Creating Online Experiments Using JsPysch: Sociolinguistics and Identification Task

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Outline

- Online Research: Potential benefits and concerns
- Introduction of JsPsych
- **Practice:** Create two linguistic experiments using JsPsych

Online research

- Online research has a number of potential benefits over the traditional lab-based studies (Woods et al 2015).
- **Benefits**
  - Speed of data collection
  - Easy access to large pools of participants
  - Use online recruitment platforms (e.g. Mechanical Turk)
  - Access to a more representative sample of participants
  - Economical

- **Concerns**
  - Stimulus timing
  - Reaction times
  - Variability in hardware
  - Ethics

Demo Experiment 1: Sociolinguistics Task

URL:http://142.1.108.117/~test/sample/exp1_hard.html

Task: Participants are asked to listen to a conversation and answer several questions.

Completion Progress

Please listen carefully and answer the questions.

Q1. How old do you think the male speaker is in the dialogue?*

○10~20　　○21~30　　○31~40　　○41~50

Q2. How old do you think the female speaker is in the dialogue?*

Demo Experiment 2: Identification Task

URL: http://142.1.108.117/~test/sample/exp2_hard.html

Task: Participants are asked to listen to a conversation and identify what they heard between "pa" and "ba,"
by selecting a corresponding button on their electronic device used for the experiment.

Completion Progress
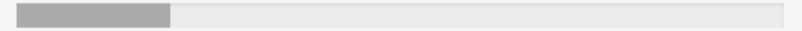
pa ba
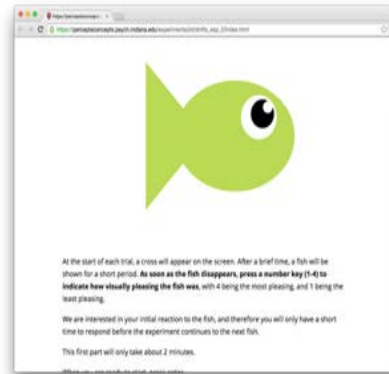
Replay

Please click what you heard.

What you need to run an online experiment

Web server

your computer or laptop

Participants

- Apache
- PHP
- JsPsych
- jQuery

- Brower (Safari, Fireworks, Chrome)
- Text editor(ex. Atom)
- FTP software (ex. FileZilla)

Why use JsPsych?

- **JsPsych is a JavaScript library for running experiments in a web browser.**

  - free and open source
  - Relatively easy, with a bit of programming
  - Reusable codes for same kinds of tasks, regardless of experimental context
  - Code for one task should work seamlessly with another code for any other task
  - No special software is required for participants
  - No modifications needed to run experiments online or in the lab

Feature of JsPsych

DATA MANAGEMENT

Data collection is automatic. Data can be output as json or csv strings. Easy to add custom data fields.

EVENT-DRIVEN FUNCTIONS

Add custom, arbitrary functions that trigger whenever a trial starts or ends, when new data is added, or when the experiment finishes.

MTURK SUPPORT

Built-in support for tracking mechanical turk worker variables like workerID and assignmentID.

RANDOMIZATION

Randomize the order of trials by specifying a single parameter. Helper methods for shuffling orders, generating randomly ordered factorial combinations, and repeating a set of trials in a random order.

PRELOAD CONTENT

Automatically preload media content like images and audio files to ensure precise timing during the experiment.

TABLET READY

Plugins that don't require keyboard input can be used on tablet devices.

JsPsych: Structure & Content

- Jspsych handles the **structure**, letting you focus on the **content.**

| Structure	Content
Display instructions to the participant	What the instructions say
Show an image and measure response time for a keyboard response	How long the image should be displayed
	What keys the participant is allowed to press
Display a question with a likert scale and record the response	How many response options are on the scale

Architecture overview

| Core library	Plugins
Required for every JsPsych experiment. Handles functions that are common to all experiments: controlling flow, data management, etc.	Plugins are ready-made templates for simple experimental tasks. List of available plugins. https://www.jspsych.org/plugins/overview/

Procedure

- Step 1: Set up a web server
- Step 2: Create a user account on the server (See Powerpoint slides and a video clip)
- Step 3: Download the JsPsych library and jQuery library and upload them on the server
  - JsPsych 6.0.3: https://github.com/jspsych/jsPsych/releases
  - JQuery: https://jquery.com
- Step 4: Create a folder "Experiment" to store your experiment files
  - Sub-folders: img, sound, stimuli, data
- Step 5: Create HTML files using JsPsych library
  - Text editor: Atom (https://atom.io)
- Step 6: Upload your experiment files to your account
  - FTP application: FileZilla v3.20.0

