Using R for Policy Research in a State Education Agency

Jared Knowles

Wisconsin Department of Public Instruction

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What is a State Education Agency (SEA)?

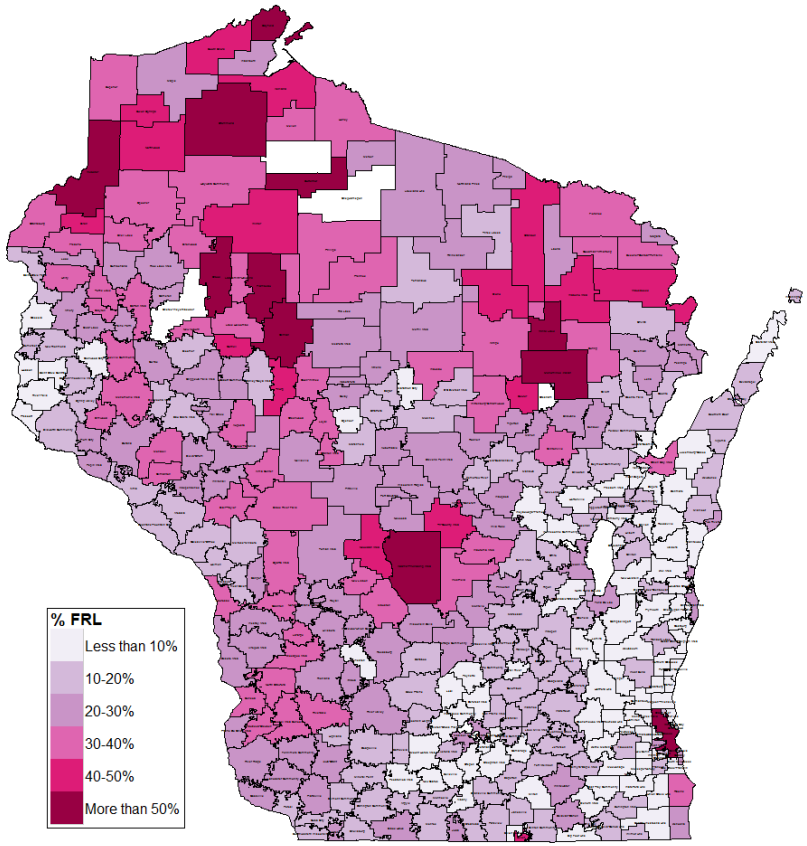
- The administrative agency for public education
- Manages financial outlays and state and federal programs for schools
- Big entity, Wisconsin, for example, is a medium sized SEA

Annual Expenditures	Description
$5.7 billion	State and Federal school aids (money to schools)
$101 million	Program administration (state and federal)
$80.7 million	Aids to libraries, individuals, and organizations

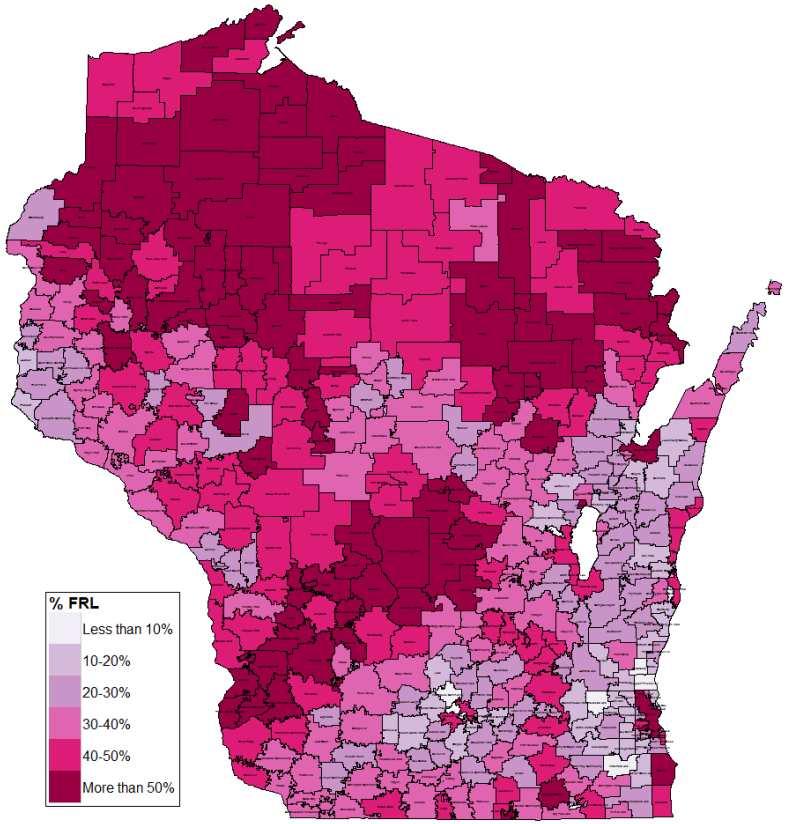
Collects records on all students on a number of dimensions

