SUNG KYUN KWAN UNIVERSITY

성균관대 영어영문학과 4단계 BK21교육연구단

Workshop on Experimental Linguistics/Syntax

Experimental Syntax: a walkthrough

January 22, 2021

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Guest (Will be answering questions in the chat!)

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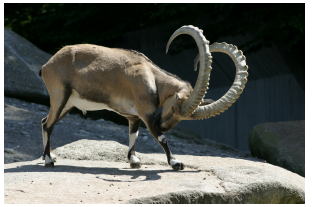
Presentation Outline



Introduction to IBEX

- Basic ideas
- Navigating the platform

Scripting an experiment

- Overview of critical components
- Code walkthrough

Analysis of the results

- Understanding the output format
- Importing into Excel and R

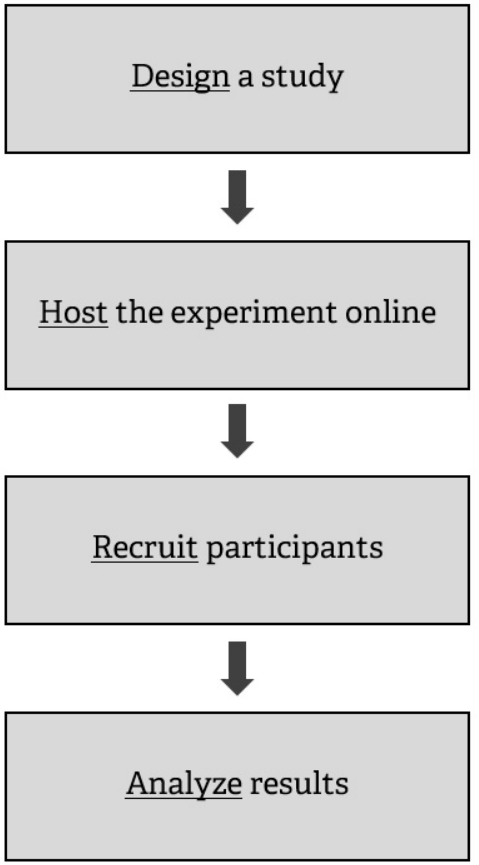
Link to the slides: https://ibex-workshop-slides.netlify.app

1. Introduction to IBEX

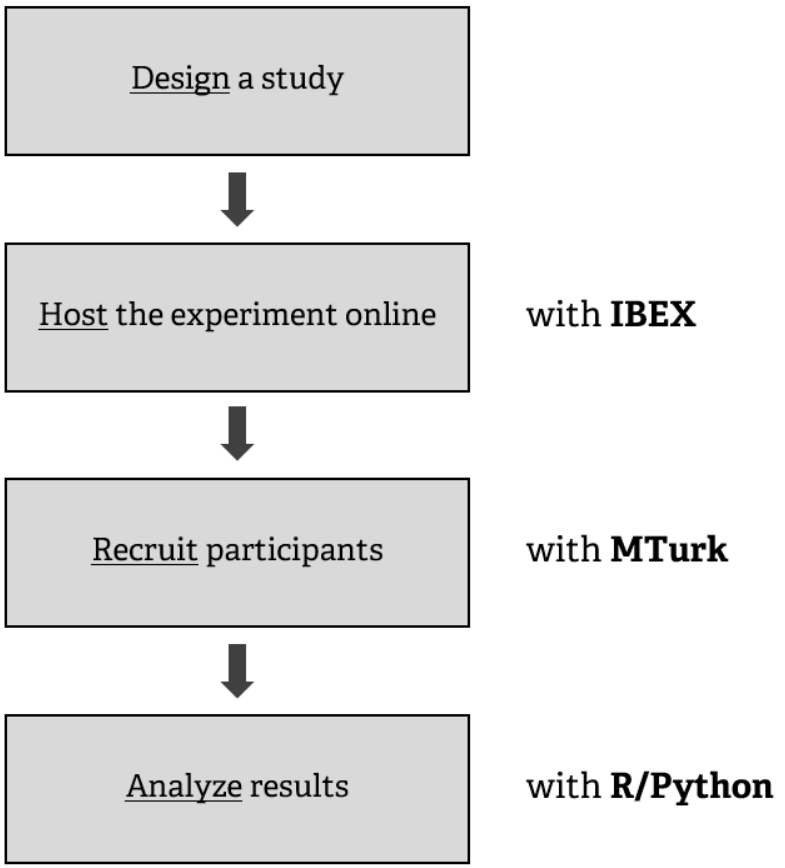
What is IBEX?

- Stands for (**I**)nternet-(**B**)ased (**EX**)periments
- **DOES**:
  - Host experiments on a webpage
  - Log user interactions with the experiment
  - Store data on a secure server
- **DOES NOT**:
  - Recruit participants (*see* Amazon Mechanical Turk)
  - Provide an analysis of the results (*see* R, Python)

Where does IBEX fit?

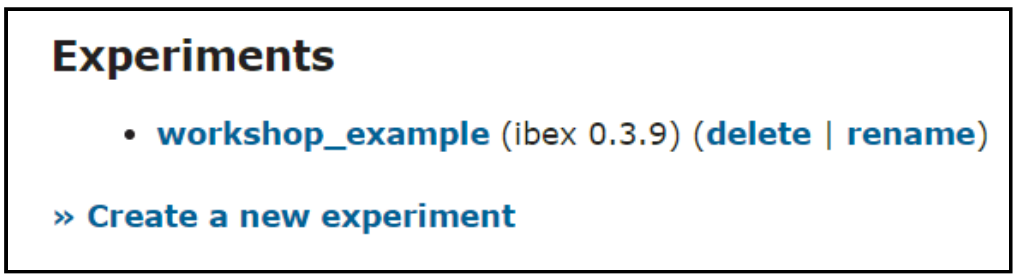


Where does IBEX fit?

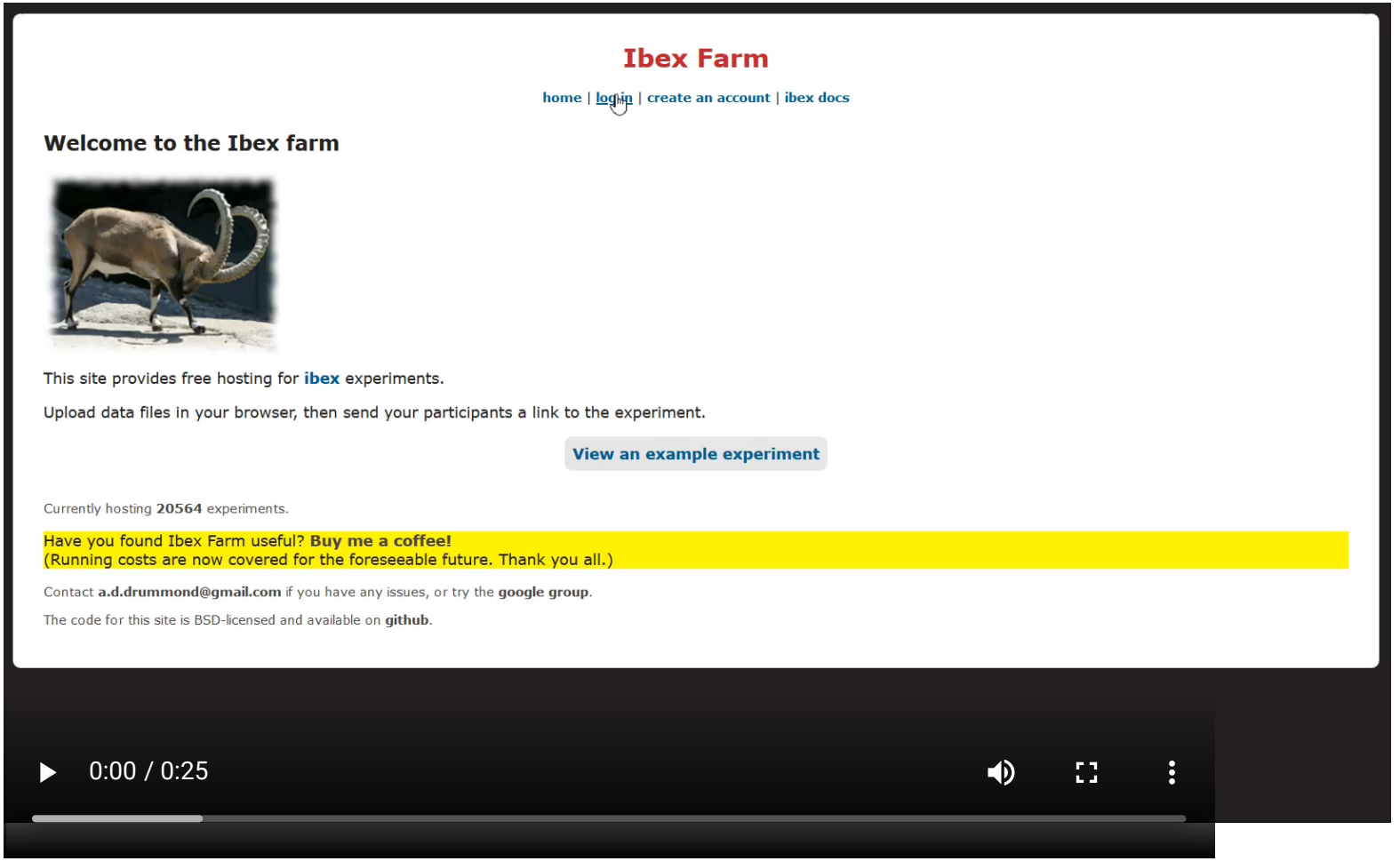


Navigating IBEX

- Go to https://spellout.net/ibexfarm
- Click **create an account** (or **log in**)
- Click **manage my experiments**
- Click **Create a new experiment**
- Give it a unique name like "*workshop_example*"
- Done!



