User Interaction

COMPSCI2031

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Recap: What we did last yesterday

- Lecture on Usability and Heuristics
- Lab Task: Looking at heuristics and discussing these on different websites
- Reading: Human Factors in HCI by Scott MacKenzie

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User Interaction Topics

- ✅ HCI History and Introduction
- ✅ Usability and Heuristics
- Heuristic Evaluation and Human Cognition
- Human Perception and Capabilities
- Experimental Design & Variables Research
- Personas and Scenarios
- Surveys in HCI
- Ethnography
- Statical Methods
- Theories in HCI
- Models of Interaction
- Large Scale and Mobile HCI
- User-Centered Design
- Ethics in User Testing
- Revision & Example Exams

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Heuristic Evaluation & Cognition

Lecture 3

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Human Cognition

Lecture 3

Studying the Human

- HCI: **Human**-Computer Interaction
- Early HCI work took findings/ approaches from Psychology to apply to interactions with computers
  - Perception
  - Cognition
  - Motor function
- Used to guide system development
- Continue to measure, refine and experiment

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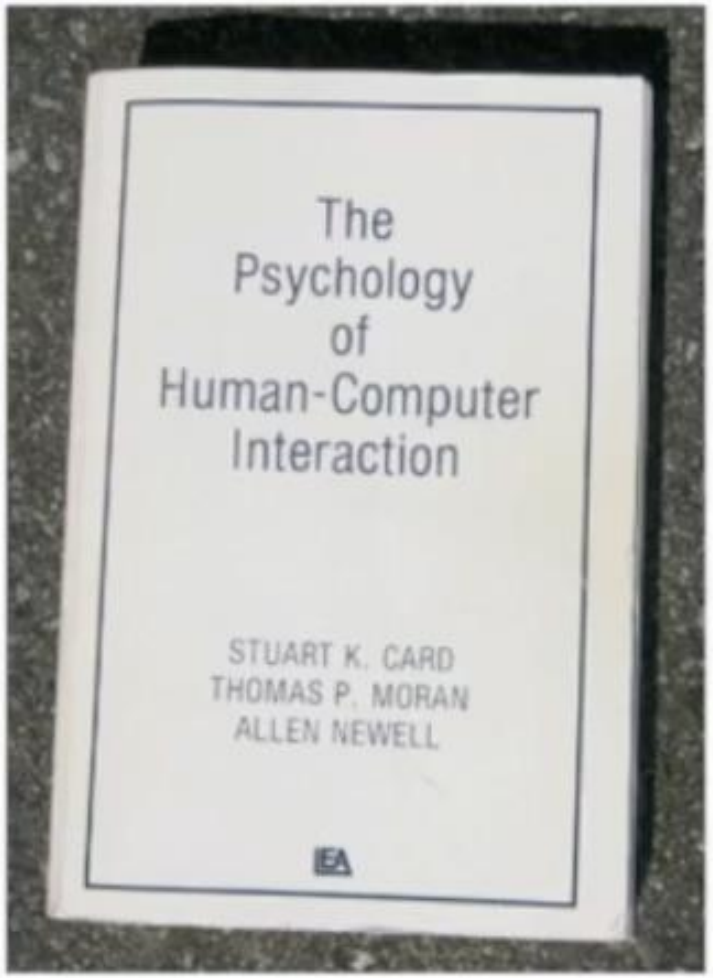
Historic Interplay

