

Ethics in GIS: Empathy

Trisalyn Nelson

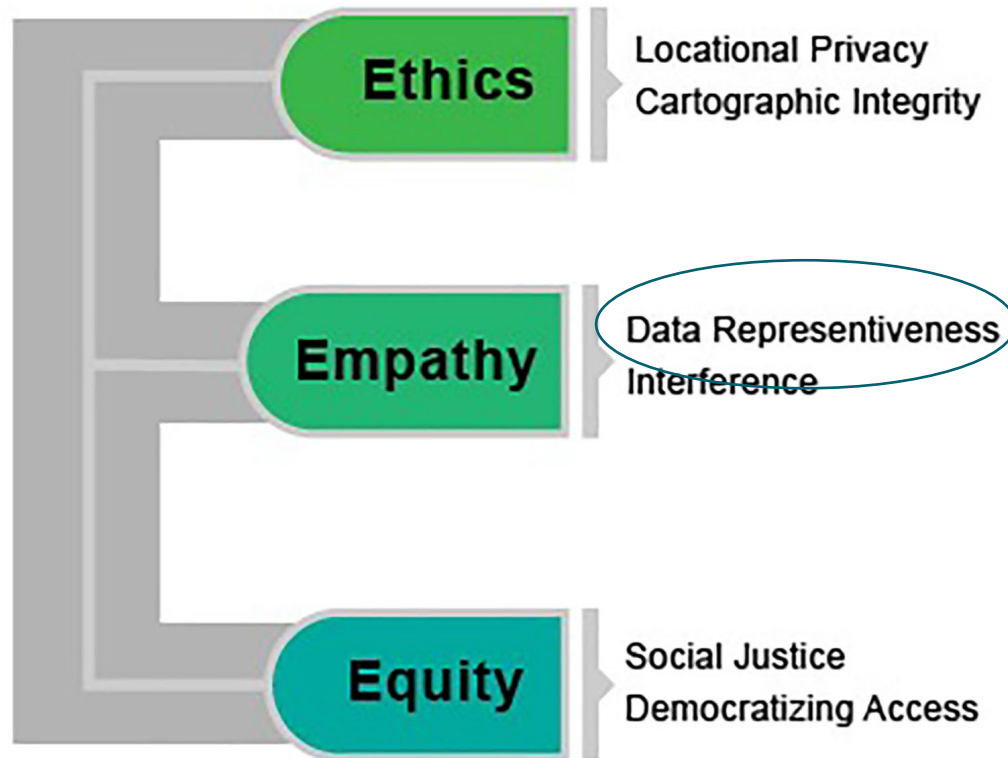
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Accelerating ethics, empathy, and equity in geographic information science

T. A. Nelson^{a,1,2} , M. F. Goodchild^{a,2} , and D. J. Wright^{b,c,1,2}

This contribution is part of the special series of Inaugural Articles by members of the National Academy of Sciences elected in 2021.



Dawn Wright



Mike Goodchild

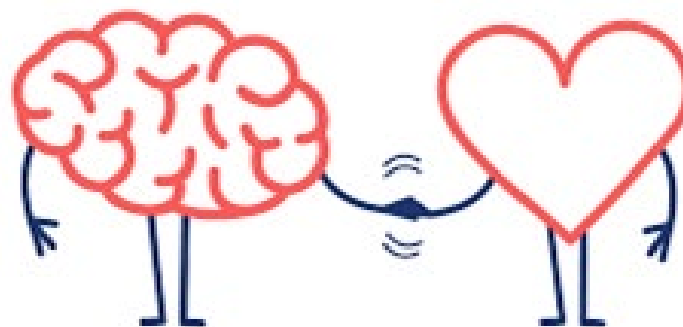
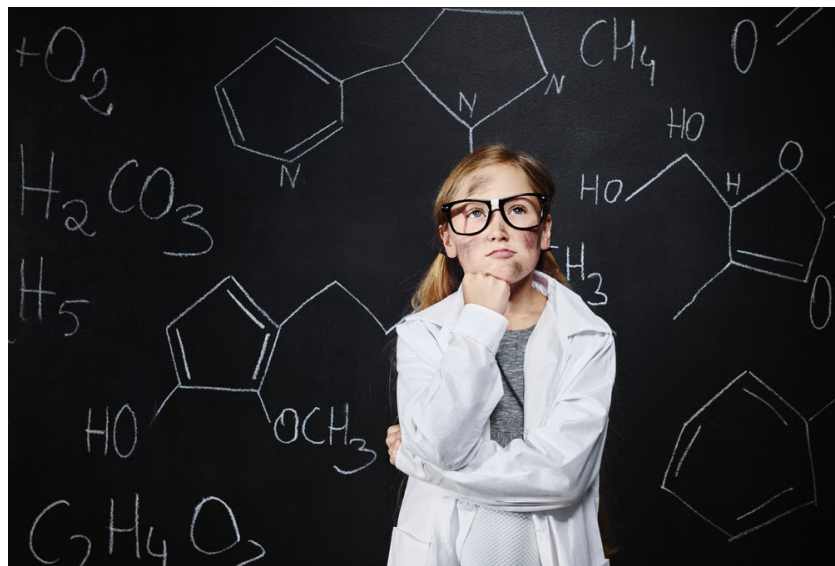


The Emerging GIScientist

Curiosity



**Empathy
& Equity**

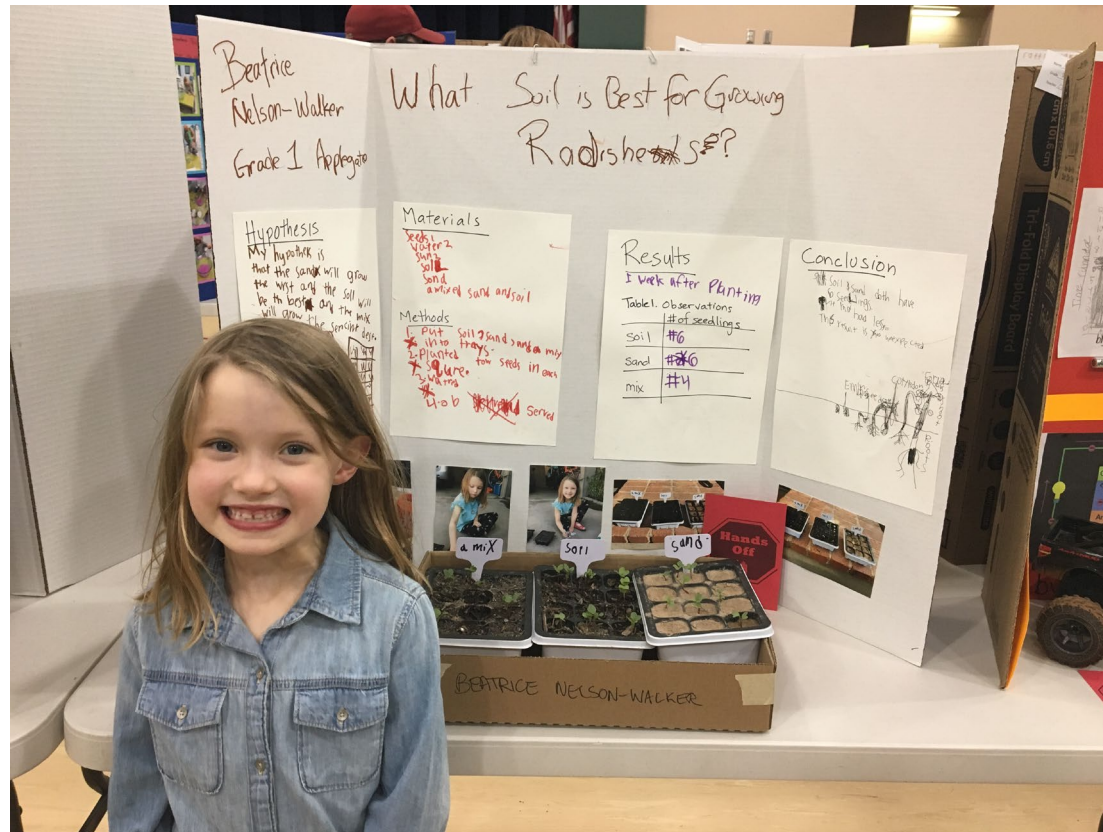


What is Empathy? – A lesson from Beatrice



What is Empathy?

