USENIX Security Symposium 2024

How WEIRD is Usable Privacy and Security Research?

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Background and Motivation

Lack of geographic diversity of user study participants

- Psychology
  - Henrich et al. (2010) : The majority of participants have been reported to be **W**estern, **E**ducated, **I**ndustrialized, **R**ich, and **D**emocratic (**WEIRD**) population.

- Human-Computer Interaction (HCI)
  - Linxen et al. (2021) : "***How WEIRD is CHI?"*** confirming the WEIRD skew of participant samples.

Top HCI conference

- Our study:
  "***How WEIRD is Usable Privacy and Security (UPS) Research?"***
  - quasi-replication of the *Linxen study* for UPS

How does WEIRD skew influence UPS research?

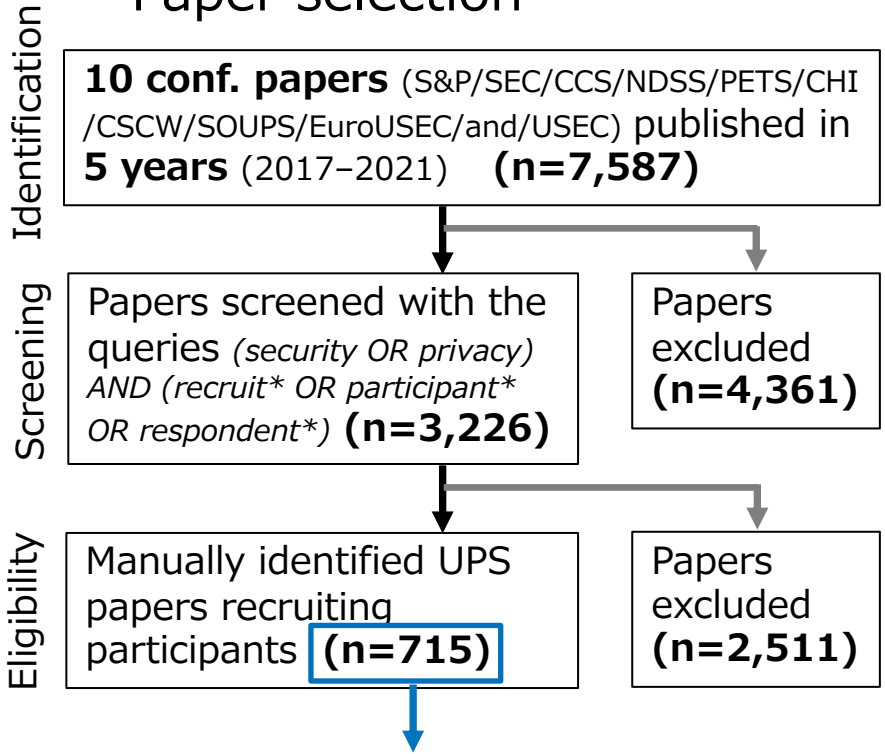
Gaps between WEIRD and non-WEIRD populations

- Misconceptions, privacy preferences, susceptibility to phishing, IT resource usage, security documentation, privacy laws, ...
- Other potential gaps

Gaps may harm the **generalizability** of WEIRD-skewed studies.
→ The findings may **not be beneficial** to non-WEIRD populations.

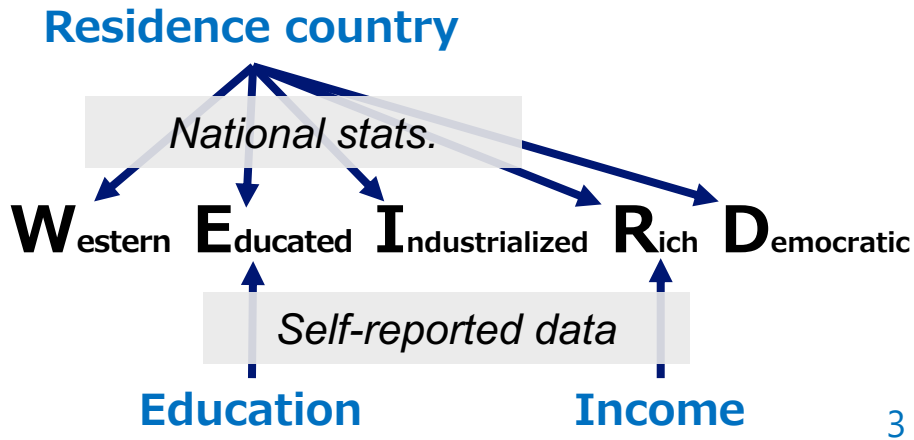
Methodology

- Paper selection



- Extracting info. and coding

Category	Item
Publication	Title, conference, publication year
Participant	Number, **residence country**, **education**, **income**, participant type (expert/non-exp.)
Author	Affiliation, affiliation country
Method and Topic	Study method, recruitment method, research topic, design evaluation (y/n), attack feasibility evaluation (y/n)



