

Affective Computing
Dr. Jainendra Shukla
Department of Computer Science and Engineering
Indraprastha Institute of Information Technology, Delhi

Week - 03

Lecture - 09

Experimental Design: Affect Elicitation Research and development Tools

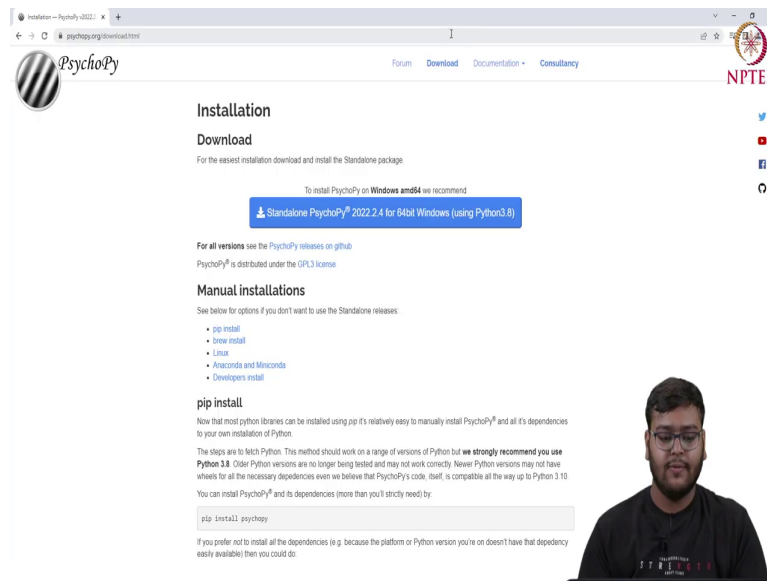
Hi friends welcome to today's module. In the last lecture we have already learnt about the experimental methodologies in which we learn about different sensors. In today's class we will be exploring PsychoPy and how to use these sensors. So, PsychoPy is an open-source Python tool which is widely accepted to create experiments in neuroscience and experimental psychology research.

PsychoPy provides a graphical user interface for designing various psychological experiments without any programming. So, PsychoPy has three main building blocks for constructing experiment which include the stimulus component, the routines and the loops. Stimulus components are the pre made custom templates which for displaying various types of stimuli like geometric shapes, videos, pictures, audio signals.

Then the user can control which stimuli they want to present in what order and for how long. Similarly, response components allows to record different types of responses like keypress, mouse, clicks, vocal responses, facial data, etcetera. Stimulus and response components are organized within routines which are a sequence of events within one experimental trial. So, PsychoPy provides us an option to include custom Python code which can be embedded in the beginning or end of the experiment.

Text can be added in different routines as stimuli by adding text, pictures, item, keyboard, mouse and other sensors. So, we will be looking how to integrate them in the further video. Also, PsychoPy uses Python programming language as a in the background and we can use custom Python code items to add different features which are not available in PsychoPy. Routines and loop can be added for repeating one or several routines including the stimuli, the user response, the sending of the recording of facial data, etcetera.

(Refer Slide Time: 02:43)



Installation

Download

For the easiest installation download and install the Standalone package

To install PsychoPy on Windows amd64 we recommend

[Standalone PsychoPy 2022.2.4 for 64bit Windows \(using Python3.8\)](#)

For all versions see the PsychoPy releases on [github](#)

PsychoPy is distributed under the [GPL3 license](#)

Manual installations

See below for options if you don't want to use the Standalone releases:

- [pip install](#)
- [brew install](#)
- [Linux](#)
- [Anaconda and Miniconda](#)
- [Developers install](#)

pip install

Now that most python libraries can be installed using pip it's relatively easy to manually install PsychoPy and all its dependencies to your own installation of Python

The steps are to fetch Python. This method should work on a range of versions of Python but we **strongly recommend you use Python 3.8**. Older Python versions are no longer being tested and may not work correctly. Newer Python versions may not have wheels for all the necessary dependencies even we believe that PsychoPy's code, itself, is compatible all the way up to Python 3.10

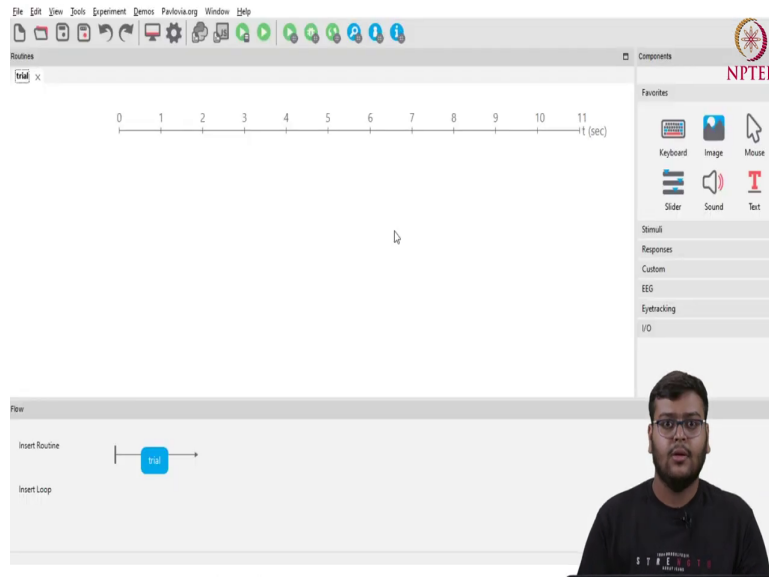
You can install PsychoPy and its dependencies (more than you'll strictly need) by:

```
pip install psychoy
```

