



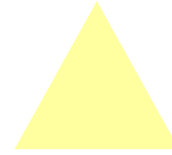
BIAS IN BIG DATA

PREDICTIVE ANALYTICS + RACIAL
JUSTICE



Kelly Capatosto
Senior Data & Policy
Specialist

Discussion



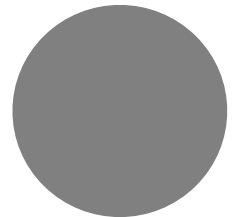
- How do we think about our sample? What populations do predictive analytics miss? Over-sample?
- What does “bias” or “accuracy” mean in this context?
- What role does neighborhood conditions play in predicting outcomes?



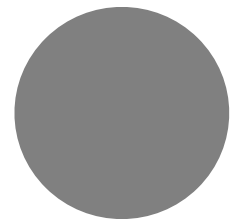
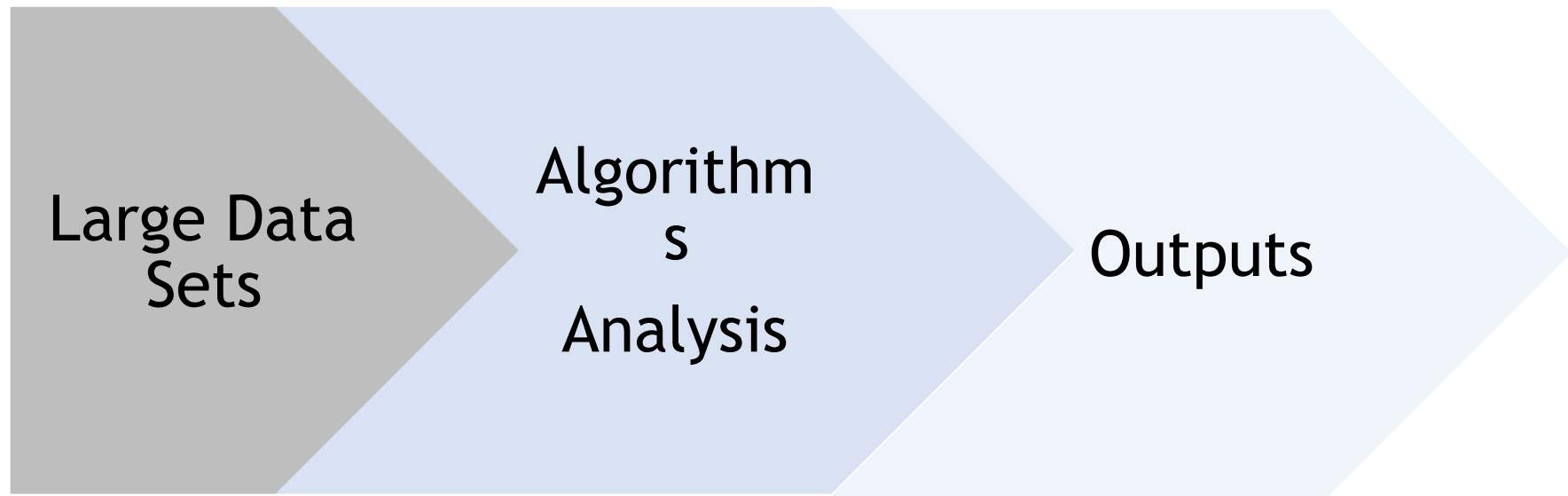
Defining Predictive Analytics

Characteristics

- Sift through large data sets through a variety of statistical analyses, algorithms, and machine learning
- Typically involve assigning levels of risk to various outcomes
- Increasingly used to help guide decision-making in child welfare & law



Defining Predictive Analytics



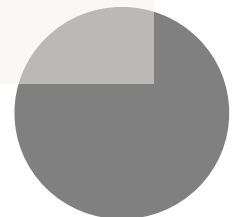
Defining Predictive Analytics

Pros

- Access Hidden Data Patterns
- Streamline Service Delivery
- Decrease Budgets

Cons

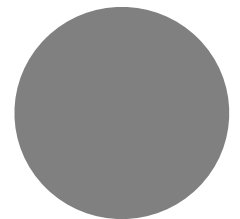
- Risk of Perpetuating Biases
- Cognitive
- Structural