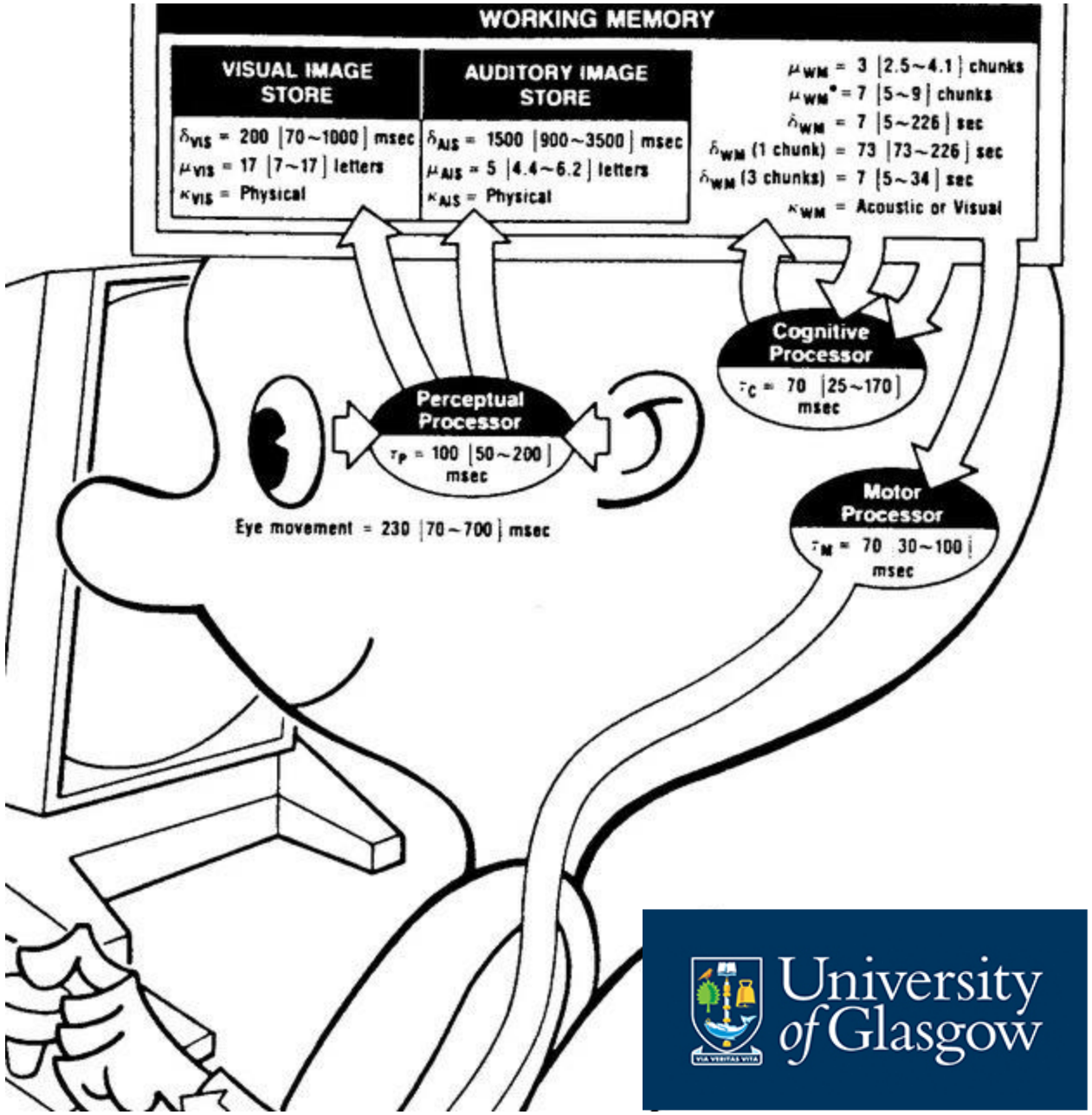


- Trying to create a psychology of HCI
- Based on knowledge of human psychology
  - Perception
  - Cognition
  - Motor Function
- For many in software design communities, first exposure to Psychology basics
- Engineering-style theories to give approx. calculations of how efficiently humans would interact

Human Processor Model

- perceptual + cognitive + motor

Parameter	Mean	Range
Eye movement time	230 ms	70–700 ms
Decay half-life of visual image storage	200 ms	90–1000 ms
Visual Capacity	17 letters	7–17 letters
Decay half-life of auditory storage	1500 ms	90–3500 ms
Auditory Capacity	5 letters	4.4–6.2 letters
Perceptual processor cycle time	100 ms	50–200 ms
Cognitive processor cycle time	70 ms	25–170 ms
Motor processor cycle time	70 ms	30–100 ms
Effective working memory capacity	7 chunks	5–9 chunks
Pure working memory capacity	3 chunks	2.5–4.2 chunks
Decay half-life of working memory	7 sec	5–226 sec
Decay half-life of 1 chunk working memory	73 sec	73–226 sec
Decay half-life of 3 chunks working memory	7 sec	5–34 sec



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Time Scale of Human Action

- Social Band
- Rational Band
- Cognitive Band
- Biological Band
  - Less relevant for most HCI research/ practice you will be part of

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Scale	*Time units*		*System*	*World*
10^7		Months		
10^6		Weeks		Social band
10^5		Days		
10^4		Hours	Task	
10^3	10	min	Task	Rational
10^2	1	min	Task	
10^1	10	sec	Unit task	
10^0	1	sec	Operations	Cognitive
10^{-1}	100	msec	Deliberate act	
10^{-2}	10	msec	Neural circuit	
10^{-3}	1	msec	Neuron	Biological
10^{-4}	100	msec	Organelle	

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Cognitive Band

- 100 milliseconds to 10 seconds
  - Pointing devices, selection techniques, text entry, gestural input
  - Times based on reaction times and biomechanical properties
- Consider how users perform multitouch rotation gestures
  - Does the angle of rotation impact performance?
  - Do users pivot from the thumb or rotate multiple touchpoints?
  - Does the starting angle impact performance?

Rational Band

- Occupy minutes or hours
  - Tasks, like website use, user search strategies, IS navigation
  - Users must experience an interface **and make decisions** about their next actions
- Consider an evaluation of user search behavior
  - How often do users “branch” their search results?
  - How many “branches” do users generate during a typical search?
  - Why do users establish a new “branch”

Social Band

- Days, weeks and months
  - Activities such as workplace habits, social networking, online dating, privacy
  - Require development of social bonds or establishing norms/ standards
- Consider a study on people developing relationships in online dating
  - Interviews with members of the community
  - Participation/observation in active forums
- Qualitative methods dominate
  - Although often opportunity for mixed methods studies/data analytics too
    - For refence https://theblog.okcupid.com