Navigating Ibex



Experiment file structure

chunk_includes

- Stand-alone files go here

css_includes

- Style specifications go here

data_includes

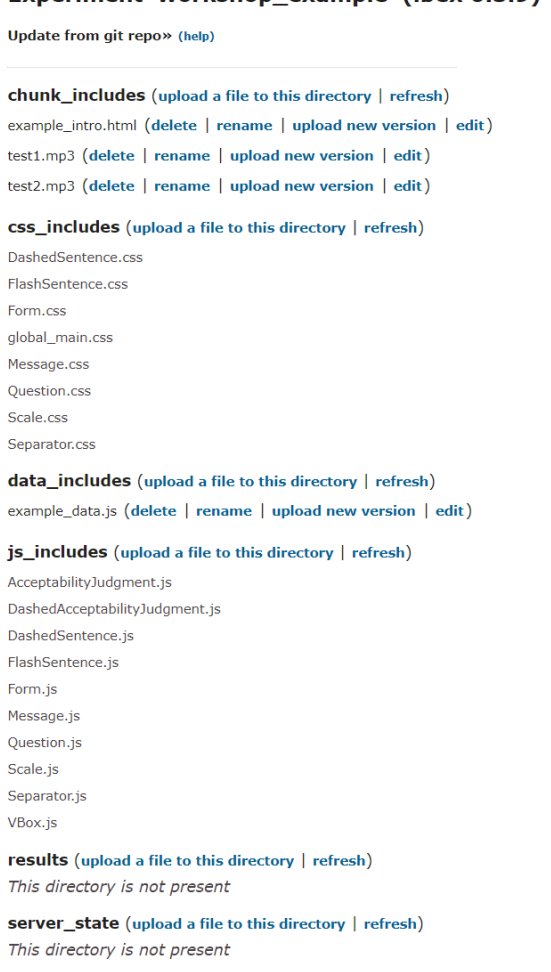
- Experiment scripts go here

js_includes

- Modules ("controllers") go here

results & **server_state**

- Automatically generated/updated



Experiment file structure

chunk_includes

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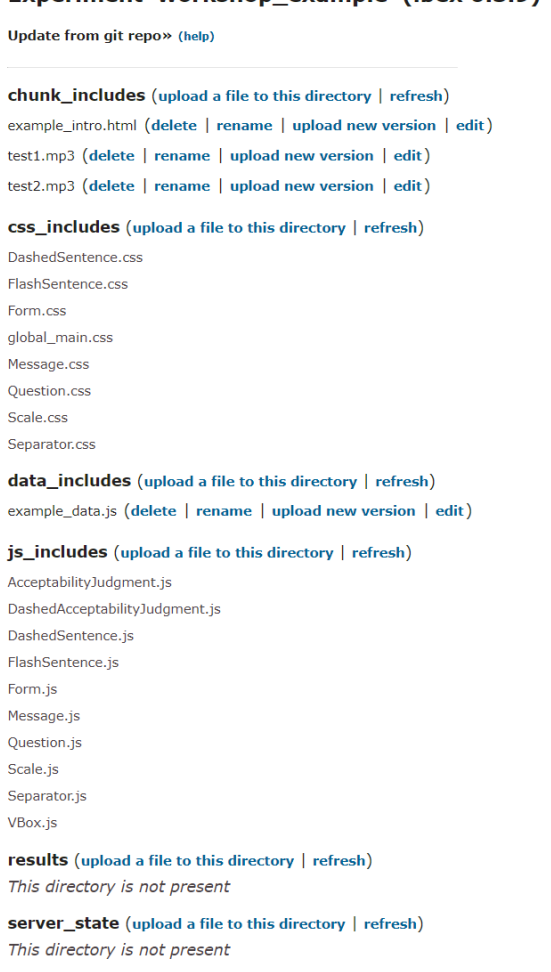


2. Scripting an experiment

The script

Only need to modify **one file**: *example_data.js* (can also be renamed later)

At creation, the default file looks like this:

```
var shuffleSequence = seq("intro", sepWith("sep", seq("practice", rshuffle("s1", "s2"))),
sepWith("sep", rshuffle("q1", "q2")));
var practiceItemTypes = ["practice"];

var defaults = [
    "Separator", {
        transfer: 1000,
        normalMessage: "Please wait for the next sentence.",
        errorMessage: "Wrong. Please wait for the next sentence."
    },
    "DashedSentence", {
        mode: "self-paced reading"
    },
    "AcceptabilityJudgment", {
        as: ["1", "2", "3", "4", "5", "6", "7"],
        presentAsScale: true,
        instructions: "Use number keys or click boxes to answer.",
        leftComment: "(Bad)", rightComment: "(Good)"
    },
```

The above script creates this self-paced reading experiment.

Writing your own script

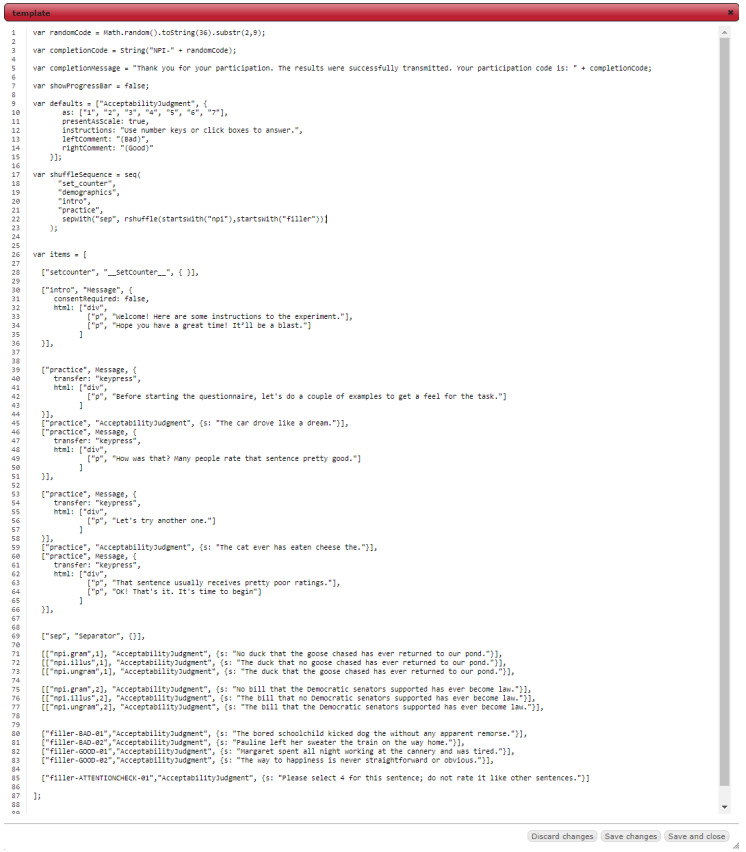
The *example_data.js* script works, but is not very friendly.

We'll use **our own** - **template file** - to demonstrate how the script works.

```
// Defaults and other settings //

//// Generates random number assigned to participants (Participant ID)
var randomCode = Math.random().toString(36).substr(2,9)
//// A message to show to participants at completion (useful for confirmation, raffle entry, etc.)
var completionMessage = "Thank you for your participation. Your participation code is: " +
randomCode

//// Show a progress bar at the top? (true/false)
var showProgressBar = false

//// Override default settings for controllers (parameters go inside the curly braces { })
var defaults = [
    "AcceptabilityJudgment", {
       as: ["1", "2", "3", "4", "5", "6", "7"],
       presentAsScale: true,
       instructions: "Use number keys or click boxes to answer.",
       leftComment: "(Bad)",
       rightComment: "(Good)"
```

The above script creates this acceptability rating experiment.

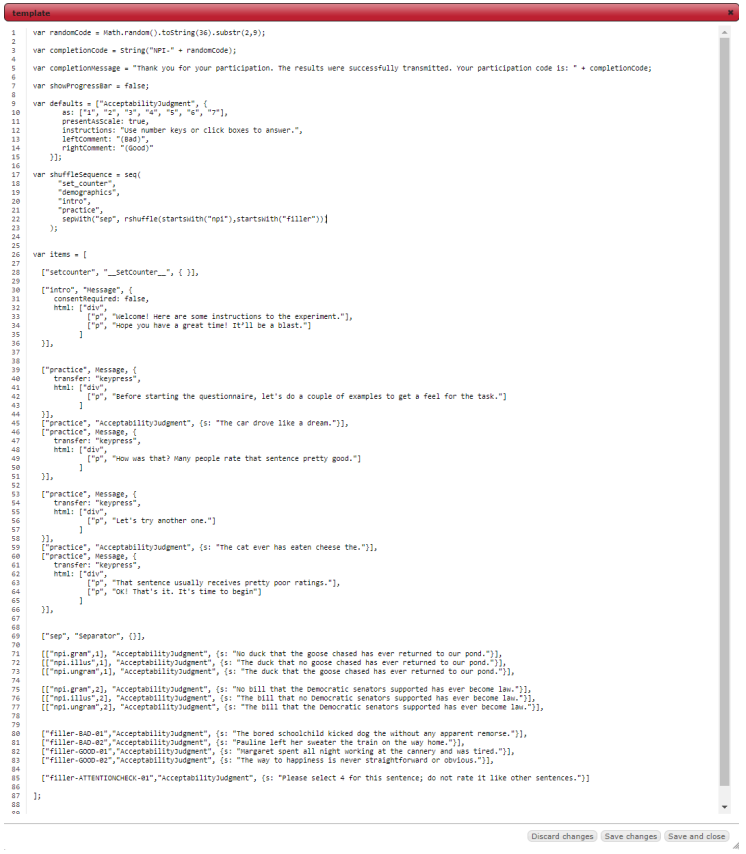
A simple layout



Editing the script

When you open the `.js` file in the `data_includes` section of your experiment on Ibex, it will open up a text editor.

A simple layout



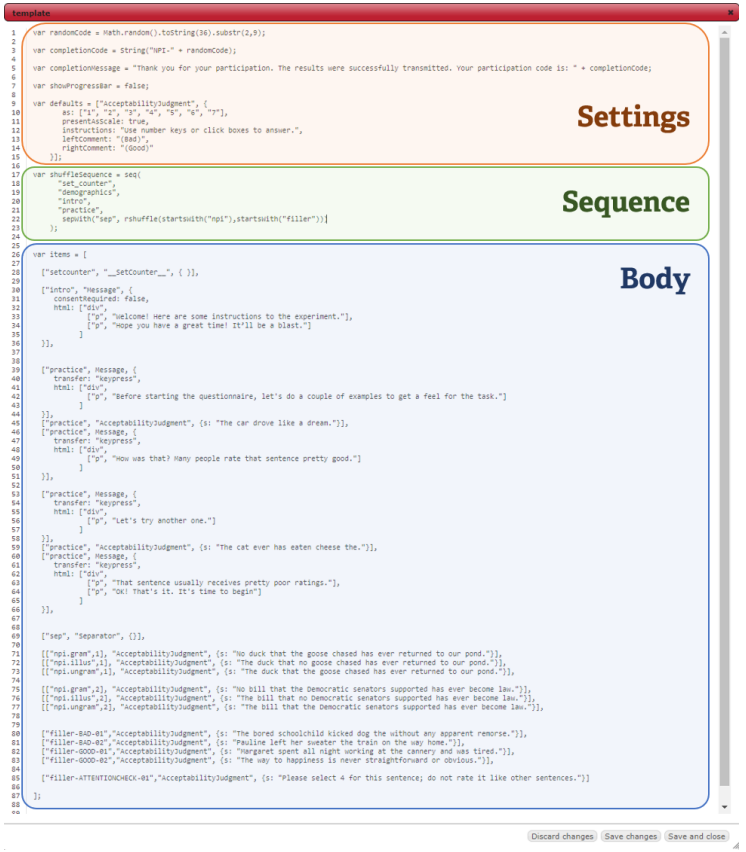
Editing the script

When you open the `.js` file in the `data_includes` section of your experiment on Ibex, it will open up a text editor.

