Sample excellent answers for
INFO 345 SP 08
Final Exam.
Watch the video at http://youtube.com/watch?v=XXoM_9aEgtg and tell us, using ideas we've discussed in class, what the problem is.

**Problem:** As the woman towards the end of the video indicates as she tries to recover from her embarrassment, the glass is “too clean”, and the metal frames on the sides make it appear like it’s an exit. Also, users’ attention is divided, and they, naturally, don’t focus 100% of their attention in trying to notice the very subtly highlighted frames around the door.

**Norman** emphasizes that when people have trouble with a particular design, it’s not their fault, but it’s the fault of the design, and this is true for this case as well.

**Affordances:** The designers of the door, or the store manager, is obviously putting more emphasis on the aesthetics than usability hence not enough care is given to making sure that appropriate actions are perceptible and inappropriate one are invincible (in this case exiting through the glass).

To fix this design weakness, they should use the type of doors that automatically open in response to motion stimuli.

**Constraints:** The door is not designed to be used with user errors and to prevent people from crashing. Design the door in such a way that accounts for user errors, with a proper feedback mechanism, or warning signs.

**Visibility:** The correct parts must be visible and they must convey the correct message. With clear glass surfaces being used as doors, the designers must provide signals that naturally indicate where to push/pull, and the purpose of the design. (Stickers or more opaque glass might work)

**Mapping:** Mappings between what the users wants to do and what appears to be possible is weak.

Figuring out how to control the exiting process is hard because nothing is visible to give the slightest hint. As a result, people rely on user mapping of walking through a clear, bright view of the outside with exiting the store, which in turn causes them to make the error of crashing into the glass surface.

(4 pts) Below is a diagram from an early version of a paper that we recently submitted to a conference on CSCW. Explain why this is not a good way to think about the relationship between effectiveness and playfulness, and suggest a better way.

Putting effectiveness and playfulness on opposite sides of the spectrum is not correct because many designs benefit from the combination of the two, such as the designs for education for youngsters or many of the social interaction tools. Instead, I suggest the above diagram works better because I think incorporating playfulness into the interface enhances user engagement, experience and better yet the perception of the design and the brand/product. Apple for example makes full use of this playfulness across their device and desktop designs. On the iPhone, deleting photos is made a “playful activity” by lifting up the lid of a virtual trashcan which receives the deleted image in the form of a genie and then wobbles slightly when the task is completed. Apple is only one of the many brand examples I can think of who has very well increased their user satisfaction through incorporation of playfulness to effectiveness of the design.
(4 pts) Explain how the logo presented here uses, or does not use, the graphic design ideas we talked about in class from Robin Williams.

- Heavy use of alignment
  - "c p b" all have circular center shapes, which are aligned horizontally and spaced evenly within the blue square
  - Stick on the "p" is the left-alignment location for the text below
  - "c p b" is centered vertically within the blue square

- Proximity
  - The acronym (cpb) and text are grouped mentally because of their close placement

- Contrast
  - Text below the blue square is all the same font size
  - Acronym is the same font, with a different size and inverted color

- Repetition
  - sticks on "p" and "b" are parallel to the vertical square edges
  - The circles in the center of the letters are repeated symbols (hence the use of the lowercase b instead of the uppercase one)

I think their design could be improved by using the design to the right, however, because this would repeat the CPB horizontal pattern vertically, and would align the capital letters in the full words.

(4 pts) Read the article at http://www.wired.com/techbiz/people/magazine/15-08/st_thompson about ambient awareness. Then, briefly describe how ambient technologies relate to ideas from cognitive science that we talked about earlier in the semester.