Result: Demographic reporting

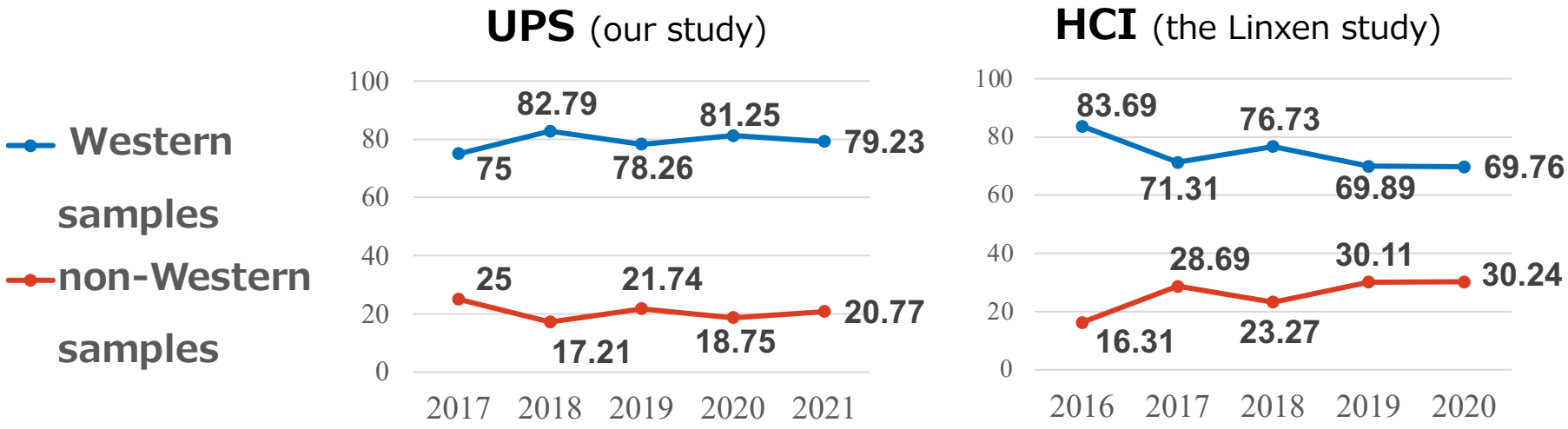
	% Papers		
	Residence country	**Education**	**Income**
#1 Explicitly reported	52% } 68%	35% } 49%	6%
#2 Not reported, but can be inferred	16% e.g., authors in the same countries use local recruitment	14% e.g., recruit university students	(n/a)
#3 Not reported and cannot be inferred	**32%** e.g., authors in multiple countries, online recruitment	**51%**	**94%**

- Lack of the reporting → Reproducibility problems
  - more prevalent in S&P conf. papers (S&P/SEC/CCS/NDSS/PETS) than in HCI/UPS-focused conf. papers (CHI/CSCW/SOUPS/EuroUSEC/USEC).

Result [WEIRD]

Residence country of participants (1)

Participant samples



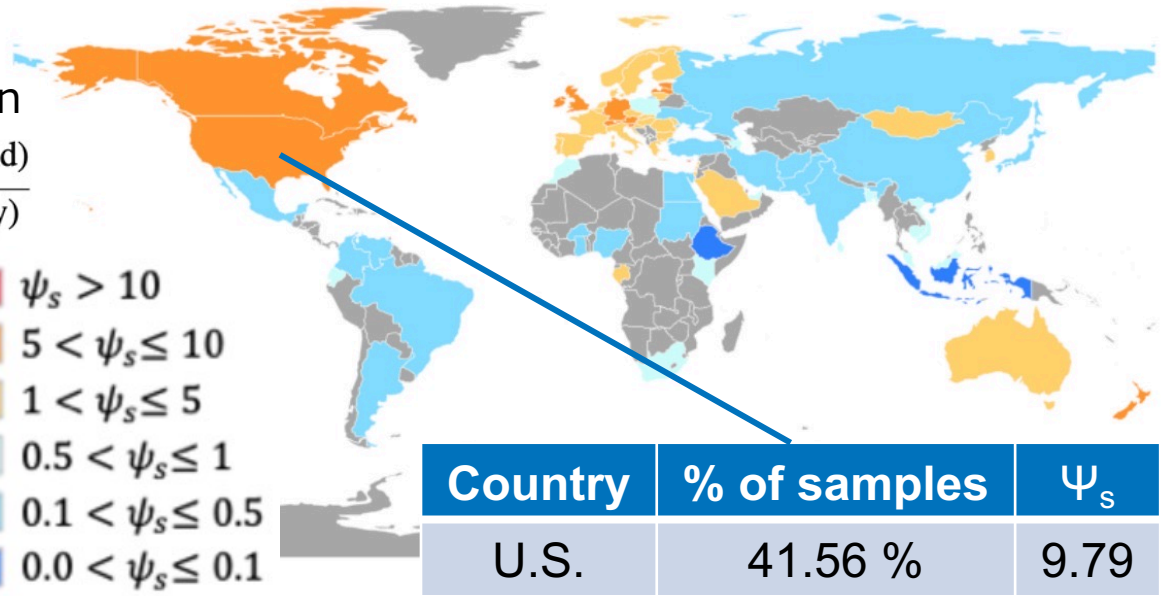
- No increase in non-Western samples over 5 years
- The skew toward Western samples in UPS is greater than in HCI.