If you prefer not to install all the dependencies (e.g. because the platform or Python version you're on doesn't have that dependency easily available) then you could do:

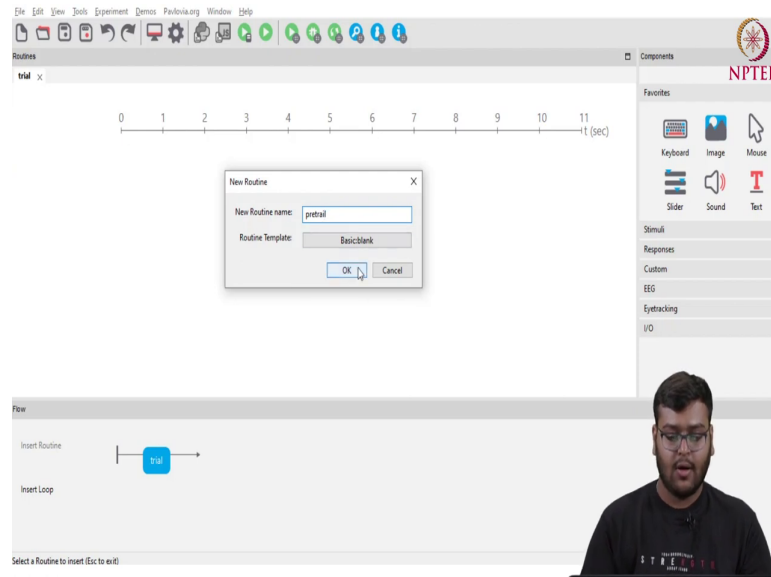
So, for installing the PsychoPy please visit the official website which is [www dot PsychoPy dot org slash download dot html](http://www.PsychoPy.org/download.html).

(Refer Slide Time: 02:50)



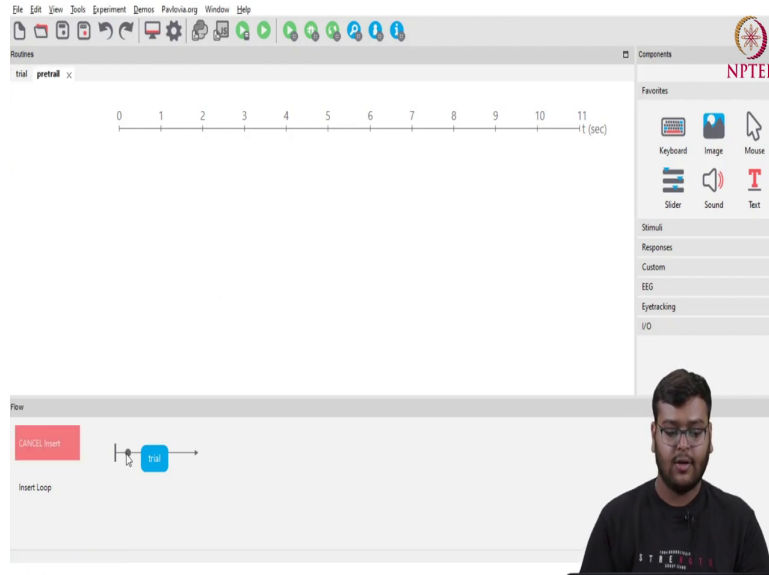
So, after downloading the PsychoPy, now opening the PsychoPy builder. So, after opening we will be shown this timeline where we have a initial trial a trial routine which is created by default. So, we will be creating a pretrial routine.

(Refer Slide Time: 03:10)



So, for that in click on the insert routine button and adding a pretrial. So, on clicking.

(Refer Slide Time: 03:18)



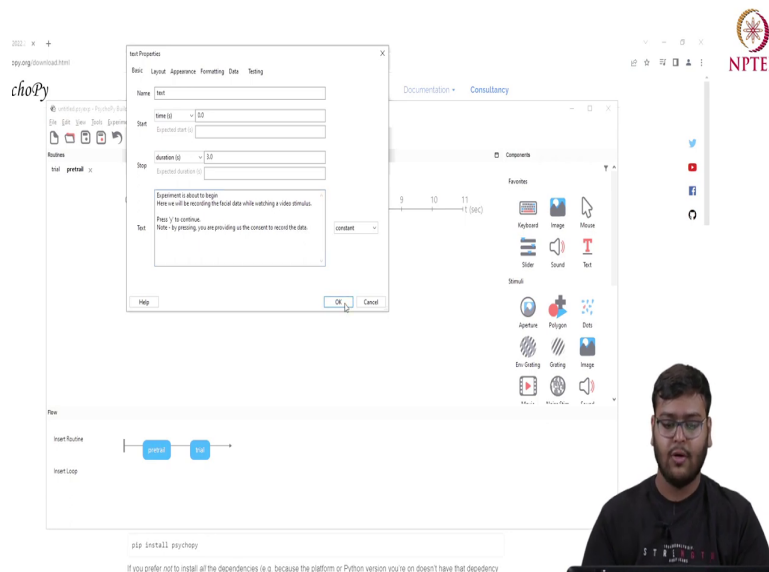
We get an option to install pretrial before and after the trial. So, here we want to install that before the trial added that pretrial before the actual experiment. So, here we can see now we have two videos for trial and pretrial.