The Challenge: Rising Poverty

Proportion of Students FRL 2001

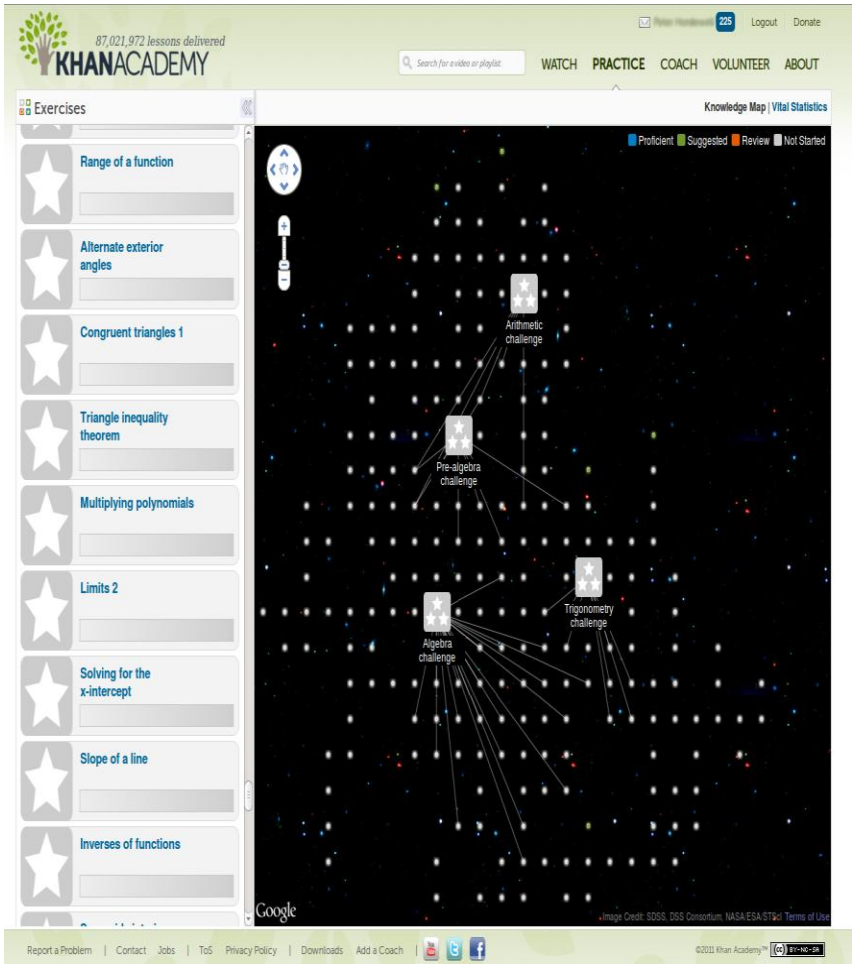


Proportion of Students FRL 2012



The Challenge: Schools run experiments every day

- Does this lesson help students better than that lesson?
- Can we increase participation in this program with this incentive?
- Does this punishment deter this behavior?
- Does this policy increase attendance?
- What learning tools increase student engagement?



