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Going Virtual: A Step-by-Step Guide to Taking the In-Person Experimental Lab Online

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Going virtual: A step-by-step guide to taking the in-person experimental lab online

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Abstract

This guide provides a detailed account of procedures for conducting traditional in-person laboratory experiments in a "virtual setting." The main objective of these procedures is to maintain the control of traditional in-person lab studies when conducting studies over the internet. Using the participant pool of the in-person lab the key procedural steps include participants having their webcams on throughout the experiment, technical screenings and attention pledges, playing pre-recorded instructions out loud, upholding clear experimenter roles and communication protocols when interacting with participants, and finally detailed and scripted procedures for managing participants throughout the session. The described procedures have been used for more than 100 sessions and have secured results that are indistinguishable from those from the in-person lab.

1   Introduction

This guide describes detailed procedures for creating a "virtual laboratory" that to the extent possible mirrors that of the classic in-person laboratory. A critical objective for these procedures is to uphold the control of in-person laboratory studies. Our procedures rely on the standard in-person subject pool and are conducted via Zoom with participants having their webcams on throughout the session. This secures not only that the participants behavior can be monitored, but also that participants observe other participants in the session. Li et al (2020) shows that the use of webcams reduce noise in the virtual lab. Extending prior procedures for online experiments (e.g., Zhao et al.,2020) we provide a detailed step-by-step descriptions of the procedures needed prior to a session including participant communication and settings; during the session in the form of check-in procedures which include how to rename participant to maintain anonymity, descriptions of attention pledges, a web app to test participants' internet connectivity and browser compatibility before the experiment (the app is written in oTree, Chen et al., 2016); during the experiments including managing participants, providing verbal instructions, addressing questions, and monitoring; and finally we include procedures for concluding the study and compensating participants using electronic payments.

The described procedures have been in use at the Pittsburgh Experimental Economics Laboratory (PEEL) since fall of 2020. They have been used in over one hundred sessions and have secured results that mirror those from the standard in-person lab.

2   Procedures

An overview of the flow of the procedures surrounding a session in an online experimental session is provided next. Figure 1 shows the sequential progression of a session in our virtual lab. The pre-session preparations include selecting an electronic mode for participant payment, sending out participant invitations, and setting up the Zoom meeting.[1] The beginning of the session includes verifying participants' identity and testing their internet connectivity and browser compatibility to minimize disruptions and attrition during the experiment. Next, participants are asked to pledge their full attention to the experiment. If the design allows, experimental instructions are then played out loud to the participants. Participants can request clarifications from the experimenters before beginning the experiment, or during the session. Finally, payments are made electronically at the end of a session. Details on how each step is handled at PEEL is described below.
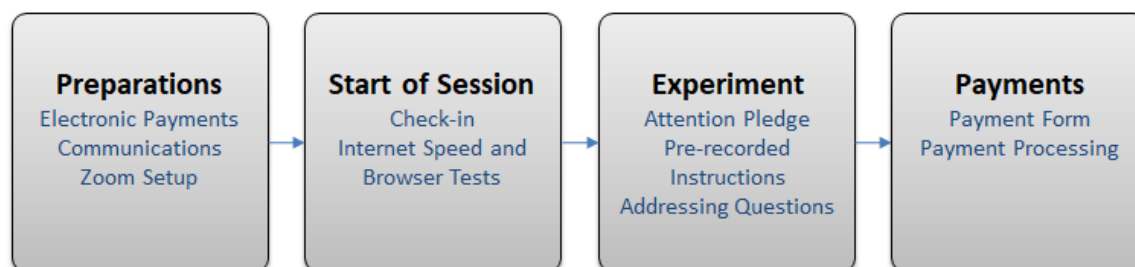

Figure 1 Summary of Virtual Experiment Procedures

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[1] Note that you in all likelihood will have to modify your IRB protocols to conduct sessions in the virtual lab.

2.1   Electronic Payment

Most online experiments involve electronic payments to the participants. Among the many alternatives (Venmo, Google Pay, PayPal, Cash App, etc.), PEEL uses Venmo, primarily because of its popularity among college students, the typical population for lab experiments. Hoel et al. (2020) show that payment method (Venmo or cash) do not impact measures of time and risk preferences, and in addition, participants prefer electronic payment over cash payments. In a survey of participants in the PEEL Virtual Lab, 98% already had a Venmo account and 2% were willing to create one on the spot. Participants are paid in private immediately after the session (or at predetermined times in the future).[2] Researchers at PEEL maintain their own Venmo account making payments from their private accounts.[3]

2.2   Participant Communication

Communication standards can help reduce no-show rates and attrition during the experiment. The invitation email to the participants (see template in Appendix 5.1) clarifies that participants must be available for the entire duration of the session and not engage in any other activities during that time. The invitation also lists all system and electronic payment requirements.

Reminder emails (see template in Appendix 5.2) have shown to significantly reduce no-show rates at PEEL, where researchers usually send them a day in advance and the morning of the session.

To avoid unwanted circulation of the online meeting information, the meeting link and instructions for joining the session are sent to signed-up-participants one hour in advance of the session (see template in Appendix 5.3).