(Refer Slide Time: 03:25)



A screenshot of the PsychoPy software interface. The main window shows a timeline for a trial with a duration of 11 seconds. Below the timeline, there are two event routines: 'Insert Routine' and 'Insert Loop'. The 'Insert Routine' routine contains two sub-routines: 'Event' and 'Image'. The 'Insert Loop' routine is currently empty. On the right side of the interface, there is a 'Component' panel with various icons for keyboard, mouse, sound, and image. At the bottom of the screen, there is a video feed of a presenter, a man with glasses and a beard, wearing a black t-shirt. Below the video feed, there is a text box with the command 'psa test411 psychoy' and a note: 'If you prefer not to install all the dependencies (e.g. because the platform or Python version you're on doesn't have that dependency easily available) then you could do:'.

(Refer Slide Time: 03:34)



So, for the pretrial now we will be adding a text component. So, we will name it as a text this is a variable name. Now, we will be telling the starting time and the stopping time. So, here we want like it should continue till 3 seconds and here we can add the custom text that we want. So, let us say we add Experiment is about to begin. Press here we will be recording the facial data while watching a video stimulus. Press Y to continue.

So, for recording the experiment we should always take the consent of the participant who is actually giving his data. So, here we will be providing the consent option as well. So, by pressing you are providing as the consent to record the data.

(Refer Slide Time: 05:06)

The screenshot displays the PsychoPy Builder software interface. At the top, there is a menu bar with options like 'File', 'Edit', 'View', 'Tools', 'Experiment', 'Camera', 'Preferences', 'Window', and 'Help'. Below the menu bar, the main workspace is divided into several sections. On the left, there is a 'Route' section with a 'Text' component and a timeline ranging from 0 to 2.5 seconds. The timeline has a blue bar indicating the duration of the text component. On the right, there is a 'Components' panel with various icons for different components like Keyboard, Image, Mouse, Slider, Sound, Text, Aperture, Polygon, Dots, Env, Grating, Grating, Image, and Video. Below the main workspace, there is a 'Flow' section with 'Insert Routine' and 'Insert Loop' buttons. At the bottom, there is a text box with the instruction 'pip install psychopy' and a note: 'If you prefer not to install all the dependencies (ie e.g. because the platform or Python version you're on doesn't have that dependency)'. In the bottom right corner, there is a small video feed of a person with glasses and a beard, wearing a black t-shirt. The NPTEL logo is visible in the top right corner of the slide.

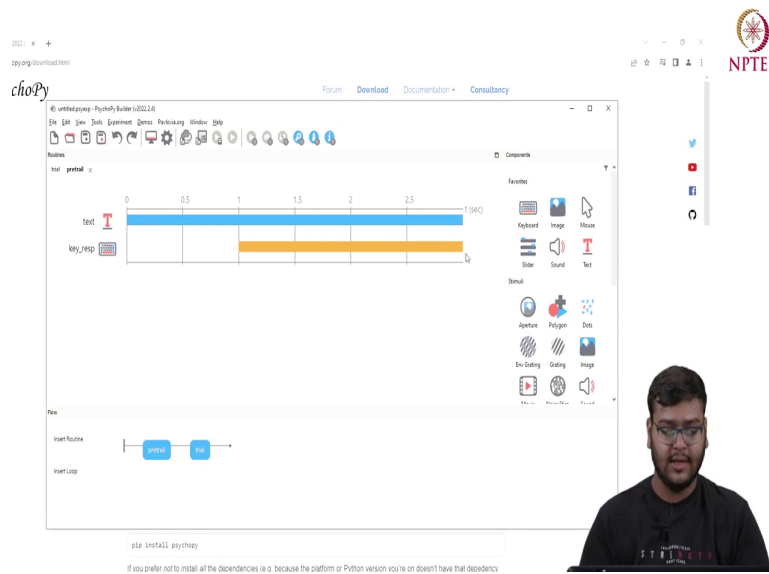
So, now, we have added the text and also.

(Refer Slide Time: 05:08)

The screenshot displays a software interface with a 'Key-Step Properties' dialog box open. The dialog has three tabs: 'Basic', 'Data', and 'Timing'. The 'Basic' tab is active, showing fields for 'Name' (key_step), 'Start' (Time: 0.0, Expected duration: 0.0), 'Stop' (duration: 0.2, Expected duration: 0.0), 'Focus end of routine' (checked), and 'Allowed keys' (Y). A tooltip for the 'Allowed keys' field lists recommended keys: 'A, B, C, D, E, F, G, H, I, J, K, L, M, N, O, P, Q, R, S, T, U, V, W, X, Y, Z, 0-9, ~, `', and 'Space, Tab'. The 'Timing' tab shows a value of 2.5. Below the dialog, a timeline diagram shows a sequence of steps: 'insert routine' followed by 'key_step' and 'insert loop'. At the bottom, there is a note: 'Please install psychopy. If you prefer not to install all the dependencies (i.e. because the platform or Python version you're on doesn't have that dependency)'. In the top right corner, there is an NPTEL logo and social media icons. A video inset in the bottom right shows a man with glasses speaking.

