CSC290 Communication Skills for Computer Scientists

Lisa Zhang

Lecture 2; Jan 14, 2019

Announcements

Blog post #1 due Sunday 8:59pm

- Submit a link to your blog post on MarkUs (should be operational next few days)
- Create a file called `link.txt`, write the URL of the *blog post* (not your entire blog) in the file
- Submit `link.txt` to MarkUs.
- Make sure that you are submitting the *public URL* of the blog post!

Critical Review

- Read the article before the tutorial on Friday
- Required reading:
  - Transition to University
  - Grammar Hit Parade
- Start a draft as soon as you can
  - Your first draft will suck, that's okay!
  - You will think of ideas as you start writing.
  - Revise, revise, revise!

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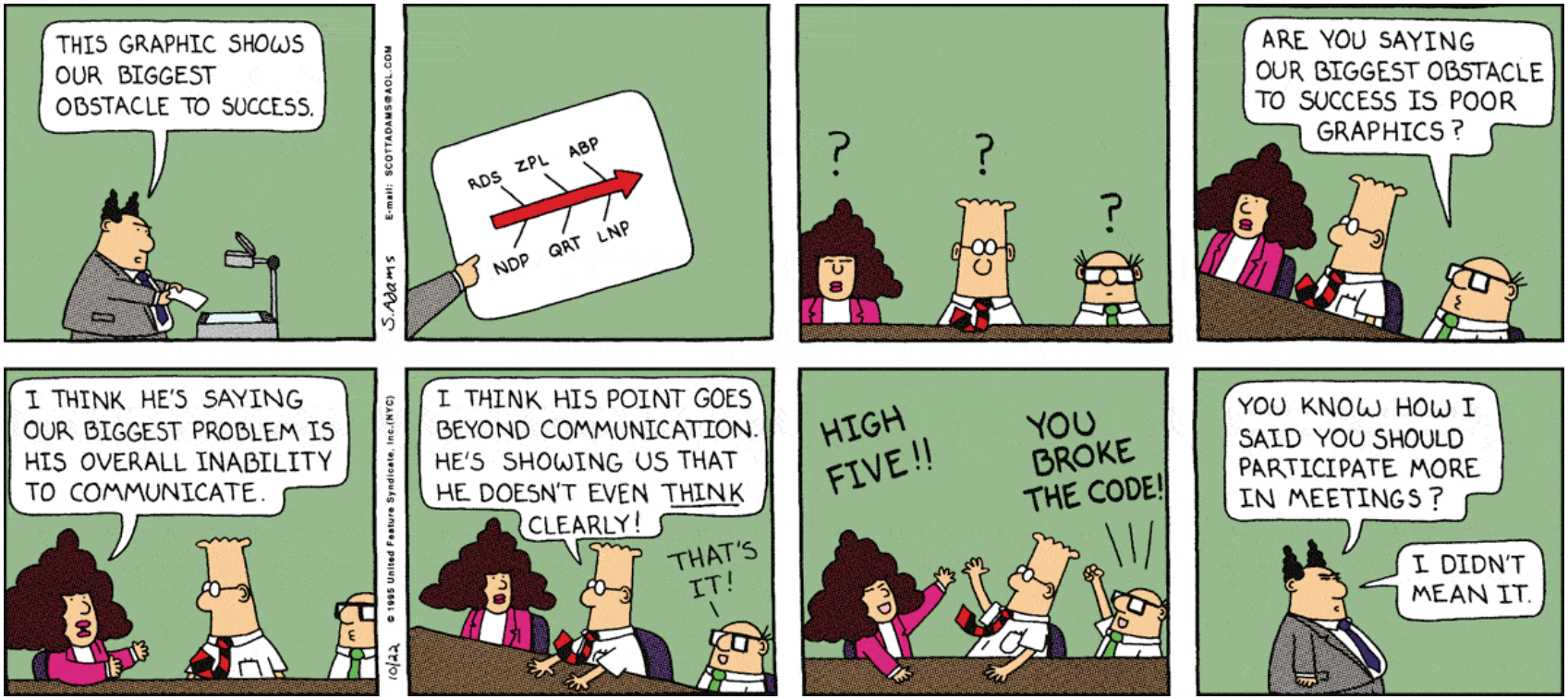
Questions?