The Vision

- Results of experiments were previously evaluated locally using intuition and observation
- Now, states and districts have hundreds of attributes about millions of students in public K-12
- Traditional inferential statistics is not enough
- Simulations can be built to understand the effects of decisions before the decisions are made

Did you say data?

Attribute	Description
Demographics	Gender, race, economic status, English proficiency
Special Indicators	Homeless status, migrant status, etc.
Location	School, district, transfers between them
Discipline	Suspensions, expulsions, office referrals
Test Scores	NCLB tests for school accountability

Population, not sample

Education generates more data every day

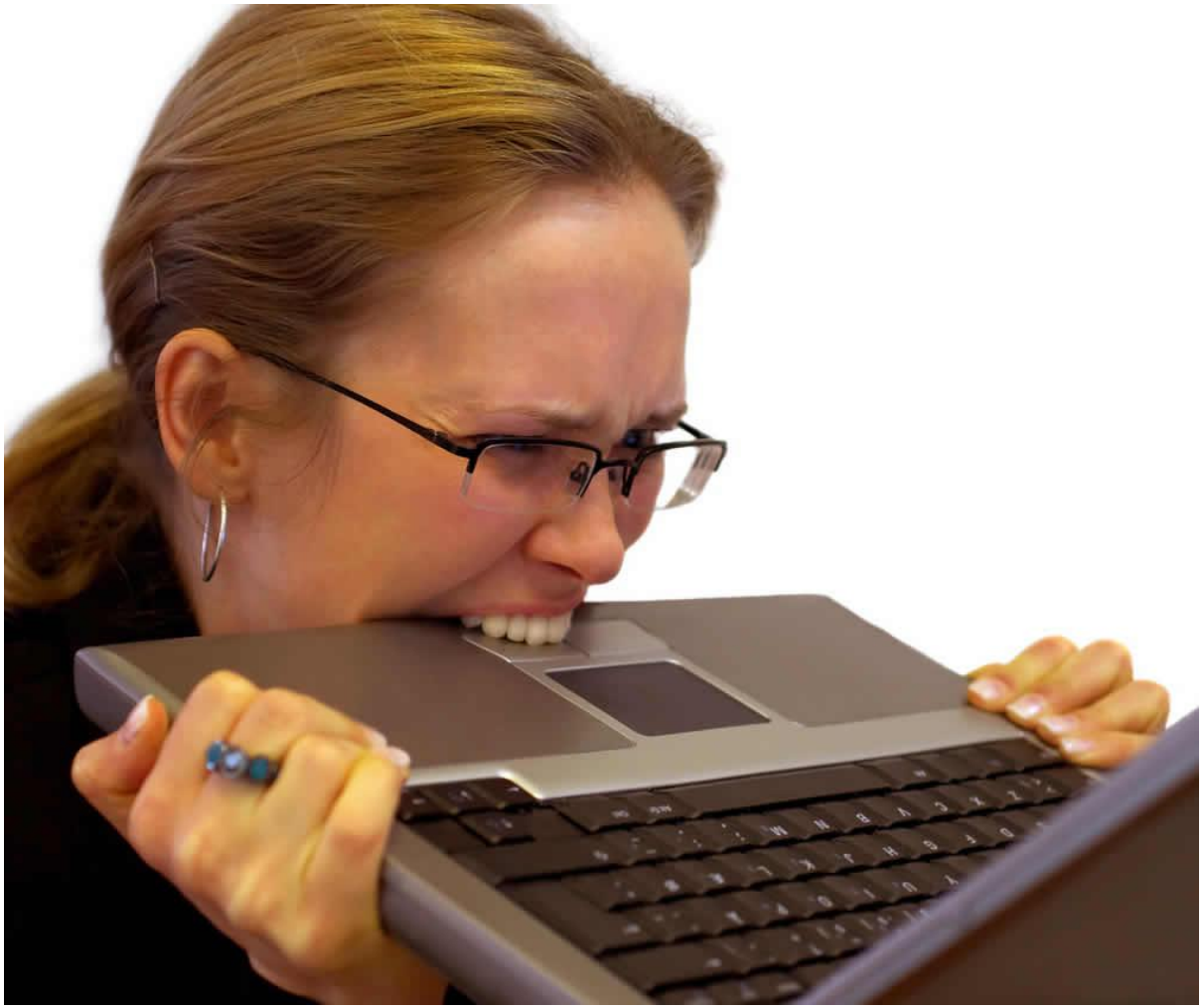
What questions does this pose?