- Good science often generates empathy

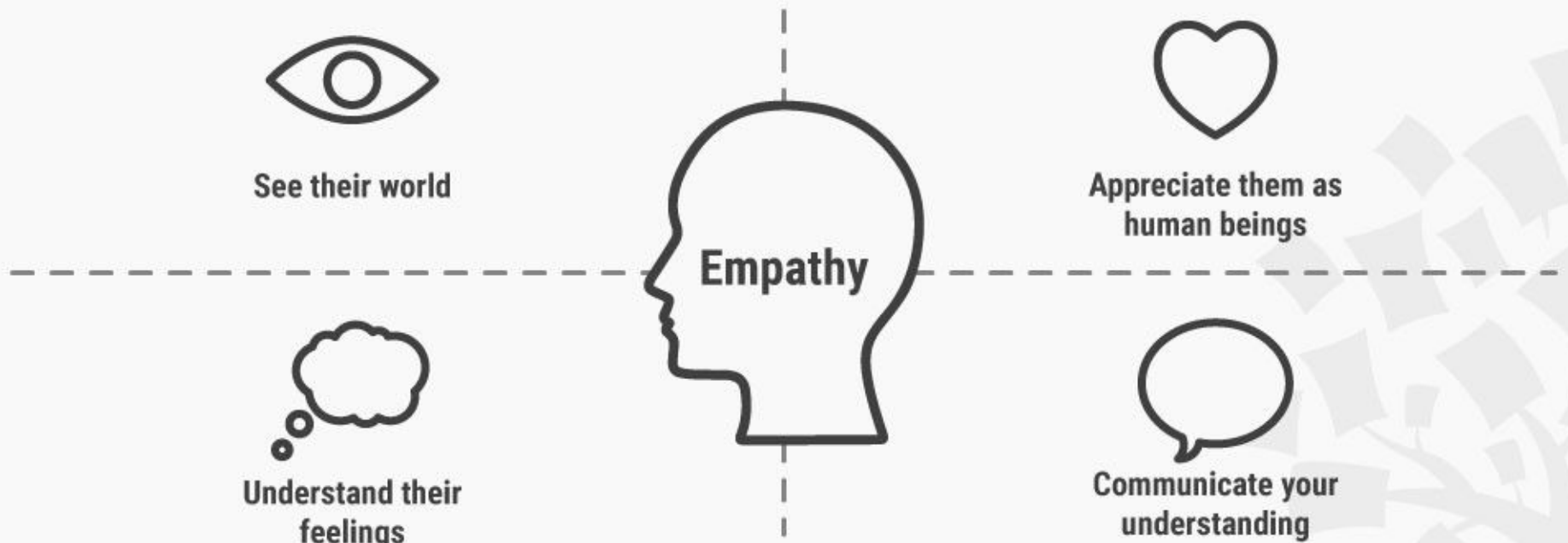


What is Empathy?