Options for editing the file:

- Make changes directly on IBEX
- Download the file and open with an **editor** that supports **JavaScript** syntax checking (e.g., Atom)

A simple layout



Parts of the Script

Settings:

- Sets various options for the experiment

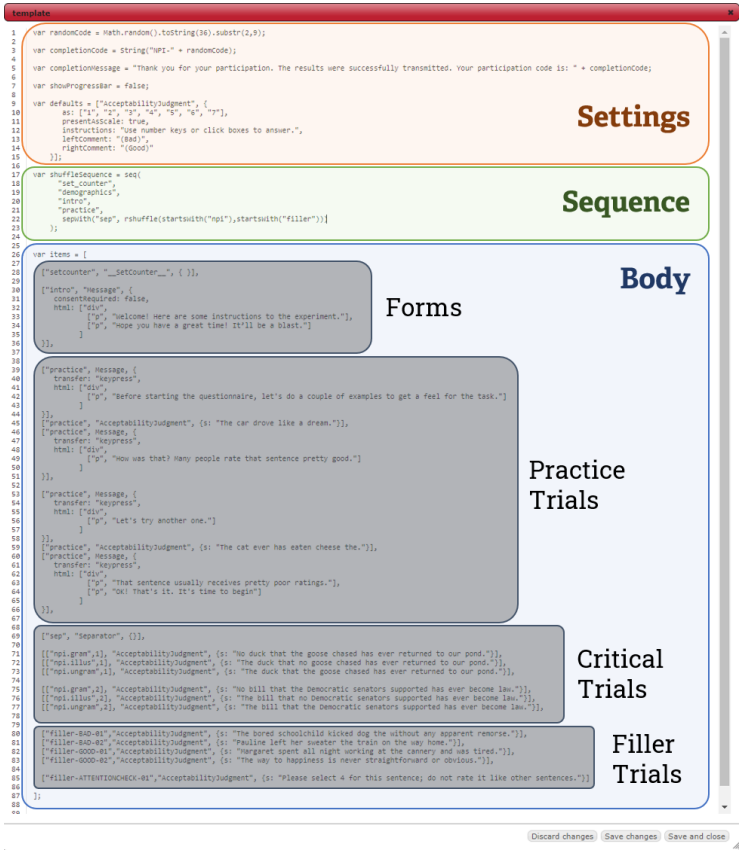
Sequence (`shuffleSequence`):

- Specifies the ordering of the different parts of the experiment

Body (`items`):

- Includes the actual material that will be shown to the participants

A simple layout



Body

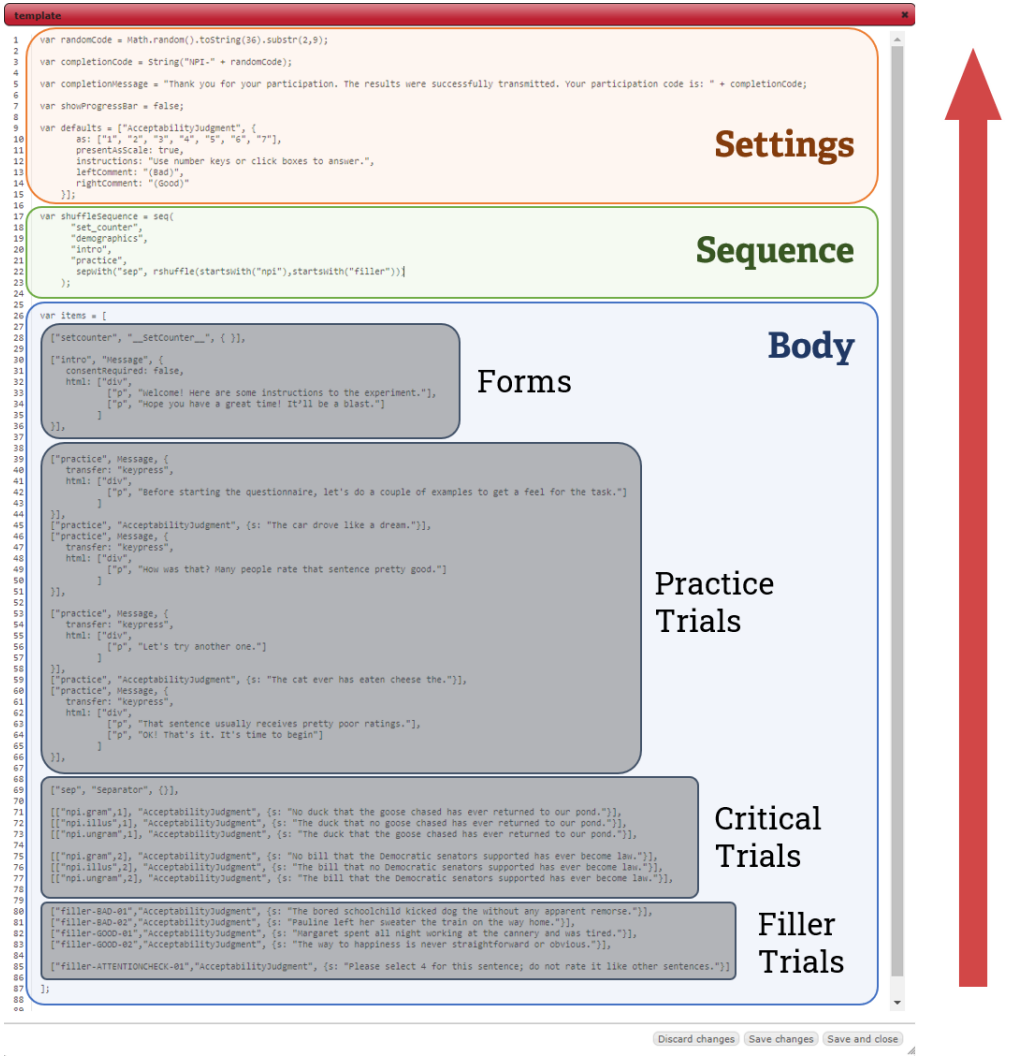
Forms

- Introduction page, consent form, directions, language background, demographic information, etc.

Trials

- All stimuli for the experiment
- *Practice*, *Critical*, *Filler*
- Can be accompanied by messages, questions, etc.

Walkthrough of the components



Our first experiment

Study: We are interested in how people recover from **garden-path sentences**.

"While Anna dressed the kitten paid attention."

... *[$_{VP}$ dressed the kitten], ...

... ✓[$_{VP}$ dressed], the kitten ...

Hypothesis: Verbs that are frequently **transitive** make recovery more difficult, compared to verbs that are frequently **intransitive**.

(transitive-biased) - "While Anna ***trained*** the kitten paid attention."

(intransitive-biased) - "While Anna ***dressed*** the kitten paid attention."

Prediction: Lower **acceptability ratings** in the transitive-biased condition (***gp.trans***) than in the intransitive-biased condition (***gp.intrans***).

Note: this is a *within-participant* design!

Trial Syntax

For each trial in our acceptability judgment experiment, we write this code:

[["*Trial name*", *Set #*], "*Trial Type*", {s: "*Sentence*"}]

This is a list (array) of three elements (clearer with spacing):

```
[
    ["Trial name", Set # ],
    "Trial Type",
    {s: "Sentence"}
]
```

```
[ ["Trial name", Set # ],
    "Trial Type",
    {s: "Sentence"} ]
```

We have one big bracket which contains **three elements**:

1. Another list, consisting of the *name of the trial* and *set number*
2. A string specifying the *type of the trial* (called **Controllers**)
3. A curly bracket (*braces*), which has "s" and the *sentence* separated by a colon

Translating the design to code

Example 1:

For the gp.trans condition, the first stimuli in our acceptability judgment experiment is the sentence "While Anna trained the kitten paid attention".

```
[
    [ "gp.trans", 1 ],
    "AcceptabilityJudgment",
    {s: "While Anna trained the kitten paid attention."}
]
```

Translating the design to code

Example 1:

For the **gp.trans condition**, the first stimuli in our acceptability judgment experiment is the sentence "While Anna trained the kitten paid attention".

```
[
    [ "gp.trans", 1 ],
    "AcceptabilityJudgment",
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Translating the design to code

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    [ "gp.trans", 1 ],
    "AcceptabilityJudgment",
    {s: "While Anna trained the kitten paid attention."}
]
```

Translating the design to code

Example 1:

For the **gp.trans condition**, the **first stimuli** in our **acceptability judgment experiment** is the **sentence** "While Anna trained the kitten paid attention".

```
[
    [ "gp.trans", 1 ],
    "AcceptabilityJudgment",
    {s: "While Anna trained the kitten paid attention."}
]
```

Translating the design to code

Example 1:

For the **gp.trans condition**, the **first stimuli** in our **acceptability judgment experiment** is the **sentence "While Anna trained the kitten paid attention"**.

```
[
    [ "gp.trans", 1 ],
    "AcceptabilityJudgment",
    {s: "While Anna trained the kitten paid attention."}
]
```

This can be put into a single line:

```
[["gp.trans",1], "AcceptabilityJudgment", {s: "While Anna trained the k
```

Translating the design to code

Example 2:

For the **gp.intrans condition**, the **first stimuli** in our **acceptability judgment experiment** is the **sentence "While Anna dressed the kitten paid attention"**.

```
[
    [ "gp.intrans", 1 ],
    "AcceptabilityJudgment",
    {s: "While Anna dressed the kitten paid attention."}
]
```

This can be put into a single line:

```
[["gp.intrans",1], "AcceptabilityJudgment", {s: "While Anna dressed the
```

Practice

Item set #2:

(transitive) - "Since Dave improved the department was satisfied."