In general, information that comes in the form of an unwelcome interruption is resisted or ignored. Ambient displays make information available without immediate interruption by:

- Enhancing perception
  - Invisible information such as the varying price of electricity can be made visible
  - Directly mapping the value of data to something we can perceive without cognition from a sense (ex. sending text messages to remind people of the prices requires them to see, read, understand and evaluate; shades and colors are an innate part of seeing that association has been made)

- Eliciting attention when it is available
  - As opposed to direct communication, ambient displays make information readily available all the time, delivering it repeatedly and whenever the user is able to be interrupted
  - Ambient displays can be peacefully ignored if something more pressing is being done, but they are persistent enough to be a constant reminder

- Memory
  - By working over time, users don’t have to remember anything in order to use the information; it’s always available, (unlike a text message or email, which I know I frequently read then forget to do anything about)
(8 pts) Watch the (very cool) video about the multitouch touchscreen at http://www.youtube.com/watch?v=ysEVwa-vHM&feature=related and tell us how it relates to ideas we’ve talked about in class. Be sure to relate it to the gulf of execution and evaluation, and to at least two other ideas we’ve talked about.

Most of the software running on this large multi-touch screen takes advantage of the huge amount of screen real estate and the ability to easily traverse three-dimensional space. This enables them to excel in terms of the principle of visibility, where most information is visible or apparent on screen. This is in contrast to many typical desktop applications that hide information behind different tabs/windows, conceal commands in menus, etc. A nice example of this is the tree view, where a large set of information is displayed in the form of a tree hierarchy. The user can quickly traverse the set of information and zoom in to see more detail and edit and add nodes of information. Even if part of the tree is not visible on screen in this example, the user has a very understandable mental model of the information and can traverse back or zoom out to the next point of interest. This display can also be evaluated in terms of memory principles. It does a great job of not requiring a user to remember information by replacing memory with visual information. For example, when adding information to a new node in the tree, the user doesn’t have to remember what was in the parent node because it is still visually represented on screen and connected above the new node.

I’ll argue that one potential downside is that possible actions are not always evident to the first-time user. The users in these demonstrations make a point to show off their multi-finger gestures, and I wholeheartedly agree that they have implemented powerful techniques with natural mappings. However, the user still has to learn these gestures. Walking up to the display for the first time, I would not know exactly how to control pan/zoom/tilt/etc. in a map or three-dimensional space. I personally might have a good guess based on the increasingly common set of gestures for multi-touch displays like pinching in/out to zoom out/in on the Apple iPhone or Microsoft Surface, but few people would immediately know to plant two fingers of one hand and use the other to control tilt. Thus, the system’s interaction possibilities and the user’s perceived possibilities may not be in sync, leading to a larger gulf of execution. In opposition to my argument, the experienced user of the system probably feels a very direct link between intention and execution, but the fact remains that a new user may have a hard time translating a psychological goal (e.g. look at this house from the north) into a physical action sequence (e.g. plant left two fingers in vertical orientation and swipe right hand to the left... or was that supposed to be rotating the right hand...).

Whereas the gulf of execution is more about system input, where the user is translating goals to actions, the gulf of evaluation is more about system feedback, where the user is responding to system response and perceiving system state. The gulf of evaluation is the gap between the system’s representations and the user’s ability to directly perceive and interpret them. The software on this large multi-touch screen almost always depicts a highly visual representation of its system state, whether it be the location and zoom level of a map, the number and content of nodes in a tree, or which photos have been selected in a group. Thus, it is easy and quick for the user to determine the system state, and there is small gulf of evaluation.
Give a common application (that has nothing to do with photo collection management) that would be better on a large multitouch screen than on current interfaces, and briefly explain why.

Music composition applications would benefit hugely from having a large multitouch screen. Currently, music composition takes place with traditional keyboard and mouse inputs. Users click on the staff to add notes and often click on floating menu to specify note length and type. To speed up the process, composition applications often employ a full range of shortcut keys that allow a trained composer to free themselves of the mouse and input notes using just the keyboard. However to notate other markings, the composer generally still must have mouse input. A music composition application would be able to take advantage of the increased gestural inputs. This would be allowed by the increased input bandwidth of a multitouch device (Wu et al. 1993). Users of the system would be able to quickly input notes with a simple tap gesture and be able to specify note type with other multi-fingered gliding or swiping. Composers could also use other input gestures including palm or hand swiping and shaping. Composing incorporates many different tools and aspects that the traditional keyboard and mouse input has serious limitations and do not map over well to the screen. The increased input bandwidth of a multitouch screen can allow composers to more easily input notes and manipulate notations.

