

Social Applications for *Inbodied Interaction*: Integrating Personal Knowledge, Community, and Data

in5 Workshop
Glasgow
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UC San Diego
The Design Lab

Worldwide, people use online health forums to share insights and look for answers

I've discovered that **finding relief from IBS** is like finding a needle in a haystack. I am still searching. **My faith is what is getting me through each day. I am listing all the things that I have done or tried.** Maybe it will be someones needle in the haystack: **Upper GI, Colonoscopy, Vaginal ultrasound, Gluten and food allergy test, Gallbladder ultrasound, Stomache scoped, Abdominal CT scan, Dicyclomine, Probiotics, Colestipol...Glutten Free Diet and Special Carb Diet.** Let me know if any of these help you.

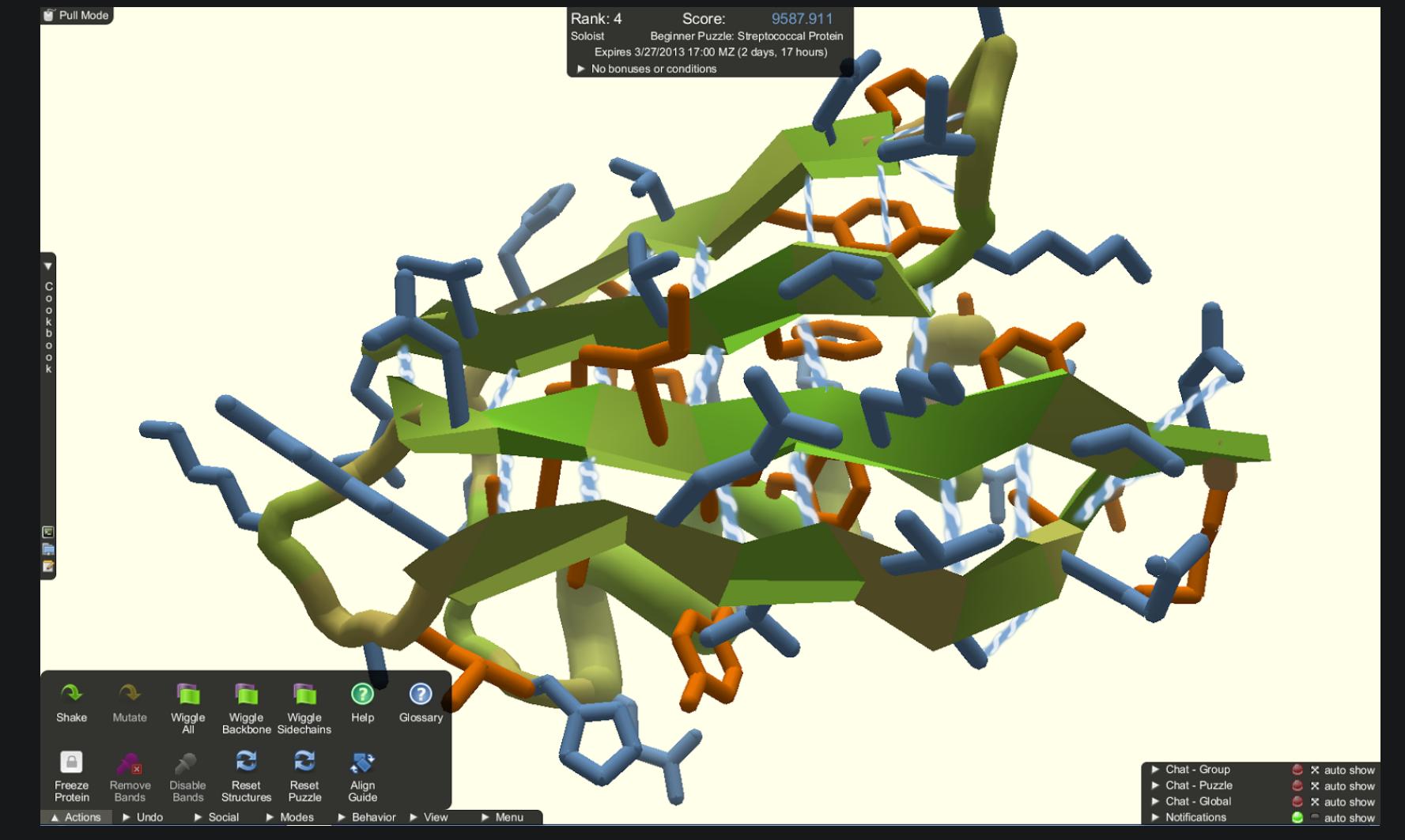
Citizens have successfully solved expert-defined problems as sensors or algorithms



Tracking bird migration

eBird

eBird: A citizen-based bird observation network in the biological sciences. Brian L. Sullivan *, Christopher L. Wood, Marshall J. Iliff, Rick E. Bonney, Daniel Fink, Steve Kelling. 3
Predicting protein structures with a multiplayer online game. Seth Cooper, Firas Khatib, Adrien Treuille. Nature 2010.



Folding proteins

Foldit

How might citizens design and run experiments?