Like we have actually asked the students to press the Y key.

(Refer Slide Time: 05:25)



The screenshot displays the PsychoPy Builder interface. At the top, there are navigation options: 'Forum', 'Download', 'Documentation', and 'Consultancy'. The main workspace shows a trial timeline for a trial named 'pretrial_x'. The timeline is marked from 0 to 3 seconds. A blue bar labeled 'text' spans from 0 to 3 seconds. A yellow bar labeled 'key_resp' spans from 1 to 3 seconds. Below the timeline, a flow diagram shows a 'trial' component. On the right side, there is a 'Components' panel with various stimulus options like Keyboard, Image, Music, Slider, Sound, Text, Aperture, Polygon, Dots, Env, Grating, Grating, Image, and Video. At the bottom, there is a message: 'Please install psychopy. If you prefer not to install all the dependencies (ie. because the platform or Python version you're on doesn't have that dependency)'. In the bottom right corner, there is a small video feed of a man with glasses and a beard, wearing a black t-shirt.

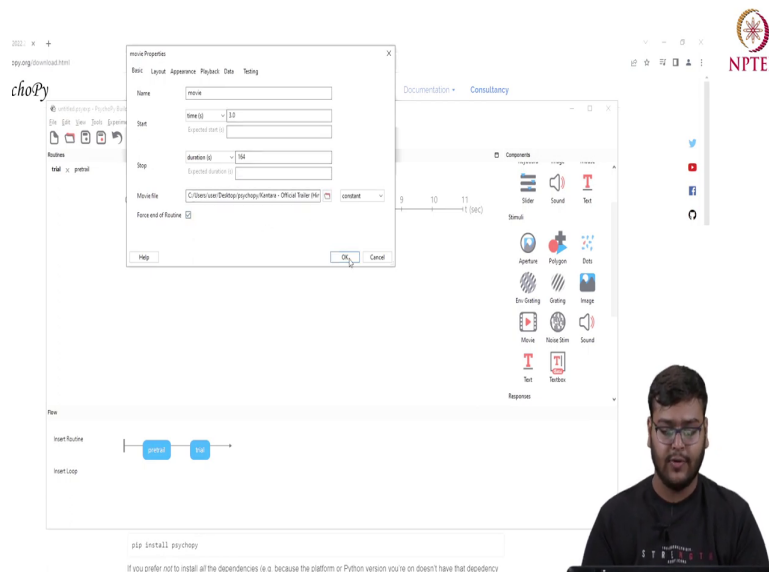
So, here we will add a key response and here we want it to start at time t equals to 1 second and for a duration of 2 seconds. So, and we want it to press the Y key. So, now we can see here like we have created a 3 second pretrial where a text will be displayed and a key response will be taken from the 1 second to 3 second.

(Refer Slide Time: 05:38)

The screenshot displays the PsychoPy Builder software interface. At the top, there are window titles for 'PsyPy.org/Download.html' and 'choPy'. The main workspace shows a timeline from 0 to 11 seconds. Below the timeline, there are two sections: 'Insert Routine' and 'Insert Loop'. The 'Insert Routine' section contains two blue boxes labeled 'Stimuli' and 'Text'. The 'Insert Loop' section is currently empty. On the right side, there is a 'Components' palette with various icons for Stimuli (Aperture, Polygon, Dots, Env. Grating, Grating, Image, Movie, Mouse Click, Sound) and Responses (Text, TextBox). A small video inset in the bottom right corner shows a man with glasses and a beard, wearing a black t-shirt, speaking. In the top right corner, there is an NPTEL logo and social media icons for Twitter, YouTube, and Facebook. At the bottom of the window, there is a text box with the instruction: 'Please install psychopy' and a note: 'If you prefer not to install all the dependencies (ie. because the platform or Python version you're on doesn't have that dependency)'. The background of the slide is white with a faint grid pattern.

Now going on to the trial section. So, here we want to add a video response a video stimuli to the participant.

(Refer Slide Time: 05:47)



So, here we will click on the video option and let us name this variable as movie and we want it to start after the pretrial is completed. So, here we will have we will start it from the 3 seconds also like we want to watch the whole video. So, whole video is around 2 minutes 44 seconds. So, it will be around 164 seconds. So, it will start from time 3 equals to 3.

(Refer Slide Time: 06:14)

The screenshot shows a video player interface. In the top right corner, there is an NPTEL logo. The main content area displays a file explorer window titled 'Specify file...' with the path 'This PC > Desktop > psychopy'. The file explorer shows a folder named 'data' and a file named 'Kumar - Official Talk Hindi_Rishabh Shetty_Sophomr L_Honorable File_Vijay Kogekar.mp4'. Below the file explorer, there is a code editor with a 'File' menu and a 'Run' button. The code editor contains the following text:

```
File Install psychopy
```

Below the code editor, there is a note: 'If you prefer not to install all the dependencies (ie. because the platform or Python version you're on doesn't have that dependency)'. In the bottom right corner, there is a small video thumbnail of a man with glasses and a beard, wearing a black t-shirt.

And now we will need to provide the path of the video. So, here we will be adding the path of the video and we want to end this routine after the completion of the video.

