An Introduction to PsychoPy

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Learning outcomes from training

At the end of this session you will be familiar with:

- What PsychoPy and some similar applications can be used for.
- The PsychoPy programming environment
- The flow of an PsychoPy experiment
- The display objects and their response objects
- Routines and Loops

At the end of the session you will be able to:

- Get yourself around the PsychoPy basic interface
- Run experiments
- Do basic editing on a pre-existing experiment
- Be prepared for the next session

Experimental software

Applications used at Kent for the presentation of stimuli and the collection of data:

Application	Cost	Platforms	Comments
E-Prime	$$	Windows only	Easy for simple experiments. Can get complicated quickly. Can be used with EEG & Eye-trackers
PsychoPy	***FREE***	***Windows, Mac, Linux***	***Uses Python, a powerful and flexible free language. Routinely used with EEG/TMS based experiments. Has been used with EyeLink, but not yet with Tobii Eyetracker.***
Inquisit	$	Windows, Mac	Lab & Web components. Web Browser based to run experiments
Matlab	$	Windows, Mac, Linux	Use Psychophysics toolbox to run experiments. Some good internal expertise. Somewhat idiosyncratic.
Superlab	$$	Windows only	Limited use @Kent. Legacy experiments only as a rule.

PsychoPy:
Why might I want to use it?

In Psychology - a need for:

- Constructing experiments to:
  - display stimuli
  - capture user responses
- Examples:
  - Eprime, PsychoPy, SuperLab, MatLab, JSPsych, Qualtrics (logic flow)

PsychoPy is free and is written in a computing language called **Python, which means:**

- works on Windows/MAC/LINUX
- is VERY widely used:
  - GOOGLE, FACEBOOK, Finance, Science...
- has lots of support
- Adaptable:
  - run experiments, analyse data, scripting
- libraries, libraries, libraries,...

Using and installing PsychoPy

For all of 2015/16 we are using v1.82.01 of PsychoPy

- Fixed for consistency across School
- Experiments created in an older version should upgrade fine.
  - Let us know if you have any problems with any upgrade process.
- Warning! - Experiments created in an newer version will not run properly on an older version!
- Any upgrade to the version will only occur if a major bug is found with PsychoPy, and will be communicated.

Installation instructions

Student/staff PC's (like you are on now), should already have it installed via the location you've used.

For home use, visit:

http://psychopy.org/

1. Select the DOWNLOAD link - this takes you to the SOURCEFORGE website which hosts the download files
2. Select the PsychoPy folder and then choose the appropriate installer to download and then run
3. If in doubt, choose the latest 'STANDALONE' version, MAC or Windows as appropriate
4. see also www.psychopy.org/installation

Know your file types

Experimental files:

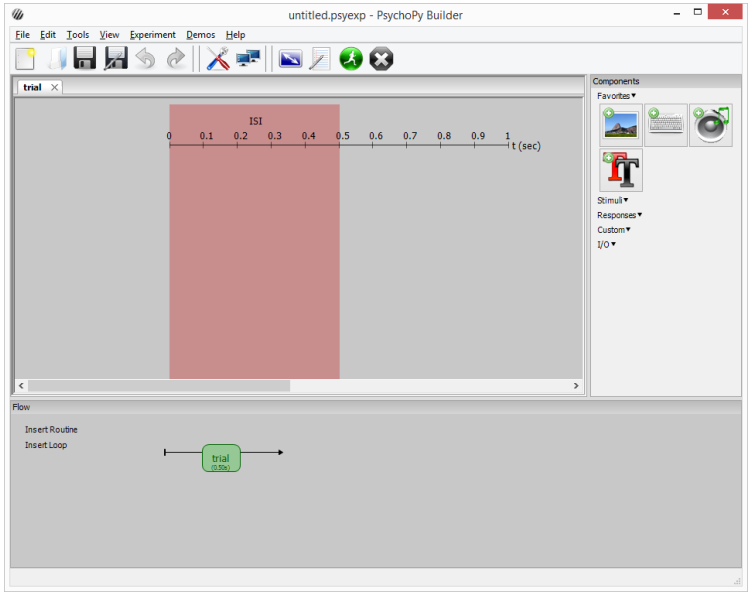
- `*.psyexp` : these are PsychoPy `BUILDER` source files
- `*.py` : these are Python source code files. Your PsychoPy `CODER` files
- `*.pyc` : these are your '`byte compiled`' files. You can safely ignore them for now.

