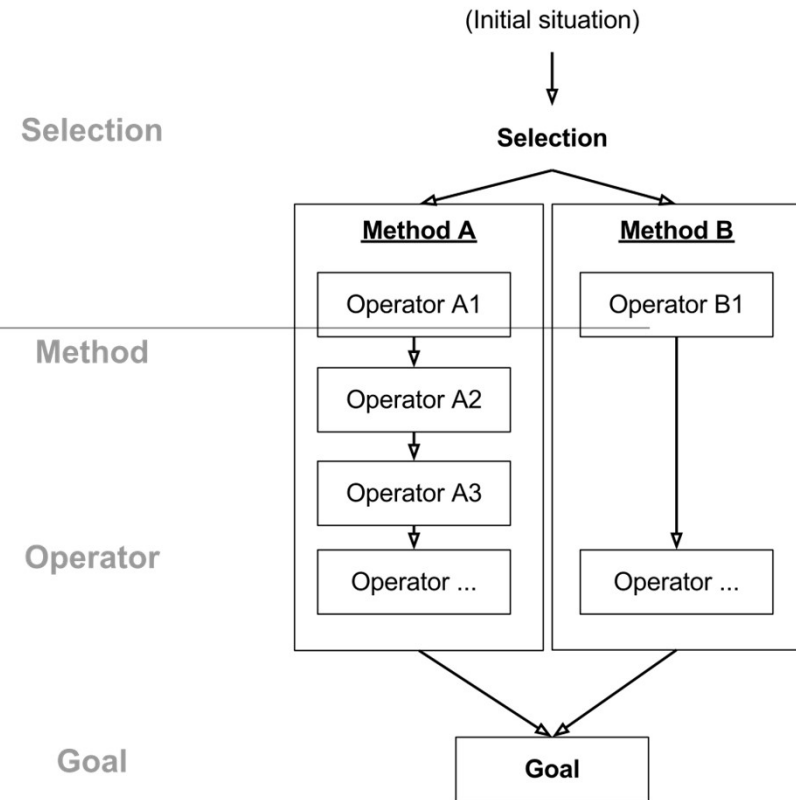
# GOMS (and KLM)

---

- GOMS: a family of human information processor models.
- Predict user performance.
- Useful for predicting actual time an experienced user will take in UI.
- Useful for comparing different UIs.

# GOMS Constructs

- Goal, Operators, Methods, Selection rules
- Goal: “what”.
- Method: “how” steps (learned).
- Operators: Cognitive processes + physical actions to DO it.
- Selection rules: rules saying which method to select.



# Limitations of GOMS [Card et al. (1980) ]

- applied to skilled users, not to beginners or intermediates.
- doesn't account for either learning of the system or its recall after a period of disuse.
- doesn't account for errors.
- does not address the amount and kind of fatigue
- individual differences among users is not accounted for in the model.

# KLM (a low-level variant of GOMS)

---

- Keystroke Level Model.
- Simple, but accurate. Widely used.
- Scope:
  - *experienced* users
  - doing a task *error-free*.
  - using a *specific method* in a UI.
- CogTool has this built-in.

