

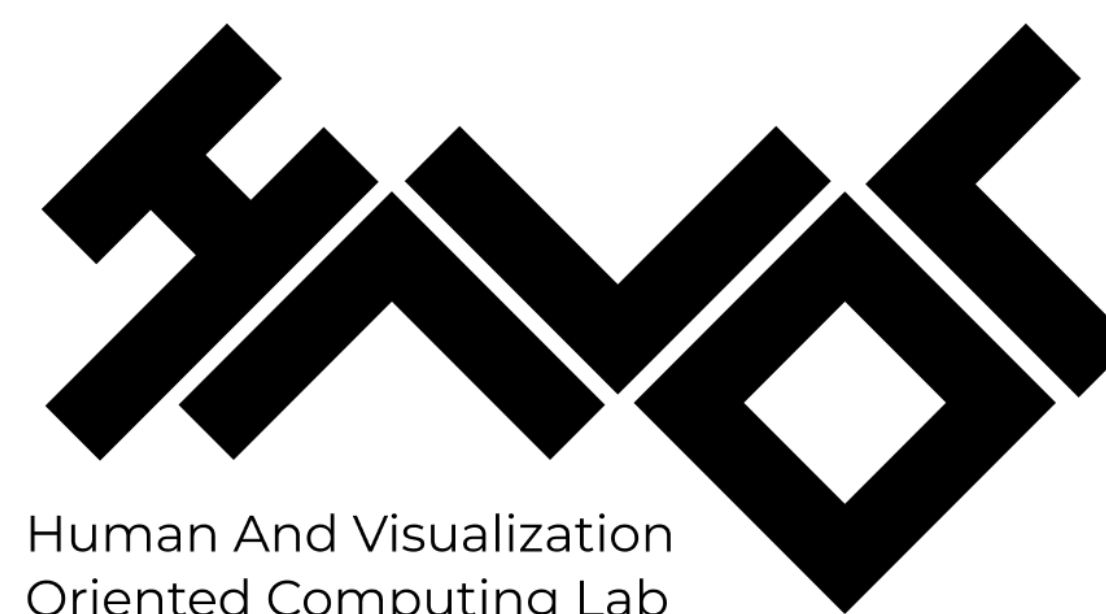


A TOOLKIT FOR DATA VISUALIZATION EXPERIMENTS

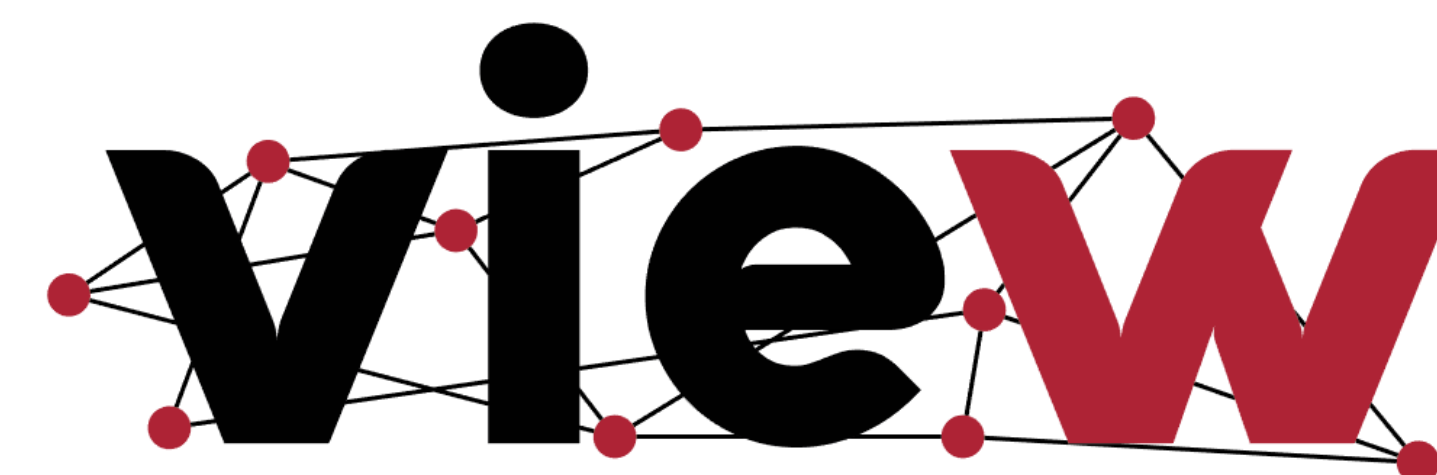
Jack Wilburn, Hilson Shrestha, Zach Cutler, Yiren Ding, Tingying He, Jay Kim, Abhraneel Sarma, Andrew McNutt, Lane Harrison, Alexander Lex



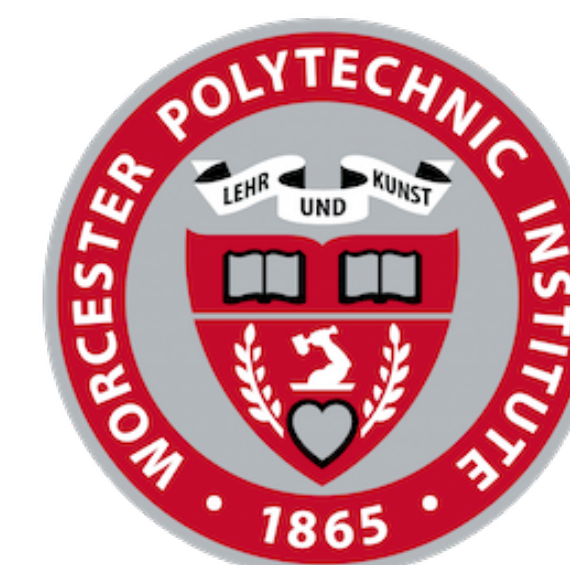
visualization
design lab



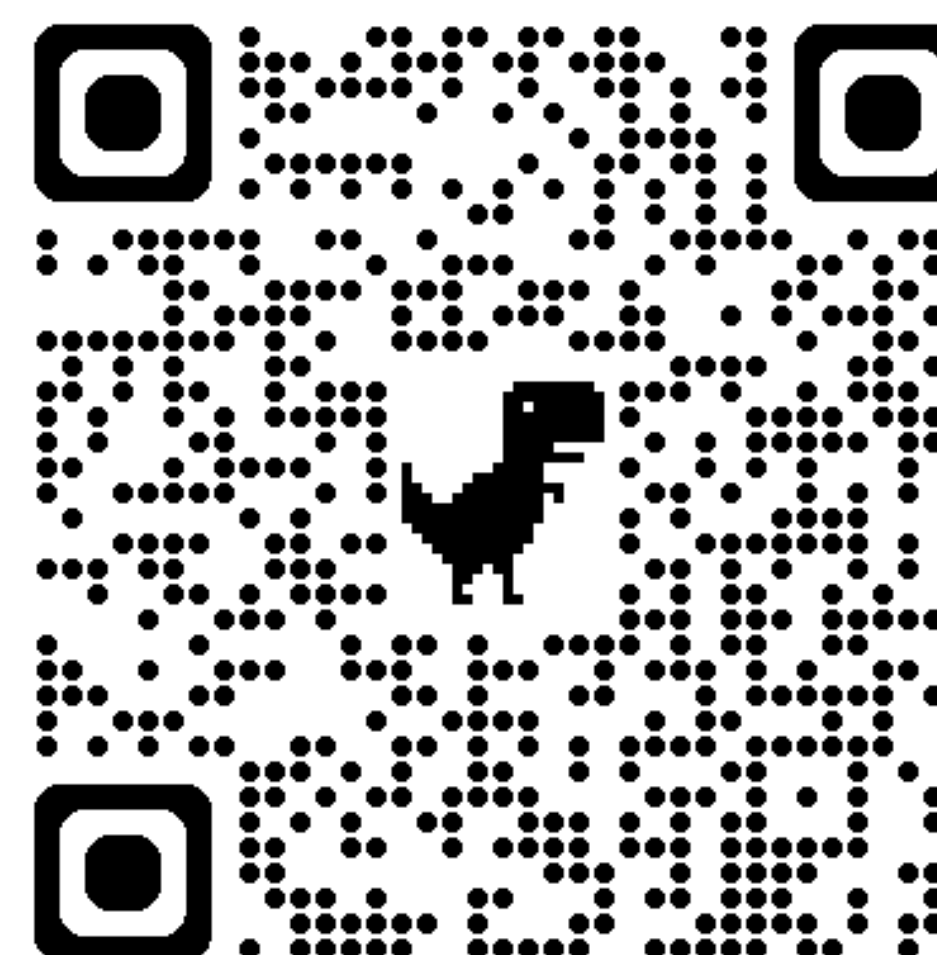
Human And Visualization
Oriented Computing Lab



Graz University of Technology



WPI



revisit.dev

PREPARATION

<https://revisit.dev/docs/getting-started/installation/>

Things you need:

git / github

npm (>v 22): npm install -g npm

yarn: sudo npm i -g yarn

Download:

<https://github.com/revisit-studies/template>

Slack:



AGENDA

45 Minute reVISit Overview

10 Minute Discussion

Then: Hands-On Tutorial (2h)

Goal: get revisit working for you

- Build a simple study
- Components and the reVISit spec
- Creating a React component
- Randomization strategies