Can we:

- understand what this data means?
- do data analysis fast (and accurate) enough to **improve student outcomes**?
- maintain transparency and trust with stakeholders?
- produce analyses that are approachable to policy makers and the public to galvanize change?
- do these things in a time of reduced staffing, decreased budgets, and *time constraints*?

What does R solve?

- **F**ast
- **A**ccurate
- **I**nexpensive
- **R**eproducible

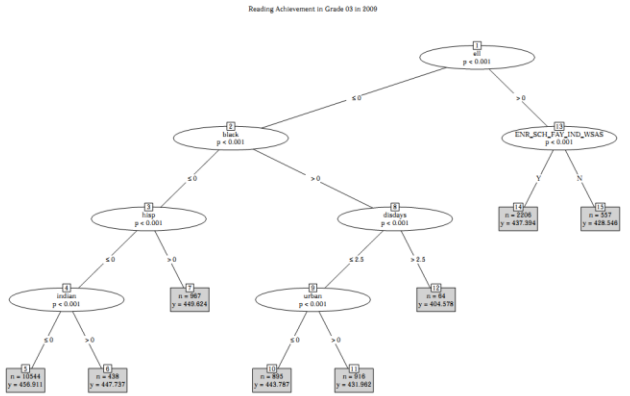


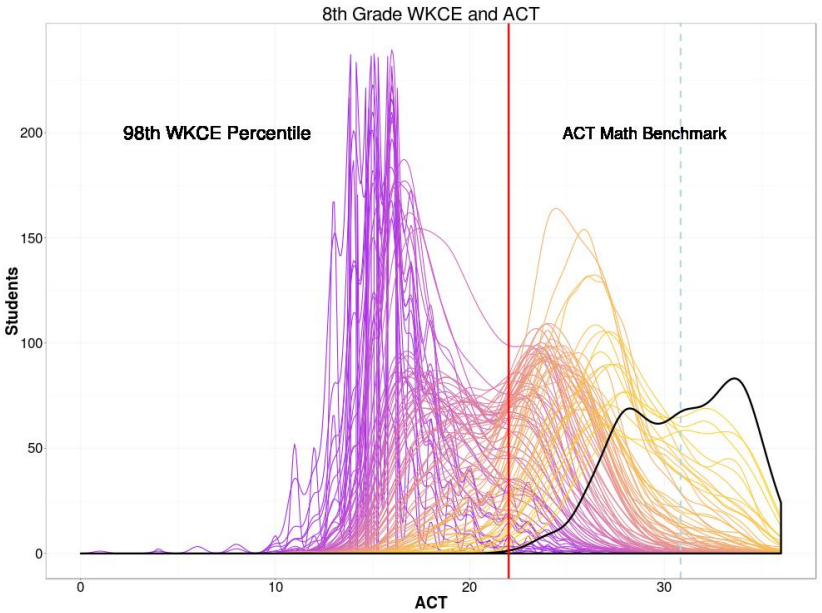
Where do (can) we use it?