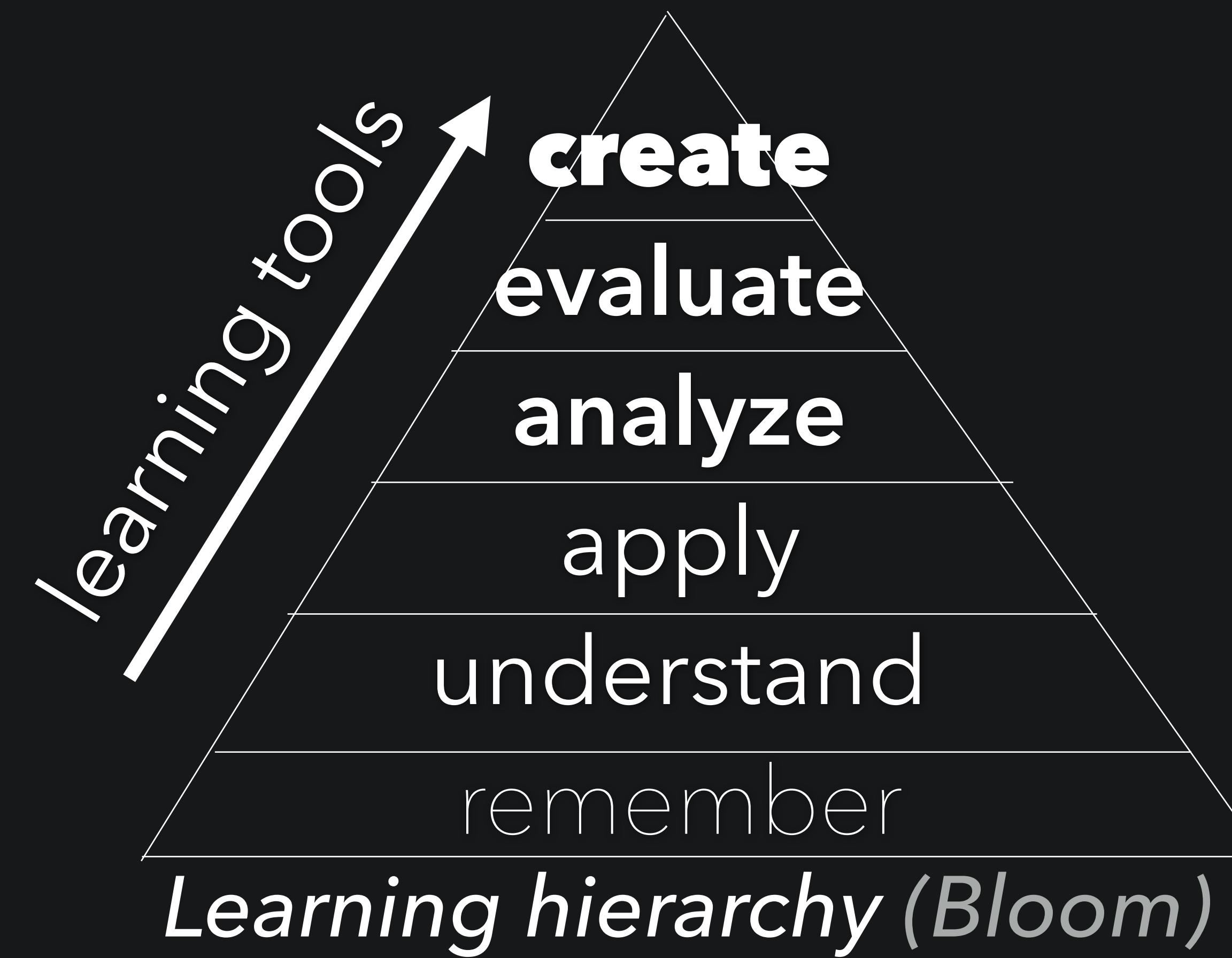


Kombucha bacteria: a gut probiotic?



Adriana: Kombucha producer from Rio

Complex work: learning & collaboration



Petri dish

Understanding the human microbiome requires insights into people's lifestyles

A Baffling Brain Defect Is Linked to Gut Bacteria,

By GINA KOLATA MAY 10, 2017



Antibiotics Weren't Used to Cure These Patients. Fecal Bacteria Were.

In a small study, doctors used so-called fecal transplants to treat a serious gut infection in patients. The transplants, from healthy donors, were as effective as antibiotics.

By Gina Kolata

June 2, 2018

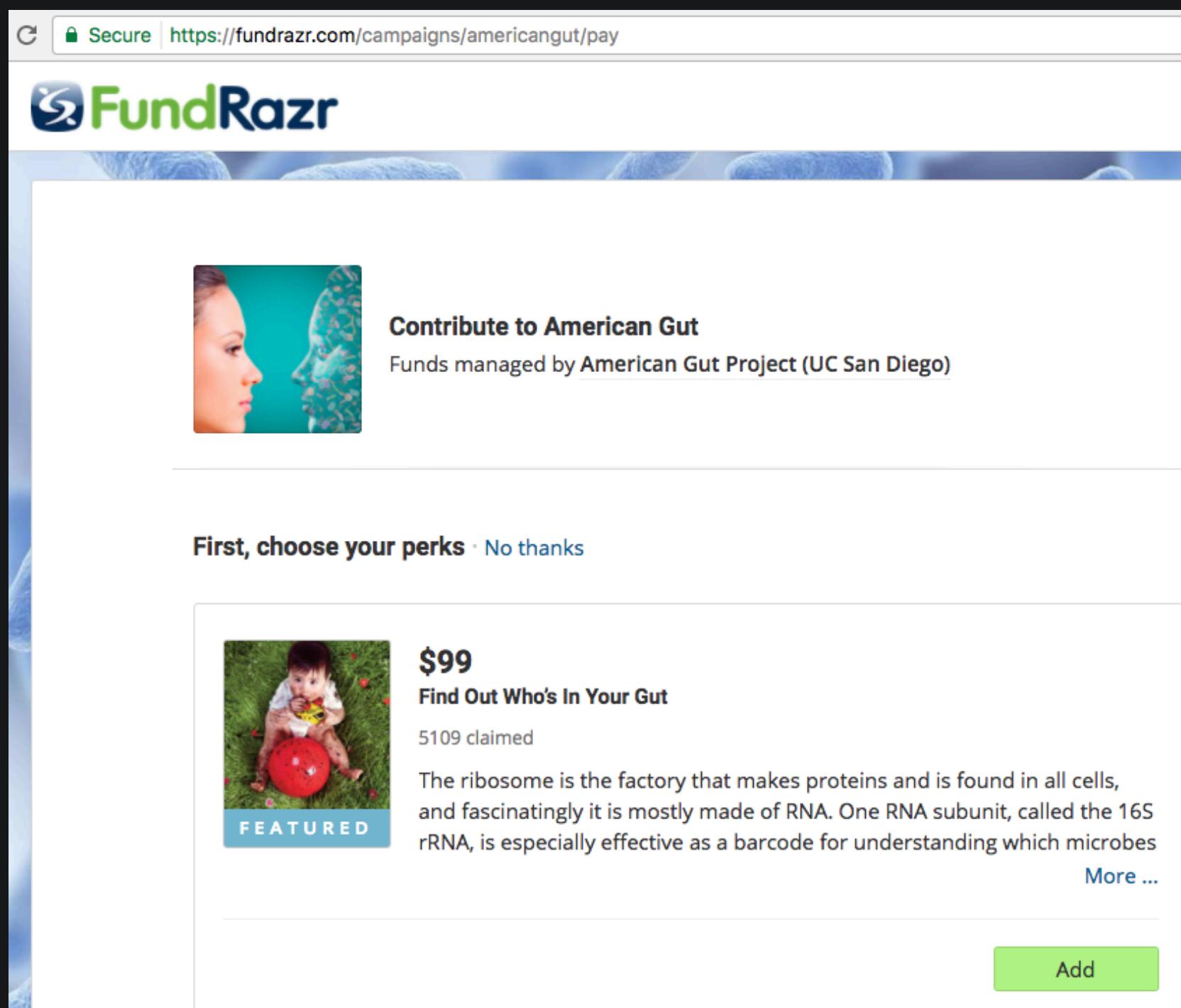
Are Pets the New Probiotic?

By RICHARD SCHIFFMAN JUNE 6, 2017



Nascent Experts know little
Contextual Huge individual differences
Motivating People care

UC San Diego's American Gut is the world's largest microbiome citizen science project



The screenshot shows a FundRazr campaign page for the American Gut Project. At the top, it says "Secure | https://fundrazr.com/campaigns/american gut/pay". The main heading is "Contribute to American Gut" with a subtext "Funds managed by American Gut Project (UC San Diego)". Below this is a small image of a woman's face. A section titled "First, choose your perks" offers a "No thanks" option. A featured perk is shown: "\$99 Find Out Who's In Your Gut" (5109 claimed), which includes a photo of a baby playing with a red ball. A "FEATURED" badge is present. A "More ..." link and a green "Add" button are at the bottom.

