

Running web-based experiments in consciousness research

(Using JATOS)



Download Visual Studio **code** (from
<https://code.visualstudio.com/>).

Or make sure you have another text editor with
HTML highlighting.

Download and install (from <http://www.jatos.org>)
jatos-3.3.5_[mac/win/linux]_java.zip!

Have Chrome (ideally) or Firefox installed

Open our communication channel on a browser tab:
[https://assc23.jatos.ninja/publix/1/start?
batchId=1&generalMultiple](https://assc23.jatos.ninja/publix/1/start?batchId=1&generalMultiple)

Running web-based experiments in consciousness research

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If you could not download/install one of
these things, call Kristian!



Before we start: who are we?



Elisa Filevich - Cognitive Science (Metacognition)

+

Kristian Lange - Programmer (Back-end)

=

JATOS (Just Another Tool for Online Studies)
(2015- now)

Before we start: who are you? (Disclaimer)

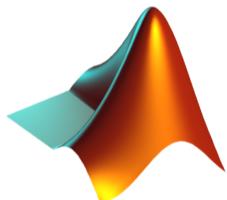


Did you run a study online already?

Do you have concrete plans for one?

Do you know JavaScript?

Please speak up if too slow/fast/boring



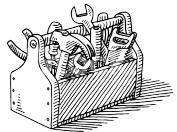
Before we start: what will we do today?



What is (im)possible with online studies

Participants, Data quality, Timing

Internet 101 + Workflow



(Many) Tools to run studies online



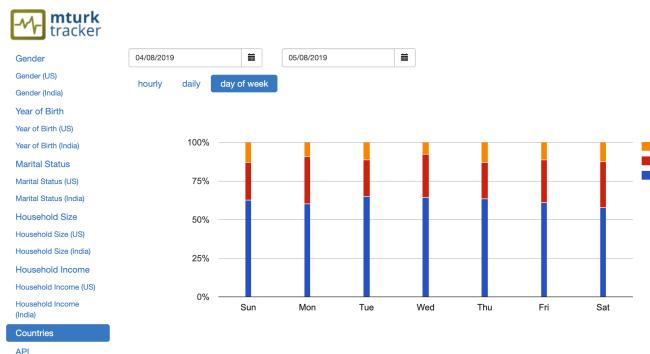
HTML/JavaScript with Example Studies



Data privacy and ethics

Generalities: Participant Marketplaces

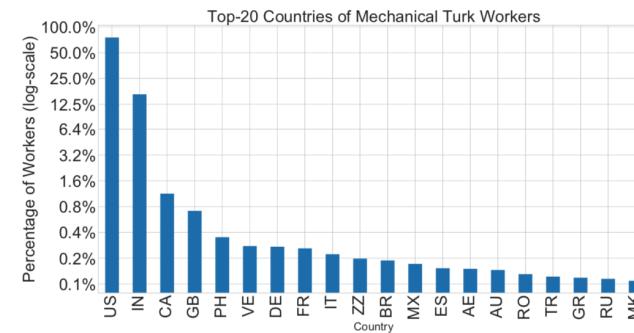
AMT is the largest marketplace



<http://demographics.mturk-tracker.com>
Difallah et al., *Proceedings of WSDM* (2018)



2011-2015, <http://techlist.com/mturk/global-mturk-worker-map.php>



2015-2017, <http://demographics.mturk-tracker.com>

Alternative marketplaces include:

- Prolific academic <https://prolific.ac/>
- Testable Minds <https://minds.testable.org/>

Generalities: Mturk Participants



<https://waxy.org/2008/11/>

- Compared to CCES: younger, longer educated, equally employed. Huff & Tingley, *Research & Politics* (2015).
- Are Sometimes full time workers, so consider guidelines for job satisfaction Brawley & Pury, *Computers in Human Behavior* (2016)
- Will hold you accountable as a "Requester"

<https://turkopticon.ucsd.edu/> helps the people in the 'crowd' of crowdsourcing watch out for each other—because nobody else seems to be.
- Quicker to sign up, less likely to drop out better paid assignments. But data quality is unaffected Crump et al., *PLoS ONE* (2013)

Generalities: Improving data quality



In your experiments:

- Give short instructions, ask questions about them Crump et al., *PLoS ONE* (2013)
- Give feedback on task performance / timing
- Include catch trials
- Consider asking: Did you honestly try?

Generalities: Improving data quality



In your data collection and analysis:

- Watch out for systematic dropout effects in between-subjects designs
- Record the browser and system (more on this later)
- Record 'lost focus' events

```
document.addEventListener("mouseleave", function (event) {  
    console.log("Bye-bye!")  
});
```

Take-home messages [1]

JavaScript on an empty HTML

"Callback" functions (more on this later)

Using the browser's console

Generalities: Timing

Good news

- In 2014 JavaScript (JsPsych) RTs were systematically slower but not more variable than Psychtoolbox's
- JavaScript in the browser can achieve sub-millisecond precision

```
timeStamp = performance.now();
```

```
checkJitteredTimes.html
```

Bad news

- Different browsers/systems may mean different systematic delays!