2.3   Zoom Meeting Setup

The following settings are put in place prior to starting the zoom meeting for the session:

- The host ensures that they have the Breakout Room functionality enabled by going to zoom.us → settings → In Meeting (Advance).
- The host schedules a Zoom meeting such that it has a Passcode, a Waiting Room, Video on by default and Enable join before host unchecked.
- The waiting room screen can be customized by going to zoom.us → settings → In Meeting (Advance) and clicking the pencil below Waiting Room Options. Experimenters can update the title, logo, and description. Note that this will update the waiting room for all Zoom meetings, not just the experimental session.

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[2] Standard money transfer from Venmo to the participant bank account typically takes 1-3 business days. For experiments with time-sensitive payment structures, you can pay each participant an additional $0.25 (1% if above $25, with a maximum of $10) that covers the cost for rushing the transfer (typically within 30 minutes).
[3] Here are some restrictions you should keep in mind when using Venmo: (1) There is a rolling-limit of $2,999.99 (both sending and receiving) for a 7-day period for money sent over Venmo. (2) There can only be one account per phone number. (3) If researcher has a non-zero Venmo balance on their account prior to beginning an experiment, they should be aware that that balance will get used by Venmo first in transferring to participants.

The following settings are put in place after starting the online meeting for the session, but before admitting any participants:

- The host clicks the Security button to ensure participants cannot Share Screen or Rename Themselves. The Chat option remains enabled.
- The host goes to the Chat setting and ensures that participants can chat with the Host Only.
- The host admits the other experimenters and makes them a Co-Host.
- The host renames themselves ("Experimenter A") and second experimenter ("Experimenter B") using the participants panel on the Zoom meeting.
- The host creates one Breakout Room to which participants will be Manually assigned; names the breakout room "Lobby"; checks that breakout rooms will close after 10 seconds; and unchecks all other options.
- Experimenter B is assigned to the "Lobby" breakout room.
- Finally, the host clicks Open All Rooms.

2.4 Participant Check-In

Individual participant check-in in a virtual setting is time-consuming and can cause significant delays. PEEL uses two to three experimenters for this part of the experiment. Figure 2 shows the check-in with two experimenters (for a faster check-in with three experimenters see Appendix C: Check-in with three experimenters). Appendix B: Scripts for Communications during Sessions contains sample scripts experimenters can use while interacting with participants at various stages of this process.
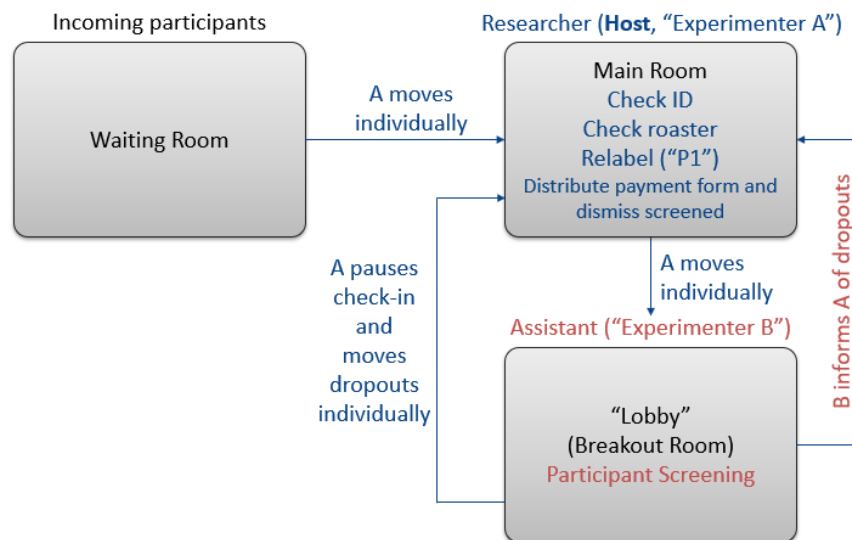

Figure 2 Summary of Check-in Process with 2 Experimenters

When participants dial into the Zoom call, they are automatically placed into a default waiting room where they stay until they are admitted to the call by Experimenter A.

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Experimenter A (Main Room)

- Sends a chat message to the waiting room at the start of check-in and every 5 – 10 minutes afterwards with instructions to ensure participants are prepared once let in to the meeting.
- Moves participants, one at a time, out of the waiting room and checks their IDs.
- Changes their Zoom name to a number (an anonymous participant ID equivalent to a seat number assigned in the lab, e.g., "P1", "P2").
- Places them into the "Lobby" break-out room.
- Occasionally pauses the check-in process to distribute the payment form and dismiss anyone who wishes to dropout or has been identified to not meet the study requirements.

Experimenter B ("Lobby")
- Ensures that participants do not talk to each other. Note that Zoom does not allow hosts to control chat setting or the ability for participants to unmute themselves in break out rooms.
- If the experiment involves consent forms, B sends them to participants to sign virtually by going to the chat and selecting "choose file". The participants e-mail their signed consent forms to the main researcher. Experimenter A ensures that signed consent forms have been collected from all participants before the experiment begins.
- Helps facilitate technical tests if they are used (see Section 2.5). The technical tests are completed before dismissing any potential overbooked participants from the waiting room.
- Throughout, Experimenter B identifies any participants to be dismissed and notifies Experimenter A.

These steps are repeated for all participants until the session reaches capacity (including any dropouts, see below).