(Refer Slide Time: 06:22)

The screenshot displays the PsychoPy software interface. At the top, there is a menu bar with options like 'File', 'Edit', 'View', 'Tools', 'Experiment', 'Camera', 'Preferences', 'Window', and 'Help'. Below the menu bar is a toolbar with various icons for file operations and settings. The main workspace is divided into several sections:

- Routes:** A horizontal timeline at the top of the workspace, labeled 'Movie', with a play button icon. The timeline has a scale from 0 to 1.6e+02 (160) with major ticks every 20 units.
- Components:** A panel on the right side of the workspace containing various stimulus and response components. The 'Stimulus' section is active, showing options like 'Aperture', 'Polygon', 'Dots', 'Env. Grating', 'Grating', 'Image', 'Movie', 'Movie Stim', and 'Sound'. The 'Response' section shows 'Text' and 'TextBox'.
- Flow:** A section at the bottom of the workspace showing a flow diagram with two blue boxes labeled 'insert' and 'loop' connected by arrows.

At the bottom of the window, there is a status bar with the text: 'psicopy: Install psychopy' and 'If you prefer not to install all the dependencies (ie. because the platform or Python version you're on doesn't have that dependency)'. In the bottom right corner, there is a small video feed of a man with glasses and a beard, wearing a black t-shirt, looking at the screen.

So, now, here we can see from time t equals to 3 the movie stimulus has been added and also, we want to add a camera option. So, for the camera option.

(Refer Slide Time: 06:35)

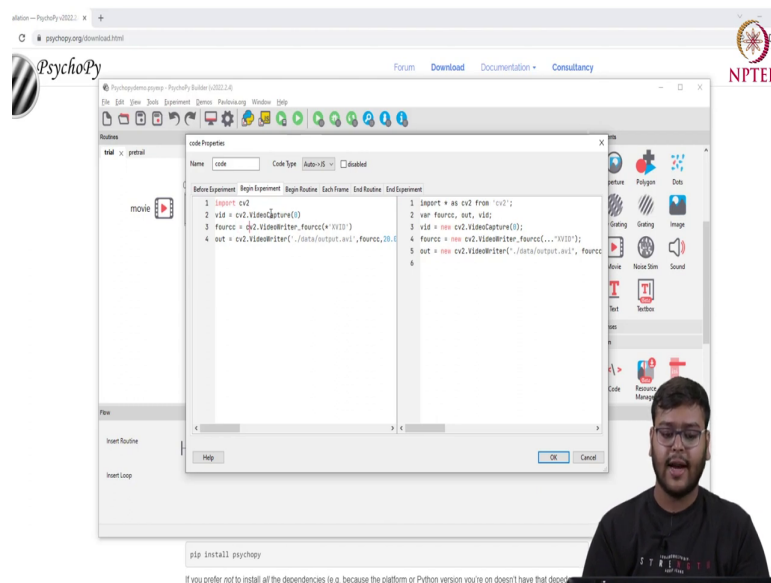
The screenshot displays the PsychoPy software interface. A 'code Properties' dialog box is open, showing a table with the following content:

Name	Code Type	Code
1	1	1

Below the table, there are 'OK' and 'Cancel' buttons. The background shows the PsychoPy main window with a 'Routine' panel on the left and a 'Code' panel on the right. A small video inset of a person is visible in the bottom right corner.

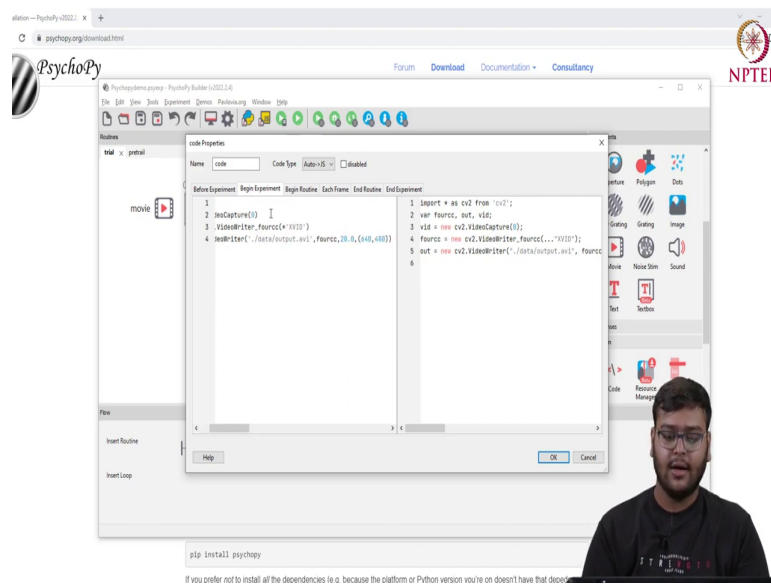
We will be using the custom code component and we will be writing the code.