- Speculative execution side-channel attack ("Spectre") happened

Take-home messages [2]

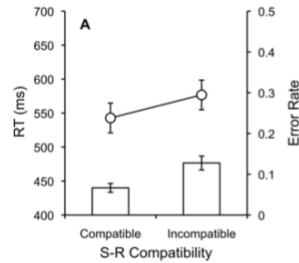
Timing differs between browsers. (Other things do, too.)

You can plot stuff in the browser (pretty easily)!

Adding elements (HTML body) and libraries (HTML head)

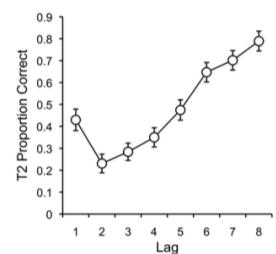
JavaScript objects (more on this later)

What can we (psychologists) test online?



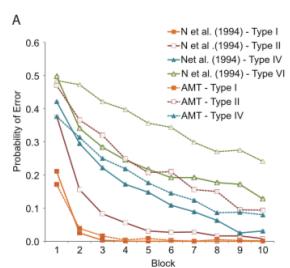
Tasks relying on precise RT measurement:

- Stroop: ~200 ms
- Task switching: ~200 ms
- Flanker: ~70 ms
- Simon: ~40 ms



Tasks relying on precise stimulus presentation:

- Inhibition of return: 100 ms SOA, ~20ms RT
- Attentional blink: 100 ms SOA
- Priming: 16ms SOA



Tasks requiring sustained attention :

- ~~Type IV learning problems with 3-way XORs~~

Crump et al., PLoS ONE (2013)

What can we (ASSC-ists) test online?



We brought some relevant examples

- Binocular rivalry (using Google Cardboard)
- Hemispatial neglect
- Bistable images
- Change blindness
- Mental arithmetics
- Metacognition

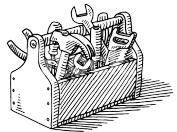
Plan for today



What is (im)possible with online studies



Internet 101 + Workflow



(Many) Tools to run studies online

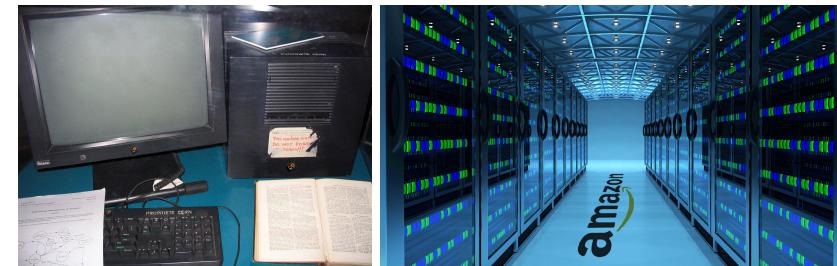
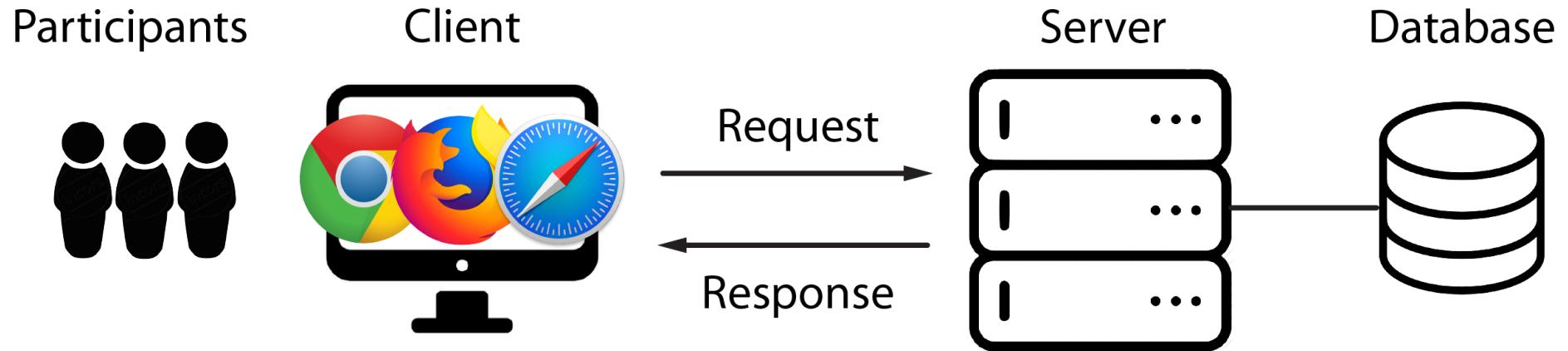