After the session reaches capacity:

- Experimenter A checks that there are no remaining participants to be dismissed from the study. If there are, Experimenter A ensures that those participants have received the required payment information and removes them from the Zoom meeting.
- Experimenter A closes the "Lobby" breakout room, which brings all participants and Experimenter B back to the main room. The study now proceeds in the main room of the Zoom meeting.
- Experimenter B sends the link to the Payment Receipt to overbooked participants remaining in the waiting room using the chat. Overbooked participants receive the show-up payment (see payment protocols in Section 2.9).

We budget 1-2 minutes per participant for the time-consuming check-in procedure. To reduce participant frustration, the experimenters can communicate waiting times to the participants by chat message to the waiting room, during check-in, or when they are in the "Lobby". A third experimenter can help to speed up the process of dismissing any identified participants by being placed in a second breakout room, the "Departure Room" (see Appendix C: Check-in with three experimenters for details of protocols with three experimenters).

2.5 Internet connectivity and browser compatibility tests

Depending on the type of experiment, it can be useful to test whether participants have a fast and reliable internet connection, that they are using compatible browsers with JavaScript enabled, and that their speakers are properly set up before playing out pre-recorded instructions.

A simple web app for oTree users implementing these tests can be found here:[4]

https://www.otreehub.com/projects/pitt-test/

The tests are conducted on a rolling basis while participants wait in the "Lobby" breakout room for the check-in process to complete. Performing the tests adds little time to the overall check-in time but can considerably reduce troubleshooting time during the experiment.

2.5.1 Test app setup and distribution

Prior to the session, an experimenter deploys the test app to Heroku. At the start of the session, the experimenter creates a room for the number of participants signed up for the study (rather than the number of participants anticipated to run with). This is done to account for participants who may be dismissed during check-in because they do not satisfy the study's technical requirements. After creating the Room, the experimenter can click "Configure session" to select which subset of tests they need for the session. A JavaScript test is always included. The optional tests are: internet speed (live_ping), audio (audio), and enforced full-screen mode (full_screen).

To have participants complete the tests, Experimenter B sends the room-wide URL to the chat in the "Lobby" break out room every 5 – 10 minutes during check-in, or alternatively for every new set of participants in the Lobby. Example language can be found in Appendix B: Scripts for Communications during Sessions. Participants enter their participant label, which is the number assigned to them by Experimenter A as their Zoom name. This allows the experimenters to match the data from the technical tests to the Zoom participants. The participant label, which can be used to identify the participants on Zoom, will show up under the column "Label". There is code within the test app to assign the oTree participant ID number by participant label, rather than in order the app is opened. This is particularly helpful when looking at the internet speed test, which requires you to go to the "Data" tab.

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[4] This app is most useful when the experiment is coded in oTree as well. The app has been coded for oTree version<5, but can be updated by the researchers to run on oTree lite. Although the test has been used in previous PEEL virtual lab studies, researchers are encouraged to test the application and customize it as they see fit after downloading the code from oTree hub. If a session with over 24 participants is being run, researchers should also add additional participant labels to the "participant_label.txt" file.

Figure 3 Setting up the technical test application

When a participant is flagged to have failed a particular test, Experimenter B chats with the respective participant privately over chat to go through the troubleshooting steps (summarized with each test below). If a participant is flagged to be dismissed from the study, Experimenter B indicates this to Experimenter A who then pauses the check-in to move this participant to the main room, distributes payment form and instructions, and dismisses them from the Zoom meeting (see Section 2.4 for protocols and Appendix B: Scripts for Communications during Sessions for a dismissal script).[5] Please note that if the technical tests are used, Experimenter A does not replace the dismissed subject's participant label, but rather continues to use new labels as each number can only be used once for the technical test application.

2.5.2 *JavaScript Test*

Many experiments require JavaScript, for example oTree projects involving dynamic movements within a page. This basic test ensures that all participants use a browser that has JavaScript enabled. The test is implemented by using JavaScript to display the "Next" button on the technical test application landing page. If JavaScript is disabled, a message is shown asking the participant to contact the experimenter. This is an unobtrusive way to ensure that JavaScript is working before the participants reach the actual experiment decisions.

Researchers can also add the same unobtrusive test to the first page of the experiment which requires JavaScript. There are times when participants need to reopen the link to get their JavaScript working. This can be done at the start of the experiment. Testing it in the technical app ensures that their JavaScript is enabled, which means that any JavaScript error in the main experiment can be solved by following steps 1 or 2 below.

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[5] In case of three experimenters, Experimenter B notifies Experimenter A and moves the flagged participant to a second "Payment" breakout room where Experimenter C distributes payment form, instructions and dismisses this participant (See Appendix C: Check-in with three experimenters for protocols involving three experimenters).

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Troubleshooting steps for enabling JavaScript include:

1) Refreshing the page.
2) Closing the browser and re-opening the link.
3) Ensuring JavaScript is not disabled on browser (for example, for Chrome see this link).
4) Opening the link on a different browser.

2.5.3 Internet Speed Test

Internet speed may be important for experiments involving time-sensitive choices or dynamic interactions. The technical test identifies the ping speed for each participant. The test results enable researchers to flag participants with suboptimal internet speeds. The researcher can access the internet speed test results by clicking the "Data" tab and reviewing the latency_1 to latency_5 variables (the live ping response time is measured five times per participants). Any participants with values over 2000 may be dismissed from the study, in particular ones that are magnitudes larger than other participants.

The test uses oTree live pages and allows the researcher to measure the time it takes for each participant's client to speak with the server (total of sending a message and receiving a response) in the same way it would happen during the experiment.