Download files from the server to your computer
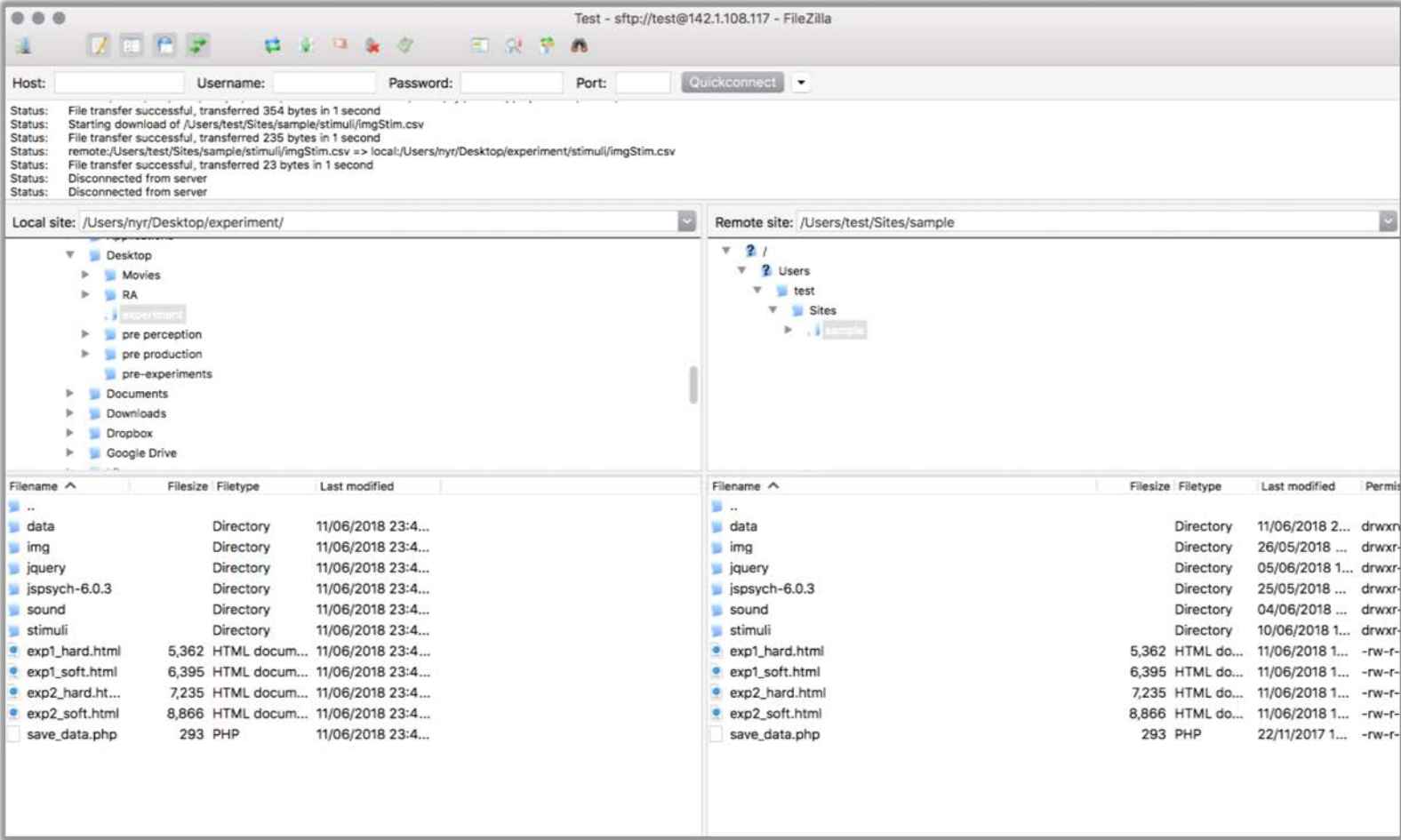
Upload files from your computer to the server