Starting PsychoPy

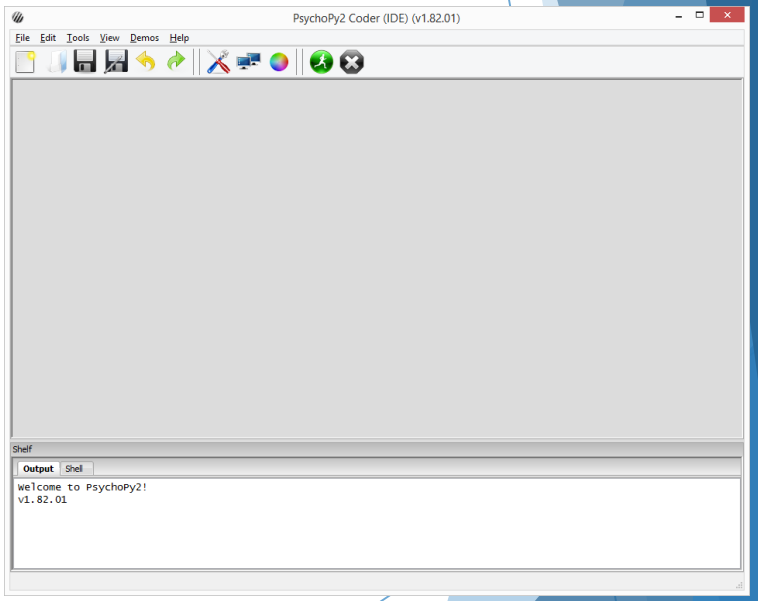
- PsychoPy icon … 
- On UoK ‘managed build’ Windows PCs
  - `START | Programs | Departmental Software |`
  - `.. School of Psychology | PsychoPy`
- PsychoPy has 2 modes, so if it starts in Coder view, you can switch mode using:
  - `View | Go to Builder View`

Builder Vs Coder views

- A brief overview of both and what they are
- Will be sticking with Builder



Builder



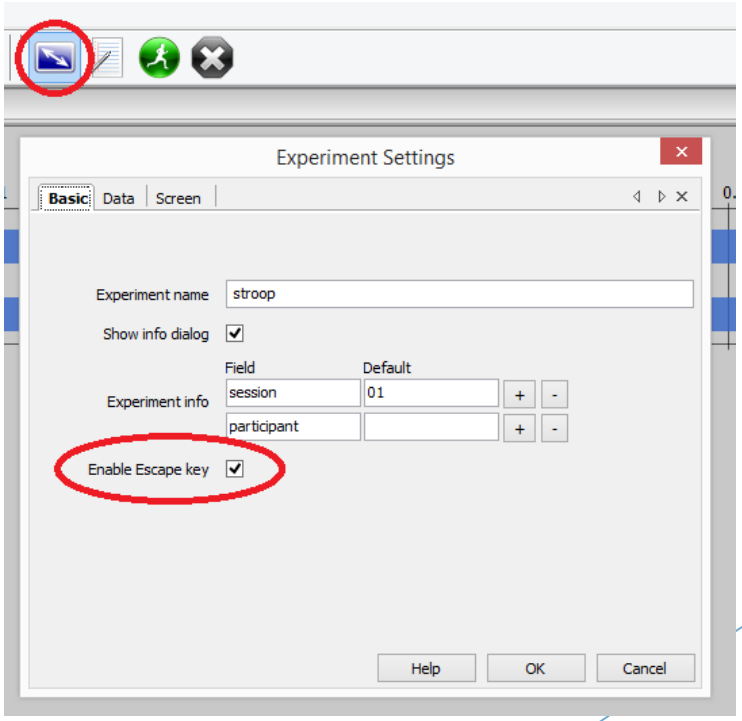
Coder

Escaping from your experiment

- By default, when running an experiment you can press ESC
- This will halt the experiment
- And save any data recorded so far.

This can be disabled:

- E.g.



Exercise 1
Run a stroop demo

Exercise 1.1

- Open up `stroop/stroop.psyexp` from within your directory
- Don't worry what everything is just yet, we'll cover it later!
- Click the green icon at the top to run it
- See what it does.

Exercise 1.2

- Look inside the `/data` folder and see what is produced
- Open one of the most recent CSV files that you find
  - Study the file, noting the column headings.

Demo:
What comes out from PsychoPy?

Lets see what PsychoPy builder generates...

Demo:
Result file output

What else comes out of PsychoPy?

- Default area for data output is within a `data` sub-folder
- 4 files are generated:
  - `csv` – main data
  - `xlsl`– compacted version of the csv file
  - `psydat` – complex - but useful for batch processing of results files. Possibly of interest if you are familiar with matplotlib
  - `log` – chronological record of everything BUT depends on what settings you use.
- These are all generated automatically.
- Filename based on Session/Participant and date number

Will cover more in next part about how to add our own data and extras to this output to help with our analysis.