PERILS OF ONLINE VISUALIZATION EXPERIMENTS

There is no **end-to-end platform** for building **interactive experiments**

The support for **types of stimuli** in survey tools are limited

Lack of experiment **debugging** features

No built-in **data collection** and **provenance tracking** functions

EXPERIMENT FRAMEWORKS

expensive, not open

qualtrics^{XM}[®]

Not built for Vis/HCI



PsychoPy



WHAT IS REVISIT: INFRASTRUCTURE FOR VIS STUDIES

Set up studies with all **components** (consent, training, trials, tasks, surveys, etc.) including sophisticated **study designs** (randomization)

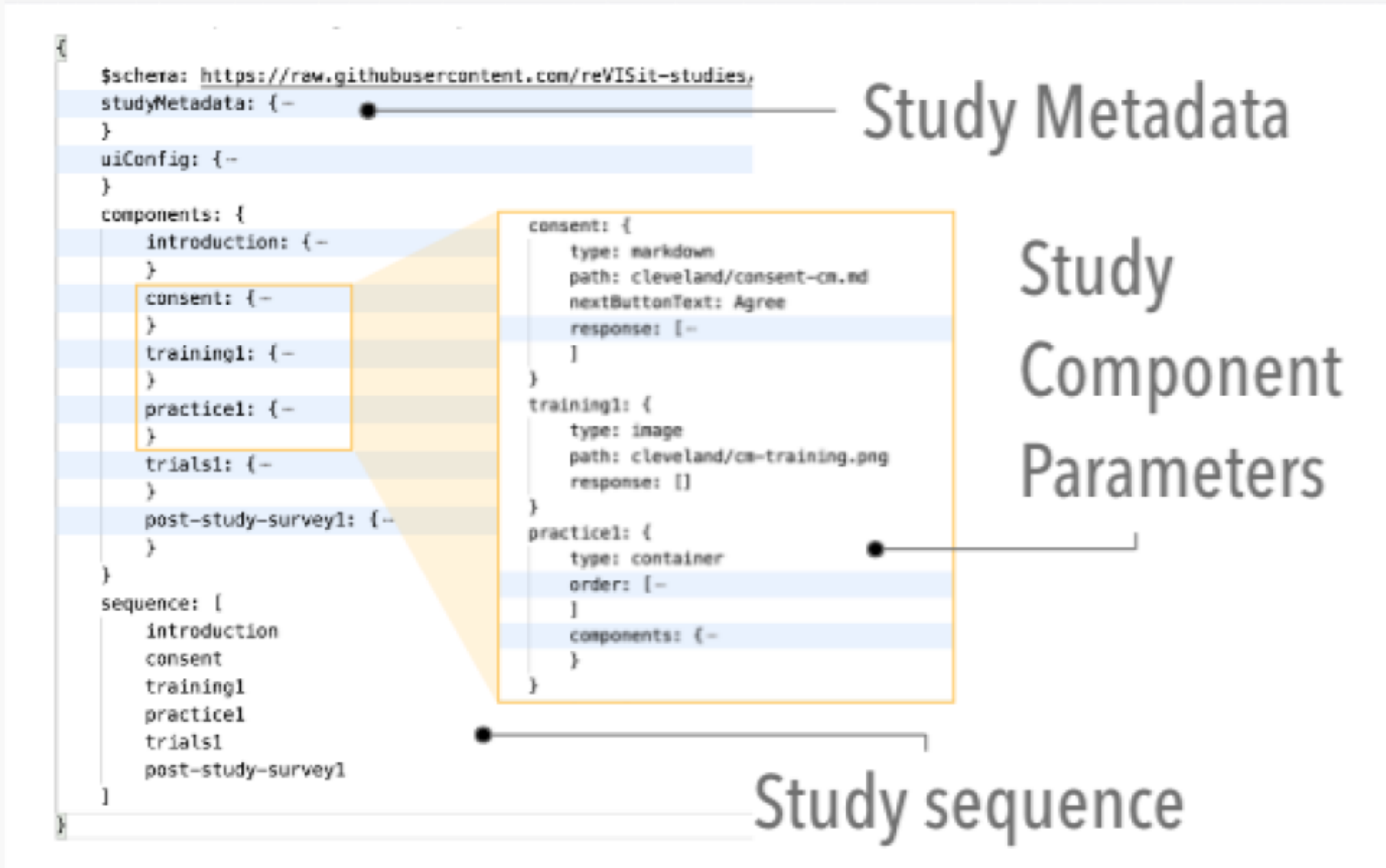
Simple **data tracking and data export**

Simple to **deploy and run** studies

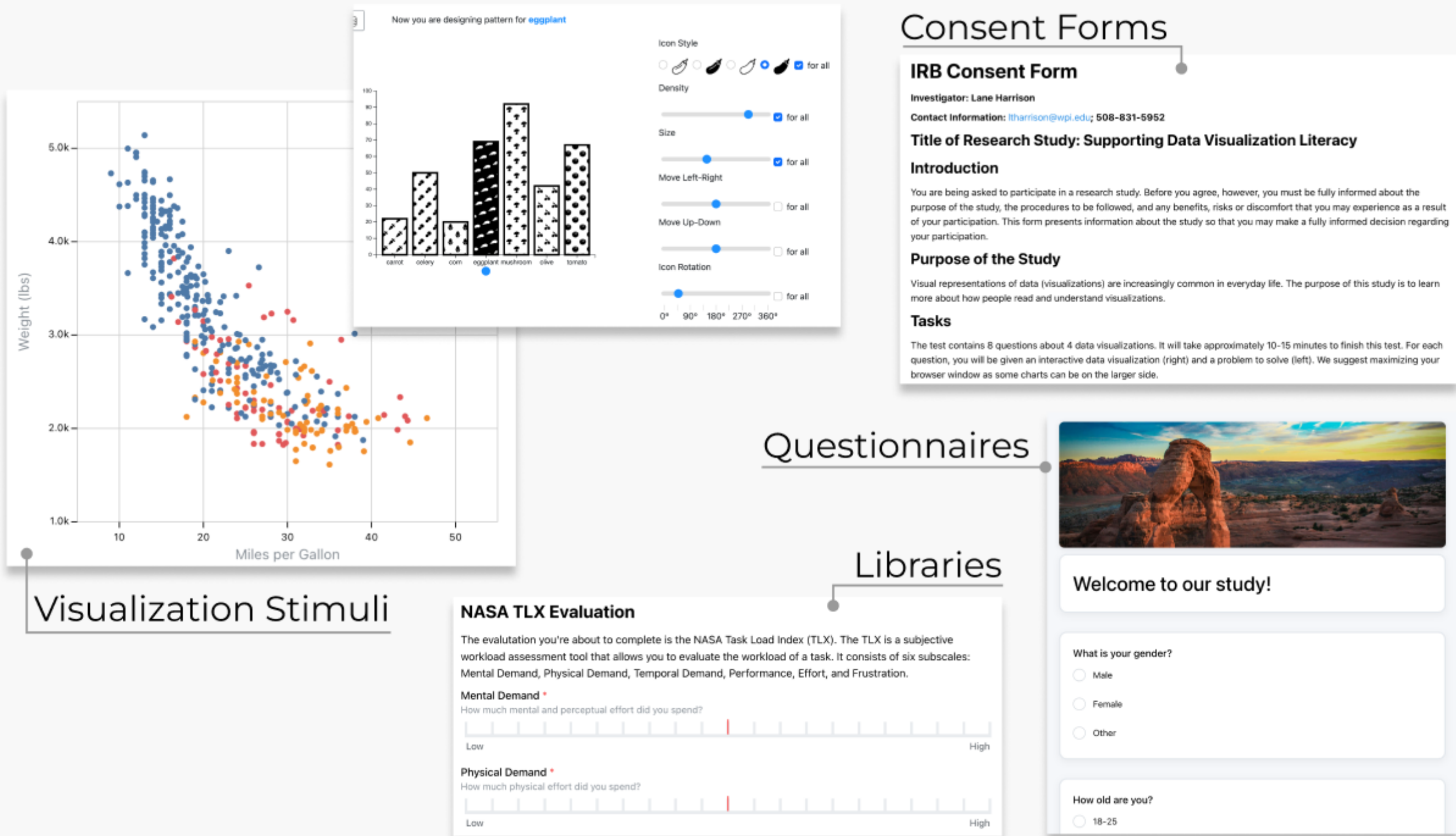
Fully **reproducible and open**. You can share your whole study setup for anyone to re-run, without having to have a license for software (qualtrics).