Tech check: session nm9d5jxb

	group	id_in_group	role	payoff	audio_test	latency_1	latency_2	latency_3	latency_4	latency_5	group. id_in_subsession
P1	1	1		0.00	42	23	49	26	23	7	1

For experiments that do not use live pages or oTree, the test can be completed using a free internet speed test. A link to the test can be embedded into a survey form periodically sent to participants during check-in. Participants follow the link and submit their responses. Participants with ping values above 100 may be removed.

2.5.4 Audio Test

Pre-recorded instructions can be embedded within an experiment to control pacing and maintain consistency between different sessions of an experiment. Hiding the next button until the audio recording is finished can also help improve participants' attention. A playlist of different audio clips can be embedded on the same page of an experiment, allowing for instructions that are consistent across treatments to use the same audio clip. Altogether, pre-recorded instructions can increase the control both within and between treatments.

In the audio test, participants are instructed to submit the number they hear spoken out loud using embedded audio. Participants will not be able to move forward without submitting the correct number. Text will alert participants that they should be hearing audio playing, allowing them to reach out to the experimenters if they do not. Alternatively, the researcher can look at the "Monitor" tab in oTree and reach out to a participant who has been on the first page for a large amount of time. Note that without reaching out to the participant, you cannot tell if the participant who has not moved to the second page is struggling with full screen mode, the audio test, or the

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JavaScript test. However, the participant should be able to describe the issue which can help the experimenter to figure out the best way to troubleshoot.
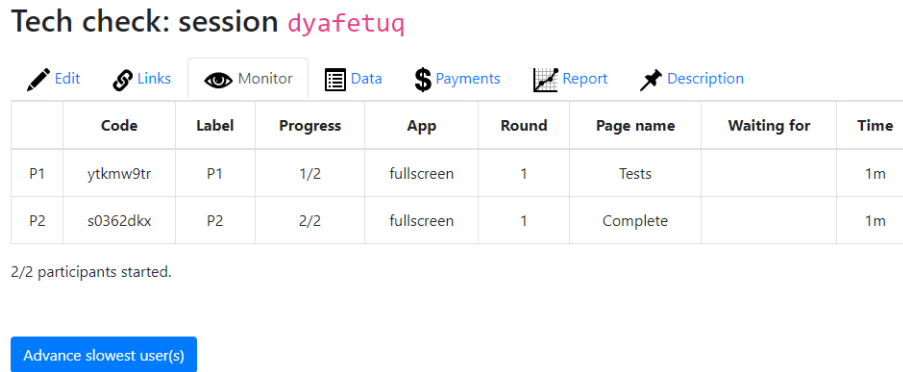

Figure 4 The Monitor tab on oTree. The "Label" column corresponds to the participant labels on Zoom and the "Progress" column shows what page they are on. Moving from page 1/2 to page 2/2 requires the participant to put their browser in full screen mode and to pass the audio and JavaScript test. The "Time" column shows how long the participant has been on that page, allowing the experimenter to reach out to someone who has been on the "Test" page for a while.

Troubleshooting for embedded audio not working include:

1. Ensuring the participant is using a laptop or desktop computer. Many cell phones and tablets do not support auto-playing embedded audio.
2. Ensuring the participant is using a browser compatible with the audio.
3. Ensuring that the participant has their speakers turned on.

2.5.5   *Enforcing full-screen mode*

One way of decreasing distractions and increasing control during an experiment is to require all participants to put their browser into full screen mode. The code for implementing this in an oTree project can be found the test app. Full screen mode is the most likely cause for participant troubleshooting, however, no participants have been dismissed due to it not working.

The pre-test allows the participants to understand how to use full screen mode on their computers in the time set aside for check in, rather than at the start of the experiment. If the full screen test is enabled in the technical test application, participants see a screen with instructions for entering the full screen mode when the application is opened, and full screen mode is not enabled. When participants are in full screen mode the instructions for the technical tests are automatically displayed. As participants cannot complete further tests without opening the application link in full-screen, participants who are stuck on the first page for a large amount of time are potentially having trouble with full-screen mode.

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Troubleshooting for full-screen mode includes:

1. Ensuring the participant is using the correct keyboard shortcut keys.
2. Ensuring the participant is using a supported browser (full screen mode currently only works with Chrome, Firefox, and Edge; see optional language in invitation email).
3. Having the participant press F5 (Windows) while in full screen mode to refresh.[6]
4. Exiting the browser and re-opening the link.
5. Opening the link in a supported different browser.

Note for experiments which require participants to be in groups: The internet speed test can take some time for slow connections. It is therefore advised to pause check-in before admitting the last group and resume check-in conditional on the ongoing internet speed tests. Please note that occasionally there are participants in the last group who do not meet the internet speed requirements. We therefore recommend only admitting the final group if there are remaining overbooked participants to replace them. For example, if you needed groups of three, you would stop once the number of participants checked in is a multiple of three and there are three or fewer participants left in the wait room. Not checking in the final group when there are exactly three participants does increase the number of overbooked participants turned away but can help prevent technical issues from impacting the experiment overall.