Pitfalls of Predictive Analytics

Foretelling the future (Capatosto, 2017)

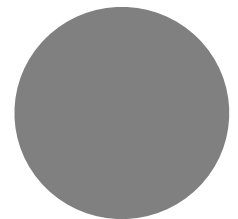
- 1) Humans Encode Biases into Machines**
- 2) Previous Marginalization as a Predictor for Future Risk**
- 3) Overconfidence in the Objectivity of Outputs**
- 4) Perpetuating Existing Structural Disparities**



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Previous Marginalization Predicts Future Risk

Columbus Opportunity Map

- Low opportunity: Light
- High Opportunity: Dark

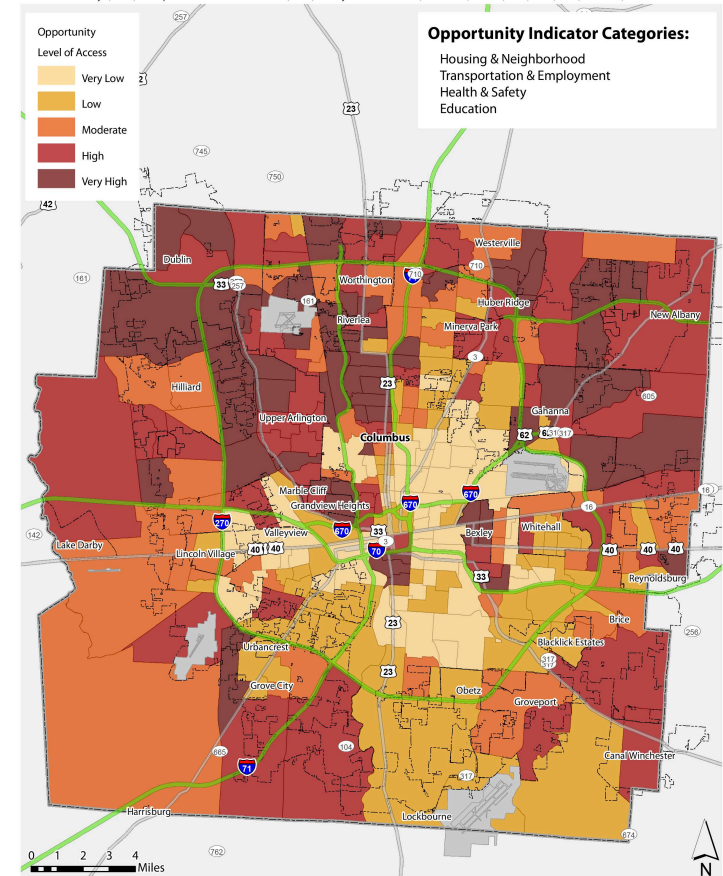
Indicators

- Housing & Neighborhood
- Transportation & Employment
- Health & Safety
- Education

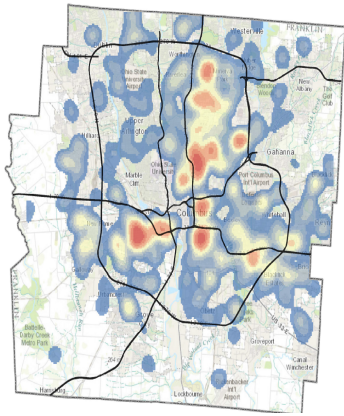
Franklin County: Comprehensive Access to Opportunity