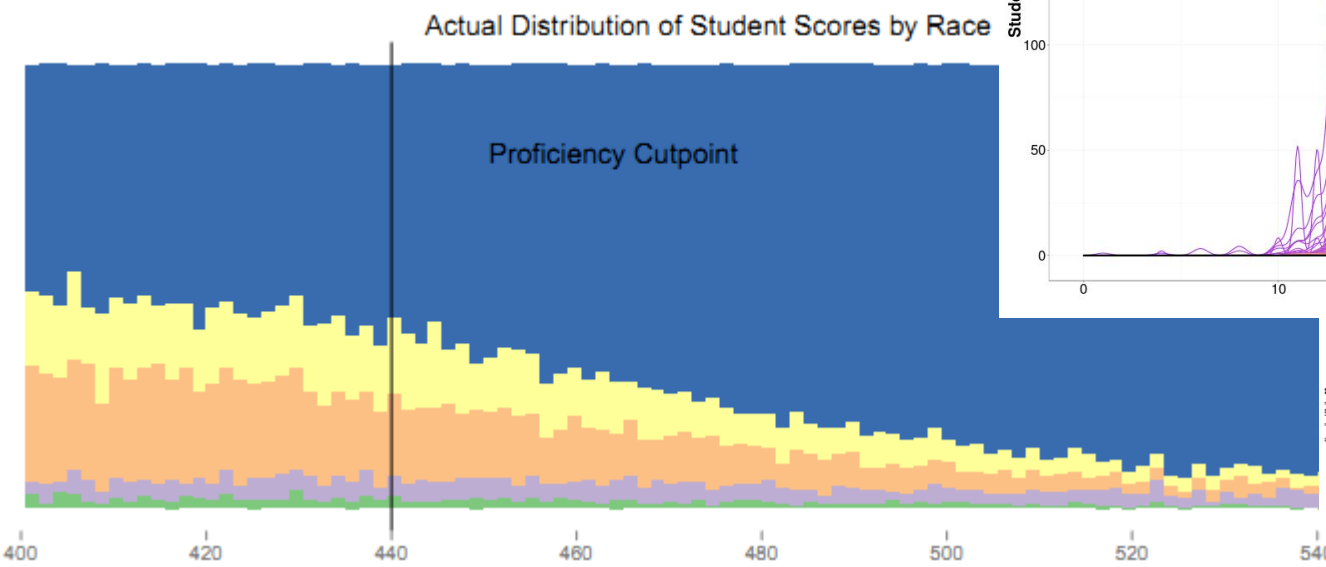
Operational	Analytical
School performance reports – where do schools excel?	Analysis of bilingual program effectiveness
High school completion – did your school's students finish?	Cluster analysis of "typologies" of high school dropouts
Student transfer reports – tell schools when/where students move?	What are the predictors and results of student transfer?
Discipline – which schools are safest?	What effect do no-tolerance polices have on student long-term outcomes?

