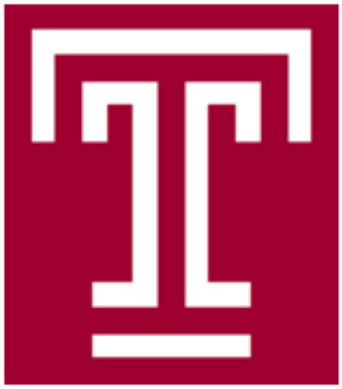

Virtual SILCton Navigation Assessment Software Documentation

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Contents

1 Introduction

Thank you for using the Virtual SILCton Navigation Assessment. This documentation will provide basic instructions for administration, use, and analysis of the Virtual SILCton website and experimenter interface. Funded by the NSF, and in collaboration with Strategic Spatial Solutions, inc., this online product was developed to be an objective assessment of navigation ability, which is flexible, but easy and fast to administer.

The materials provided in the zip file sent to you by your administrator will have all the information you should need to run your study. Included in the zip file are the following files, in alphabetical order:

Advanced_Online_Weisberg_etal.JEPLMC - Published manuscript containing methodology and results from the initial sample of participants (college undergraduates).

Friedman Kohler [03 Psych Methods] A PDF detailing the statistics, assumptions, and Excel Macro for bidimensional regression analysis, used in analyzing model building data.

Full Info Silcton Map An aerial view of all materials in Virtual Silcton.

Model Building Data Bidimensional Regression Macro an Excel Macro [in .xlsm and .xls], with instructions, that will run the bidimensional regression analysis.

MRT Key Virtual SILCton Correct answers for the MRT as it is given on the Silcton website

Sample Data Spreadsheets with Comments Excel sheets with sample data sheets as they are downloaded from the experimenter interface data website. Comments and separate tabs provide details for each type of data.

Silcton_Coordinates_Map.jpg Image of the Virtual Silcton environment for use with the Navigation Log data.

Virtual SILCton Building and Route Layout Aerial view image of the buildings and routes for the virtual environment.

Virtual SILCton Building Names and Layout Aerial view of building names and images along the roads. The white circles indicate the precise locations used in the analyses (x-y coordinates provided in the bidimensional regression Macro.)

Virtual SILCton Documentation Document with instructions for administering Virtual SILCton, managing data, and using the experimenter interface.

Virtual SILCton Instructions for Sample Instructions for administering the basic version of Virtual Silcton, along with computer setup suggestions and instructions.

Virtual SILCton Experimenter Script Detailed instructions for just the administration of all measures included as part of the Virtual SILCton website.

2 Experimenter Interface Instructions

This chapter consists of instructions for the administrator of the study on using the Experimenter Interface (Click on Manage Your Studies)

I. **Setting up an account**

To set up an account, first access the link above. As part of your introductory email, you should have received a password. Enter the email address at which you received the introductory email in the Email line, and the password you received in the Password line.

There are three types of accounts.

A. Experimenters
   i. Can view materials, participants, and data from the Experimenter Interface.
   ii. Can edit Studies and delete Participants for Studies they have been assigned Primary Experimenter to
   iii. Can view publicly-available data

B. Lab Managers
   i. Have all capabilities of Experimenters, PLUS, for the Lab they belong to:
   ii. Can delete participants
   iii. Can edit Studies
   iv. Have access to all data
   v. Can add, edit, and delete Lab Managers, Experimenters, and Studies

C. Administrators
   i. Have all capabilities of Lab Managers, PLUS for all Labs:
   ii. Can delete participants; edit Studies
   iii. Have access to all data
   iv. Can add, edit, and delete Administrators

II. **Studies**

Click on the Studies tab on the black banner at the top of the screen.

This page lists any studies (Active or Inactive) that your Lab has created. Lab Managers can create a new study by clicking Create Study

From this interface you can customize settings for your study.

A. Name - The name that displays for your new study.

B. Primary Experimenter - Select the Experimenter or Lab Manager who will be responsible for the study. (Note: Lab Managers can edit Studies and delete Participants for all Studies; if an Experimenter is assigned to this role, he will have these capabilities only for that Study).

C. Active - If checked, the Study will be viewable by participants through the main web page. This should be checked ONLY for studies for which you have approval from the IRB to collect and analyze data from participants collected online. Otherwise, if you are only administering your study in the lab, it should be Inactive.