(Refer Slide Time: 06:38)



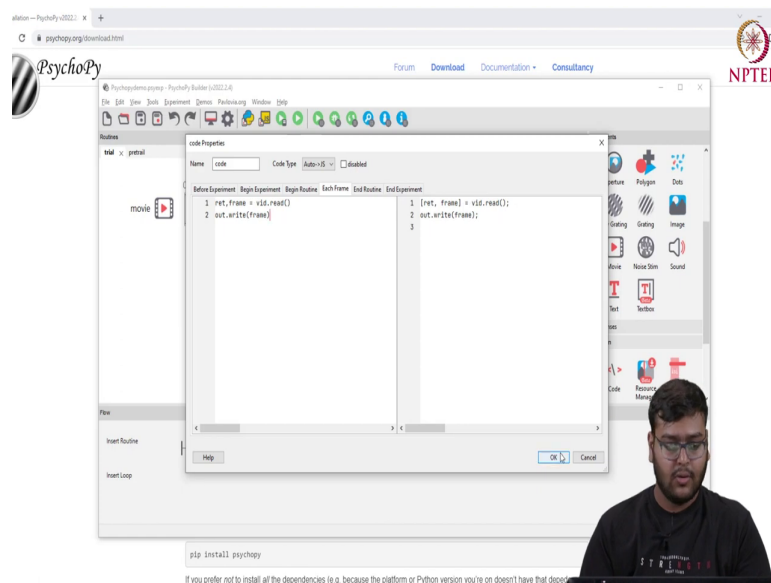
So, in the we want that code to be begin in the begin of the experiment. So, we will be adding the demo code. So, for code we will be importing a cv2 and we will be saving we will be getting the video capture for the camera that we have actually added external camera that we have added. So, after that we will be adding a fork to write the video and we will be saving the video in the data folder.

(Refer Slide Time: 07:08)



And we will be at providing the custom window frame size that is 640 cross 480.

(Refer Slide Time: 07:15)



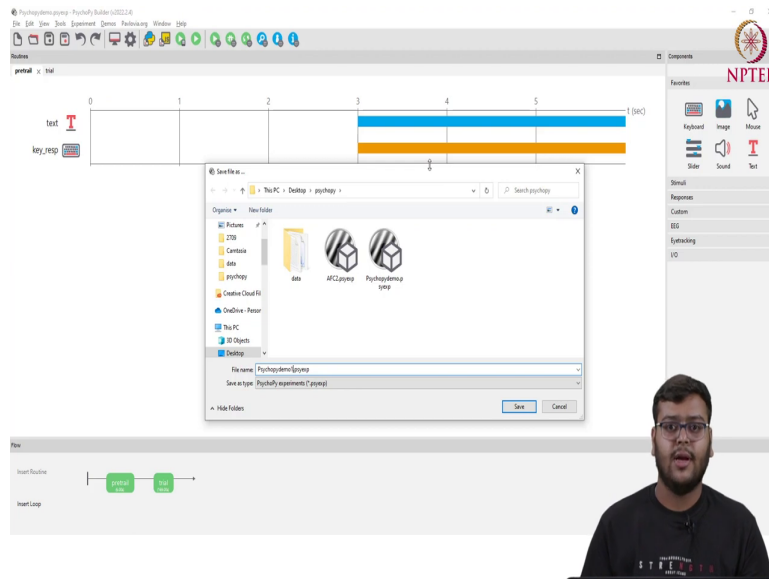
Also, for each frame we want to save the get the video frame and save it in the output file. So, for that we will be using ret and we return in frame to actually read the video that is there and we want to write that frame. So, we will be writing that frame in the output file.

(Refer Slide Time: 07:42)

The image shows a screenshot of the PsychoPy Builder software interface. The window title is "PsychoPy Builder 1.022.2.6". The interface includes a menu bar (File, Edit, View, Tools, Experiment, Demos, Preferences, Windows, Help), a toolbar, and a main workspace. The workspace is divided into several sections: a timeline at the top with a scale from 0 to 1.6e+02 (160) seconds, a "movie" component represented by a play button icon, and a "code" component represented by a code editor icon. A "Fix" section at the bottom contains "Insert Routine" and "Insert Loop" buttons. On the right side, there is a "Components" panel with various icons for different components like Aperture, Polygon, Data, Eye Gating, Grating, Image, Movie, Mouse Stim, Sound, Text, and Textbox. A small inset window in the bottom right corner shows a terminal with the command "pip install psycho" and a warning message: "If you prefer not to install all the dependencies (e.g. because the platform or Python version you're on doesn't have that dependency) you can use the --no-deps flag." A small video feed of a person is visible in the bottom right corner of the screenshot.

So, now, our code for that is complete.

(Refer Slide Time: 07:46)



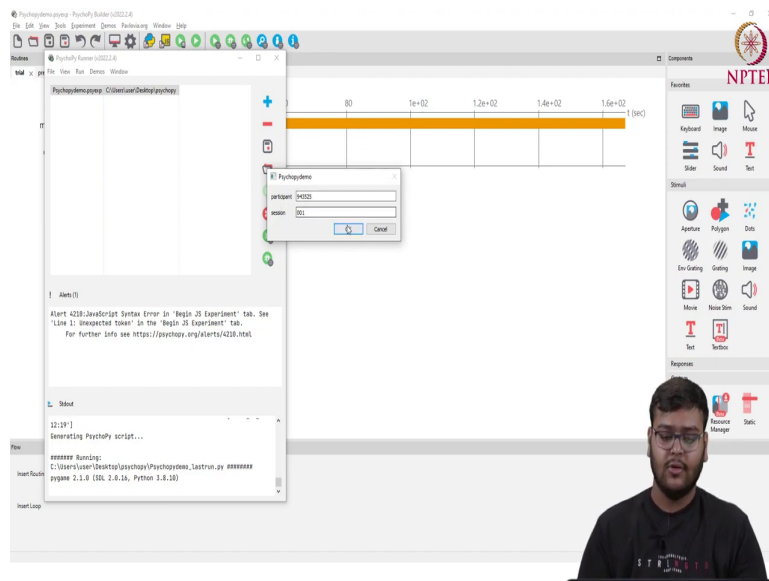
So, now, clicking on the File option and save as. So, here we will be saving the PsychoPy experiment that we have generated.

