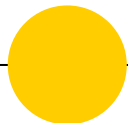


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Fellowship Proposal

Alexis T. Baria, PhD





Hi!

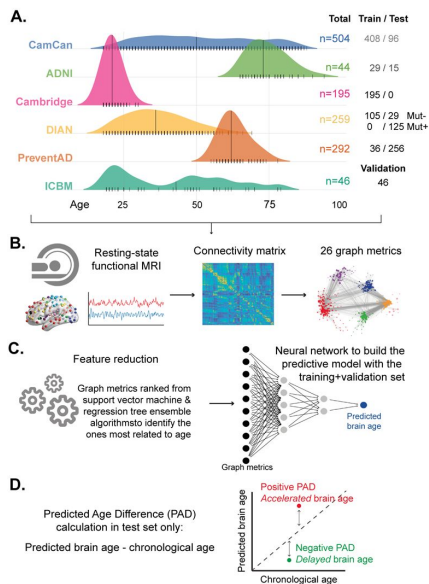
A few things about myself...



I'm a neuroscientist

Accelerated functional brain aging in pre-clinical familial Alzheimer's disease

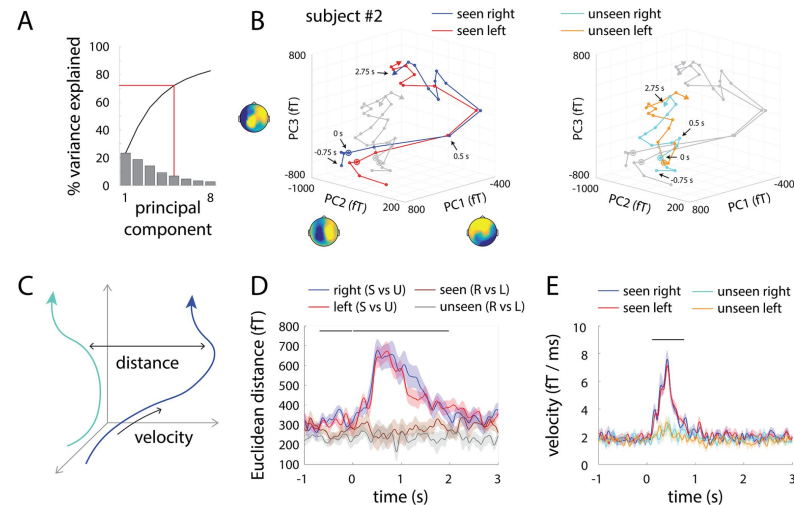
Julie Gonneaud,^{1,2*} Alex T. Baria,¹ Alexa Pichet Binette,^{1,2} Brian A. Gordon,³ Jasmeer P. Chhatwal,⁴ Carlos Cruchaga,³ Mathias Jucker,⁵ Johannes Levin,⁶ Stephen Salloway,⁷ Martin Farlow,⁸ Serge Gauthier,¹ Tammie L.S. Benzinger,³ John C. Morris,³ Randall J. Bateman,³ John C.S. Breitner,¹ Judes Poirier,¹ Etienne Vachon-Presseau,^{9,10,11a} and Sylvia Villeneuve,^{1,2,*} for the Alzheimer's Disease Neuroimaging Initiative,[†] the Dominantly Inherited Alzheimer Network (DIAN)^{††} and the PREVENT-AD Research Group^{†††}



RESEARCH ARTICLE

Initial-state-dependent, robust, transient neural dynamics encode conscious visual perception