Wu et al. 2003.

Then give one common application that would be much worse on a large multitouch screen than on currently used interfaces, and briefly explain why.

Word processing is less suitable for a large multitouch screen. Users have developed a skill for using a keyboard for input and have become exceptionally proficient in text entry. Keyboard entry has also become the standard for word processing to the extent that multitouch screens, such as the one in the video, require a popup on-screen keyboard to input text. However, there are alternatives to keyboard entry, many of which have been explored with the emergence of tablet PCs from handwriting/voice recognition to alternative keyboards using stroking entry. However these alternatives require significant extra training and often have resulted in slower words-per-minute speed than keyboard typing. Using a multitouch screen with keyboard popup screen is a problematic substitute for a traditional keyboard. The most obvious is the lack of feedback the keyboard provides. The instant feedback of a depressed key is hard to mimic, if at all, on a touchscreen. Even if the screen is able to provide a vibrating key indicator when touched, the tactile feel of a key is missing. Similarly, if the touchscreen is not carefully designed, it may register accidental input when the user did not wish to, since there is no physical key to depress.

(10 pts) Discuss why, how, and how well your project currently uses (or avoids) metaphors, idioms, and affordances in its interface. Use ideas from Cooper and Norman to support your discussion.

Metaphors

My project uses metaphors to guide the user to know how to act with the interface of DeTour at first sight intuitively, without having to learn anything. For example, the main menu lists six main options, shown at left. Given this screen on a cell phone, the user would intuitively know that to choose an option, they could simply press the number of the option they wanted. Having such a numeric listing of options makes the interface metaphoric in the sense that most users will easily perceive a relationship between the numbers on their keypad and the choices present on the screen, thus enabling the user to use DeTour more readily and quickly and giving us a reason to use metaphor in our interface. According to Cooper, metaphors "rely on the associations perceived in similar ways by both the designer and the user. If the user doesn't have the same cultural background as the designer, it is easy for metaphors to fail" (Cooper 272). In our case, we expected the user to see the appropriate association between their cell phone and the screen. However, even if they did not, we designed our interface in mind of the chance for the metaphor to fail by allowing the user to also traditionally scroll up and down to make their selection. The advantage in using metaphor to such a deep depth is to make our interface as intuitive as possible, and thus easy to use and fast, for any user.

Idioms

My project uses idioms to convey to the user information that we could not using metaphors. One major example of this is the panning interface. We were confused on how to enable users to pan a map on a cell phone with such a limited number of keys, and also allow them to zoom as well. We decided to keep the conventional up/down buttons for zooming. For panning, we decided to take a new approach and use the four numeric buttons - 2, 4, 6, 8 - to pan up, left, right, and down respectively. Looking at a keypad, this is easily learned after the first time doing it - thus following the definition of an idiom requiring to be learned. According to Cooper, "All idioms must be learned; good idioms need to be learned only once" (Cooper 275). We believe that with the screen (at right) we provide to users of DeTour, our implementation meets this definition and needs to be learned once and used efficiently thereafter. The reason for using this idiom is to try to incorporate a feature that would be nearly impossible to do without an idiom, other than adding more hardware of course or changing the interface (i.e. touch). However, we wanted to make our project mainstream and thus be designed for a cell phone, since not everybody has an iPhone yet.

