**2AFC Texture Smoothness Experiments: Subject Instructions Script**

This is the script I use to explain the experiment process to subjects. You should modify it as needed.

(Before experiment, have the subject sign the consent form; and both the subject and experimenter should wash their hands)

I'm going to explain the purpose of this study: this is a psychosensory study, and the purpose of this study is to evaluate tactile perception of **roughness** and **smoothness** using 3d printed textures.  I'm going to give you two textured plastic squares [show examples], and ask you which one feels **smoother**. You probably know what roughness and smoothness mean: something that is smooth is completely flat with no surface texture, and roughness is the opposite of smoothness, whatever that means.

I’ll explain the process to you. I'm going to place two textures into this case, and with your right (or dominant) hand index and middle finger, you will feel them, using a downwards vertical stroking motion toward yourself. Only stroke in the direction toward yourself; do not move your finger up or away from yourself against the texture. Try to use a normal pressure, as if you were feeling a piece of fabric or something like that. You don't need to press very hard so that it is uncomfortable, or you might damage the print.

The way we are going to get the data in the computer is this: at the same time as you first make contact with the textures with your **right** (or dominant) hand, use your **left** (or non-dominant) hand to press the left and right arrow keys on this keyboard. Continue holding down the keys firmly while you feel the texture, for as long as it takes. When you have decided which texture is ***smoother*, release** the key corresponding to that direction, and then release the other key and resume a resting position. Some people find it helpful to lift both the finger on the smoother texture, and the corresponding (right or left) finger on the other hand; it’s up to you. After lifting one key, you can release the other key, and you can resume a resting position with your hands on the table in front of the texture case. We use this process to measure the amount of time it takes to make your decision.

We're going to repeat this process for the whole duration. When the next texture is ready, a tone will sound to indicate that you can start. If you don't know which texture is smoother, simply give a best guess. Some of them may be the same or may be too similar to tell.

During the test, I'm going to ask you to close your eyes (or use a curtain or cover) so that you are only using your sense of touch. I'm also going to play a quiet white noise (if necessary); ensure that you can hear the beeping noise over it.

Do you understand? We will start by doing about 10 test trials, just to get used to the process. These don't count.

If you feel at any point that you have made a mistake -- sometimes people reflexively or accidentally lift the wrong key -- then let me know.

Ensure you are ready and comfortable. If you need a break at any time, let me know; there will also be a quick break after each session.

**Experimenter Instructions**

**Ensure that the grip\_scripts folder and subfolders are in your MATLAB path before beginning. This script and all the PsychToolbox scripts must be in your path in order for the script to run.**

The function to run the experiment for one session is:

experimentTrial\_v2(subj\_id, type)

The function to run the experiment for one session is:

experimentTrial\_v2(‘test\_person’, ‘test\_type’)

When you type this in and press enter, a window will pop up for you to select the output directory. Select the ROOT results directory where you want all of the output to be stored. The program will create or automatically navigate to the subject’s individual directory.

For example, in the example above, if you select the directory ROOT, the output will be stored in:

ROOT/test\_person/test\_person\_test\_type\_v0.mat

After you select the directory, a green window will pop up. **You must keep this green window up and active during the experiment process,** because keyboard actions will only be detected if this window is active.

A number of trial pairs will be randomly generated for this experiment session. The program will reveal these pairs to you one by one for each trial, on the main MATLAB window. For each trial, a pair of numbers will appear on the screen to indicate the trial pair. You should remove the stimuli already in the case and place these two new stimuli into the case, ensuring that the **first** number is the one on the **subject’s left,** and the second number stimulus is on the subject’s right.

Then, the subject must press down both arrow keys with their left hand and feel the texture with their right hand; when they decide which is smoother, they should release the arrow key corresponding to the smoother texture to indicate their selection (then they should release the other arrow key). After this sequence, a new trial pair will appear on the screen. You will remove the stimuli from the case and put in the new ones. Then the subject can start again.

During the experiment, you have a few more controls:

* **The 's' key** can be used to play a tone, which is useful to indicate readiness for the trial to begin.
* **The 'r' key** can be used to revert one trial backwards, i.e. to repeat the previous trial. The previous trial will be overwritten.

The experiment session is complete when all of the pairs have been seen and completed. The system will tell you that the testing session is complete, and you can close the green window. You can start the second or third session the exact same way you started the first session; a separate file will be saved.

The files saved by the script are 5-column matrices where the first two columns are the indexes of the trial pair, the third and fourth columns indicate if the left/right keys were pressed and released (1 indicates the key was released first, 0 indicates it was not released first, and -1 indicates the trial never happened), and the last column is the amount of time taken for the trial.

When you begin with each subject, you should begin with a practice set of 9 trials by using the type ‘practice’. For example, use the command:

experimentTrial\_v2('test\_person\_name', 'practice')

Inputting the ‘practice’ type will create a set of 9 trials, used to train the subject and accustom them to the procedure. The first three trials are very obvious, so you can check if the subject is giving “correct” responses and that they understand which finger to lift on the keyboard. The other trials vary in difficulty to give an accurate representation of what the trials will be like. This is usually enough to accustom the subject to the procedure, but if a subject is still getting confused, then you can run additional ‘practice’ sets.

Using any type besides ‘practice’ will generate the normal set of 48 trials for the single session.

The most difficult part of the experiment (besides the fact that it’s very boring) is keeping track of the textures. Make sure you keep them organized (e.g., keep them in order on the table), and check them again after every trial to make sure the correct textures were in the case in the correct order. It’s easy to accidentally mix them up, and then you may have to go back and repeat trials.

**\*\*IN THE EVENT OF AN ERROR\*\*:** errors happen occasionally, for reasons I don’t know. If there is an error in the middle of the session, then you have the ability to restart that session where you left off using the last index position (the index is given before each trial pair). You can use the same function, but in addition, give the function the **name of the file** that you want to continue, and the **index** where you want to continue.

For example, to continue the file 'test\_person\_static\_v0' at pair index 6, use:

experimentTrial\_v2('test\_person', 'static', 6, 'test\_person\_practice\_v0')

There are comments at the beginning of the script that repeat most of what I said here:

% experimentTrial\_v2(subj\_id, type)

% Or: experimentTrial\_v2(subj\_id, type, startInd, fn)

% To begin a 'practice' trial for subject test\_person:

% experimentTrial\_v2('test\_person','practice')

% Or for example, to continue previous file 'test\_person\_static\_v0' at pair index 6 use:

% experimentTrial\_v2('test\_person', 'static', 6, 'test\_person\_practice\_v0')

%% FUNCTION DESCRIPTION

% The function runs an 2AFC experiment trial on a set of numerically-indexed input pairs,

% using Matlab's UI key events. The testing window must be open while testing is in progress.

%

% subj\_id: the name or ID of the subject being tested, which will be the

% directory name for the output file.

%

% type: a string, e.g. 'practice' or 'static' which will be appended to

% output filenames. 'practice' will initiate a trial with 10 pairs for a

% practice session; any other type will initiate a trial with the full 48

% pairs.

%

% startInd [optional, defaults to 1]: the starting index for the trials. Use this

% only if you want to continue a previous session, using the fn argument to

% input the filename you want to continue.

%

% fn [optional]: name of an existing file which you want to test on; used only

% if you want to continue a previous session (WARNING: will

% overwrite existing file if the start index is not set properly)