1. 3 non-desktop interface

a) Cell phone:

Cell phones are a commodity now and people from most demographic segments all most all use cell phones. (perhaps except babies) Also cell phones are used in many different kinds of contexts. They are not only used for calling people but also involved all kinds of communication, entertainment, and information management. That’s why cell phones have the sizes and shapes that are designed for easy carrying. Because cell phones are so popular now, manufacturers want to incorporate all kinds of functions into cell phones, from the basic games to the high-end GPS systems.

The design of cell phones has gone through several generations and now there are many good designs on cell phones. iPhone is not doubt one of the best designs. The multi-touch screen and the ability to use it vertically or horizontally make it very easy and fun to interact with the interface. I like the fact that I can take pictures with my cell phone and use them as my background. This function allows me to customize my cell phone. Also there are many cool features in the cell phone, for example I can create a new song using the built-in instrument sounds. I’ve never used music editing tools before but it is a cool thing to do when I’m waiting for the bus. The other strength about the design is that cell phones are sturdy now. Not many electronic devices are as sturdy as cell phones now. I dropped my cell phone to the floor several times and I’m happy that it still works well.

The one major weakness of interface design on my cell phone is that there are too many useless options in the menu. Cingular or AT&T tried too hard to bundle their service on the cell phone, but I have to say the service they provide are not attractive. For example I like to edit my own ring tong so I really don’t need the AT&T mall function. It would be a lot better if I could customize the main menu. The other thing I don’t like about the design is the push-to-talk button (PTT) that is easily miss-pressed. I’m sure Sony Ericsson is proud of its PTT function so it made the button big and standing out, but so far I didn’t know anyone who uses that function. Basically this is another useless button and it often interrupts my work. I wish they could just take it out or at least make the button flat. The other feature I don’t like about my cell phone is that the brightness of the screen is not good enough so sometimes it’s hard to see at night. I believe this design could be improved when better materials become available.

b) Digital Camera: Nowadays digital cameras have big screens that people can interact with. Digital camera is often used in special social occasions, for example in graduation ceremony or birthday parties. Sometimes it is used for work or for documenting some observations. I personally like to take pictures everywhere I go. I take a lot of pictures during a trip or when I visit a new restaurant. I think that digital cameras help me record my life in an easy and vivid way. Because people use digital cameras in all kinds of places, the interface should be able to help users adjust settings easily. In order to make
the screen easy to see especially at night, the screen should be big and bright enough. Also because users of digital camera diversified, the design of camera interface for experts and novices should be totally different.

Most digital cameras have different shooting mode, and a lot of them have the “simple mode” and “manual mode.” This design gives user control over the camera, but also allows people to take photographs quickly without changing settings for 10 minutes every time. The second strength is that there are small icons on the screen, not just texts. Pictures help me recognize the options I want quickly, and the small icons also allow more information on one screen. The third strength is that the 11 control units on the camera all serve different purpose, but because of the different shapes and small illustration on them, it’s pretty easy to learn and memorize how to use all the buttons.

One problem I found with digital cameras is that most of them are designed for right-hander. The control area locates at the right side of the camera, which makes it hard to use for left-handers. Also some cameras do not give people enough space to hold steady. They might be too thin or the screen is too large and people tend not to touch the screen. Another design problem that might only apply to my camera is that there is an extra button I never use. This button allows you to zoom in/zoom out to the maximum with one touch. However this camera has 6 times optical zooming ability and I rarely zoom in to 6X at a time. These problems could be solved if designers design different interfaces for various groups of users if one model does not fit all. As for the extra button, it could be figured out by user survey and I believe the button could be replaced by some other more useful functions.

c) Wii: Wii is designed for interactive entertainment at first. But now people use Wii to do exercise (Wii Fit) or browser the Internet too. It is a lot better than traditional game device because it tracks human motion and players don’t have to memorize a lot of commands/key combination. Because of its simple interface, even elderly people enjoy playing Wii and it makes computer games more powerful. Basically the advanced design of Wii affects the usage of it.

The best thing about the Wii interface is that it tracks users’ motion so users could play tennis with their body, not just the index finger. This design increases the joy and sense of reality of playing games. Also the Wii controller (Wii Remote) is easy to use and has multiple functions. When selecting menus, it works like a mouse or a remote control; when playing games, it could be the tennis racket or a gun, depending on the contexts. A lot of innovative games came out and utilize the Wii Remote in various ways. I also like the fact that Wii Remote would give users feedback instantly. For example when you catch a fish in the Wii Play Fishing game, Wii Remote would vibrate to make a signal. That function makes Wii Remote not only an input device but also an output device.

There are several small weaknesses of Wii that I could think of. The strips on Wii Remote are not very strong and sometimes it breaks. This could be fixed with a better material. Also some light would interfere with the signal. I don’t know a lot about the optics science but I guess they could at least warn user to turn off the lights that would interfere. Also the resolution of Wii is not very good. This is more obvious when playing Wii with a HDTV. I’m not sure whether Nintendo is planning to improve the resolution, but they
are definitely able to do that with a higher unit price.