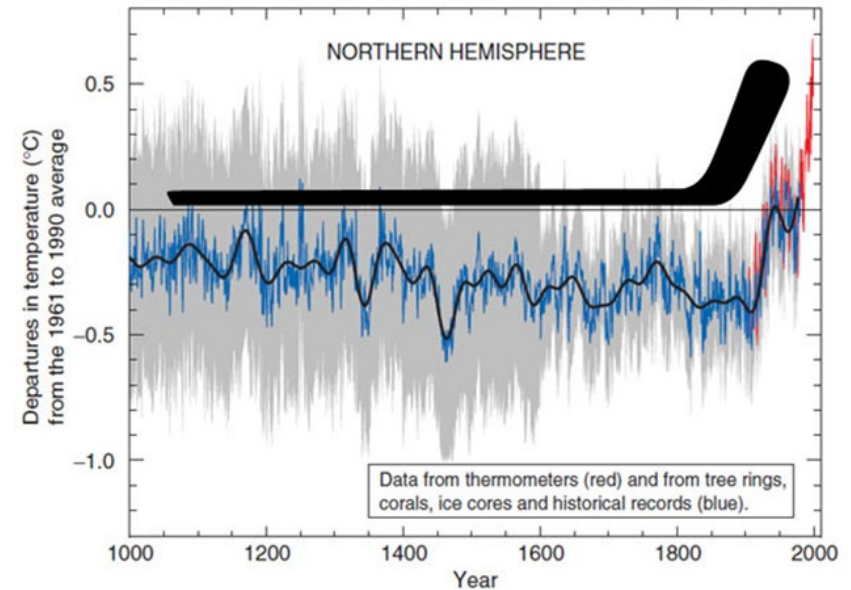
Understanding the feelings of another

Empathy requires

- a curiosity or interest
- knowledge
- acknowledgement of what you don't know

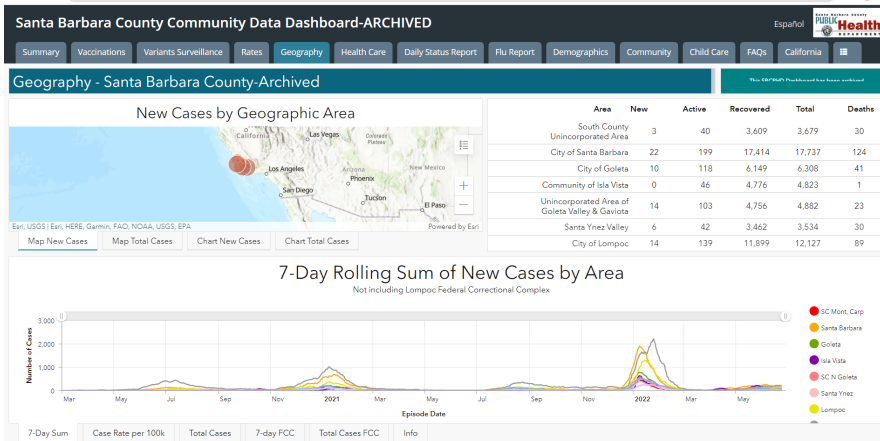


Geography poised to increase empathy

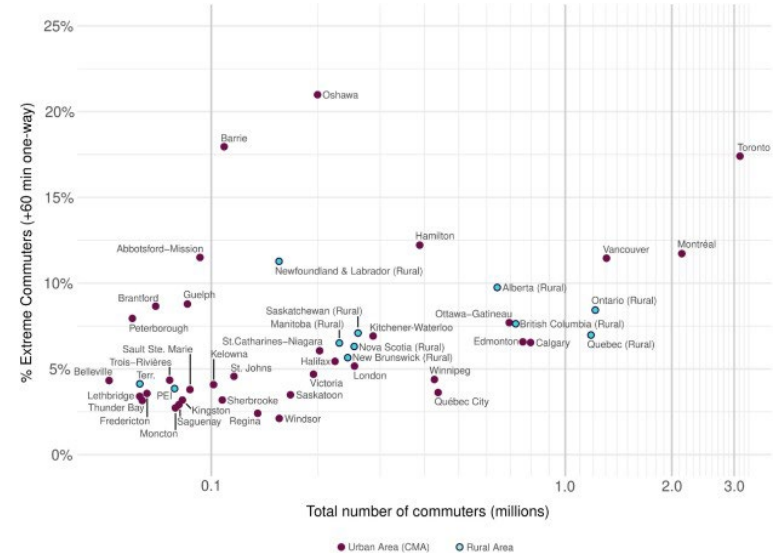


Geography uncovers spatial variation

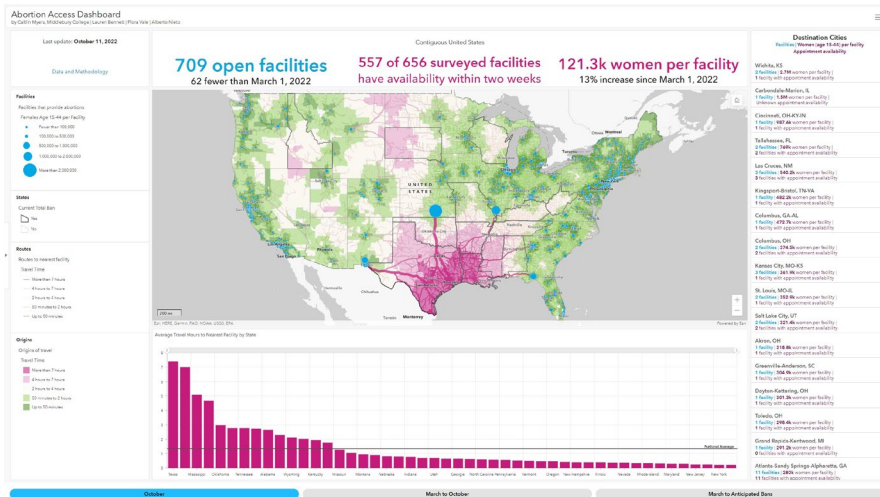
COVID-19



Extreme Commutes

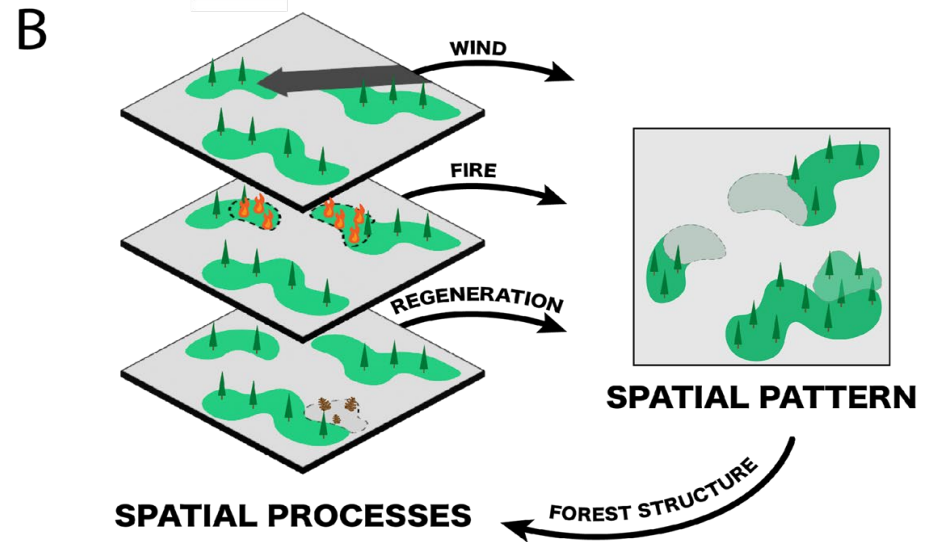
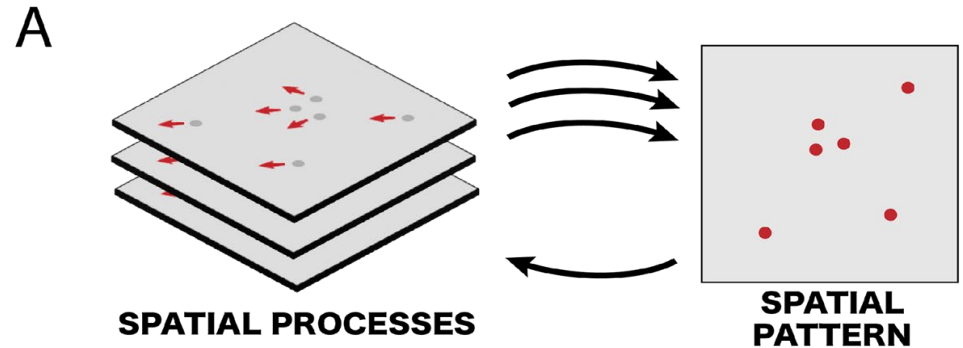


Healthcare Access



Opportunities and Challenges

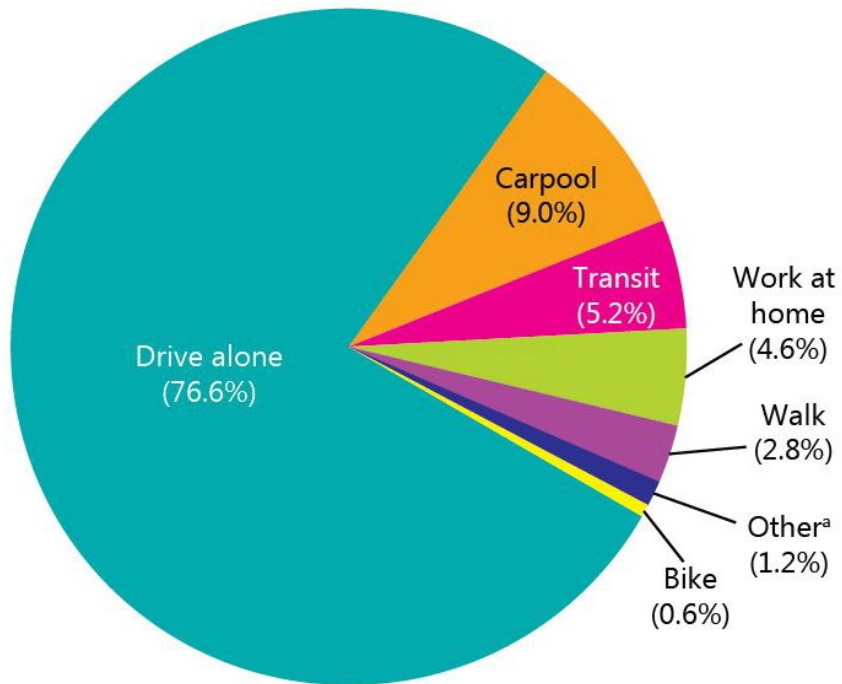
- Patterns in variation are data dependent
- Link between pattern and process



Example - Sustainable and Active Transportation



Dominant Transportation Mode and Data



Shift Towards Sustainable Transportation

JUNE 23, 2022 | Albany, NY

Governor Hochul Announces \$178.8 Million in Funding to Support Transportation Enhancements in 75 Communities Across New York