(intransitive) - "Since Dave worried the counselor devised a plan."

```
<code here>
```

Hover for answer

Putting together the stimuli

Wrap in `var items = []` and separate by a **comma**:

```
var item = [

  //// Set #1
  [["gp.trans",1], "AcceptabilityJudgment", {s: "While Anna trained the kitten paid attention."}],
  [["gp.intrans",1], "AcceptabilityJudgment", {s: "While Anna dressed the kitten paid attention."}],

  //// Set #2
  [["gp.trans",2], "AcceptabilityJudgment", {s: "Since Dave improved the department was
satisfied."}],
  [["gp.intrans",2], "AcceptabilityJudgment", {s: "Since Dave worried the counselor devised a
plan."}]

]
```

Good scripting habits:

- Grouping item sets together and separating sets with new line
- Adding comments (starts with two or more slashes `//`)
- Saving often! (editing in IBEX not recommended)

Practice and Fillers

Practice Trials:

- Presented at the beginning, accompanied by instructions and feedback

Filler Trials:

- Mixed in with the critical trials

Both types of trials are invariant across conditions

This means that the first element of the big bracket can just be the *Trial Name*, without assigning it a *Set #*:

```
Practice    Filler-good    Filler-bad    Filler-catch
```

Practice #1: "The car drove like a dream"

```
["practice-1",
"AcceptabilityJudgment",
{s: "The car drove like a dream."}]
```

Practice and Fillers

Practice Trials:

- Presented at the beginning, accompanied by instructions and feedback

Filler Trials:

- Mixed in with the critical trials

Both types of trials are invariant across conditions

This means that the first element of the big bracket can just be the *Trial Name*, without assigning it a *Set #*:

```
Practice    Filler-good    Filler-bad    Filler-catch
```

Good Filler #1: "When Harry fell, the audience was shocked."

```
["filler-good-01",
"AcceptabilityJudgment",
{s: "When Harry fell, the audience was shocked."}]
```

Practice and Fillers

Practice Trials:

- Presented at the beginning, accompanied by instructions and feedback

Filler Trials:

- Mixed in with the critical trials

Both types of trials are invariant across conditions

This means that the first element of the big bracket can just be the *Trial Name*, without assigning it a *Set #*:

```
Practice    Filler-good    Filler-bad    Filler-catch
```

Bad Filler #1: "When Tyler sneezed the driver, he passed a tissue."

```
["filler-bad-01",
"AcceptabilityJudgment",
{s: "When Tyler sneezed the driver, he passed a tissue."}]
```

Practice and Fillers

Practice Trials:

- Presented at the beginning, accompanied by instructions and feedback

Filler Trials:

- Mixed in with the critical trials

Both types of trials are invariant across conditions

This means that the first element of the big bracket can just be the *Trial Name*, without assigning it a *Set #*:

```
Practice    Filler-good    Filler-bad    Filler-catch
```

Catch Filler #1: "Please select 4 for this sentence."

```
["filler-catch-01",
"AcceptabilityJudgment",
{s: "Please select 4 for this sentence."}]
```

Putting together the Body

```
var items = [

  //// Practice
  ["practice-1", "AcceptabilityJudgment", {s: "The car drove like a dream."}],

  // Critical Trials //

  //// Set #1
  [["gp.trans",1], "AcceptabilityJudgment", {s: "While Anna trained the kitten paid attention."}],
  [["gp.intrans",1], "AcceptabilityJudgment", {s: "While Anna dressed the kitten paid attention."}],

  //// Set #2
  [["gp.trans",2], "AcceptabilityJudgment", {s: "Since Dave improved the department was
satisfied."}],
  [["gp.intrans",2], "AcceptabilityJudgment", {s: "Since Dave worried the counselor devised a
plan."}],

  //// Fillers (Good)
  ["filler-good-01","AcceptabilityJudgment", {s: "When Harry fell, the audience was shocked."}],

  //// Fillers (Bad)
  ["filler-bad-01","AcceptabilityJudgment", {s: "When Tyler sneezed the driver, he passed a
tissue."}],

  //// Fillers (Catch)
  ["filler-catch-01", "AcceptabilityJudgment", {s: "Please select 4 for this sentence."}]
```

Important: The ordering of the trials here is just for human readability. We haven't yet told the program what order to present them in!

Defining the Sequence

```
var items = [

  //// Practice
  ["practice-1", "AcceptabilityJudgment",
{s: "The car drove like a dream."}],

  // Critical Trials //

  //// Set #1
  [["gp.trans",1],
"AcceptabilityJudgment", {s: "While Anna
trained the kitten paid attention."}],
  [["gp.intrans",1],
"AcceptabilityJudgment", {s: "While Anna
dressed the kitten paid attention."}],

  //// Set #2
  [["gp.trans",2],
"AcceptabilityJudgment", {s: "Since Dave
improved the department was satisfied."}],
  [["gp.intrans",2],
"AcceptabilityJudgment", {s: "Since Dave
worried the counselor devised a plan."}],

  //// Fillers (Good)
  ["filler-good-
01","AcceptabilityJudgment", {s: "When
Harry fell, the audience was shocked."}],
```

List the *names* of each trial in order:

```
"practice-1",
"gp.trans",
"gp.intrans",
"gp.trans",
"gp.intrans",
"filler-good-01",
"filler-bad-01",
"filler-catch-01"
```

Defining the Sequence

```
var items = [

  //// Practice
  ["practice-1", "AcceptabilityJudgment",
{s: "The car drove like a dream."}],

  // Critical Trials //

  //// Set #1
  [["gp.trans",1],
"AcceptabilityJudgment", {s: "While Anna
trained the kitten paid attention."}],
  [["gp.intrans",1],
"AcceptabilityJudgment", {s: "While Anna
dressed the kitten paid attention."}],

  //// Set #2
  [["gp.trans",2],
"AcceptabilityJudgment", {s: "Since Dave
improved the department was satisfied."}],
  [["gp.intrans",2],
"AcceptabilityJudgment", {s: "Since Dave
worried the counselor devised a plan."}],

  //// Fillers (Good)
  ["filler-good-
01","AcceptabilityJudgment", {s: "When
Harry fell, the audience was shocked."}],
```

Wrap them in `seq()`:

```
seq(
 "practice-1",
 "gp.trans",
 "gp.intrans",
 "gp.trans",
 "gp.intrans",
 "filler-good-01",
 "filler-bad-01",
 "filler-catch-01"
)
```

Defining the Sequence

```
var items = [

  //// Practice
  ["practice-1", "AcceptabilityJudgment",
{s: "The car drove like a dream."}],

  // Critical Trials //

  //// Set #1
  [["gp.trans",1],
"AcceptabilityJudgment", {s: "While Anna
trained the kitten paid attention."}],
  [["gp.intrans",1],
"AcceptabilityJudgment", {s: "While Anna
dressed the kitten paid attention."}],

  //// Set #2
  [["gp.trans",2],
"AcceptabilityJudgment", {s: "Since Dave
improved the department was satisfied."}],
  [["gp.intrans",2],
"AcceptabilityJudgment", {s: "Since Dave
worried the counselor devised a plan."}],

  //// Fillers (Good)
  ["filler-good-
01","AcceptabilityJudgment", {s: "When
Harry fell, the audience was shocked."}],
```

Assign to `shuffleSequence`:

```
var shuffleSequence = seq(
 "practice-1",
 "gp.trans",
 "gp.intrans",
 "gp.trans",
 "gp.intrans",
 "filler-good-01",
 "filler-bad-01",
 "filler-catch-01"
)
```

Defining the Sequence

```
var items = [

  //// Practice
  ["practice-1", "AcceptabilityJudgment",
{s: "The car drove like a dream."}],

  // Critical Trials //

  //// Set #1
  [["gp.trans",1],
"AcceptabilityJudgment", {s: "While Anna
trained the kitten paid attention."}],
  [["gp.intrans",1],
"AcceptabilityJudgment", {s: "While Anna
dressed the kitten paid attention."}],

  //// Set #2
  [["gp.trans",2],
"AcceptabilityJudgment", {s: "Since Dave
improved the department was satisfied."}],
  [["gp.intrans",2],
"AcceptabilityJudgment", {s: "Since Dave
worried the counselor devised a plan."}],

  //// Fillers (Good)
  ["filler-good-
01","AcceptabilityJudgment", {s: "When
Harry fell, the audience was shocked."}],
```

Assign to `shuffleSequence`:

```
var shuffleSequence = seq(
 "practice-1",
 "gp.trans",
 "gp.intrans",
 "gp.trans",
 "gp.intrans",
 "filler-good-01",
 "filler-bad-01",
 "filler-catch-01"
)
```

The `shuffleSequence` variable handles the *order of presentation* of the **experiment materials** that are stored inside the `items` variable.

Defining the Sequence

```
var items = [

  //// Practice
  ["practice-1", "AcceptabilityJudgment",
{s: "The car drove like a dream."}],

  // Critical Trials //

  //// Set #1
  [["gp.trans",1],
"AcceptabilityJudgment", {s: "While Anna
trained the kitten paid attention."}],
  [["gp.intrans",1],
"AcceptabilityJudgment", {s: "While Anna
dressed the kitten paid attention."}],

  //// Set #2
  [["gp.trans",2],
"AcceptabilityJudgment", {s: "Since Dave
improved the department was satisfied."}],
  [["gp.intrans",2],
"AcceptabilityJudgment", {s: "Since Dave
worried the counselor devised a plan."}],

  //// Fillers (Good)
  ["filler-good-
01","AcceptabilityJudgment", {s: "When
Harry fell, the audience was shocked."}],
```

Problems

```
var shuffleSequence = seq(
 "practice-1",
 "gp.trans",
 "gp.intrans",
 "gp.trans",
 "gp.intrans",
 "filler-good-01",
 "filler-bad-01",
 "filler-catch-01"
)
```

1. A lot of typing ("-02", "-03", ...)

Defining the Sequence

```
var items = [

  //// Practice
  ["practice-1", "AcceptabilityJudgment",
{s: "The car drove like a dream."}],

  // Critical Trials //

  //// Set #1
  [["gp.trans",1],
"AcceptabilityJudgment", {s: "While Anna
trained the kitten paid attention."}],
  [["gp.intrans",1],
"AcceptabilityJudgment", {s: "While Anna
dressed the kitten paid attention."}],

  //// Set #2
  [["gp.trans",2],
"AcceptabilityJudgment", {s: "Since Dave
improved the department was satisfied."}],
  [["gp.intrans",2],
"AcceptabilityJudgment", {s: "Since Dave
worried the counselor devised a plan."}],

  //// Fillers (Good)
  ["filler-good-
01","AcceptabilityJudgment", {s: "When
Harry fell, the audience was shocked."}],
```

Problems

```
var shuffleSequence = seq(
 "practice-1",
 "gp.trans",
 "gp.intrans",
 "gp.trans",
 "gp.intrans",
 "filler-good-01",
 "filler-bad-01",
 "filler-catch-01"
)
```

1. A lot of typing ("-02", "-03", ...)
2. Presentation order of some trials should be random

Defining the Sequence

```
var items = [

  //// Practice
  ["practice-1", "AcceptabilityJudgment",
{s: "The car drove like a dream."}],

  // Critical Trials //

  //// Set #1
  [["gp.trans",1],
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"AcceptabilityJudgment", {s: "Since Dave
improved the department was satisfied."}],
  [["gp.intrans",2],
"AcceptabilityJudgment", {s: "Since Dave
worried the counselor devised a plan."}],

  //// Fillers (Good)
  ["filler-good-
01","AcceptabilityJudgment", {s: "When
Harry fell, the audience was shocked."}],
```

Problems

```
var shuffleSequence = seq(
 "practice-1",
 "gp.trans",
 "gp.intrans",
 "gp.trans",
 "gp.intrans",
 "filler-good-01",
 "filler-bad-01",
 "filler-catch-01"
)
```

1. A lot of typing ("-02", "-03", ...)
2. Presentation order of some trials should be random
3. How do we counterbalance critical trials?

