Name: _____ **Student ID Number:** _____

Signature: _____

CPSC 344 2008W1 Midterm Exam
90 minutes

SOLUTIONS + comments

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Exam Instructions (read carefully):

1. **Sign this page** in the space provided to indicate your agreement with these instructions. (You ***must*** sign to write the exam.)
2. Continue reading these instructions, but **do not open the exam booklet** until you are told to do so by a proctor.
3. Print your **Name** and **Student ID** at the top of each page of the exam **before you start working.**
4. **Cheating is an academic offense.** Your signature on the exam indicates that you **understand** and **agree to** the University's policies regarding cheating on exams.
5. The exam is **closed book**. There are **no aids permitted** (this includes calculators).
6. **Interpret the exam questions as written**. When in doubt, take a strict, literal interpretation of the question.
7. You have **90 minutes** in which to work (~1 min/mark). **Budget your time wisely**.
8. No one will be permitted to leave the exam room during the **last ten minutes** of the exam.

Question	Points	Received
1	12	
2	12	
3	12	*10 pts on distributed exam*
4	16	
5	8	
6	22	
Total	82	*80 pts on distributed exam*

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Question #1 [12 points total]: True/False

For each of the **6 statements** below, indicate whether the statement is true or false by **circling** either **True** or **False**. Briefly **explain** your T/F response in one or two sentences, and illustrate with an example where appropriate. **[2 pts each;** 1 pt for T/F + 1 pt for explanation] *explanation: full credit only for very good ones*

(a) **Statement:** In HCI, we refer to "human error" as a "myth" because in fact, people never make mistakes.

True **False**

Explain:

False. *People do make mistakes - all the time. The question is WHY – it's often because the interface was not designed with their abilities and context in mind, and a better design could have avoided them. In extreme cases, the interface requires humans to do something that's physically impossible for them. Calling it "human error" lays responsibility entirely on the user, when this may be unrealistic.*

(b) **Statement:** Contrary to how it may seem, the mental visual image we hold of a scene is constructed gradually, with attention determining what goes into the image.

True **False**

Explain:

True. *The "parallel" camera metaphor is an inaccurate, even though it seems right. Our focal point is always moving, update is selective and guided by attention. This is how we can visually miss so much. (must reference "how it seems" in explanation).*

(c) **Statement:** The secretary who processes all the expense reports filed by faculty and students in a department is an *object* of the task of expense report processing in that department.

True **False**

Explain:

True. *While we don't like to refer to people as objects, in this case the secretary is a resource or "task object" because the task depends on her special skills, job description and/or access privileges*

(d) **Statement:** Statement: The *gulfs of execution and evaluation* (Norman) are part of a model that is useful for understanding (in particular) expert, rather than novice, interface use.

True **False**

Explain:

False. *Norman's model of Goal-Oriented Action is focused on exploratory use; it is not going to be that applicable to expert use. 0 pts for explanation of "Applies to all users" (implication: equally applicable to all).*

(e) **Statement:** As designers, we use evaluation tools aimed at understanding a user's *mental model* of an interaction, so we can then modify the user's mental model when we see it is incorrect.

True **False**

Explain:

False. *Designers can influence user's mental models only indirectly; we only have direct control over the system image.*

(f) **Statement:** One way a designer can build the *affordances* of an interaction is by using constraints.

True **False**

Explain:

True. *Visible constraints are a way of revealing affordances, because they highlight the "negative" space of what is not possible; or said another way, they indicate (helpfully) limits on what* is *possible. Of course, this is true only if the constraints are perceivable to the user as he/she assesses the interface and forms action goals. 0 pts for just giving an example; an explanation was also required.*

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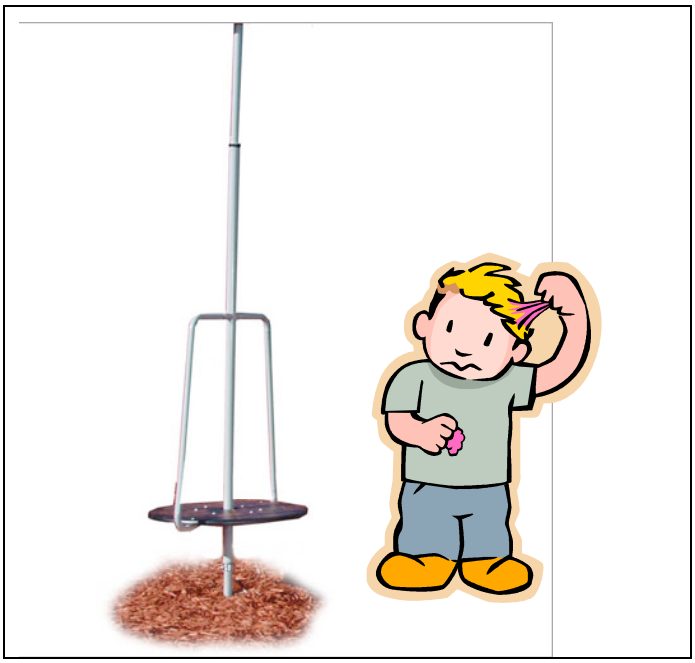
Question #2 [12 points total]: Design Concepts



A 5-year-old child (indicated by the cartoon figure in the figure) encounters the structure shown in the photograph on left side of figure, in the middle of a park. He has not seen anything like it before.