Model of Human Computer Interaction

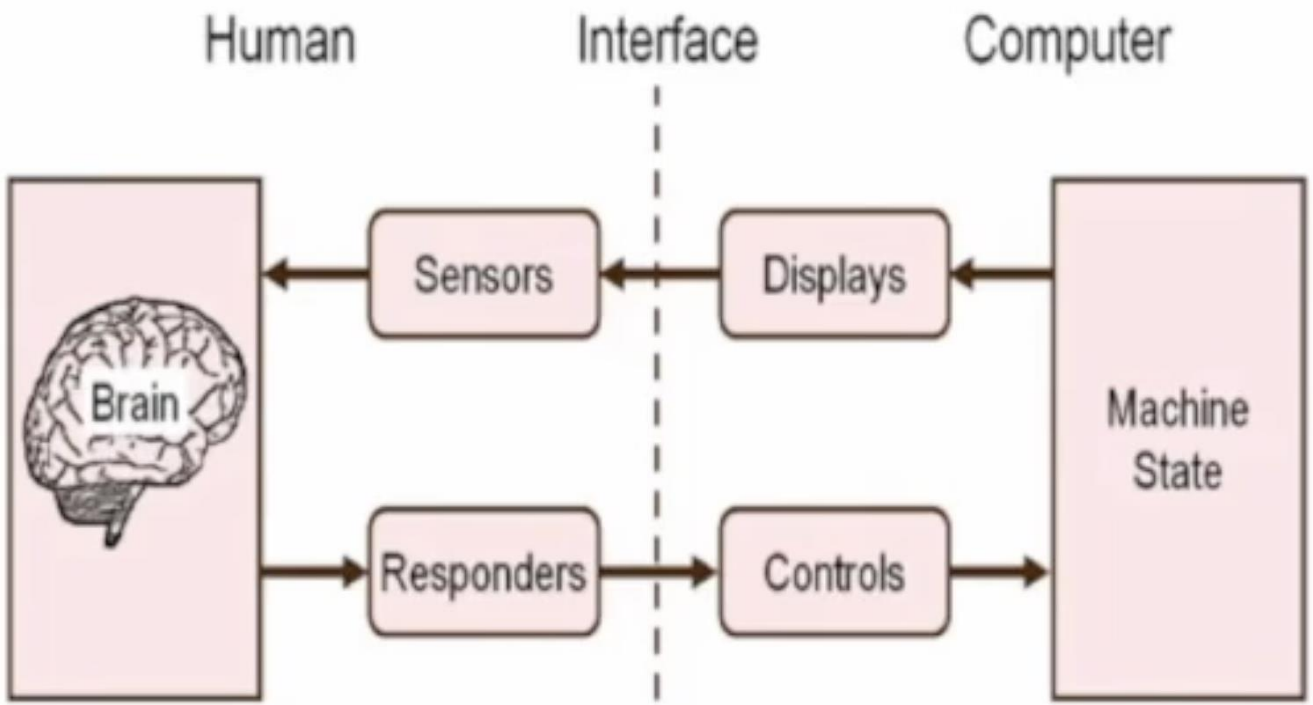


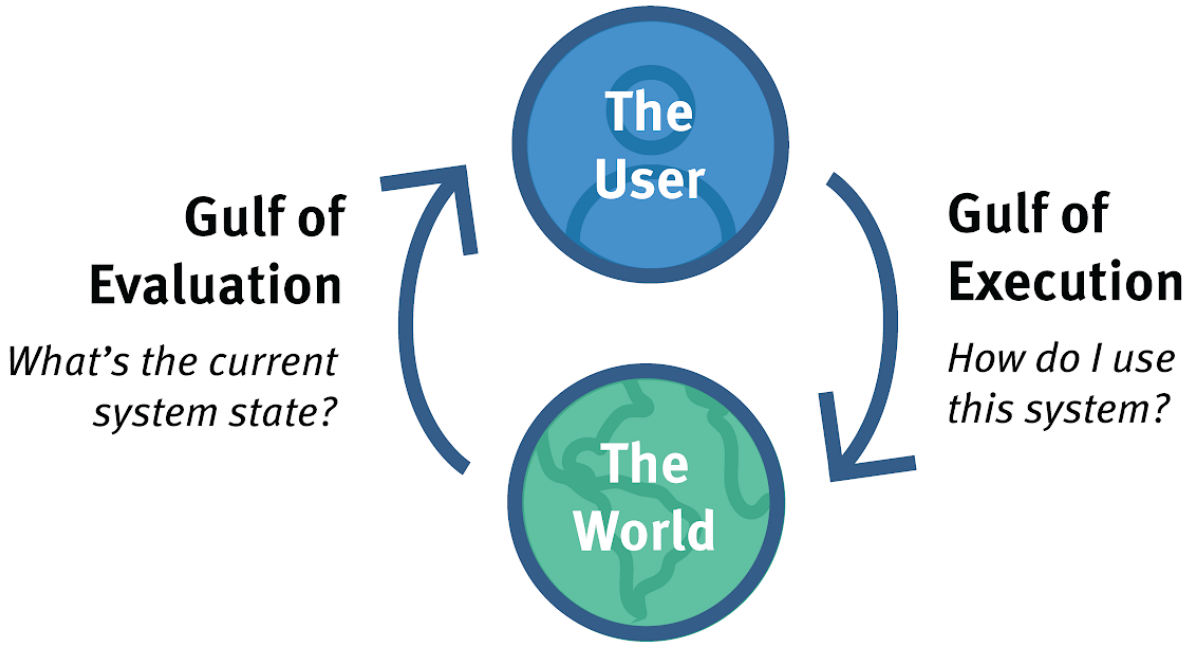
FIGURE 2.2

Human factors view of the human operator in a work environment.