Alexis T. Baria^{1,2*}, Brian Maniscalco^{1,2*}, Biyu J. He^{1,2,3*}





I'm a data scientist

POTATO, AU GRTN
DHY REDUC SDM

Contextual Term Expander

POTATO, au gratin
dehydrated reduced sodium

POTATO, au gratin
dehydrated reduced sodium

Open-Access Semantic Network

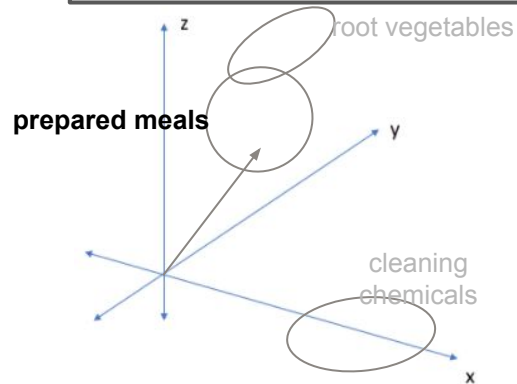
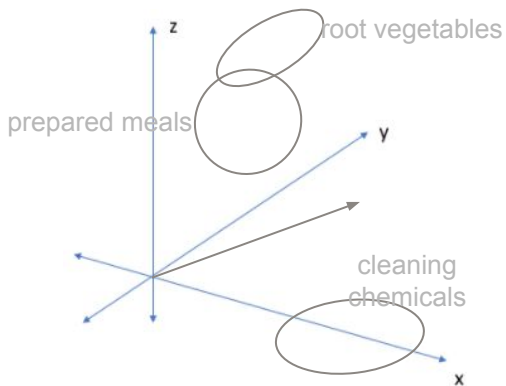
Related terms

en au gratin

- en breadcrumb →
- en browned →
- en cheese →
- en crust →
- en cooked (a, wn) →
- en cooked (a, wn) →

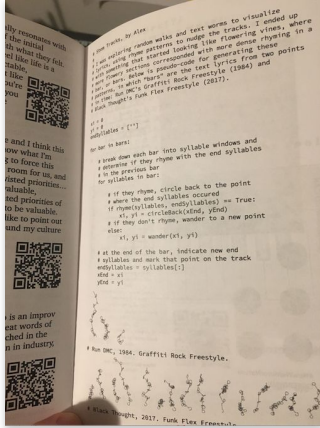
en sodium

- en table salt →
- en salt →





I'm a lyricist



The brain as a computer as a brain: neuroscience and the social implications of the computational metaphor

Authors: Alexis T. Baria¹ and Keith Cross²

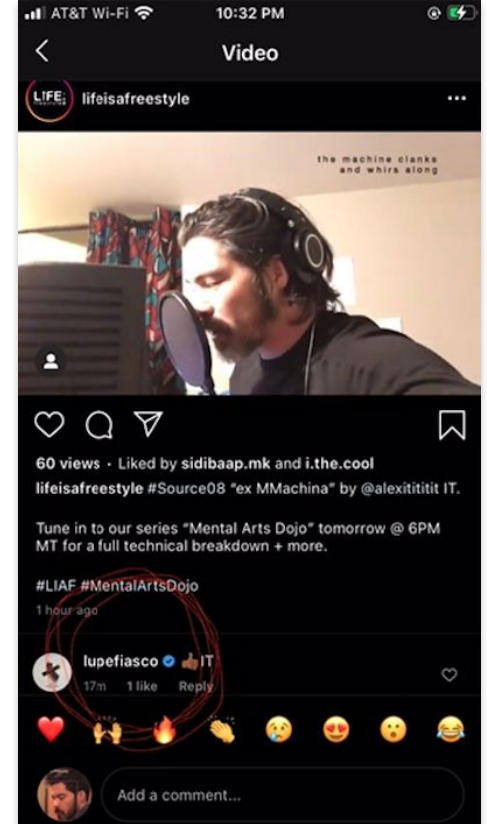
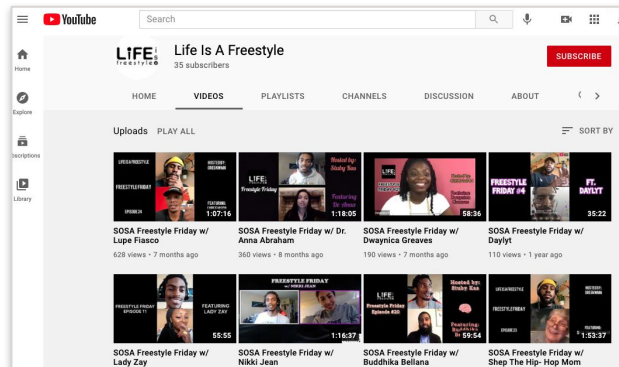
Affiliations:

¹Society of Spoken Art, New York, NY, USA.