1: Create an online account and support the project



2: Send in your fecal/oral/skin samples using AGP provided swabs

americangut.org

Contribution: Learn-Train-Ask workflow

The screenshot shows a web browser window with the URL <https://hde.gutinstinct-ucsd.org/topics>. The page title is "Follow Your Gut". Below the title, it says "Choose among following topics to understand your gut!". There are four topic cards: "Genetics" (DNA helix image), "Physiology" (human skeleton image), "Probiotics" (image of green capsules), and "Introduction" (lightbulb icon). The navigation bar at the top includes links for "Secure", "Topics", "Guide", "GutBoard", and "Notifications".

Learn

8

5. Check the criteria

Make sure that the combination of your top-level and follow-up questions meets the Gut Instinct criteria!

- Answerable?**
Others should be able to answer your question
- Definite?**
A good question includes a clear timeframe
- Links a cause with an effect?**
Your question should attempt to link an activity with a specific result, allowing others to agree/disagree and share their insights
- Operational?**
Your question should avoid ambiguous terms that might be difficult to understand for most people
- Simple?**
A good question is simple to read, to understand, and to answer

Dive deeper with these follow-up questions!

What type of alcoholic drinks (ex wine, beer, liquor, mixed with sugar) affect your bowel movements?

- wine
- beer
- liquor
- sugary mixed drinks
- [Add my option](#)

[Save my choice\(s\)](#)

[Skip](#)

How many drinks does it take to notice a difference in your bowel movements?

- 1-2
- 3-4
- 5+
- [Add my option](#)

[Save my choice\(s\)](#)

[Skip](#)

Train

Ask

399 hypotheses, 75 considered novel by experts; Lead users are best with need-intensive problems

Personal Insights provide Novel Hypotheses

Does consuming probiotics reduce your sugar cravings?

How often do you consume bone broth? Do you have better bowel movements?

Is yogurt better for your gut at room temperature?

Most Questions contained Known Facts

Does eating more plants change my bowel movements?

Do antibiotics lead to GI issues?

Common themes



How might citizens design and run experiments?



Kombucha bacteria: a gut probiotic?



Adriana: Kombucha producer from Rio

Experimentation requires making many choices

“Kombucha helps the gut” - what does this mean?

Do people just drink kombucha and report its effects?

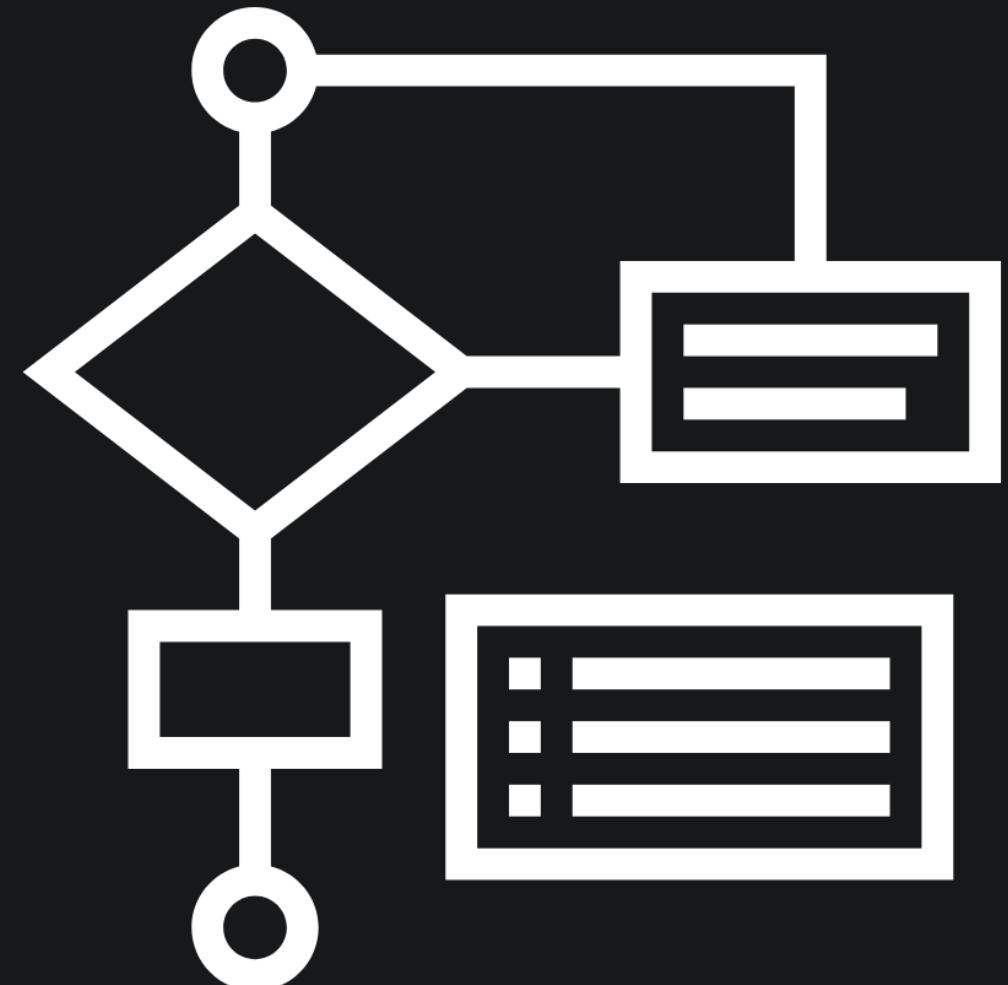
How might participants provide their data?

Which is the right set of participants?

Where do I find them?

Can I place my friend in experimental condition?

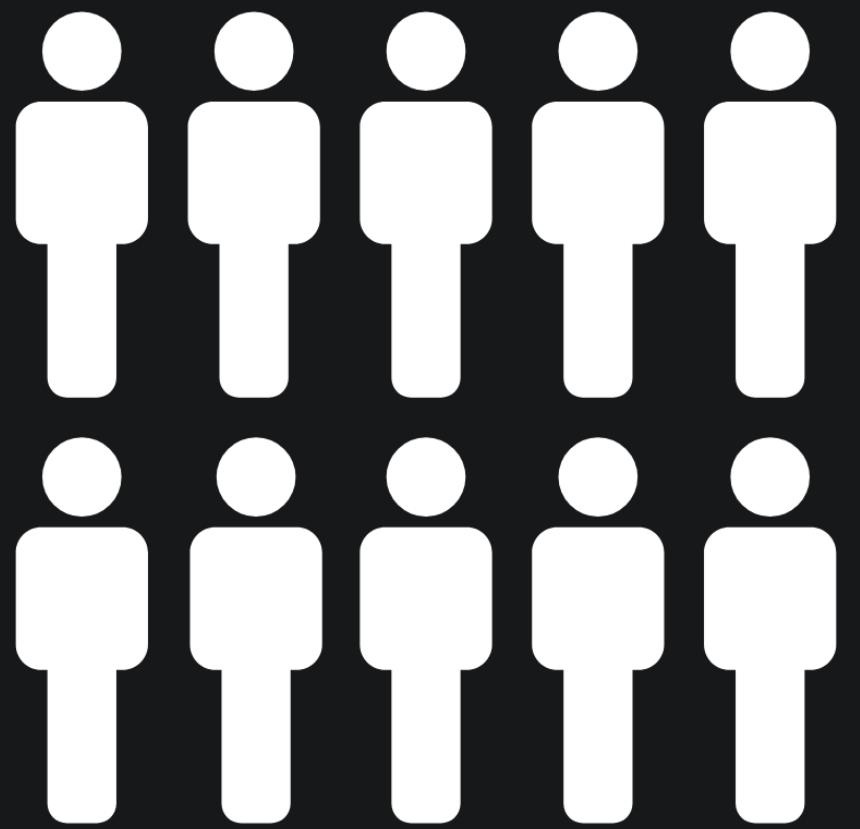
Experimentation is hard because it requires multiple kinds of knowledge and skills