HOW DOES IT WORK

reVISit DSL – Study Specification

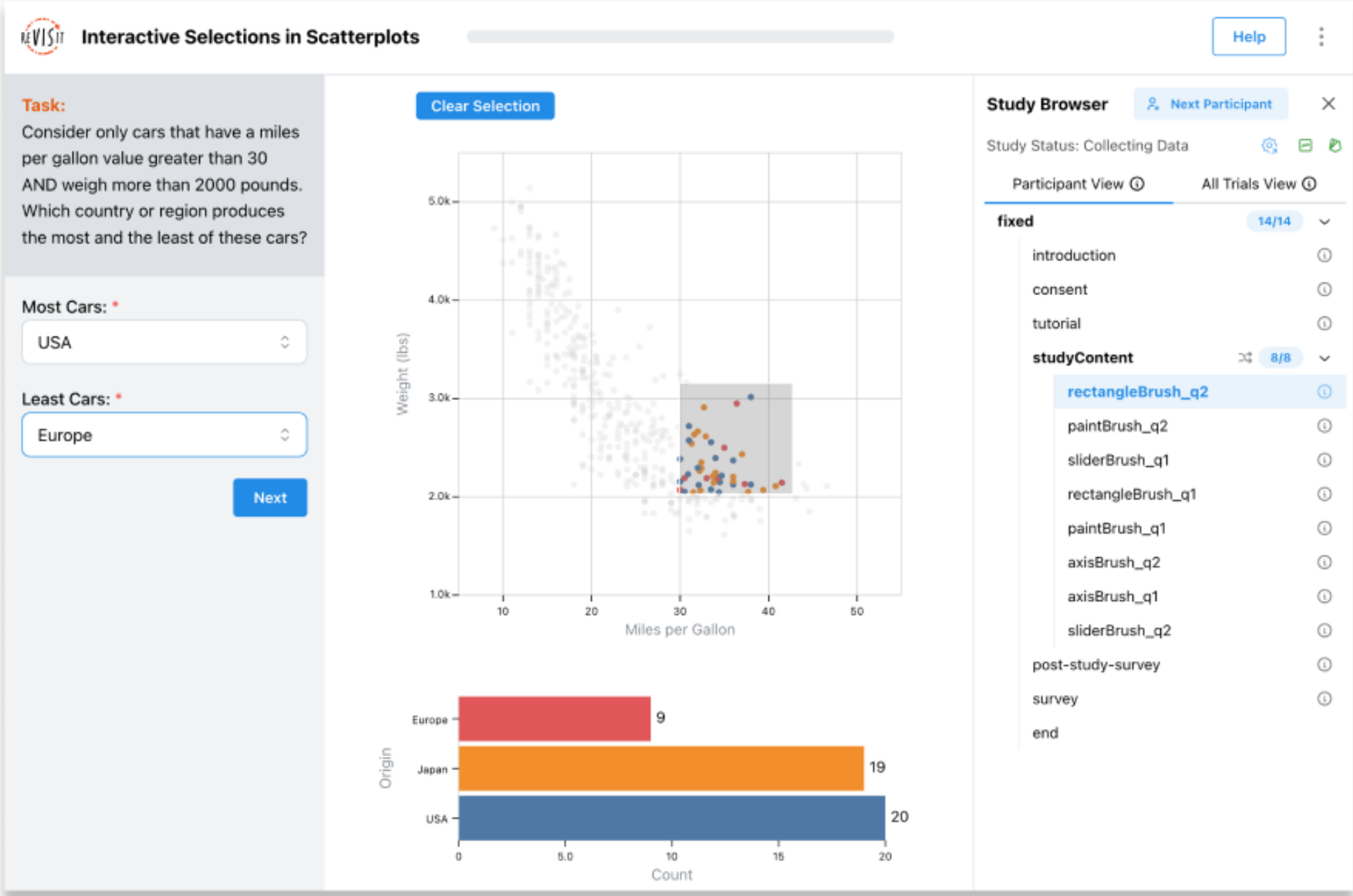


Stimuli: Components & Libraries



Compile & Deploy

Interactive Study Web App



Task Instructions Study Stimulus Study Browser

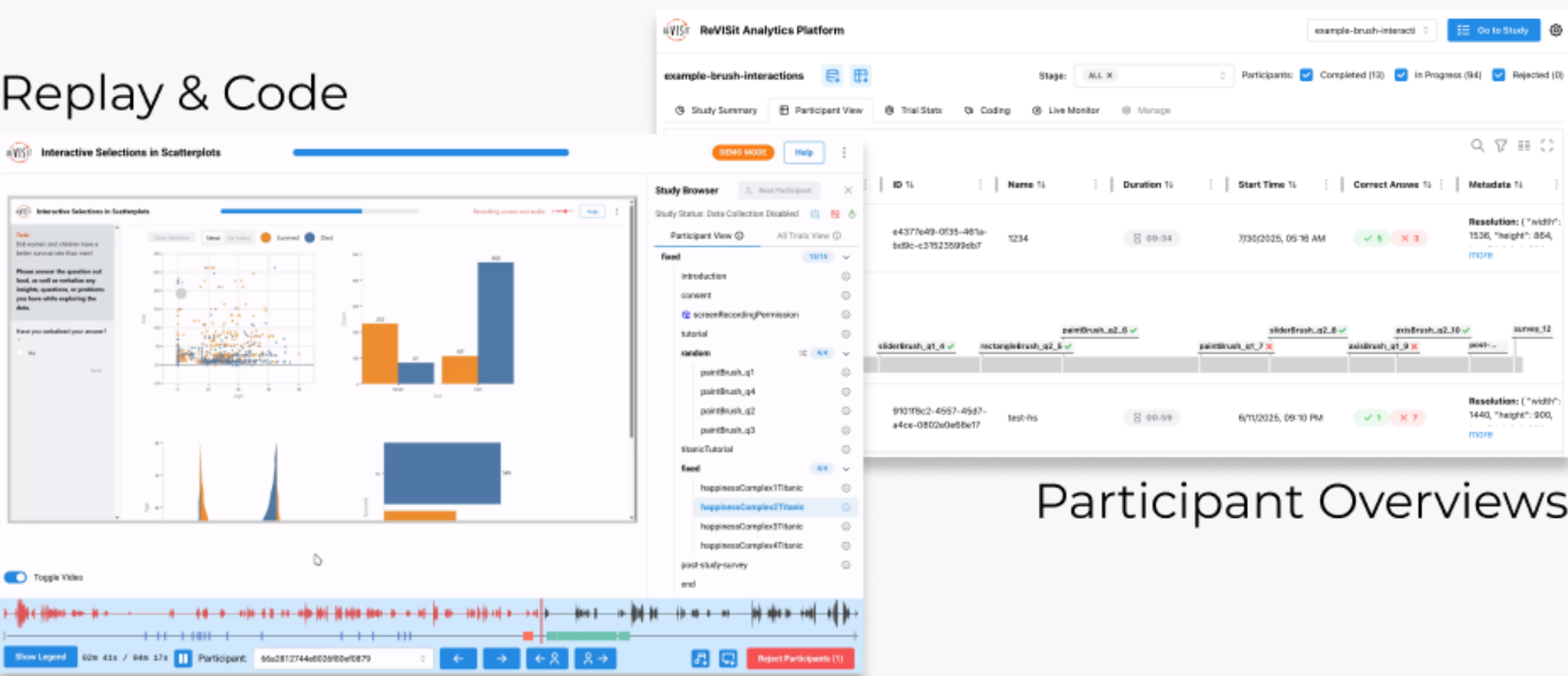
Recruit

Prolific
Mechanical Turk
Social Media
Local / Lab

Data Store



Monitor, Replay, Code, Download



Analysis



ReVISit

A Full Experiment Life Cycle User Study Framework



ReVISit

A Full Experiment Life Cycle User Study Framework

DSL
Vega Instrumentation
Python Bindings
Data Tracking



**Experiment
Design**

Study Browser
Participant Simulator
Data Preview
Participant Replay



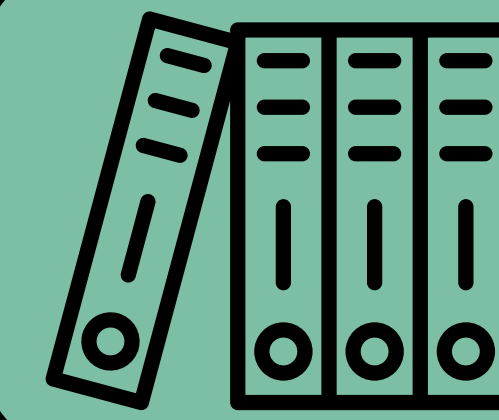
**Debug &
Pilot**

Viewing Progress
Rejecting Participants



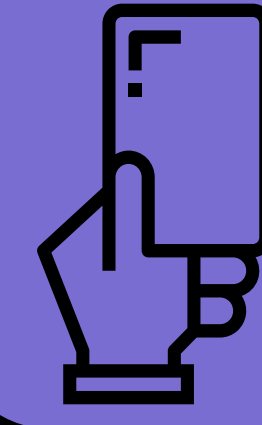
**Data
Collection**

Data Export
Participant Replay



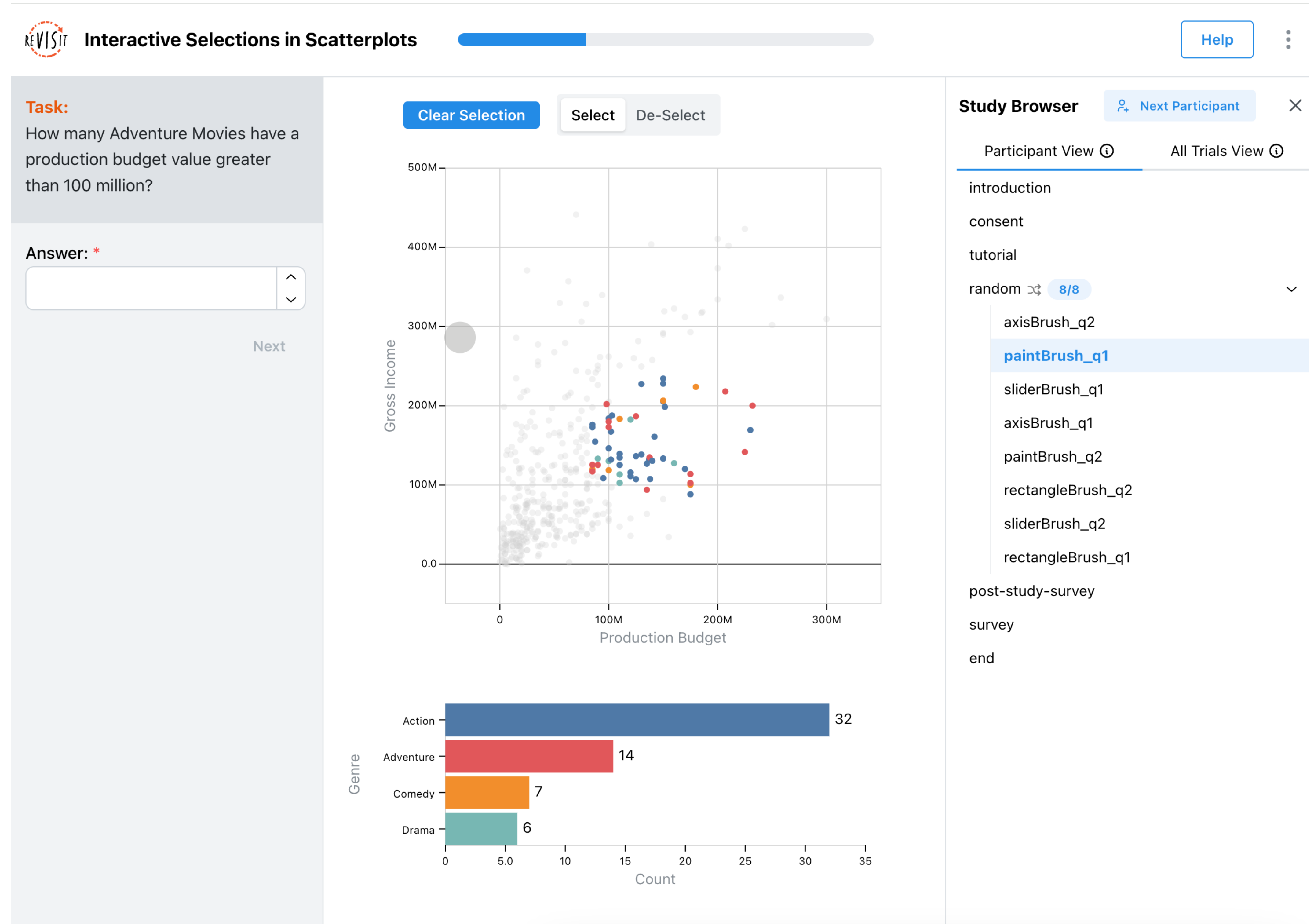
Analysis

Deep-linked Results
Navigable Stimulus
Shareable Data
Forkable Studies



Dissemination

DEMO



<https://revisit.dev/study/example-brush-interactions/>

REVISIT BASICS

THE REVISIT SPEC

Define the details of your experiment as a JSON file.

Study Metadata — name of the study, authors, contact e-mails

UI Config — parameterizing the appearance of reVISit

Components and **BaseComponents** — setting up the content of the study

Sequence — choosing the order and selection of tasks participants see.

REVISIT SPEC

Outline

```
{
  "$schema": "https://raw.githubusercontent.com/reVISit-studies/study/main/src/parser/StudyConfigSchema.json",
  "studyMetadata": {
    "title": "Basic Questionnaire Study",
    ...
  },
  "uiConfig": {
    "contactEmail": "contact@revisit.dev",
    ...
  },
  "components": {
    "introduction": {
      "type": "markdown",
      "path": "basic-questionnaire-study/assets/introduction.md",
      "response": []
    },
    "first-question-set": {
      "type": "questionnaire",
      "response": [
        {
          "id": "q1-name",
          "prompt": "What is your first name?",
          "type": "longText",
          "placeholder": "Please enter your first name"
        },
        ...
      ],
      "sequence": {
        "order": "fixed",
        "components": [
          "introduction",
          "first-question-set"
        ]
      }
    }
  }
}
```

REVISIT COMPONENTS — WHERE YOUR “STUDY CONTENT” GOES

Markdown Files – introductions, consent forms, help pages, etc.

Images, Videos – static (vis) stimuli

Web Pages – custom stimuli, made interactive with JavaScript

React Components – sophisticated interactive stimuli. Simplify the communication between reVISit and the stimulus

Survey Questions – structured responses

Vega Visualizations – directly put in interactive visualizations as stimulus

VEGA DEMO



Introduction

Welcome to our study. This is a replication of a study by Padilla et al., published in Frontiers in Psychology, 2021.

Instructions

The following instructions describe the tasks you will see and how to complete them. If you need to refer to these instructions during the experiment, please click on help at the top of the page.

Scenario: Alpacas may need blankets. Assume that you work at the Red Cross, and your job is to manage resources for farms in Peru. In previous years, alpacas have died in Peru from cold temperatures. Alpacas can typically withstand the cold unless the temperature drops below 32°F.

Budget: You are in charge of the Red Cross's blanket budget, and it is your job to issue blankets to the alpacas when temperatures fall below 32°F, which will help them withstand the cold.

Budget Constraints: You have a budget for 48 days of \$48,000. Purchasing and delivering blankets to farmers costs \$1,000 (per night). If you fail to issue blankets to the farmers and the temperature drops below 32°F, it will cost \$6,000 from your budget.