TRANSPORTATION

RECREATION

Over \$2B announced for roads, bridges, bike lanes across US

By TERRY TANG and DAVID A. LIEB August 11, 2022



UC SANTA BARBARA

Lack of Data on Bicycles and Pedestrians

- Safety / Accessibility
- Volume
- Infrastructure

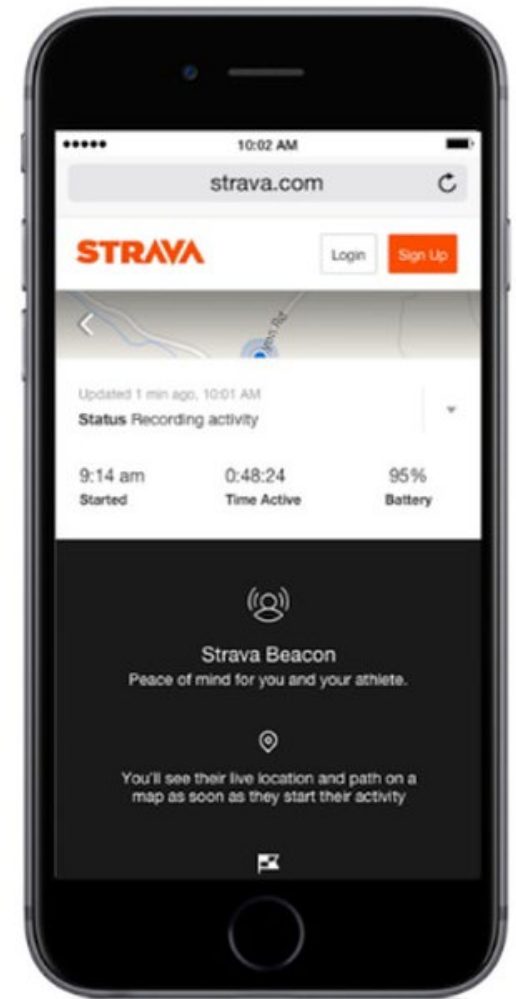
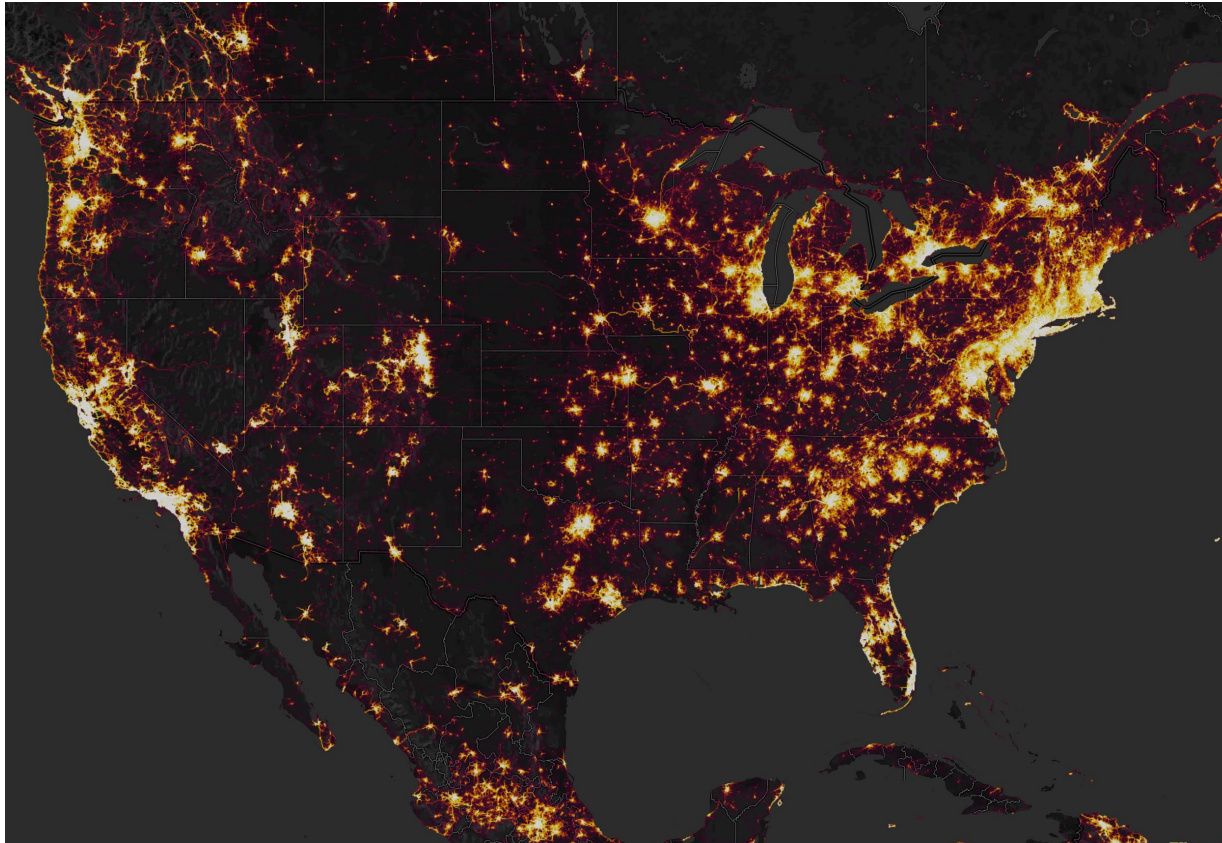
Empathy...
Vulnerable road users