Kirwan Institute
Many Differences One Destiny

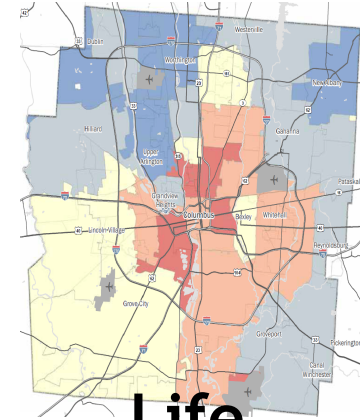
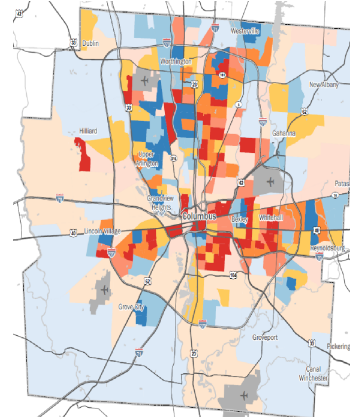
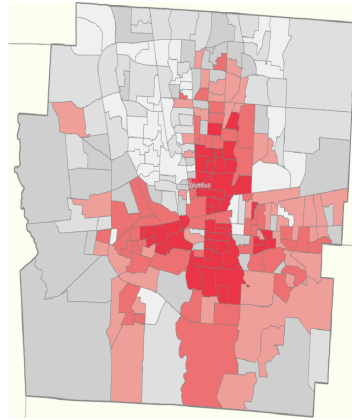
Sources: American Community Survey, 2006-2010; Ohio Department of Education, 2010-2011; Justice Atlas, 2008; ESRI Business Analyst, 2010; US Dept of Health & Human Services, 2010; County Business Patterns, 2006-2009; MORPC, 2010; COTA, 2010; HUD User, 2010



