

Protocol / instructions for researcher

Setting up before the session

- Enter the codespace
- Run the command `code --install-extension telemetry.vsix`
- Open the workspace `session.code-workspace`, make sure this message pops up: "Telemetry data is being logged ."
- Install the recommended extensions.
- Copy the codespace link, exit the codespace.

Before starting the tasks

- Provide the participant with the codespace link and the GitHub login details.
- The participant should use a Google Chrome incognito window, or a Firefox private window.
 - **Note:** In Firefox, participants need to press on the shield icon in the URL bar and disable Enhanced Tracking Protection in order to use the codespace.
- If needed, access the Gmail associated with the GitHub account to give the participant the MFA code.
- Ask the participant to turn off their camera if they have it on.
- Record and Transcribe through Microsoft Teams.
- Ask the participant to (re-)share their screen and unmute themselves (screen sharing and microphone are disabled when recording starts).

"Hello, thank you for participating in this study. My name is ..., I am a Master's/PhD student from

In this study, we are trying to understand how people use GitHub Copilot. We don't only want to find out what you use it for and how you use it, but also what you think of Copilot.

To study this, we need you to say out loud everything you're doing and thinking. This may feel a bit awkward at first, but is very helpful for us! Maybe it helps to pretend like I am a novice programmer, and you're trying to teach me by showing your own thought process.

You'll be working on some tasks. There are three practice tasks to get used to the codebase and to using Copilot, and three actual tasks. Each task has multiple requirements, each with some verification steps to check your solution. Please focus on getting all the verification steps to succeed before moving on. You do not need to complete all the tasks - after 40 minutes, we'll ask you to stop programming and fill in a post-study survey. You are not required to use Copilot, so please use it in any way you want.

If you are completely stuck on a task and Copilot does not help, please inform me and search the web. If you're still not able to proceed, please ask me what to do."

During the tasks

- Send the participant the first task pdf. Only send the next task when the current task is complete.
- For the first task, make sure the participant carefully reads the Copilot instructions. Confirm that the participant knows how to open the chat window, and knows how the commands work.

- If the participants accidentally skips a requirement or verification step, the researcher should alert the participant and ask them to complete it first.
- We want to hear the participant's thinking steps when doing the tasks, what they want to know from Copilot, and what they think of Copilot's responses.
 - If the participant is silent, prompt them to keep thinking aloud (e.g. "What are you thinking right now?").
 - Reinforce thinking aloud by showing gratitude (e.g. "Thank you for thinking aloud the way you are doing it, it is very helpful!").
- If the participant is stuck:
 - If the participant is stuck on a task and Copilot does not help after trying, they are allowed to search the web. If this still does not allow them to proceed, they can skip this (part of the) task. In case other requirements depend on this task, that requirement can be (partially) skipped.
 - If the participant is stuck on something other than the task itself, the researcher should give advice on how to proceed if the participant does not make progress in 5 minutes. Examples when the researcher can give advice are when the participant does not know how to:
 - save files,
 - run the application,
 - access debugging/error information.
- The participant should not delete any chats, but create a new one when needed.
- Take notes on points to ask after during the semi-structured interview.
- After 40 minutes, ask the participant to stop working on the tasks. Do not stop the recording yet.
- Ask the participant to save all of their chats:
 - Create a folder named **chats** in the root folder.
 - In the chat window, press the history icon (clock with anti-clockwise arrow). For each chat in here, press **command + shift + P** and then execute the **Chat: Export Chat...** command, export the chat to the **chats** folder and change the name to a unique one.

Post-study survey and interview

- Send the participant the link to the post-study survey. Do not end the recording. Ask them to fill in the survey.
- Next, we conduct a short semi-structured interview. Ask the following questions to get insights in the participant's preferences and interaction style. Ask follow-up questions if something is not clear, or if the participant may have more useful information.
- Interview questions:
 - Any questions noted during the session.
 - "Could you find your way through the codebase? How did Copilot influence this?"
 - "Do you feel like you understood the codebase? How did Copilot influence your understanding?"
 - "How would you have solved the tasks without Copilot? How did using Copilot influence your strategy when solving the tasks?"
 - "In the survey, you indicated which aspects of Copilot's responses you liked or disliked. Can you explain which aspects stood out to you?"
 - "Did you change the way you interacted with Copilot over time?"

- After the interview, thank the participant. The session can now be ended.

After the session

There are several sources of data that need to be collected after the session is completed:

- The researcher should enter the codespace. Then:
 - Delete the node_modules folder.
 - **Copy of the repository:** Right-click the root folder `copilot-study-todo`. Press download to save the code (which should also contain the `chats` folder and the `telemetry.log` file).
- Microsoft Teams:
 - Transcription file.
 - Screen + audio recording.
- When everything is saved, delete the codespace.