Task: In the experiment, you will be shown a nighttime temperature forecast like the one below. In the forecast, each dot represents a 1 out of 20 chance the nighttime low will be that temperature. You will be asked some questions about this forecast, including if you will issue blankets to the alpacas.

Compensation: Please respond to the best of your ability. You will receive an extra \$0.15 cents for every \$1,000 that you have in your budget at the end of 48 days.

Next

Study Browser

Next Participant



Participant View ⓘ

All Trials View ⓘ

introduction

vegademo1

vegademo2

end

Also auto-captures interaction!

REVISIT SPEC

Components & Inheritance

```
"baseComponents": {
  "bar-chart": {
    "type": "website",
    "response": [
      {
        "id": "barChart",
        "prompt": "Your selected answer:",
        "required": true,
        "location": "belowStimulus",
        "type": "iframe"
      }
    ],
    "path": "basic-questionnaire-study/assets/bar-chart.html",
    "instructionLocation": "aboveStimulus"
  }
}

"bar-chart-1": {
  "baseComponent": "bar-chart",
  "description": "A trial for the user to click the largest bar",
  "instruction": "Click on the largest bar",
  "parameters": {
    "barData": [0.32, 0.01, 1.2, 1.3, 0.82, 0.4, 0.3]
  }
},
"bar-chart-2": {
  "baseComponent": "bar-chart",
  "description": "A trial for the user to click the smallest bar",
  "instruction": "Click on the smallest bar",
  "parameters": {
    "barData": [1.2, 1.2, 1.2, 1.3, 0.82, 0.4, 0.3]
  }
}
```

COMPONENTS AND RESPONSES

1. Dropdown example – which chart do you like best? * ⓘ

You can specify secondary text to clarify your question.

Enter your preference

Bar ⓘ

Bubble

Pie

Stacked Bar

Responses are a **primary data type** - **each component can have a response**

Forms are “responses only” components

```
Component  "first-question-set": {
  "type": "questionnaire",
  "response": [
    {
      "id": "q1-name",
      "prompt": "What is your first name?",
      "required": true,
      "location": "aboveStimulus",
      "type": "longText",
      "placeholder": "Please enter your first name"
    },
  ],
}
```

Response

<https://revisit.dev/study/demo-form-elements/>

SEQUENCE

In what order do the components appear for which participant

- Can be made up of **nested blocks**
- **Fixed**
- **Random**
- **Latin Square**
- **Condition** (new)
- **Dynamic** (provide a function)
- **Subsets** (show 2 out of 5)
- **Skips** (if wrong, go to next task)
- **Interrupts** (breaks, attention checks)

REVISIT SPEC

Sequence

```
"sequence": {  
  "order": "fixed",  
  "components": [  
    "introduction",  
    "consent",  
    "tutorial",  
    {  
      "order": "random",  
      "components": [  
        "paintBrush_q1",  
        "rectangleBrush_q1",  
        "axisBrush_q1",  
        "sliderBrush_q1"  
      ]  
    },  
    "post-study-survey",  
    "survey"  
  ]  
}
```

CONDITION URL SELECTOR

```
{
  "sequence": {
    "order": "fixed",
    "components": [
      "introduction",
      {
        "id": "color",
        "conditional": true,
        "components": ["color-trial-1", "color-trial-2"],
        "order": "random"
      },
      {
        "id": "shape",
        "conditional": true,
        "components": ["shape-trial-1", "shape-trial-2"],
        "order": "fixed"
      }
    ]
  }
}
```

mystudy.com/study?condition=color

Participants will see only color trials

mystudy.com/study?condition=shape

Participants will see only shape trials

STYLING

You control the appearance!

Configure what to show
(Sidebar, top bar, progress bar..)

Global, component, response-
level styling with css

<https://revisit.dev/study/demo-style/>



Styling Demo Study

Help



Welcome to our study!

What is your gender?

☐ Male

☐ Female

☐ Other

LIBRARIES

18 libraries implemented

reusable components (microphone checks, virtual chin rest)

visualization **literacy** checks (VLAT, CALVI,...)

visualization **quality metrics** (PREViS, QUIS,...)

usability and user workload **assessments** (SUS, NASA TLX,...)