(After Kantowitz and Sorkin, 1983, p. 4)

Gulfs of Interaction

- Evaluation: Understanding the state of the system
- Execution: Taking action to accomplish a specific goal



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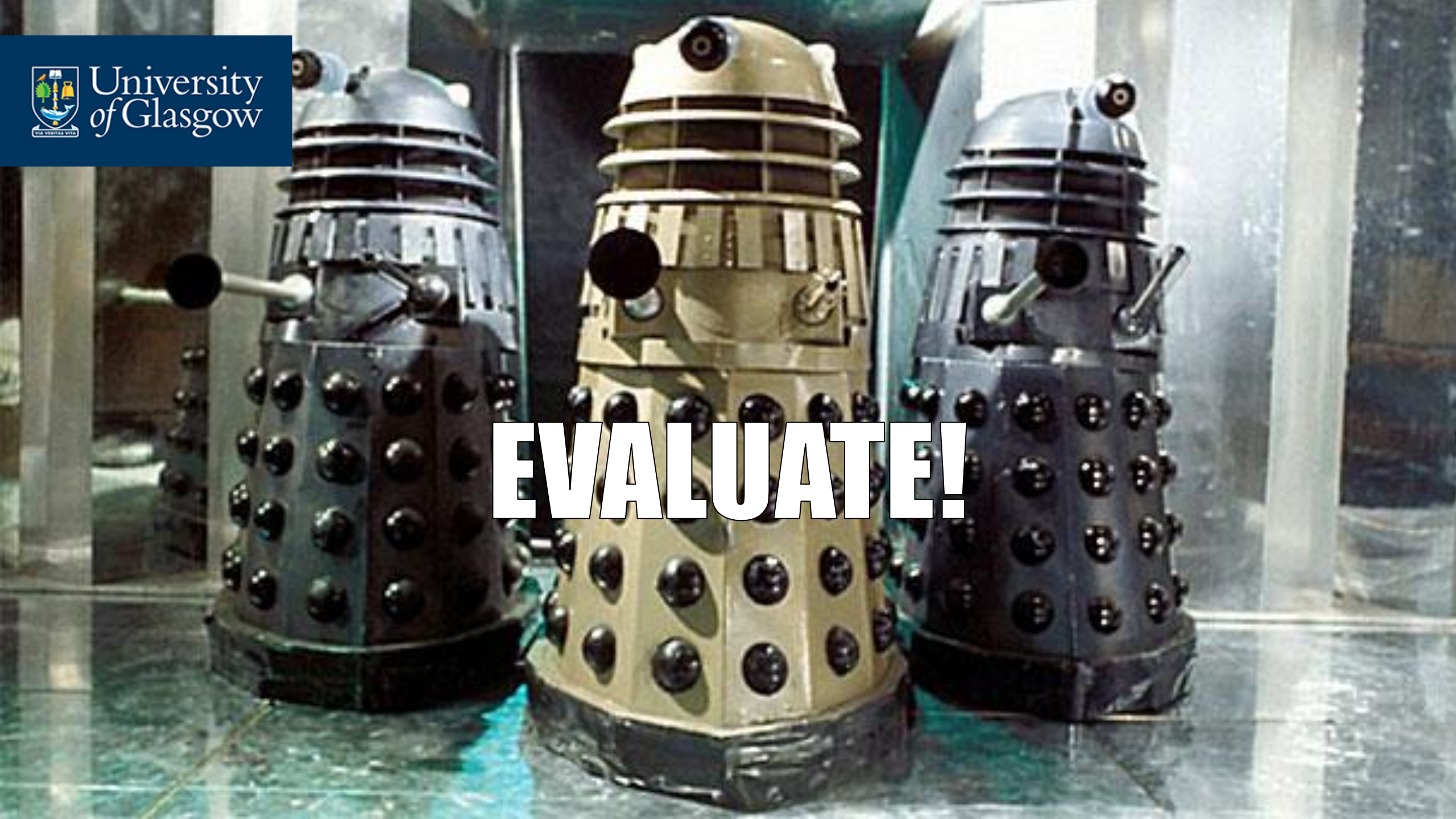
Heuristic Evaluation

Lecture 3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EVALUATE!

Heuristic evaluation

- Heuristic evaluation is a usability engineering method for finding the usability problems in a user interface design.
- Involves having a small set of evaluators examine an interface and judge its compliance with usability principles.

Further Reading: https://www.nngroup.com/articles/how-to-conduct-a-heuristic-evaluation/

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Heuristic evaluation

- Usability issues are judged against standard heuristics to provide consistent targets.
- Aggregated issues are plotted in a standard format.
- Each issue is analysed for the difficulty to correct it and importance.

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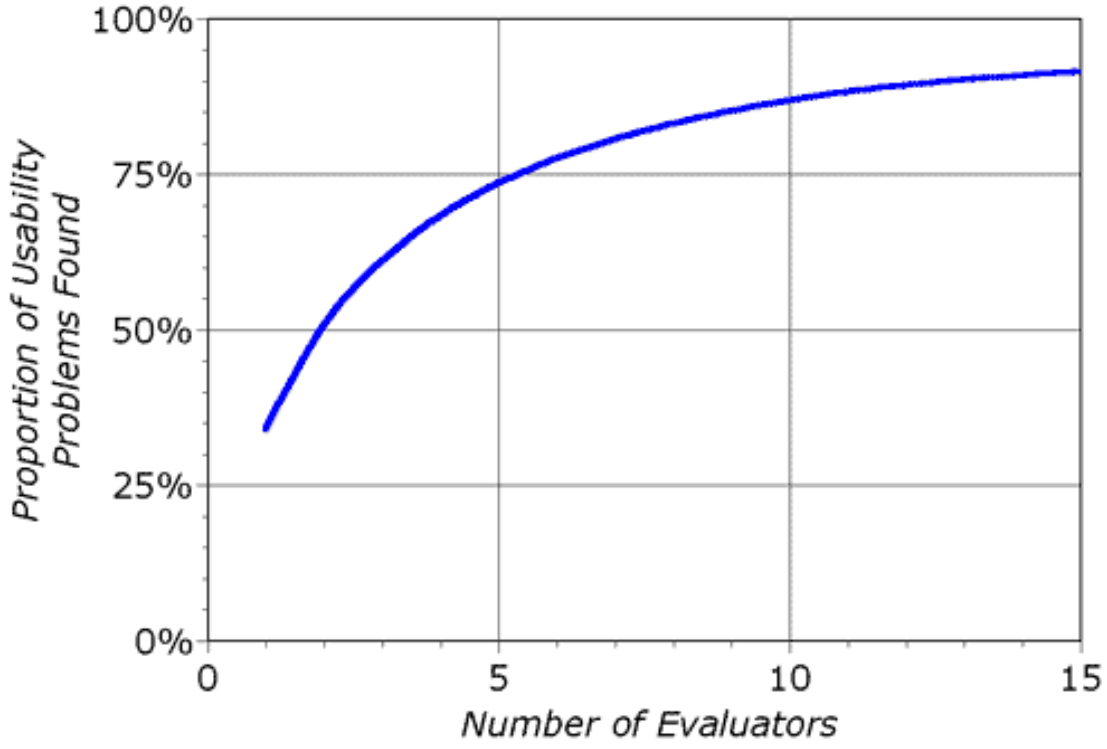
Evaluators