Critical Thinking

Why Critical Thinking?



Why Critical Thinking?

- Clear thinking is the first step to clear communication.
- Life is full of open-ended questions with no clear answers.

Some Qualities of Critical Thinking

- Asking probing questions
- Not blindly accepting facts and memorizing
- Acknowledgement of limitations
- Ability to questions one's own bias
- Ability to prioritize information
- Effective communication and articulation of information

How do I Support My Argument?

Conceptual argument does not rely on scientific/statistical data.

For example, if you think software piracy is wrong because you think stealing is wrong, you might argue that software piracy is a form of stealing. You don't use scientific data or statistics to make this point; you would have to write about the meaning of 'steal' and explain how you can steal software.

How do I Support My Argument?

Empirical argument relies on scientific data.

For example, if you think software piracy is harmless because people only pirate software they wouldn't buy, you would need to find a reputable study showing that software pirates only pirate software they wouldn't buy.

Components of an Argument

- **Claim**: The position you are attempting to establish
- **Grounds**: Reasons or evidence in support of the claim
  - An argument is no stronger than the grounds that support it
- **Warrant**: chain of reasoning that connects grounds to the claim
  - e.g. “that claim is not warranted”

Example

A basic education is more important than fancy degrees that nobody uses. If we have to cut education funding, it should be university funding.

- What is the claim? What are the grounds? Is the claim warranted?
- Is the argument conceptual or empirical?

Example

We interviewed 10 business professionals, and 8 of them agreed that we should continue to teach cursive in elementary school.

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- Is the argument conceptual or empirical?

Worksheet

- Worksheet - Page 1

Fallacy

What is a **fallacy**?

- a mistaken belief, especially one based on unsound argument
- a failure in reasoning that renders an argument invalid
- faulty reasoning; misleading or unsound argument

In short, fallacies are “bugs” in arguments.

Fallacies in conceptual arguments

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  - Bob is a jerk.
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Ad hominen: argument that attacks attributes of the person making the argument.

Is there attribute related to the claim in a significant way?

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Vested interest fallacies: dismissing an argument on the ground that the person making the argument stands to gain from the argument being accepted.

You should not discount an argument because of vested interest, but consider the context and other evidence available.

Fallacies in conceptual arguments

- We shouldn't aim for 100% computer literacy because if everyone is on their computers, there would be no one left to farm.

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Straw man fallacies: deliberately confuse an argument with a weaker argument.

Are you really understanding the concepts?

Fallacies in conceptual arguments

Other fallacies:

- **The fallacy fallacy**: There is a fallacy in the reasoning, therefore the claim is false.
  - The claim may be warranted, for other reasons.
- **Black swan fallacy**: I haven't seen a black swan, therefore it doesn't exist.
  - How hard have you looked? Are you a bird expert or do you never go out?
- **Inappropriate appeal to authority**:
  - What is the experience of the authority? Can they justify their reasoning?
- **Inappropriate analogies**:
  - Where does the analogy fall apart?

Empirical arguments

Which is true?

Canada: A Dangerous Place to Live. Despite the best efforts of police departments across the country, the number of murders committed in Canada has increased 6% since 1996.

Canada: A Safe Place to Live. The Canadian gun registry appears to have paid off. The Canadian murder rate has decreased by 4% since 1996, about the time short barrelled handgun registration started.

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Both can be true!

Empirical arguments

- You can paint different pictures depending on how you summary and present your data.

Fallacies in empirical arguments

- There can also be fallacies (faulty reasoning) in empirical reasoning

Fallacies in empirical arguments - Causation

- Jake observes that crime rates are higher on months that ice cream sales are high.
  - Jake concludes that ice cream makes people violent.

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- B cause A
- A, B have a common cause C (called a **confounder** or **confounding factor**)

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In this case, **seasonality** is a confounder that causes both ice cream consumption and crime rates to increase.