# KLM Operators

---

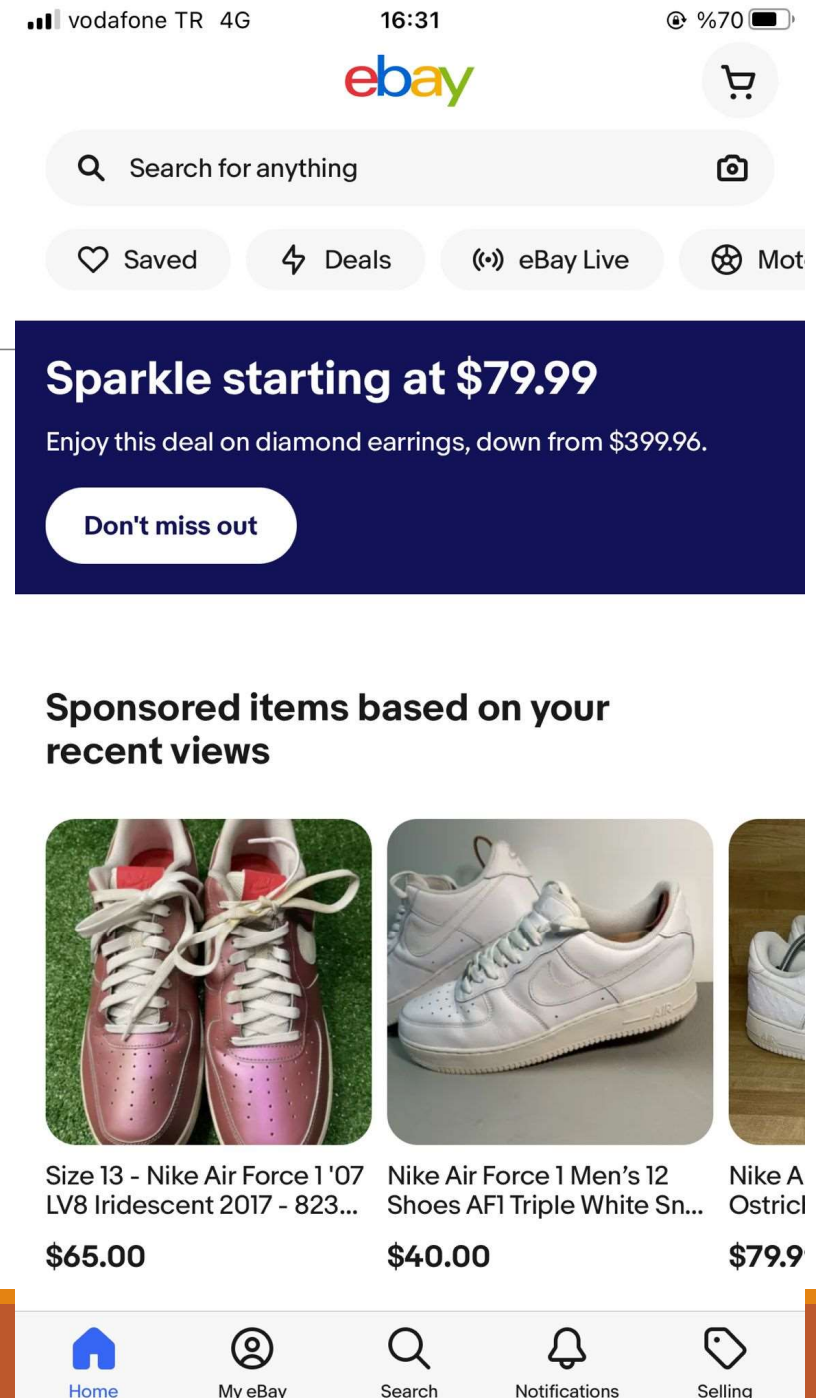
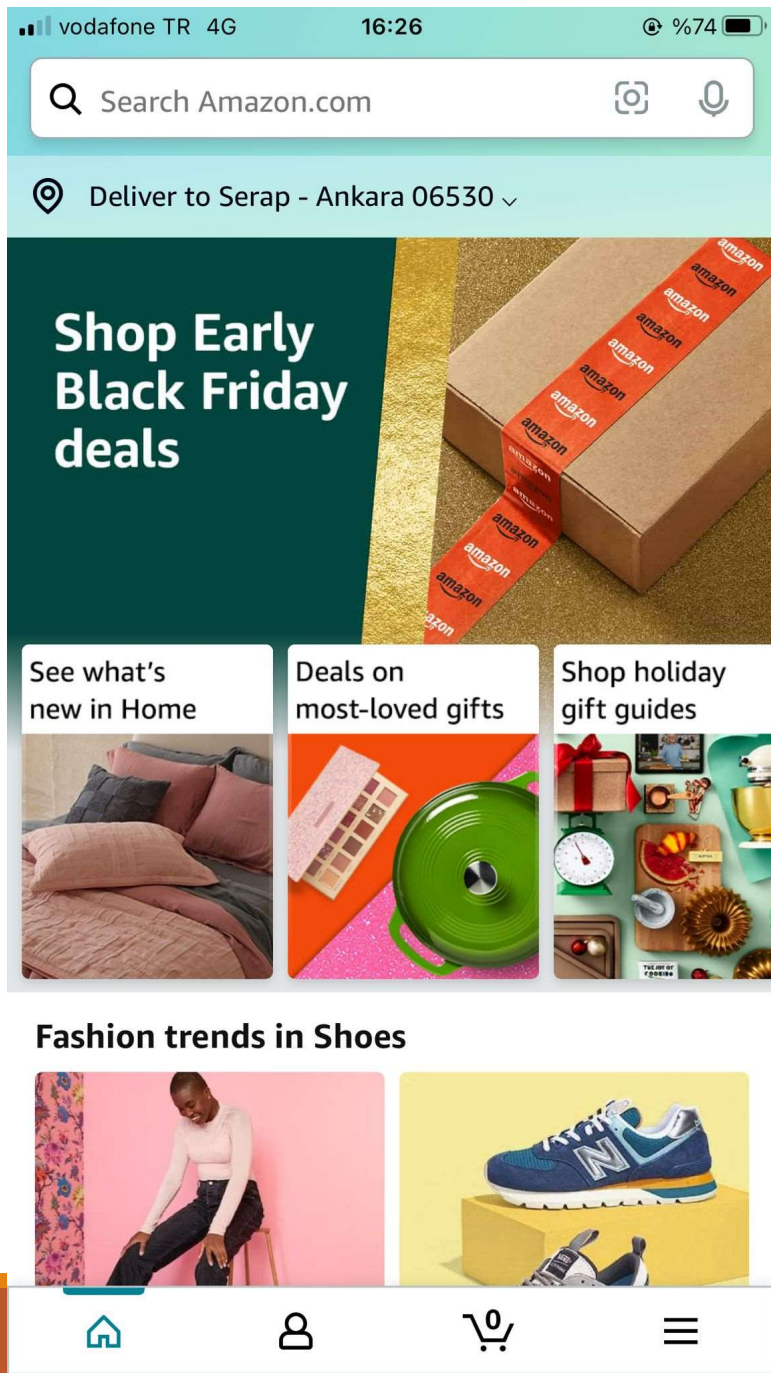
- User Operators:
  - K (keystroke), P (point), H (homing), D (drawing), M (mental: think).
  - Times for each are provided to you
    - based on extensive research/empirical data.
- System Operator:
  - R (respond).



