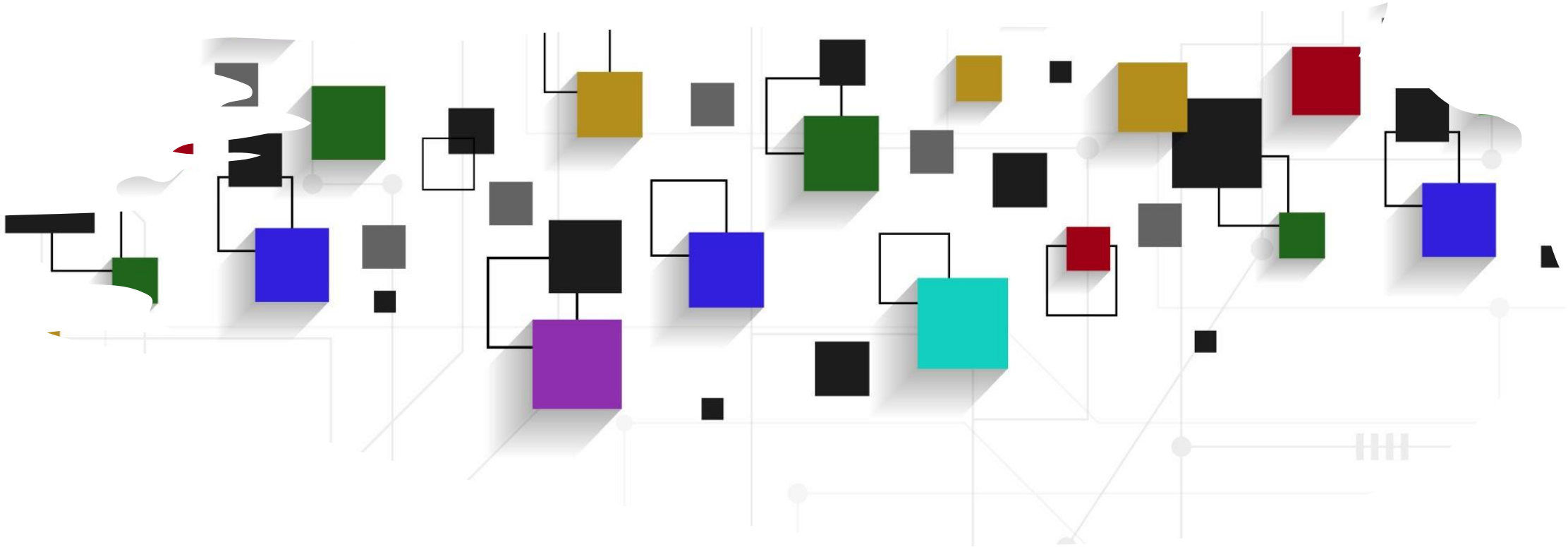


CogLab: recording data

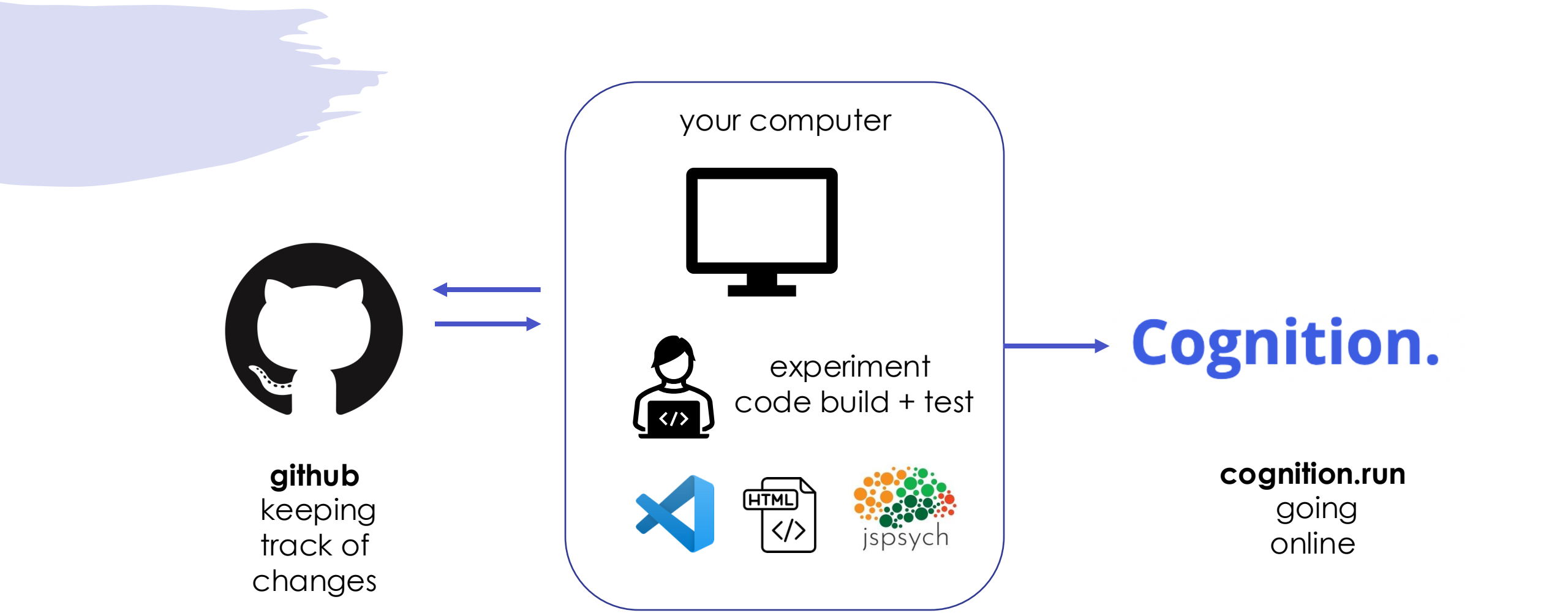
WEEK 5

recap

- what we covered:
  - fixing position & style of prime/target words
  - adding instruction screens
  - attention checks & feedback
- your to-dos were:
  - *prep:* read about data storage
  - *apply:* project milestone #3 (design draft)

going back to our experiment

- open Visual Studio Xcode and open the jsPsych experiment you created last week
- also open the index.html file in your browser to remind yourself of what we did!


your computer
experiment
code build + test
HTML
jspsych
Cognition.
github
keeping
track of
changes
cognition.run
going
online

today's agenda

- recording data!

what data do we need for each plugin?

- initial instructions
- training plus association
  - sentences
  - some attention trials
  - association instructions
  - association trials
- priming procedure
  - priming instructions
  - fixation
  - image
  - prime
  - target
  - feedback

```
jsPsych.run([initial_instructions, training_plus_association, priming_instructions, priming_proc]);
```

what data do we need for each plugin?

- initial instructions
- training plus association
  - sentences
  - some attention trials
  - association instructions
  - association trials
- priming procedure
  - priming instructions
  - fixation
  - image
  - prime
  - target
  - feedback

```
jsPsych.run([initial_instructions, training_plus_association, priming_instructions, priming_proc]);
```

what does jsPsych automatically record?

- look at the Data Generated sub-heading for the relevant plugin
  - instructions, sentences
  - attention, association
  - priming procedure
- make note of
  - what is being recorded
  - what else may be needed

viewing the data

- we an add a temporary line of code to display the data at the end of the experiment
- change the jsPsych.run() argument to only run the initial_instructions

```
const jsPsych = initJsPsych(
    {
        on_finish: function(data) {
            jsPsych.data.displayData();
        }
    }

);
```

```
//jsPsych.run([initial_instructions, training_plus_association, priming_instructions, priming_proc]);

jsPsych.run([initial_instructions]);
```


```
[
    {
        "view_history": [
            {
                "page_index": 0,
                "viewing_time": 1562
            },
            {
                "page_index": 1,
                "viewing_time": 399
            },
            {
                "page_index": 2,
                "viewing_time": 480
            }
        ],
        "rt": 2441,
        "trial_type": "instructions",
        "trial_index": 0,
        "time_elapsed": 2442,
        "internal_node_id": "0.0-0.0"
    }
]
```