REVISIT PY

REVISIT-PY

Python Bindings for
reVISit

Some things are **annoying** to do in
JSON

Eg: generating 50 stimuli with slightly
different data

reVISitPy Python bindings allow you
to “program” a spec

Iterate over “**factors**”, like datasets,
tasks, conditions

REVISIT-PY EXAMPLE

```
import revisit as rvt
import data.scatterjnd.metadata as metadata

study_metadata = rvt.studyMetadata(
    **metadata.study_metadata
)

newResponse = rvt.response(
    id='hello',
    type='matrix-radio',
    required=False,
    prompt='Test Prompt',
    test='hello',
    answerOptions='satisfaction5',
    questionOptions=['Test1', 'Test2']
)

base_comp = rvt.component(
    type='questionnaire',
    response=[],
    component_name__='Base_Test'
)

comp_one = rvt.component(
    base__=base_comp,
    component_name__='Test',
).responses([
    newResponse
])
```

▶ ▾

```
import src.revisit as rvt

study_metadata = rvt.studyMetadata(
    **{
        "title": "HTML as a Stimulus",
        "version": "pilot",
        "authors": [
            "The reVISit Team"
        ],
        "date": "2023-04-14",
        "description": "A simple demo of using stimuli in an HTML file that renders a D3 visualization. Data is collected via a numeric response field.",
        "organizations": [
            "University of Utah",
            "WPI",
            "University of Toronto"
        ]
    }
)

ui_config = rvt.uiConfig(
    **{
        "contactEmail": "contact@revisit.dev",
        "helpTextPath": "./assets/help.md",
        "logoPath": "./assets/revisitLogoSquare.svg",
        "withProgressBar": True,
        "autoDownloadStudy": False,
        "sidebar": True,
        "windowEventDebounceTime": 200
    }
)

introduction = rvt.component(
    component_name__='introduction',
    type='markdown',
    path='./assets/introduction.md',
    response=[]
)

barChart = rvt.component(
    component_name__='barChart',
    type='barChart',
    data=[
        {"category": "Category 1", "value": 10},
        {"category": "Category 2", "value": 20},
        {"category": "Category 3", "value": 30},
        {"category": "Category 4", "value": 40},
        {"category": "Category 5", "value": 50}
    ]
)
```

⌵

DATA

DATA COLLECTION

Responses – Participant responses to specified questions

Logs – a variety of things about participants and sessions

time information about responses

“Clean” time – minus “browsed away” time

Participant Metadata: Browser information, etc

Provenance Data – data you track in your stimulus via our provenance tracking library

Audio Data – you can run think aloud studies

Screen Captures – see what ppl do!

PROVENANCE DATA

Instrument your interactive stimulus with **provenance tracking!**

E.g., using our **trrack library** (<https://apps.vdl.sci.utah.edu/trrack>)

Works out **of the box for Vega!**

Provenance **data is stored as JSON** with the rest of your data

PROVENANCE DATA

New analysis possibilities!

Analyze **logs**

Analyze **interaction strategies**

Review individual user actions

Debug your study setup

See where things go **wrong**

CAN WE DO
QUALITATIVE
EVALUATION
ONLINE?

Yes! Think Aloud & Provenance / Screen Capture

The screenshot shows a web-based audio player. At the top is a waveform of an audio recording. Below it is a progress bar with a playhead. Underneath the progress bar are two buttons: 'Play' and 'Pause', followed by the timestamp '3/18/2024, 3:07:31 PM'. Below the buttons is a 'Transcript' section with a list of text segments, each preceded by a vertical bar. To the right of the transcript is a '+ Tags' section with a list of tags, each in a box with a close button (X) and a dropdown arrow (v).

Play Pause 3/18/2024, 3:07:31 PM

Transcript

So for this task, uh, I just need to consider penguins that weigh between 4 and a half and 5.

Okay kilograms, but all that I'll flip a length between 2 and 215.

All right. I'm going to have to be quite precise so I can

I'm I'm confident about the 4 to 5K but 2 to 15.

Okay, so I'm just going to click on select.

All right, so actually 200 to 20.

So I'm just going to have to have to estimate where.

2 15 is

which is approximately there about 75% of that.

Let me just clear that selection. Let me just try this again.

+ Tags

- Reading question X v
- Reading question X v
- Stating intent X v
-
-
-
-
-
-

Pushing the boundary of what can be
evaluated using crowdsourcing

WHY?