D. Ask Participant - If checked, the participant will be prompted to enter his/her Participant ID.

E. Start Button - Select Standard and a mouse/keyboard setup will be assumed. Selecting Virtual Silcton (Mouse and Joystick) will present participants the choice between those two modes of input. (Note: Joystick mode is currently not supported.)

F. Instruments - This dropdown menu provides all instruments available through Virtual SILCton. See Chapter 3 for an explanation of each instrument, as well as whether the instrument is mandatory, recommended, optional, or discouraged.

G. Welcome Text - Text entered here will appear on the first page the participant sees. (Note: HTML tags can be used).

H. Completion Text - Text entered here will appear after the final instrument is completed. (Note: HTML tags can be used).

Once your study has been created, click on Save Study. You will now see the name of your study, and a summary of the settings you have chosen. You will also see 4 tabs directly underneath the name of your study.

View Study will show you your settings, URL, and whether or not the study is active.

Edit Study will allow you change your settings (the same settings as when you created the study).

View Participants will show a table of demographic information from Page 1 of the study for all Participants who have completed the study.

View Data will show a table of all data collected from every participant on all instruments (included or not) of your study. (Note: if instruments are not included for your study, they will display as a blank table).

III. Experimenters

Click on the Experimenters tab on the black banner at the top of the screen.

This allows you to view and (for Lab Managers) edit information for all Experimenters from your Lab. Lab Managers can also create new Experimenters and Lab managers by clicking Create Experimenter.

3 Virtual Silcton Assessment Instructions

Administration of the Virtual Silcton assessment requires a computer with internet access, a keyboard, and a mouse.

Using Mozilla Firefox or Google Chrome, navigate to the study website set up for your Lab and Study. Provided below are instructions for each of the instruments that are available. All instruments may not be included in your study module.

I. **Participant Identification (Mandatory)**

This MUST NOT CONTAIN identifying information. An anonymized Participant ID in the format: INSTITUTION_STUDY_ID# is recommended. (e.g., Temple_Virtual Silcton_4).

II. **Consent (Automatic)**

The consent form is automatically included. However, all consent procedures at the institution at which data will be collected MUST be followed.

In order to store data on our servers, participants MUST consent to allow anonymized data to be stored on the website. We require the following language to be included in any IRB protocol involving Virtual SILCton:

An anonymous version of the data collected on the website from this study will be accessible to the administrators of that website. None of your personal, identifying, or confidential data will be collected on this website.

The version of consent that participants agree to on the website allows administrators to view the anonymized data.

III. **Web Data Release (Automatic)**

The second automatic item is the web data release form. This form allows participants to share their anonymized data with any researchers who wish to access it, and are granted that ability by the administrator. This release does not include researchers covered by the Silcton Consent form or the home institution consent form.

Participants DO NOT have to share their data, and may indicate ”No” in the yellow box, yet still participate in the study.

IV. **Demographics Questionnaire (Optional))**

See instructions at the top of the form.

V. **SBSOD (Optional)**

Santa Barbara Sense of Direction scale. A self-report measure of navigation ability.

VI. **PSAS (Optional))**

Philadelphia Spatial Ability Scale. Available in long or short format. A self-report measure of small-scale spatial ability.

VII. **PVAS (Optional))**

Philadelphia Verbal Ability Scale. A self-report measure of verbal ability.

VIII. **MRT (Optional)**

Mental Rotation Test. Please read all instructions before proceeding to the test. Participants must first complete the practice problems correctly in order to proceed to the actual test. They may check answers as many times as they like. Clicking I am ready to being automatically starts the 3-minute timer. Once time expires, that section will automatically end.

IX. **Vambler Route Learning, Main Routes (Mandatory, Add Twice)**

Each of these instruments MUST be included TWICE, as there are two separate routes of each kind. These routes must also be learned before the connecting routes. Each of the Main Routes contains 4 buildings, the names and locations of which participants must learn to complete the navigation tasks that follow. Each of the Connector Routes leads from one Main Route to the other Main Route, providing information about how the two routes are spatially situated in the environment.

X. **Vambler Route Learning, Connector Routes (Mandatory, Add Twice))**

Each of these instruments MUST be included TWICE, as there are two separate routes of each kind. These routes must also be learned before the connecting routes. Each of the Main Routes contains 4 buildings, the names and locations of which participants must learn to complete the navigation tasks that follow. Each of the Connector Routes leads from one Main Route to the other Main Route, providing information about how the two routes are spatially situated in the environment.

XI. **Virtual SILCton Free Exploration**

This instrument provides the virtual environment as it is when learned from the routes. However, the participant starts in the middle of the environment and there are no walls barring exploration.