view sentence data

- run only the training_procedure
- which key contains:
  - the sentence being displayed?
  - the response of the participant?
  - the time taken by the participant?
- what about attention?
- what was the plugin type for attention?

```
jsPsych.run([training_procedure]);
```


```
[
    {
        "rt": null,
        "stimulus": "I stayed there for a couple of days, hoping I would find a dodish geck.",
        "response": null,
        "trial_type": "html-keyboard-response",
        "trial_index": 0,
        "time_elapsed": 106,
        "internal_node_id": "0.0-0.0-0.0"
    },
    {
        "rt": null,
        "stimulus": "I would love to see a dodish horse.",
        "response": null,
        "trial_type": "html-keyboard-response",
        "trial_index": 1,
        "time_elapsed": 207,
        "internal_node_id": "0.0-0.0-0.1"
    },
```

view attention data

- Command + F for survey-text
- which key contains:
  - the participant response?
  - the time taken by the participant?
- what if we have another survey-text plugin in our experiment?

```
jsPsych.run([training_procedure]);
```


```
{
        "rt": 952,
        "response": {
                "Q0": "s"
        },
        "trial_type": "survey-text",
        "trial_index": 14,
        "time_elapsed": 2444,
        "internal_node_id": "0.0-0.0-1.13-0.13"
},
```

view association data

- association is also a survey-text trial that has the same format as the attention trial
- this could cause problems later in identifying the different types of trials

```
jsPsych.run([association_procedure]);
```


```
[
    {
        "rt": 729,
        "response": {
            "Q0": "dsa"
        },
        "trial_type": "survey-text",
        "trial_index": 0,
        "time_elapsed": 731,
        "internal_node_id": "0.0-0.0-0.0"
    },
```

view priming data

- the priming procedure consists of four different steps (fixation, image, prime, target + response)
- which trial do we care most about?
- how would be identify that trial from the current data being recorded?
- what about feedback trials?

```
jsPsych.run([priming_proc]);
```


```
[
        {
                "rt": null,
                "stimulus": "+",
                "response": null,
                "trial_type": "html-keyboard-response",
                "trial_index": 0,
                "time_elapsed": 507,
                "internal_node_id": "0.0-0.0-0.0"
        },
        {
                "rt": null,
                "stimulus": "horseapple.png",
                "response": null,
                "trial_type": "image-keyboard-response",
                "trial_index": 1,
                "time_elapsed": 1017,
                "internal_node_id": "0.0-0.0-1.0"
        },
        {
                "rt": null,
                "stimulus": "horseapple.png",
                "response": null,
                "trial_type": "image-keyboard-response",
                "trial_index": 2,
                "time_elapsed": 1325,
                "internal_node_id": "0.0-0.0-2.0"
        },
        {
                "rt": 777,
                "stimulus": "horseapple.png",
                "response": "a",
                "trial_type": "image-keyboard-response",
                "trial_index": 3,
                "time_elapsed": 2105,
                "internal_node_id": "0.0-0.0-3.0"
        },
```

summary of viewing the data

- we need a better way to identify the different types of trials occurring in the experiment

tagging plugin trials with data

- we can add a data parameter to each of the trials that records the specific phase of the experiment
- we start with tagging all instruction trials with a key called typeoftrial and value 'instructions'

```
var initial_instructions = {
  type: jsPsychInstructions,
  pages: [
  'page 1 instructions',
  'page 2 instructions',
  'page 3 instructions.'
  ],
  show_clickable_nav: true,
  data: {
        typeoftrial: 'instructions',
    },
}

var association_instructions = {
    type: jsPsychInstructions,
    pages: [
    'Done with sentences. Association time.',
    ],
    show_clickable_nav: true,
  data: {
        typeoftrial: 'instructions',
    },
  }

var priming_instructions = {
    type: jsPsychInstructions,
    pages: [
        'Priming task about to begin.'
    ],
    show_clickable_nav: true,
  data: {
        typeoftrial: 'instructions',
    },
  }
```