Logistics are easier

Crowdsourcing

Expert-studies at their schedule

Potentially more **diverse participant pools**

Time-saving for experimenter

Usual trade-offs of lab vs crowdsourced

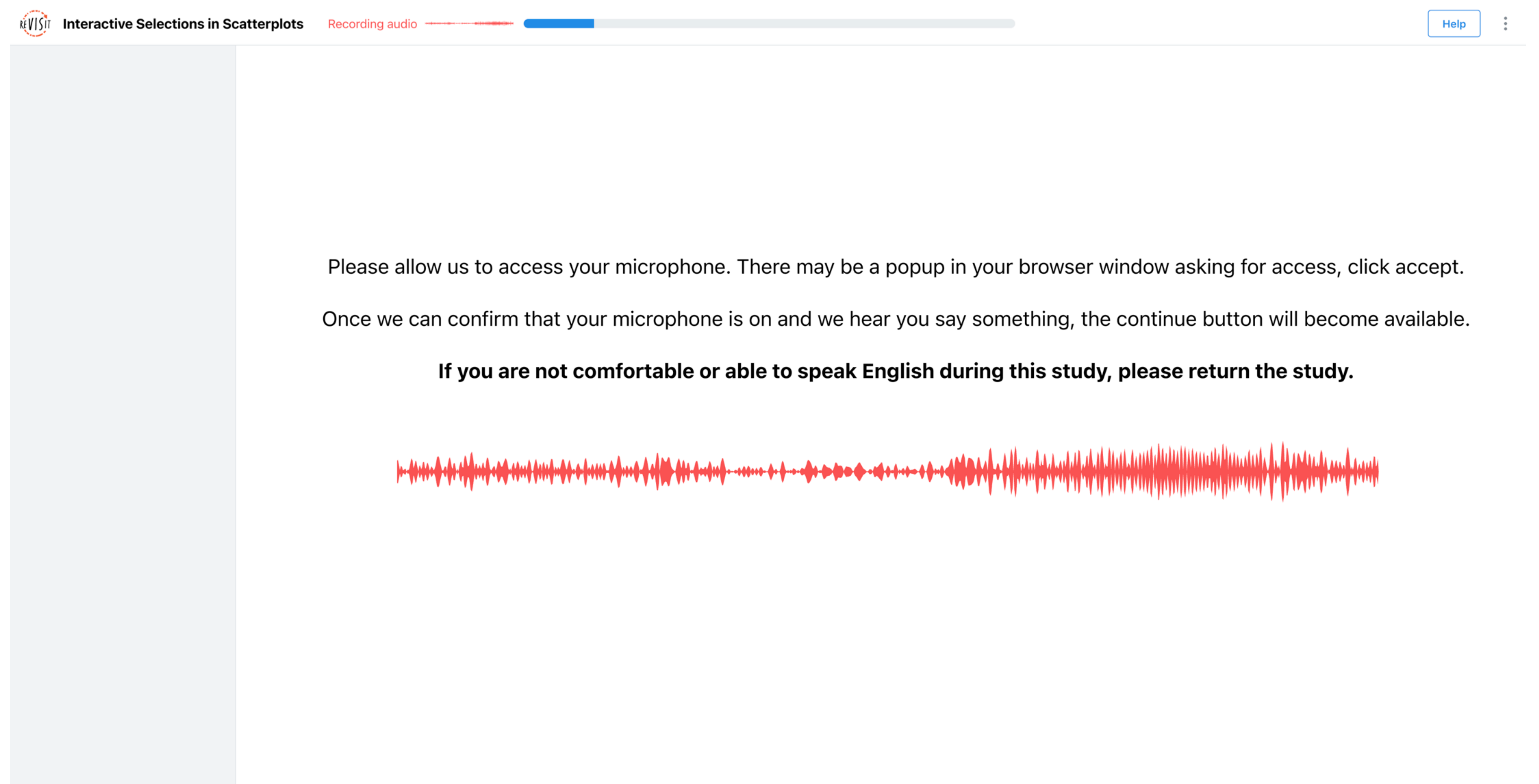
RECORDING

Single flag

Waveform vis to show
recording is on

Automatic

transcription



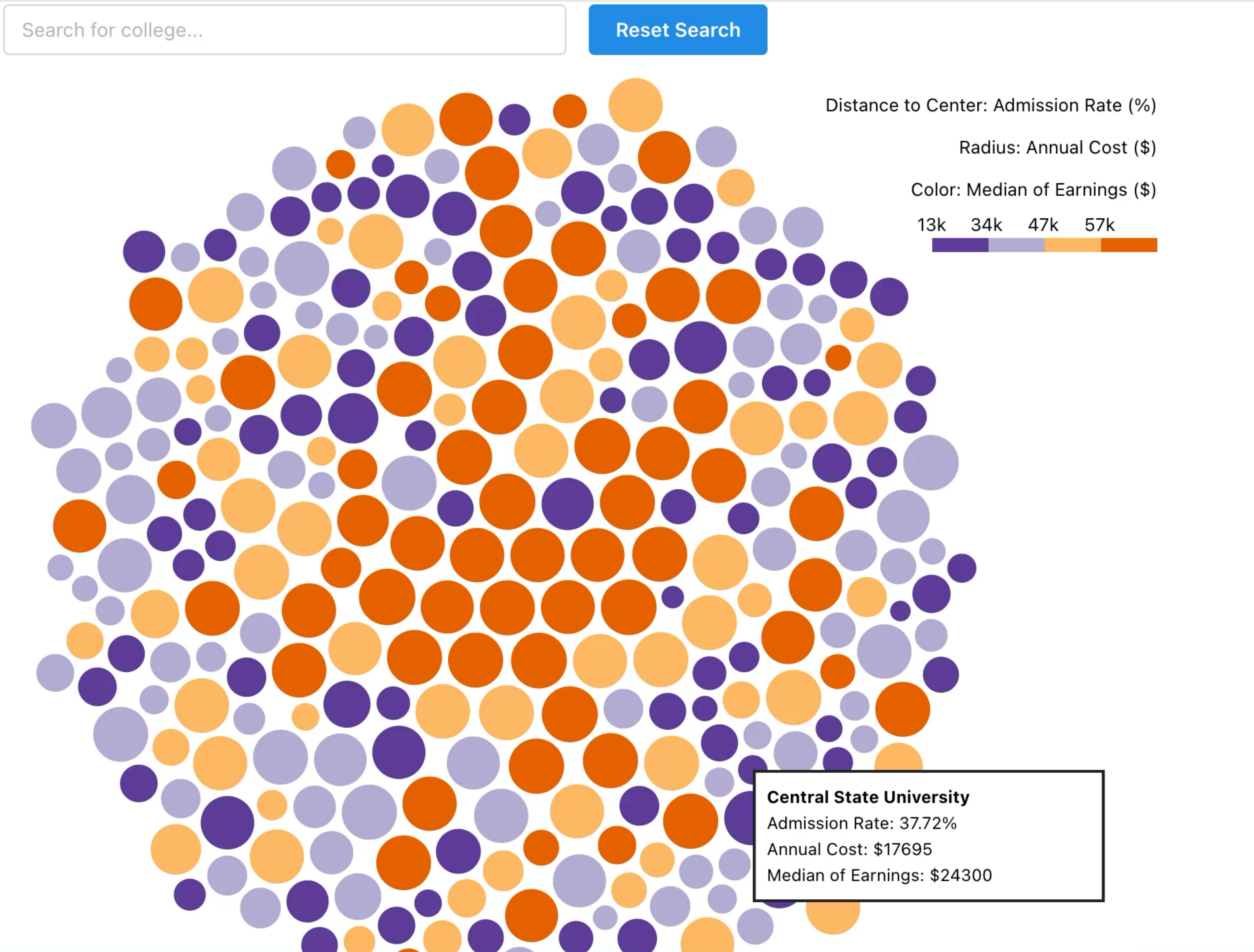
Task:

Your task is to analyze this dataset of college information and describe the findings you identified in the next page.

How to Interact:

- Mouseover any of the circles to obtain a detailed view.
- Use the text box at the top to search for specific college.

Note: Your audio is be recorded in this page. Please verbalize your thought process as you go analyze the dataset.



Study Browser Next Participant ×

Participant View ⓘ All Trials View ⓘ

fixed 8/12 ⌵

- consent
- introduction
- audioTest
- latinSquare** 2/6 ⌵
 - fixed** 2/2 ⌵
 - instructionsWithSearch
 - bubbleChartWithSearch**
 - fixed 0/2
 - fixed 0/2
- explorationStrategy
- demographics
- end

Show Legend

03m 50s / 05m 17s ▶

Participant: c26a6e17-ef44-4275-8cf5-c3c017ee0 ⌵

⬅ ➡ ⬅ ⬅ ➡ ➡

SCREEN CAPTURE DATA

Provenance is great, but can be annoying to implement

Screen capture: easy way to see what's going on

Great for debugging / piloting

Can be combined

- with provenance / event logging

- with audio recording

Screen and Audio Recording Permission

This study requires recording of your **screen** and **audio**. If you're not comfortable, you may exit and return the study.

Follow the steps below to grant screen and audio recording permissions.

1. **Click the button below** to enable screen and audio recording.

Start Recording

Note: Please make sure you are recording the correct tab or window. Otherwise, stop and re-share the correct one.

2. **Speak** into your microphone to check if audio is working.

Study Browser

Next Participant



Study Status: Collecting Data



Participant View ⓘ

All Trials View ⓘ

fixed

6/6



introduction ⓘ

screenRecordingPermission ⓘ

external_website ⓘ

external_website2 ⓘ

barChart ⓘ

end

DATA STORAGE: LOCAL, CLOUD, SELF-HOSTED

Local

Works out of the box

Download from local storage of your browser

Doesn't work for online studies

Cloud-Based: Firebase

A bit of a pain to set up (but better than running your own server)

Reliable cloud storage option

Available with servers in many countries

Self-Hosted: Supabase

You control the environment

Spin up server via docker files



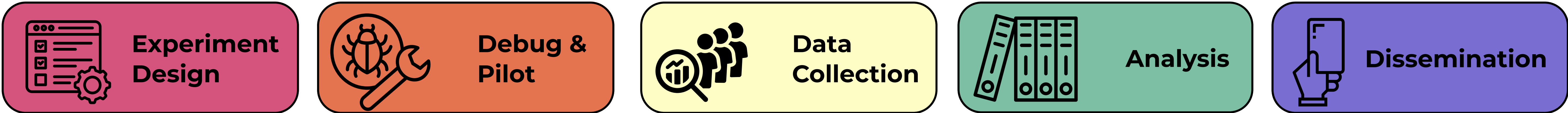
Firebase



supabase

STUDY LIFECYCLE

The study life cycle



Study Browser



Data Collection



Public Sharing



STUDY MODES – EXPERIMENT LIFECYCLE

Study Design & Debugging

Jump around a study, see all data, see run-throughs of pilots

Collecting Participant Data

Hide all debug features

Study & Data Dissemination

Share study w. navigation

Share data

Study Browser [Next Participant](#) ✕

Participant View ⓘ All Trials View ⓘ

introduction

consent

tutorial

random ⌘ 8/8 ⌵

- paintBrush_q1
- sliderBrush_q1
- rectangleBrush_q2
- paintBrush_q2
- axisBrush_q1
- rectangleBrush_q1
- axisBrush_q2
- sliderBrush_q2
- post_study_survey

reVISit ✕ +

← → ↺ 🔒 <https://revisit.dev/study/analysis/stats/demo-html/manage>

reVISIT ReVISit Analytics Platform

demo-html ✓ 0 ⚠ 0 ✗ 0

📊 Table View 🕒 Trial Stats ▶ Participant Replay ⚙️ Manage

ReVISit Modes

- ☒ Data Collection Enabled
- ☒ Study Navigator Enabled
- ☒ Analytics Interface Publicly Accessible

Data Management

STUDY STATES

States let you track what phase you're in in your data.
Debugging, pre-pilot, pilot, pilot2, main

demo-html

Study Summary

Participant View

Trial Stats

Coding

Manage

demo-html

Stage: ALL X

Participants: ☒ Completed (0) ☒ In Progress (1) ☒ Rejected (0)

ReVISit Modes

Stage Management

Add New Stage

Current	Stage Name	Color	Edit
☐	DEFAULT	#F05A30	Edit
☒	dev	#0ffc6a	Edit

Data Management

LIVE MONITOR

reVISIT

HTML as a Stimulus

Thank you for completing the study. You may close this window now.

reVISIT

ReVISit Analytics Platform

demo-html

Go to Study

demo-html

Participants:

Completed (28)

In Progress (6)

Rejected (1)

Study Summary

Participant View

Trial Stats

Live Monitor

Manage

Live Monitor

Total: 36

29 COMPLETED

7 ACTIVE

1 REJECTED

Participant Progress

In Progress (7)

Participant: 12ca4d4e-329a-4486-8870-5e7450f9f5c9

Started: 10/16/2025, 9:33:32 AM

Q1

Q2

Q3

33%

Participant: e335e001-6954-46d6-83bb-e3fe8064d320

Started: 10/8/2025, 9:54:47 PM

Q1

Q2

Q3

67%

Participant: 6a94a29d-714b-4f28-815c-fd0b043533f6

Started: 10/4/2025, 8:51:48 AM

0%

Participant: fde24231-582b-4d62-8408-5b1a35bae415

Started: 9/19/2025, 2:16:05 PM

0%

Participant: 9c4d5f36-0a1f-4359-9e52-e58b8aca854c

Started: 9/19/2025, 2:16:02 PM

0%

Participant: 74aff623-729b-4525-bdc2-3e47c8868df0

0%

Study Browser

Next Participant

Study Status: Collecting Data

Participant View

All Trials View

fixed

introduction

barChart

external_website

end

ANALYSIS

ANALYSIS INTERFACE

Download the data as tidy csv or JSON

Review and reject trials

Get summary previews of trials

demo-training

demo-training

Study Summary

Participant View

Trial Stats

Manage

22

Total Participants

4

Completed

17

In Progress

1

Rejected

4/9/2025

Start Date

8/12/2025

End Date

36.9 s

Average Time

30.9 s

Average Clean Time

42.2%

Correctness

Component Statistics

Component	Participants	Avg Time	Avg Clean Time	Correctness
main-page-text-field	2	25.9s	25.9s	22.2%
multiSelectCheckbox	4	9.7s	9.7s	0.0%
simple-dropbox	9	67.1s	52.9s	100.0%