- Each evaluator finds as many problems as possible alone.
- Evaluators find different problems.
  - On average, a single evaluator finds only 35% of usability issues identified by a group.
- Diminishing returns when numerous evaluators are used.
  - Nielson recommends up to five evaluators but should consider the cost/benefit in the specific context.



nngroup.com

Reports

- Problems are presented as a written report.
- Problems can be captured by recording a verbal exchange between evaluator and moderator.
  - This is converted into a written report by the moderator.

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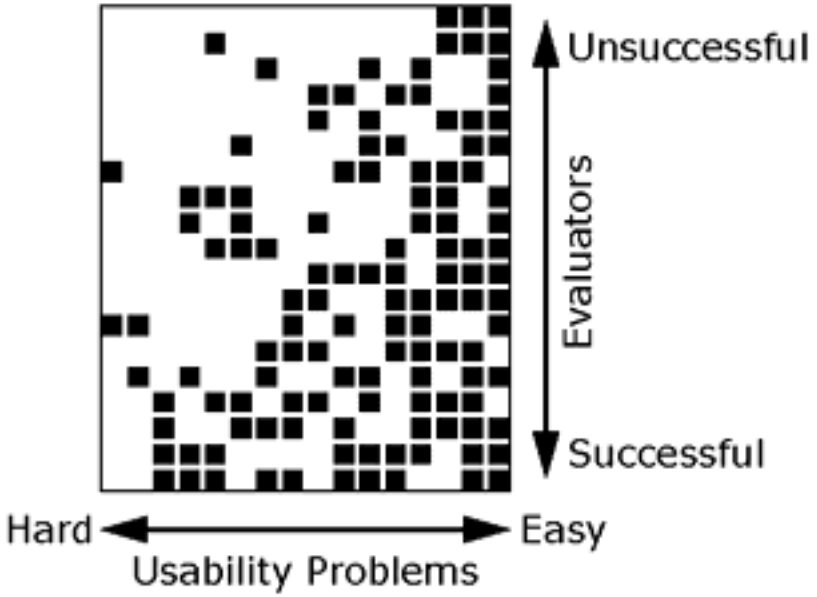
Aggregating reports

- A complete list of problems is aggregated from all reports.
- Each unique problem is labelled, and these labels are applied to all reports.
  - Each problem must be associated with a usability heuristic.
- A matrix is created with problems along the x-axis and evaluator along the y-axis.
  - This is sorted first by y-axis (successful evaluators) and second by x-axis (difficult to find problems).