Data: Permission ->777
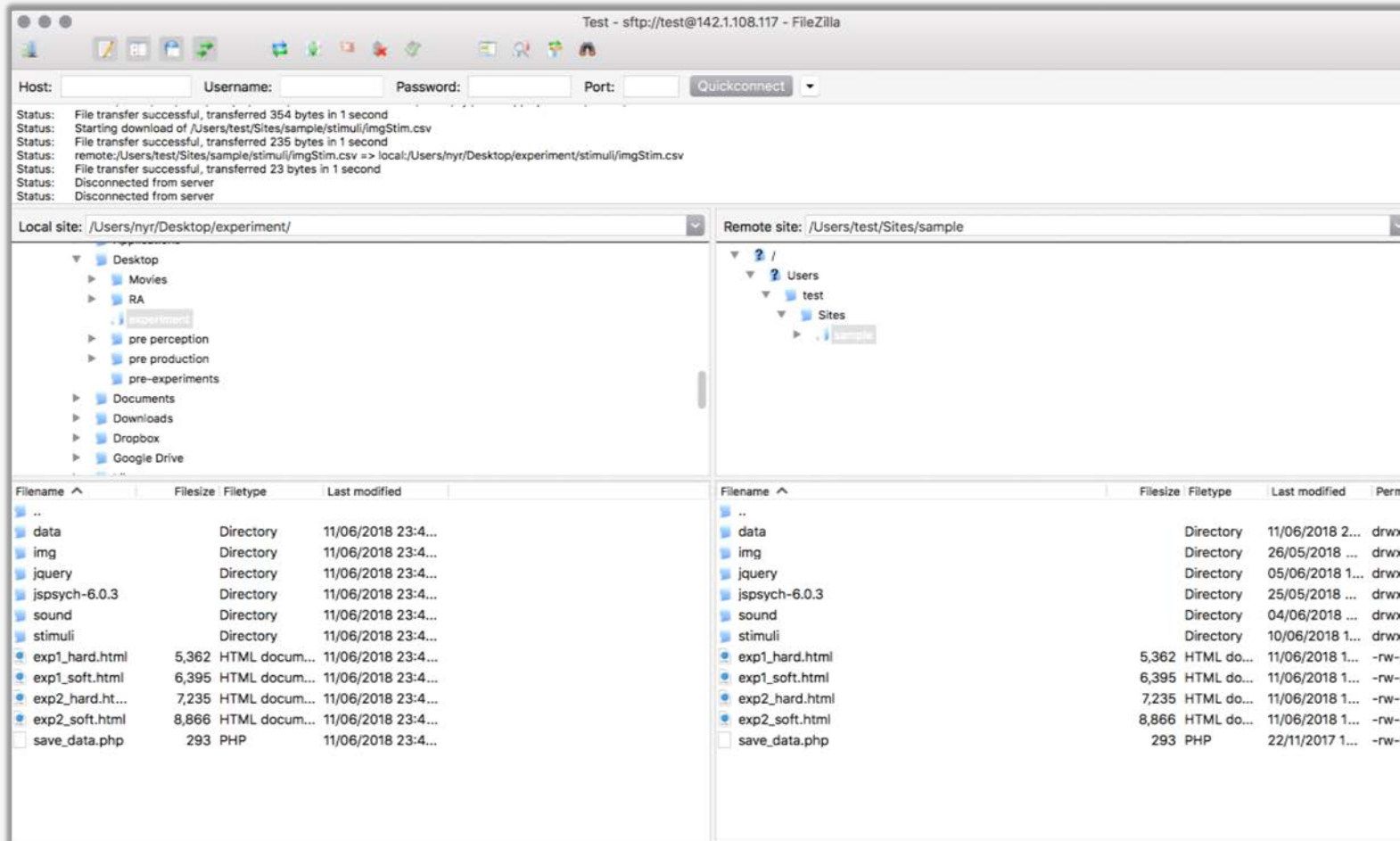
Demo Experiment 1: Tutorial Content

- The task is to listen to a conversation between two people and answer several questions.

JsPsych: Timeline

- To create an experiment using JsPsych, you need to specify **a timeline** that describes the structure of the experiment.

- The timeline is an ordered set of trials.

- JsPsych uses *plugins* to define what to do at each point on the timeline.
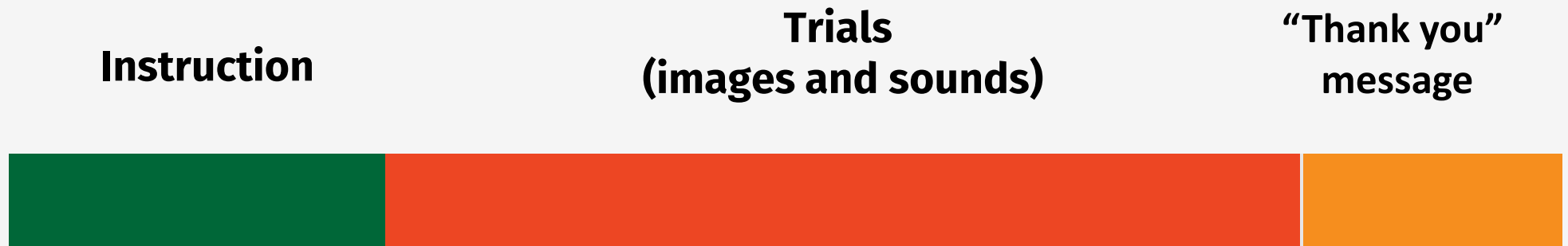
Instruction