2.6   Attention Pledge

After the check-in is complete but before the beginning of the experiment, we recommend including an attention pledge (See Figure 5). The pledge prompts participants to give their full attention to the experiment for the entire duration, to keep other electronic devices turned off, and not to communicate with other participants. The participants indicate their agreement by selecting prompts and signing at the bottom of the form. To further increase salience of this commitment, we also recommend prefacing the distribution of this attention pledge with an announcement requesting participants to step away from other gadgets and give their full attention to the experiment (see Appendix B: Scripts for Communications during Sessions for sample scripts). The steps for the beginning of the experiment:

- In the main room, Experimenter A welcomes everyone and announces that participants should put away all other electronic devices and commit their full attention to the experiment.
- Experimenter A distributes the link to a Full Attention Pledge. You can use this template for creating your own pledge (see Figure 5).
- Experimenter A ensures all participants have signed the attention pledge before proceeding. If any participant is taking more than one minute, Experimenter A reaches out to that participant using the private chat.

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[6] To allow participants to remain in full-screen mode when moving from one page to another, the full-screen mode in the screening app is not implemented using the modern Fullscreen API. In some cases, participants may find themselves stuck on the full screen instructions even after entering full-screen mode. This can be fixed by pressing F5 to refresh.

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Figure 5 Full Attention Pledge

2.7 Instructions

- When instructions are coded into the experiment, they can be complemented with embedded audio recordings (see test app). Alternatively, experimenter A can share their screen with the instructions and can read them out loud.
- Participants can request clarifications from the experimenters through the chat before beginning the experiment.

2.8 Experiment

- Experimenter A sends the experiment link using the chat (for example, the oTree session-wide link or the Qualtrics generic survey link).
  a) For sessions run in oTree, we recommend using a Room to run. This simplifies the URL sent to participants and requires them to enter a participant label, ensuring they only open the link once and cannot further share the link. [7] We recommend sending the room-wide

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[7] Since the participants are renamed using their participant label, participants could enter another participant's label and access their oTree code. By waiting to open the session until oTree shows that all labels have opened their session you can ensure that everyone has opened their correct link. We have not run into issues with participants opening

URL, waiting until everyone has opened the link, and then starting the session.[8] In Appendix B: Scripts for Communications during Sessions, we provide suggested language to ensure participants are able to quickly identify and enter their participant labels (i.e. their Zoom names of P1, P2, P3, etc). We provide code in Appendix D: Sample Code to match the oTree ID in session with their Zoom name/participant label.

b) In Appendix D: Sample Code we include sample code to match their participant label to their oTree participant ID. It is important to ensure you are looking at the column "Label" in order to match participants from Zoom to oTree.

- Subjects stay on Zoom during the experiment.
    a) Staying on Zoom lets the researcher verbally give instructions between treatments and ensure participants are moving through the experiment.
    b) We tell participants to keep their cameras on (see also Li et al., 2020).

2.9 Payments using Venmo

- A link to the participant payment form can be embedded on the final page of the experiment. An example is shown in Figure 6 below (you may use this template to create your own form).[9] In Appendix D: Sample Code, we include sample code for an oTree project that auto-populates the payment form with oTree participant values.
- Once they access and complete the payment form, participant may leave the Zoom meeting.
- Payments are processed by Experimenter A after the session:
    o Participants are informed of the anticipated time frame for payment.
    o Payment information on the form is checked against the payment information in the data. This can be done without violating anonymity by assigning each participant a random code that they must enter in their payment receipt. You can then compare the payments of the receipts against the payment variables in oTree using this random code.
- Research contact information is provided to participants should they have any questions regarding their payment.

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other's oTree links, however, if you wanted to take extra precaution you can privately message each participant an uniquely generated link. Please be aware that this would add additional time to an already lengthy check-in procedure. Alternatively, you can generate a participant label in private that you message to the participants during check-in, ensuring that no one can see each other's label.

[8]When you send out the oTree room-wide URL without starting the session, participants will see a waiting message. You can monitor which participant labels have been used, and reach out to any participants who are not shown to have opened the link. If there are issues, such as a participant claiming to have opened the link but oTree not showing it, you can ask all participants to exit the link, re-open it, and re-enter their participant labels without disrupting the experiment.

[9] You must be logged into a Google account to make a copy of the Google form.

Figure 6 Payment Form

3 Summary

The procedures presented in this note have been used at PEEL in over 100 individual sessions. Our procedures use our standard subject pool and are implemented online over zoom to mimic the conditions and control of our standard in-person lab experiment. To minimize participant attrition during the experiment, we test participants' internet connectivity, java script, and, if applicable, audio output and full-screen mode. Measures to maximize attention during the experiment include attention pledges, playing out loud pre-recorded instructions, and enforcing full-screen mode. Clearly defined experimenter roles and communication protocols reduce delays especially during the participant check-in.

Our procedures have been refined over the past year and have helped us establish a virtual lab that very closely mirrors that of our in-person lab. For example, Danz, Vesterlund, and Wilson (2021) find the same results when using in the virtual as when using the traditional in-person lab experiments. Further the virtual lab provides us with new opportunities as our researchers have been able to conduct studies with participants at other labs. While we hope to soon move back to the in-person laboratory for studies where the physical presence of other participants is critical, we anticipate that many of our PEEL faculty and students will continue to rely on our virtual lab even as in-person experiments become feasible.

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4 References

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5   Appendix A: Email Correspondence

5.1   Invitation Email

Subject: Invitation to PEEL Virtual Lab Experiment

Hello,

You are being invited to sign up to participate in our paid virtual experiment, [Your Study Name]. As in other PEEL lab experiments, you will be paid in money according to your choices. A minimum payment of [Your Minimum Payment] is guaranteed if you complete the study; however, depending on your decisions and chance your earnings are expected to exceed this amount. This experiment will be conducted over Zoom, and you can participate from your home.