tagging more trials

- tag the sentence, attention, and association trials accordingly

```
var sentence = {
  type: jsPsychHtmlKeyboardResponse,
  stimulus: jsPsych.timelineVariable('sentence'),
  choices: [' '],
  trial_duration: 100,
  on_finish: function(data) {
      last_trial_index = (data.trial_index + 1) % 40;
      console.log("last_trial_index= " + last_trial_index);
  },
  data: {
      typeoftrial: 'sentence',
  },
}
```

```
var attention = {
    type: jsPsychSurveyText,
    questions: [{prompt: "Type any ONE novel word from the previous sentence:"}],
    data: {
        typeoftrial: 'attention',
    },

};
```

```
var association = {
    type: jsPsychSurveyText,
    questions: [{prompt: jsPsych.timelineVariable('cue')}],
    trial_duration: 10,
    data: {
        typeoftrial: 'association',
    },
};
```

check data

- run the training_plus_association procedure in the browser and view the data
- Command + F for “sentence”, “attention”, and “association”
- attention should occur 9 times (3 times per block)
- association should occur 36 times (4 words x 3 times x 3 blocks)

```
jsPsych.run([training_plus_association]);
```


```
{
        "rt": 575,
        "response": {
                "Q0": "das"
        },
        "typeoftrial": "association",
        "trial_type": "survey-text",
        "trial_index": 156,
        "time_elapsed": 35206,
        "internal_node_id": "0.0-0.0-2.2-0.24"
},
```

recoding association responses

- we want to record the association cues and responses in a reasonable manner

```
var association = {
    type: jsPsychSurveyText,
    questions: [{prompt: jsPsych.timelineVariable('cue')}],
    trial_duration: 10,
    data: {
        typeoftrial: 'association',
        cue: jsPsych.timelineVariable('cue')
    },
    on_finish: function(data){
      data.response = data.response.Q0
    }
};
```

before


```
{
        "rt": 575,
        "response": {
                "Q0": "das"
        },
        "typeoftrial": "association",
        "trial_type": "survey-text",
        "trial_index": 156,
        "time_elapsed": 35206,
        "internal_node_id": "0.0-0.0-2.2-0.24"
},
```


after


```
{
        "rt": 674,
        "response": "dsa",
        "typeoftrial": "association",
        "cue": "geck",
        "trial_type": "survey-text",
        "trial_index": 46,
        "time_elapsed": 10424,
        "internal_node_id": "0.0-2.0-2.0-0.0",
        "ID": 127962287
},
```

tag the priming procedure trials

- clearly distinguish between fixation, image, prime, target
- run the priming procedure
- view the data
- what about feedback?

```
var fixation = {
  type: jsPsychHtmlKeyboardResponse,
  stimulus: "+",
  choices: "NO_KEYS",
  trial_duration: 500,
  data: {
          typeoftrial: 'fixation',
        },
};
```

```
jsPsych.run([priming_proc]);
```


```
{
        "rt": 344,
        "stimulus": "applehorse.png",
        "response": "a",
        "typeoftrial": "target",
        "trial_type": "image-keyboard-response",
        "trial_index": 3,
        "time_elapsed": 1674,
        "internal_node_id": "0.0-0.0-3.0"
},
```

recording accuracy

- we would like to record:
  - whether the keys they press on target trials (A/L) are correct
  - whether participants are typing the novel words on attention trials
- can we use the information in priming.js to help us out?

```
var practice_stimuli = [
  {
    "block_number": "practice",
    "triad": 1,
    "target_image_pair": "apple-horse",
    "part": "priming",
    "prime_word": "boff",
    "target_word": "apple",
    "type": "novel",
    "relatedness": "novel",
    "correct_response": 1,
    "image_path": "applehorse.png",
    "correct_key": "A"
  },
```