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Low sample size: sample size too small with respect to the group that you want to make a claim about.

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Biased sample: Is your sample representative of the group in your claim?

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Timing of study: Is your study recent? What does *recent* mean?

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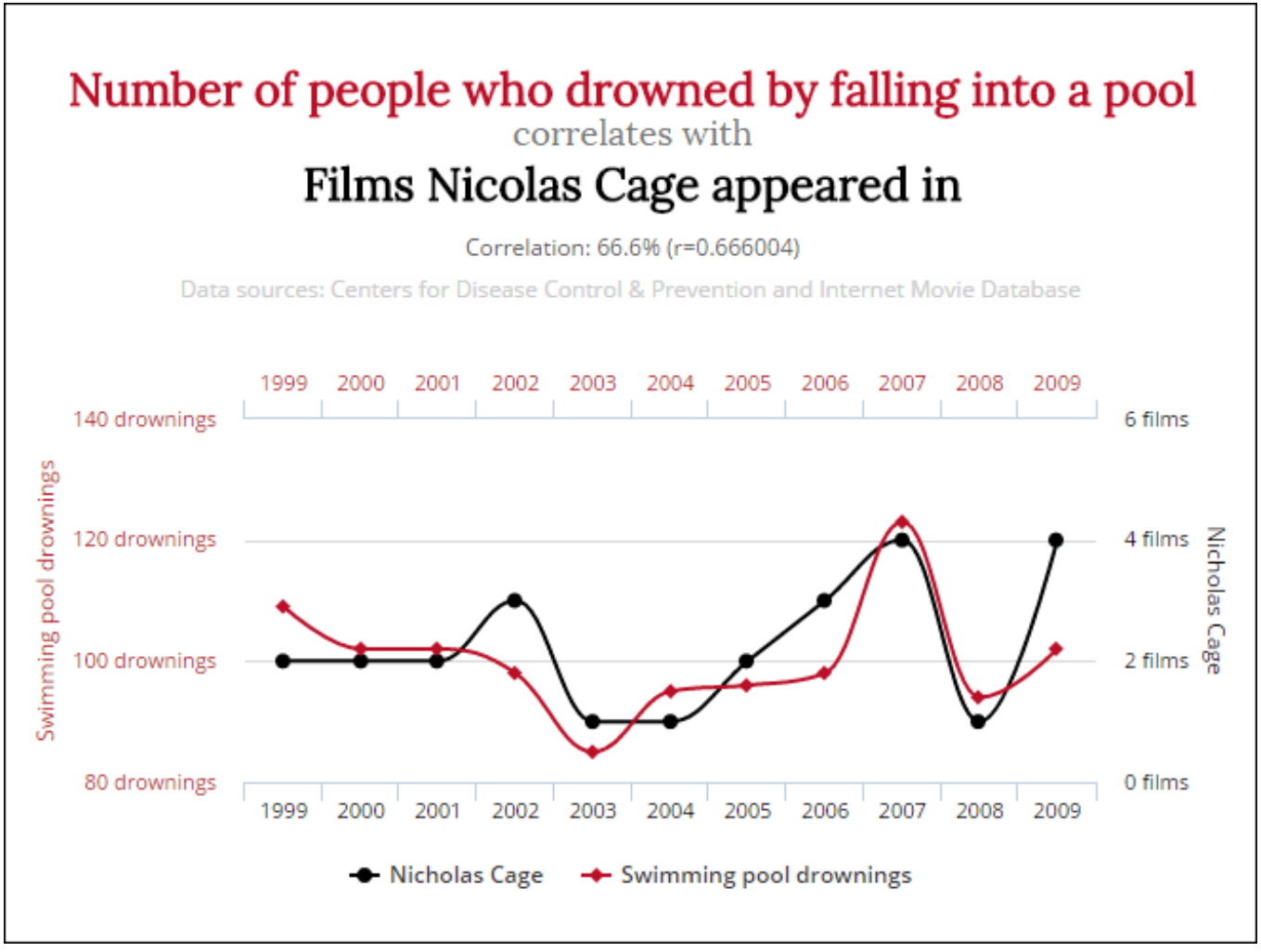
Leading question: Are survey questions leading? What is the default answer?