Please register if you are interested and meet all the following requirements:

- You are **available for the full time of the session** you are signing up for.
- You are able to **focus on the experiment**. We will ask you to turn off all other applications and silence your mobile devices after check-in.
- You have a **web camera** to present your student ID for self-identification.
- You have **speakers or headphones** to listen to instructions.
- You have a **reliable internet connection**.
- You have a [Your Electronic Payment Method] **account** to receive the payments or are willing to set up an account prior to the session.
- [Optional] You are participating from a **computer or notebook with Google Chrome (recommended), Microsoft Edge, or Firefox** installed. You cannot participate using tablets or cell phones and Safari, Internet Explorer, and other browsers are not supported.

If you register you will receive an **email one hour before the session starts** with a link including the following information:

- The Zoom link to the session room.
- Instructions on how to join the experiment.

Please pay attention to your email inbox before the session starts. You will also receive a reminder email 12-24 hours before the session starts.

Other important details:

- You are guaranteed a show-up fee of [Your Show-up Fee] if you arrive on time and can earn considerably more for participating in the experiments.
- If you are a no-show or arrive too late, you will not be able to join the session and may not be invited to future experiments.
- If you are disconnected mid-session, please try to rejoin the session as soon as possible and reach out to the researcher ([Researcher Email Address]).

Please note that we occasionally need to overbook studies to ensure full participation. To make sure you have a spot in studies you sign up for, please arrive 10 minutes early. If you arrive on time for a session that is already full, you will be dismissed, but paid a [Your Show-up Fee] show-up fee, and you will be able to participate in subsequent sessions of the study.

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Thank you!
[Your Name]
[Add the link to the study here]

5.2 Reminder Emails

Send this reminder three days in advance, one day in advance, and the morning of the session

Subject: Reminder for PEEL Virtual Lab Experiment

Hello,

This is to remind you that you are scheduled to participate in the study [Your Sona Name] on [Date], [Time]. This is an online experiment.

You will receive an **email one hour before the session starts** with the **Zoom link** and instructions on how to join the experiment. Please pay attention to your inbox before the session starts.

Please make sure you meet the following requirements:

- You are **available for the full time of the session** you are signing up for.
- You are able to **focus on the experiment**. We will ask you to turn off all other applications and silence your mobile devices after check-in.
- You have a **web camera** to present your student ID for self-identification.
- You have **speakers or headphones** to listen to instructions.
- You have a **reliable internet connection**.
- You have a [Your Electronic Payment Method] **account** to receive the payments or are willing to set up an account prior to the session.
- [Optional] You are participating from a **computer or notebook with Google Chrome (recommended), Microsoft Edge, or Firefox** installed. You cannot participate using tablets or cell phones and Safari, Internet Explorer, and other browsers are not supported.

If you can no longer attend this session, please let a researcher know in advance so you can be marked as excused. If you do not attend the session without letting the researcher know, you will be marked as unexcused. After three unexcused no-shows your participant account will be automatically deactivated.

Please note that we occasionally need to overbook studies to ensure full participation. To make sure you have a spot in the study, please join 10 minutes early. If you arrive on time for a session that is already full, you will be dismissed with a [Your Show-up Fee] show-up payment, and you will be able to participate in subsequent sessions of the study.

If you have any questions, please e-mail the researcher at [Researcher Email Address]

Thank you!
[Your Name]
[Add the link to the study here]

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5.3   Zoom Instructions Email

Send this one hour prior to the session

Subject: Zoom Link to PEEL Virtual Lab Experiment

Hello,

This is a reminder that you have an online experiment session for [Your Study Name] in one hour. It will take place today [Date], [Time] over Zoom:

[Link to Zoom Meeting]

- Please join at least 10 minutes early.
- You will enter a waiting room first. Please wait for the researcher to check you in.
- Please ensure your camera is on. When the researcher checks you in, you will be asked to show your ID to verify your identity.
- Please pay attention to any messages sent to you in the waiting room from the researchers.
- **If you are disconnected mid-session**, please try to rejoin the session as soon as possible and reach out to the researcher.

Please make sure you meet the following requirements:

- You are **available for the full time of the session** you are signing up for.
- You are able to **focus on the experiment**. We will ask you to turn off all other applications and silence your mobile devices after check-in.
- You have a **web camera** to present your student ID for self-identification.
- You have **speakers or headphones** to listen to instructions.
- You have a **reliable internet connection**.
- You have a [Your Electronic Payment Method] **account** to receive the payments or are willing to set up an account prior to the session.
- [Optional] You are participating from a **computer or notebook with Google Chrome (recommended), Microsoft Edge, or Firefox** installed. You cannot participate using tablets or cell phones and Safari, Internet Explorer, and other browsers are not supported.

Please note that we occasionally need to overbook studies to ensure full participation. To make sure you have a spot in the study, please arrive 10 minutes early. If you arrive on time for a session that is already full, you will be dismissed with a [Your Show-up Fee] show-up payment, and you will be able to participate in subsequent sessions of the study.

