

# Novice vs. Expert Critical Statistical Literacy Habits of Mind

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# Session Overview

- Brief Background
- Examine authentic example of an expert making sense of a data representation from the media
  - In small groups, participants will discuss (and record on a collaborative whiteboard) the habits of mind they identify in the example
  - Brainstorm a list of any other habits of mind that may be important for making sense of data representations from a critical perspective.
- Brief context of this snippet of my study
- Overview of Critical Statistical Literacy Habits of Mind (CSLHM)
- Comparison of the CSLHM of both a novice and an expert will illustrate what is typical and what is possible.

## I hope that you (goals of the session):

- Gain an understanding of what Critical Statistical Literacy Habits of Mind (CSLHM) are and why they are important
- See the value in using the guiding questions in the CSLHM framework to inform instruction, development of instructional materials/activities, and as a tool for students to use to improve their analysis of statistical messages presented in the real world

# Data is Everywhere

“a world driven by data”

(Levitt, 2019, 42:34)

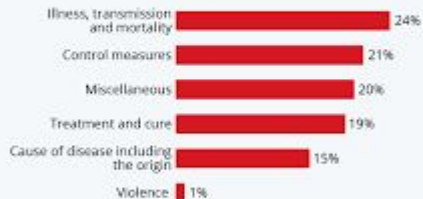
“golden era of data”

(Bersin & Zao-Sanders, 2020)



## The Composition Of Coronavirus Misinformation

Composition of Covid-19 rumors, stigma and conspiracy theories circulating on social media/online news platforms\*



\* Based on 2,311 reports in 25 languages from 87 countries between Dec 31, 2019 and Apr 15, 2020.

Source: American Journal of Tropical Medicine and Hygiene



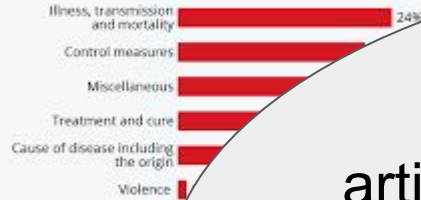
statista

# Misinformation



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# Misinformation

There is a need for clearly articulating the ideal habits of mind for making sense of statistical messages or the *Critical Statistical Literacy Habits of Mind (CSLHM)*



# Main Purpose of my Dissertation



## Goal 1

Describe the Critical  
Statistical Literacy  
Habits of Mind  
(CSLHM) in detail  
and provide an  
example of how an  
expert and novice  
would enact CSLHM

# Main Purpose of my Dissertation

Goal 1

Describe the Critical Statistical Literacy Habits of Mind (CSLHM) in detail and provide an example of how an expert and novice would enact CSLHM

Goal 2

Explore the similarities and differences of CSLHM enactment across individuals with varying backgrounds



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Goal 3

Explore how pre-service secondary mathematics teachers (PSMTs) enact CSLHM

# Main Purpose of my Dissertation: Focus Today is Goal 1

Goal 1

Describe the Critical Statistical Literacy Habits of Mind (CSLHM) in detail and provide an example of how an expert and novice would enact CSLHM

Goal 2

Explore the similarities and differences of CSLHM enactment across individuals with varying backgrounds

Goal 3

Explore how pre-service secondary mathematics teachers (PSMTs) enact CSLHM



**Lib.er.al**  
(Adj.) Not limited to or by establisher, traditional, orthodox, or authoritarian attitudes, views, or dogmas; free from bigotry.

## My Positionality

# Let's Start with Common Ground: Terminology

# What do we mean by **Habits of Mind**?

- **Habits of Mind** refer to the collection of thinking behaviors that when used appropriately lead to sense-making

(Costa, 1991, 2008; Costa & Kallick, 2000a, 2000b; Goldenburg, 1996)

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(Lee & Tran, 2015)

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 Lack of explicit critical perspective

# What do we mean by **Statistical Literacy**?

**Statistical Literacy from a consumer orientation** is conceptualized as the set of skills needed to effectively consume statistical messages presented in the real world, particularly the media

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## What do we mean by **Critical Statistical Literacy**?

When statistical literacy entails interrogating statistical content to inform reflection, action, or change, it is referred to as **Critical Statistical Literacy** (CSL).

# The Context & Today's Focus

- In our interviews we drew upon the instructional routine of *data talks* (Boaler et al., 2021)

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  - intentionally selected a representation that addressed an issue of equity → require a critical analysis
  - Teachers were asked to watch the dynamic data representation and talk aloud as they made sense of it, watching as many times as needed.
  - Then asked what conversations they would have about the representation with trusted friends/family members