Fallacies in empirical arguments - p-hack



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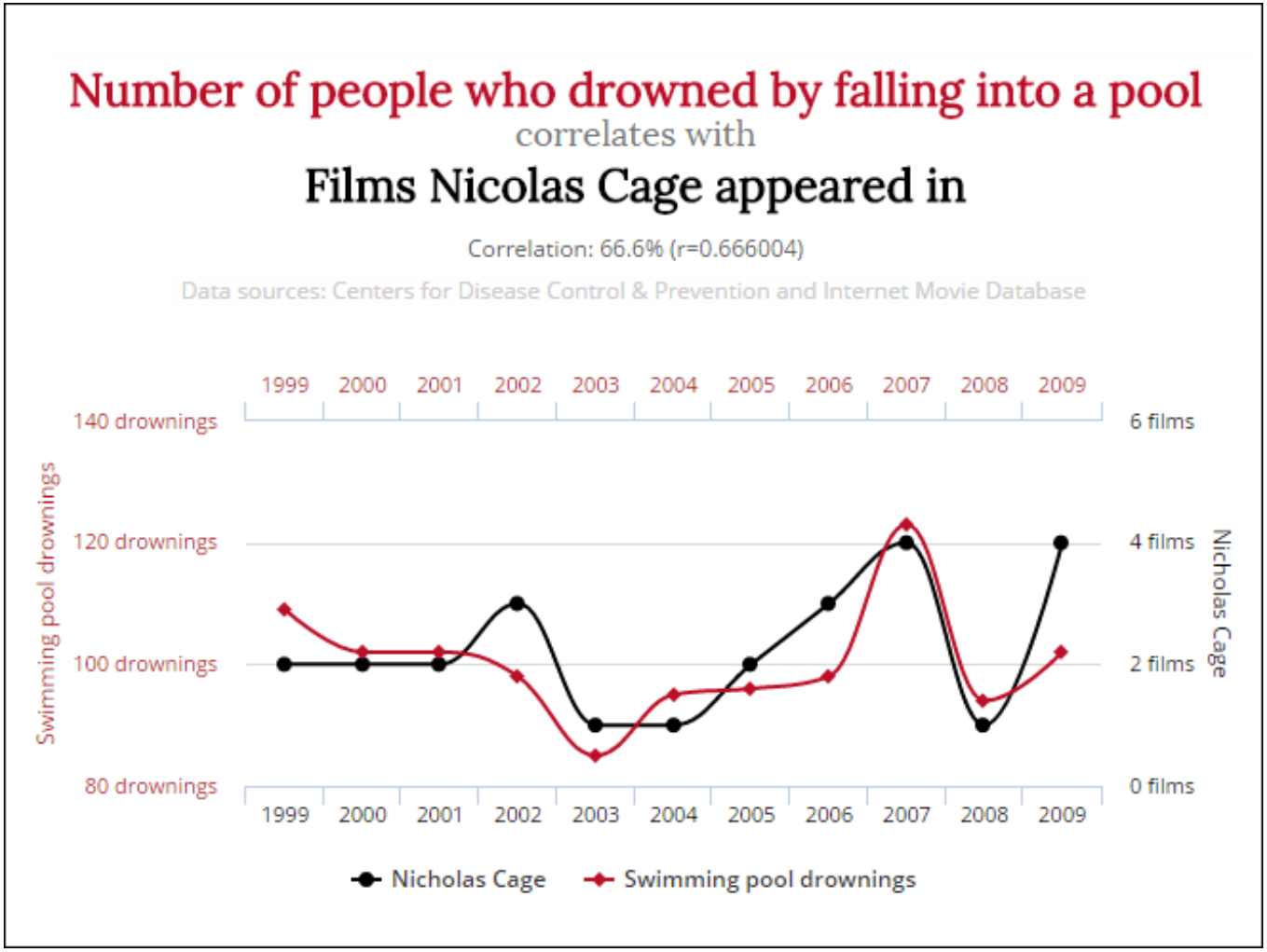

p-hacking: Looking through lots of data to try and find spurious *correlations*.