If you have any questions, please e-mail the researcher at [Researcher Email Address]

Thank you!
[Your Name]
[Add the link to the study here]

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6 Appendix B: Scripts for Communications during Sessions

[Brackets] indicate spoken communication and *italics* indicate communications that happen via the chat

- *Broadcasting message to the waiting room informing that check-in is beginning/ongoing*

When check-in in beginning:

Thank you for attending the experiment. We will now begin checking in participants. Once you enter the session, please be prepared to turn on your camera and present a photo ID. Thank you for your patience!

Every 5 – 10 minutes during the check-in process:

Thank you for attending the experiment. We are currently checking people in. Please be patient and we will be with you shortly. Once you enter the session, please be prepared to turn on your camera and present a photo ID.

- *Moving a checked in participant into the "Lobby"*

[I am going to place you into a breakout room momentarily while we complete the check-in process. Thank you for your continued patience during the check-in process.]

- *Distributing the technical tests*

[Welcome and thank you for coming today. The virtual experiment will begin shortly. In the meantime, we ask that you please complete a technical test to ensure the session runs smoothly. Please note that you must complete this study on a laptop or desktop computer. If you are logged onto Zoom on a cell phone or a tablet, please type the URL into a browser on a computer.

In a moment I will send a link to the chat box. If you have not already completed the test, please open the link, and enter your participant label. Your participant label is what your Zoom name was changed to during check in. It takes the form of a capital letter "P" followed by a number. You can find your participant label by looking at the corner of your video. If you cannot find your participant label, please send me a private chat message and it will appear as your name.

Once you open the link, please follow the instructions to open the technical test in full screen. Then follow the instructions and submit the technical test. Please send me a message if you have any issues. Thank you again for your continued patience during the check in process.]

- *Lobby instructions without the technical tests*

[Welcome and thank you for coming today. The virtual experiment will begin shortly. In the meantime, we ask that you please take a moment to locate your participant label. Your participant label is what your Zoom name was changed to during check in. It takes the form of a capital letter "P" followed by a number. You can find your participant label by looking at the corner of your video. If you cannot find your participant label, please send me private chat message and it will appear as your name. Thank you for your continued patience during the check in process.]

- *Dismissing participants who have been flagged to not meet the technical requirement*

[This is a complex experiment with high technical requirements. Unfortunately, our technical test has shown that you do not meet these requirements. You will now be dismissed from the study. You will be marked as an excused absence and paid a $6 show up payment as a thank you for your time.

In a moment, I will send a link to a secure payment form in the chat. You will fill this out with your Venmo username, $6 as the payment amount, and 0 as the participant code. Please exit the Zoom call as soon as you have received the form and fill it out after you have exited. You will receive your payment later today.

Thank you for your time and your patience.]

- *Closing of breakout rooms and getting ready to begin experiment*

[Check-in is now complete. In a moment, the breakout room will close, and we will return to the main room. Please hit the 'Leave Breakout room' button once the option appears.]

- *Distributing full attention pledge*

[Thank you for waiting. We are now ready to begin the experiment. At this point, we ask that you please silence and put away your cell phones and other electronic devices and exit out of anything open on your computer. [Pause.] Before beginning the experiment, we will send a link to an attention pledge. We ask that you commit to giving the experiment your full attention for the remainder of the session. Your attention is important and ensures that the experiment will go smoothly, and we thank you for your time and participation today. Please click on the link in the chat box to fill out the attention pledge. After everyone has filled it out, we will begin the experiment.]

- *Beginning of the experiment in the main experiment room*

[We are now ready to begin the study. In a moment, I will send the link to the study in the chat. Please click on the link to open it, enter your participant label, and follow the provided instructions.]

Send room-wide URL in the chat

Note: If you opt to not use the technical tests, we recommend repeating the instructions about how to locate the participant label again if you are using an app coded in oTree. If you are not using oTree, you should update the instructions to reflect how to open the experiment.

- *Dismissing overbooked participants by broadcasting message in the waiting room*

To ensure full participation, we occasionally need to overbook sessions. Unfortunately, today's session is full. We will now pay you a $6 show up payment as a thank you for coming, and you will be marked as an excused absence. This means you can sign up to participate in future sessions.

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In a moment, we will send you a link to a secured form. This will act as your virtual receipt. Please fill it out with [list of form fields].

Please double check your [Payment Method] username before submitting. We will send the $6 payment to whatever username you put on the form. Thank you for your participation, and we hope to see you in another PEEL virtual lab experiment soon!

If you have any further questions, please e-mail [e-mail address].

Here is the Link: [form link]

You can enter "0" for the completion code. Thank you!

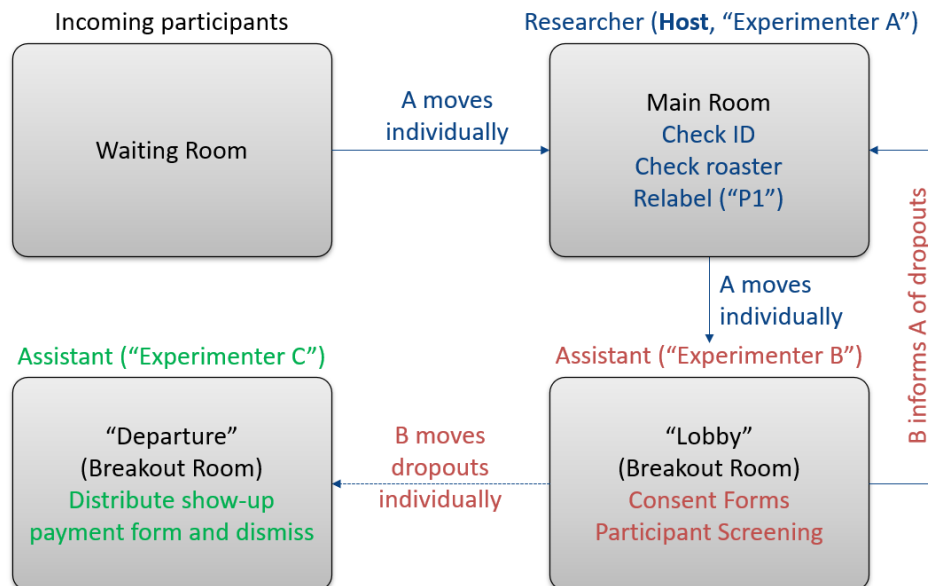# 7 Appendix C: Check-in with three experimenters