(Refer Slide Time: 07:51)

The screenshot displays the PsychoPy Builder software interface. At the top, the title bar reads "Psychopy Builder 3.02.2.0". Below the title bar is a menu bar with options: File, Edit, View, Tools, Experiment, Demos, Preferences, Windows, Help. A toolbar with various icons is located below the menu bar. The main workspace is divided into two sections. The upper section is a timeline labeled "pretrial x trial" with a scale from 0 to 6 seconds. Two horizontal bars are shown: a blue bar labeled "text" and an orange bar labeled "key_resp", both starting at the 3-second mark and ending at the 6-second mark. The lower section is a flowchart titled "Flow" showing a sequence of components: a red box labeled "Load Routine", followed by a green box labeled "pretrial", and another green box labeled "trial", connected by arrows. On the right side, there is a "Components" panel with the NPTEL logo at the top. Below the logo are sections for "Facories" (Keyboard, Image, Mouse, Sound, Text), "Stimuli", "Responses", "Custom", "EGG", "EyeTracking", and "IO". A small video inset of a person is visible in the bottom right corner of the software window.

So, here the PsychoPy experiment has been saved successfully.

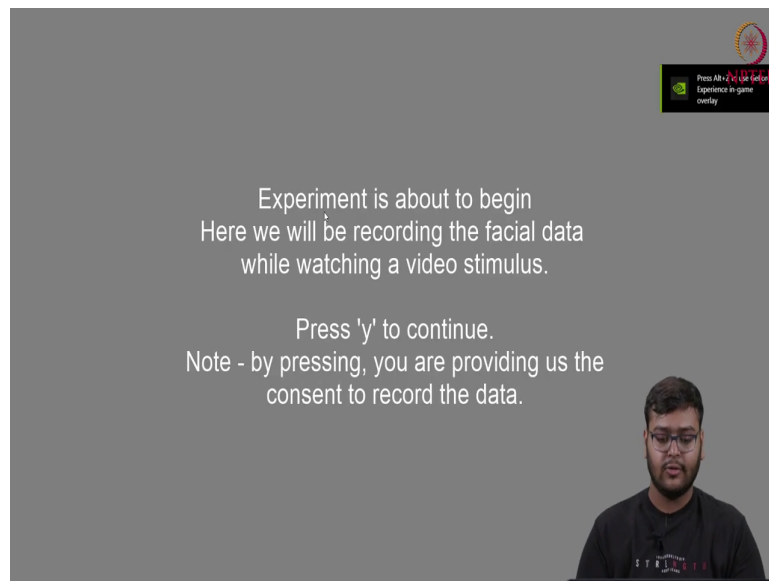
(Refer Slide Time: 07:58)



Now starting with the experiment and while playing it we will record it will show me the stimulus and the facial cameras will record my expression while watching the video. I am starting with the experiment. So, by clicking play option it will start the experiment and I will be open up with this dialogue box which will be asking for the participant ID and the session.

So, by clicking OK it will start with the experiment and this PsychoPy has started. So, initially we will be shown with the pretrial screen and then with the routine.

(Refer Slide Time: 08:33)

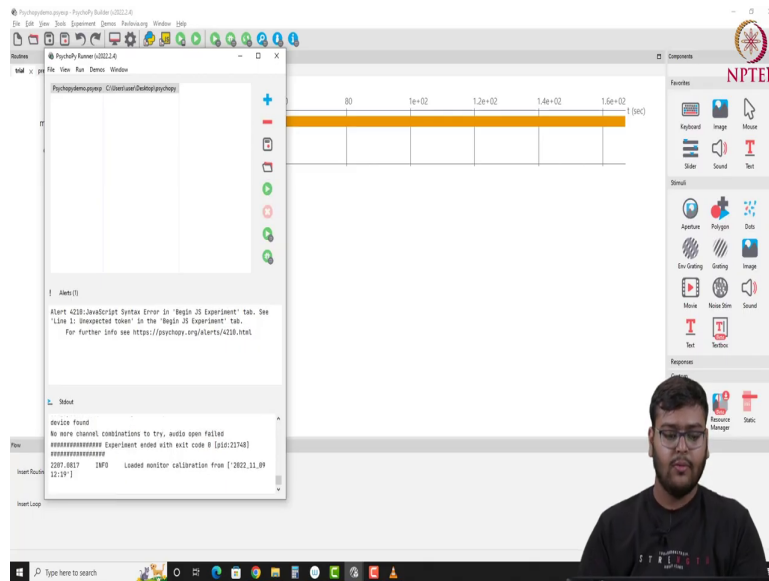


So, here the pretrial routine is there and by pressing Y we are starting with the actual experiment.