# Focus of Today: NY Times Dynamic Graph

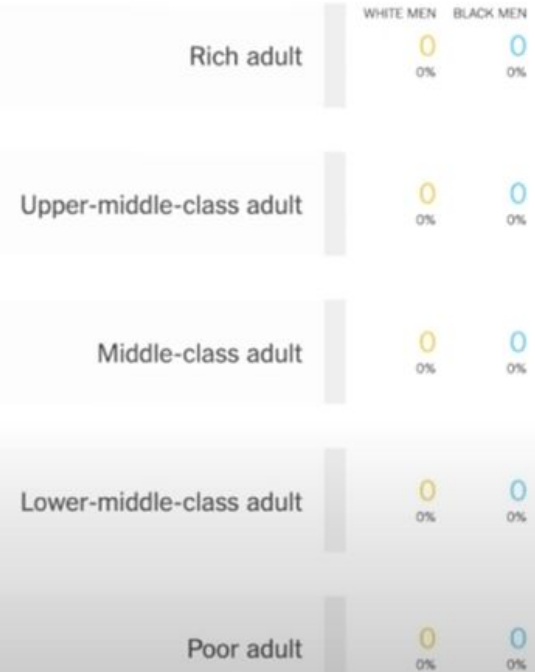
Follow the lives of 53 boys who grew up in rich families ...



Grew up rich

Most white boys ■ raised in wealthy families will stay rich or upper middle class as adults, but black boys ■ raised in similarly rich households will not.

...and see where they end up as adults:



Adult outcomes reflect household incomes in 2014 and 2015.

# An Expert Making Sense of a Statistical Message from the Media

# In Small Groups

- Discuss (and record in Jamboard) the habits of mind that you identify. In other words what does this expert do that enables them to consume and make sense of the statistical message in a critical manner?
- Brainstorm a list of any other habits of mind that may be important for making sense of data representations from a critical perspective.

# Commonalities Across Groups

- Effectiveness of Visualization, Question construction (does it match data?), How it demonstrates the fall, is it just eye candy?
- Do we Trust the Source?
- Count vs. Percent, Concerns about units
- Confirmation Bias
- What do the categories mean - how are they defined?

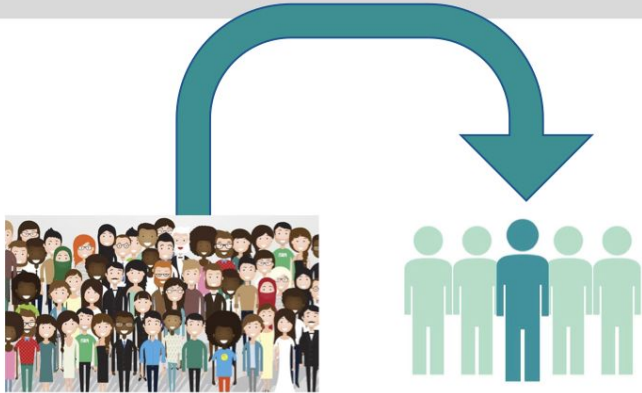
# Context of my Study

# Data Collection: Goal 1 of Dissertation



Pool of  
Participants:  
Initial Survey

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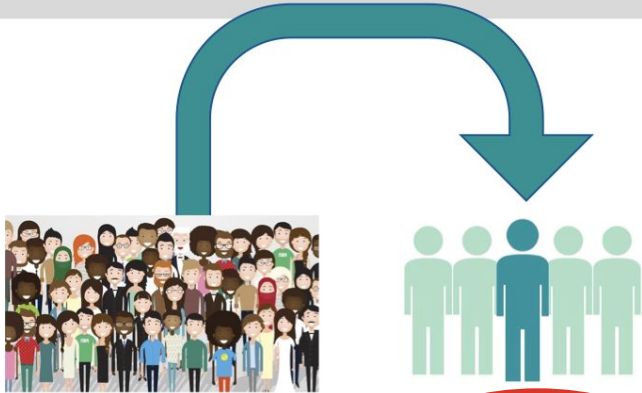