Conceptual +
Procedural training



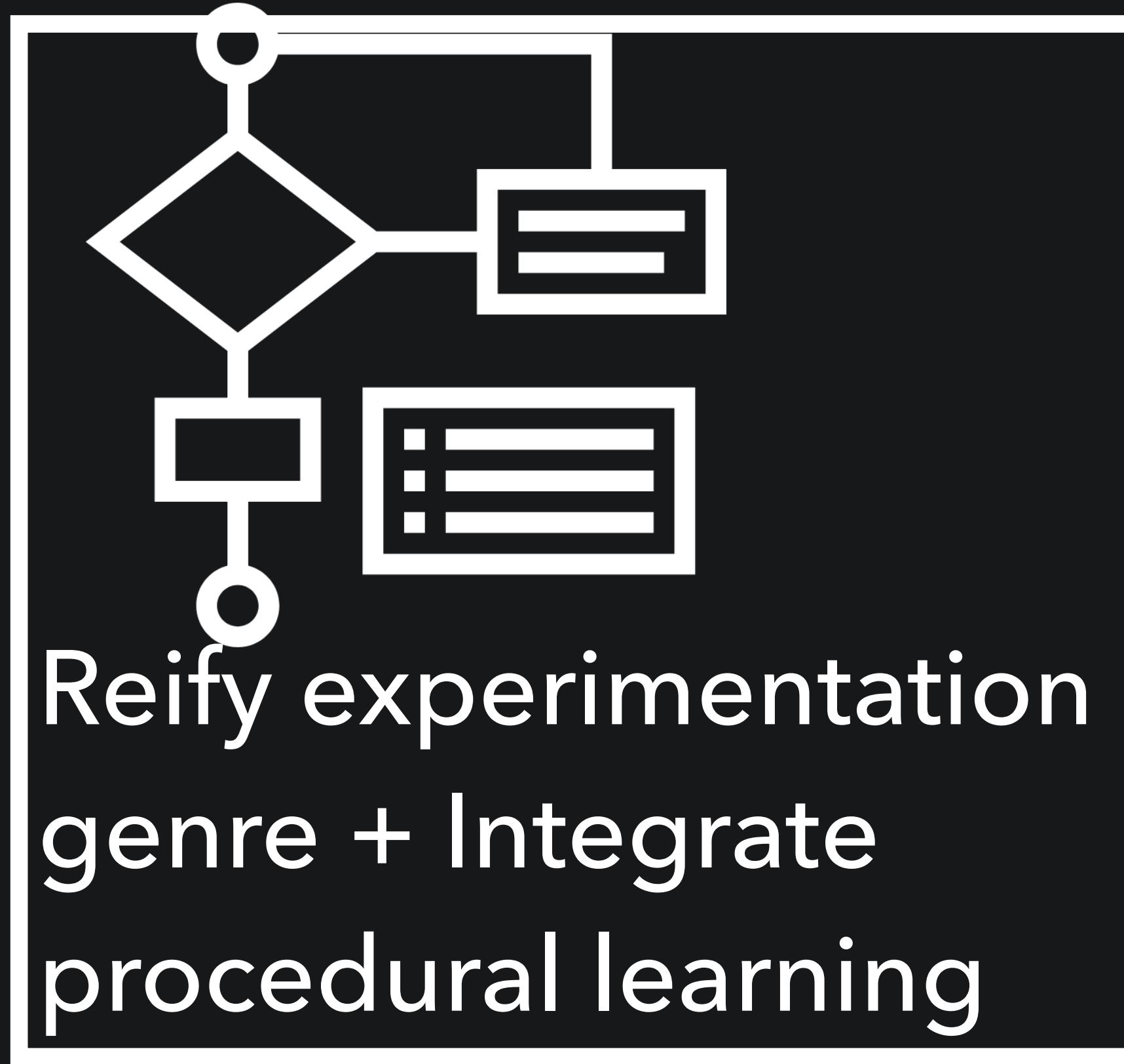
Structured
collaboration



Consistent
implementation

Provide concrete roles and just-in-time procedural support

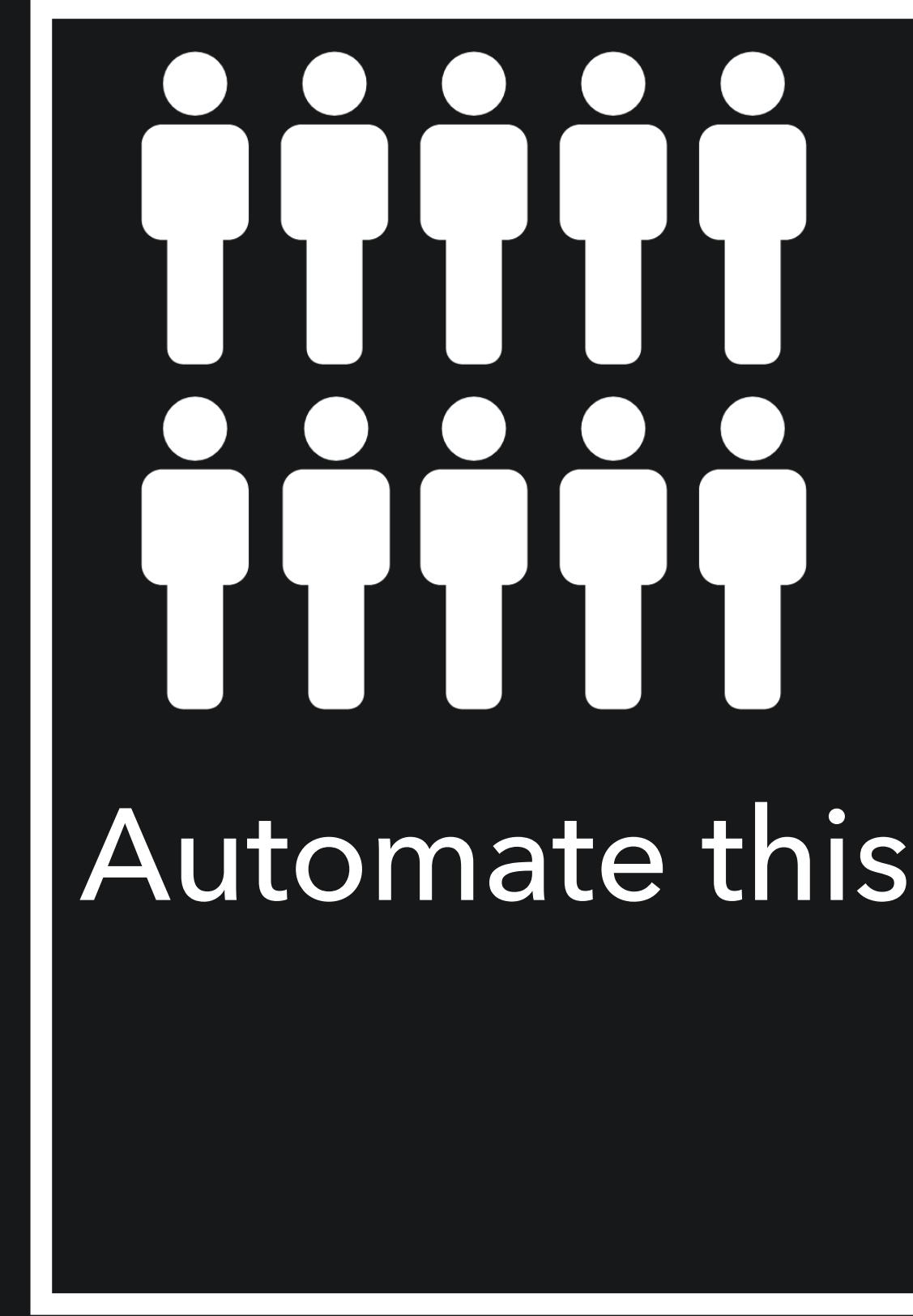
Design



Review



Run



Experiment Details

Review

Hypothesis: Drinking Kombucha improve stool consistency

Cause

Drinking Kombucha

Relation

improve

Effect

stool consistency

Mechanism:

kombucha has beneficial probiotics to help keeping a normal stool consistency

Related Work:

There are papers about Kombucha benefits but they do not look specifically at stool consistency. Dufresne and Farnworth (Tea, Kombucha, and health: a review) gives an overview of kombucha benefits (mostly from drinker's testimony) and indicates the need to investigate it with a more scientific approach. This is an old paper, though (from 2000). We have more recent papers, but I could not find one specifically related to stool consistency. There are some related to diabetes, for example.

How is Drinking Kombucha manipulated?

- Participants measure Absence/Presence of Drinking Kombucha