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Survivorship bias: Does your sample only contain "survivors"?

Fallacies in empirical arguments - Exclusions

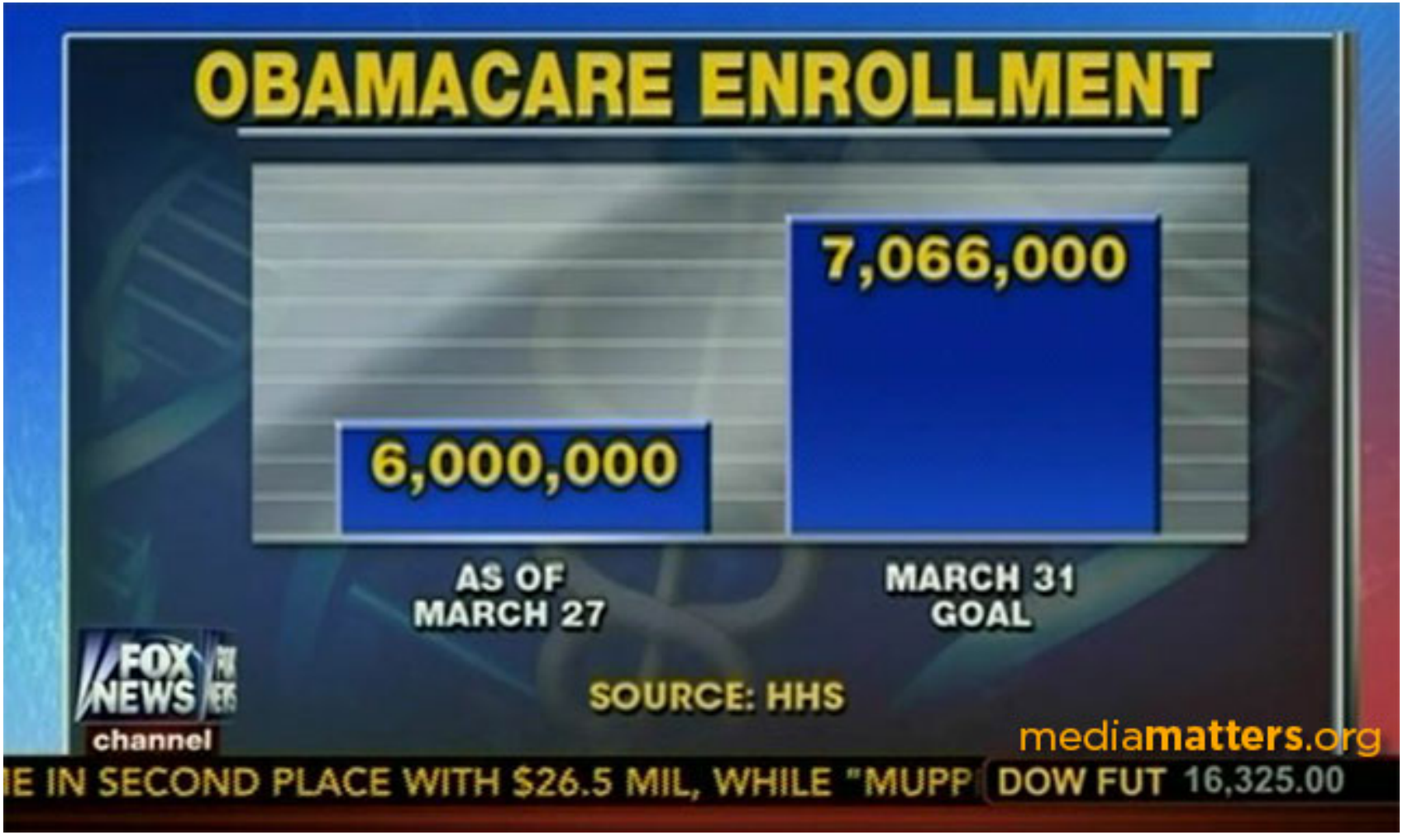
- Great new CS initiatives in 2007 boost women in CSC108 enrollment by 50%

Excluded information: Did total enrollment also increase? How many women were in CSC108 in 2007? Is the increase just due to random chance?