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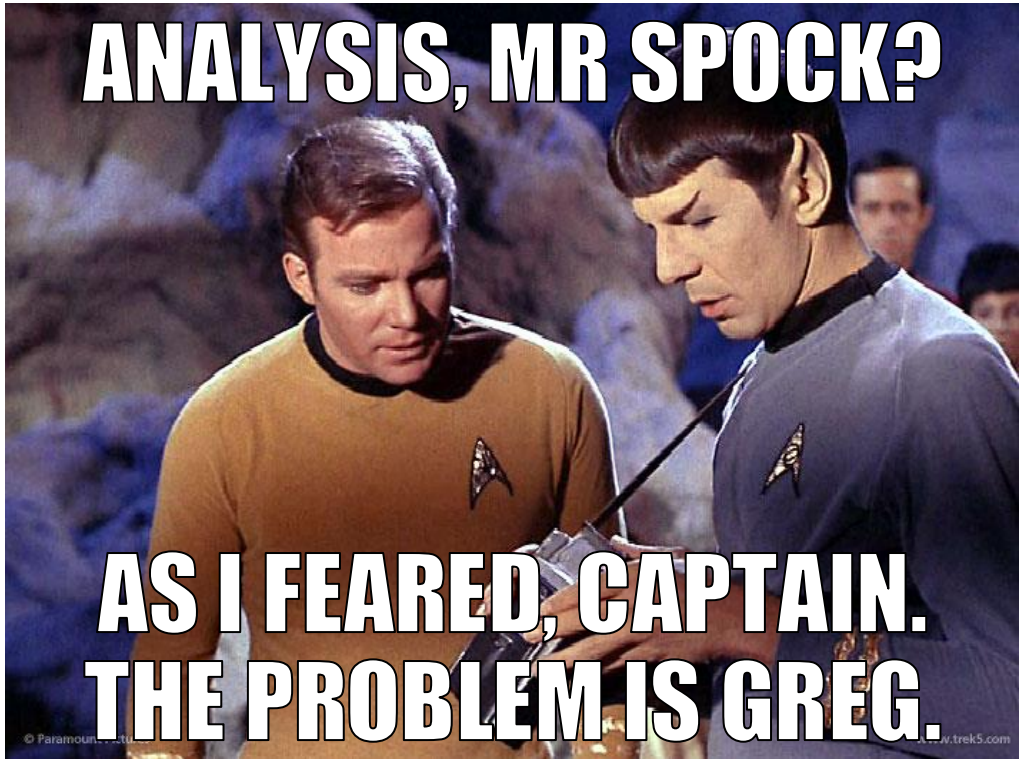
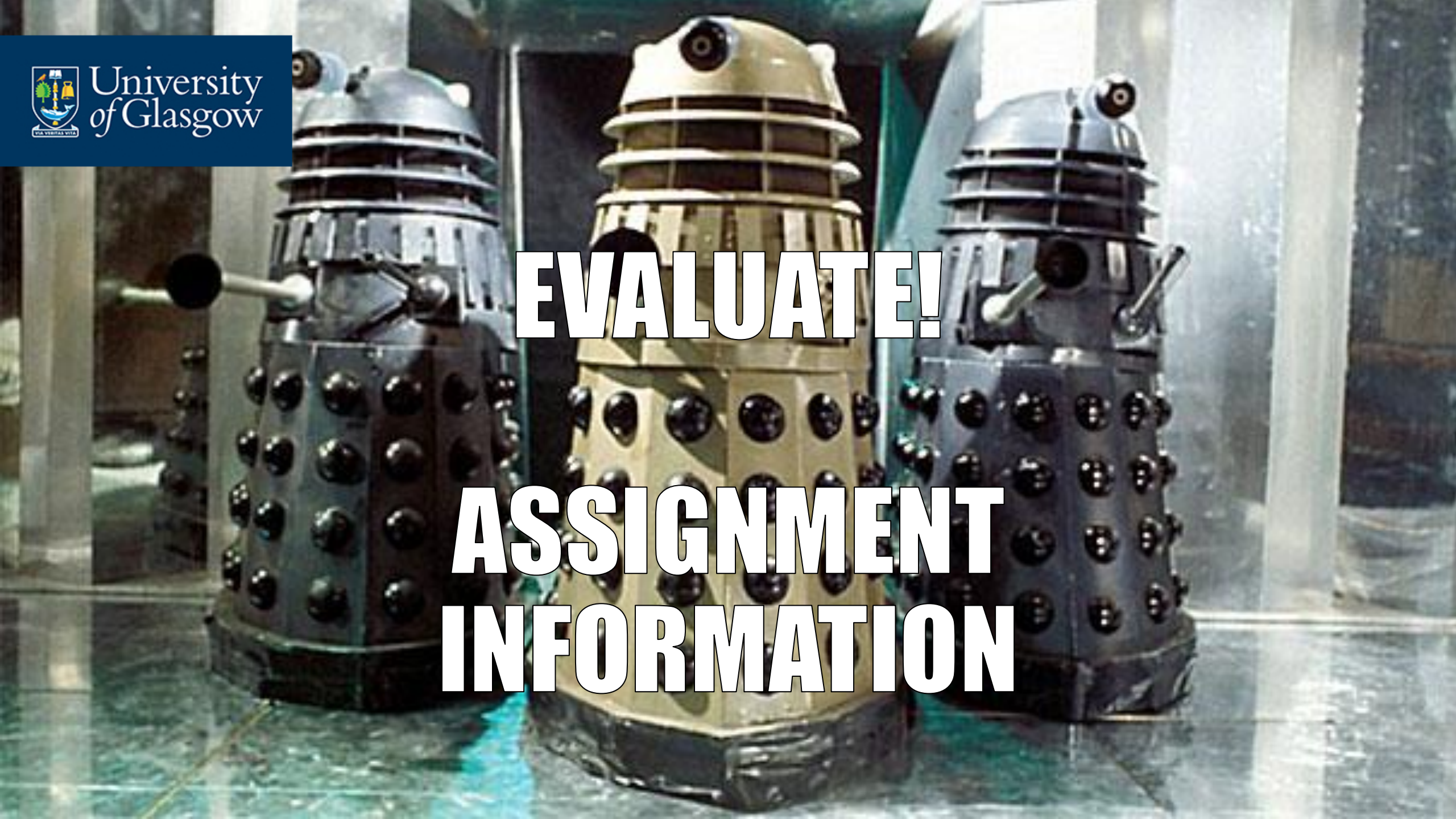
Analysing problems

- Consider the prevalence of the problem.
  - How many evaluators found it?
  - Consider the ease of correcting the problem.
  - Consider the importance of the problem.
- Propose solutions and a ranked list of priority.



Questions?
Comments?
Concerns?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EVALUATE!
ASSIGNMENT INFORMATION

Heuristic Evaluation Assessment

- This assessment is due **18th April**.
  - Extensions are always available.
- It is worth **20%** of your course grade.
- Your marks and feedback will be returned by the end of **12th May**.
- It is a **group** assessment.