(Refer Slide Time: 08:39)

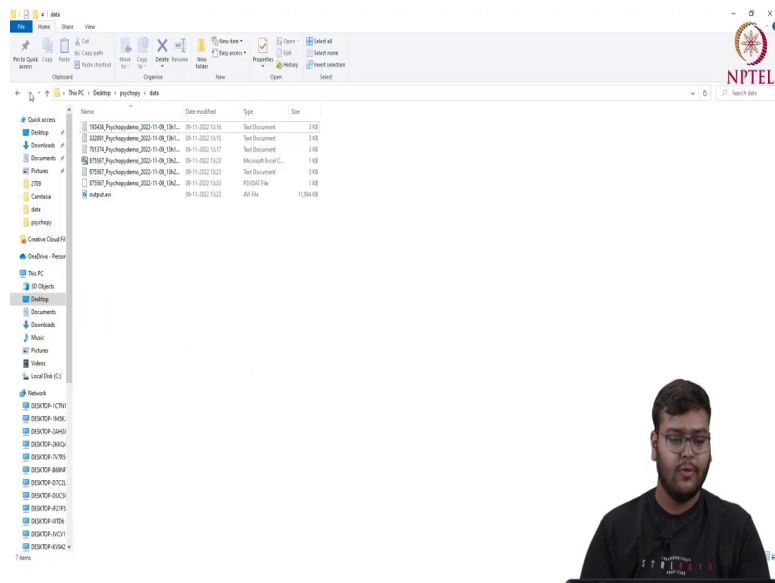


(Refer Slide Time: 11:19)

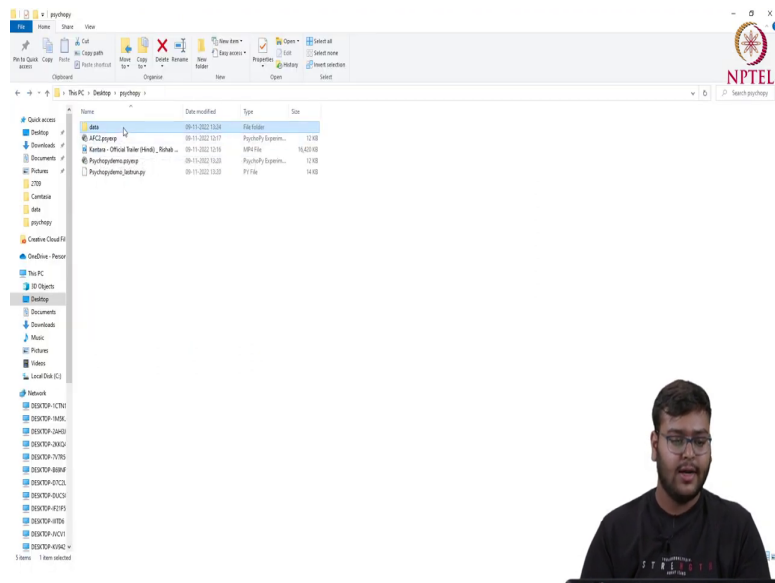


So, now with the experiment has been completed successfully and we can see the data has been saved. So, going to the data directory.

(Refer Slide Time: 11:28)

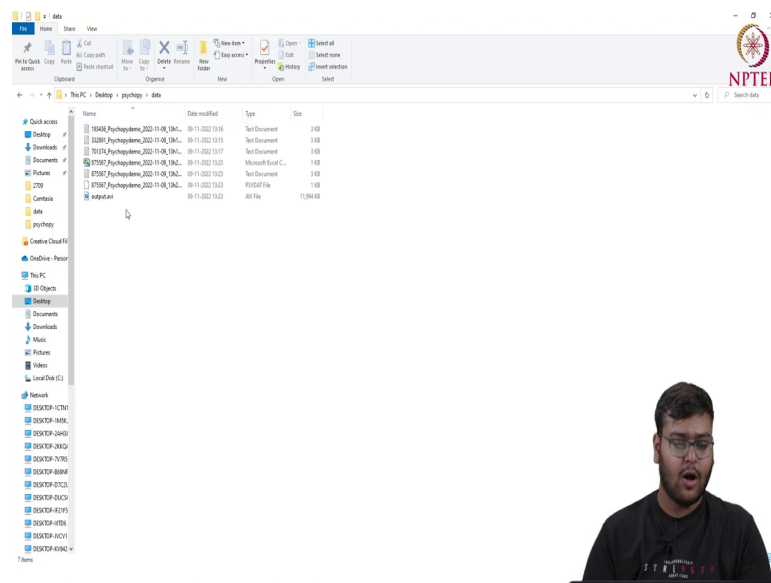


(Refer Slide Time: 11:29)



So, we can see in the data directory.

(Refer Slide Time: 11:31)



There is an output file of the camera recording that has been generated. So, if we will open that. So, here we can see the camp that has generated and if we will look at the video. So, here we can see like the video and the camera expressions that are there. So, while watching the video we are actually getting the facial camera experiment and it has saved the data for around with the same time period that we have generated.

In this lecture we have seen how to create an experiment while using PsychoPy and we have seen a demo experiment that we have generated and the data that has been generated while watching a video stimulus and after that the data has been recorded. This data can be used by the researchers for their future research.

Thank you.

