Experiment protocol

1 Introduction

This manuscript documents the process that was used to collect the data for [**?**]. Its purpose is to provide sufficient detail to allow independent researchers to reproduce the study.

2 Materials

Most materials are included in this replication package (artifacts/). For remaining items, please contact the researchers.

- *Pre-task manuscript*
  A document outlining (meta-)information about the study.

- *Confidentiality agreement*
  A contract addressing ethical concerns.

- *Anonymous ID* (not included)
  One of many randomly generated strings of 8 (6 for pilot studies) alphanumerical characters ([a-zA-Z0-9]).

- *Name-ID list* (not included)
  A physical list that is the sole link between the identity of the participant and their *Anonymous ID*.

- *Instructions text*
  A document explaining the participant's task in the experiment (SAM instructions + task description).

- *Instructions recording* (not included)
  An audio recording of *Instructions text*.

- *Audio player* (not included)
  A device for playing audio files (*Instructions recording*). Avoid using mobile phones or computers. We used a `Sony ICD-PX370` device (in part because of its ordinary-looking appearance).

- *SAM example ratings*
  Sets of SAM figures illustrating valid responses.

- *SAM rating booklet*
  A booklet containing one set of SAM figures per scenario (incl. anchor point).

- A4 papers (not included)
  Blank, whites papers for the participant and researchers to make notes on.

- Pens (not included)
  Professional-looking (no company logotypes or spectacular design) blue-inked pens for the participant and researchers to make notes with.

- *Code examples* (not included)
  Scenarios illustrating design debt in a small, but realistic situation.

- Timer (not included)
  Should have a soundless, vibrationless mode. We used a mobile phone.

- *Post-task manuscript*
  A document outlining information about the last parts of the session.

- *Participant profiling questionnaire*
  A questionnaire asking for professional characteristics.

- *Audio recorder* (not included)
  A device for recording audio. Avoid using mobile phones or computers. We used a `Sony ICD-PX370` device (in part because of its ordinary-looking appearance).

3   Groundwork

Print all text-based material viz., *Pre-task manuscript* (two-sided), *Confidentiality agreement* (two-sided; 2 per participant), *Anonymous ID* (one-sided; many more than 1 per participant), *SAM example ratings* (one-sided), *Code examples* (one-sided; colour), *SAM rating booklet* (two-sided booklet format; 1 per participant), *Participant profiling questionnaire* (two-sided; 1 per participant), *Post-task manuscript* (two-sided). Also create and print a *Name-ID list* (table with one column each for name and anonymous ID).

Take the *SAM example ratings* and draw one *"X"* on each row (9 figures), as follows (1-based indexing). For *"HAPPY VS. UNHAPPY"*, $\langle 1, 9, 5, 4 \rangle$. For *"EXCITED VS. CALM"*, $\langle 1, 9, 5, 8 \rangle$. For *"CONTROLLED VS. IN-CONTROL"*, $\langle 1, 9, 5, 6 \rangle$.

Cut out each class from the *Code examples* (aim for the same amount of padding around the code). Take care *not* to mix the different scenarios nor their variants. In similar fashion, cut out the *Anonymous ID*s individually.

Laminate *Pre-task manuscript*, *SAM example ratings*, *Code examples*, *Post-task manuscript*.

For each participant, create one bundle containing 10 blank A4 papers, *SAM rating booklet* (stapled), 2 *Confidentiality agreement*s, *Participant profiling questionnaire*.

Plan one session for each participant. Divide the sessions into two equal groups. The first group will use the LHHLH treatment pattern. The second, HLLHL. Assign each session a random permutation of the scenarios $\langle$ScA, ScB, ScC, ScD, ScE$\rangle$. This predetermines that whoever attends the first session will face (in order) the anchor point and then e.g., ScD-Low, ScE-High, ScA-High, ScC-Low, ScB-High.

4   Session Preparations

Two researchers arrive at the room 30 minutes before the participants does. Assign one researcher to be *Driver*. The other becomes *Co-pilot*. Organise all materials with the aim of minimising participant distraction (pay special attention to electronic equipment). Keep the material accessible, but out of sight when not used (e.g., on chairs adjacent to the researchers, under blank papers). This applies throughout the session, including when retrieving materials from the participant.

Prepare the participant's seat. This seat should offer an easy exit from the room. Place a stack of 10 A4 papers (neatly) in front of this seat. Place a fresh copy of the *SAM rating booklet* on this stack. Place one pen on the stack, adjacent to the booklet.

Prepare the researchers' seats. These seats are next to each other, opposite the participant's. The *Driver* should have access to a pen, blank A4 papers, *Pre-task manuscript* (optional), *Instructions text* (optional), *SAM example ratings*, *Post-task manuscript* (optional). The *Co-pilot* should have access to a pen, blank A4 papers, 2 copies of *Confidentiality agreement*, *Anonymous ID*, *Name-ID list*, *Audio player*, timer, *Code examples* (as previous assigned), *Participant*

profiling questionnaire.

Sort the *SAM example ratings*. Select and rewind the *Instructions recording* on the *Audio player*. Turn off the sound and vibrations for all electronic equipment (beware of mobile phones). Ready the timer for 300 seconds.