Worksheet

- Worksheet - Page 2

What is wrong with this chart?



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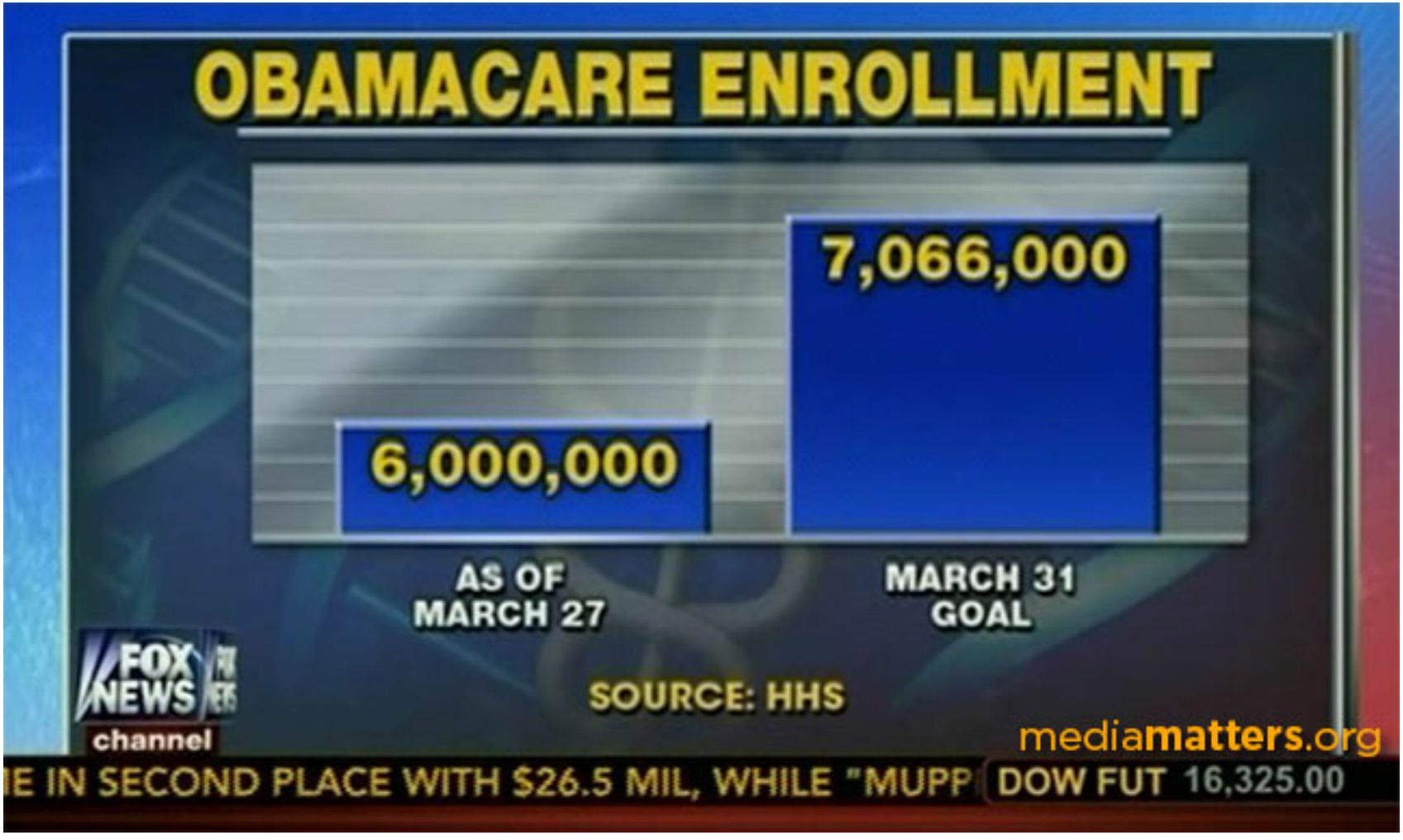