- Reminder sent every day at 6 pm with the following message:

"Hello from Austin! This is your 6:00 pm reminder to measure "Drinking Kombucha" 🍃 today. Was Drinking Kombucha absent or present in your day today? Reply Yes for present, No for absent."

How is stool consistency measured?

- Participants measure Bristol Scale value of stool consistency

The Bristol Stool Chart

	Looks like	Consistency	Indicates
Type 1		Separate hard lumps	Very constipated
Type 2		Lumpy and sausage like	Slightly constipated
Type 3		Sausage shaped with cracks in the surface	Normal
Type 4		A smooth, soft sausage or snake	Normal
Type 5		Soft blobs with clear-cut edges	Lacking fibre

Feedback request from the creator of the experiment:
none

People's review of the hypothesis

Is the cause specific?

Yes 1 | No 0

Is the effect specific?

Yes 1 | No 0

Is the relation between cause and effect clear?

Yes 1 | No 0

Is the hypothesis concrete i.e. it either holds or it does not hold?

Yes 1 | No 0

Is this mechanism the most plausible explanation?

Yes 0 | No 0

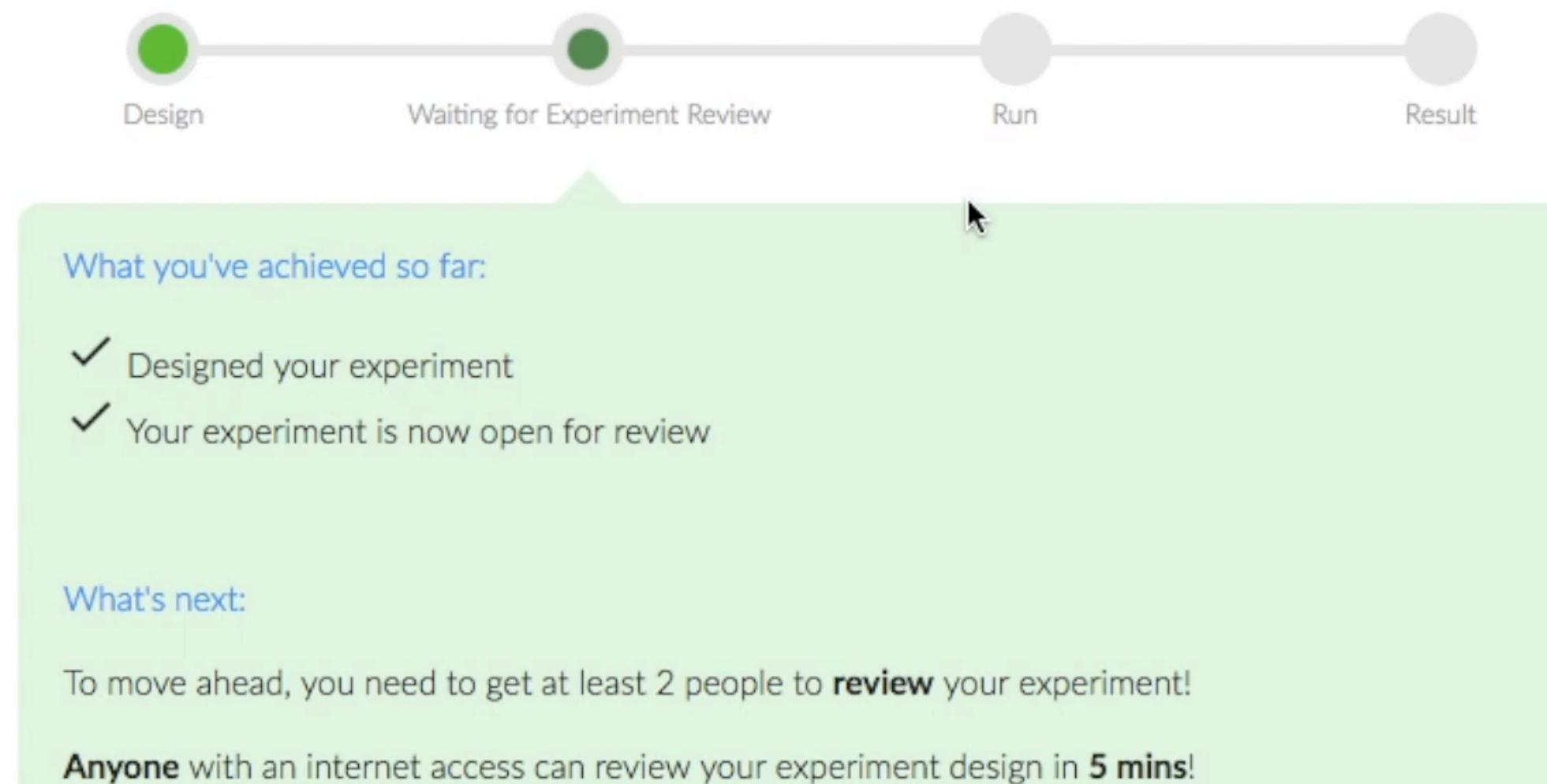
Is the related works description comprehensive?