Result [WEIRD]

Residence country of participants (2)

Normalized ratio of participant samples based on the population

$$\Psi_s = \frac{n_{samples}\ (\text{country}) \cdot \text{population (world)}}{n_{samples}\ (\text{total}) \cdot \text{population (country)}}$$



Country	% of samples	Ψ_s
U.S.	41.56 %	9.79

Under-represented or marginalized:
Africa, South America, the Middle East, and Asia

Result [wEIRD] Education level, Industrialization, Income (Rich), and Democratic levels

- *From national stats.*:
  Most participant samples come from countries with generally highly educated populations, industrialized (high GDP), rich (high GNI), and democratic (high political-right index).

- *From self-reported data*:
  Majority of participants (71%) had a college-level or higher education.
  Reasons of the skew toward highly educated participants
  - Recruitment within the authors' institution (e.g., university)
  - Recruitment through crowdsourcing (Workers are generally highly educated.)

Result [WEIRD]

Author diversity

Geographic diversity of authors' affiliation

	% Papers
Only Western-affiliated authors	**87%**
Both Western- and non-Western affiliated authors	**10%**
Only non-Western affiliated authors	**3%**

Authors tend to recruit participants only in their country (81% of users studies did so).
→ This causes the Western skew of participants.

Result [WEIRD]

Participant diversity by research topics

		% W-only samples
Participant type	**Non-experts**	85.38% (**Western-skewed**)
	Experts (excluding developers)	88.57% (**Western-skewed**)
	Experts (developers)	66.67% (**Relatively diverse**)
User study type	**Feasibility of cyber attack** User study only for demonstrating the feasibility of the proposed attack (e.g., keystroke inference)	92.31% (**Western-skewed**)

Result [WEIRD]

Participant diversity by study method

- Interviews and lab studies
  - Geographic/linguistic barriers cause authors to **recruit participants closer to them**, e.g., their countries/universities.
- Online surveys
  - Crowdsourcing is commonly used for recruiting participants both inside and outside of authors' country.
  - However, the major crowdsourcing platforms **do not** sufficiently **contribute** to the **geographic diversity** of participants
    - › E.g., Prolific and MTurk mainly target populations in the US and UK.

Discussion: Replication study

- Replications involving non-WEIRD populations
  - UPS-focused conferences emphasize replications in CFP
    - › but existing replication studies rarely focus on non-WEIRD.
  - The **generalizability** and **different insights** from diverse populations

- Diversity within program committee (PC)
  - crucial for understanding and evaluating studies involving non-WEIRD
  - 90% of PC members in UPS are Western-affiliated researchers.
  - Way to increase PC diversity: recruit researchers from non-Western and/or studying non-WEIRD

Discussion: Reproducibility and participant protection

- Reproducibility
  - Many papers lack basic participant demographics.
  - Researchers need to report participant demographics appropriately.
  - ***p-hacking*** (brute-force statistical analysis) is a common pitfall.

- Demographic reporting vs. Participant protection
  - Risks: (1) **oversimplifying** sensitive demographic issues (e.g., nationality in territorial dispute areas) and (2) **exposing** at-risk populations (e.g., political activists and IPV survivors)
  - Researchers need to balance demographic reporting and participant protection.

Discussion: Geographic/linguistic barriers

- These barriers causes **convenience sampling.**
  - e.g., researchers tend to recruit participants closer to them.
- Online recruiting can help overcome geographic barriers, however ...
  - (1) Only people with Internet access can participate.
  - (2) The majority of popular crowdsourcing workers are from the US and UK.
  - (3) Recruiting developers may violate the terms of service of code repositories.
  - (4) Recruiting experts other than developers is more difficult.
- Linguistic barriers remain unsolved...

→ **Authors diversity** and **collaboration with local researchers** are complementary solutions.

Discussion: Research justice considerations

- "*Helicopter research*" (neo-colonial research)
  - It is easy to lead to unilateral exploitation when researchers investigate non-WEIRD populations.
  - E.g., round trips to the Global South to conduct research without involving local collaborators/communities/facilities.

- Equal and synergistic collaboration with local researchers and communities:
  - This approach avoids helicopter research and establishes better, collaborative, and non-colonial science with non-WEIRD populations.

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Thank you!