Show Image / Play Sound / Questions

"Thank you" message
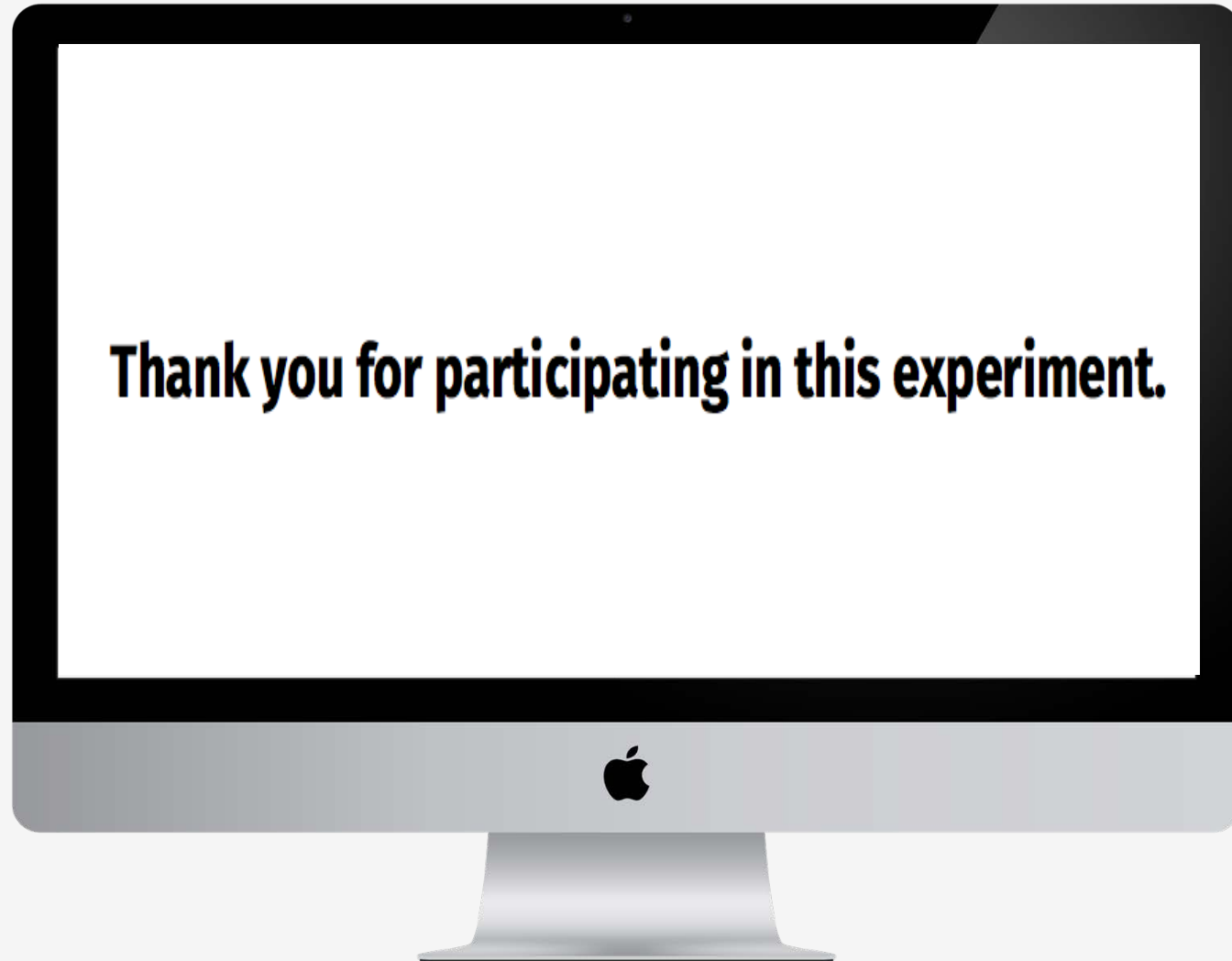
Demo Experiment 1: Plugins & Function