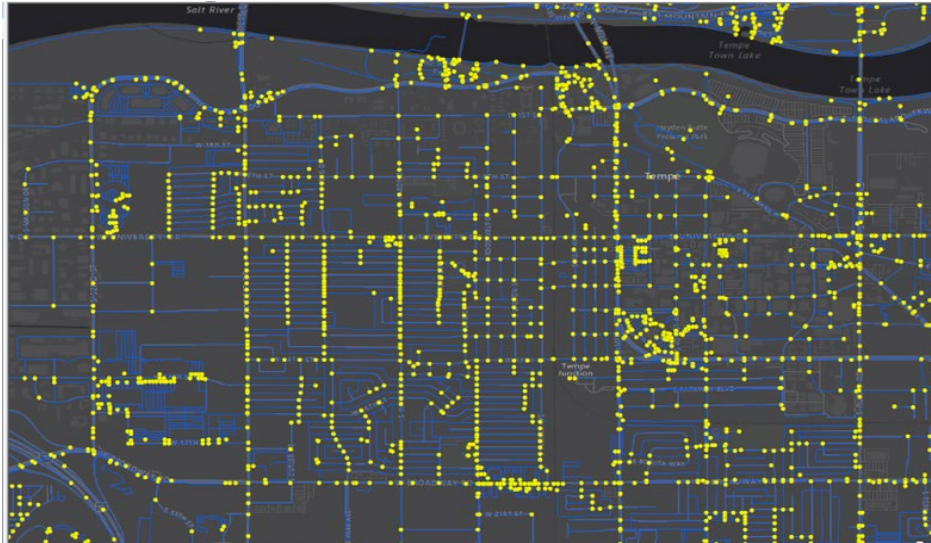
Bicycle Volume Data



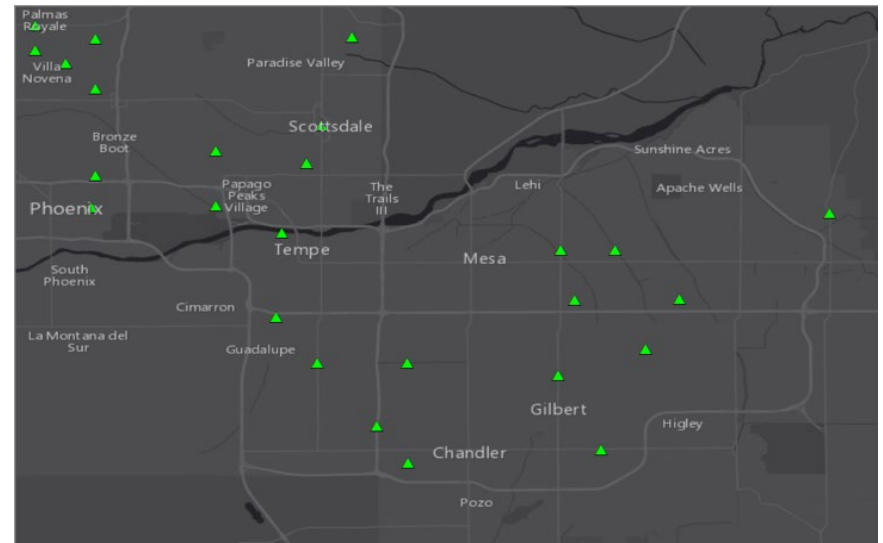
Big Bicycle Data



Big Bicycle Data



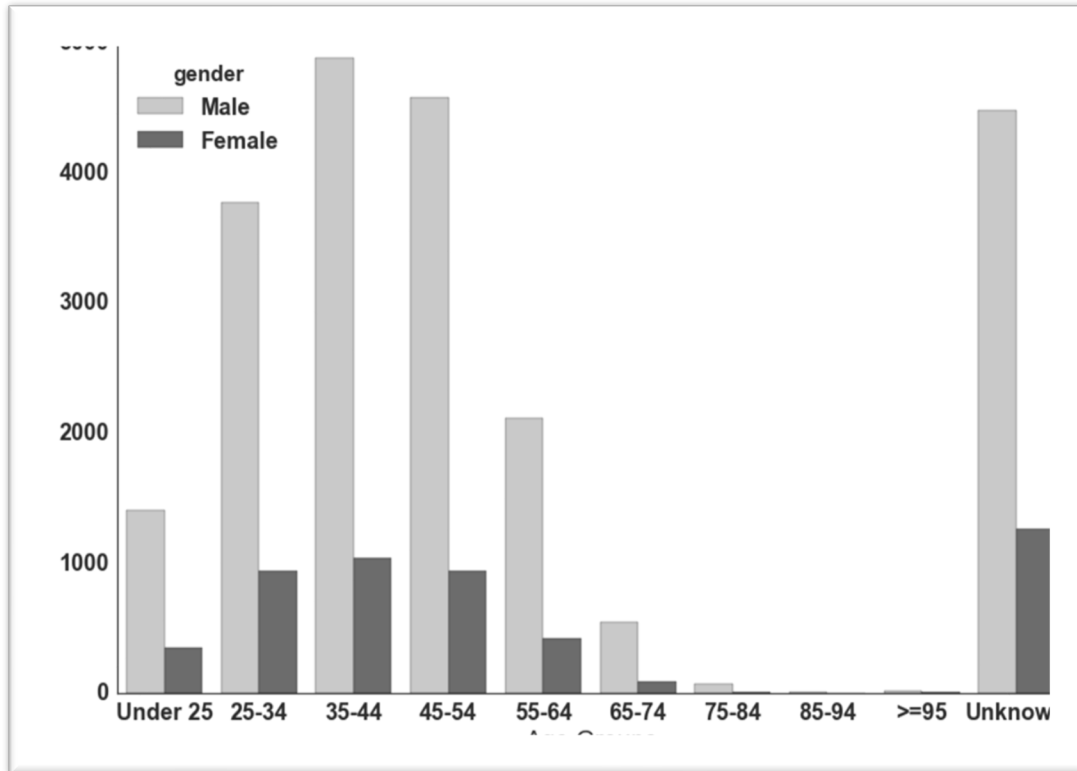
Strava Metro (44 billion records annually)



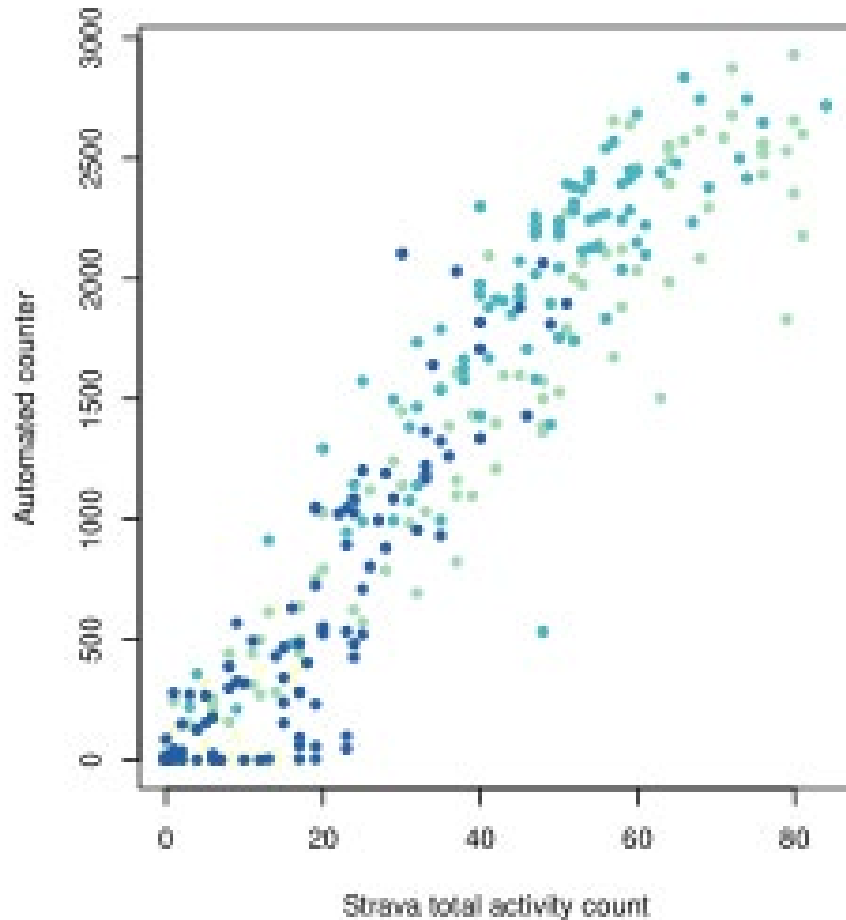
Official data: 42 locations measured for one week

Nelson, T., Roy, A., Ferster, C., Fischer, J., Brum-Bastos, V., Laberee, K., ... & Winters, M. (2021). Generalized model for mapping bicycle ridership with crowdsourced data. *Transportation Research Part C: Emerging Technologies*, 125, 102981.

Who is counted?