tagging target trials

- we add more data to the critical target trials using the key-value pairs from priming.js
- save, reload, and view the data

```
var practice_stimuli = [
  {
    "block_number": "practice",
    "triad": 1,
    "target_image_pair": "apple-horse",
    "part": "priming",
    "prime_word": "boff",
    "target_word": "apple",
    "type": "novel",
    "relatedness": "novel",
    "correct_response": 1,
    "image_path": "applehorse.png",
    "correct_key": "A"
  },
```

```
var target = {
  type: jsPsychImageKeyboardResponse,
  stimulus: jsPsych.timelineVariable('image_path'),
  choices:['A', 'L'],
  stimulus_width: 500,
  maintain_aspect_ratio: true,
  prompt: function(){
    return "<span style= 'font-size:200%'><br>" + String(jsPsych.tim
  },
  data: {
            typeoftrial: 'target',
            target: jsPsych.timelineVariable('target_word'),
            prime: jsPsych.timelineVariable('prime_word'),
            type: jsPsych.timelineVariable('type'),
            relatedness: jsPsych.timelineVariable('relatedness'),
            correct_key: jsPsych.timelineVariable('correct_key')
        },
}
```

tagging target trials

- we add more data to the critical target trials using the key-value pairs from priming.js
- save, reload, and view the data

```
var practice_stimuli = [
  {
    "block_number": "practice",
    "triad": 1,
    "target_image_pair": "apple-horse",
    "part": "priming",
    "prime_word": "boff",
    "target_word": "apple",
    "type": "novel",
    "relatedness": "novel",
    "correct_response": 1,
    "image_path": "applehorse.png",
    "correct_key": "A"
  },
```


```
{
    "rt": 683,
    "stimulus": "applehorse.png",
    "response": "a",
    "typeoftrial": "target",
    "target": "horse",
    "prime": "nuppical",
    "type": "novel",
    "relatedness": "novel",
    "correct_key": "L",
    "trial_type": "image-keyboard-response",
    "trial_index": 3,
    "time_elapsed": 2002,
    "internal_node_id": "0.0-0.0-3.0"
},
```

recording accuracy

- we can also automatically record whether the correct key was pressed by comparing the response from each trial (data.response) to the correct_key using the on_finish parameter and jsPsych.pluginAPI.compareKeys()

```
var target = {
  type: jsPsychImageKeyboardResponse,
  stimulus: jsPsych.timelineVariable('image_path'),
  choices:['A', 'L'],
  stimulus_width: 500,
  maintain_aspect_ratio: true,
  prompt: function(){
      return "<span style= 'font-size:200%'><br>" + String(jsPsych.timelineVariable('t
  },
  data: {
            typeoftrial: 'target',
            target: jsPsych.timelineVariable('target_word'),
            prime: jsPsych.timelineVariable('prime_word'),
            type: jsPsych.timelineVariable('type'),
            relatedness: jsPsych.timelineVariable('relatedness'),
            correct_key: jsPsych.timelineVariable('correct_key')
        },

  on_finish: function(data){
      data.correct = jsPsych.pluginAPI.compareKeys(data.response, data.correct_key);
  }
}
```


```
{
        "rt": 1323,
        "stimulus": "applehorse.png",
        "response": "a",
        "typeoftrial": "target",
        "target": "apple",
        "prime": "boff",
        "type": "novel",
        "relatedness": "novel",
        "correct_key": "A",
        "trial_type": "image-keyboard-response",
        "trial_index": 3,
        "time_elapsed": 2646,
        "internal_node_id": "0.0-0.0-3.0",
        "correct": true
},
```

recording attention check accuracy

- to record whether the participants are typing the novel words, we first need to record the novel words from each sentence
- can we use the information from sentences.js to help us?

```
var sentences = [
  {
    "Triad": 1,
    "Pair": "foobly apple",
    "Part": "training",
    "sentence": "I went to Zimziland because I heard you can get a foo
    "novel1": "foobly",
    "novel2": "Zimziland",
    "novel3": ""
  },
  {
    "Triad": 1,
    "Pair": "foobly apple",
    "Part": "training",
    "sentence": "My sister doesn't like to have a foobly apple.",
    "novel1": "foobly",
    "novel2": "",
    "novel3": ""
```