1. Sequence: multiple selection

To save us from writing repetitive code, we use `startsWith()`

```
var shuffleSequence = seq(
 "practice-1",
 "gp.trans",
 "gp.intrans",
 "gp.trans",
 "gp.intrans",
 "filler-good-01",
 "filler-bad-01",
 "filler-catch-01"
)
```

```
var shuffleSequence = seq(
 startsWith("practice"),
 startsWith("gp")
 startsWith("filler")
)
```

The function `startsWith()` matches all names that starts with the given string.

2. Sequence: randomization

To mix critical and filler trials in random order, we use `rshuffle()`

```
var shuffleSequence = seq(
 startsWith("practice"),
 startsWith("gp")
 startsWith("filler")
)
```

```
var shuffleSequence = seq(
 startsWith("practice"),
 rshuffle(
    startsWith("gp"),
    startsWith("filler")
  )
)
```

By wrapping both the critical trials (*gp...*) and the filler trials (*filler...*) in `rshuffle()`, they are mixed together and presented in random order.

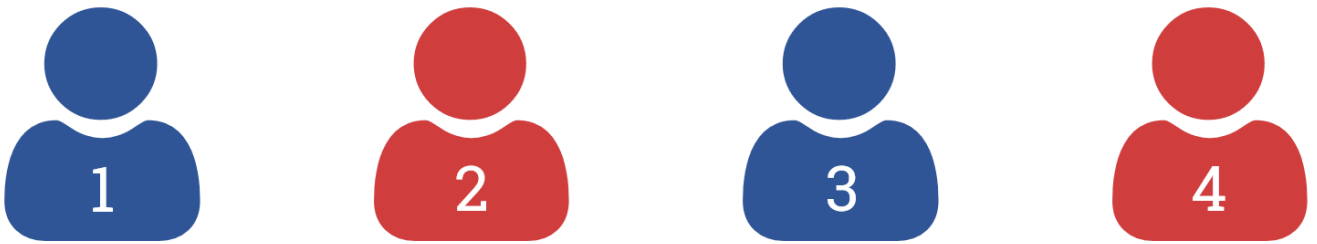
We can also write this out more compactly:

```
var shuffleSequence = seq(
 startsWith("practice"),
 rshuffle(startsWith("gp"), startsWith("filler"))
)
```

3. Sequence: counterbalancing

The **set number** in our critical trials automatically handles **counterbalancing**:

[["gp.trans", **1**], ...], [["gp.intrans", **1**], ...], [["gp.trans", **2**], ...], [["gp.intrans", **2**], ...]



We just need to add a **counter** inside `items` to track group assignment:

```
["setcounter", "__SetCounter__", { }]
```

3. Sequence: counterbalancing

To use the counter, you need to modify both `items` and `shuffleSequence`:

```
var items = [
  ...
  ["setcounter", "__SetCounter__", { }], // The counter is defined
  ...
]

var shuffleSequence = seq(
  "setcounter", // The counter is incremented at the start
  ...
)
```

Note: Sometimes you want to place "setcounter" in the *middle* of the experiment

```
var shuffleSequence = seq(
  "intro"
  "consent",
  "setcounter",
  ...
)
```

Body and Sequence together

```
// Presentation Order //
var shuffleSequence = seq(
  "setcounter",
  startsWith("practice"),
  rshuffle(startsWith("gp"), startsWith("filler"))
)

// Experiment Materials //
var items = [

  //// Counter
  ["setcounter", "__SetCounter__", { }],

  //// Practice
  ["practice-1", "AcceptabilityJudgment", {s: "The car drove like a dream."}],

  // Critical Trials //

  //// Set #1
  [["gp.trans",1], "AcceptabilityJudgment", {s: "While Anna trained the kitten paid attention."}],
  [["gp.intrans",1], "AcceptabilityJudgment", {s: "While Anna dressed the kitten paid attention."}],

  //// Set #2
  [["gp.trans",2], "AcceptabilityJudgment", {s: "Since Dave improved the department was
satisfied."}],
  [["gp.intrans",2], "AcceptabilityJudgment", {s: "Since Dave worried the counselor devised a
```

Just need one more step: **Settings**

Settings (Basic)

Consist of miscellaneous options that we can put at the top of the script.

At the very least, we want to do two things:

1. Generate unique **participant IDs**
2. Specify the parameters for the **method design**

Settings (Basic)

Consist of miscellaneous options that we can put at the top of the script.

At the very least, we want to do two things:

1. Generate unique **participant IDs** (`randomCode`)
2. Specify the parameters for the **method design** (`defaults`)

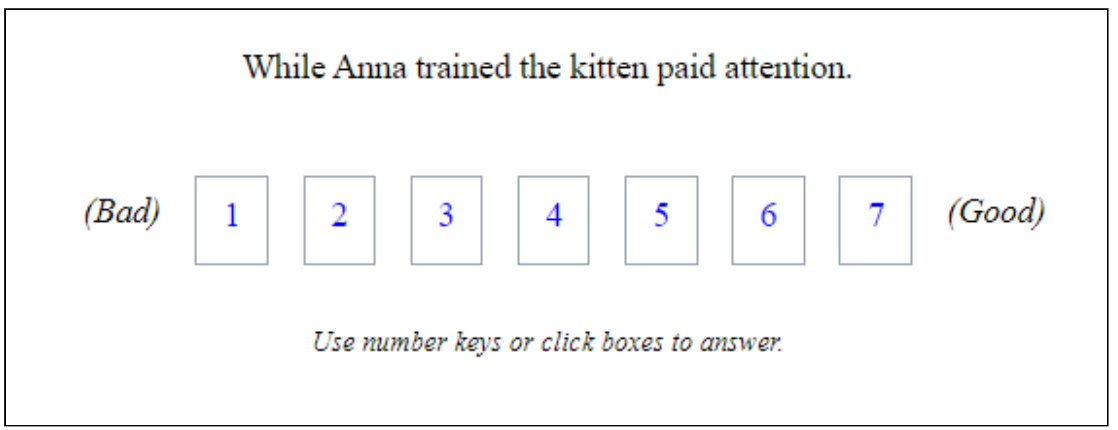
```
// Defaults and other settings //

//// Generates random number assigned to participants (Participant ID)
var randomCode = Math.random().toString(36).substr(2,9)

//// Override default settings for controllers (parameters go inside the curly braces { })
var defaults = [
    "AcceptabilityJudgment", {
       as: ["1", "2", "3", "4", "5", "6", "7"],
       presentAsScale: true,
       instructions: "Use number keys or click boxes to answer.",
       leftComment: "(Bad)",
       rightComment: "(Good)"
    }]
```

More details in the **AcceptabilityJudgment** section of the documentation.

The `defaults` variable

The specifications in `defaults` set the design of the trials:

```
var defaults = [
    "AcceptabilityJudgment", {
       as: ["1", "2", "3", "4", "5", "6", "7"],
       presentAsScale: true,
       instructions: "Use number keys or click boxes to answer.",
       leftComment: "(Bad)",
       rightComment: "(Good)"
    }]
```



Another `defaults` example

Suppose you'd like to show participants *multiple sentences* but have them only rate the acceptability of **one** of the sentences.

Code Output

```
var defaults = [
    "AcceptabilityJudgment", {
        ...
         instructions: "Rate how natural Speaker B's response sounds.",
        ...
    }]
```

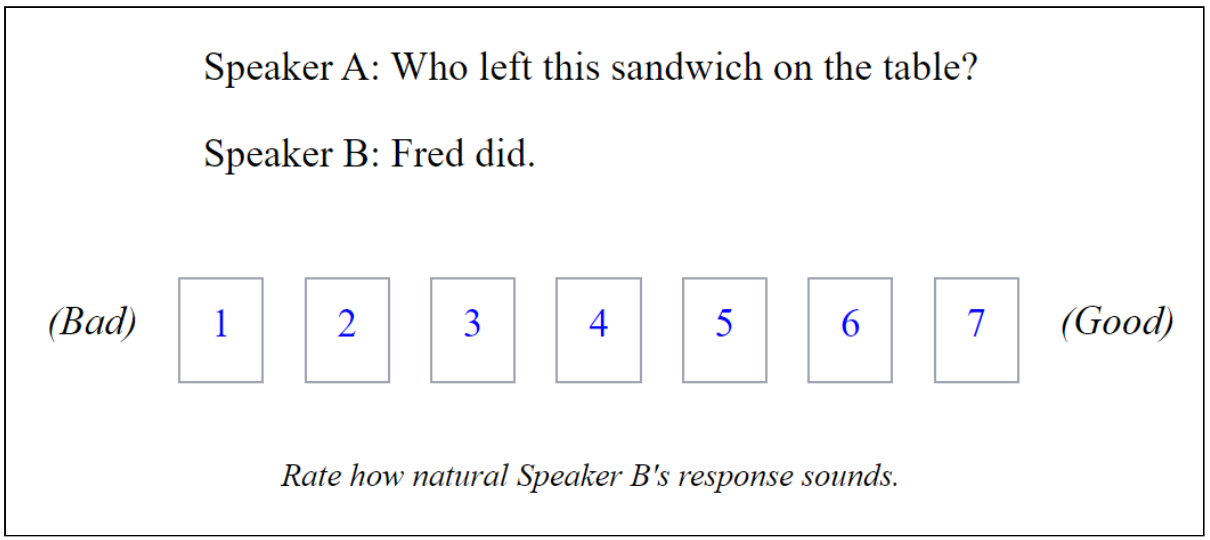
```
[["ConditionA", 1],
 "AcceptabilityJudgment",
 {s: ["div",
     ["p", "Speaker A: Who left this sandwich on the table?"]
     ["p", "Speaker B: Fred did."]
 ]}]
```

Note: You can show multiple lines of text using **html** tags like "p" and "div" - more on that later

Another `defaults` example

Suppose you'd like to show participants *multiple sentences* but have them only rate the acceptability of **one** of the sentences.