²Curriculum Studies Department, College of Education, University of Hawai'i at Manoa, Honolulu, HI, USA.

Abstract

The Computational Metaphor, comparing the brain to the computer and vice versa, is the most prominent metaphor in neuroscience and artificial intelligence (AI). The appropriateness of the metaphor is highly debated in both fields, particularly with regards to whether it is useful for the advancement of neuroscience and computer science, but scholars have devoted considerably less attention to how the computational metaphor is used outside of the lab and in society at large. Recently publicized concerns over AI bias perpetuating systemic racism, genderism, and ableism suggest that the term "artificial intelligence" is misplaced, and that a new lexicon is needed to describe these computational systems. Thus, there is an essential question about the Computational Metaphor and its effects beyond the lab that is rarely asked: whom does it help and whom does it harm? This essay invites the neuroscience community to consider the social implications of the field's most controversial metaphor.





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Fellowship Proposal



Are neurotech and mental health consumer products worthy of trust?



Consumer neurotech lacks oversight

INSIGHTS

POLICY FORUM



SCIENCE AND REGULATION

Oversight of direct-to-consumer neurotechnologies

Efficacy of products is far from clear

By Anna Wexler^a and Peter B. Reiner^a

UNCLEAR EFFICACY, POTENTIAL HARMS

These products are neurotechnologies inso-

Direct-to-consumer marketing of neurotechnologies is on the rise.

gains from brain-training games are generalizable (3), and whether the behavioral effects of EEG neurofeedback (4) and mental health apps (5) are due to placebo.

tDCS devices present the possibility of overt harms such as skin burns, which are reported by a small portion of users (6). Also worth mentioning are the potential psychological harms from DTC neurotechnologies. For example, many consumer EEG devices purport to “read” one’s emotional state (e.g., as stressed, meditative, or focused). Yet these devices have not been independently validated and may provide false information. If a consumer EEG device erroneously shows that an individual is in a stressed state, this may cause him or her to become stressed or to enact this stressed state, resulting in unwarranted psychological harm (7). Individuals may learn from a smartphone app that they have symptoms of depression—yet the diagnosis is provided without support structures that exist within the medical realm, such as a psychologist or mental health counselor.

PUBLIC UNDERSTANDING AND ETHICS

It is difficult for the public to assess the validity of claims made by DTC neurotechnology companies. Even those who are interested in developments in neurotechnology see navigating product claims as a key concern in the brain fitness field (8). Research has found that the public is unsure

Concerns

No oversight / regulation

No safety / efficacy standards

No transparency



Messaging is misleading

Bloomberg Businessweek

Can a \$110 Million Helmet Unlock the Secrets of the Mind?

Bryan Johnson, who made a fortune in online payment processing, has spent a lot of it building hardware meant to radically expand science's understanding of the brain's aging and effects on the body.