Response Statistics

Component	Type	Question	Options	Correctness
main-page-text-field	shortText	Respond with a vowel	N/A	100.0%
main-page-text-field	shortText	Respond with a consonant	N/A	100.0%
multiSelectCheckbox	checkbox	Select A, D, F	A, B, C, D, E, F, G	0.0%

Did they finish?

example-brush-interactions

Stage: ALL X Participants: Completed (13) In Progress (94) Rejected (0)

Study Summary Participant View Trial Stats Coding Live Monitor Manage

>>		↑ ↓	↑ ↓	Stage ↑ ↓	ID ↑ ↓	Name ↑ ↓	Duration ↑ ↓	Start Time ↑ ↓	Correct Answers ↑ ↓	Metadata ↑ ↓
^		✓	61	N/A	e4377e49-0f35-461a-bd9c-c31523599db7	1234	⌚ 09:34	7/30/2025, 05:16 AM	✓ 5 ✗ 3	Resolution: { "width": 1536, "height": 864, "availHeight": ... } more
^		✓	38	N/A	9101f8c2-4557-45d7-a4ce-0802e0e68e17	test-hs	⌚ 00:59	6/11/2025, 09:10 PM	✓ 1 ✗ 7	Resolution: { "width": 1440, "height": 900, "availHeight": ... } more

ADVANCED ANALYSIS WITH PROVENANCE / AUDIO / VIDEO

Synced with Application State / Events

Easy **editing** of transcripts

Ability to **code** per participant / task / trial

Transcripts

I might run out of time. I don't like having hours is trying to taking me a long time and no only half an hour.

Send this for complicated. I don't know if I can finish the text. I don't know how long it takes other people text me I like more than 7 minutes.

I have to do something I need to do it fair. I could pentagram. Yeah. I am I drop pentagram and not exactly Sky News is so used Mr my drawing 5.

Basically, I'm drying don't between it's like between the points of a star it's up. There is no star different really fast at the name is easier to see.

Sorry, Amy Amy set I can't do anything faster than this. I have a limited amount of time and make sure you finish 44236.

Desmond Charles and then a purple line down so clever

Properly between my two also draw arrows on the end and then up to next and then returns to basal values yellow Charles to basic and then but 74th and then next time.

That's true blue for the the two child is well-being for them to try and clear to Desmond so are you?

How can I use the blue green yellow 12 covers can use red and black with the last one is try using you are you read today's man is 24 and then I'm going.

The other lines tablet the pentagram lines to Black visualisation ok, I think I'm done with it now.

Text Tags ⓘ

Add Text Tags

Add Text Tags

Add Text Tags

Add Text Tags

Test

Add Text Tags

Add Text Tags

Add Text Tags

Add Text Tags

Add Text Tags

Annotations ⓘ

Add Annotation

Add Annotation

Add Annotation

Add Annotation

Add Annotation

Add Annotation

Add Annotation

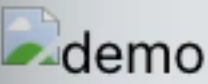
Add Annotation

Add Annotation

Add Annotation

Task:

Below is a list of authors, how many papers each author has published, and how many papers author pairs have published together.



Sketch a visualization which shows each author and their paper counts, as well as the collaborbation and collaboration counts between authors.

While doing so, **please speak out loud** to explain your thought process or any challenges you face.

We suggest spending around 7 minutes on this task.

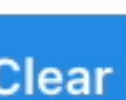
Have you finished drawing your visualization? *

☒ Yes

☐ No

01:19

Next



Clear all



Study Browser

EXPORT FOR STATS

Download as **tidy csv** or **JSON**

Use your favorite method to do your analysis



DISSEMINATION

DISSEMINATION WITH REVISIT

Share your code (spec and components – let others reproduce your work)

Share a link to your study (easy for readers/reviewers to understand what you did)

Share a link to the replay (let readers/reviewers see what your participants did)

Share your data (let others re-analyze your data)

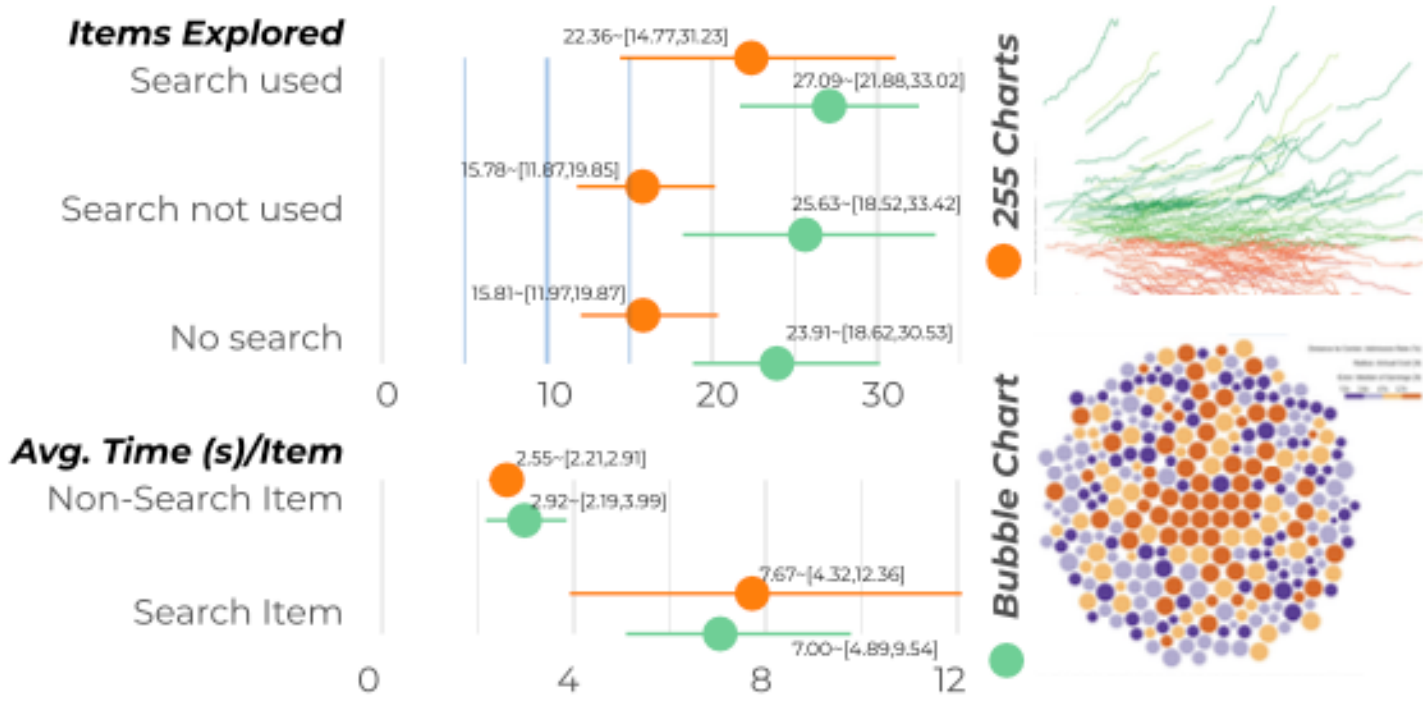


Fig. 7: Replication results from the search study align with prior findings (not shown), suggesting that while participants tend to interact with similar numbers of items, when participants engage with items highlighted during search, they tend to interact with them for longer.

original code for 255 charts into reVISit using a website component, whereas we re-implemented the Bubble Chart in React.

We recruited 99 participants for the Bubble visualization. Two participants did not record any interactions for more than 500 ms, an exclusion condition in the c for the 255 chart visualization not interact with any eleme

Results. Our experiment that participants in both conditions explored similar numbers of items (Fig. 7). However, the main effect of items highlighted in search being engaged with for longer also holds across both conditions. For example, in the Bubble visualization, items highlighted by search were statistically significantly viewed longer ($M(ean) = 7.00s$) than those not highlighted ($M = 2.92s$) via mouse click. Similarly, in the 255 charts visualization, search-highlighted items were also statistically significantly viewed longer ($M = 7.67s$) than non-search items ($M = 2.55s$) among search users.

Lessons Learned. ReVISit’s provenance tracking allowed us to measure where/how-long participants were interacting, but also allowed us to recreate their exploration session for deeper qualitative insights. Combined with the audio-enabled think-aloud protocol, this led to several new insights. For example, we can observe how participants “orient” themselves in the visualization: ↗ “So, this one is relatively small, the circle. And it looks like it’s an orange circle, which would appear that it’s on the higher end of earnings for people that attend this school”. It also confirmed a hypothesis from the original paper: that people would often use search to examine data that was personally relevant to them (↗ in this case, particular industries).

5 REFLECTION

Next we reflect on the design of our system. To do so we interviewed users of reVISit and did a heuristic analysis of the system.

Interviews. We conducted a semi-structured interview study with researchers who have used reVISit in a completed study. While reVISit has been used many times [10, 11, 41, 45], there is often an overlap between the maintainer of the system and the researchers running the study. This is in part because of our persistent community-centered outreach strategy. All participants were current PhD students who have run multiple user studies as part of their PhD, have run at least one study with reVISit, and are not part of the reVISit development team. We refer to participants as PX and “quote them”.

