Architectures of Intelligence
Assignment 1B

Group 13
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Subitize-experiment

In this assignment, we created an ACT-R model which solves a subitizing task. This means that the model speaks the number of items displayed on the screen. Running the Lisp version of the task, our model produced the following results for the $(subitize - experiment)$ function:

```
CORRELATION:  0.980
MEAN DEVIATION:  0.174
Items    Current Participant   Original Experiment
  1         0.55  (T  )               0.60
  2         0.75  (T  )               0.65
  3         0.95  (T  )               0.70
  4         1.15  (T  )               0.86
  5         1.35  (T  )               1.12
  6         1.55  (T  )               1.50
  7         1.75  (T  )               1.79
  8         1.95  (T  )               2.13
  9         2.15  (T  )               2.15
 10         2.35  (T  )               2.58
```

This shows that our model achieved a correlation $>= 0.980$ and a mean deviation $<= 0.230$. **Figure 1** in the appendix shows the results obtained in a graphical way.

Question a

The reaction times produced by your subitizing model will probably not fit the human reaction times perfectly. In what way(s) do they differ from each other? Discuss absolute deviation of the reaction times, as well as the general pattern of times.

The first difference you can see is that the data produced by our subitizing model follows a linear function, while the human reaction times are first faster and then increase stronger with higher numbers of items on the screen. If the number of items on the screen is between one and seven, the human reaction time is faster than the time obtained from our model, however, when the number of elements increases, the human reaction time is slower. The biggest difference between the two measurements is 0.29 at four items on the screen, while the best match is 0.04 at seven items. In general, our model matches the human data better for higher numbers of elements on the screen.

Question b

Why doesn't your model fit the data perfectly? That is, what do people do differently from your model?

The biggest difference between a human and our model is in the way smaller numbers of items on the screen are handled. In our model, no matter how many items are displayed, the process stays the same. We search for unattended items on the screen and increase the count if we found one or respond with the number currently saved if we attended every item. A human, in contrast, recognizes patterns for smaller numbers of items. That means when, e.g. four items are displayed, the human recognizes the pattern and knows instantly that there are four items on the screen. For higher numbers, however, the human also needs to count and therefore the data matches better for higher numbers of items displayed.

A. Assignment 1B

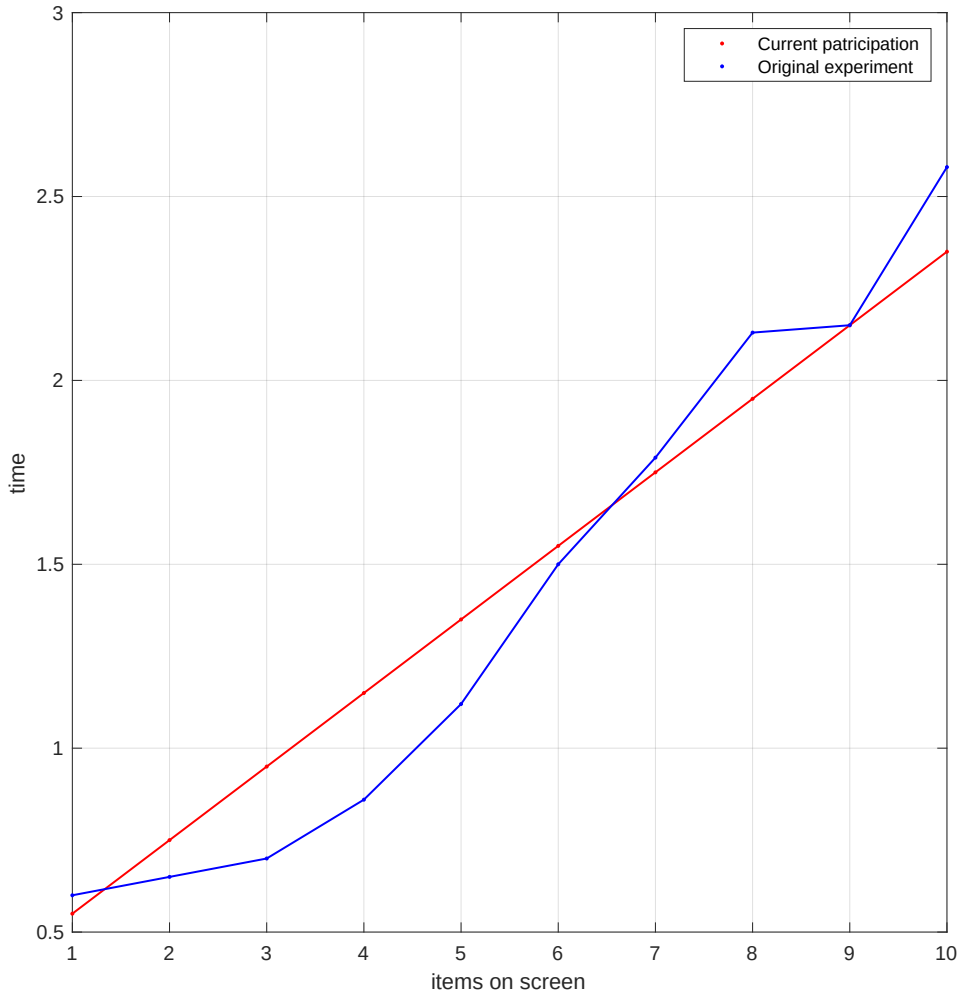

Figure 1: *Graph visualizing the results of the subitizing experiments*