Pool of Participants:  
Initial Survey

Identify Novice  
and Expert  
Statistics  
Teachers



# Data Collection: Goal 1 of Dissertation



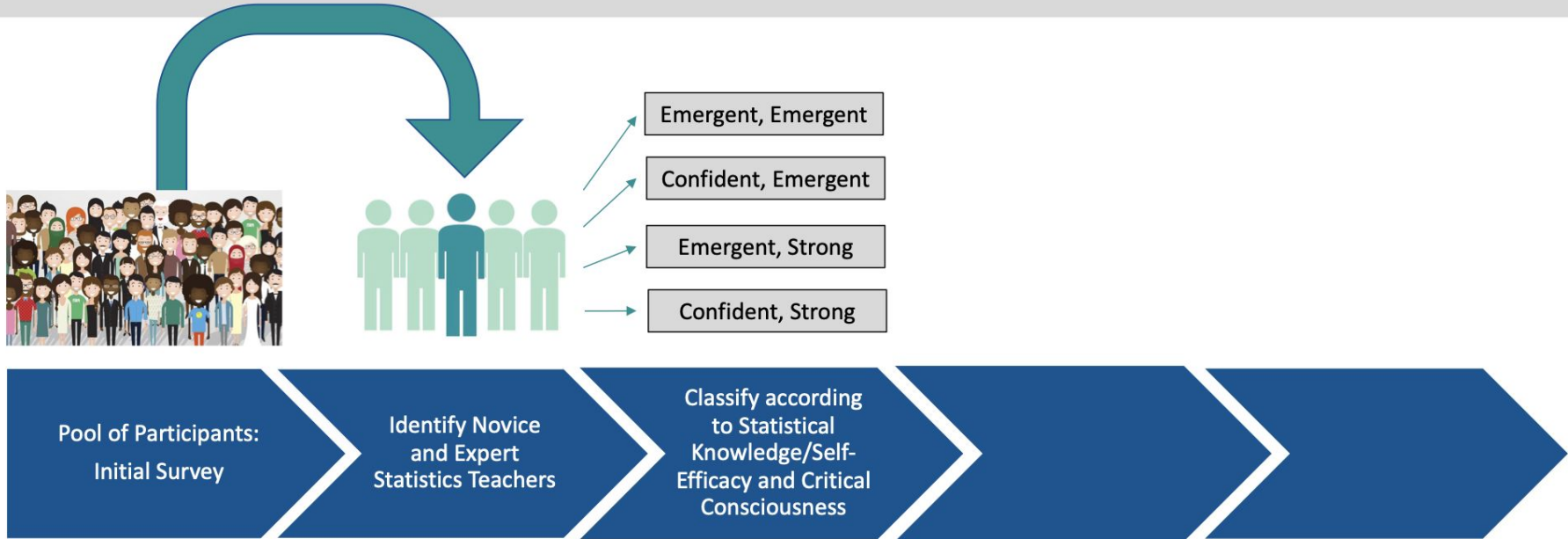
**Novice** = any grade 6-16 teacher who is new to teaching statistics content or new to teaching it from a critical lens (n=26)

**Expert** = been teaching statistics *from a critical standpoint* for at least three years (n=4)

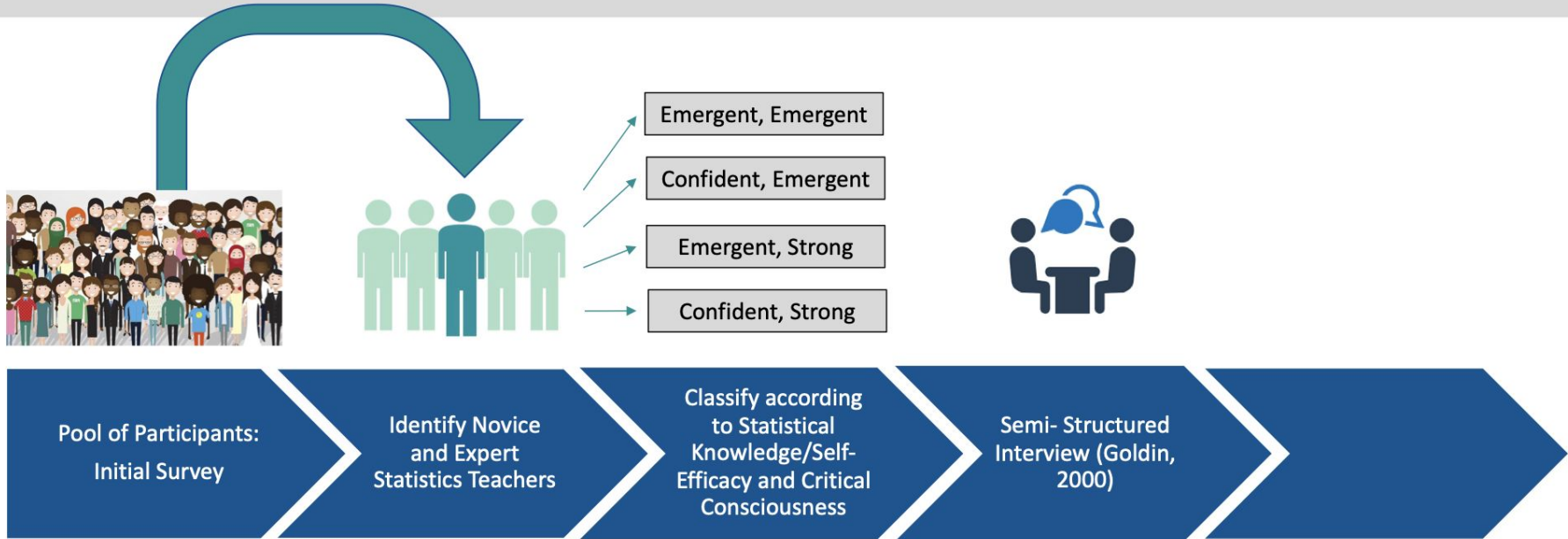
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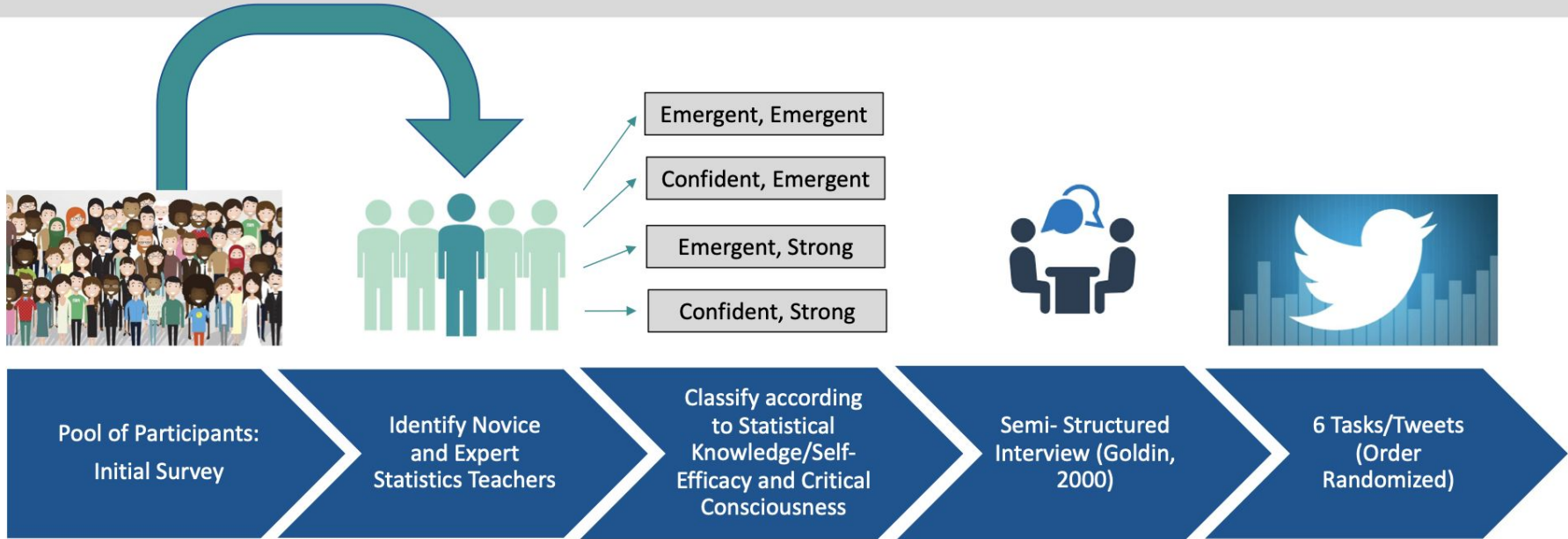
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# Context