Affordances

Because our project was cell-phone based, we found it rather hard to incorporate the idea behind affordances anywhere. In the real implementation of DeTour, one way in which we could incorporate this idea would be to have a transition so that if the button corresponding to a choice is being pressed, it actually seems that it is being pressed. This fits into Cooper's idea of the contract between the user and designer: "When we render a button on the screen, we are making a contract with the user that the button will visually change when she pushes it" (Cooper 285). The benefit in using affordances in our interface is to take advantage of interactions the user sees naturally, inherent to the action they are doing, and therefore increase user satisfaction.

References: Cooper Chapter 13
In his classic CSCW article “Groupware: Eight Challenges for Developers” (that was assigned for Jeremy’s lecture), Jonathan Grudin mentions eight challenges that developers of CSCW systems face. Think about your own group project in relation to these eight challenges. Explain how two of his challenges applied to your project, and how your design addresses these challenges, using ideas from Jeremy’s lecture and our larger design vocabulary.

Of the eight challenges that Grudin mentions in his article, the following two are most applicable to my group project:

- **Disruption of social processes.** Groupware can lead to activity that violates social taboos, threatens existing political structures, or otherwise demotivates users crucial to its success.

- **The adoption process.** Groupware requires more careful implementation (introduction) in the workplace the product developers have confronted.

The latter problem, the adoption process, was actually the first one to be addressed by our group. When we began the project of creating a touchscreen poker table, we had envisioned our target users to be individuals who enjoyed playing poker at the home, in school dorms, in frats, and other more private non-commercial settings. However, immediately, we were confronted with the viability of those ideas, and we decided that we had to reconsider the adoption process. Where could this table actually exist and be used? We came to the conclusion that restaurants and bars would be the most likely places. After our latest user testing for our final project, we considered other places like sports bars and arcades as well. From Jeremy’s lecture, we remembered that part of designing for more than one user is making sure that our product has potential to achieve critical mass in usage. If there were not many places that wanted this table or could afford it, there is no use for one lone individual to buy the table and play by him or herself. Last but not least, Norman strongly recommends that we produce user centered design. Especially since the poker table would be used by people: with a wide range of ages, having different technical experiences, varying usage settings and contexts, and purposes, it will be important to make use of what Norman calls “natural properties” of people and of the world. For instance, we are to exploit natural relationships (e.g. mapping, affordances, etc.) and constraints, try to avoid labels, make things visible, and provide feedback.

The former challenge, the disruption of social processes, evolved from the change we made in the setting and user. Since the touchscreen poker table we were designing would be moved from the setting of the home to the restaurant or bar, we would need to consider the context. In most cases, people eat out and go out in groups in order to have fun in groups and to experience social interactions. As designers, we needed to make sure that this was what still happened amongst groups. Therefore, during our table interface designs, we constantly prompted ourselves to consider the question, “Does this help our user achieve his or her goal in having fun and interacting with the group he or she is with?” We wanted the system to share knowledge and information to a certain extent with other users, whether it be the table tutorial, the game moves, or poker chip numbers. We also wanted to give the users a certain amount of flexibility and control so that the interactions around the game were not strictly structured. Through a loosely structured interaction with the game, our project would still allow for users to carry on with their social interactions. For example, we debated over whether we wanted to put the poker tutorial in the center for the entire group at the table to view, or if we wanted to keep it to individual privacy screens. We felt that if too much information was placed on individual private screens on the table, there would be disconnect between the players, which would hinder their communication and social interactions. Though we decided to make the poker tutorial individually viewable, the application would be programmed so that everyone would have to wait for every person to finish the tutorial before continuing to a game together. Though this may seem annoying, from Jeremy’s lecture, we see that it could help to create a shared experience, joint starting points, and awareness of other user’s presence.

Jeremy’s classification model, which I have filled in with tasks related to the touchscreen poker table project:
(0 pts) Do a heuristic evaluation of the Just the Facts website. Be sure to make it clear what the problems are, why they are problems, and how you found them (i.e., the heuristic you used). Shoot for five problems minimum. Based on people's reactions to the site, it shouldn't be hard.

