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September 2022

A brief guide to running an experiment using PsychoPy, Pavlovia, and Prolific

Overview

This is a brief summary of how our lab has run studies online using PsychoPy (to build the experiment), Pavlovia (to host the experiment), and Prolific (to recruit participants). Once the experiment is built, PsychoPy will translate the code into Javascript and will move the study from your computer to Pavlovia. The translation of Python to Javascript occurs when you tell PsychoPy to upload it to Pavlovia. For the most part, this will work smoothly but when it doesn't it *can* be difficult/time consuming. Once the study is on Pavlovia, you can use Prolific to recruit participants. You can also use mTurk and Sona, but the focus of this document is on Prolific. Qualtrics was also involved in our study (see below for order of events).

Important to keep in mind:

Psychopy is a free open-source software that has made running online studies more accessible for many researchers (especially those who do not have programming experience). Since the first version of this document (March 2020), the number of resources available to researchers using Psychopy to run studies online has increased substantially. If you're stuck on something, check out the forum for previously posted questions and/or post your own question. If you follow the suggestions for posting etiquette, you increase your chances of getting a response. My experience posting questions and getting responses on the forum has been very positive. There are more helpful resources directly below and throughout this document along with some debugging tips towards the end.

Some helpful resources:

PsychoPy's Youtube Channel
PsychoPy Forum
Python to JavaScript CribSheet by Wakefield Morys-Carter
Launching your study online
Fixing your online study

Order of the study events for SH lab:

1) Participants were recruited from Prolific (where they have a unique Prolific ID).
2) The study link on Prolific redirected participants to Qualtrics (for consent, task instructions, and task instructions quiz).

3) From Qualtrics, participants were directed to Pavlovia where they completed the task. Data is stored on Pavlovia.
4) After the task, participants were directed back to Prolific where they entered a completion code.
   *throughout these steps, participants' Prolific IDs were transferred from site to site without the participants needing to copy and paste.

Coding the experiment using PsychoPy (uses Python)
First, download PsychoPy (make sure you are using the latest version!).

There are a few ways to build the experiment:

1. **Builder interface [RECOMMENDED FOR BUILDING ONLINE STUDIES]** - mainly point and click, not a lot of coding involved. Using builder is recommended for online studies because the translation between Python to JavaScript will go a lot smoother than if you code it before putting it online.
    - **Code snippets:** If you use the builder, you have the option to insert snippets of code for things like randomizing the location of stimuli on the screen from trial to trial. You will likely have to use the code feature at least once because the builder interface does not have a button for everything. If you have some coding experience this should not be a big problem. If you have little-to-no coding experience, it is still possible to use code snippets, it just may take a little longer to figure out. Google is your best friend! With a code snippet, you have the option to code in Python, JS, or both. You can also write your code in python and PsychoPy can automatically translate it to Javascript (this translation is getting better with time and updates) or you can write the code in both Python and Javascript. My suggestion would be to use the auto translate first and in the few instances where the translation may not work, write the code yourself in Javascript. Lots of good info HERE on how to translate Python to JavaScript.
    - In the builder interface, you can also include a completion link (where participants should be directed if they complete the study) and a non-completion link (where participants should be directed if they quit the study or something else goes wrong). For adding the completion link:
      https://www.psychopy.org/online/onlineParticipants.html

2. **Coding:** For in-person studies, my preference is to code in Python (not using builder) because you have much more control of what happens "under the hood".
    - You can use the PsychoPy coding interface that comes with the standalone version of PsychoPy or you can use other coding environments like Spyder and can install PsychoPy to use with Spyder (here is a helpful resource on how to do this). The latter is my preference!

Getting the study online

Follow these steps to move your study from PsychoPy (on your computer) to Pavlovia: https://www.psychopy.org/online/usingPavlovia.html

The code for the study on Pavlovia will be stored on a repository (similar to Github), called 'Gitlab'. It will create a repository where you can find all of your code translated into JavaScript (**the experiment will be in a .js file**). Also, in the Gitlab repository will be any resources that your experiment needs (e.g. images, spreadsheets, etc). See our experiment for an example: https://gitlab.pavlovia.org/sokolhessnerlab/cgtgamblingspantasks (Click "View code" once you're at the experiment dashboard. You may need to sign in.)