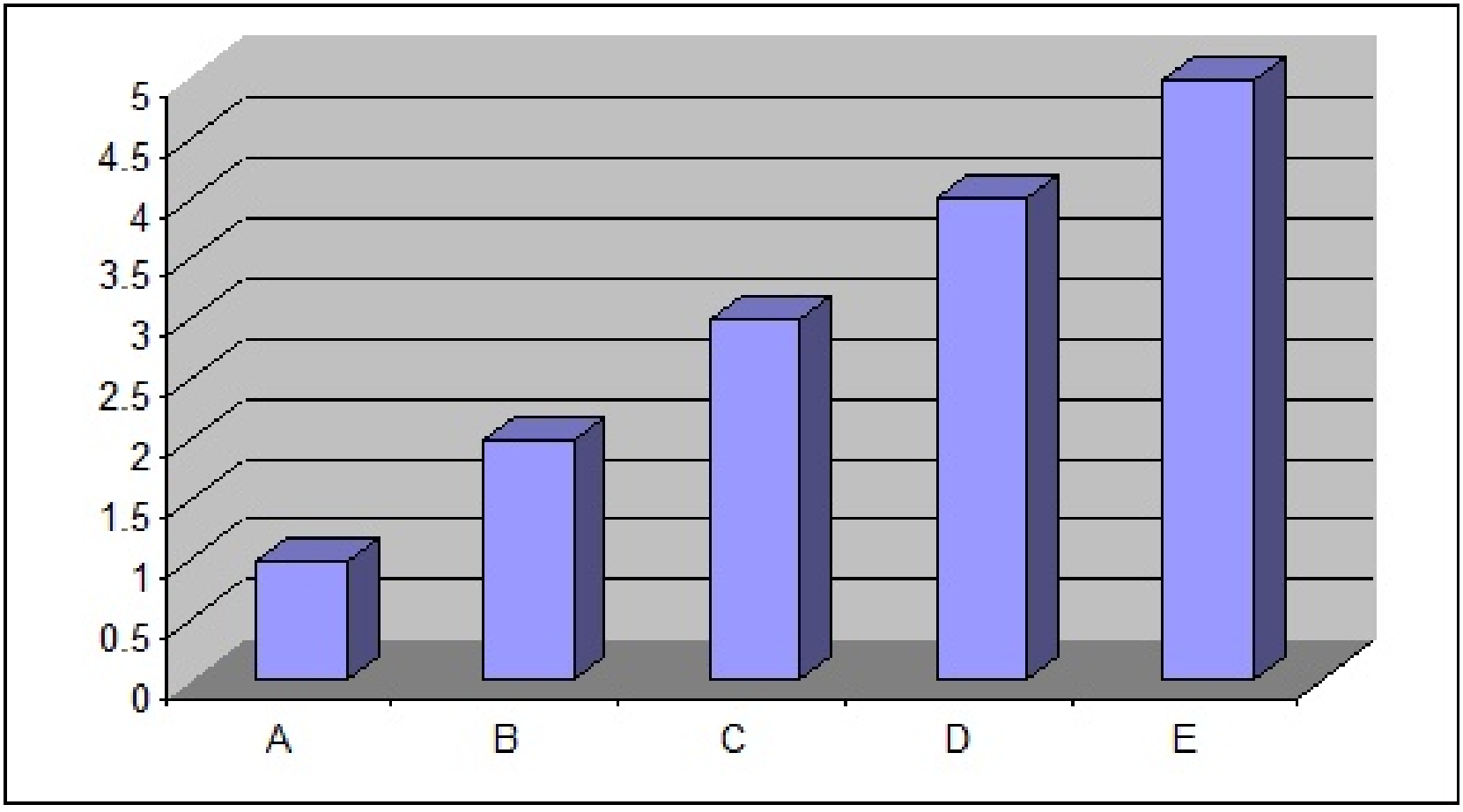


misleading axis: bar chart axis should start at 0, so the bar *areas* are proportional.

