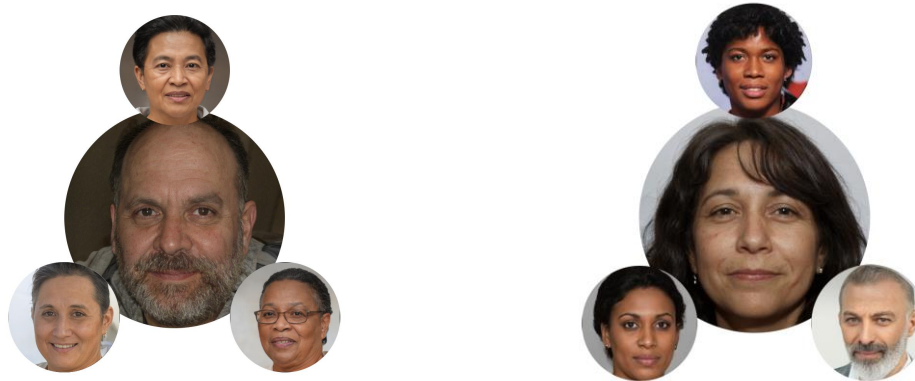


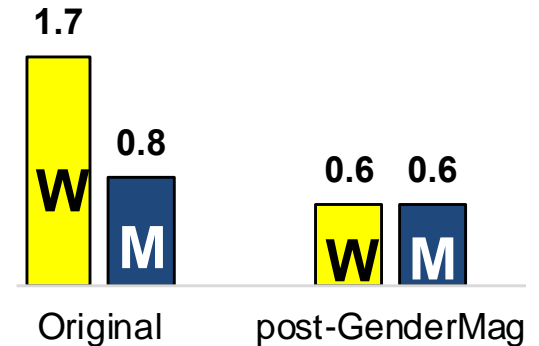
# Systematic Inclusive Design: From GenderMag to SocioeconomicMag



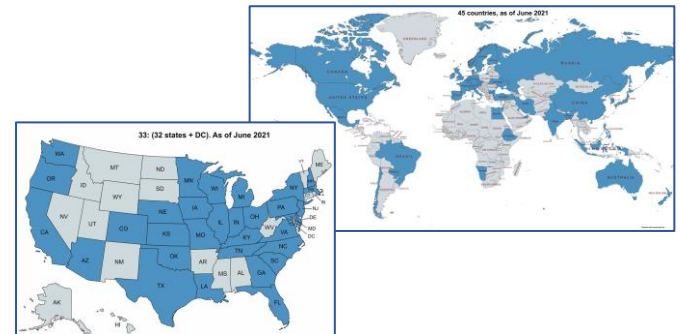
Margaret Burnett, Anita Sarma, and many collaborators  
Oregon State University  
[burnett@oregonstate.edu](mailto:burnett@oregonstate.edu)

# GenderMag

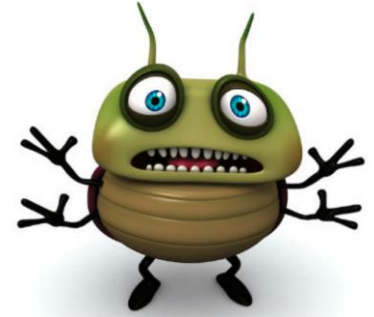
- GenderMag is
  - a method/process
  - for software practitioners
  - to find and fix:
    - biases/“bugs” in workflows and user experiences
    - that disproportionately affect some genders