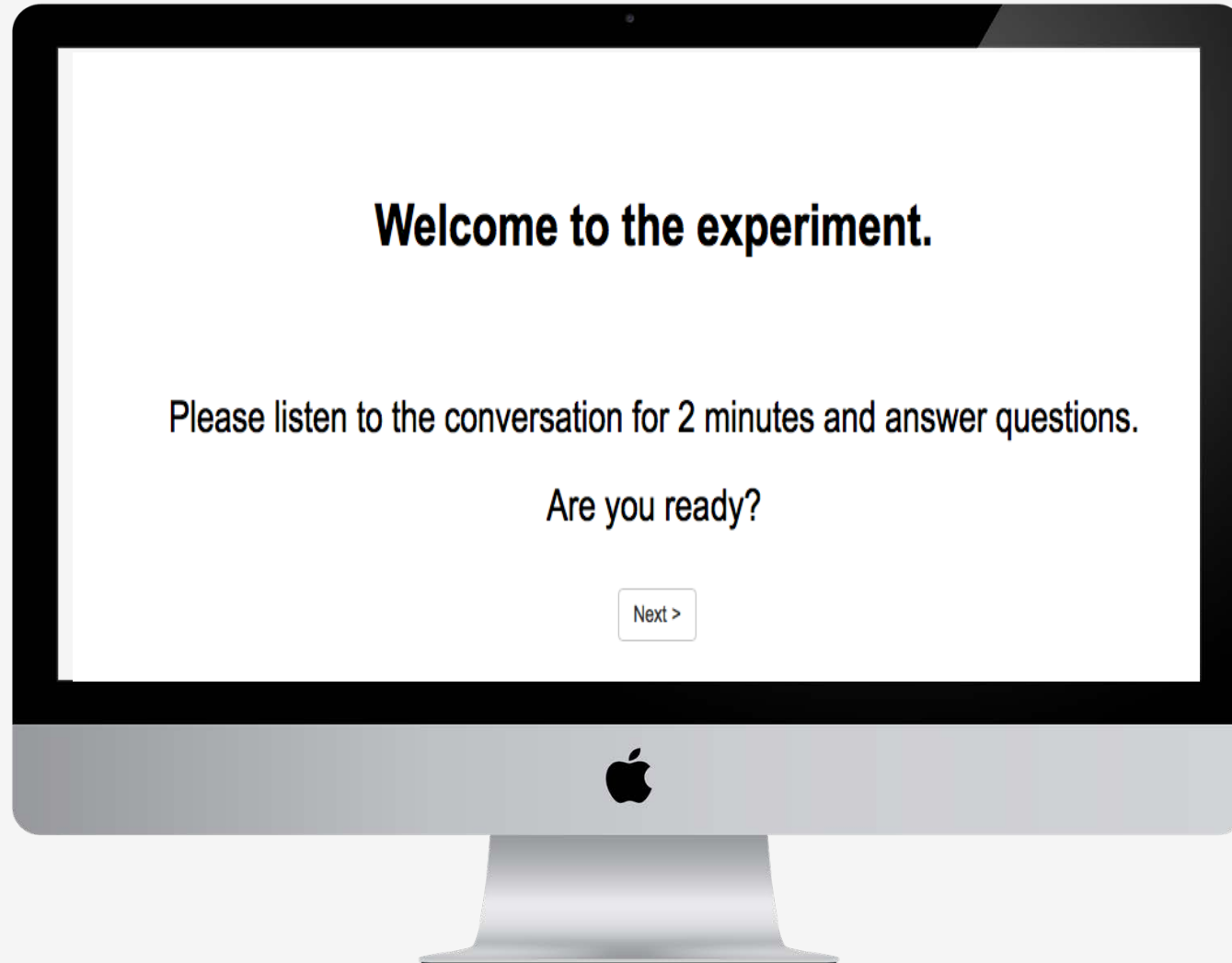| Content	Plugin & Function	Description
Instruction	jspsych-instructions.js	Display instruction
Questions	jspsych-survey-multi-choice.js	Display multiple choice questions with one answer allowed per question.
Thank you message	'Finish' function	Show "Thank you" message
	'Save data' function	Save participants' responses
	'Time stamp' function	Show the absolute date and time of the day when data file is saved.

Import the JsPsych library and use Plugins

- To use jsPsych, add a <script> tag to import the library.
- To use plugin, we need to load it with a <script> tag.

```html
<!DOCTYPE html>
<html>
<head>
    <meta charset="UTF-8">
    <title>Experiment1-hard</title>
    <script src="jquery/jquery-3.3.1.min.js"></script>
    <script src="jspsych-6.0.3/jspsych.js"></script>
    <link href="jspsych-6.0.3/css/jspsych.css" rel="stylesheet" type="text/css"></link>
    <script src="jspsych-6.0.3/plugins/jspsych-instructions.js"></script>
    <script src="jspsych-6.0.3/plugins/jspsych-survey-multi-choice.js"></script>
</head>
<body></body>
<script>
```

Display instruction
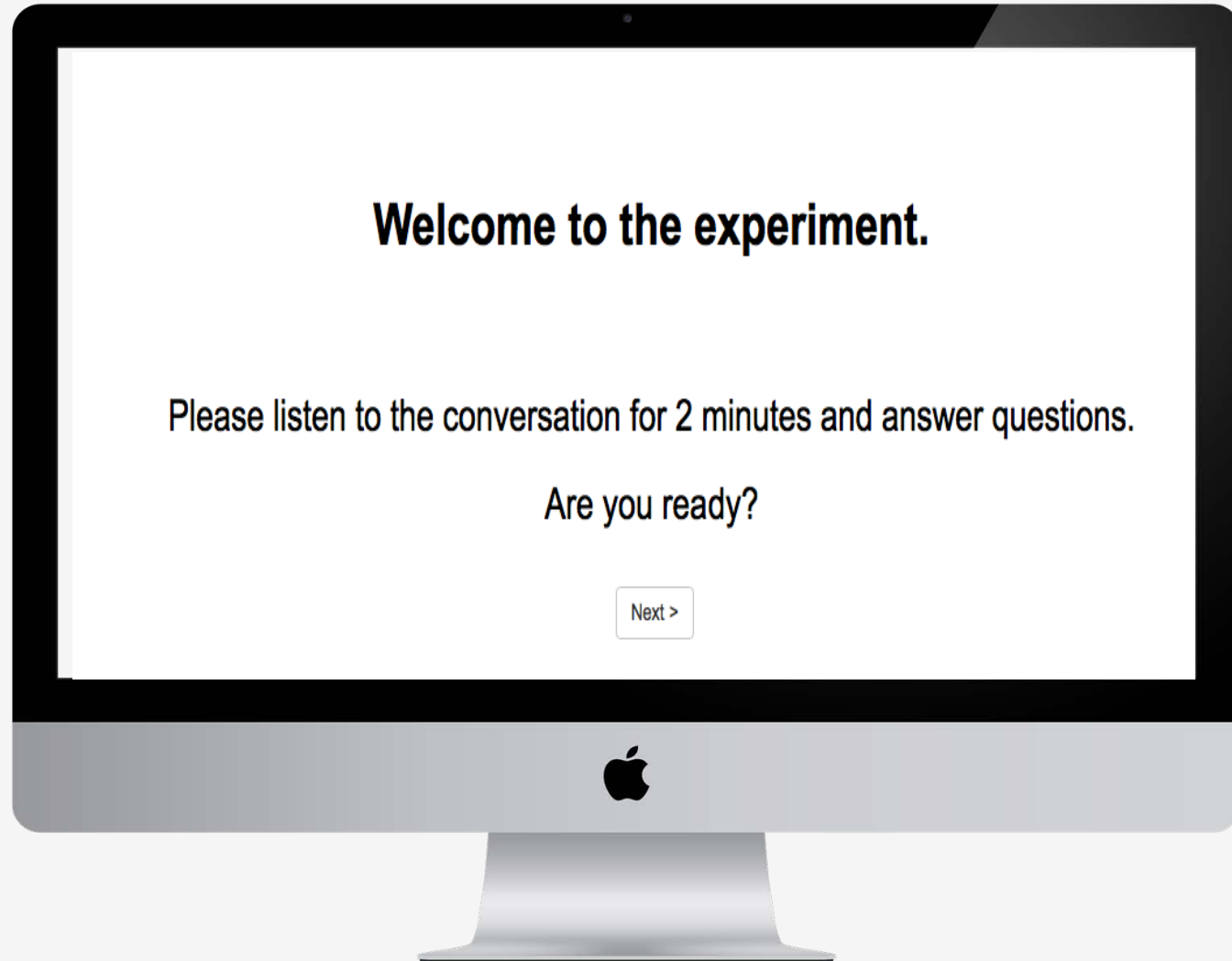
Show Instruction: Coding