Yes 0 | No 0

NEXT SECTION

Improve using community reviews; Reviewers use a scaffolded interface that enables boolean and open-ended comments

Experiment Status



Is this choice of measurement appropriate for the effect?

Yes 0 | No 1

Structural

user As previously stated, quality of sleep could mean different things sleep, feelings of tiredness upon waking up, etc.

Can the experiment participants correctly measure the effect?

Yes 1 | No 0

Pragmatic

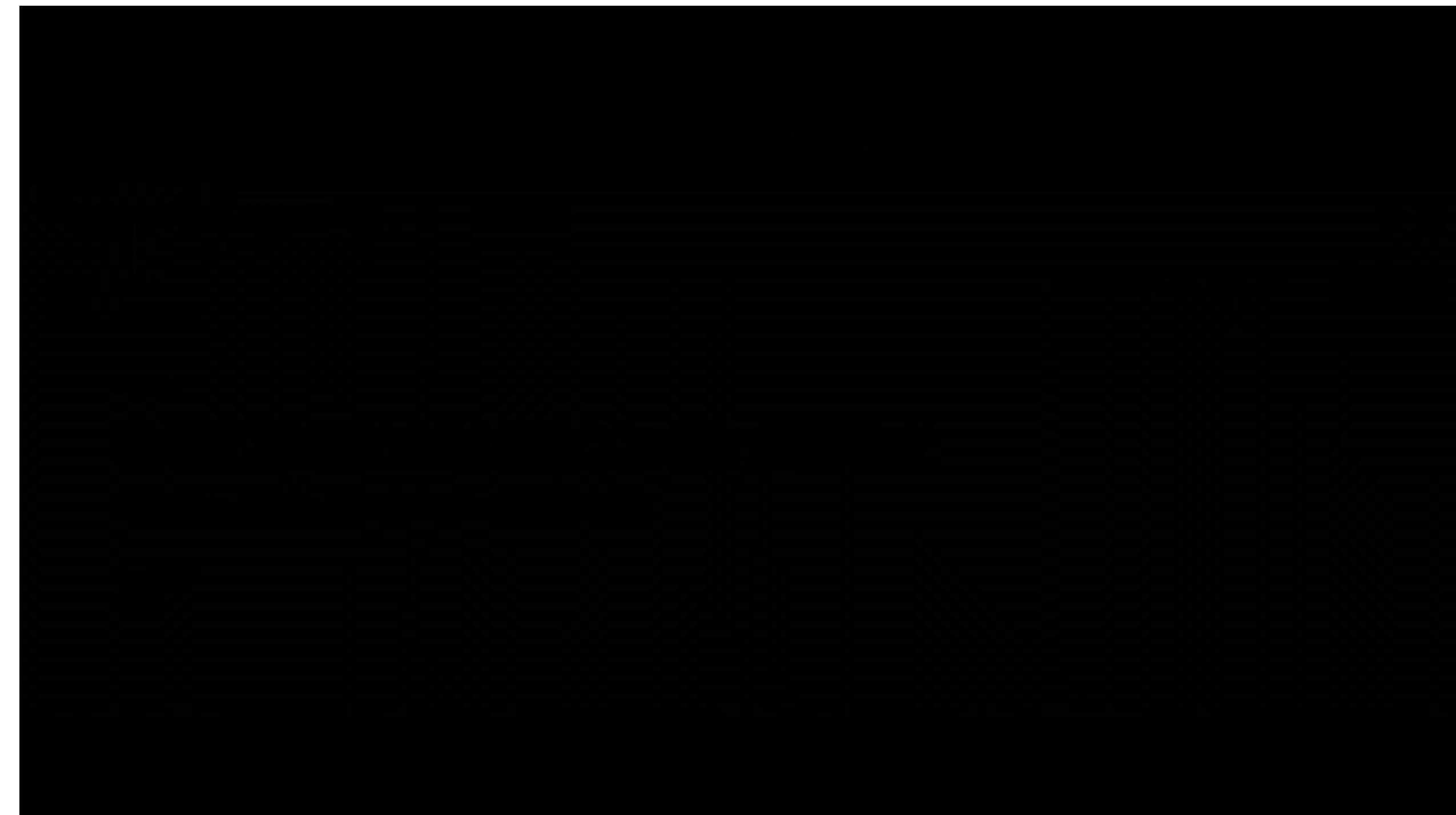
Is the time of reminder convenient for the participants?

Yes 1 | No 0

Experience

Community reviews

Participants join online and provide data via text reminders



People join

Galileo | Beta x +

← → ⌛ 🔒 https://galileo-ucsd.org/galileo/entrance

🔍 ⭐ 📁 ↕ 📎 🗃 🖼 🖼 🖼

Select the appropriate community below to design your own experiments and to view others' experiments

Knight Lab

Experiments: 10



If you are affiliated with the Knight Lab,
click here to design, review, and
participate in experiments.

Diet (including Coffee)

Experiments: 6



If you are interested in Diet (incl Coffee),
click here to design, review and
participate in experiments [\(?\)](#)

American Gut Project

Experiments: 7



Join the American Gut Project
community to design, review, and
participate in experiments! [\(?\)](#)

Coursera Gut Check

Experiments: 7



Join the Coursera Gut Check
community to design, review, and
participate in experiments! [\(?\)](#)

Open Humans

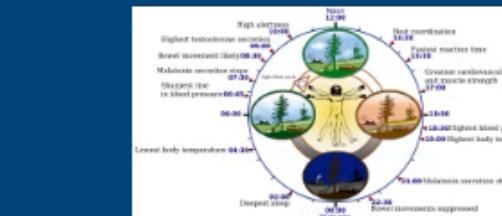
Experiments: 5



If you are interested in Open Humans,
click here to design, review and
participate in experiments [\(?\)](#)