By Ashlee Vance

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Post

Email

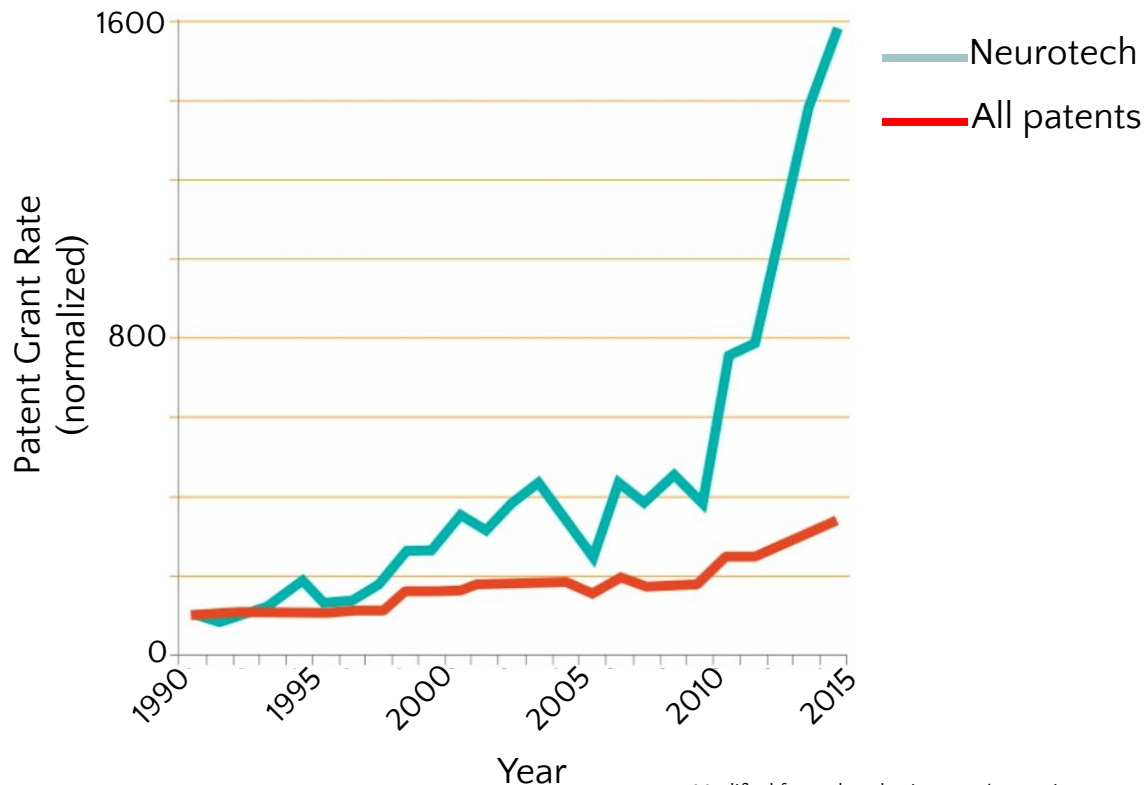
Over the next few weeks, a company called Kernel will begin sending dozens of customers across the U.S. a \$50,000 helmet that can, crudely speaking, read their mind. Weighing a couple of pounds each, the helmets contain nests of sensors and other electronics that measure and analyze a brain's electrical impulses and blood flow at the speed of thought, providing a window into how the organ responds to the world. The basic technology has been around for years, but





Private investments are unprecedented

Nielsen
Microsoft
IBM
Medtronic
Facebook
Neuralink (Tesla)
GlaxoSmithKline





Devices available on market

Muse



Dreem



Neorhythm



BrainTap



Emotiv



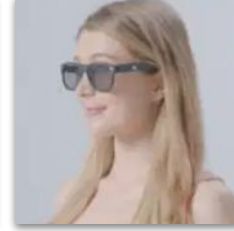
Neurocity



Mendi



Coming soon
Blueberry



Kernel

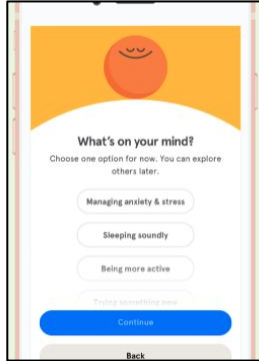




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Neurotech and Mental Health App Guide

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Headspace App



Muse Headband



Curable App



Neurable Headphones



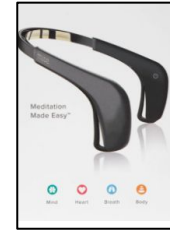
Kernel Flow



Facebook Wristband

muse

Muse Headband



What is it for? Muse is a device that uses brain activity to guide you through meditation.

What does it collect? Brain activity, heart rate, movement, user-entered data, location

Does the product use AI? Yes

Does the AI use personal data to make decisions? Perhaps -- Muse appears to use personal data for targeted marketing.

Does the product offer explanations about AI-based decisions? Unknown

Is your data kept private? Muse claims they do not share data without explicit permission. Their [privacy policy](#) does opt you in to data sharing if you want certain app functionality.

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confidentiality



Muse



Fisher Wallace
Stimulator

Website

choosemuse.com

fisherwallace.com

Device Type

This is an EEG (electroencephalograph) device which records electric fields from the surface of the scalp.

This is a TCDS (transcranial direct stimulation) device which emits a small electrical current through the scalp.

Proposed Use

The device uses electrical signals from the brain to help the user track their brain state and guide them through meditation.

The device directly stimulates the brain with electricity in attempt to improve mood and sleep.