## Statistical messages

- From Twitter
- Contain Static or Dynamic Graph

## Why Tweets?

- Brief but real-life
- Folks use it as news source
- Engage with statistical message as they would normally



What are the Critical Statistical  
Literacy Habits of Mind  
(CSLHM)?

# The CSLHM

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# The CSLHM

- Critical Statistical Literacy Habits of Mind resulted from my synthesis of the literature and by operationalizing the work of others:
  - operationalized Gal's (2002) worry questions from his critical stance to develop an initial set of CSLHM
  - distinct absence of a true critical perspective -- I agree with Weiland (2017)
  - operationalized Weiland's (2017) emphasis on using statistics to interrogate, disrupt, and dismantle injustice, as well as his focus on communicating and understanding the influence of one's own social and political position

# The CSLHM

Questioning Sample Size and Methods

Recognizing Appropriate Statistics and Appropriate Representations

Desiring Additional Information

Acknowledging Alternate Explanations

Recognition of One's own Sociopolitical/Critical Consciousness

Employing Active Citizenry

Acknowledging Ethical Considerations

# In Small Groups

- What differences do you see between the novice and expert examples?
- Which guiding questions were addressed? And to what depth?

# Recognition of One's Own Critical Consciousness

## Novice

Um, so I guess when I think of the wealth gap, I'd always thought of, like, I had never thought of it from this angle. So I'd always thought that, I guess the reason there was such a wealth gap, um, between like black Americans and white Americans was that, uh, black Americans had never like broken out of the lower class, like the poverty shell, which not all this is, but, um, like inner city, they had been in a poorer.

Cause that's what I see, not with black Americans, but with white Americans around, we don't have the percentage of black people in our town is very small. Um, but for white Americans around me, the primary, primarily what I see is lower class families staying in that lower class, um, area and not, and I think this is the conversation I'll be having with probably, yeah, the people that I'm, that I share beliefs with around me, this would be this conversation. So what I had mostly seen was, um, people in, white Americans, low, low to middle class or poor staying in that, in my town. And so when I had thought of the wealth gap, I was always thinking of kind of that group of people and then black people who were also initially in the lower class or poor class staying in that class.

## Expert

I'll start by recognizing that this is an issue I care about deeply. And in this particular moment, unless I actually have somebody who can give me an informed opposing argument, I'm not going to bother considering it, just because of this issue and how, how, important I think it is.