2. 3 interviews

a) One of my friends felt frustrated when he wanted to play with some new software. One example he gave was the software that could make DVD auto-run menus. He tried several different softwares, but all of them are not intuitive and he still couldn’t figure out how to do that quickly. He said it’s really hard to find how to start a new task, or which view to work on when he used a new software. He has to try many times and search for the manual. If he still can’t figure out, he would just give up doing that task.

I think the reason to the problem is because most software tries to present too much functionality to the users and that often confuses the new users. A really simple way to fix that is providing a wizard that offers minimum options so users could at least finish their tasks.

b) Another friend is a law student, and she has a lot of complaints about the website that she has to use to find cases. The website is not flexible and requires the single correct citation format to make a successful query. However if she uses keyword search, the results would be too many to read. Also the search results don’t tell users whether this cases is overruled or not, and users have to read the case to find out. The problem of the interface is that it is not flexible and smart enough. Most search engines have error tolerant mechanisms that help user search effectively. This website should be more flexible to accept different formats of query as long as the content is correct. It should also provide different ranking criteria, for example ranking results based on importance or overruled or not. In that way users are more likely to find what they want from the first few query results.

c) Another friend of mine is frustrated about the input devices. He thinks it’s hard to use a track point because track points make the index finger sore. And cordless mice are too heavy to use for all a long time. He doesn’t like touch pad either because he feels that touch pad is not sensitive enough. I think designers could try to make cordless mouse without 2 AA batteries to decrease the weight.


Total trial: 25 times. The strategy is that the subject tried to remember the sequence to type faster. There are no wrong trials. Source code, result, and the plot are as following.

Power Law of Practice: $T_n = T_1 \times n^\alpha$

Learning constant is 0.3094.

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Question 3  Trendline: $y = 10.347x^{-0.3094}$

Source code:
```cpp
// TypeTime.cpp : Defines the entry point for the console application.
/

#include 'stdafx.h'
#include <iostream>
```
```cpp
#include <time.h>
#include <iomanip>
using namespace std;

int _tmain(int argc, _TCHAR* argv[]) {
    time_t Start_t[30], End_t[30];
    double time_task[30];
    char tstring[30];
    int i, correct=0, wrong=0;

    cout << "Task: type stuvwxyz in reverse order for 30 times\n"
    for (i=0; i<25; i++)
    {
        cout << "#" << i << ":\n";
        Start_t[i] = time(NULL); //record time that task begins
        //perform task here
        cin >> tstring;
        End_t[i] = time(NULL); //record time that task ends
        time_task[i] = difftime(End_t[i], Start_t[i]); //compute elapsed time of task
        if ( !strcmp (tstring, "zyxwvuts") )
        { cout << "correct typing. "; correct++; }
        else
        { cout << "wrong typing. "; wrong++; }
        cout << "\nTask " << i << " took " << setw(4) << time_task[i] << " seconds.\n"
    }
    cout << "Correct typing " << correct << " times. Wrong typing " << wrong << " times.\n";
    return 0;
}

4. Choice Reaction Time. Assume error free behavior and that the user knows the target item. Given a static menu with 12 items.
(a) Move Time = a + b * log (A / W + 1)
   “a” and “b” are determined experimentally.
   Assume each item has width d and this is a sequential, one-direction menu.
   Average amplitude A= 12d/2=6d    Width of the target W=d
   Assume selection time is 0.
   => Average Move Time = a + b * log (6+1) = a + b * 2.807355

(b) suppose the first 4 menu items are placed dynamically (8 remain in the static area). Approximate how long it will take a user to select an item when the probability that the target is in the dynamic/static area is:
   - 50/50, 75/25, and 90/10
   50/50 : Move Time = 0.5 (a + b * log (4/2 +1)) + 0.5 (a + b* log( 4+ 8/2 +1))
          = a + b * (log 3 + log 9 ) = a + b * 4.7549

   75/25: Move Time = 0.75 ( a + b * log ( 4/2 + 1)) + 0.25 (a + b * log(4+ 8/2 +1))
```
\[ 0.75 (a + b \times 1.58496) + 0.25 (a + b \times 3.16992) = a + b \times 1.9812 \]

90/10: Move Time = 0.9 \((a + b \times \log (4/2+1)) + 0.1 (a + b \times \log(4+4+1)) = a + b \times (0.9 \times 1.58496 + 0.1 \times 3.16992) = a + b \times 1.74346\]

- What is the minimum choice time for this dynamic menu?
  Minimum time is when the choice is always the first item.
  Move Time = \(a + b \times \log (0.5d / d + 1) = a + b \times 0.58496\)

- What is the probability split that would cause maximum choice time?
  0/100, when the probability that the target is in the dynamic/static area is 0/100, the choice time would be the biggest because all choices are at least 4 items away from the start point.

(c) What are some limitations of applying Hick’s Law to real-world performance tasks?
Hick’s Law does not apply when the menu (or the list of options) is in random order because users have to spend time scanning through the menu.