(You can ignore the bubble gum in the child's hair, and just focus on the confused expression on his face ☺).

The structure's height relative to the child's size is as indicated in the figure. No other children are around.

Four design concepts are listed below. For each, describe how one aspect of the structure or situation **which is referenced by this concept** could *influence*, or conversely *fail to influence* this child as he decides whether, why and how to interact with the structure. **[up to 3 pts per concept]**

(a) Affordance:

FOR ALL ANSWERS: full credit only for excellent answers.

(a): Many possible good answers; it was easier to provide an excellent answer by offering multiple examples. E.g.

- *bars at the arm/shoulder height are about the right height for pulling up and holding onto*
- *the platform at knee height suggests climbing onto (sitting: just 1 pt. legs would drag!)*
- *roundness (might) suggest spinning*
- *However, the bars don't have handholds, so the grasping part might be unclear*

(b) Feedback:

When he climbs onto it, it moves easily. Leaning in and out makes it spin faster and slower. If these movements are enjoyable, this helps him learn how to play with it, without having to be shown or told.

For full marks, needed to include how the user utilized the feedback (e.g. enjoyable motion -> play more)

(c) Transfer:

Since he hasn't seen this before, there might not be transfer; also, he doesn't get to watch what other children do with it. (Answers which suggest he has seen spinning things in other domains work).

An answer of "no transfer occurred" needed to be backed up with rationale such as above.

(d) Individual differences:

The structure is oriented towards his height. If it were smaller and taller relative to his size, the same actions might not be clear to him. For full marks, needed to provide some elaboration.

Question #3 [12 points total]: Mental Models

Contrast *structural* versus *functional* mental models:

(a) Explain the difference between structural and functional mental models *[2 pts]:*

A structural model presents an image of WHAT the system is; a functional (action-based) model describes HOW it is used.

For each model, 1 point if the given definition matches the meaning of the sample solution (what the system is; how its components are laid out and are interrelated; etc.)

- *structural: not sufficient to only say "how the system works", as this leaves certain structural aspects unclear (-1/2)*
- *structural: not sufficient to only say "what the system looks like", as this is a superficial "map" definition (-1/2)*
- *structural: incorrect (0) if it is implied that the model describes use (this is a functional model)*
- *functional: must describe that it is action-based, provides a step-by-step flow, etc. for full marks*
- *-1/2 in all cases for erroneous extraneous information*

(b) State one good and one bad aspect of EACH *[2 pt each]:*

Structural:

Functional:

Structural: *For example,*
- User may need additional knowledge to use
- may be harder to use generally.
+ often more powerful or flexible (more global knowledge

Functional: *For example,*
+ easier to use, does not assume global/system knowledge
- not helpful for problem-solving or dealing with unexpected

Each advantage/disadvantage marked out of 1. Full marks for clear identification.

- *complete reversal of advantages/disadvantages between structural and functional are acceptable if they are explained (i.e., "harder vs. easier" requires clarification)*
- *1/2 marks for vague answers that are not given in the context of the models (the question asks for a good and bad aspect of each)*

(c) Give one example of EACH. Minimal points for repeating examples given in class *[3 pts each]:*

Structural:

Functional:

Examples given in class are listed here. To get full marks, example must be spot-on and clearly explained. Max 1 point per example if repeat class examples.

***Structural**: road map (shows a particular type of information, but isn't customized to your particular use of the information. You can use it in many ways; it gives you a global view of the information.*

***Functional**: Google directions (step-by-step): great when everything's there; need more when there's a roadblock. If something goes wrong or you change your plan, they do not help your error recovery. [Many kinds of step-by-step manuals or 'wizards' would be acceptable answer here.]*

Full marks if a clear example is given with a correct explanation of what makes it structural/functional

- *1/3 given for repetitions from lecture (maps, directions)*
- *structural: 1/3 for identifying the "overview" aspect of the example (e.g., layout of things in my kitchen); explanation about how this guides/drives the model required for 3 points*
- *functional: full marks for accurate examples if they mention guidance, step-by-step progress, and roadblocks to troubleshooting or some other clear reason that the example is functional (or if they mention this in an answer to a different part of the question)*
- *-1 in all cases for erroneous extraneous information*