I want to intuitively go look there's evidence of systemic racism, but I don't think that there actually is per se, because I don't know enough about how this was calculated to really say that it was done rigorously to say that I could actually conclude something that powerful from it. And I really don't want to fall into the pitfall of making conclusions that match what my beliefs are without actually making sure that the data was telling me that's what what's happening. Um, because you know, bad data goes, knows no political affiliation. They, they both do it. Everybody does it. Um, everybody's biased. So I'm still hesitant to make any kind of firm conclusions here.

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Novices did make connections  
between what they see in their  
community and the way they  
perceived the message of the *NY Times* representation

# Recognition of One's Own Critical Consciousness

- identified that they care deeply about dismantling racial injustice and that it would be hard to convince them that such injustice does not exist
- intentionally noted that their analysis of this particular representation should not be driven by these beliefs

## Expert

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# *Recognition of One's Own Critical Consciousness*

<b>Novice</b>	<b>Expert</b>
<ul style="list-style-type: none"><li>● less common to identify the influence that their own beliefs and experiences play in interpreting the data<ul style="list-style-type: none"><li>○ If they did, it was often via a discussion of what they witness in the world that surrounds them.</li></ul></li></ul>	<ul style="list-style-type: none"><li>● more common to explicitly recognize and/or stop to acknowledge their own beliefs and experiences and how they influence their assessment of the statistical message being presented<ul style="list-style-type: none"><li>○ Some experts did so more implicitly by discussing their stance on the issue being addressed.</li></ul></li></ul>



# In Small Groups

- What differences do you see between the novice and expert examples?
- Which guiding questions were addressed? And to what depth?

## *Desiring Additional Information*

<b>Novice</b>	<b>Expert</b>
<p>What time period was this? And so before I can, we can have a real conversation. You would have to know certain things.</p>	<p>I'm not sure what timespan it's for, because it would have to be some sort of time series data to go from, grew up rich to what they are as an adult. And all I see down here is “adult outcomes reflect household incomes in 2014 and 15”. I would imagine they would have had to have traced back to, to make sense of that. So I'm not sure like how far back they went. Um, so that starts to raise questions of methodology of where this came from.</p> <p>I'm still really hesitant to make any conclusions here because for one, I don't know what “grew up rich” meant, nor do I know what these categories are or where they came from. I'm assuming there's some sort of income intervals that they're using for this, but I don't know what they are. So that makes it all those questions of like, where did these numbers come from? Make me really hesitant to actually conclude anything from this. I want to intuitively go look there's evidence of systemic racism, but I don't think that there actually is per se, because I don't know enough about how this was calculated to really say that it was done rigorously to say that I could actually conclude something that powerful from it.</p>

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# *Desiring Additional Information*

<b>Novice</b>	<b>Expert</b>
<ul style="list-style-type: none"><li>• typically wonder in a general fashion asking questions like “why did they do this?” or “when did this happen?”</li></ul>	<ul style="list-style-type: none"><li>• experts also wondered about similar questions, yet these questions were often explicitly connected to why they desire this information</li><li>• tend to desire more information regarding specific aspects of the methodology that are not transparent in the representation<ul style="list-style-type: none"><li>○ usually leads experts to look for a source that they can use to dig for answers</li></ul></li><li>• often want to know how the variables are defined, what the creators of the data representation mean by specific terms, what the categories represent, or whether the intervals are consistent</li></ul>

What is Typical for the remaining  
CSLHM?

# *Recognizing Appropriate Statistics and Appropriate Representations*

<b>Novice</b>	<b>Expert</b>
<ul style="list-style-type: none"><li>● tend to consider whether the graph is easy to read or not</li><li>● sometimes ponder the choice of statistical measure in a questioning manner (e.g., would a rate be better here?)</li><li>● Focus on design elements such as colors</li></ul>	<ul style="list-style-type: none"><li>● typically emphasize the connection between the statistical message and the choice of measure, test, and/or representation<ul style="list-style-type: none"><li>○ assessed if there was a better choice of statistical measure/test to demonstrate the point (e.g., to make a fair comparison a rate should have been used) while also attending to issues of correlation versus causation</li></ul></li></ul>

# Questioning Sample Size and Methods

<b>Novice</b>	<b>Expert</b>
<ul style="list-style-type: none"><li>● rarely explicitly focus on measures aimed to reduce bias or the specific sampling methods</li><li>● common to wonder about aspects of the sample that are answered through analysis of the representation</li></ul>	<ul style="list-style-type: none"><li>● wonder more specifically about who was sampled and why</li><li>● question the methodology employed that would make the sample representative of the population (or not)<ul style="list-style-type: none"><li>○ and often this includes a discussion of their level of trust in the source.</li></ul></li></ul>