Please complete these steps as soon as possible – ideally in the next day or two – so that the other group can start prepping for their video presentation…

This assessment is made up of the following components:

- Select an website from the provided list.
- Design three tasks for participants to complete.
- Have every member of *another* group complete the three tasks.
- Collate evaluator reports and generate a summary table.
- Write a summary of your findings (750 words).
- Contribution statement

Heuristic Evaluation Assessment

•**Interface Selection**

- You will be completing a heuristic evaluation of one of three possible websites.
- Choose one of the following:
  - Yale Art School
  - H&M
  - Guide.com
- Design three short tasks that you will ask evaluators in another group to perform and report their findings on.

Example tasks:

- Find a given piece of content – Find the course speciation for the MSci in Computing Science on the University of Glasgow website.
- Browse a given topic – Find information on video games research on the University of Glasgow website.

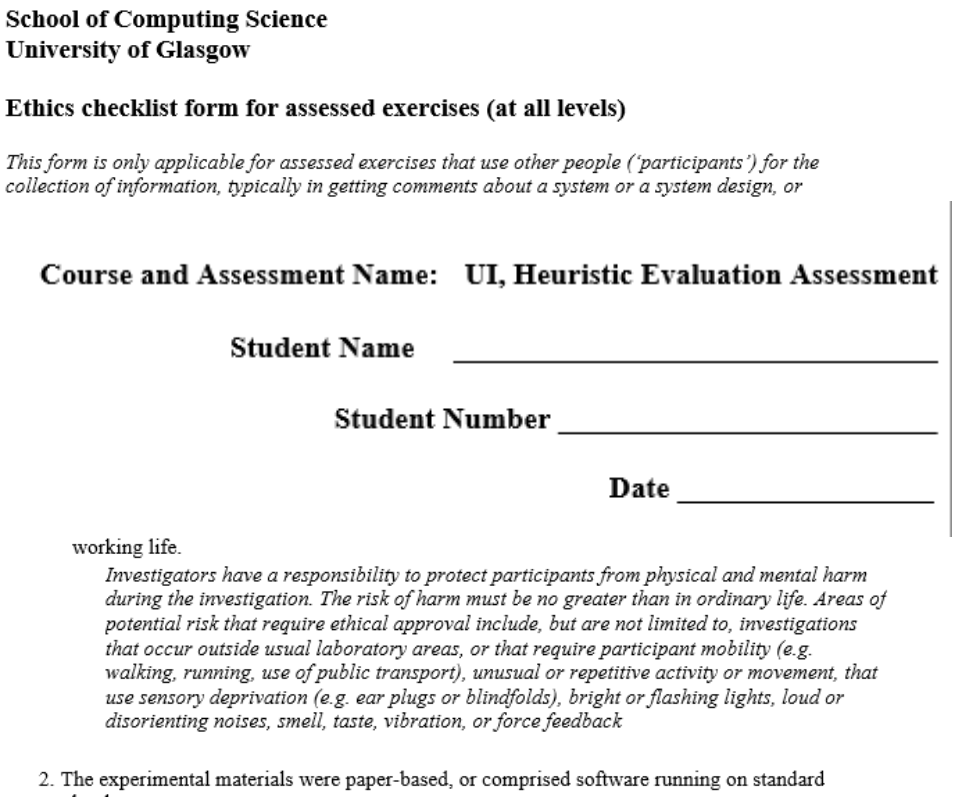
Heuristic Evaluation Assessment

•Evaluator Reports

- Using the Evaluator Report Template, the students in the next group after yours on Teams will act as evaluators in your heuristic evaluation.
- You should collect all their reports for inclusion in your submission.
- You should include all the evaluation reports completed by your group in your submission, too.

Heuristic Evaluation Assessment

- **Heuristic Evaluation**
  - Collate the reports you have collected into a matrix with usability problems on the x-axis and evaluators on the y-axis.
  - Once this is complete, write a summary of the results (up to 750 words) describing the issues uncovered during the evaluation.
  - This should include a summary of the issues and a discussion of priority of each issue.



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Ethics checklist form for assessed exercises (at all levels)

This form is only applicable for assessed exercises that use other people ('participants') for the collection of information, typically in getting comments about a system or a system design, or

Course and Assessment Name: UI, Heuristic Evaluation Assessment

Student Name _____

Student Number _____

Date _____

working life.