Question #4 [16 points total]: Discussion Questions

(a) Subjective evaluation **[5 pts total]:**

*Give one example of a **subjective evaluation metric** [1 pt]:*

*Answer must be **subjective** (half) and **metric** (half). Half marks for orderable, multi-choice questions. Likert scale is ideal (e.g. "From 1-5, how much did you like Interface A?"), as it's metric(-like) and often asks for subjective information (users' opinions, feelings, etc.)*

Explain what makes it subjective [2 pts]:

*The data relies on **personal experience**, opinions, or attitudes, and it **cannot be observed objectively**. The data is self-reported.*

Describe a situation in which this type of data would be particularly valuable [2 pts]:

*Subjective data (one and a half) is valuable when you seek information about attitudes, interpretation of behavior you've observed, and when objective data cannot be obtained. A metric (half) would be useful for easily compiling and comparing the data (as it exists along a common scale/categories). **Subjective data can be quantitative or qualitative.***

(b) Quantitative evaluation **[5 pts total]:**

*Give one example of a **quantitative evaluation technique** [1 pt]:*

*Any technique in which **data is captured in a numerical form**; rated, ordered, measured (e.g. performance speed, # of errors). Allowed Likert, though they're a little tricky.*

Explain what makes it quantitative [2 pts]:

*It is quantitative because data can be described on a **numerical scale**; it's more easily compared or compiled.*

Describe a situation in which this type of technique would be particularly valuable [2 pts]:

*Quantitative data is valuable for **comparing** data from different situations (e.g. how do you know one system is better than another), **compiling** data, and for **analysis** and summary **statistics**. Again, **quantitative data can be subjective or objective**.*

(c) Describe ***cognitive walkthrough*** by describing its following aspects: **[6 pts total]**

Consists of [2 pts]:

Goals [2 pts]:

When in the design process it is most useful [2 pts]:

Consists of: ***description/prototype*** *of interface,* ***task examples and actions*** *necessary to complete them,* ***users or experimenters*** *that try to perform tasks using the interface, and* ***questions to ask*** *at each step (see http://www.pages.drexel.edu/~zwz22/CognWalk.htm)*

Goals: to understand if and ***how users learn*** *to accomplish tasks with the interface (i.e. the degree to which the prototype establishes a helpful mental model in the user), and any* ***problems that may come up*** *while learning.*

When: It is most useful ***in early design*** *(even with a description of the interface, or partial prototype), to* ***establish the large parameters*** *of the design.*

Questions 5-6 are based on the following design brief.

Your design team has been retained by a university researcher (for a fee) to design the interface for a new web-based recruitment and reservation system for psychology experiments (known by the internal name "**SubjectSignupNow**"). This system will be used by university graduate students and staff running user experiments, the staff managing the experiment rooms and equipment, and the subjects (mainly students) who participate in these experiments.

In the past, experimenters have used email and posters to recruit and sign up subjects, who are compensated with a monetary payment, course credit, or the satisfaction of a job well done. However, these methods are not good for developing and accessing a subject pool. Furthermore, subjects and experimenters alike find it cumbersome to use. For whatever reason, not very many subjects have been signing up lately.

Your client (the researcher), having noticed how much students these days use cell phones, has told you it's very important that students be able to view available experiment opportunities and sign up for them using a mobile networked device (i.e. mobile phone with internet access).

Your team is right at the start of the design process for **SubjectSignupNow**. And while you are excited about the project, you are also concerned that your client might not completely understand either the source of the problems observed with current method, or the implications of the suggested new approach.

Question #5 [8 points total]: Stakeholders

(a) **List** 4 important stakeholders, given the information provided in the design brief. Be specific in your answer: e.g. clearly identify demographic characteristics when relevant.

Then, **justify them:** for each stakeholder you list, state in 1 sentence **what makes this role important**. You do not need to identify their potential needs and concerns beyond this justification. **[1.5 pts each;** up to **2 additional pts total** for exceptional insight]

Example (probably not the most important one!)**:** ***"Significant others" of potential subjects****: may want to know if an experiment is* really *the reason for a cancelled date.*

1.

2.

3.

4.

.5 pt for stakeholder; 1 pt for justification. Reasonable answers accepted. E.g.:

- the students (potential subjects); the researcher, both as employer and as user of the utility; the experimenters (grad students and staff); the facility managers; the granting agency; the university ethics board, who may be concerned about the recruiting procedure followed; instructors giving course credit. Keep points low. Most of the stakeholders are identified in design brief. Emphasis on good justification.

+1 (extra) for mentioning ethics.