# *Acknowledging Alternate Explanations*

<b>Novice</b>	<b>Expert</b>
<ul style="list-style-type: none"><li>● tended to wonder if other variables play a role and often connected this to their personal experience with the world<ul style="list-style-type: none"><li>○ tended to wonder in ways that provided potential reasons for what they saw from one perspective</li></ul></li></ul>	<ul style="list-style-type: none"><li>● experts tended to wonder if other variables play a role and often connected this to their personal experience with the world<ul style="list-style-type: none"><li>○ more often provided potential explanations from both sides of an issue or argument</li><li>○ tended to expand upon this by either connecting it to what they have read or researched or by trying to understand the argument from an opposing viewpoint</li></ul></li><li>● ponder if those variables were considered and/or controlled for, if information was omitted or not clear, and how transparent the creator of the visualization/message was about their goal in sharing the information.</li></ul>



# *Employing Active Citizenry*

<b>Novice</b>	<b>Expert</b>
<ul style="list-style-type: none"><li data-bbox="112 270 726 727">● tend to acknowledge inequity and express some desire to either learn more or converse on the topic with the goal of challenging someone who does not see or acknowledge the inequity</li></ul>	<ul style="list-style-type: none"><li data-bbox="805 270 1802 558">● tend to acknowledge inequity and express some desire to either learn more or converse on the topic with the goal of challenging someone who does not see or acknowledge the inequity</li><li data-bbox="805 604 1843 809">● tend to express the desire to research to better understand the context with the goal of being able to better dig into the statistical analysis</li><li data-bbox="805 856 1837 976">● explicitly demonstrate how they would or would not use a data representation to press on the views of others.</li></ul>

# Acknowledging Ethical Considerations

<b>Novice</b>	<b>Expert</b>
<ul style="list-style-type: none"><li data-bbox="112 270 803 579">● tend to ask questions such as “Why did this person share this?” or by expressing a general unease such as “There is something off here”</li><li data-bbox="112 631 803 849">● did <i>not</i> frequently comment on the trustworthiness of the representation as it connects to the creator/source</li></ul>	<ul style="list-style-type: none"><li data-bbox="880 270 1707 401">● tend to explicitly question the transparency or motivation behind the message in some way</li><li data-bbox="880 453 1789 671">● frequently comment on the trustworthiness of the representation as it connects to the creator/source especially if the message was political</li><li data-bbox="880 722 1850 941">● often move beyond how a variable is defined to why it is defined the way it is and what purpose(s) that might serve</li></ul>

# Implications

- In the examples we have seen today, it is evident that even statistics teachers need support to develop and enacting these habits of mind
  - Allison and I have introduced it to preservice secondary math teachers and in their subsequent data talk rehearsals they enacted many, if not all, of the CSLHM
- More research is needed on how to support students and teachers in developing CSLHM

# Implications

- The distinct differences in enactment by novice and expert statistics teachers suggests that the CSLHM has both conceptual and analytical power as a framework

# Implications: Analytic Power

- CSLHM addresses a gap in the literature by providing an operationalization of CSL.
- Helpful analytical tool for teasing out the important aspects of CSL related to reading the world (e.g., Gutstein, 2003; Weiland, 2017)
  - Helpful grain size for identifying the differences in the ways that individuals enact each of the individual CSLHM
- Given the calls for the need of applying a critical lens to the consumption of statistical messages (e.g., Callingham & Watson, 2017; Cannon, 2020; Weiland, 2017), the field would benefit from further research in this area; we hope that CSHLM can help to move that forward.

# Implications: Conceptual Power

- We envision the use of CSLHM to guide the design of instruction for both K-16 students and their teachers
  - In response to the continued call for students and teachers to engage in SL with a critical lens (Weiland, 2017) and research that suggests that this is an area in which students need support (e.g., Callingham & Watson, 2017)
- Since the CSLHM describes each habit of mind and provides guiding questions, we see the potential for CSLHM to support the intentional development of activities and lessons that elicit and/or unpack each CSLHM and specifically those aspects less common to novices.
- Future research should endeavor to reveal the potential of CSLHM to be used in this way.

# HUGE THANK YOU to...

My chair & committee

All the folks that helped with the pilot

Everyone that has talked about CSL, SJ, CM, methods, etc. etc. with me over the years and refined my understanding, goals, hopes, and ultimately this work thus far.