- First published in 2016
  - Usage has spread widely



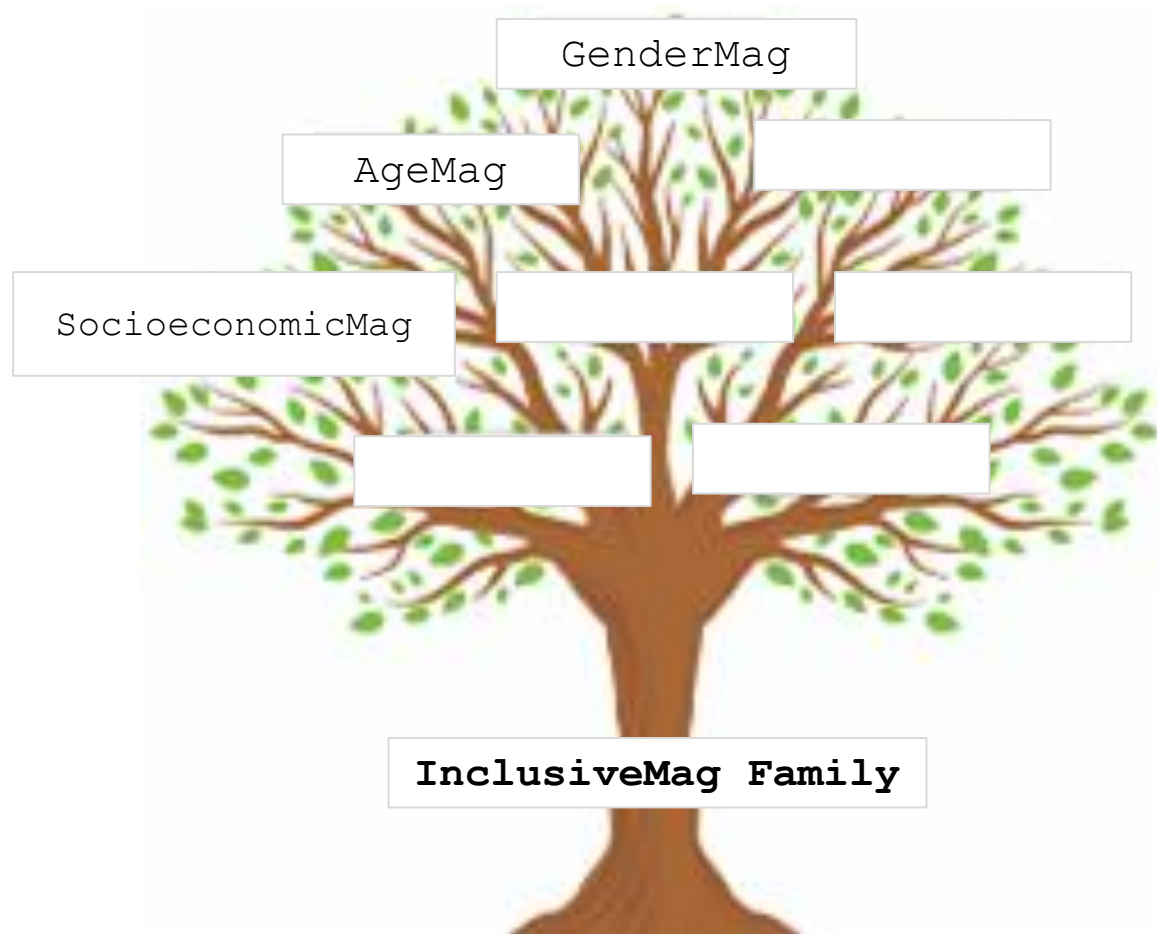
# SES & Software



- Q: How do these relate?  
*We think* – A: Software has **SES** -biased “bugs”.
- Q: You’re kidding! Where?
  - A: in the software you create.
  - A: in the tools you use to do it.
- Q: How?
  - A: **SES** factors → ways people problem-solve.
- Q: How much does this really matter?  
*We think* – A: A lot! Like a “cognitive tax” you pay even if you hit one of the bugs.