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Question #6 [22 points total]: Pre-Design Activities

(a) In 1-2 sentences, explain why it is wise to use more than one such activity to understand what is involved in the process that this new interface will support **[3 pts]:**

No one activity will accommodate all your pre-design evaluation needs, because all evaluation activities suffer from some flaw or limitation; instead you must use a variety of approaches to look at a question from different perspectives.

NOTE: this is called "triangulation" but we didn't dwell on that term in 2008 – term not required.

Was looking (in particular) for "complementing of strengths and weaknesses". Each evaluation method has different strengths and weakness, which results in faulty (patchy or erroneous) data if you use just one type. By using different methods, your view becomes more robust.

Another good reason, more commonly mentioned, is to access different user groups, address different questions, etc. in that different methods might be more suited to different groups (e.g. researchers vs potential subjects. "Get more data that way" was not, by itself, a good answer. Obviously, you can get large amounts of data with a single method if you use it enough.

(b) What are the most immediately appropriate activities that you, as a trained HCI designer, could do in this stage to learn how this interface should work (or even if it's a good idea)? You will want to address the concerns noted in the design brief, both those of the client and those of the design team.

In each case, state (1) the **specific goal** of the activity (including how it addresses a noted concern), (2) the **type of activity**, (3) the **makeup of the group** you'd access, (4) how you'd **contact** them, (5) **most important things you'd ask/show** them; and (6) **potential problems** with this approach that you must be aware of and try to address.

Ensure that the various parts of your answer are clear (**name/ number them as in example**).

[8 pts per activity and description; up to 3 pts more, total, for highly insightful responses]

Example response (if you use this activity or goal, other parts of your answer should be quite different):

Activity X:

1. *Goal: To understand what is keeping students from signing up with the present system.*
2. *Type: Anonymous web survey.*
3. *Makeup: Members of a psychology course which gives extra credit for experiment participation.*
4. *Contact: by email (list shared by the course instructor, on condition of appropriate use).*
5. *Questions: history of performing evaluations; awareness of posted experiments; reasons for not signing up; difficulty of learning of experiments/signing up; would proposed web-based system, cell phone access help; any other suggestions?*

6. Potential problems: Addressees need incentive to respond to survey; potential inaccuracy or bias in self-reporting; if students have not yet tried to sign up, might not learn much from them; accessing only one type of potential subjects (those who would be compensated with course credit.)

To get full base credit, must have basically appropriate answers at the detail level of example: 1 pt each for 1-4, 2 pt each for 5-6. To get add'l 3 pts, must have exceptional choices, rationale, insight into issues; and in particular, nice coverage across all methods (the example provided plus your two) was rewarded here.

More observations, accumulated during marking:

- ***Choosing your evaluation goals**: Strategize! You are looking for high value. What are the MOST IMPORTANT things you need to learn? In early design, don't focus on details. Activities should complement one another so together they cover your most important need-to-know items. So, e.g. seeking details of how people respond to text messages (in general) is of low relevance. Text solicitation for experiments wasn't even mentioned (we spoke of sign-ups) and while it is one possible approach, you first need to know why people aren't signing up now.*
- ***Choosing your sample**: your subjects need to be people who have the information you need. For example, why would you ask a general sample of all university students why they don't sign up? (A common answer). Most of these students probably have never heard of the system.*
- ***Sampling your demographic**: there are other drawbacks to having large samples (e.g. "whole university"). For example, if you are solicited to participate in a survey and you are aware that you are just one of thousands, you may be less likely to participate because your input does not feel important. When you are aware you are part of a more selective sample, and you are persuaded that your input is particularly valuable in some way, this helps.*
- ***Contacting your sample**: just saying "email" no good. How will you get those email /phone addresses? If everyone did what you're proposing to do, this would be a huge source of spam, reducing its value/impact. There were a LOT of responses that said "we'll use the emergency contact registry" or "contact through student services". What makes you think you have access to these lists? Do you get other communications through them? What would it do to the emergency contact service if it got clogged with spam? Indiscriminate bombardment is what telemarketers do.*
- ***Anonymity**: there are cases where respondents don't need to be anonymous. For example, when they are the clients … More complex case is when the information they yield is useless if you can't follow up on it. In this case, taking great pains to anonymize researcher respondents is probably misplaced effort, unless you imagine their responses might reflect badly upon them to their boss.*
- ***Incentives:** are a double-edged sword. If you offer an incentive that has potential of offending, this reduce recruitment. (e.g. Starbucks card: some people have principled objections to this business, and an assumption that "everyone loves Starbucks" is an example of experimenter bias.)*
- ***Asking questions about the "new" system in pre-design**: You don't even have requirements yet – that will presumably come out of pre-design evaluations; you certainly don't have much information about the new system. Asking users, either researchers or potential subjects, what they think about the new system is not likely to yield valuable data. What are they supposed to base their responses on?*