Once your study is on Pavlovia, you will be able to "pilot" your study to make sure that it works. When you do pilot, the data from your experiment will be automatically downloaded to your computer. When you run the study for real, the data will be saved to Pavlovia where you can download the results whenever you want. It costs somewhere around $.25 to run a single participant on Pavlovia.

It is very likely that once you have uploaded your study to Pavlovia that it does not run exactly how you want. A couple reasons are that there are certain things that are available in PsychoPy (on your computer) but cannot (yet) be supported by JavaScript or the Javascript translation is not correct. This can be frustrating but know you're not alone! I have found that many people experience very similar issues which is why the forum can be so helpful. If you run into issues with your study running online, first watch this video that goes over some common problems with online studies on Psychopy.

Making changes to your study once it is online:

Any changes to your study should happen in the .psyexp file that you created in Builder on your local computer. Once you make the changes to your study on your local computer, you can push the changes back online. PsychoPy will ask you to make a commit which is a brief description of what changes you made (do yourself a favor and just add a brief description, you never know when you'll need to know what changes you made). **This is version control and it is so amazing!** If you mess up at any point, you can recover older versions of the document on Gitlab. This general framework applies if you need to make changes to condition files or any other stimuli (e.g. images) your study needs – just make the changes on your local computer, then push the change back online and your files will be updated. If you use Github, then this whole version control concept should be familiar to you.

Debugging tips:

1. It is hard to understand *why* your study is not working online when you can't see the error. You can use the console on your browser to understand what and where things are going wrong. On google chrome, click on the three little dots on the far right corner to open the Chrome menu, click on "More tools" and then "Developer Tools". Here is a resource for figuring out how to find your console on other browsers.
2. Use the JavaScript command "console.log()" in your code snippets. This is super helpful if you want to make sure things are working as expected. For example, let's say that I wanted to randomize the location of a square on the screen but when I run the study online, the location of the square is not randomizing as expected. In a code snippet, where I determine the random location of the square (let's say the variable name is "squarePosition"), I could use console.log(squarePosition) to print the variable to my browser's console when the study is running. This would tell me if the squarePosition variable is updating as expected and/or whether my issue has to do with defining the variable or something else.
3. Check the forum and/or post your question/issue. Sometimes there are things that are out of your control. Because PsychoPy is open-source, its built and updated by humans. There have been a couple of time where I spent several hours trying to solve an issue to find out it was a bug. Posting on the forum can help you figure out whether this is a coding issues you can solve or something that the developers need to take care of.
4. Walk away, come back later.

Linking all the websites together (Prolific→ Qualtrics→Pavlovia→Prolific)

Using Prolific is pretty straightforward. Prolific will generate a study completion link that you can add to your study in the builder interface on PsychoPy. (See above for the link with more information on this).

Since we used Qualtrics for the consent process, instructions, and task instructions quiz, the link that Prolific participants clicked on sent them to Qualtrics (not Pavlovia). An example study link would be: https://qualtrics.com/jfe/form/aBunchOfNumbers?PROLIFIC_PID={{%PROLIFIC_PID%}}

With this link, the Prolific ID was automatically stored on Qualtrics and participants did not have to copy and paste it.

From Qualtrics, participants were directed to Pavlovia with something like: https://run.pavlovia.org/username/studyname/?participant=${e://Field/PROLIFIC_PID}

Adding the '?participant=${e://Field/PROLIFIC_PID}' to the link allowed the Prolific ID to be passed from Qualtrics to Pavlovia. Here is more information on how to do this: https://www.qualtrics.com/support/survey-platform/survey-module/survey-flow/standard-elements/passing-information-through-query-strings/

After they completed the experiment on Pavlovia, participants were directed back to Prolific. Again, see the following link for information on how to do this: https://www.psychopy.org/online/onlineParticipants.html