Code | Output



Settings (Miscellaneous)

You can also change other options, such as showing a message at the end:

```
var completionMessage
```

```
//// A message to show to participants at completion (useful for confirr
var completionMessage = "Thank you for your participation. Your particip
```

And whether to show a progress bar:

```
var showProgressBar
```

```
//// Show a progress bar at the top? (true/false)
var showProgressBar = false
```

You can learn more about these various elements in the **Miscellaneous options** section of the documentation.

A minimal experiment

We now have a minimally working experiment!

```
// Defaults and other settings //

//// Generates random number assigned to participants (Participant ID)
var randomCode = Math.random().toString(36).substr(2,9)
//// A message to show to participants at completion (useful for confirmation, raffle entry, etc.)
var completionMessage = "Thank you for your participation. Your participation code is: " +
randomCode

//// Show a progress bar at the top? (true/false)
var showProgressBar = false

//// Override default settings for controllers (parameters go inside the curly braces { })
var defaults = [
    "AcceptabilityJudgment", {
       as: ["1", "2", "3", "4", "5", "6", "7"],
       presentAsScale: true,
       instructions: "Use number keys or click boxes to answer.",
       leftComment: "(Bad)",
       rightComment: "(Good)"
    }]


// Presentation Order //

var shuffleSequence = seq(
  "setcounter",
```

Interim Summary #1

What we've covered:

- We use a special syntax to create stimuli
- We store all the materials for our experiment inside `items`
- We specify the order of presentation inside `shuffleSequence`
- We set various options at the top of the script, such as defaults for the experiment *method* and the assignment of *participant ID*

A few more things to know:

- How can we add *plain text*?
  - Introduction page, consent form, directions, etc.
- How can we extend this workflow for *other experimental designs*?
  - Self-paced reading, comprehension tasks, etc.

The "Message" controller

The **"Message"** controller shows text on a new page.

It is a list of 3 elements, similar to the "AcceptabilityJudgement" items:

["*Trial name*", "Message", {html: *text*}]

- ***Trial name*** is used to reference the trial in sequencing, as seen earlier
- **"Message"** tells IBEX that this trial just shows text on a new screen
- Inside of the curly braces **{}** we can add text in the **html** parameter:

```
["intro", "Message", {html: ["p", "Welcome to the experiment!"]}]
```

Notes on **html**:

The code `["p", "<your text here>"]` prints a single paragraph of text.

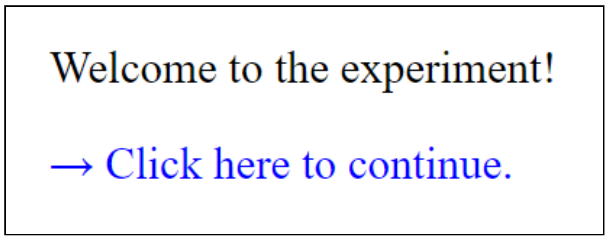
The "p" is called an **HTML tag** and there are many others (most common: "div", "strong", "em"), but usually these don't get very complicated.

Message examples

1-paragraph | n-paragraphs | consent | keypress | separator

A message composed of a single paragraph:

```
["intro", "Message", {html: ["p", "Welcome to the experiment!"]}]
```

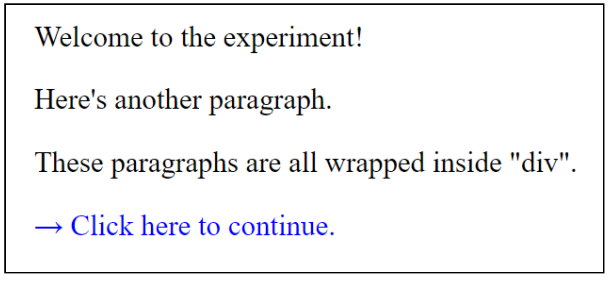


Message examples

1-paragraph | **n-paragraphs** | consent | keypress | separator

A message composed of multiple paragraphs must be combined inside a "div":

```
["intro", "Message", {html:
    ["div",
     ["p", "Welcome to the experiment!"],
     ["p", "Here's another paragraph."],
     ["p", "These paragraphs are all wrapped inside \"div\"."]
    ]
}]
```



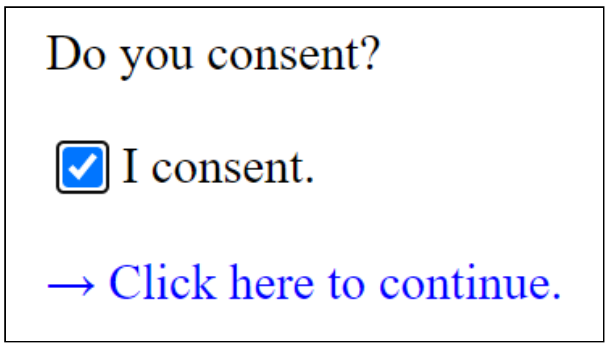
Note: You can **escape** special characters like quotes " with a backslash \

Message examples

1-paragraph | n-paragraphs | consent | keypress | separator

Ask for consent with a set of `consent...` parameters

```
["consent", "Message", {
  html: ["p", "Do you consent?"],
   consentRequired: true,
   consentMessage: "I consent."
}]
```



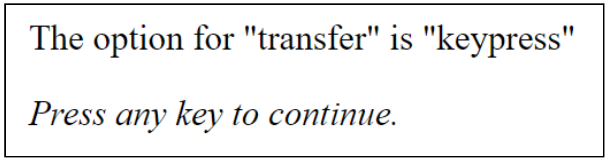
Message examples

1-paragraph | n-paragraphs | consent | **keypress** | separator

Use the `transfer` argument to specify how the participant can move on.

Setting `transfer` to `"keypress"` removes the default "**Click here to continue.**" message and allows participants to proceed with the press of any key.

```
["move_on", "Message", {
  html: ["div",
          ["p", "The option for \"transfer\" is \"keypress\""],
          ["em", "Press any key to continue."]
        ],
  transfer: "keypress"
}]
```

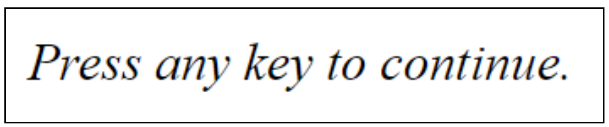


Message examples

1-paragraph | n-paragraphs | consent | keypress | **separator**

You might want to insert a page that separates the trials:

```
["sep", "Message", {
  html: ["em", "Press any key to continue."],
  transfer: "keypress"
}]
```



You can do so using `sepWith()` in `shuffleSequence`:

```
var shuffleSequence = seq(
  "practice",
   sepWith("sep", rshuffle(startsWith("gp"), startsWith("filler")))
)
```

Putting everything together

Here's a complete experiment with several **Message** controllers added.

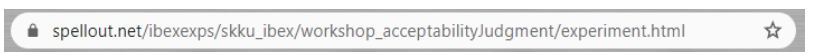
```
// Defaults and other settings //

//// Generates random number assigned to participants (Participant ID)
var randomCode = Math.random().toString(36).substr(2,9)
//// A message to show to participants at completion (useful for confirmation, raffle entry, etc.)
var completionMessage = "Thank you for your participation. Your participation code is: " +
randomCode

//// Show a progress bar at the top? (true/false)
var showProgressBar = false

//// Override default settings for controllers (parameters go inside the curly braces { })
var defaults = [
    "AcceptabilityJudgment", {
       as: ["1", "2", "3", "4", "5", "6", "7"],
       presentAsScale: true,
       instructions: "Use number keys or click boxes to answer.",
       leftComment: "(Bad)",
       rightComment: "(Good)"
    }]


// Presentation Order //

var shuffleSequence = seq(
  "intro",
  "consent",
```

Getting the experiment up

So we have a new script, but how do we host the experiment?

1. Go to the IBEX website and log in.
2. Click on your experiment (or create one if you haven't already).
3. Click **edit** next to the *example_data.js* file in the **data_includes** section.
4. Delete its contents and copy paste your new code.
5. Click on the link at the top of the page.

The URL shown in your browser is the link to your experiment!



https://spellout.net/ibexexps/skku_ibex/workshop_minimal/experiment.html

A different experiment

Suppose that after a *pilot experiment*, we find acceptability judgments to be inappropriate for answering our research question.

We want a *finer-grained measure* of recovery difficulty, so we'd like to change the experiment to **self-paced reading** and look at differences in *reading time*.

Given our existing template, we take the following steps:

1. Go to the documentation and find a Controller for self-paced reading.
2. Specify the design of that controller in the `defaults` variable.
3. Change our trials in `items` from "**acceptabilityJudgment**" to that Controller.
4. Make changes to the text of the "**Messages**" items (e.g., directions).

Let's go look at the documentation!

"DashedSentence" Controller

The **"DashedSentence"** Controller creates self-paced reading trials.

We first re-write `defaults` to specify appropriate settings for **"DashedSentence"**.

```
var defaults = [
    "DashedSentence", {
       mode: "self-paced reading",
       display: "dashed"
    }]
```

Then, we replace **"acceptabilityJudgment"** with **"DashedSentence"** in `items`.

```
var items = [
  ...
  [["gp.trans",1], "DashedSentence", {s: "While Anna trained the kitten
  [["gp.intrans",1], "DashedSentence", {s: "While Anna dressed the kitte
  [["gp.trans",2], "DashedSentence", {s: "Since Dave improved the depart
  [["gp.intrans",2], "DashedSentence", {s: "Since Dave worried the couns
  ...
]
```

Our second experiment

Finally, after re-writing some of the "**Message**" items, we have a new experiment!

```
// Defaults and other settings //

//// Generates random number assigned to participants (Participant ID)
var randomCode = Math.random().toString(36).substr(2,9)
//// A message to show to participants at completion (useful for confirmation, raffle entry, etc.)
var completionMessage = "Thank you for your participation. Your participation code is: " +
randomCode

//// Show a progress bar at the top? (true/false)
var showProgressBar = false

//// Override default settings for controllers (parameters go inside the curly braces { })
var defaults = [
    "DashedSentence", {
       mode: "self-paced reading",
       display: "dashed"
    }]


// Presentation Order //

var shuffleSequence = seq(
  "intro",
  "consent",
  "directions",
  startsWith("practice"),
  "setcounter",
```

Question and Form Controllers

Yes/No | Forced-Choice-1 | Forced-Choice-2 | Free-Response

You can use the **Question** controller to ask **Yes/No** comprehension questions:

```
[["YesNo_example",1],
 "Question",
 {q: "Was the kitten trained?", as: ["Yes", "No"]}]
```

Was the kitten trained?