# Where do we use it?

---

- CogTool examples.
  - Calculating the cost of the task in this UI.
  - Comparing the cost if do the task with different widgets.
  - Where are these cost differences coming from?



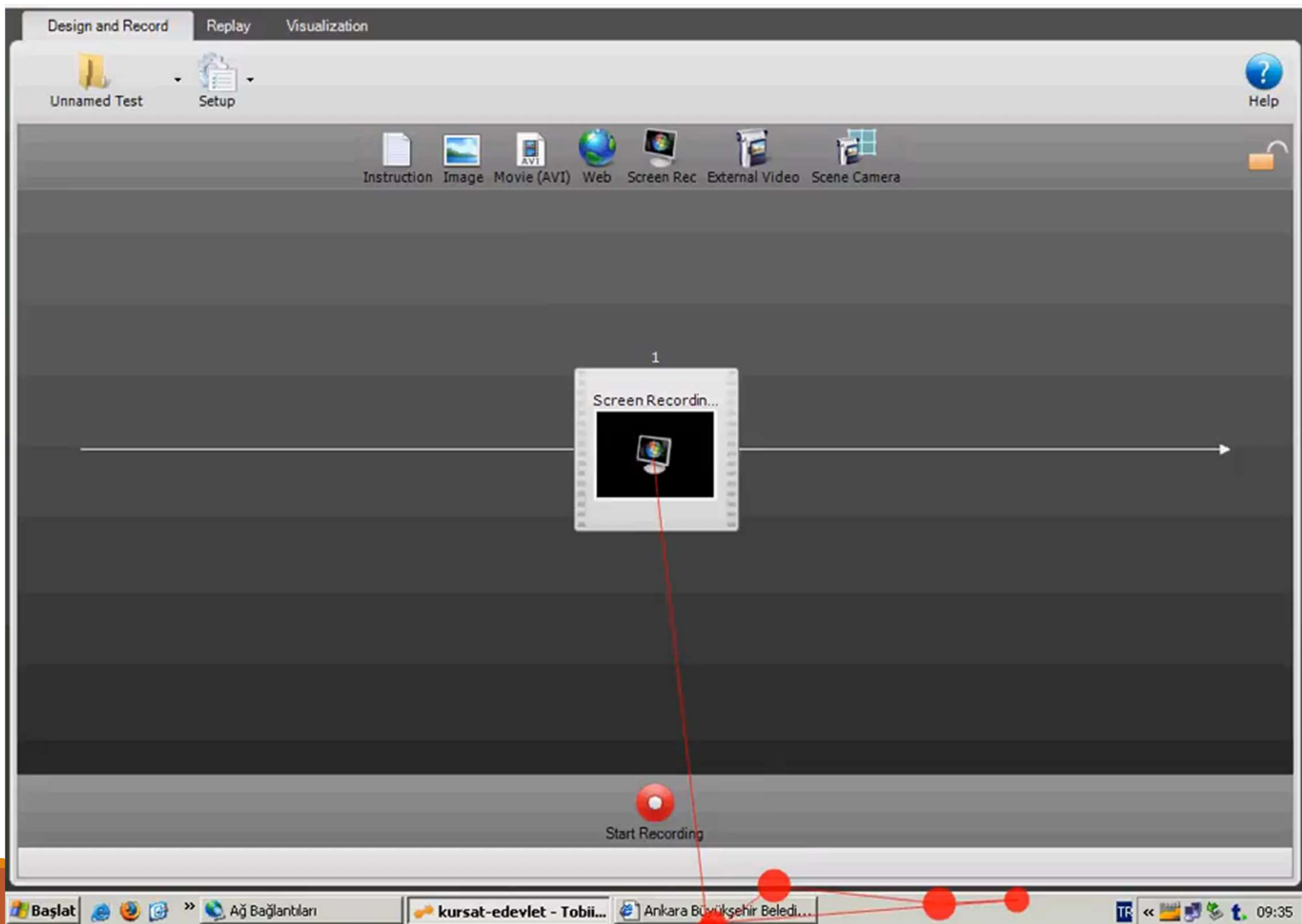
# Your Assignment

---

- Evaluation of interfaces by Cognitive modeling
  - GOMS/KLM –
  - Shopping on “Amazon” vs “eBay”
  - a demo
- 
- Dont forget to finish prereq assignment

# CogTool Demo

---



# Assignment Reminder – 40 students!

---



## Assignment-3 Cognitive Modeling in HCI



Not available unless: The activity **Assignment-3 prerequisite** is marked complete

This is your 3rd assignment - Compare two shopping sites by cognitive modeling. Due date November 26th

---



## Assignment-3 prerequisite

[Make a submission](#)

In order to submit Assignment-3, first you have to make this assignment. Simply, install Cogtool software to your computer, make sure it works and submit screenshot of it. The grading is PASS/FAIL. If you have difficulty to install please contact with course assistant. Details of the assignment is in the file.

---

## ▼ Week-7 Psychology + Intro to Evaluation strategies for usable interface design

---



Mental Models by Jacob Nielsen

---



week-7 Gestalt Principles- Our vision is optimized to see structure - Ch2

---