Interface designers often want to create interfaces that are efficient, in the sense that people can use them to accomplish things quickly. Although some techniques for this are well known, it is often not obvious how to accomplish this, or even which of two alternative designs will be faster. While it is always possible (in theory) to implement two alternative designs and experiment to see which is faster, this can be very labor-intensive.

Thus we desire a model able to predict, from a description of an interface and the user’s task, the time it will take to perform that task. Having such a model will enable us to evaluate alternative designs even before implementing them.

In this assignment you will first practice time-and-motion studies, and second develop the elements of a predictive model of task performance time.

1. Choose a partner, make sure one of you has (a) a watch on which you can count seconds (and preferably tenths of seconds) and (b) a computer. For each step, one person will take the user role and one the observer role.

2a. First warm up. Open any editor and prepare to create a list of numbers. Go to Google.com, type “log 1” into the search box and add the result to your list, correct to two decimal places. Do the same for “log 2”.

2b. Now prepare to measure the time for this process, that is, the time required per input, from typing the “l” of “log” until the last digit of the result is complete and the user is again in the browser and ready to start typing the “l”. Do this by taking the average over several repetitions. To make this task feel more realistic, tell your “user” that you need a list of log values for inputs 1 through 20, to two decimal places.

What was the average time? ______

2c. What were the constituent actions the user did to process each input? Be fairly detailed; there are probably 10-20 of them.
3a. Measure the average time to create a similar table of square roots, by typing “sqrt(n)” to Google again, where “n” ranges from 0 to 4. ________

3b. How much longer did it take per item than for the logs? ______ Why?

3c. Now use your findings to make a prediction, for how long it would take per value to create a similar table of weight conversions for 100 to 290 pounds, using the “100 lbs in kg” Google query format. _____

3d. Write a general equation for predicting task-completion times from the component actions. Show the instructor.

3a. Now go to xe.com. First warm up by computing the yen equivalent of $100. Then create a conversion table for dollars to yen, for $61 to $65 dollars.

What was the average time per value? ____

3b. If the user is right-handed now do it for $11 to $15; if left-handed for $66-$70. (Note that these values are chosen so that the user only needs one hand on the keyboard, leaving the other free to operate mouse.)

What’s the time difference? _____

3c. Write a general equation. Show the instructor.
4a. Now create a similar list for $71 to $75, but using different actions: if your use of xe.com involved clicking on “go”, now use keyboard shortcuts to select “go” (e.g. “tab enter”), otherwise now use the mouse to select “go”.

What’s the time difference relative to the method used in 3a? _____

4b. Write a general equation. Show the instructor.

5a. Go to calculator.com and write down the steps required to multiply two 2-digit numbers. Don’t forget the time it takes to verify that the digits you enter appear correctly, which is necessary since there is a response-time lag.

5b. From this list of steps, and your investigations above, estimate the total time required to do this. _____

5c. Now actually try it, for example multiplying 99 by 99. How long did it actually take? _____

5d. Now go to local calculator (in Windows via Start-Accessories; on Linux via Utilities-Desktop-Kcalc). List the steps to perform the same calculation. (Note that you can type * to invoke multiplication.)
5e. Estimate the time required. ____ Is it more or less than your estimate for 5b? ____

5f. Now measure it. ____ Is it more or less than your actual time for 5c? ____

5g. How accurate were your estimates? ______________

5h. List a few factors that may have limited the accuracy of the estimates.