# All the Questions Now

(that's how we grow)





## Questioning Sample Size and Methods

<b>Novice</b>	<b>Expert</b>
<p>I wonder where the data comes from. I mean, are they pulling it from the same city or are they, do they have the same sample, same population? Were they all throughout the country or world, or were they just picked in certain regions of the area? I mean, the different variables have got to make a difference here. Were half of them Black, half of them white? Was that a statistic or a, or a variable? I mean, I'd like to know that, uh, that little bit of information too.</p>	<p>So one thing I haven't done yet is source any of this. I'm actually kind of just trusting it. Partially because it's the New York Times and generally their editorial board does a decent job of sourcing. But I probably would want to check this because I'm not actually entirely clear where this data comes from. It does make me curious, I'm guessing it's ACS data, American Community Survey, because I'm not sure what other representative sample they would have for this sort of study.</p>

# Acknowledging Alternate Explanations

<b>Novice</b>	<b>Expert</b>
<p>Like I see this and I don't fully understand it. Um, I mean, I do understand like the numbers, but I don't understand why, like, why is it, um, that 12 percent more of black men end up poor even when they grew up rich? Like, is it college education? Is it police, uh, discrimination, brutality? Like what's the, what's the underlying cause of this. I really look at what, what made that, that young man that was raised in a rich family, white or black, what may, what situation, or what instance made that person or that young man become poor as an adult? Was it, was it drugs? Was it, uh, violence? I'm just wondering what, what is the driving force behind that?</p>	<p>I'm also thinking about how can we strengthen the argument by making sure that the two groups are comparable. Perhaps we need to know more about other demographic aspects of those families and their professional lives. I know that there's a lot of literature in sociology about all the other factors that would contribute to this. I mean, there's obviously the geography aspect of it. Based on the little I have read, I know a lot of policies have driven the lives of black persons in certain ways in the US in the last couple of decades. That's, that's sort of the best reference I have, but in terms of, uh, what happens to their lands, where the, uh, gentrification is a term I have read about, um, I don't know too much, but I think I know enough to understand that it would have affected them negatively. I want to know what are, what are the other aspects of this story? Cause there's clearly more to it, and I want to learn more about that. I think one question that I would definitely want to keep in mind is what are the confounders, because this is not enough. Where you started matters, but a lot happens to you during your life before you become an adult, that's going to drive your social economic status when you're an adult, so, yeah.</p>

# Employing Active Citizenry

## Novice

And I had never realized that even for black, um, like black men that grow up rich, there's such a spread that like less black men that grew up rich stay rich than white men. Like I just didn't realize that spread. And I, I don't really have, I mean, I don't have an explanation or a full understanding, so I think this would just leave me like the conversation I would have just kind of, do you see this or understand this? or, um, just kinda start I would start researching I guess. That's kind of what I do when I don't really get something. Is just try to research what's going on.

I'm going to have to share this graphic, and stir up some conversations. I wonder, I wonder if people are ready to have these tough conversations. And I wonder if this, if people are really bothered by things like this?

## Expert

And with mom, economics, ooh, with mom, this could be a heated discussion. Um, I think this piece, this piece of, um, causation versus association, wouldn't be obvious to her. And I think I'll have to spend some time, reminding her that the social demographics of the family you're born into don't define who you are. The parts shape your life in many, many ways. Some of them positive, some of them negative, but that's not who you are. I think just because of cultural references, the question of crime would come into the discussion. Like when we talk about rich Black families, where does it come from? And that's not the answer to that question. So I think there'll be a lot of resistance to, resistance from her to the idea that neither the racial makeup of your parents, nor the economic situation of your parents should themselves define where you end up when you grow up. That just because somebody might be born into a Black family, and if we forget that socioeconomic status doesn't mean that yeah, sure, they're just going to be poor. I think I'll be able to get across to her that there's just a lot of questions to ask. And the question is not very simple. I think the piece that I will have a resistance to is if she tries to provide anecdotal evidence. I mean the relative discussion may not be about race. It would be about caste, but in a lot of ways the issues are similar, the questions are similar.

# Acknowledging Ethical Considerations

<b>Novice</b>	<b>Expert</b>
<p>I'm just noticing things. Most white boys raised in wealthy families will stay rich or upper middle class as adults, but black boys raised in similar rich houses will not [reading visualization]. Well if they do, eventually there has to be an end point to how many, you know, black boys will stay rich. I mean, if it trickles down, it'll be so diminished. It's almost like blacks will not be rich. It's almost like there's a bias in saying that blacks do not have the ability to bounce back and become successful rich in the upper upper class ends of our socioeconomic status. So I'm just noticing there's a bias there with how short it says, but black boys raised in similar rich houses will not.</p>	<p>I think the visualization is powerful in the sense that you can see it. I struggle with it sometimes though, because there is a lot of black box magic behind the scenes, so to speak, and any time that's happening in something, it makes me somewhat hesitant just because I am guessing. It was probably more of a computer science type person that built this thing, and they may have taken creative license to visualize it in certain ways. And so I don't know how accurately it matches the data. I do think it has this dramatic effect of the black boys being the blue dots falling. So you've fallen in stature and in SES and you've fallen visually speaking. Um, so they're certainly trying to highlight that.</p> <p>So one thing I haven't done yet is source any of this. I'm actually kind of just trusting it. Partially because it's the New York Times and generally their editorial board does a decent job of sourcing. But I probably would want to check this because I'm not actually entirely clear where this data comes from. It does make me curious, I'm guessing it's ACS data, American Community Survey, because I'm not sure what other representative sample they would have for this sort of study.</p>