"p":paragraph
"Strong": bold font
"br":enter

```
var instStim = '<p style="font-size:200%;"><strong> Welcome to the experiment.</strong></p><br>' +
               '<p style="font-size:150%;"> Please listen to the conversation for 2 minutes and answer questions.</p>'+
               '<p style="font-size:150%;"> Are you ready?</p>',

instruction_trial = {
    type: 'instructions',
    pages: [ instStim ] ,
    show_clickable_nav: true
};
```

Play sound and ask questions

Play sound and questions: Coding

```javascript
var imgStim=[{image:"conversation.jpg"}];

var soundStim=[{sound:"sound_20sec.mp3"}];

var q1 = "Q1. How old do you think the male speaker is in the dialogue?" ;
var q2 = "Q2. How old do you think the female speaker is in the dialogue?" ;
var q3 = "Q3. Which dialect is spoken in the dialogue?" ;

var q1_options = ["10~20", "21~30", "31~40", "41~50"];
var q2_options = ["10~20", "21~30", "31~40", "41~50"];
var q3_options = ["American English", "Canadian English", "British English", "I don't know"];

var question_trial = {
    type: 'survey-multi-choice',
    preamble: '<table>' +
            '<tr style="font-size:150%;"><th>Please listen carefully and answer the questions.</td></tr>' +
            '<tr style="line-height:0"><th> <img src=img/' + imgStim[0].image + '> </th></tr>' +
            '<tr style="line-height:0"><th> <audio autoplay> <source src=sound/' + soundStim[0].sound + '></audio> </th></tr>' +
            '</table>',
    questions: [{prompt: q1, options: q1_options, required: true, horizontal: true,},
                {prompt: q2, options: q2_options, required: true, horizontal: true},
                {prompt: q3, options: q3_options, required: true, horizontal: true}],
    data:{sound: soundStim[0].sound},
};
```

'Save data' function

jQuery is a cross-platform JavaScript library designed to simplify a lot of the complicated things from JavaScript, like AJAX calls and DOM manipulation.

Ajax: -Asynchornous JavaScript and XML.
     With Ajaz, Web applications can send and retrieve data from a sever asynchronousl.y

Post- submits data to be processed to a specified resource

```javascript
// save data function
function saveData(filename, filedata){
    $.ajax({
        type:'post',
        cache: false,
        url: 'save_data.php',
        data: {filename: filename, filedata: filedata}
    });
};
```

'Time stamp' function

```javascript
function stamp(){
    var dt = new Date();
    var year = dt.getFullYear();
    var month = ((dt.getMonth()+1)<10?'0':'') + (dt.getMonth()+1);
    var day = (dt.getDate()<10?'0':'') + dt.getDate();
    var hour = (dt.getHours()<10?'0':'') + dt.getHours();
    var minute = (dt.getMinutes()<10?'0':'') + dt.getMinutes();
    var second = (dt.getSeconds()<10?'0':'') + dt.getSeconds();
    var stamp = year +''+ month +''+ day +''+ hour +''+ minute +''+ second ;
    return stamp;
};
```