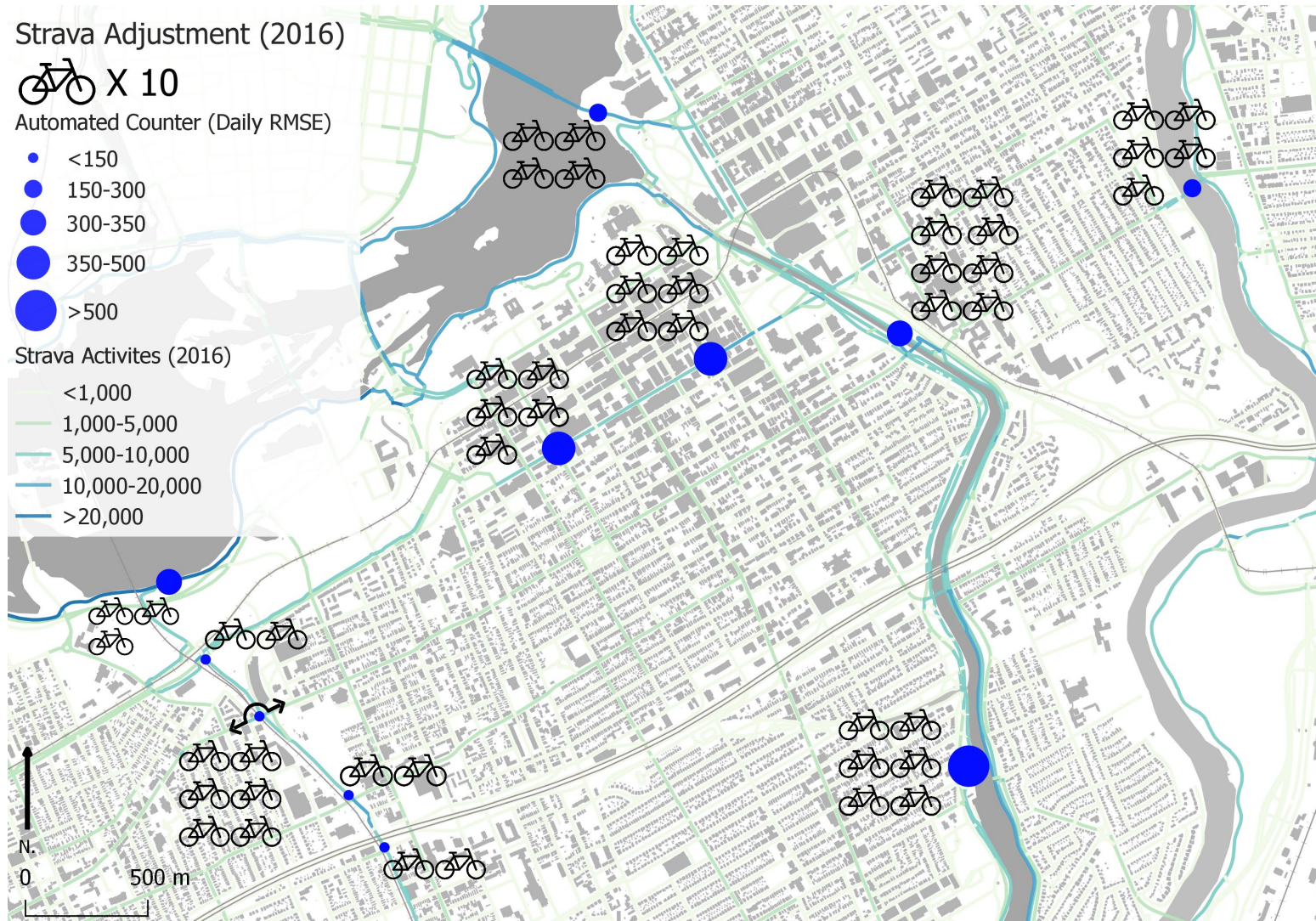


Correlation: Strava Sample Vs. All Bicyclists




$r = 0.9$, slope = 37 (i.e., one person on Strava for every 37 counted)

Correlation: Varies Geographically



Generalized model for mapping bicycle ridership with crowdsourced data

Trisalyn Nelson ^a, Avipsa Roy ^b, Colin Ferster ^c, Jaimy Fischer ^d, Vanessa Brum-Bastos ^e, Ka Hanchen Yu ^b, Meghan Winters ^d

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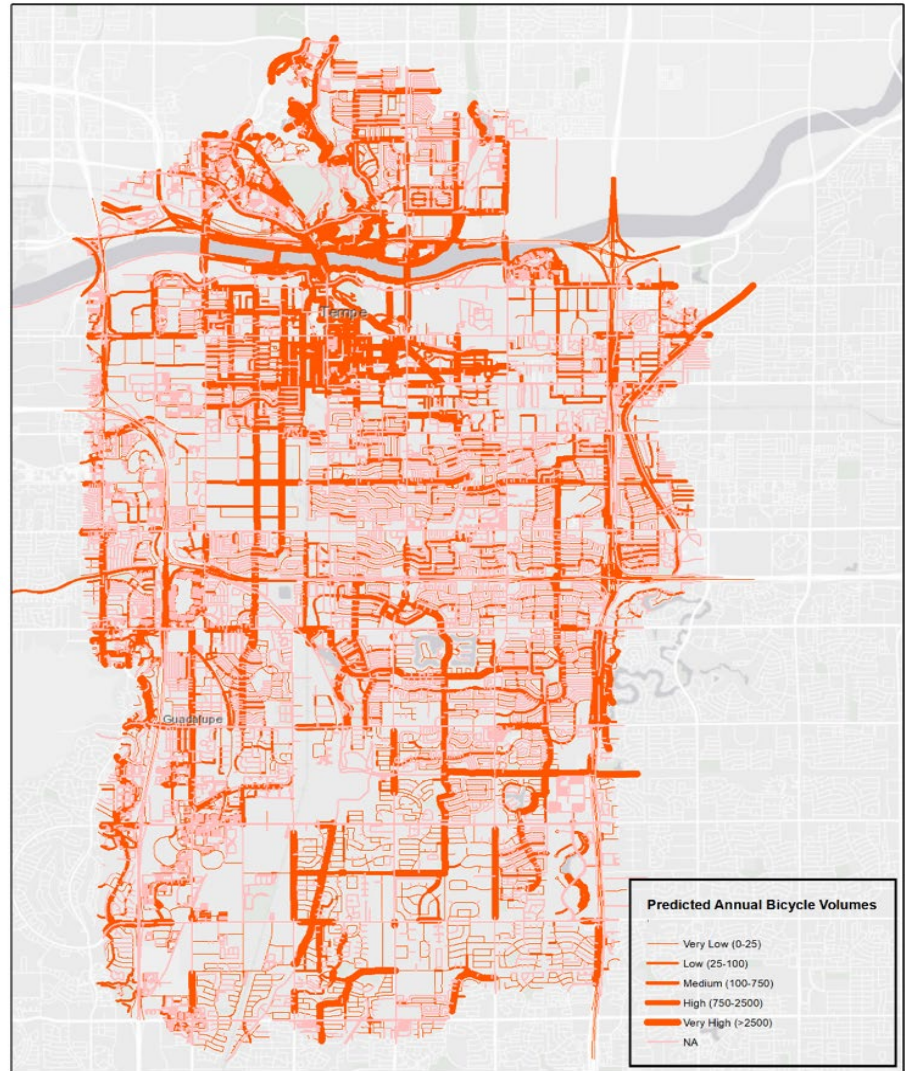
<https://doi.org/10.1016/j.trc.2021.102981>

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City	Region	Population*	Annual Temperature **		Mode*** share of bicycling
			Min	Max	
Boulder	Colorado, USA	326,078	3.2 °C	18.5 °C	8.9%
Ottawa	Ontario, Canada	934,243	1.9 °C	11.4 °C	2.6%
Phoenix	Arizona, USA	4,857,962	17.4 °C	30.4 °C	0.8%
San Francisco	California, USA	884,363	7 °C	21 °C	3.9%
Greater Victoria	British Columbia, Canada	235,689	5.6 °C	14.4 °C	6.6%

Modelling More Representative Data

- Data: Strava, bicycling safety, and income
- Result: up to ± 10 average daily bicyclists for 75% of streets



...Better Bicycling Data = More Empathy



Representative Data = Better Decisions

City	Number of Bike Crashes
Santa Maria	19
Santa Barbara	94



More than Bike Data...