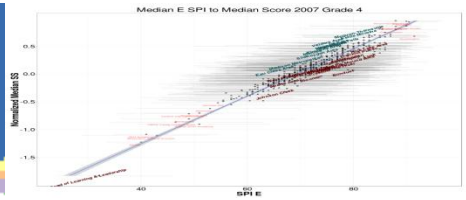
Grade 4 WKCE Reading and Primary SPED

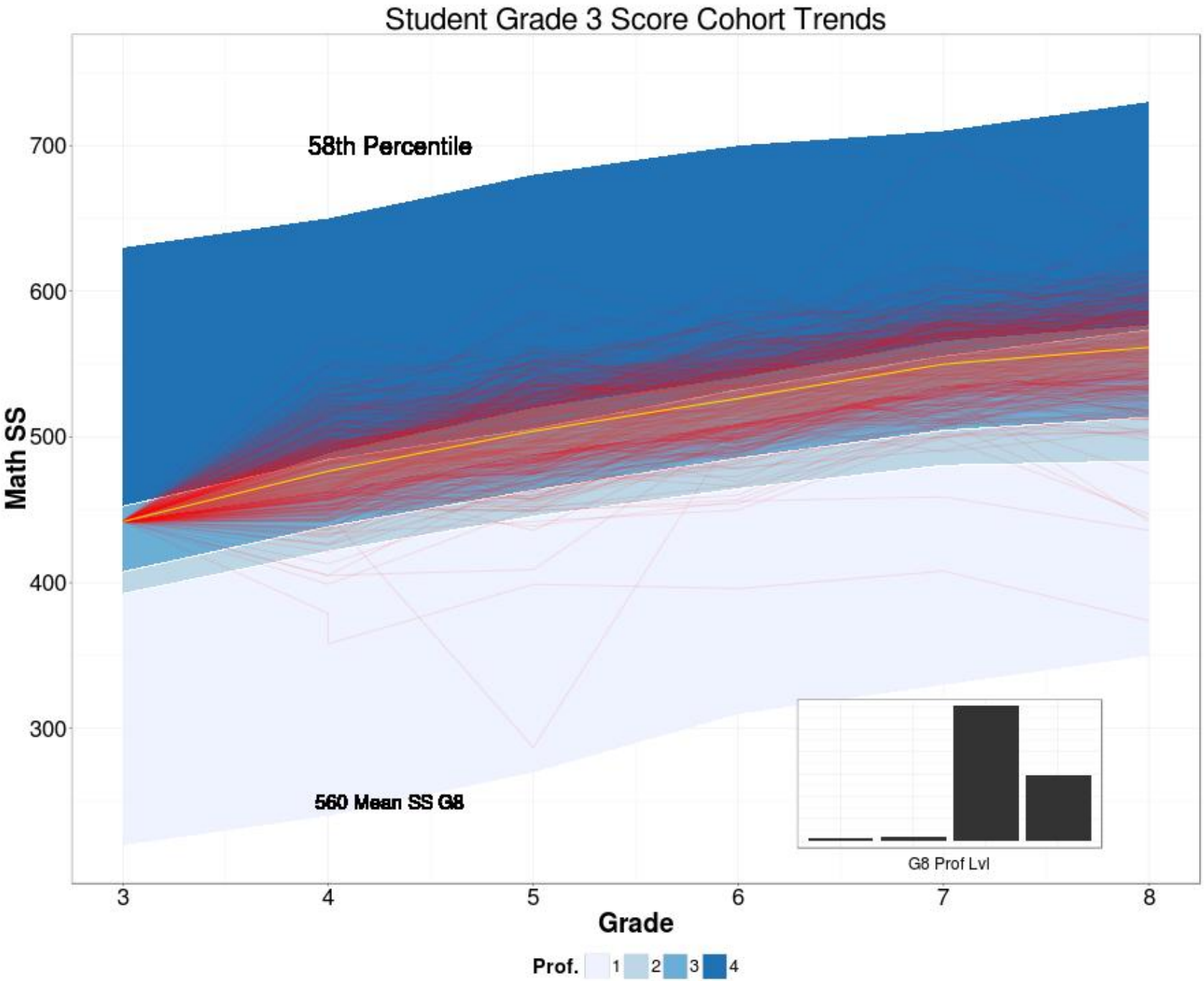
SPED	Freq
SL	13962
A	3033
EBD	5102
OHI	6684
LD	15613
CD	3415
OI	430
H	662
V	175
TBI	131










Student Grade 3 Score Cohort Trends
58th Percentile
560 Mean SS G8
G8 Prof Lvl
Math SS
700
600
500
400
300
3
4
5
6
7
8
Grade
Prof.
1
2
3
4

What have(n't) we done?

Have done:

- Classified students by increasingly refined types
- Regression discontinuity work on state and district policies
- Explored the predictive validity of test scores for other outcomes
- Thought a lot about longitudinally modeling student test results

Haven't done:

- Moved much beyond descriptive analyses of big data and categorization of it
- Developed simulation techniques to model uncertainty about future outcomes
- Come up with good and standard forecasting models for population and achievement changes

Why get involved?

- Education data is fascinating
- Building tools for bureaucrats = building for over a **million principals, teachers, etc**.

- Bureaucrats are not **programmers (yet)**
- Bureaucrats are not **hackers (yet)**
- Data is growing exponentially

Thank you!

-Learn more:

www.jaredknowles.com

-Get involved: @jknowles

-Ask Questions:

jared.knowles@dpi.wi.gov

-Contribute

www.github.com/jknowles

WISCONSIN DEPARTMENT OF PUBLIC INSTRUCTION

Tony Evers, PhD, State Superintendent