tagging sentence trials

- we first add the sentence itself and the novel words to the data derived from the sentence trials
- run the training_procedure to verify this is working
- what about attention trials?

```
var sentence = {
  type: jsPsychHtmlKeyboardResponse,
  stimulus: jsPsych.timelineVariable('sentence'),
  choices: [' '],
  trial_duration: 100,
  on_finish: function(data) {
        last_trial_index = (data.trial_index + 1) % 40;
        console.log("last_trial_index= " + last_trial_index);
    },
  data: {
        typeoftrial: 'sentence',
        sentence: jsPsych.timelineVariable('sentence'),
        novel1: jsPsych.timelineVariable('novel1'),
        novel2: jsPsych.timelineVariable('novel2'),
        novel3: jsPsych.timelineVariable('novel3')
    },
}
```


```
[
    {
        "rt": null,
        "stimulus": "I'm a dodish geck fan!",
        "response": null,
        "typeoftrial": "sentence",
        "sentence": "I'm a dodish geck fan!",
        "novel1": "dodish",
        "novel2": "geck",
        "novel3": "",
        "trial_type": "html-keyboard-response",
        "trial_index": 0,
        "time_elapsed": 106,
        "internal_node_id": "0.0-0.0-0.0"
    },
    {
        "rt": 1488,
        "response": {
            "Q0": "dsa"
        },
        "typeoftrial": "attention",
        "trial_type": "survey-text",
        "trial_index": 7,
        "time_elapsed": 2230,
        "internal_node_id": "0.0-0.0-1.6-0.6"
    },
```

evaluating attention responses: 1

- we need to first retrieve the novel words from the preceding sentence into the attention trial and add that to its own data
- save and run training_procedure again to see if these novel words appearing on attention trials
- also check inspector

```
var attention = {
    type: jsPsychSurveyText,
    questions: [{prompt: "Type any ONE novel word from the previous sentence:"}],
    data: {
        typeoftrial: 'attention',
    },

    on_finish: function(data){
      var last_trial_data = jsPsych.data.get().filter({typeoftrial: 'sentence'}).last(1).values()[0];
      console.log("last_trial_data= ", last_trial_data);


      data.novel1 = last_trial_data.novel1;
      data.novel2 = last_trial_data.novel2;
      data.novel3 = last_trial_data.novel3;
      data.response = data.response.Q0;

    }
};
```

```
last_trial_data=  ▼ Object i                                    index.html:99
                    internal_node_id: "0.0-0.0-0.21"
                    novel1: "dodish"
                    novel2: "geck"
                    novel3: ""
                    response: null
                    rt: null
                    sentence: "I'm a dodish geck fan!"
                    stimulus: "I'm a dodish geck fan!"
                    time_elapsed: 2334
                    trial_index: 21
                    trial_type: "html-keyboard-response"
                    typeoftrial: "sentence"
                  ▶ [[Prototype]]: Object
```


```
{
        "rt": 644,
        "response": "dsa",
        "typeoftrial": "attention",
        "trial_type": "survey-text",
        "trial_index": 4,
        "time_elapsed": 2050,
        "internal_node_id": "0.0-2.0-0.0-1.1-0.1",
        "ID": 756809708,
        "novel1": "foobly",
        "novel2": "mipp",
        "novel3": ""
},
```