Sit down. Wait for the participant to arrive.

5   Pre-task Instructions

The *Driver* greets the participant upon arrival (both researchers shake hands with the participant), thanks them for taking part in the study and offers them their seat.

Transmit (do *not* read word for word) the information contained in the *Pre-task manuscript* (use it as a memory aid, as needed). Reinforce the message with body language or gestures as appropriate (e.g., when presenting the researchers, gesture towards yourself and then your colleague).

When reaching the part *"read and sign a confidentiality agreement"*, the *Co-pilot* shows an *Confidentiality agreement* (both sides). When reaching the part *"at the back of the agreement"*, the *Co-pilot* hands the 2 agreements to the participant (one is theirs to keep).

After the participant has signed the agreement(s) (make sure they noticed the check box), retrieve one of them. Ask the participant to randomly draw one *Anonymous ID* (from a bag containing many). Retrieve it. The *Driver* continues with the manuscript.

When reaching the part *"Please, listen"*, the *Co-pilot* plays the *Instructions recording* and places the *Audio player* at the centre of the table. During the recording, the *Co-pilot* may and add the participant's *Anonymous ID* (and name) to the *Name-ID list* (be sure to not reveal any other entries).

The *Driver* listens attentively to the *Instructions recording* (optionally aided by *Instructions text*). Whenever the recording reaches a part where the researcher action is required (placed inside *"< >"*), the *Driver* performs it. Doing so requires the *SAM example ratings*.

Place the first example rating at the centre of the table (oriented so that the participant can read the title naturally). Point to the *"X"*s using a pen, and cover as small a part of the document as possible. Place the second example rating on top of the first (thereby covering it). Do *not* point to the *"X"*s this time (to minimise participant distraction). Place the third example rating on top of the second. Again, do *not* point to the *"X"*s.

The *Co-pilot* retrieves the *Audio player* and *SAM example ratings*. Ask if everything is clear and clarify as needed.

6 Measurement sitting

The *Co-pilot* places the first of the *Code examples* (anchor point) in front of the participant. Start the timer (300 seconds). The *Driver* and *Co-pilot* observes the participant and take notes. When the time is up, inform the participant and ask them to please fill out the *SAM rating booklet* (make sure they mark the correct page). Upon completion, start the timer (120 seconds). Retrieve the example and the participant's notes. Ask if everything is clear and clarify as needed (extend the time, if needed).

Repeat the rest of this paragraph five times (notice the similarities and differences with previous paragraph). When the time is up, place the next of the *Code examples* in front of the participant. Start the timer (300 seconds). The *Driver* and *Co-pilot* observes the participant and take notes. When the time is up, inform the participant and ask them to please fill out the *SAM rating booklet* (make sure they mark the correct page). Upon completion, start the timer (120 seconds). Retrieve the example and the participant's notes.

7 Post-task Interview

The *Driver* transmits the information contained in the *Post-task manuscript* (use it as a memory aid, as needed). When reaching the first horizontal line, the *Co-pilot* hands the participant the *Participant profiling questionnaire*. Upon completion, retrieve the questionnaire and continue with the manuscript.

When reaching the second horizontal line (and the participant consents) start the *Audio recorder* and place it at the centre of the table. Start (semi-structuredly) interviewing the participant. The *Driver* asks the questions listed in the manuscript, but the *Driver* and the *Co-pilot*[1] also ask appropriate follow-up (probing) questions, insert questions discovered during the session (primarily from the notes).

Pay attention to the time and cut the session short if the allocated time slot is in danger of being exceeded. Manage the time so that all manuscript question are answered in time.

At the end of the interview, the *Co-pilot* retrieves the *Audio recorder* and saves the recording. The *Driver* concludes the session (even if time remains) with

---

[1]We used non-verbal communication for coordinating turn-taking: holding one's pen against one's notes indicated a want to insert a question.

the last paragraph of the manuscript. Finally, both researchers shake hands with the participant and expresses their gratitude for them taking part in the experiment.

After the participant leaves, the researchers restore the room to the state is was in when they entered (take special care to not e.g., throw the *Anonymous ID* in the trash). All session output (except the *Confidentiality agreement*) is marked with the participant's *Anonymous ID* viz., non-blank A4 papers (participant's and researchers' notes), *SAM rating booklet* (every paper), *Participant profiling questionnaire*, audio file. Create a copy of the audio file (backup) as soon as possible, but take care to maintain confidentiality e.g., do *not* use cloud services.

Those are the data items (SAM ratings, professional characteristics, interview, auxiliary), and should at all times be separated from the *Confidentiality agreement* and the *Name-ID list*. Further, the *Name-ID list* must exist in nothing but one physical version, and must *not* be placed together with anything marked with an *Anonymous ID*.

8   Special Considerations

Aim to accommodate the participant where required. Honour the confidentiality agreement. Should the participant e.g., choose not to sign it, thank them for their interest and terminate the session. Should the participant choose to decline the use of audio recording, acknowledge their agency and honour the decision. Should the participant ask for their data to be destroyed, do so.