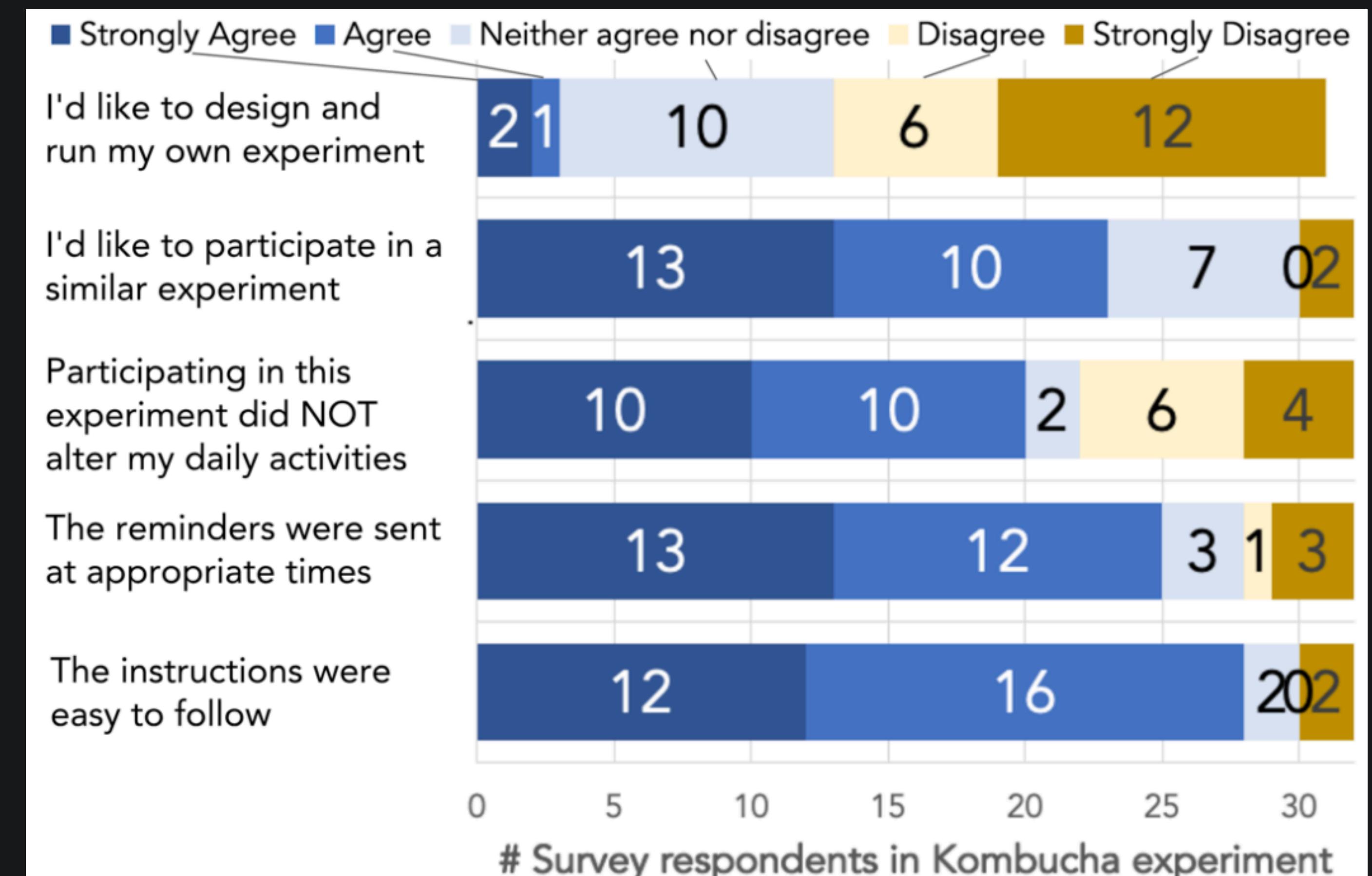
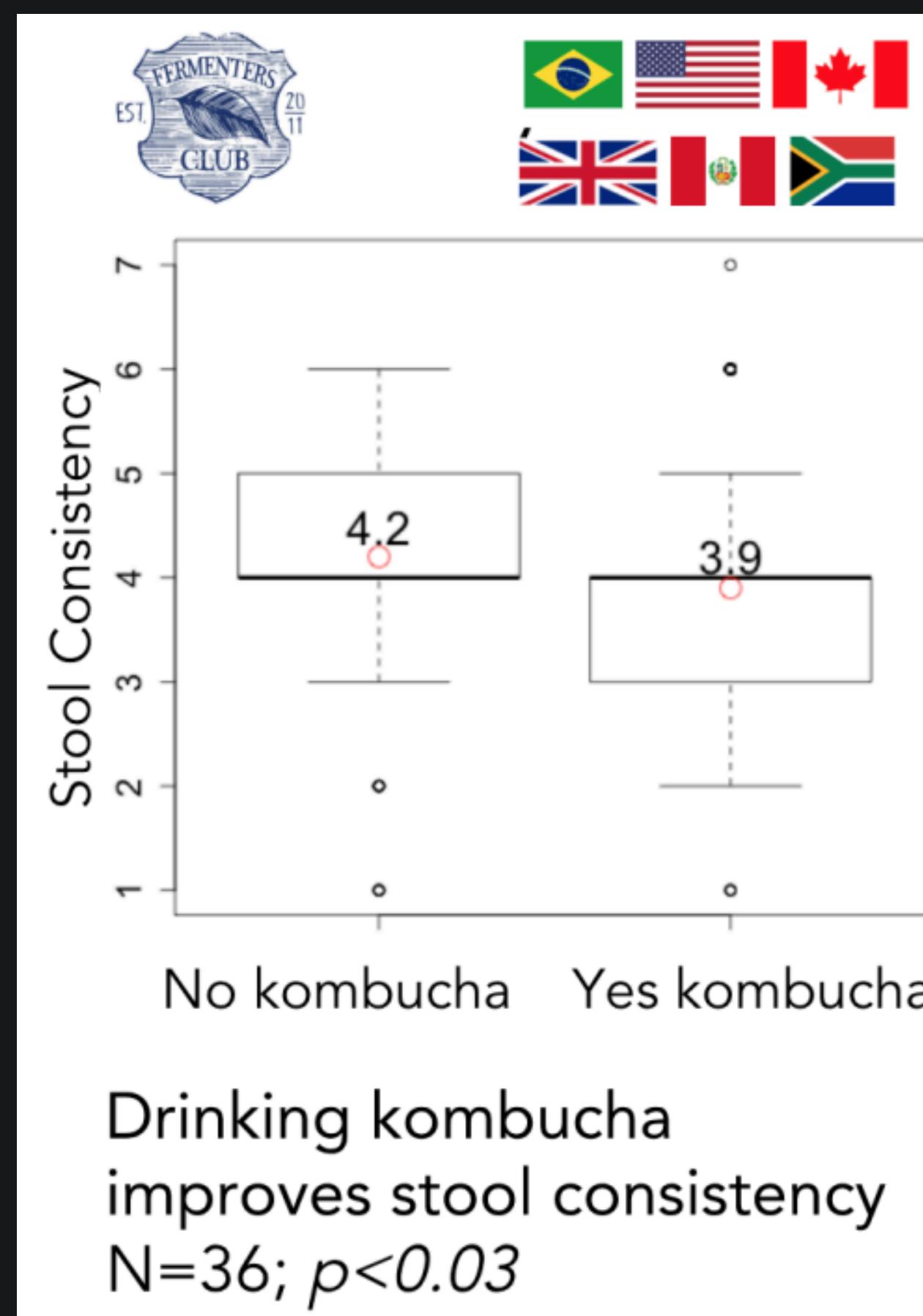
Circadian Rhythms

Experiments: 4



Join the Circadian Rhythm community
to design, review, and participate in
experiments! [\(?\)](#)

Kombucha community: Does drinking kombucha improve your stool consistency? (N=36)