# *Recognizing Appropriate Statistics and Appropriate Representations*

<b>Novice</b>	<b>Expert</b>
<p>Yeah. Um, this, I dunno, I kind of like that they chose yellow and blue, um, for the, the dots, because it shows like you have a pretty yellow bar up here with rich adult and then a little bit more blue. So it's getting to green, um, down here in the upper-middle-class adult and then it gets bluer as you go down. Um, so I think any other colors might've been, uh, harder to differentiate, um, cause like I can see that it's yellow and the top one for rich adult and like really blue for poor adult. Um, but it's also, it's really cool to see like the dots move along the screen.</p>	<p>I think the visualization is powerful in the sense that you can see it. I struggle with it sometimes though, because there is a lot of black box magic behind the scenes, so to speak, and any time that's happening in something, it makes me somewhat hesitant just because I am guessing. It was probably more of a computer science type person that built this thing, and they may have taken creative license to visualize it in certain ways. And so I don't know how accurately it matches the data. I do think it has this dramatic effect of the black boys being the blue dots falling. So you've fallen in stature and in SES and you've fallen visually speaking. Um, so they're certainly trying to highlight that.</p> <p>I also don't like how they emphasize the counts, but then shrunk the percentage. Because to me what's more important to look at are the percentages. That's what really tells me what's going on. And the percentages are constant. Those aren't changing. Um, at least I didn't notice them changing drastically.</p> <p>This whole color bar nonsense here [referring to bars filled with blue and yellow], um, to me is just useless visualization because I don't know what's, I don't know if it's actually proportional. Why didn't they just turn this into like a stacked bar where there's a yellow segment and a blue segment?</p>

# Recognizing Appropriate Statistics and Appropriate Representations

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The novices focused on the appropriateness  
of the color choice and the appeal  
of the movement

# Recognizing Appropriate Statistics and Appropriate Representations

the counts are visually larger than the percents (i.e., font size), but that percents are the more appropriate measure for comparison

## Expert

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# Recognizing Appropriate Statistics and Appropriate Representations

the bars collecting the  
blue and yellow squares  
for each income category  
are muddled and that a  
stacked bar graph would  
be more ideal for  
comparison

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Experts were wary of drawing conclusions as they were unsure of how well the representation reflects the proportionality and rigor of the calculations

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# Recognizing Appropriate Statistics and Appropriate Representations

noted the power of the  
representation in  
demonstrating the literal  
fall in status from  
growing up rich to  
becoming an adult of a  
lower income class

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# Current Statistical Self-Efficacy Scale

(CSSE; Finney & Schraw, 2003)

- 14 items on a 6-point Likert scale:
  - No Confidence at All → Complete Confidence

*Distinguish between the objectives of descriptive versus  
inferential statistical procedures*

- Statistical confidence will be classified as ratings of much confidence (4), very much confidence (5), and complete confidence (6)
- Sum  $\geq 56$  classified as Confident, Sum  $< 56$  classified as Emergent

# Short Critical Consciousness Scale

(S-CCS; Diemer et al., 2020; Rapa et al., 2020)

- 3 Parts: Critical Reflection, Critical Motivation, Critical Action
- 6-point Likert scale (Strongly Disagree → Strongly Agree) or 5-point (Never → At Least Once a Week)

*Certain racial or ethnic groups have fewer chances to get ahead*

- Sum  $\geq 50$  classified as Strong, Sum  $< 50$  classified as Emergent

# Short Critical Consciousness Scale

(S-CCS; Diemer et al., 2020; Rapa et al., 2020)

## (1) Critical Reflection

- 4 items using a 6-point Likert scale (Strongly Disagree → Strongly Agree)
- Sample Item:

*Certain racial or ethnic groups have fewer chances to get ahead*
- I expect Critically Conscious individuals to Agree (5) or Strongly Agree (6) with the statements

# Short Critical Consciousness Scale

(S-CCS; Diemer et al., 2020; Rapa et al., 2020)

## (2) Critical Motivation

- 4 items using a 6-point Likert scale (Strongly Disagree → Strongly Agree)
- Sample Item:

*It is important to correct social and economic inequality*

- I expect Critically Conscious individuals to Agree (5) or Strongly Agree (6) with the statements

# Short Critical Consciousness Scale

(S-CCS; Diemer et al., 2020; Rapa et al., 2020)

## (3) Critical Action...

- I expect Critically Conscious folks to rate the statements as a 2, 3, 4, or 5.
- Selected 50 as the cutoff sum for individuals evidencing strong critical consciousness
  - Sum of ratings of 5 on critical reflection and motivation and the sum of ratings of 2 on critical action is 50
- Individuals with a sum below 50 will be classified as emergent



# Analysis

**CODING STAGE 1:** Employ apriori theoretical codes based on the CSLHM descriptions from Theoretical Framework





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**CROSS CASE:** I will perform cross-case analysis with the goal of comparing “any within-case patterns across cases” (Yin, 2018, p. 196).