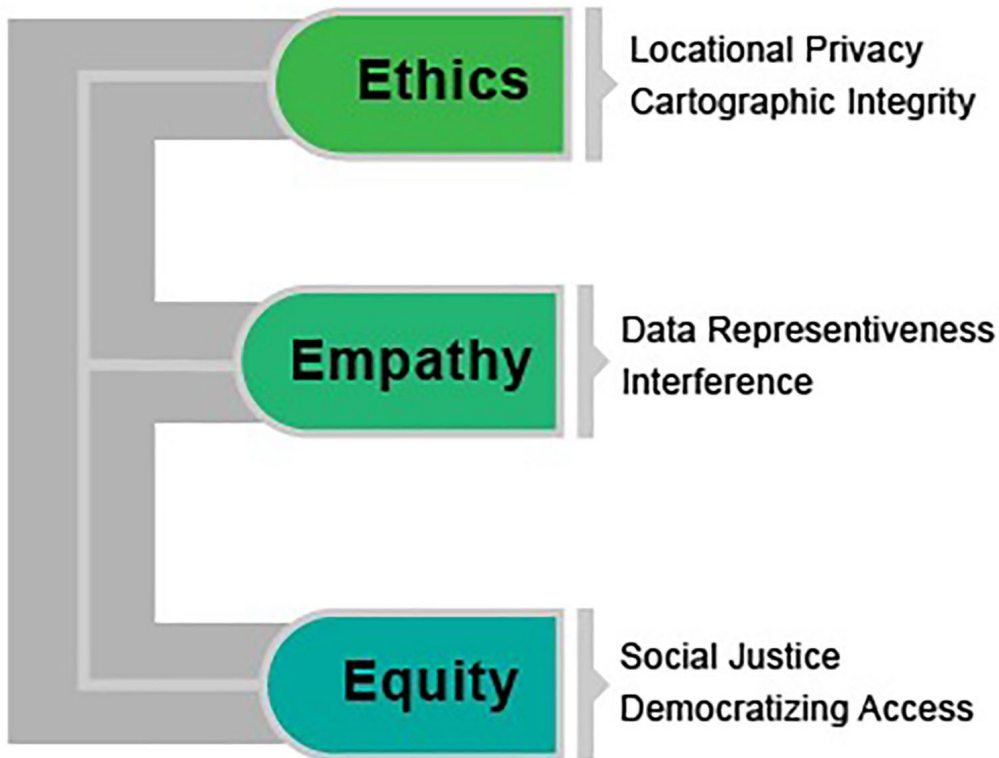
- Big Spatial Data
- VGI
- App and mobile device
- Social media studies
- Survey recruitment through outreach
- GeoAI/Machine Learning



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- 1) Humility
- 2) Broaden Measures of Excellence
- 3) Diversify Your Network
- 4) Inclusive Education and Workflows

Humility

- Space to admit you got it wrong
- Space to be transparent about bias in data and algorithms
- New criteria for review journals



Broaden Measures of Excellence

- Retaining talent will require new measures of excellence
- Broader impacts and knowledge translation
 - NSF; Canadian Institute for Health Research funding
- Measures for evaluating research impact
 - Without evaluation everything is good SO nothing is good
- Reward efforts to take the inclusive road
 - E.g., Oakland

Earth + Humans



Earth + Humans

Communicating science to the public through a podcast about sustainability, resilience, and life on planet Earth.

A screenshot of the Earth + Humans podcast player interface. The top section shows the podcast title "Earth + Humans" and social media icons for Facebook, Twitter, LinkedIn, and a menu. Below this is the episode title "Conservation and Data Science" and the date "Oct 05, 2022" and the host "SPAR Lab". The player controls show a play button, a progress bar at 00:00, and a total duration of 41:02. Below the player is a list of episodes, each with a play button icon, the episode title, the host "SPAR Lab", the date, and the duration.

▶	Conservation and Data Science	SPAR Lab	Oct 05, 2022	41:02
▶	Sustainability and Community Service	SPAR Lab	Aug 25, 2022	30:15
▶	Water Availability and Climate Change	SPAR Lab	Jul 13, 2022	37:57
▶	Habitat and Watershed Restoration	SPAR Lab	Jun 13, 2022	40:07
▶	Ethics, Empathy, and Equity in GIScience	SPAR Lab	May 04, 2022	53:33
▶	Wildfire and Preparedness	SPAR Lab	Apr 14, 2022	40:21
▶	Racial Justice and Geography	SPAR Lab	Feb 15, 2022	37:48
▶	Sex and Geography	SPAR Lab	Jan 25, 2022	27:43
▶	Agriculture and Climate Change	SPAR Lab	Dec 20, 2021	33:22

Diversify Your Network



Transportation Research Part C: Emerging Technologies

Volume 125, April 2021, 102981



Generalized model for mapping bicycle ridership with crowdsourced data

Trisalyn Nelson ^a, Avipsa Roy ^b, Colin Ferster ^c, Jaimy Fischer ^d, V
Hanchen Yu ^b, Meghan Winters ^d

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<https://doi.org/10.1016/j.trc.2021.102981>

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Awesome Minds in GIS are Diverse



Reginald Archer
@DrEngineer



Amy Fraizer
@amyefrazier



Jaimy Fischer
@JaimyFischer



Wenwen Li



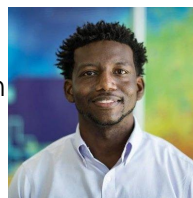
Rachel Franklin
@rsfrankl



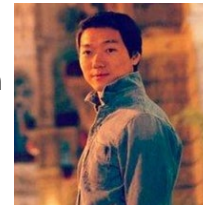
Someyah Dodge
@smayadodge



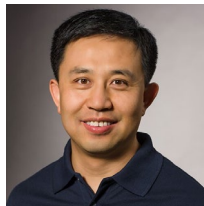
Dawn Wright
@deepseadawn



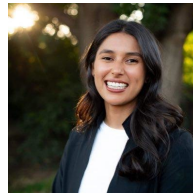
Clinton Johnson
@ClintonGJohnson



Song Gao
@gissong



Shaowen Wang
@swuiuc



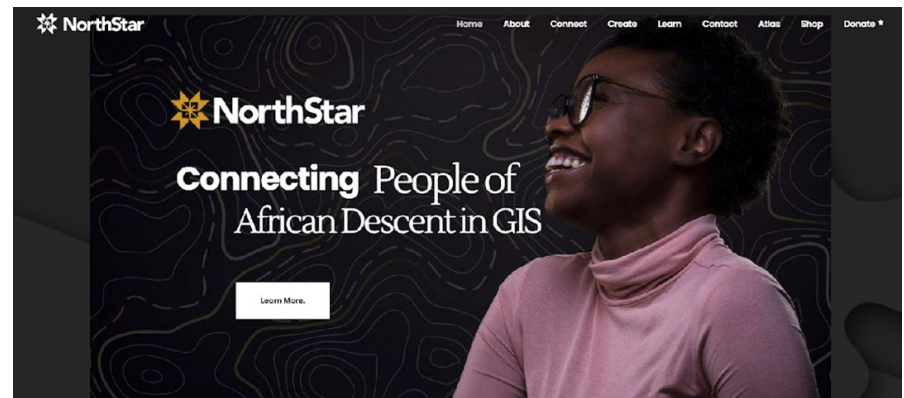
Sophia Garcia
@_sophiam_garcia



May Yuan
@yuan7220

Diversity your Network

- Support minority serving organizations
- Follow/friend diverse GIS professionals on social
- Invite meaningful collaboration with faculty at HBCU, HSI, MSI
- Snowball invitations