# The InclusiveMag Family



# The Emerging SocioeconomicMag Method

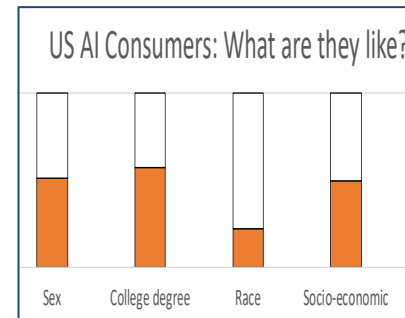
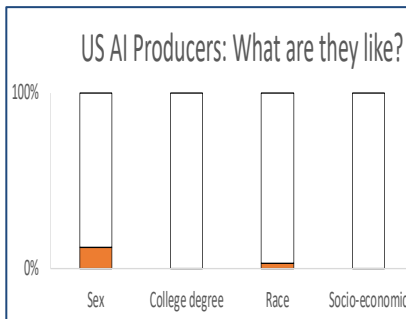
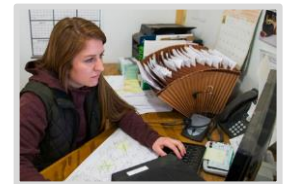
- **Socioeconomic Status** Inclusiveness **Mag**nifier
  - Process: Evaluate software's inclusiveness
  - Scope: When user is problem-solving
    - e.g., learning, debugging, budgeting, planning transportation, filling out government forms, ...
- Status:
  - (Almost) completely unproven!
  - But you can't



# Need an SESMag?



- Example: User-facing AI (e.g., recommenders)
  - The temptation is to design for ourselves



Sources:  
US Census, WIRED, AlnowInstitute.org, NY Times, Washington Post, Reuters., Bureau Labor Stats, Zippia, NC Farmworker Health, Tufekci, Z. Algorithms in our midst: Information, power and choice when software is everywhere. ACM CSCW. 2015.



Q: But my tech is SES-neutral, right?  
A: Let's find out, with SESMag...

# How SESMag will work




- 1. Pick a persona.
- 2. Pick Tech & Scenario:
  - Tech: On the resources page...
  - Scenario: “Find out how much my CS textbooks cost”
- Walk thru scenario
  - Like this...

Classes & Costs	
Want Information specific to your major? (Select your major)	
Q Computer Science	
Engineering Majors	
Your first year may look like:	
Course	Cost
COMM 224	\$ 820
HHS 231	\$ 635
WR 121	\$ 740
CS 160	\$ 904
Student Fees	\$ 414
Fall Term Cost: <b>\$ 3,558</b>	
Course	Cost
MTH 251	\$ 1,150
PH 201	\$ 1,200
PSY 201	\$ 755
CS 161	\$ 921
Student Fees	\$ 132
Winter Term Cost: <b>\$ 4,158</b>	
Course	Cost
MTH 252	\$ 950
PSY 202	\$ 880
FILM 110	\$ 740
CS 162	\$ 890
Student Fees	\$ 132
Spring Term Cost: <b>\$ 3,562</b>	
Total First Year Cost: <b>\$ 11,278</b>	
<a href="#">Help me save money &gt;</a>	

# “Find out my CS tex

- Subgoal #1: What do you  
Dav to be thinking?
- Will Dav have formed this s
  - Yes/no/maybe. Why?

Consider Dav's *Risk* OR ...



CS 160	\$ 904
Student Fees	\$ 414
Fall Term Cost: <b>\$ 3,558</b>	
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<a href="#">Help me save money &gt;</a>	



# “Find out how much my CS textbooks cost”



- Action #1: “Tap on CS 160”:
  - Q1. Will Dav do this?
    - Yes/no/maybe. Why?

*Consider Dav’s Access to Reliable Tech OR  
Risk OR  
Tech self-efficacy OR  
Attitude toward Authority*

## Classes & Costs

See each  
course’s  
books

(Select your major)

### Engineering Majors

First year may look like:

Course	Cost
COMM 224	\$ 820
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Fall Term Cost: **\$ 3,558**

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Total First Year Cost: **\$ 11,278**  
[Help me save money >](#)

# “Find out how much my CS textbooks cost”



- Q2. If action is taken, will Dav see progress?
  - Yes/no/maybe. Why?

X

Course CS 160 - Introduction to Computer Science

CS 160 is the Introduction to the computer science field and profession. Team problem solving. Introduction to writing computer programs.