Figure 7 Summary of check-in process with three experimenters

Additional Zoom setup:

- This study has two breakout rooms named "Lobby" and "Departure".
- "Experimenter C" is assigned to the "Payment" breakout room.

Modified protocols:

- The test app link is distributed to the participants on a rolling basis by Experimenter B as they enter the "Lobby" breakout room.
- Experimenter B monitors the app output to identify any participants not meeting the technical requirements.
- Experimenter B helps participants troubleshoot any issues that arise during the technical test

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- If a participant fails the internet speed test and/or the troubleshooting steps fail for other tests, Experimenter B:
  a) notifies Experimenter A
  b) moves the respective participant in the "Departure" breakout room.
- In the "Departure" breakout room, Experimenter C follows the script for dismissing participants. To speed up the process, the payment receipt can be sent to them and they can be prompted to leave the Zoom meeting before filling it out after it is confirmed they received the link.

8   Appendix D: Sample Code

This appendix provides sample code for pre-filling information into a Google form for payment and for matching Zoom participant labels to oTree participant IDs. This appendix assumes the use of Google forms for the payment form and oTree version < 5 for the experiment. However it can be modified to accommodate other types of forms and experiment software, including oTree lite.

Payment Form:

On your payment form, select More and then Get pre-filled link. This opens the form in a new window. In the opened form, enter placeholder text in each part you want to pre-fill, such as the completion code and the payment amount and then click "Get Link". This will be a URL that has &entry.(number)=(placeholder text) at the end for each of the parts of the form you want to pre-fill. You can tell which "entry" is which by the placeholder text, therefore it is important to use different placeholder text for each part you want to pre-fill.

On your settings page, add an entry called CompletionURL to the SESSION_CONFIG_DEFAULTS dictionary with the beginning of the pre-filled URL, up to the &entry part. It should look something like:

```
SESSION_CONFIG_DEFAULTS = dict(
    real_world_currency_per_point=1.00,
        CompletionURL='https://docs.google.com/forms/d/e/2FAIpQLSd5T1Fh2SabO9T1LFJm5Xp7fsZ
aPRBk-QucY2ZzJ4FOCl5kDw/viewform?usp=pp_url',
)
```

Next, pass the pre-filled variables to the page using vars_for_template. For example, to pre-fill the completion code and payment amount your code may look like this on your pages.py:

```
class End(Page):
        def vars_for_template(self):
            return dict(
            code= self.player.code,
            payment= float(self.participant.payoff_plus_participation_fee()),
            completionURL=self.session.config['CompletionURL']
            )
```

Where "code" is a random number generated in methods.py, "payment" is the total payment amount for each participant, and "completionURL" is the URL to the form that is the same for all participants.

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On the template, pass the pre-filled information through a link:

```
<p> Please follow
    <a href="{{ completionURL }}&entry.733781923={{ code }}&entry.2023632278={{ payment
}}" target="_blank">
        THIS LINK</a> to fill out your virtual receipt for payment.  </p>
```

Update the numbers after each entry to reflect what was shown on your pre-filled link. This method can be used to pass more information to the form, such as the date.

If you are using Qualtrics, this method could be updated to pass information to the pre-fill link using embedded data.

Participant Label Matching:

oTree assigns participants an ID within the session chronologically based off when participants open the link. The participant-label variable, which is visible in the monitor tab, will always correspond with the Zoom ID even if the ID within the session does not. The code below ensures that the participant label will match the ID within the session (so player one in oTree will be P1 on Zoom). This orders the participants within the monitor tab by their participant label and avoids any potential confusion between oTree IDs and Zoom IDs during the session, but is not necessary to run.

Include a text file called "participant_label.txt" in your main oTree code folder. This file should have your participant labels separated by a line. For example, if you wanted to run with 24 participants, you would have "P1" "P2" … "P24", each on their own line. If you are using the technical test, we recommend having more participant labels than the maximum number of participants you expect to run with. In "settings.py", you will add a line to your Room dictionary:

```
ROOMS = [
    dict(
        name='virtuallab',
        display_name='PEEL Virtual Lab Session',
        participant_label_file='participant_label.txt',
    ),
]
```

The following code can be entered into the "models.py" page of any app. We recommend adding it to the first app.

```
class Subsession(BaseSubsession):
    def creating_session(self):
        labels = ['P' + str(k) for k in range(1,
            self.session.num_participants + 1)]
        for p, label in zip(self.get_players(), labels):
            p.participant.label = str(label)
```

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