Good Culture Supports Diversity

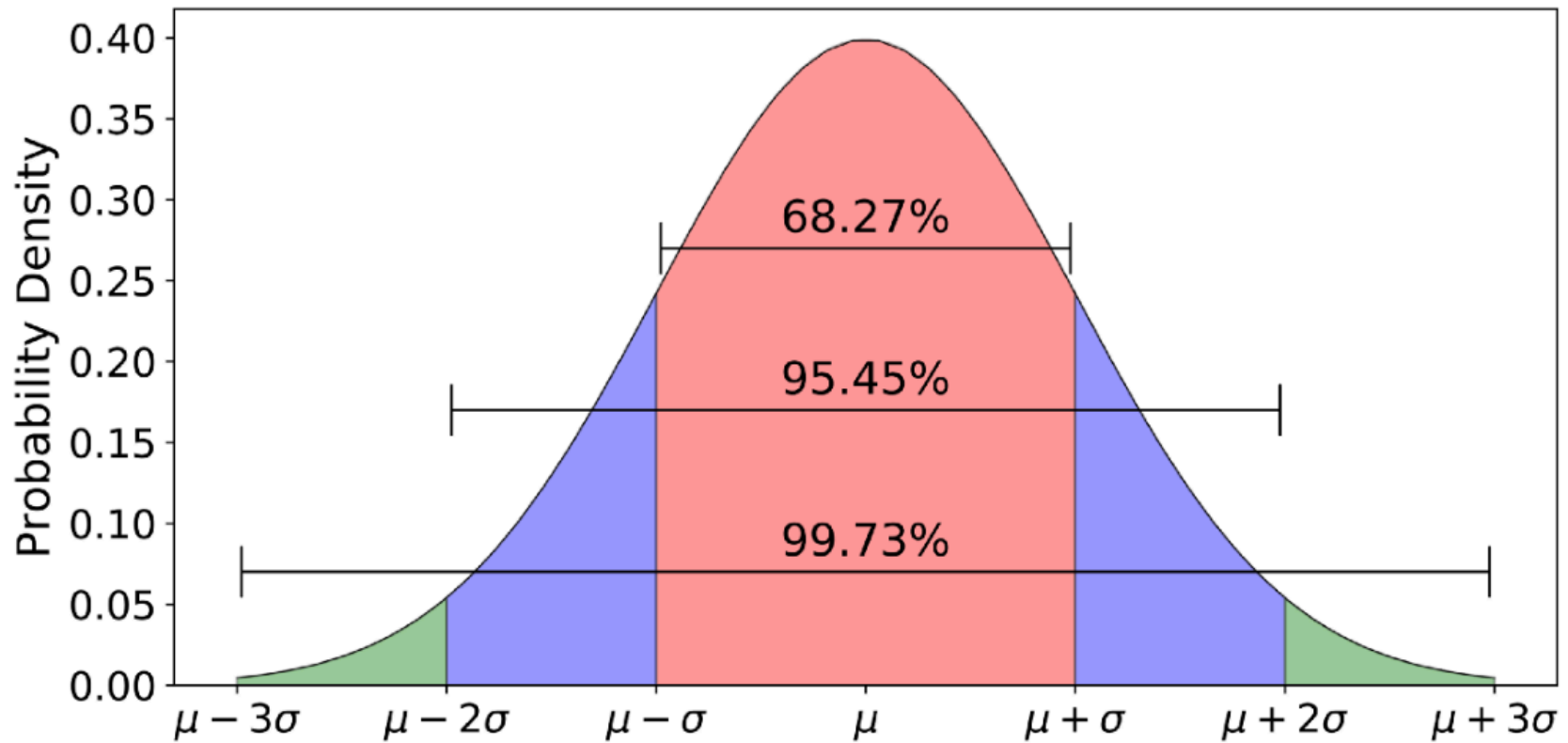


Inclusive Education and Workflows

- Alternate pathways to education
- Bootcamps and summer schools
- Applications oriented learning
- Community and solutions based education

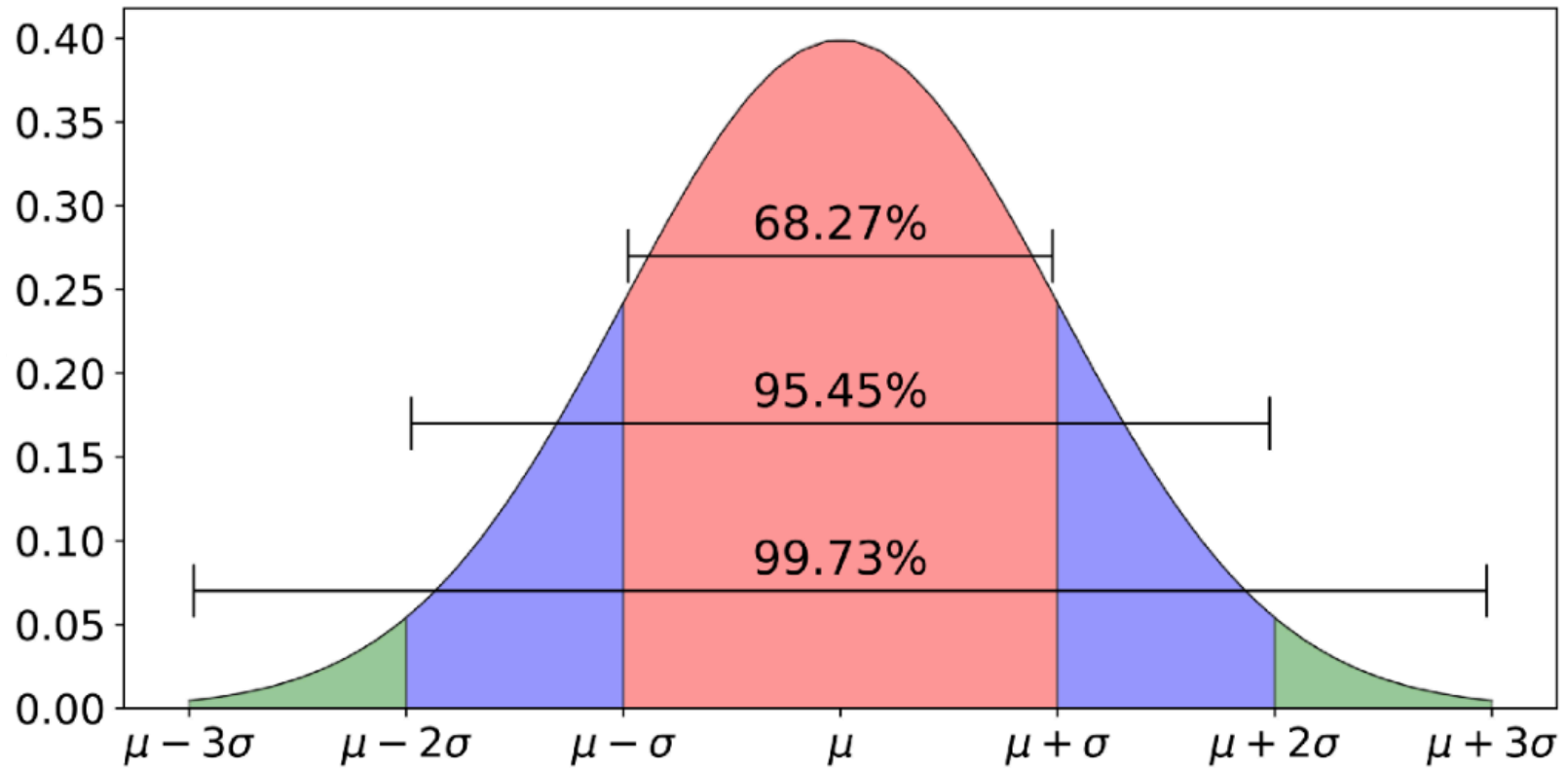


Empathy and Variation



Empathy and Variation

Cultural/Social Influence



Empathy and GIScience



Good



Right

Thanks!

Dr. Meghan Winters



Karen Laberee



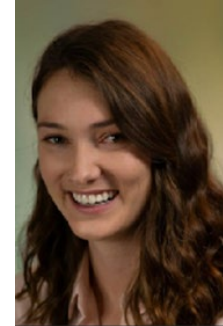
Dr. Colin Ferster



Jaimy Fischer



Lizzy Schattle



Dawn Wright



Mike Goodchild



STRAVA



Public Health
Agency of Canada

Agence de la santé
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