INPUTS: Previous Marginalization Predicts Future Risk

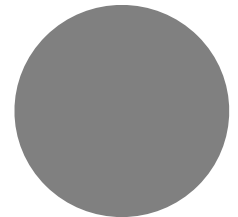


**Infant
Mortality**

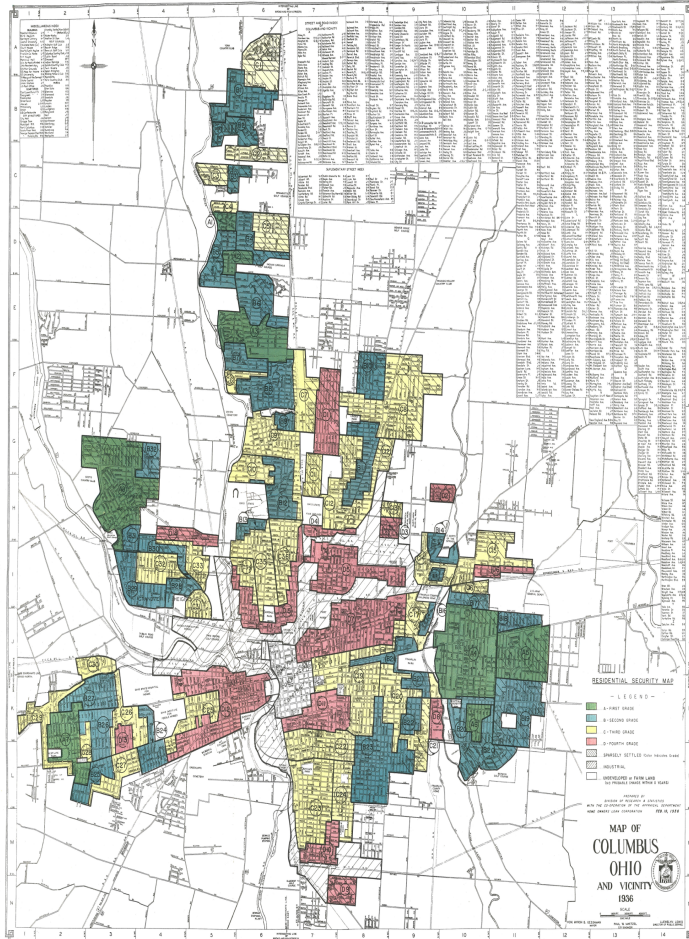


**Life
Expectancy**

Lifespan of Spatial Inequity



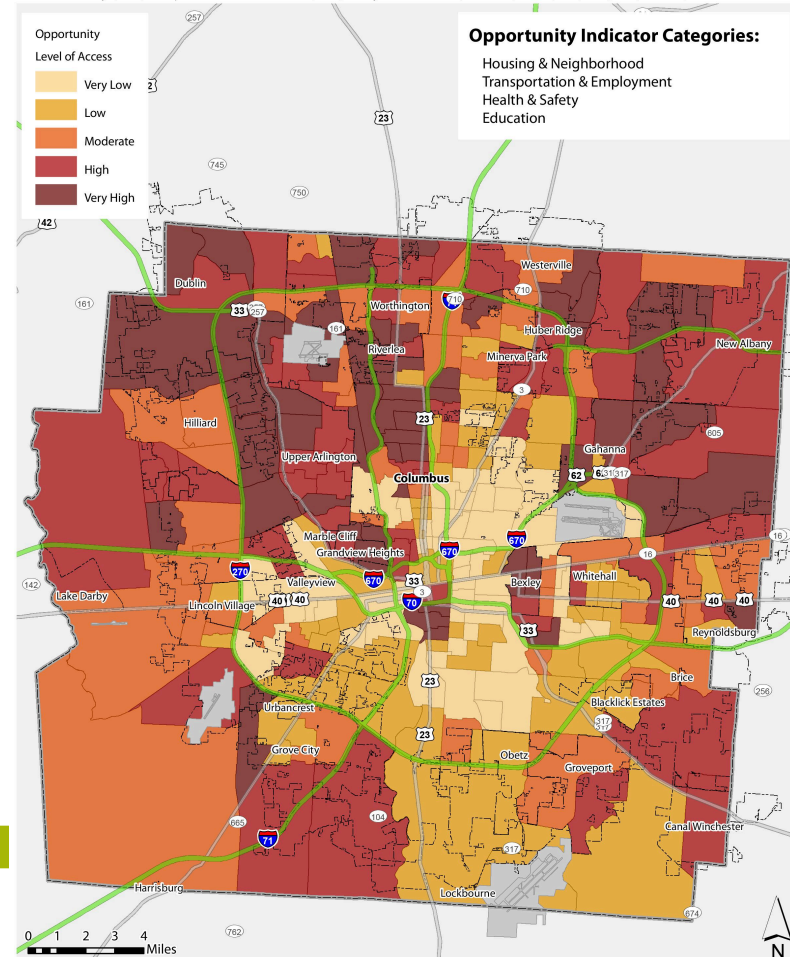
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INPUTS: Previous Marginalization
Predicts Future Risk

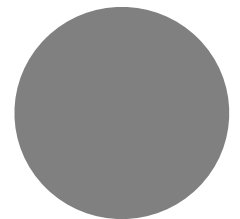
An aerial photograph of a city grid, showing streets, buildings, and a river. A dark rectangular overlay is centered on the image, containing the text 'WHAT DATA IS ENCODED IN OUR ZIP CODE?' in white, bold, sans-serif capital letters.

**WHAT DATA IS
ENCODED IN
OUR ZIP CODE?**

Pitfalls of Predictive Analytics

Foretelling the future (Capatosto, 2017)

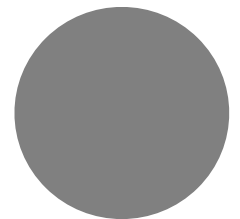
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OUTPUTS: Perpetuate Existing Structural Disparities

Relies on:

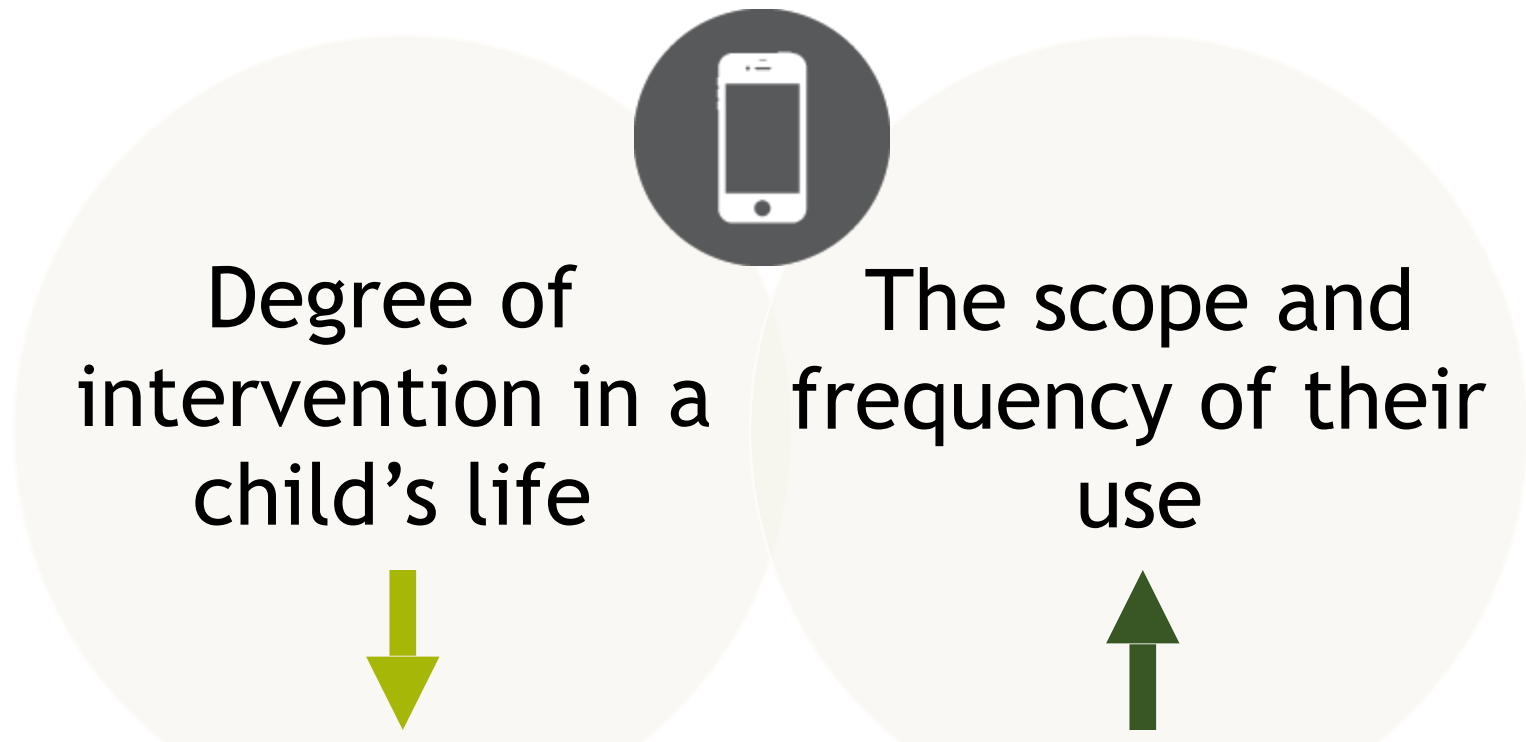


Degree of
intervention

The scope and
frequency of their
use

OUTPUTS: Perpetuate Existing Structural Disparities

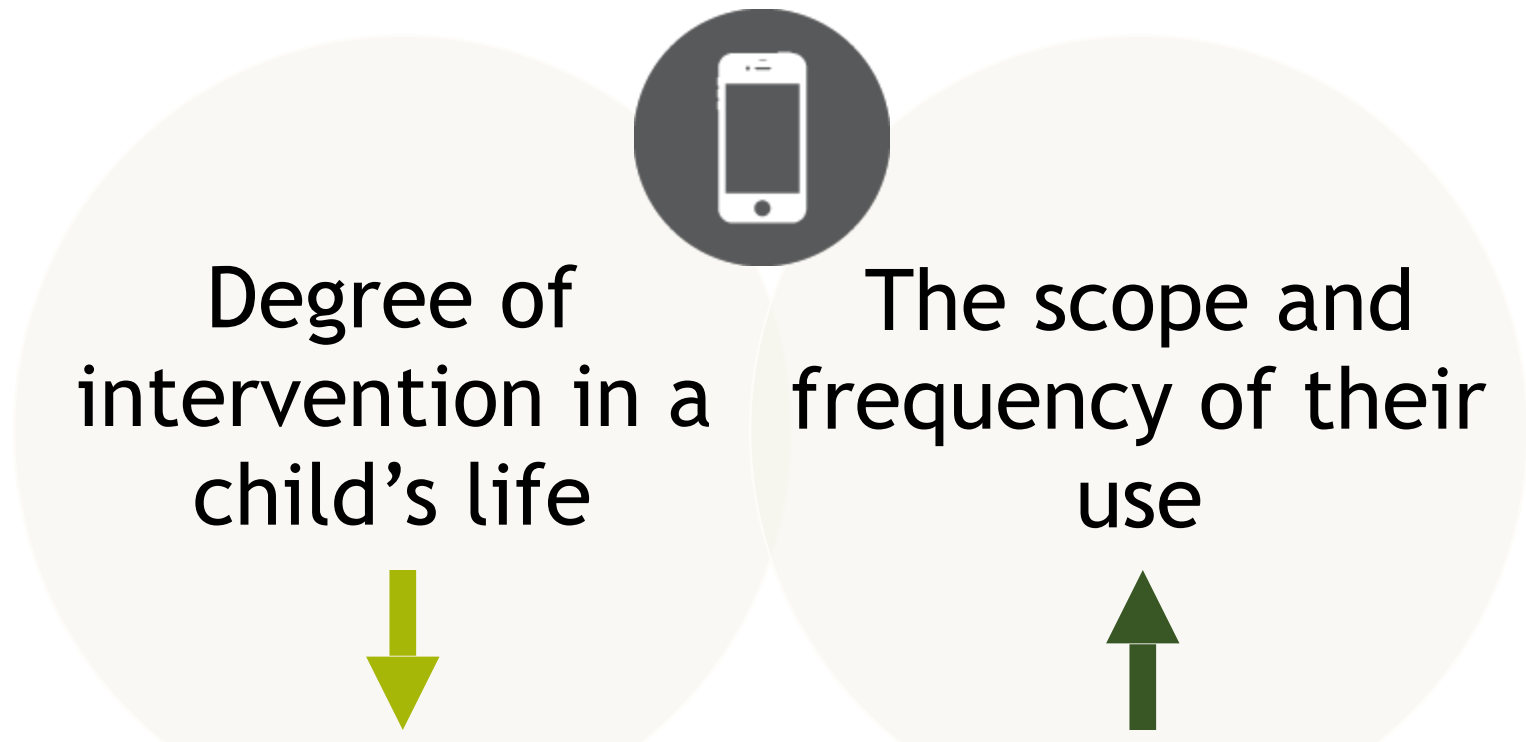
Relies on:



False Positive: monitoring could create family stress, a misuse of resources, & distrust for the system.

OUTPUTS: Perpetuate Existing Structural Disparities

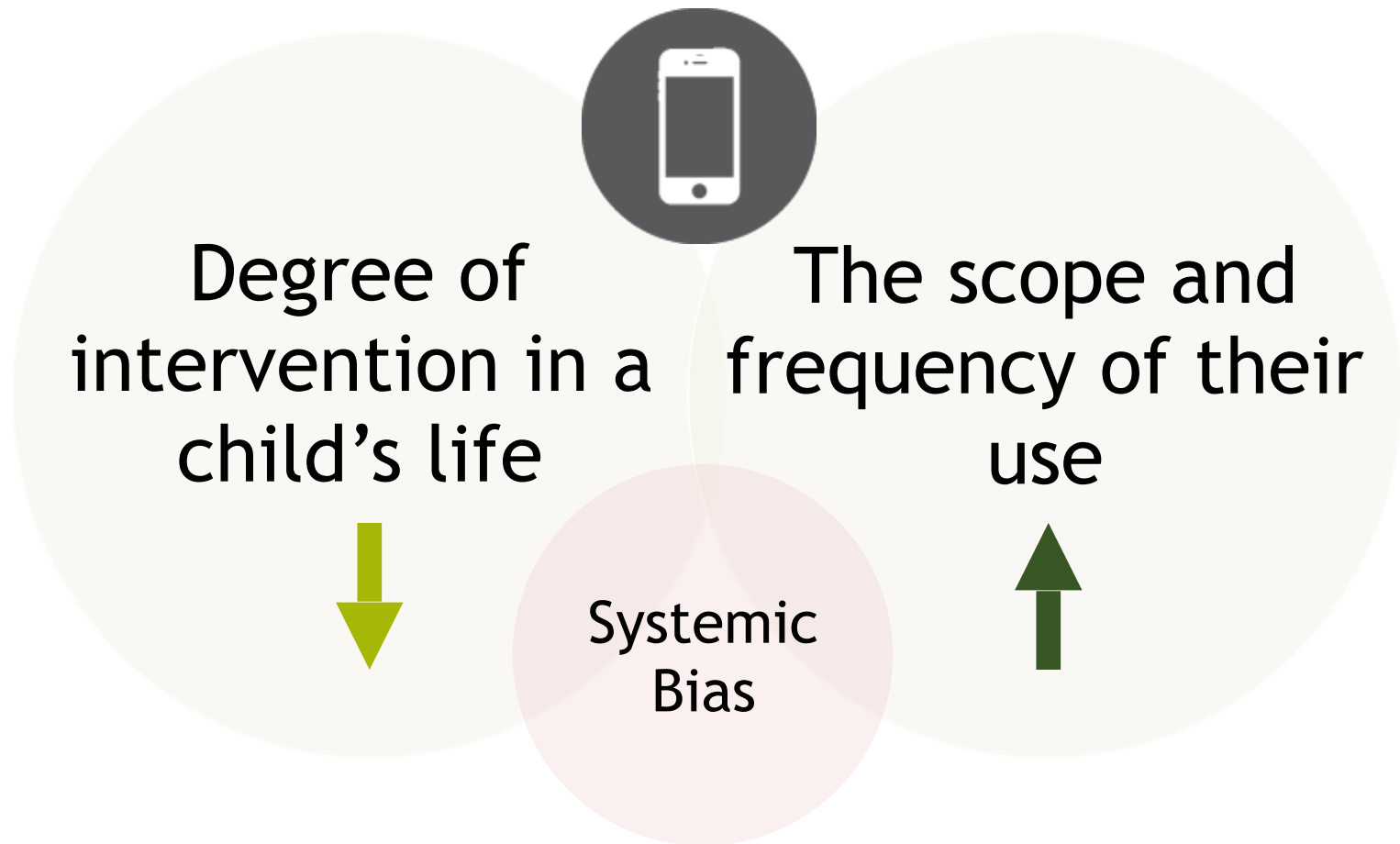
Relies on:



False Negative: Agent will be delayed in following up or may not follow up

OUTPUTS: Perpetuate Existing Structural Disparities

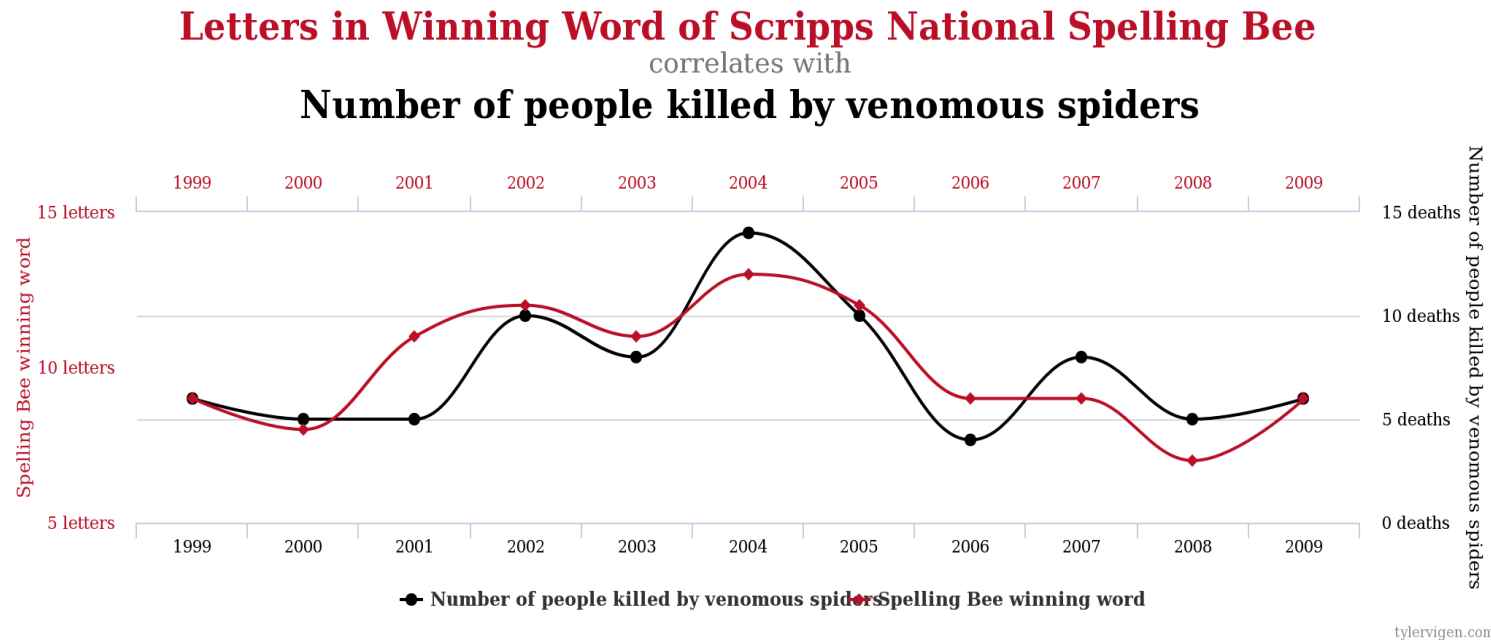
Relies on:



General Decision-Making Implications

- Accuracy
- Generalizability

Correlation \neq Causation



Source: www.tylervigen.com

“Albumen”

-egg white



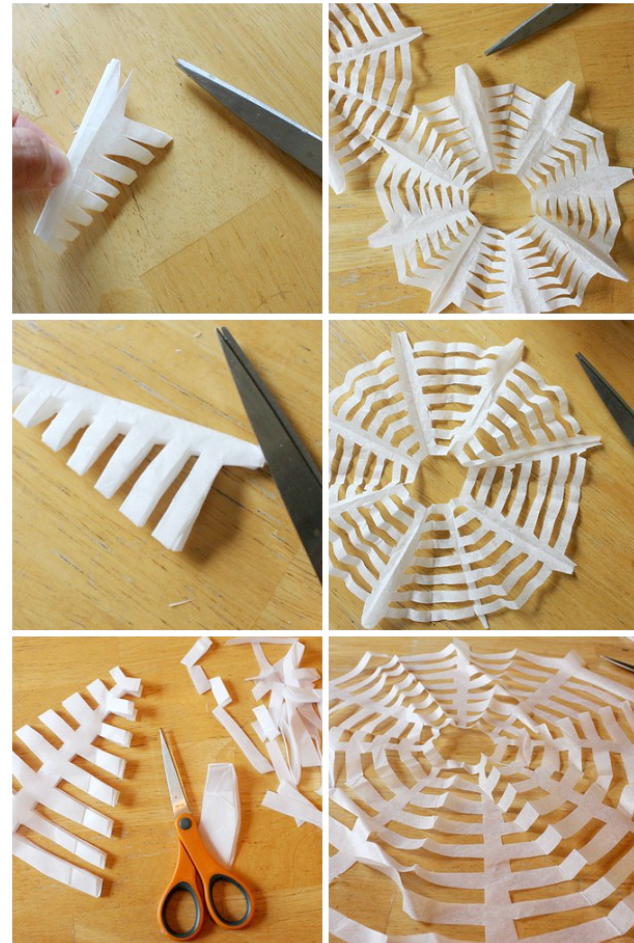
“Albumen”

-egg white



“Scherenschnitte”

-art of paper cutting



“Scherenschnitte”

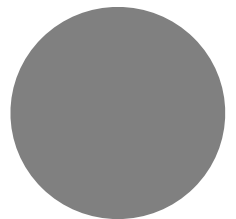
-art of paper cutting



Implications

You are tasked with a public health task force to eliminate risk of spider outbreaks...

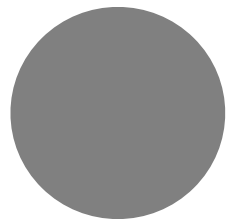
What does information does this model tell us about the best way to intervene?



Implications

Current objective: increasing student opportunities for success?

What does it mean when we label certain student groups as higher risk categories?



Final Take-Aways

- Predictive models can internalize human biases through what data we use and for what purpose
- Previous marginalization may serve as a proxy for future risk
- Overconfidence in objectivity can limit accountability and accuracy
- Unchecked cognitive and structural biases in predictive analytics use can perpetuate longstanding inequities
- Non-causal information cannot help develop new reform efforts