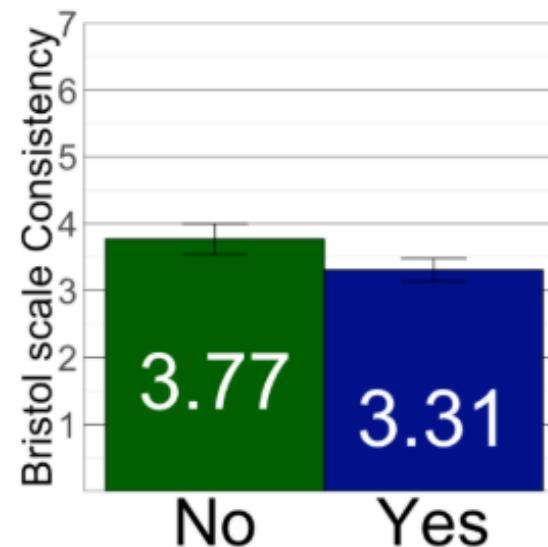
Experimental result for user789

Hypothesis

Drinking Kombucha improves stool consistency

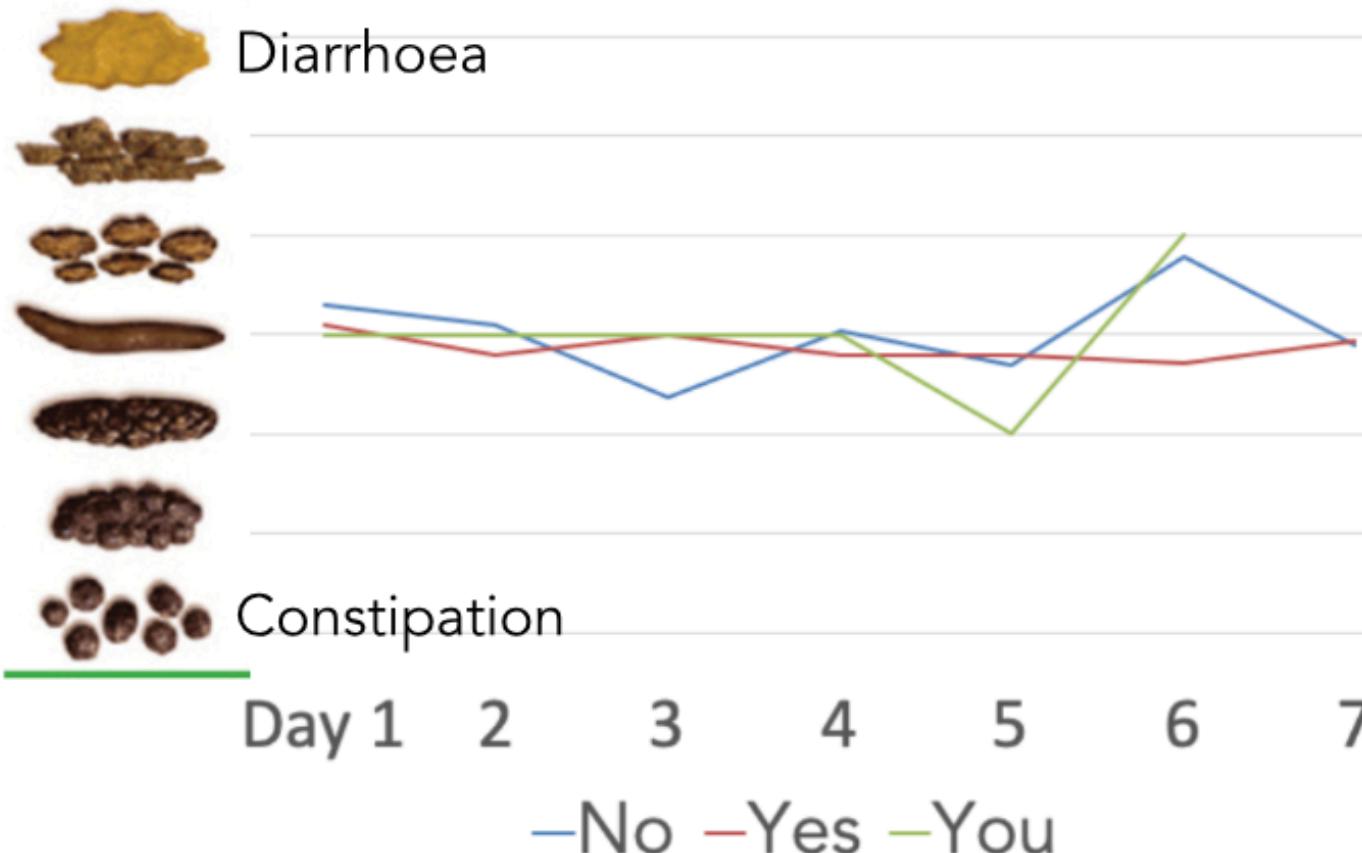
Result

Evidence found for the hypothesis



There was a significant difference between people who drank kombucha vs. not

How does your week compare?



Why this experiment?

Papers about kombucha's benefits do not look specifically at stool consistency. Dufresne and Farnworth (Tea, Kombucha, and health: a review, 2000) give an overview of kombucha benefits (mostly from drinkers' testimony).

How does the experiment work?

39 participants, for a week



Limitations

1. Self-reported data can be biased
- 2.

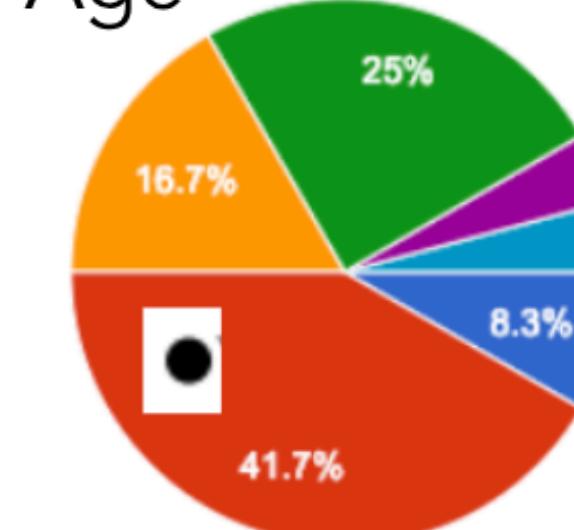
Participant comments

"I did learn to pay more attention to how food/activities affect my digestion"

"I learned that i have healthy poops!"

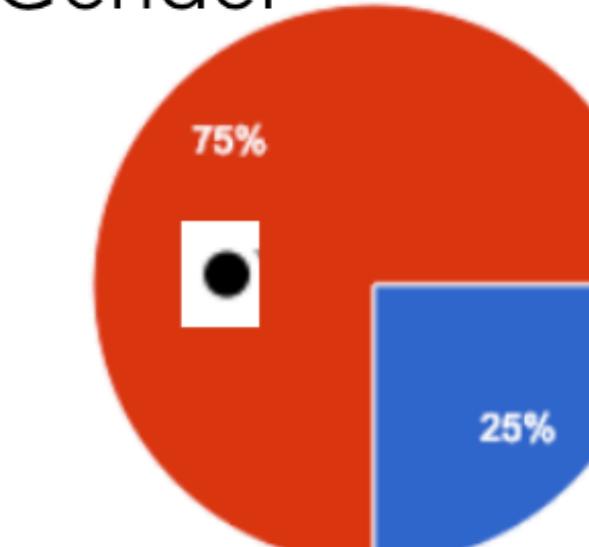
Who participated in this experiment?

Age



Your sample is here

Gender



Male
Female
Prefer not to answer

Experimenter

Austin Durant, Fermenters Club, San Diego + Adriana Daudt Grativol, Brewer, Rio

MEECS in MOOCs

Move

Eat

Engage

Cogitate

Sleep