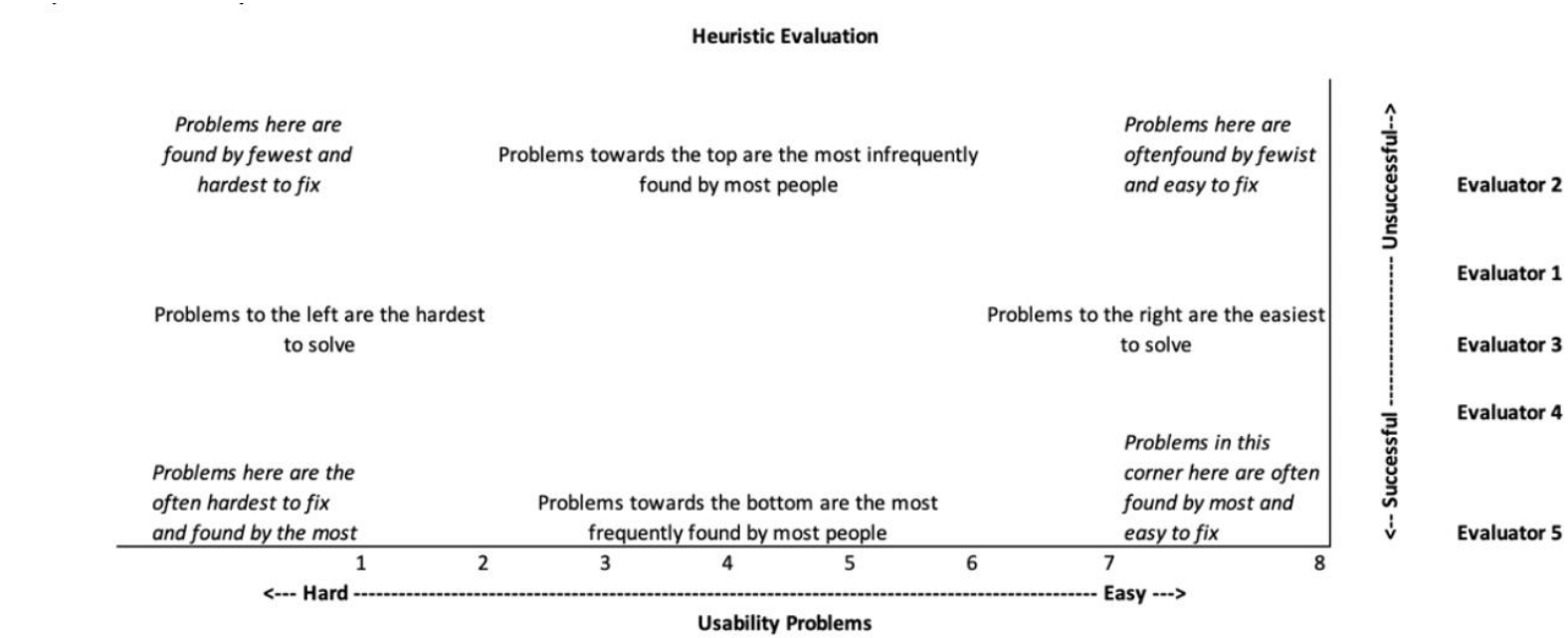
Investigators have a responsibility to protect participants from physical and mental harm during the investigation. The risk of harm must be no greater than in ordinary life. Areas of potential risk that require ethical approval include, but are not limited to, investigations that occur outside usual laboratory areas, or that require participant mobility (e.g. walking, running, use of public transport), unusual or repetitive activity or movement, that use sensory deprivation (e.g. ear plugs or blindfolds), bright or flashing lights, loud or disorienting noises, smell, taste, vibration, or force feedback

2. The experimental materials were paper-based, or comprised software running on standard

Submission Instructions

One member of your group must submit your work on Moodle as a single PDF document that contains:

- Evaluator Reports for your Heuristic Walkthrough
- Summary of Results (Table and up to 750 words)
- Evaluator Reports you have Completed
- Ethics Checklist for Assessed Work (available on Moodle)



Usability Problems *(Note these are examples, but these problems should come from your own work from the other teams evaluation)*

1 Visability of System Status
2 Match Between System and Real World
3 User control and freedom
4 Consistency and standards
5 Error prevention
6 Recognition rather than recall
7 Flexibility and efficenty of use

Presentation Assessment

- This assessment is due **9 April**.
  - Extensions are always available.
- It is worth **5%** of your course grade.
- Your marks and feedback will be returned by the end of **30 April**.
- It is a **group** assessment.

Instructions

- Select **four or five** usability issues that you have identified in your assigned website.
- Record a video of **up to four or five minutes** in duration that demonstrates each of these issues.
- Each issue should be illustrated using **video or screenshots** captured from the website.
- For each issue, **explain which usability heuristic** it relates to, and how.
- For each issue, **suggest how it may be fixed**.

Assessment Criteria	**Marks**
Identifying up to five usability issues based on Nielsen's usability heuristics.	5
Explaining how each of the issue relates to the relevant heuristic.	10
Explaining how each issue may be fixed.	5
Presenting the video in a clear, professional manner, keeping to time, etc.	2

Questions?
Comments?
Concerns?

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User Interaction Topics

- ✅ HCI History and Introduction
- ✅ Usability and Heuristics
- ✅ Heuristic Evaluation and Human Cognition
- Human Perception and Capabilities
- Experimental Design & Variables Research
- Personas and Scenarios
- Surveys in HCI
- Ethnography
- Statical Methods
- Theories in HCI
- Models of Interaction
- Large Scale and Mobile HCI
- User-Centered Design
- Ethics in User Testing
- Revision & Example Exams

Todays Lab Task: Start on Assignment

- Here to answer any questions
- Assignment (Presentation 5% and Written Assessment 20%) should be available on Moodle

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Reading: How to Conduct a Heuristic Evaluation

NN/g Nielsen Norman Group

World Leaders in Research-Based User Experience

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Topics

- Agile
- Design Process
- Ecommerce
- Intranets
- Navigation
- Psychology and UX
- Research Methods
- Study Guides
- User Testing
- Web Usability
- Writing for the Web

▷ See all topics

How to Conduct a Heuristic Evaluation

Summary: Heuristic evaluation involves having a small set of evaluators examine the interface and judge its compliance with recognized usability principles (the "heuristics").

By Jakob Nielsen on November 1, 1994
Topics: Heuristic Evaluation

Share this article:

Heuristic evaluation (Nielsen and Molich, 1990; Nielsen 1994) is a usability engineering method for finding the usability problems in a user interface design so that they can be attended to as part of an iterative design process. Heuristic evaluation involves having a small set of evaluators examine the interface and judge its compliance with recognized usability principles (the "heuristics").

In general, heuristic evaluation is difficult for a single individual to do because one person will never be able to find all the