Heuristic: Help users recognize, diagnose, and recover from errors, Severity: 4
Problem: I received the following message when trying to submit my class request:

![Error Message]

I had no clue what the problem was. Because the error message did not state something friendly or informative such as "There are too many requests, please submit your request later," I ended up altering my request because I thought it was something wrong with my "cart."

Heuristic: Error prevention: 2
Problem: The system allows me to "place in my cart" a class that overlaps with another class's time, however, only upon "checkout" does it notify me that it is not possible to checkout with overlapping times (this was a feature that was allowed in the previous generation of JTF). In a system that takes a very long time (under heavy load) to get from screen to screen, preventing me from placing this class in my cart would have saved me much pain.

Heuristic: User Control and Freedom: 3
Problem: Even though the system blocked me from submitting a class that overlapped with another, it ended up submitting all the other classes I had in my cart. Now, you would think that was a nice thing to do, however, the system decided (seemingly at random) to submit one of the overlapping classes for me. Because this entire process has to do with making a time-based schedule, when submitting a cart full of classes, it should be an all-or-nothing type transaction. If all classes aren't submitted, there may be major changes necessary when "redoing" the classes that were left behind. I really felt that the system took away my control and was not an easy process to go in and drop all the classes so I could start over.

Heuristic: Flexibility and efficiency of use: 2
Problem: When a class is in your cart, there is no way to change the section number or "edit details" of the class. In my case, I had to empty my entire cart and re-login to the system to make any changes. There should be a quick and easy way to edit the class (i.e. section details) without the need of start over from an empty cart.

Heuristic: Visibility of system status: 3
Problem: This is a failed attempt of doing something correct. During my scheduled time for enrolling in courses I would submit a request and the "processing" gif image would continually blink, even though the system was stalled. Even if the system was actually not "stalled" or frozen, it gave me the impression that it was frozen. Essentially, it was a FAIL.
The Day-Timer planner company has asked you to design a technological artifact that uses aspects of persuasion to help people do a better job of managing their time. They want you to create an initial proposal that describes:

1) What is it?
2) Why will people want to use it?
3) What persuasive techniques does it use to help people manage their time (and convince them to keep using it)?
4) What does it look like? (sketches/a paper prototype is fine).

There are no restrictions on the implementation of the artifact; it could be a run on your cell phone, your desktop, a Facebook application, an ambient display, or something entirely new. However, they would like this artifact to be fundamentally different from a day planner or organizer. A to-do list that says “good job!” when you check an item off is not what they’re looking for.

The planner is a device that looks like a digital picture frame. However instead of there being a digital picture inside, there is a touch screen that functions similar to an I-phone. The device can come in either a small or big size. This device is mainly useful for major activities and events that a person needs to do, however a person can enter any information that they would like to be reminded to do. There is a specific way that you need to purchase this device. If it costs $100, you have to put down at least $500. Four-hundred of the five-hundred dollars that you put down gets put into a small bank account that is set up to be connected to your specific device. If you complete the important things that you are supposed to do by the set deadline you entered into the device, a signal gets sent to the bank and a certain amount of money is instantly put back on to the debit card you link the to the account. The person cannot access money from this account any other way than through completing tasks. While this money is sitting in the bank, you are earning a small profit, however if you don’t complete the task by the set deadline, you loose money that you cannot earn back, the amount depends on how big or small the task is. You can set as many reminders on the device as you want to. The reminders can be in many different forms. For example, you are able to have a voice recording or video recording that shows a person who motivates you telling you to complete the task.

The persuasive techniques my time management device uses are:

1. “Response Shaping”: An attempt to shape an audience’s behavior by teaching that acting a certain way and doing specific things can offer positive rewards. The behavior is completing the task, and the reward is receiving money.
2. “Response Reinforcing”: If the people in the audience have positive attitude towards a subject, the Persuader reminds them about the positive attitudes and stimulates them to feel even more strongly by demonstrating their attitude through specific forms of behavior. By setting reminders to do tasks, you are reminding yourself about the positive outcomes of completing tasks which will reinforce you to do it.