Description	Costs
Textbook: Starting out with Python 3rd Edition (required)	<input checked="" type="radio"/> \$40.00 Used <input type="radio"/> \$ 85.00 New <input type="radio"/> I won't be buying this textbook
Tuition \$288 Per credit x 3 credits	\$ 864
Total Class Cost	<b>\$ 904</b>

# Behind the SESMag Process: SESMag's Multi-Personas



- SESMag Multi-Personas:
  - Are customizable "representatives" of a range of users...
- ...from the perspective of 6 facets:
  - *Access to Reliable Technology*
  - *Technology Self-Efficacy*
  - *Communication Literacy/Culture/Education*
  - *Perceived Control & Attitude toward Authority*
  - *Attitude toward Technology Risks*
  - *Privacy and Security*

# Dav (David, Davu, Davida)



**Background/interests:** \*\*write me\*\*

## **Access to Reliable Tech:**

Dav has spotty **access to reliable devices** with reliable **internet** access, so **relies mainly on a mobile phone** for internet access. Dav also often uses **shared devices or public devices** to get work done. This affects how, when, and why Dav uses technology.

## **Communication**

### **Literacy/Education/Culture:**

Dav went to **school in a low-SES community** which offered only a basic education. Now Dav **rarely chooses to read lengthy or complex text** (e.g., newspapers), and some cultural/literary allusions are unfamiliar to Dav. Although the school had a few **older computers**, it offered **little technology education**.

## **Attitudes toward Technology**

**Risks:** Dav's life is crowded, so they **rarely have spare time**. So Dav is risk-averse about **using unfamiliar technologies that they might need to spend extra time on**, even if the new features might be relevant. Dav instead performs tasks using familiar features, because they're more predictable about what Dav will get from them and how much time they will take.

## **Tech Privacy & Security:**

Dav is very **protective of their personal information**, like their location and identity. Dav's caution stems from their privacy/security being particularly at risk because of having to share devices, prior negative experiences with high surveillance, prior experiences with credit card/identity theft, etc.

## **Perceived Control and Attitude toward Authority:**

Dav does not expect to have much influence over technology's **outcomes**. Instead, Dav views technology as if it represents **an authority figure**, so expects technology to treat Dav as other authority figures do.

## **Technology Self-Efficacy:**

Dav's prior experiences and education have produced a **lower technology self-efficacy** than their peers about using **unfamiliar technology features**. If problems arise with technology, Dav often **blames themselves** for these problems. This affects whether and how they will persevere with a task.

# Dav (David, Davu, Davida)



**Background/interests:** \*\*write me\*\*

## Access to Reliable Tech:

### Access to Reliable

Dav has spotty **access to reliable** with reliable **internet** access, **on a mobile phone** for internet also often uses **shared devices** to get work done. The when, and why Dav uses tech

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# Facet #1: Access to Reliable Tech: Evidence



- Consistent access to reliable tech that's good for the task → how/when/why uses tech
  - 62% of households in poverty have computers, < 50% have internet  
→ use public/shared computers
  - Some low-SES users depend mostly on phones for internet use

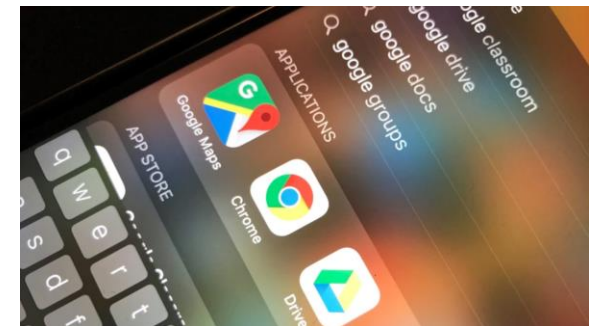




# Facet #1: Access to Reliable Tech: Hypotheses



- H1: Familiarity with certain tech/features will vary by SES:
  - higher-SES: most familiarity with latest tech
  - lower-SES: most familiarity with using mobile phones for tasks traditionally on laptops/desktops