Background

The brain emits electrical signals which have been shown to distinguish different cognitive and physiological states. These signals are known to be detectable with laboratory-grade equipment.

Direct electrical stimulation of the brain using physically implanted electrodes is known to modulate behavior and physiology. However, the research on non-invasive stimulation devices like this is less conclusive.

Device Research

None available

Fisher Wallace conducted three clinical trials on the device and report a significant decrease in depression. The authors report no conflicts of interest ([link to article](#)).

We found no research linking claims to improved sleep.

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- > What is neurotechnology?
- > Does neurotechnology “read the mind”?
- > How is consumer neurotechnology used?
- v Should I be concerned about my privacy with these devices?

This depends on a lot of factors. Like any mental-health app, data can be used and protected differently for different companies. Some neurotechnology devices are not app-based or connected to smart-phones and thus pose little risk to the user for losing control over their data. But for the ones that are, we recommend reading these [guidelines](#) to learn more about neurotechnology privacy risks.

- > Does neurotechnology alter the way my brain works?
- > Are there alternative devices with the same benefit as neurotechnology?



Application to other emerging biometric technologies

Facebook Wristband
(electromyography)



Levels
(blood glucose
monitoring)



Lumen
(CO2 monitoring)





The framework is already laid out

Be Smart. Shop Safe.

How creepy is that smart speaker, that fitness tracker, those wireless headphones?
We created this guide to help you shop for safe, secure connected products.

[All](#) [Best Of](#) [Dating Apps](#) [Smart Home](#) [Toys & Games](#) [Entertainment](#) [Wearables](#) **[Health & Exercise](#)** [Home Office](#) [Pets](#) [Sex Toys](#)

☐ *privacy not included

Jabra
Jabra Elite 85T

Withings
Withings Thermo

Sennheiser
Sennheiser Momentum True Wireless 2

Withings
Withings Body Smart Scales

Sony
Sony WF-1000XM3

Garmin
Garmin Vivo Series

Garmin
Garmin Forerunner Series

Garmin
Garmin Venu

Apple
Apple Air Pods & Air Pods Pro

Peloton
Peloton Tread

Hydrex, Inc.
Fight Camp

Garmin
Garmin Index Smart Scale

Withings Thermo

Withings \$99.95

Wi-Fi Bluetooth

Review date: 11/02/2020

Withings little smart thermometer lets you take a temperature without coming in contact with the body, which is cool in the age of coronavirus. It's got a brightly lit display that can track the temperature readings of up to eight people. And it will sync temperature readings with the smartphone app automatically over WiFi so no need to Bluetooth sync. Based on your temperature and symptoms the app can recommend when it's time to take action. Withings even works with Boston Children's hospital to help provide education on proper medication and doses. Unlike the Kinsa smart thermometer, Withings doesn't share data to help determine public health outbreaks in an area.

What could happen if something goes wrong

Withings seems to do a good job protecting your privacy and security. They don't share or sell your data and have an easy to read privacy policy. Which is all great for a device that takes your temperature because you don't need the world knowing just how hot you are (or if you have a fever).

How creepy do you think this is?



Not creepy

Super creepy

Vote & see results

1573 VOTES

Privacy

Can it snoop on me?

Camera

Device: No
App: No

Microphone

Device: No
App: No

Tracks Location

Device: No
App: Yes

What is required to sign up?