XII. **Vambler On-site Pointing (Recommended)**

This instrument tests the participants ability to remember where each of the buildings is located when they are standing at other buildings in the environment.

XIII. **Vambler Map Arrangement (Recommended)**

This instrument tests the participants ability to place all of the buildings learned on a map. Below, in italics, are the instructions that should be read/explained to participants.

XIV. **Vambler Off-site Pointing (Discouraged)**

This instrument tests the participants ability to imagine a location in an environment, and position the buildings around a compass, indicating directions they would point to them. Below, in italics, are the instructions that should be read/explained to participants.

XV. **Vambler Distance Estimates (Discouraged)**

This instrument tests the accuracy of a participants sense of distance between each building and all the others. Below, in italics, are the instructions that should be read/explained to participants.

4 Data Collection

General Instructions

All data can be downloaded from the experimenter interface. Login to your experimenter account and click on the name of your study. Your data will be available under the DATA tab. The data is in 5 different spreadsheets Spatial Ability and Demographics; Model; Distance; Onsite Pointing; and Offsite Pointing. Clicking on any of these tabs will display the data directly on the website, with sortable column functionality. However, it is recommended that the data be downloaded to your computer in Excel or CSV format for easier management.

Data from individual subjects can be deleted under the Participants tab, otherwise all data will displayed (and downloaded) every time.

Sample Data Sheets are included as part of the documentation package and are titled "Sample Data Spreadsheets with Comments ". Scrolling over the top row for each data sheet displays a comment explaining what each column contains.

NOTE: The data automatically downloads with the same title. To avoid deleting files, rename each downloaded spreadsheet according to what it is (e.g., Model Data.xsl).

Navigation Log

Download data from "Navigation Log" tab of experimenter interface in .txt format.

Three coordinates provide position, and one coordinate provides looking direction [X,Y,Z,Theta]. These data are recorded beginning 5 seconds into each session, and record 10 times per second. The data are now being provided for all 4 of the main routes, as well as free exploration mode.

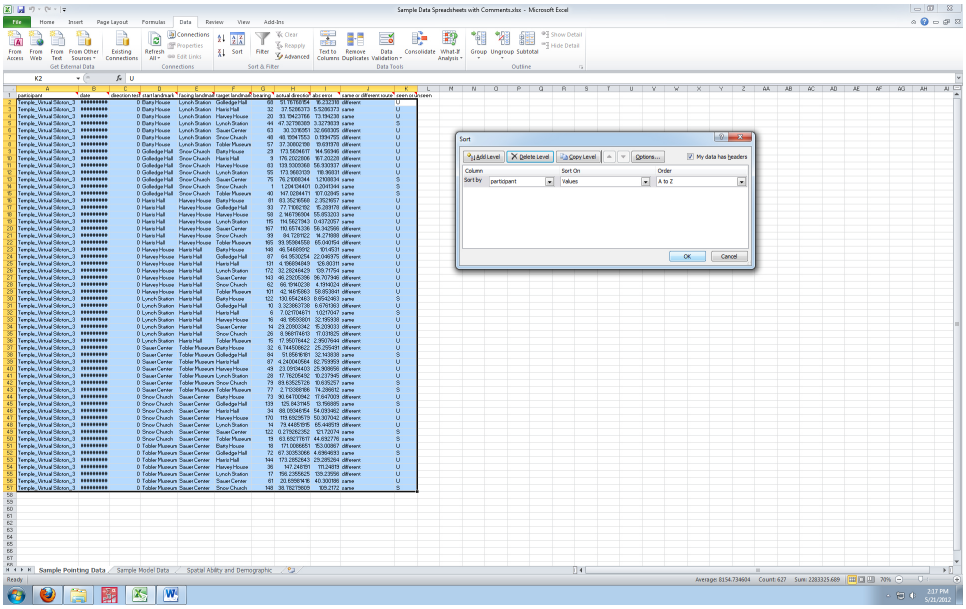
Theta = 0 is a vector pointing "Up" on the map (or North). The reference coordinates for the map begin at the inside of the black border. For each corner:

Lower left [-750, Y, 700]
Lower right [700, Y, -700]
Upper right [700, Y, 300]
Upper left [-750, Y, 300]