'Finish' function

```
function finish() {

    DOM_target = document.querySelector('#jspsych-content');

    DOM_target.innerHTML ='<p style="font-size:200%;"><strong>Thank you for participating in this experiment</strong></p>' ;

    jsPsych.pluginAPI.cancelAllKeyboardResponses();

    jsPsych.pluginAPI.clearAllTimeouts();

};
```

Running an experiment

- Now that we have defined the trials, we just need jsPsych to run the experiment of the trials.

```
jsPsych.init({
    timeline: [instruction_trial, question_trial],
    show_progress_bar: true,
    on_finish: function(data) {
        data = jsPsych.data.get().filter({trial_type:'survey-multi-choice'}).ignore('trial_index').ignore('time_elapsed').ignore('internal_node_id')
        saveData('exp1_hard_'+stamp()+'_result.csv', data.csv());
        finish();
    },
});
```

Hard-coding vs. Soft-coding

	Hard-coding	Soft-coding
Pros	**Simplicity** embed data directly into the source code of a program	**Flexibility & Adaptability** provide end users more power in adapting the product to their special needs.
Cons	**Inflexibility** Make it the program much more difficult to maintain	**Complexity**

Example of Hard-coding and Soft-coding

Hard-coding (Instruction)

```
var instStim = '<p style="font-size:200%;"><strong> Welcome to the experiment.</strong></p><br>' +
               '<p style="font-size:150%;"> Please listen to the conversation for 2 minutes and answer questions.</p>'+
               '<p style="font-size:150%;"> Are you ready?</p>',

instruction_trial = {
    type: 'instructions',
    pages: [ instStim ] ,
    show_clickable_nav: true
};
```

Soft-coding (Instruction)

Get-Requests data from a specified resource

```
$.ajax({                                  // read stimuli/instruction.txt
    type: "GET",
    async: false,
    cache: false,
    url: "stimuli/instruction.txt",
    dataType: "text",
    success: function(txt) {instStim=txtJSON(txt)}
});

var instruction_trial = {
    type: 'instructions',
    pages: [ instStim ],
    show_clickable_nav: true
};
```

Upload files to the server

Local site: Desktop >> experiment >> click "Upload" (or drag the folder to the remote site)

Remote site: In the "Sites" directory

To save date: change the file permission: Data > File permission (777)
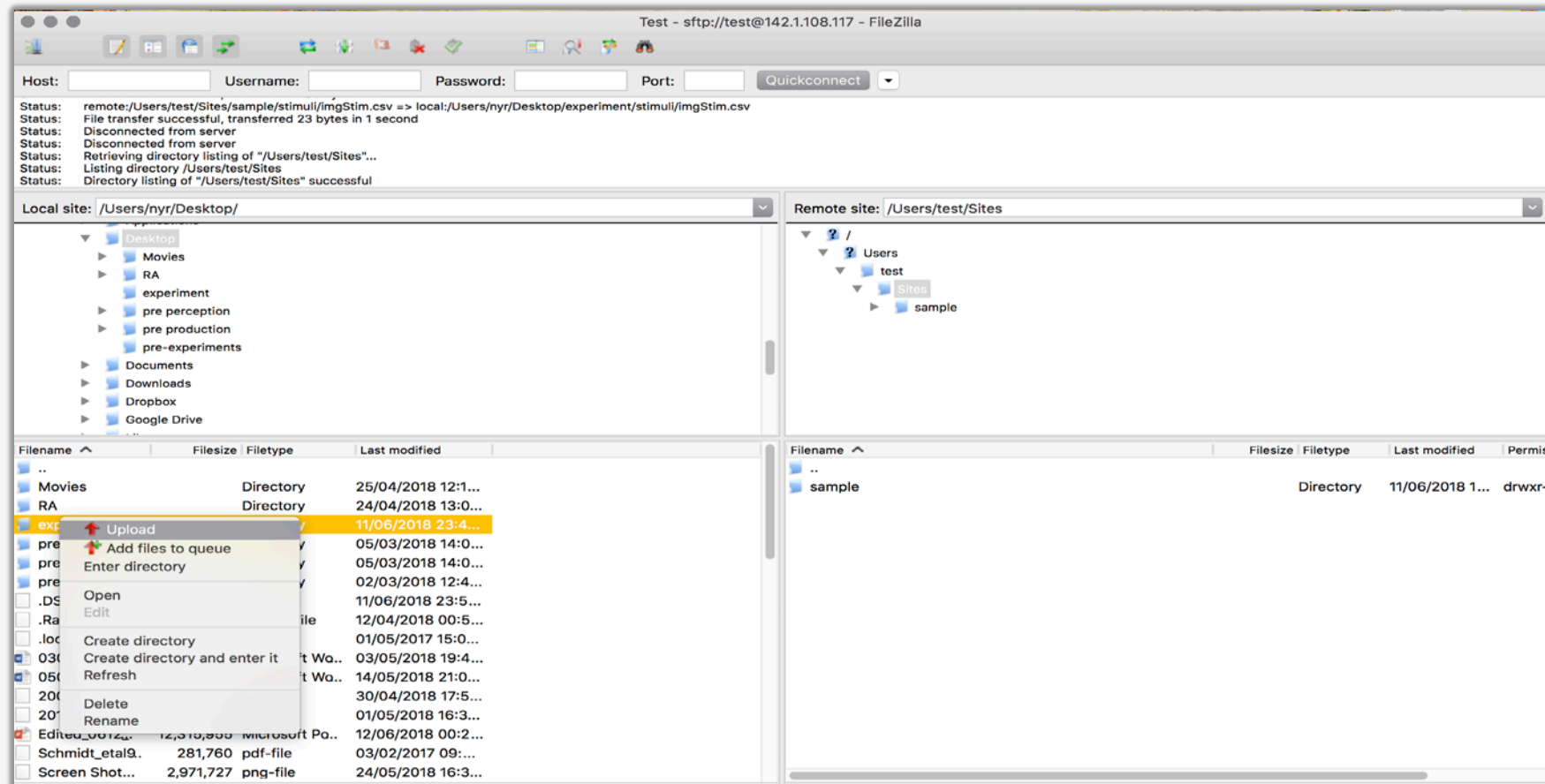
Demo Experiment 2: Plugins & Functions