Email

Yes

Phone

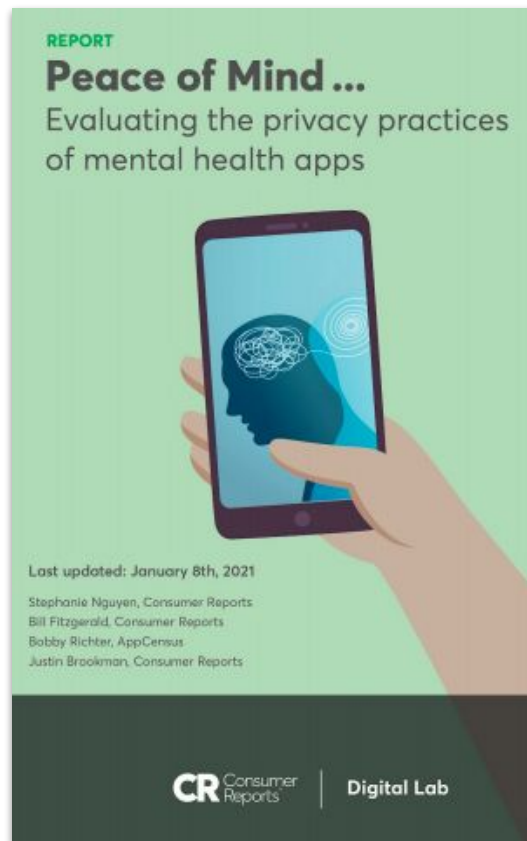
No

Third party account

No



The framework is already laid out





The framework is already laid out



Calm Review

STRESS AND ANXIETY

MOOD DISORDERS

SLEEP



Credibility

4.67 / 5.00

Expand Details



User Experience

4.40 / 5.00

Expand Details



Transparency

Acceptable

Expand Details



Reviewed by
Nancy A. Haug, Ph.D.

Read Review



Forming a consumer working group

INSIGHTS

POLICY FORUM



SCIENCE AND REGULATION

Oversight of direct-to-consumer neurotechnologies

Efficacy of products is far from clear

By Anna Wexler^a and Peter B. Reiner^a

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Forming a consumer working group

INSIGHTS

POLICY FORUM



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...funding agencies, and the public at large.

We envision the working group, which would be housed independently or within a reputable third-party organization, as drawing on the expertise of scientists, health professionals, consumer groups, industry representatives, ethicists, regulators, and funders. The working group would survey the current landscape, incorporating new domains of DTC neurotechnology and revising its appraisals. The group's mandate would include anticipating future developments, with an eye toward possible ethical concerns.

SCIENCE AND REGULATION

Oversight of direct-to-consumer neurotechnologies

Efficacy of products is far from clear

By Anna Wedder* and Peter B. Reiner*

UNCLEAR EFFICACY, POTENTIAL HARMS

These products are neurotechnologies.



How would **Blocked for confidentiality** help form the working group?

- Opportunity for systematic survey of neurotech products
- Opportunity to unify resources and researchers
- It's not too early, and it's not too late
- Consumer Reports is a trusted name



Forming a consumer working group

IEEE Neuroethics Framework

Get Engaged





Project timeline

Planning and
preparation

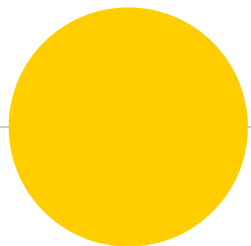
Research and
analysis

Guide
development

flex



10 months



Thank you!

Any questions ?

You can find me at

- <https://www.alexbaria.com>
- <http://neurosighingfits.blogspot.com/>
- alexis.t.baria@gmail.com
- @AlexBaria

Appendix



Ethnographic Report on Neurotech and Mental Health Data Stewards

Consumer neurotechnology and the stewards of “mind-reading” data

Alexis T. Baria

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With the fast-paced acceptance of AI technology into business, healthcare, and education, the demand for personal data is greater than ever. Information about individuals’ health and behavior is increasingly commodified; gleaned from fitness trackers, language processors, and facial recognition, it is constructed into marketable digital profiles that can be used to predict one’s perceptions and intentions (Schmidt et al., 2019; Stark, 2018). But now, perceptions and intentions are being obtained more directly, from perhaps the most personal and intimate space of all: the brain. Brain-machine-interfaces (BMI), coupled with AI, allow for a physically-direct translation of the brain’s electrical activity into readable conscious and unconscious (and private) information. And as BMIs have become more mobile and accessible, there is a growing market for direct-to-consumer (DTC) neurotechnology devices, software applications, and online services. With that also comes growing concerns about how the data is being used and by whom.

Questions

Who are these people?

What are their understandings of the data?

What are their experiences with the data?

What are their intentions?

ETHICS OWNERS

A New Model of Organizational
Responsibility in Data-Driven
Technology Companies



**DATA&
SOCIETY**

Emanuel Moss
Jacob Metcalf

Opportunities

Publish public case studies

Talk about failures

Support colleagues in civil society

Highlight possibilities of social benefit and justice