# Dav (David, Davu, Davida)



**Background/interests:** \*\*write me\*\*

## Communication Literacy/Education/Culture:

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# Facet #2: Communication Literacy

## Culture/Education: Evidence



- Tech's "communication language" tied to usability across different SES strata:

— SES > differences in comfort with

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Once deposited into an

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government. Qualified expenses as defined by the federal government are associated with the "prevention or diagnosis of illness." Individuals must keep receipts in HSA to prove that it was used properly. The funds in an HSA can be invested and the money invested can earn interest and dividends, growing in value over time. An HSA provides tax savings in three ways: a tax deduction when a taxpayer contributes to the account; earnings on the account are tax-free; and withdrawals for qualified medical expenses are tax-free. Anyone can establish an HSA regardless of their level of income.

# Facet #2: Communication Literacy/ Culture/Education: Hypotheses

- H1: Tech that's mindful of diverse literacy backgrounds/education will be more SES-inclusive
- H2: Tech that can reflect user's own culture will be more SES-inclusive.



# Dav (David, Davu, Davida)



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## Tech Privacy & Security:

**very protective** of ... location and identity, because:  
... use of mostly **shared devices**,  
... **negative experiences with high surveillance**,  
... experiences with **credit card/identity theft**,  
...

## Technology

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# Facet #3: Privacy & Security Evidence



- Everyone has privacy/security problems, but lower-SES people have more problems
  - ID theft
  - Use of social media
  - Living in crowded housing
  - Sharing devices with people they don't necessarily trust...
- Affects usage, eg:
  - → Some avoid tech when possible
  - → Some avoid all social media
  - → Some delete often/extensively ...

“Privacy is not for me, it’s for those rich women”



# Facet #3: Privacy & Security

## Hypotheses



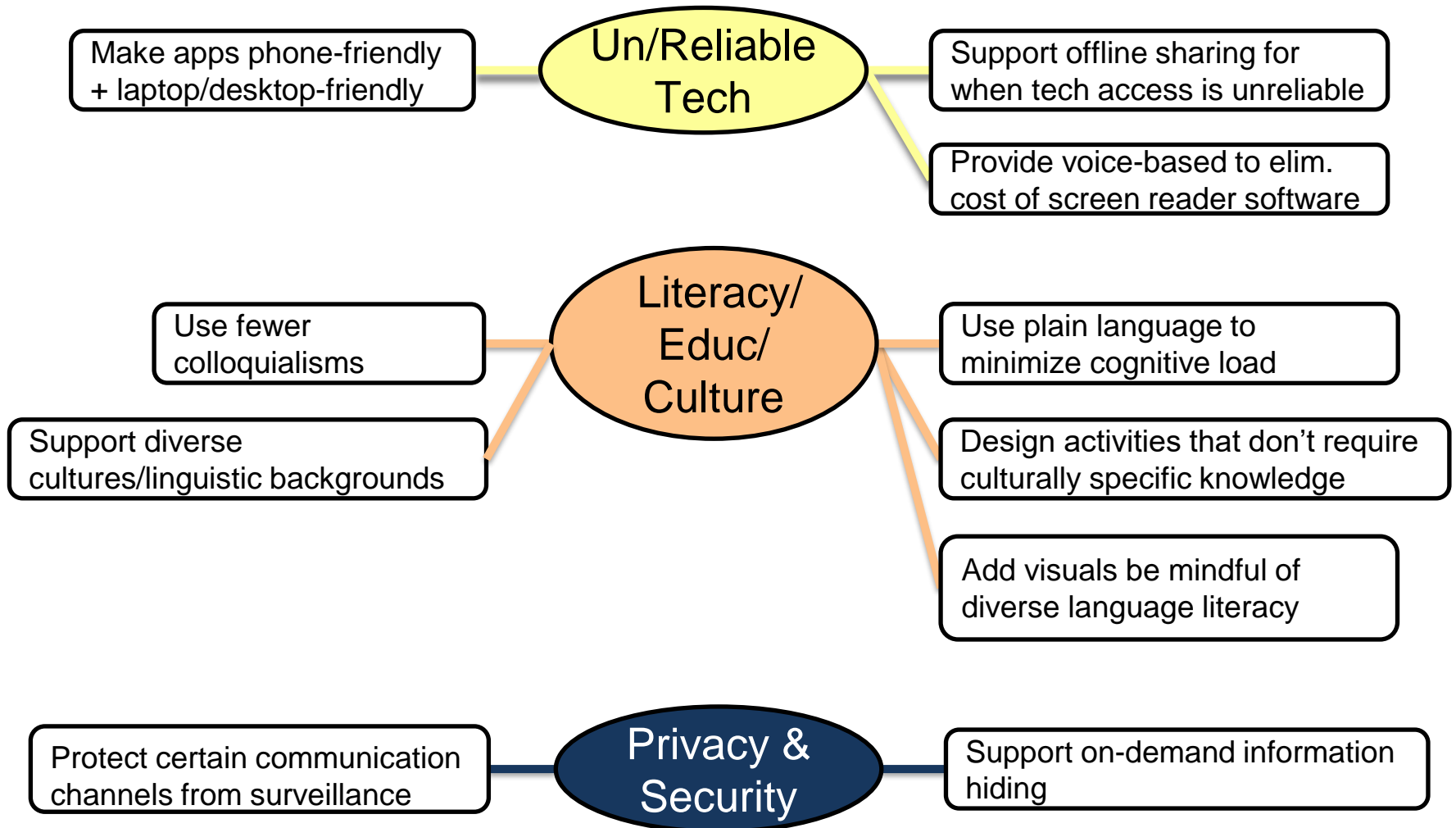
- H1: Users' perceptions of certain tech features as having privacy/security risks will vary by SES.
- H2: Users' usage of those tech features will vary by SES in the same way as in H1.