Plugin & Function	Description
jspsych-instructions.js	show instructions to the subject.
jspsych-audio-keyboard-response.js	play audio files and records responses generated with the keyboard.
jspsych-audio-button-response.js	play audio files and records responses generated with a button click.
'Finish' function	Show "Thank you" message
txtJSON, csvJSON (JSON: JavaScrpt Object Notation)	Convert text to JSON Convert csv data to JSON
'Save data' function	Save participants' response
'Time stamp' function	Show the absolute date and time of the day when the data file is saved.
'Randomization' function	Trials are randomized

Demo Experiment 2: Identification Task

Task: Participants are asked to listen to a conversation and identify what they heard between "pa" and "ba," by selecting a corresponding button on their electronic device used for the experiment.
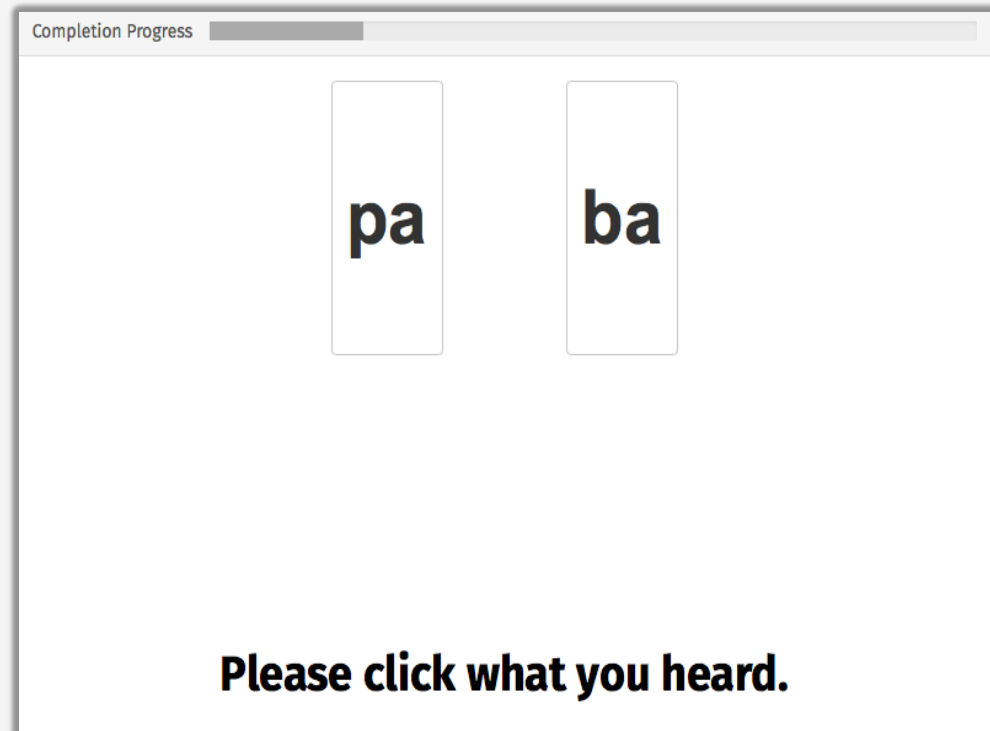
Check your experiments on the browser

Completion Progress

Please listen carefully and answer the questions.

Replay

Q1. How old do you think the male speaker is in the dialogue?*

○10~20   ○21~30   ○31~40   ○41~50

Q2. How old do you think the female speaker is in the dialogue?*

Completion Progress

pa   ba

Replay

Please click what you heard.

Suggested Software and Websites

- Jspsych: https://www.jspsych.org
- jQuery: https://jquery.com
- jQuery Tutorial: https://www.w3schools.com/Jquery/default.asp

- Atom (text editor): https://atom.io
- Woods, A. T., Velasco, C., Levitan, C. A., Wan, X., & Spence, C. (2015). Conducting perception research over the internet: a tutorial review. *PeerJ*, *3*, e1058.