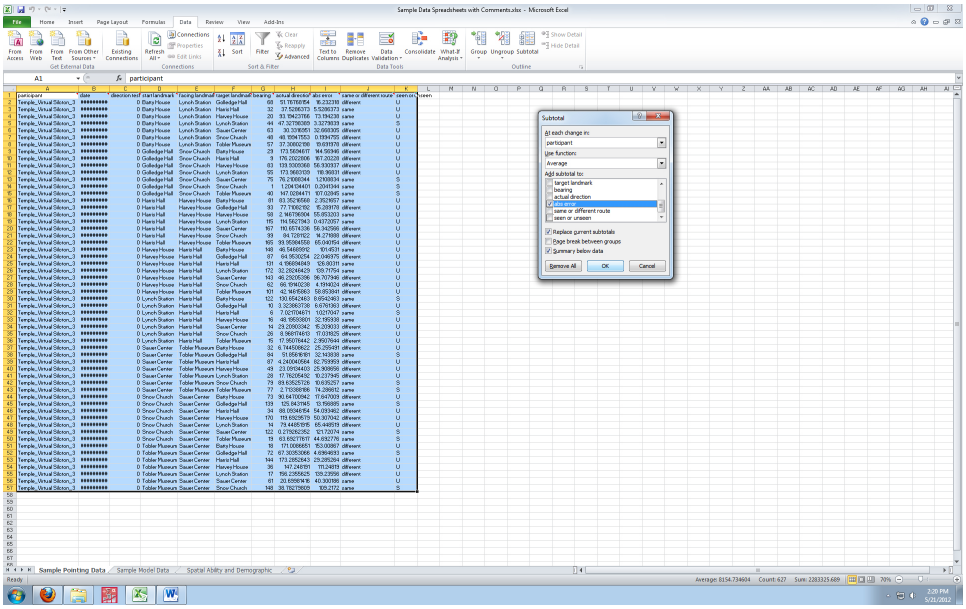
Pointing Data

Download data from "Onsite Pointing" tab of experimenter interface in Excel or CSV format.

The recommended scoring procedure for the pointing task is the average error across all trials. To retrieve this score, first sort all data columns by "Participant".



Then, in Excel, select **Subtotal**. In the first box, select *Participant*. For Use Function, select *Average*. Finally, deselect all check boxes, and select *abs error*. Click OK, and averages will automatically be generated.



Model Building Data

Macro Model Building Data Bidimensional Regression Macro.xlsm

Download data from "Model" tab of experimenter interface in Excel or CSV format. Highlight all columns of imported spreadsheet and select Sort in the DATA tab. Sort first by participant, then by building (alphabetically).

Copy data from the X and Y columns into the Bidimensional Regression Macro, and paste it under the A and B columns (under Dependent). Enter the number of subjects to be analyzed in the upper right (anywhere between 0 subjects and 1040). Note, if you are unsure how many subjects you have, pick an arbitrarily larger number and the macro will compute the results for the number of subjects that are actually there.

Click “Compute.”

Data interpretation:

See Friedman & Kohler, 2003 for an in depth description of bidimensional regression and output parameters.

R^2 = percent of variance accounted for in subjects map by the actual map. Higher values mean closer correspondence to actual locations, controlling for scale, rotation, and translation.

Spatial Ability and Demographics

This tab will provide data from any demographic, psychometric, and self-report measures in summary form. For self-report measures (SBSOD, PSAS, PVAS), data are on a scale from 1-7 with 1 = lower self-report ability, 7 = higher self-report ability. For the MRT, signal-detection scoring was used (hits, correct rejections = +2, false alarms, misses = -2). 2 points are awarded or subtracted for each answer, not each item. So scores for any individual item range from -4 (2 incorrect selections), -2 (1 incorrect, 1 omission), 0 (1 incorrect, 1 correct), 2 (1 correct, 1 omission) and 4 (2 correct).

SBSOD, PSAS, PVAS, MRT

Provides summary (average and total) and individual item data for each test.

5 Data Sharing

Virtual SILCton has the capability to provide large datasets, which can be made available to and analyzed by the research community at large. Here are the key aspects to data sharing on the Silcton platform.

1. Data will not be made public unless individual participants agree to release their anonymized data via the Web Data Release form.
2. Data will not be made public for studies until 3 years after the study has been created (unless the study experimenter chooses to release the data earlier).
3. Data will be download-able from the Silcton experimenter interface by any researcher who requests and is granted an account on the Silcton site.
4. Studies that are "Active" will be viewable (and can be accessed) by anyone with the general Silcton website. Studies that are "Inactive" will be viewable (and can be accessed) only by those who know the website for that individual study. To avoid data contamination or dilution, it is highly recommended that all studies be made "Inactive."