Demo:
Overview of the interface

Lets take a look at some of the basics of the interface:

- Menus (key items)
- Experiment flow
  - sequential order of execution
- Routines
  - one tab per routine
    - components in this routine
    - WARNING: closing a TAB deletes the routine!
- Routine timelines
  - Concurrent objects/components controlled by start/duration
- Components
  - 5 sections - drop-down menus
  - More details coming up…

Components

A quick look at a few of the key and basic components you can use:

- **Text box** (display component)
- **Keyboard** (response component)
  - Can record data automatically in results file
- **Mouse** (response component)
  - Can record data automatically in results file
- **Loops** (flow component)
  - Data feeds and repetitions

When you add a component, you must give it a sensible name (No spaces, something meaningful so you remember what it is!)

Each component comes with its own set of properties and attributes These allow us to make them do different things.

Lets take a look at some of the key properties of the items we've covered….

Demo:
Key component properties

- Position
- Color
- Text (where applicable)
- Start time
- Duration

…. And so on.

More on “loops”

Loops are where we want to **repeat** something a number of times. You may hear the word “Iteration” used to describe a repetition.

- In PsychoPy we want to present stimuli or trials
  - Often routines are repeated using a Loop for this
  - Text or Image components are then repeated within our routine/s
  - But the actual text/image may need to change each time. How?...
- …By using a data source!
  - Created in Excel
  - Headings refer to “attributes” that are created for us that we can use as our trial data
- Warning: When a trial list is updated with new columns, you must refresh the Loop reference so the options get picked up.
- Loop sequence options:
  - **Sequential, Random**, fullRandom, staircase, interleaved staircases
  - We’ll just focus on the first two for now.

Accessing trial data in a loop

- When a trial loop is set up, the attributes are now made available
- In the Stroop task, we had:
  - **text, letterColor, corrAns** available to us
- How is the colour and text passed through and displayed?
  - We use the Excel header and prepend the name with a **$** symbol.
  - See Stroop experiment.
- But we also need to change another property – Update mode:
  - **"Constant"** = never changes
  - **"Set every repeat"** = update and change on every repetition/trial/loop
  - **"Set every frame"** = update at every single screen refresh (overkill!)
- If we set the Word colour and text attributes to "Constant", we would get an error.

Exercise 2:
Modify the Stroop demo

1. Open up `/stroop/stroop.psyexp` from Exercise 1
2. Change the intro text and the first line “OK. Ready for the real thing?” to “Instructions”
3. Update keyboard input from “left”, “down”, “right” to “a”, “s”, “d”
   - Ensure you update the instructions
4. Add another 5 trials to the Stroop
   - Edit the `trialTypes.xlsx` is where the source trial data is!
5. Try adding a new routine which will act as a title page for the experiment
   - HINT: the “instruct” routine should give you some clues
   - Look at the properties of the Text and Keyboard component and replicate
6. Re-Run and see what you get
   - Look at the result file, has your new data column come over?

Components - Part 2

Overview of remaining components in brief.

Stimuli:

- **Sound** – Playback of sound
- **Image** – Display of image
- **Aperture** – Add a circular effect onto image component
- **Grating** – Wrapped texture that can be cycled in 2 dimensions
- **Movie** – Playback of movie files
- **Dots** – Presentation of Random Dot Kinematogram to participants
- **Polygon** – Shape presentation of different sides (square, rectangle, octagon)

Responses:

- **Mouse** – Take responses from the mouse
- **Mic** – Only records sound, doesn't register response to sound
- **Scale** – Mouse friendly scale to choose a value
- **ioBox, Cedrus** – Input options for external hardware devices and button boxes

Other:

- **Parallel icon** – Send signals down a cable (EEG)
- **Static** – A static period to allow for pre-loading images or other operations

More details can be found at
http://www.psychopy.org/builder/components.html

Demo: File preferences

Some additional settings hidden away in PsychoPy.

Demo: Picture stroop

Exercise 3
Turn stroop into a Picture based stroop

Simply add images to the stroop trials as a distractor.

- Open up the picture-stroop folder in your directory
  - `/picture-stroop/images` contains 6 images for you to use and link to each of the 6 trials.

- **Hints:**
  - You will need to store a path to each image for each of the 5
    - E.g. "`images/1.jpg`" (without the quotes)
  - That path then needs to be passed to an image component
  - Remember: when trial data is updated, Excel link needs refreshing.
  - Attributes are accessed with $ and name of excel header

- We will come round and help
- **If you don't get chance to finish, have a go at home ready for next week.**