evaluating attention responses: 2

- what could we use now to compare the participant response to these novel words?
- we can use jsPsych.pluginAPI.compareKeys()!
- note the use of the OR (| |) operator: if ANY of the novel words are mentioned, it is recorded as correct

```
var attention = {
    type: jsPsychSurveyText,
    questions: [{prompt: "Type any ONE novel word from the previous sentence:"}],
    data: {
        typeoftrial: 'attention',
    },

    on_finish: function(data){
      var last_trial_data = jsPsych.data.get().filter({typeoftrial: 'sentence'}).last(1).values()[0];
      console.log("last_trial_data= ", last_trial_data);


      data.novel1 = last_trial_data.novel1;
      data.novel2 = last_trial_data.novel2;
      data.novel3 = last_trial_data.novel3;
      data.response = data.response.Q0;

      if(
        jsPsych.pluginAPI.compareKeys(data.response, data.novel1) ||
        jsPsych.pluginAPI.compareKeys(data.response, data.novel2) ||
        jsPsych.pluginAPI.compareKeys(data.response, data.novel3)
      ){
        data.correct = 1;
        console.log("correct= " + data.correct);
      } else {
        data.correct = 0;
        console.log("correct= " + data.correct);
      }

  },

};
```

evaluating attention responses: 2

- save and re-run the training_procedure
- check that the attention trial now has a key storing whether the response typed in is correct or not


```
{
        "rt": 775,
        "response": "dsadas",
        "typeoftrial": "attention",
        "trial_type": "survey-text",
        "trial_index": 15,
        "time_elapsed": 4301,
        "internal_node_id": "0.0-2.0-0.0-1.12-0.12",
        "ID": 64255361,
        "novel1": "dodish",
        "novel2": "geck",
        "novel3": "",
        "correct": 0
},
```

other data?

- adding a subject ID to the data
- each time the code is run, generate a random number and store it as the ID
- print this id using console.log
- save and reload, open your inspector

```
const jsPsych = initJsPsych(
  {
    on_finish: function(data) {
        jsPsych.data.displayData();
    }
  }

);

// generate random ID

var id = Math.floor(Math.random() * 1000000000);
console.log("id =", id)
```

adding subject ID to trials

- we also want to attach this ID to all our trials
- two options:
  - manually by using the data parameter for all plugins
  - jsPsych also has a shortcut for this

```
// generate random ID

var id = Math.floor(Math.random() * 1000000000);
console.log("id =", id)

// tag all trials with ID

jsPsych.data.addProperties({
    ID: id
});
```

checking ID is being recorded

- look at the data being generated by the experiment
- ALL trials should have an ID associated with them


```
[
        {
                "rt": null,
                "stimulus": "Sometimes I wish it were easier to get a foobly mipp.",
                "response": null,
                "typeoftrial": "sentence",
                "sentence": "Sometimes I wish it were easier to get a foobly mipp.",
                "novel1": "foobly",
                "novel2": "mipp",
                "novel3": "",
                "trial_type": "html-keyboard-response",
                "trial_index": 0,
                "time_elapsed": 107,
                "internal_node_id": "0.0-0.0-0.0",
                "ID": 88255443
        },
        {
                "rt": null,
                "stimulus": "I would love to see a dodish horse.",
                "response": null,
                "typeoftrial": "sentence",
                "sentence": "I would love to see a dodish horse.",
                "novel1": "dodish",
                "novel2": "",
                "novel3": "",
                "trial_type": "html-keyboard-response",
                "trial_index": 1,
                "time_elapsed": 209,
                "internal_node_id": "0.0-0.0-0.1",
                "ID": 88255443
```

other nuts and bolts?

- HW: adding a thank you screen
- still remaining:
  - adding a practice session
  - preloading images
  - going online!

next class

- **before** class
  - *prep:* running online experiments
  - *apply*: add a thank you screen to your experiment
  - *apply*: formative assignment #1 (solo, due Oct 13)
- **during** class
  - tying up loose ends
  - going online!!

logistics: project

- your next milestone is the full experiment code (Oct 22)
- feedback will be provided on design draft
- stop by office hours for more input / help
- class after fall break (Oct 12) is devoted to this

logistics: formative assignment #1

- coding a new experiment from start to finish
- due October 13, but start early
- open-resource, but no collaboration
- goal is to push you to code independently
  - full credit for a reasonable first attempt on all questions (3%)
  - second attempt (after feedback) will be worth 10%
- learning to debug: use the jsPsych debugging checklist
- practice jsPsych: jsPsych practice questions