1. Yes

2. No

Question and Form Controllers

Yes/No | **Forced-Choice-1** | Forced-Choice-2 | Free-Response

The **as** parameter sets the **answer choices** presented to participants.

```
[["FC1_example",1], "Question", {
  instructions: "Choose the more natural sentence.",
   as: ["Who did you see that ate bread?",
        "What did you see the girl who ate?"]}]
```

1. Who did you see that ate bread?

2. What did you see the girl who ate?

Choose the more natural sentence.

Question and Form Controllers

Yes/No | Forced-Choice-1 | **Forced-Choice-2** | Free-Response

You can ask for **continuations** by modifying the **q** parameter.

```
[["FC2_example",1], "Question", {
   q: "While Anna dressed the baby ______",
  instructions: "Choose the more natural continuation.",
  as: ["started to cry.", "he started to cry."]}]
```

While Anna dressed the baby _____

1. started to cry.

2. he started to cry.

Choose the more natural continuation for this sentence.

Question and Form Controllers

Yes/No | Forced-Choice-1 | Forced-Choice-2 | **Free-Response**

Use **Form** controller with the **"textarea"** HTML tag to collect a **free response**:

```
[["FR_example",1],
 "Form", {html: ["div",
   ["em", "Fill out a continuation for the sentence fragment:"],
   ["p", "While Anna dressed the baby ______"],
   ["textarea"]
]}]
```

Fill out a continuation for the following sentence fragment:

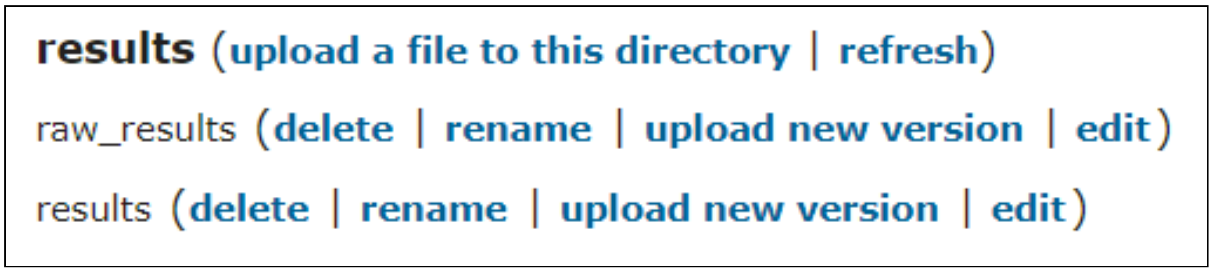
While Anna dressed the baby _____

→ Click here to continue

3. Analysis of the results

Where to find the data

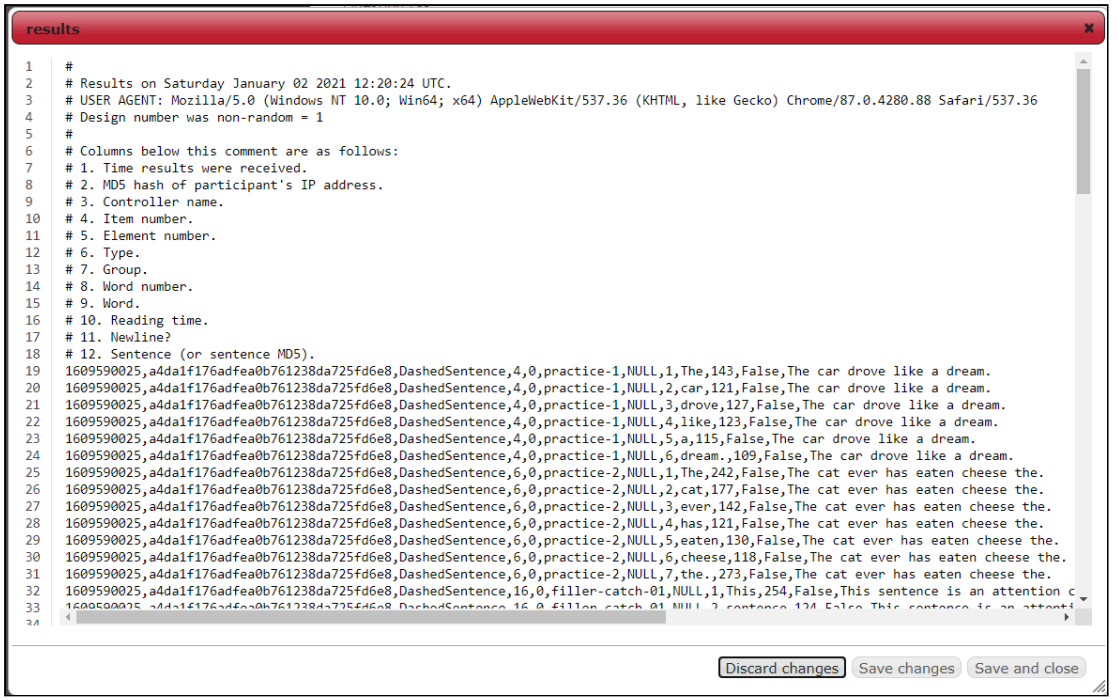
The data collected in the experiment can be found on the experiment page, under the **results** section.



The section comprises of two files, of which *results* is the better formatted one.

The *results* file

results is a **csv** file (**c**omma **s**eparated **v**alues), meaning that each line contains a set of values that are separated by a comma.



The lines that start with a pound symbol "#" are **comments** that include *metadata*.

They tell us what **variables** each comma-separated values correspond to.

The variables

All IBEX experiments return these **7** variables:

1. **Time**
2. **Participant ID**
3. **Controller Name**
4. **Item number**
5. **Element number**
6. **Type**
7. **Group**

The variables

Generally, we only care about **4** of these:

1. Time
2. **Participant ID**: A unique ID for each participant.
3. **Controller Name**: The controller that the values are from.
4. Item number
5. Element number
6. **Type**: The name of the trial.
7. **Group**: The item group number.

The last two variables uniquely identify each trial created in `items`:

[["*Type*", *Group*], "*Trial Type*", {s: "*Sentence*"}]

[["gp.trans", 1], "DashedSentence", {s: "..."}]

The variables

Depending on the experiment, IBEX returns other variables specific to the design.

For self-paced reading with **"DashedSentence"**, we get **5** more variables:

1. **Word number** - The index of the word in the sentence.
2. **Word** - The text of that word.
3. **Reading time** - Reading time for that word.
4. **Newline?** - 0 or 1 indicating whether there was a line break.
5. **Sentence** - The text of the sentence.

These are also outlined in the documentation for **"DashedSentence"**, so you know what variables to expect beforehand.

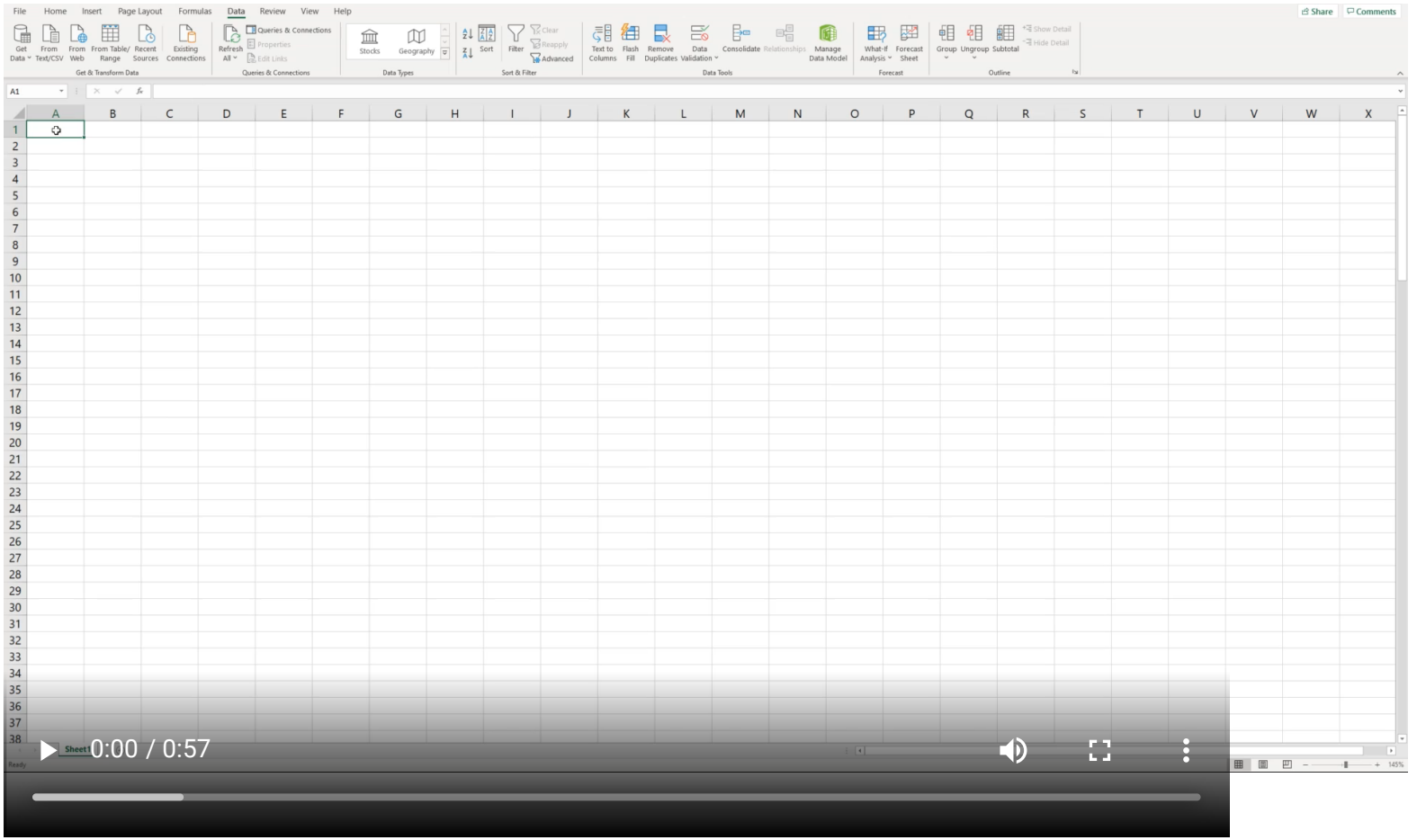
For an actual analysis of the results, we need the results to be imported somewhere as a **data frame** (where every value is a cell and each variable forms a column).