Source: www.angelfire.com/un/jrl1/lecture2.ppt
Multiple colored frames: or comes in 3 sizes:

- SMALL
- MEDIUM
- LARGE

Touch screen to type:

<table>
<thead>
<tr>
<th>TO DO:</th>
<th>DATE &amp; TIME:</th>
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Yes, I get it. Sizes. Good.
Example of Reminder Video:

REMINDER: MAY 2, 2008 12:00 PM

Do your take home final or you will lose $100!

Completion of Task:

To Do:

☑ COMM 345 Take Home Final
Completed!

$200 is transferred to your debit card
(20 pts) Finally, a choose your own HCI adventure question, a three-parter.
1) Ask a good HCI question you wish had been on this test.
2) Explain why you think it is a good question, and
3) Answer the question. (10/10)

Don't use questions you find on the web. Be original, creative, and fun.

1) Design an interface for controlling computer functions in a car. Assume that the car is acting as a universal interface for various mobile devices you are carrying. As such, it should be able to do things such as picking music from an MP3 player's collection, operating a cellphone, operating a GPS system, etc. Describe how the interface will appear and function, including rationale for design decisions.

2) This is a good question because it applies a good number of interesting constraints to see how well we can weigh the pros and cons of different designs. The previous question on making something to improve time management is good for seeing how creative people can be with few constraints, and this is good for seeing how well people can find a solution under many more constraints. Additionally, it's interesting and totally plausible.

3) The first design consideration that has to be addressed is that of safety; it's first and foremost when making something which is to be operated at the same time as a large vehicle. As such, the system must be able to work without necessarily requiring the user's full attention, or for them to take their eyes off the road for more than a quick glance. Additionally, because cars can be noisy environments (especially convertibles with the roofs down, or any car playing music), the system must be able to work under this situation. The third design consideration is one of generality; the system must be flexible enough to allow for a multitude of inputs, varying from analog scales (volume controls) to discrete pre-set entry selection (dialing phone numbers) to variable entry selection (picking between several artists in a music collection).

Addressing the third issue, it seems unlikely that a set of physical controls with a 1-to-1 mapping of action to button will be possible, such as the sort of knobs and buttons used for car radios and temperature adjustments. Input mechanisms must be fairly general and flexible. However, addressing the first issue, we don't want to have a system which requires much visual attention to use. Touch and audition are thus the most likely senses to be used to help this, although any use of sound must deal with the noise of the car—this immediately rules out voice recognition, unless a wireless headset were to be used.

The design I came up with to address all these constraints and issues is one which has a touch screen in the steering wheel, ideally one with haptic feedback to let users feel virtual buttons. Buttons would be large to deal with drivers being unable to look directly at the controls, and make consistent use of color and position to make it easier to pick out repeat controls and distinguish where buttons are. Additionally, to help a driver who is engaged in other activities (such as, say, driving) navigate the menu, audio cues would be given through the car's speaker system when a user's finger was held over an option for more than a set period of time (perhaps half of a second). The sound level of the cues would be moderated by the ambient sound level, so if driving with loud music on or the windows down, the commands would still be audible, but waiting in line for a drive-through, they would not be overwhelmingly loud. This would create a system which would allow a driver to blindly feel/listen through a list of choices, if unable to devote the visual attention to actually look at it, but still allow for quick selection if a glance (while on a highway) or longer look (while at a stoplight) could be afforded. Such an input device could be mirrored at other locations in the car, such as in passenger seats, although they could provide fewer options (to keep kids from deleting navigational routes), no audio cues (as they're unnecessary for people who can look at the screen) and more dense information (again, possible because the users can look at them). The system is general enough to accommodate many sorts of functions, while still allowing for blind use.

Clever & creative.