Psychological Task Design & Development

A Programming Workshop
Part I*B* – Task Design & Development

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The Design Process

- Many psychological paradigms focus on mental processes
  - E.g., executive cognitive control functions, selective attention, automatic associations, subliminal processing, etc.
- Their specs are usually **very** precise, but sometimes hard to determine. So how to translate descriptions to specific task?

Drug and Alcohol Dependence

Reversing the sequence: Reducing alcohol consumption by overcoming alcohol attentional bias

Javad Salehi Fadardi, W. Miles Cox

Documentation

- The answer is rigorous **design documentation** (a.k.a. requirements engineering)
  - Building a program in general, or a complex psychological task in our case, may take quite some effort
  - Many decisions are made; many changes to the initial design
  - Easy way to communicate your design with others
  - Half of your methods section already done ☺

- Let's assume most of the details are in the papers you use as a basis. And you've added some ideas of your own
  - What level of detail do you need to describe to develop (program) the task?

Design Details (1)

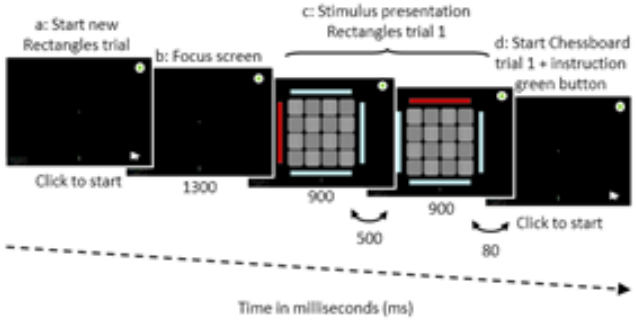
- Block structure
  - How many blocks; how many (practice) trials per block (e.g., IAT)?

Block	left	right	type
1	*Positive* (6)	*Negative* (6)	Practice
2	*Soda* (6)	*Alcohol* (6)	Practice
3	*Positive* (12) + *Soda* (12)	*Negative* (12) + *Alcohol* (12)	Practice
4	*Positive* (24) + *Soda* (24)	*Negative* (24) + *Alcohol* (24)	Test
5	*Alcohol* (6)	*Soda* (6)	Practice
6	*Positive* (12) + *Alcohol* (12)	*Negative* (12) + *Soda* (12)	Practice
7	*Positive* (24) + *Alcohol* (24)	*Negative* (24) + *Soda* (24)	Test

- Data output
  - Which variables do you want to measure (per trial)?
  - E.g., #block, #trial, stim, response, feedback, reaction time, etc.
- Stimuli
  - Pictures (size, placement); words?
  - How many categories?

Design Details (2)

- Trial structure (make a visual timeline with ms)
  - Fixation-stimulus-response window-inter trial interval, etc.



- Feedback structure
- Instructions (which and when)
- Counterbalancing; randomization algorithms

Technical Considerations (1)

Timing accuracy

- Specific timing is very sensitive to noise from hardware (e.g., input devices: keyboard, mouse, fixed button, joystick) as well as software influences (background virus scans, choice of programming language)
- This may be very important for stimulus presentation, and RT-measurement
- Output / synchronization: connection with fMRI / EEG materials: synchronization pulse via LPT port

Technical Considerations (2)

Display issues

- Screen size and resolution; aspect ratio (4:3 vs. 16:9)
- Refresh rate
  - TFT vs CRT vs tablets; most standard TFT have 60 Hz (16.67 ms/frame)
  - Stimulus duration therefore multiple of 16.67 (so 25 becomes 33.3)
- Rise and fall time:

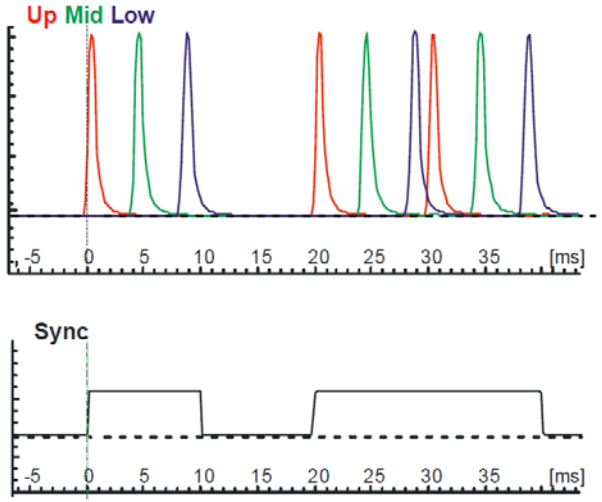


Fig 2 Average luminance for CRT monitor at 100 Hz with single refresh and double refresh display.

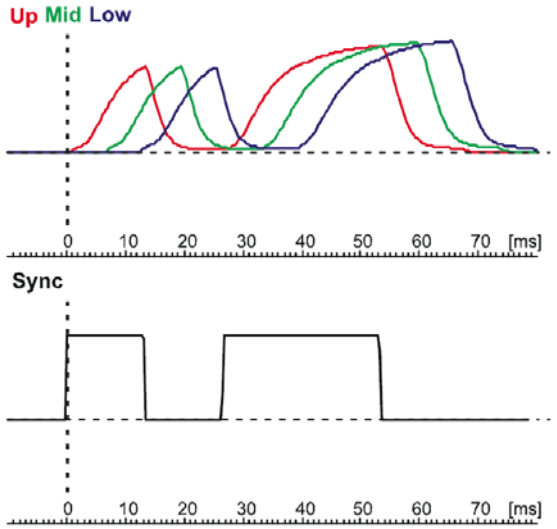


Fig 3 Average luminance for LCD pannel at 75 Hz with single refresh and double refresh display.

The Development Process

Or: Documentation, Part II

- As the design may change during the development stage, it is important to **keep it up to date**!

While developing, we use a 2nd form of documentation:

- **Code comments** that explain how and why things were done in a certain way.

- This may seem a lot of on-the-side prep work, but it will save you loads of trouble and time in the end.