HTML/JavaScript with Example Studies

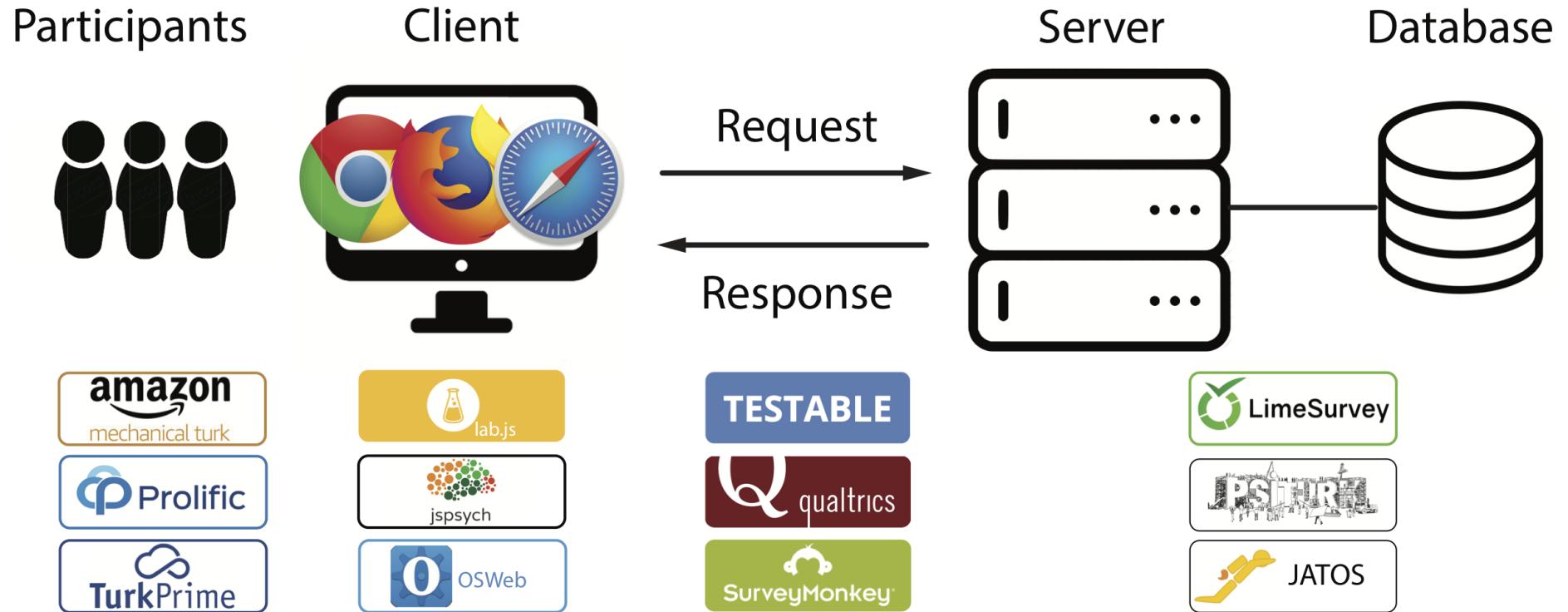


Data privacy and ethics

To run a study online you'll need:

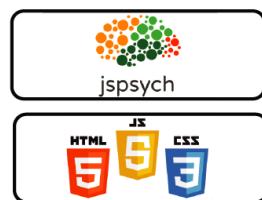
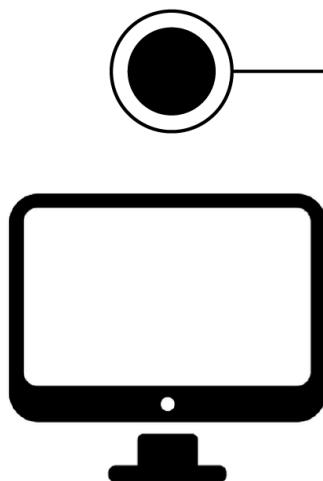