Importing - Excel

Steps for importing the data into Excel:

1. Copy the text of the *results* file from IBEX
2. Paste into the first column of an Excel spreadsheet
3. Highlight that column and click **Data** tab -> **Filter**
4. Click on the dropdown arrow that appears at the top cell
5. Click **Text Filters** -> **Begins With...** and type in "#"
6. Go to **Home** tab -> **Find & Select**, check "Visible cells only", and click OK
7. Right click on any part of the sheet and select **Delete Row**
8. Click the first column again and go to **Data** tab -> **Text to Columns**
9. Check "Delimited", "Comma", then "General" for each prompt
10. Add an empty row at the top and manually type in the column names from the comments of the original *results* file

Importing - Excel



Complex results

Some Controllers return more than 1 line of results, making thing complicated.

For example, each **AcceptabilityJudgment** trial adds two lines to *results*:

results

```
# The lines below this comment are in groups of 2.
# The formats of the lines in each of these groups are as follows:
#
# Line 1:
#     Col. 1: Time results were received.
#     Col. 2: MD5 hash of participant's IP address.
#     Col. 3: Controller name.
#     Col. 4: Item number.
#     Col. 5: Element number.
#     Col. 6: Type.
#     Col. 7: Group.
#     Col. 8: Sentence (or sentence MD5).
# Line 2:
#     Col. 1: Time results were received.
#     Col. 2: MD5 hash of participant's IP address.
#     Col. 3: Controller name.
#     Col. 4: Item number.
#     Col. 5: Element number.
#     Col. 6: Type.
#     Col. 7: Group.
#     Col. 8: Question (NULL if none).
#     Col. 9: Answer.
#     Col. 10: Whether or not answer was correct (NULL if N/A).
#     Col. 11: Time taken to answer.
1609648766,a4da1f176adfea0b761238da725fd6e8,AcceptabilityJudgment,4,0,practice-1,NULL,The car drove like a dream.
1609648766,a4da1f176adfea0b761238da725fd6e8,AcceptabilityJudgment,4,0,practice-1,NULL,NULL,5,NULL,1920
1609648766,a4da1f176adfea0b761238da725fd6e8,AcceptabilityJudgment,6,0,practice-2,NULL,The cat ever has eaten cheese the.
1609648766,a4da1f176adfea0b761238da725fd6e8,AcceptabilityJudgment,6,0,practice-2,NULL,NULL,4,NULL,513
1609648766,a4da1f176adfea0b761238da725fd6e8,AcceptabilityJudgment,14,0,filler-good-01,NULL,When Harry fell%2C the audience was shocked.
1609648766,a4da1f176adfea0b761238da725fd6e8,AcceptabilityJudgment,14,0,filler-good-01,NULL,NULL,4,NULL,252
1609648766,a4da1f176adfea0b761238da725fd6e8,AcceptabilityJudgment,10,0,gp.trans,1,While Anna trained the kitten paid attention.
1609648766,a4da1f176adfea0b761238da725fd6e8,AcceptabilityJudgment,10,0,gp.trans,1,NULL,4,NULL,272
1609648766,a4da1f176adfea0b761238da725fd6e8,AcceptabilityJudgment,15,0,filler-bad-01,NULL,When Tyler sneezed the driver%2C he passed a tissue.
1609648766,a4da1f176adfea0b761238da725fd6e8,AcceptabilityJudgment,15,0,filler-bad-01,NULL,NULL,4,NULL,284
1609648766,a4da1f176adfea0b761238da725fd6e8,AcceptabilityJudgment,13,0,gp.intrans,2,Since Dave worried the counselor devised a plan.
1609648766,a4da1f176adfea0b761238da725fd6e8,AcceptabilityJudgment,13,0,gp.intrans,2,NULL,4,NULL,306
1609648766,a4da1f176adfea0b761238da725fd6e8,AcceptabilityJudgment,16,0,filler-catch-01,NULL,Please select 4 for this sentence.
1609648766,a4da1f176adfea0b761238da725fd6e8,AcceptabilityJudgment,16,0,filler-catch-01,NULL,NULL,4,NULL,326
```

In cases like these, using a **processing script (R/Python)** is recommended

Importing - R

Steps for importing into R:

1. Download the *results* file from IBEX
2. Open it with the `read_ibex()` function from this read_ibex.R script

DashedSentence AcceptabilityJudgment

```
source("read_ibex.R")
results <- read_ibex("SPR_results.txt")
```

```
##    Controller name          Type Group Word number    Word Reading time
## 92  DashedSentence    gp.intrans     2           8   plan.          261
## 75  DashedSentence      gp.trans     1           5  kitten          277
## 95  DashedSentence filler-bad-01  NULL           3 sneezed          339
##                              Sentence (or sentence MD5)
## 92     Since Dave worried the counselor devised a plan.
## 75        While Anna trained the kitten paid attention.
## 95 When Tyler sneezed the driver%2C he passed a tissue.
```

Importing - R

Steps for importing into R:

1. Download the *results* file from IBEX
2. Open it with the `read_ibex()` function from this read_ibex.R script

DashedSentence AcceptabilityJudgment

```
source("read_ibex.R")
results <- read_ibex("Acceptability_results.txt")
```

```
##          Controller name            Type Group
## 16 AcceptabilityJudgment      gp.intrans     2
## 5  AcceptabilityJudgment filler-catch-01  NULL
## 2  AcceptabilityJudgment      gp.intrans     2
##                          Sentence (or sentence MD5) Answer
## 16 Since Dave worried the counselor devised a plan.      7
## 5                Please select 4 for this sentence.      4
## 2  Since Dave worried the counselor devised a plan.      4
```

Break

Exercise

Task

The experiment script incomplete.js has some missing pieces.

```
//////////////////
//// Exercise ////
//
// There are a total of EIGHT tasks for you to complete in this script.
// The instructions for each task are written out as comments.
// Some parts of the task are completed for you and your job is to fill in the blanks ______.
//
// Make sure to consult the IBEX manual! -
https://github.com/addrummond/ibex/blob/master/docs/manual.md
//
//////////////////


// Task #1: Send a completion message that says "Thank you for your participation!"
var ______ = "______"

var showProgressBar = false

var defaults = [
    "AcceptabilityJudgment", {
       as: ______, // Task #2: Make the acceptability judgment scale from 1-5
       presentAsScale: true,
       instructions: "Use number keys or click boxes to answer.",
       leftComment: "(Bad)",
       rightComment: "(Good)"
    }]
```

Task

Directions:

1. Download incomplete.js
2. Create a new experiment on your ibex account called "WorkshopExercise" and replace the contents of *example_data.js* in the **data_includes** section with *incomplete.js*.
3. Click **edit** and follow the directions in the script to fill in the blanks.
4. Complete as many of tasks as possible (**8 total**).

If you finish, save the edits and click on your experiment link at the top of the page. Check to see that your experiment looks similar to this complete version.

Make sure to use the IBEX documentation!

https://github.com/addrummond/ibex/blob/master/docs/manual.md

Solutions

Live demo on Atom

This slide will be updated with solutions

Resources

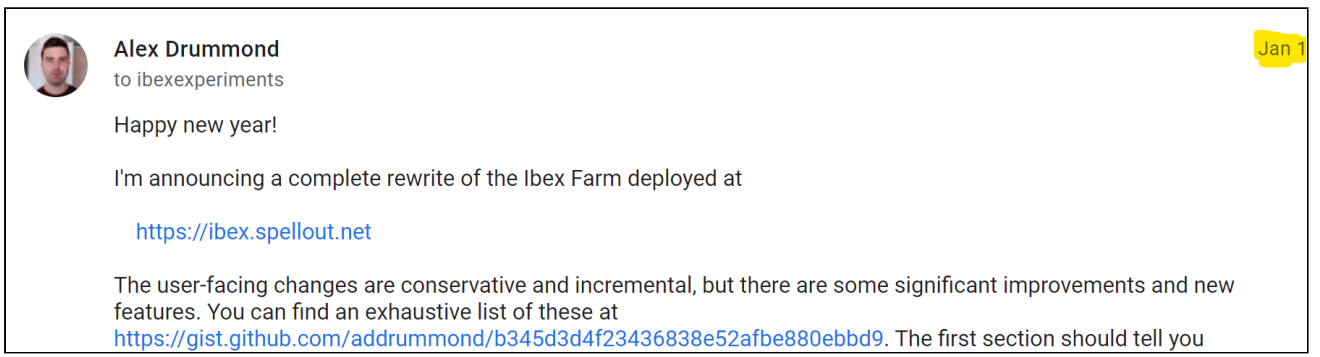
All materials from this presentation can be found on github.

More resources from the community:

- The official IBEX documentation.
- The official IBEX google group to ask questions.

UPDATE (01/01/2021)

There is a **new version of IBEX** at a different link: https://ibex.spellout.net



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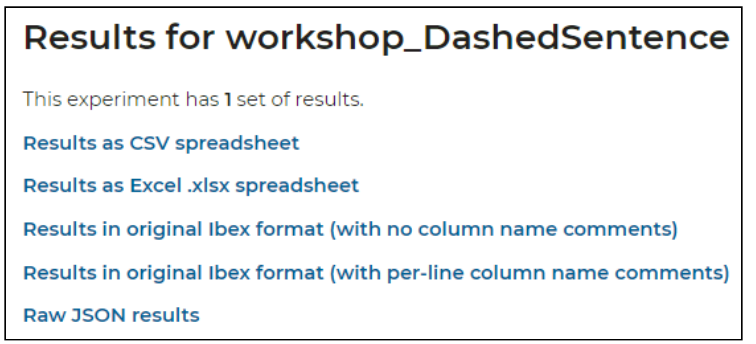
- The official google group to ask questions.

UPDATE (01/01/2021)

New feature: results can be downloaded as a spreadsheet (full list of changes).



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Other platforms

- PCIbex (Penn Controller for IBEX) Link
- PsychoPy Link
- _magpie (minimal architecture for the generation of portable interactive experiments) Link

Resources

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More resources from the community:

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- The official google group to ask questions.

Platforms to recruit participants for your IBEX experiment

- MTurk (Amazon Mechanical Turk) Link
- Prolific Link