# Some Design Remedies Exist!

## So if you find things, you can fix them



# Summary:

## This is coming next



Possibility: try teaching (portions of) it in your class.

Let us know how it goes.



<http://gendermag.org>



[burnett@oregonstate.edu](mailto:burnett@oregonstate.edu)









# Facet #2: Technology Self-Efficacy

- User's perception of their own ability to perform technology and computer-based tasks



# Technology Self-Efficacy: Evidence



- Lower computer access contributes to lower computer self-efficacy
- Students in low-SES situations are less likely to experience computer-related courses in their schools
- Individuals in low-SES situations rely on shared devices

# Technology Self-Efficacy: Hypotheses



- H1: Expectation that failing is inevitable when attempting complex technology tasks
- H2: Individuals in low-SES situations will blame themselves
- H3: Unfamiliar technology needs to clearly state where/how to get help
- H4: Failing at complex technology task will be more likely due to a “self-fulfilling prophecy”

# Facet #4: Perceived Control & Authority

- User's belief in their own ability to exert influence over technology's positive or negative outcomes and interactions
  - Attitude towards authority figures and technology's outputs as an authority



# Perceived Control & Authority: Evidence



- Poverty is often accompanied by a lack of agency/control
  - Children raised by parents in low-SES situations tend to defer to authority figures [8]
  - Individuals in low-SES situations are less likely to ask for and seek out help with technological problems [8, 9]

# Perceived Control & Authority: Hypotheses



- H1: Users in low-SES situations that run into errors, dead-end, or unfavorable outcomes, will be more likely to accept them as outcomes to which they have no recourse
- H2: Users in low-SES situations will be less likely to plan or invest time into needed to learn complex technological feature sets, or to plan a complex strategy for overcoming a problem with technology





# Calls for Action



1. In practice: **Try it on your tech** and tell us how it goes.
2. **Help our research** by also letting us come and watch.
3. **Collaborate** by also gathering before/after data on how SES-diverse individuals fare when using your tech.
4. **Fully collaborate** by also funding us to work with you more fully.

**Join in!**



<http://gendermag.org>



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