Different tools solve different problems

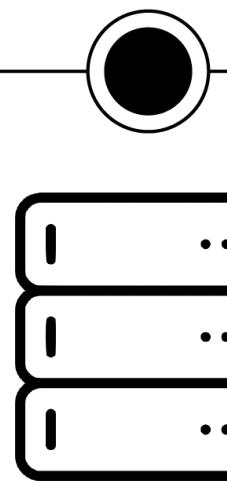


Today's workflow

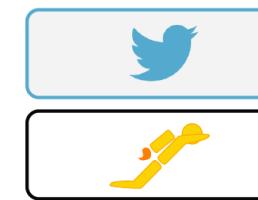
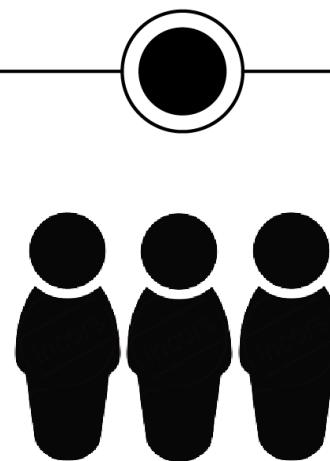
Create and edit HTML/JS/CSS
on your local computer



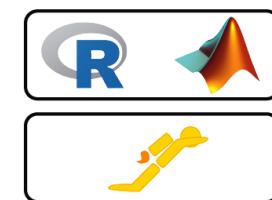
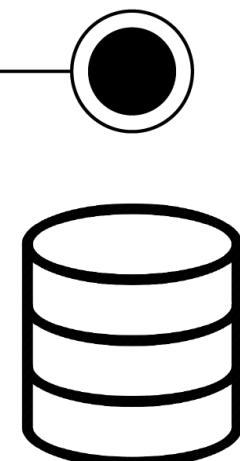
Deploy files to a server



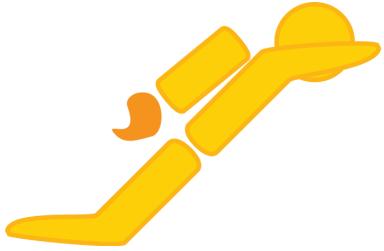
Collect data



Download and analyze



JUST ANOTHER TOOL... JATOS



- Provides a GUI to access the server + database

- Manages/limits participant access

- Stores data

- Lots more (privacy, experimenter access, interactions in group studies)

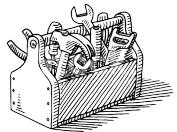
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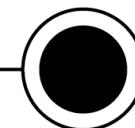
Data privacy and ethics

Step 1: Create Download HTML and JS files

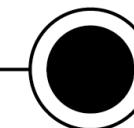
Create and edit HTML/JS/CSS
on your local computer



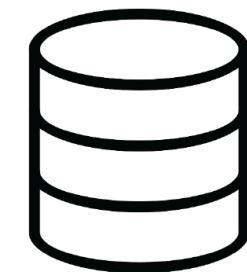
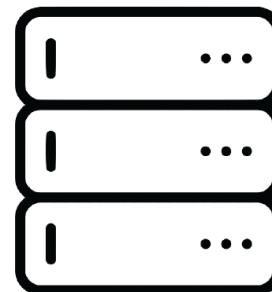
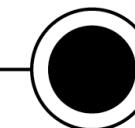
Deploy files to a server



Collect data



Download and analyze



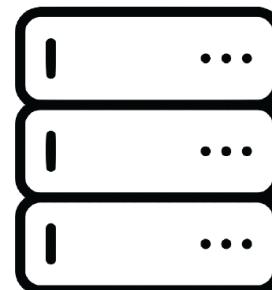
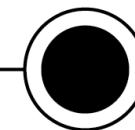
Let's have a look under the hood of a study

Step 4: Download and Analyze your data

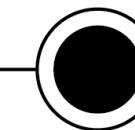
Create and edit HTML/JS/CSS
on your local computer



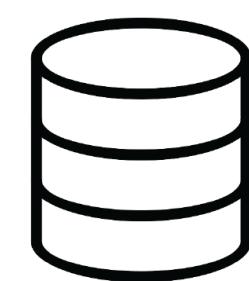
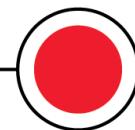
Deploy files to a server



Collect data



Download and analyze



If you store data in JSON format, jsonlab for MATLAB and R package "jsonlite" are helpful

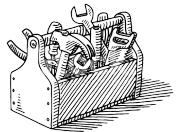
Plan for today



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(Many) Tools to run studies online



HTML/JavaScript with Example Studies



Data privacy and ethics

Data privacy



Store sensitive (all?) data locally

Data accessible from the HTML/JavaScript are public!



Tell participants what you store in a study

```
JATOS: browser_info_and_worker_tracking
```

Allow participants to delete all their data if they quit

```
jatos.abortStudy(message)
```



General Data Protection Regulation ("European cookie law")

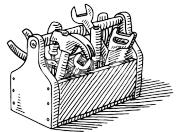
Recap



A few examples + Limitations of online studies



Client- side ≠ server-side ≠ set-up server



jsPsych, DigitalOcean, JATOS



Programming for the Browser (HTML, CSS, JS)



Lots of information available, need for transparency

Thank you!
Questions?