5.1 Findings

Interaction. Which loops in the system are overlapping and how far apart are the corresponding gulfs of evaluation? A common problem in developing user study prototypes is wide feedback loops during the development and testing of a study. Our study browser, as well as our development environment, is primarily aimed at tightening these feedback loops. After forking our repo, designers are met with a full development environment (via their choice of IDE, such as VSCode). P2 this found helpful: “it was also super helpful that no setup is required, [...] auto refreshes on saves and stuff: The ideal development situation that’s already there”. A common slow loop in other systems is to have to walk through the study in its entirety to debug parts of the sequence, whereas our study browser supports quick sequence navigation and therein rapid stimuli iteration.

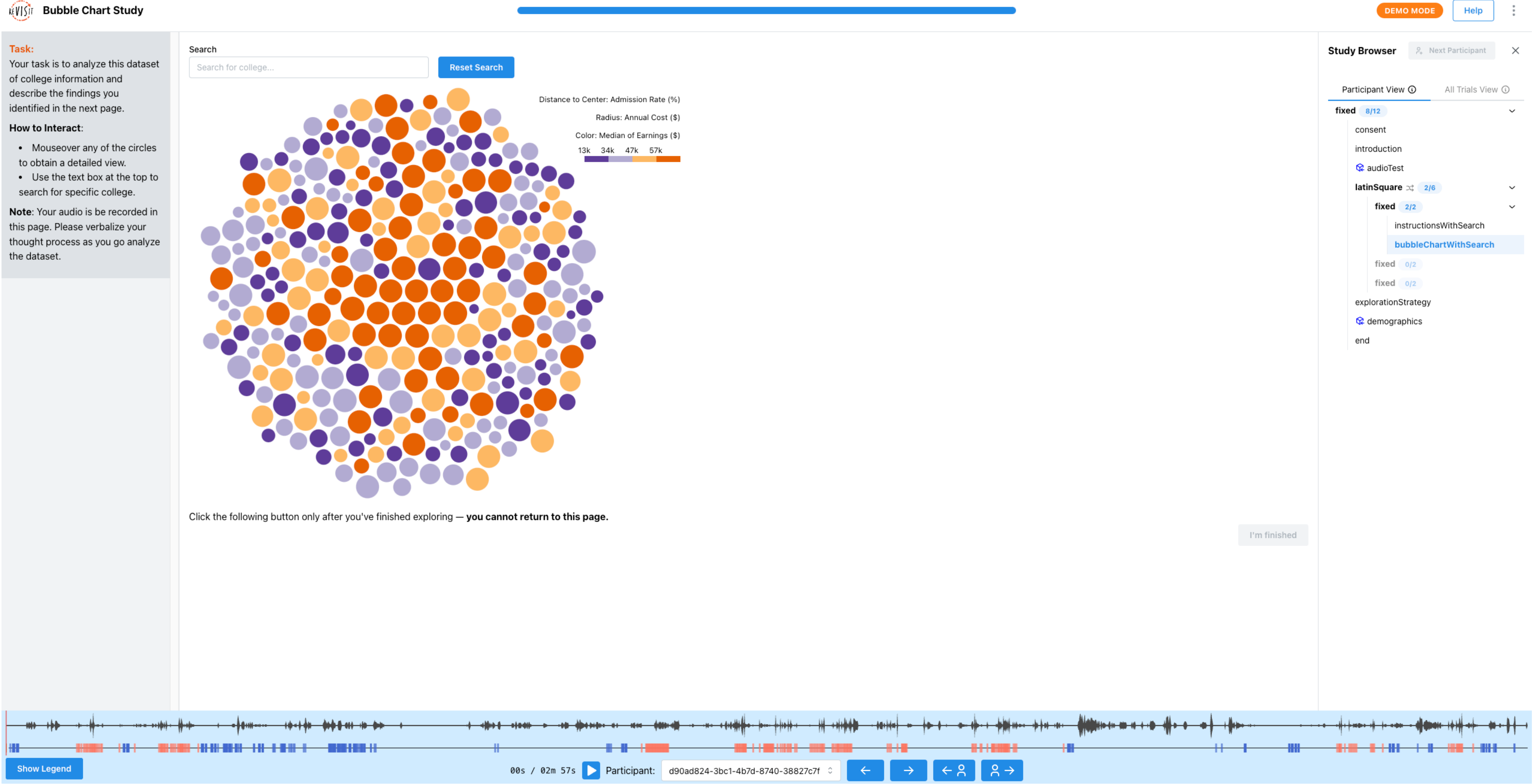
ReVISitPy has its own unique feedback loops. When used to generate configurations, there may be a wide feedback loop between generating a configuration in a notebook, copying the generated configuration into your project, and running the project to view changes. To tighten this feedback loop, reVISitPy can preview the study within a notebook, ensuring the configuration is appropriate before leaving the notebook. However, additional exploration of desired affordances during the pro-

interact with study tutorials. As part of ble documentation, along with several examples covering a range of functionality (inspired by the sprawling D3 example gallery ecosystem [69]), and descriptive tutorials for more complex concepts. For instance, P2 found our data storage setup tutorial helpful, saying that they “100% had to use the guide to be able to remember what to do”; however, “I thought the guide was really good”. Similarly, P3 recalled that “I mainly learned by using the documents on the website and API documents.” Our documentation increases awareness of available features, explains the use cases and applicability of features via examples, and helps users move from abstract to concrete with tutorials and documentation. No documentation is perfect, but we continue to work to adapt it to the needs of our user community.

A key design decision was to task study designers with using a DSL to specify experiments, in contrast to a GUI (as Qualtrics does), which likely would have radically tightened the design loop. While there is substantially higher technical complexity in using a DSL, it makes many more designs possible than what we might have designed for in building a GUI. Echoing Alan Kay: “Simple things should be simple, complex things should be possible” [4]. While future work might explore a GUI, we suggest that centering the possible (and valuing the technical proficiencies of our design-for audience) is essential.

Notation. What notations are present and how do they interrelate? ReVISit’s primary notation is the JSON DSL (which every study interacts with), complemented by several optional ones. Our DSL is designed to be simple and highly composable, with the only syntactic abstraction being baseComponents, as indicated in Fig. 2.

Such simplicity can be misaligned with the expected simplicity of some experiment designs. As discussed in Sec. 3.1, config files can be very large due to repetition of structures and components for a variety of factors. P2, who needed to make a 12k LOC file, questioned “I don’t know if what I’m doing is just a really rare experimental design. It doesn’t sound it from saying it in English, but then I think it kind of ends up being fairly orthogonal to the way the sequence is set up”. ReVISitPy attempts to address this problem by offering a greater degree of abstraction than is present in the DSL. The choice of transferring complexity away from the primary notation (the DSL) and into a secondary notation (reVISitPy/Python) was intended to keep the DSL simple, as most studies would not need the complex features that reVISitPy enables, while also empowering users who do need such functionalities. We forwent implementation of common abstractions (such as loops and variables) to avoid maintaining a full programming language. Instead, we ensure that our DSL is highly composable,



COMMUNITY

DOCUMENTATION & COMMUNITY

Documentation & Tutorials on Website
Community participation via slack etc.
<https://revisit.dev>



**A study creation platform allowing
you to quickly create, publish, and
disseminate your customized
visualization study.**

About ReVISit

Try The Demo

Get Started



Flexible And Powerful

ReVISit is designed with researchers from all disciplines in mind. It is simple enough



Focus on What Matters

ReVISit allows researchers to focus on the visual stimuli without the hassle of setting



In Depth Analysis

With the Analysis Dashboard, you can investigate the results from your study with

STEERING COMMITTEE

Thank you!

Danielle Albers Szafir

Cindy Xiong Bearfield

Ana Crisan

Alex Endert

Jean-Daniel Fekete

Petra Isenberg

Lace Padilla

John Stasko

Manuela Waldner

PAPERS USING REVISIT

Cui et al. VIS 2024

Promises and Pitfalls: Using Large Language Models to Generate Visualization Items

Harrison et al. Tech Report 2024

SummShaper: Empowering Analysts to Tailor Attributed Summaries

McNutt et al. EuroVis 2025

Accessible Text Descriptions for UpSet Plots

Lisnic et al. CHI 2025

Visualization Guardrails: Designing Interventions Against Cherry-Picking in Interactive Data Explorers

Cutler et al. CHI 2025

Crowdsourced Think-Aloud Studies

Cutler et al. VIS 2025

ReVISit 2: A Full Experiment Life Cycle User Study Framework

Chang et al. VIS 2025

Tell Me Without Telling Me: Two-Way Prediction of Visualization Literacy and Visual Attention

Ellemose et al. VIS 2025

Eye of the Beholder: Towards Measuring Visualization Completely

Pahr et al. Alt. Vis 2025

Investigating the Task Load of Investigating the Task Load in Visualization Studies

SUMMARY



reVISit takes care of the annoying parts of a study

Gives you the **ability to share your study with** reviewers and community!

Hope you give it a try.

INTRIGUED?

Tutorial at EuroVis

Happy to offer tailored tutorials

Join Slack: <https://revisit.dev/community/>

FUTURE IDEAS

Better Factorial Design

AI Detection

Internationalization

Better event sequence analysis

Integrating other signals (BCI, Eye Tracking)

Integrating other modalities (AR/VR, Mobile, Watches)

Data-API – easy access to data collected with reVISit

THOUGHTS?