Corrected visualization

3D Bar Charts



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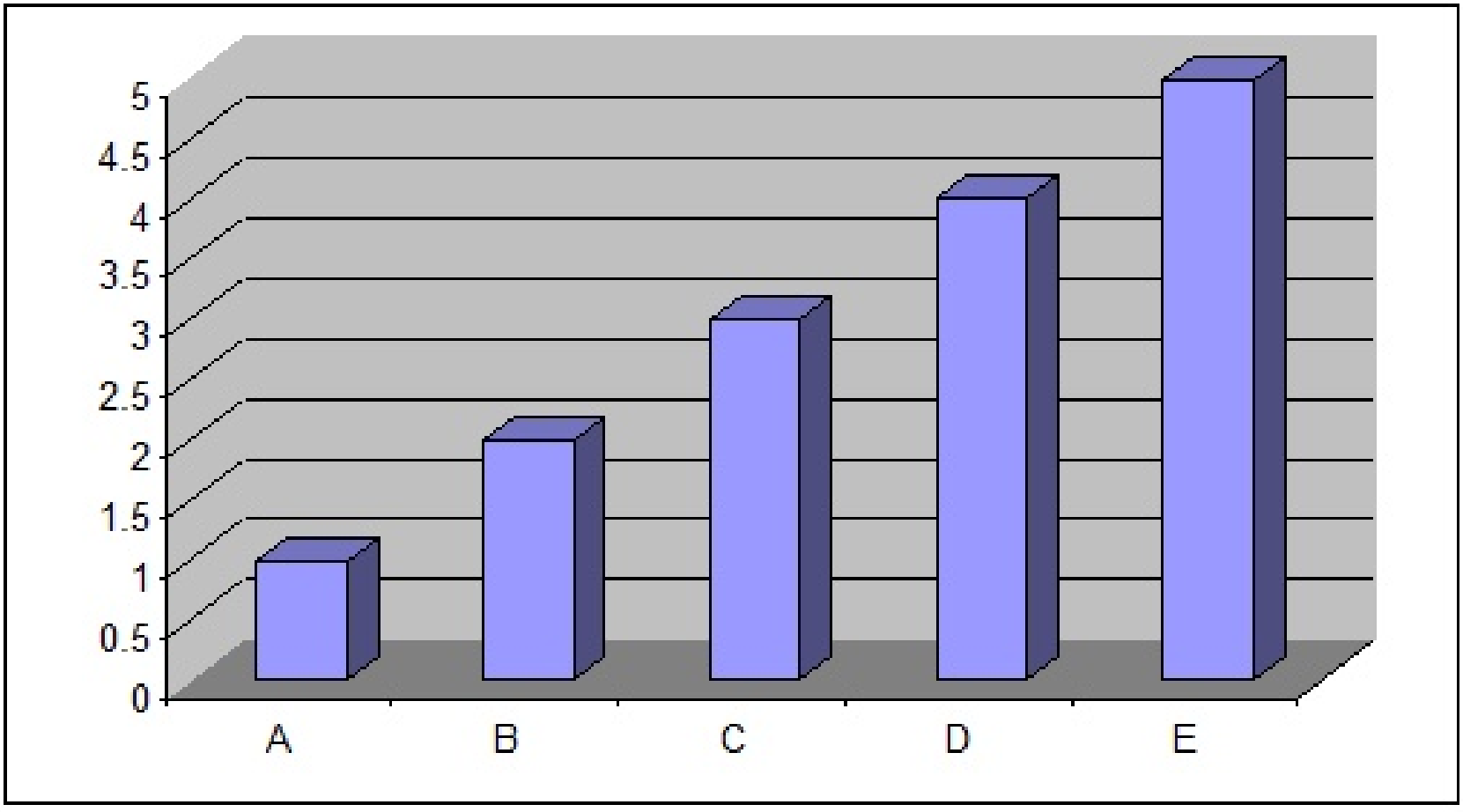
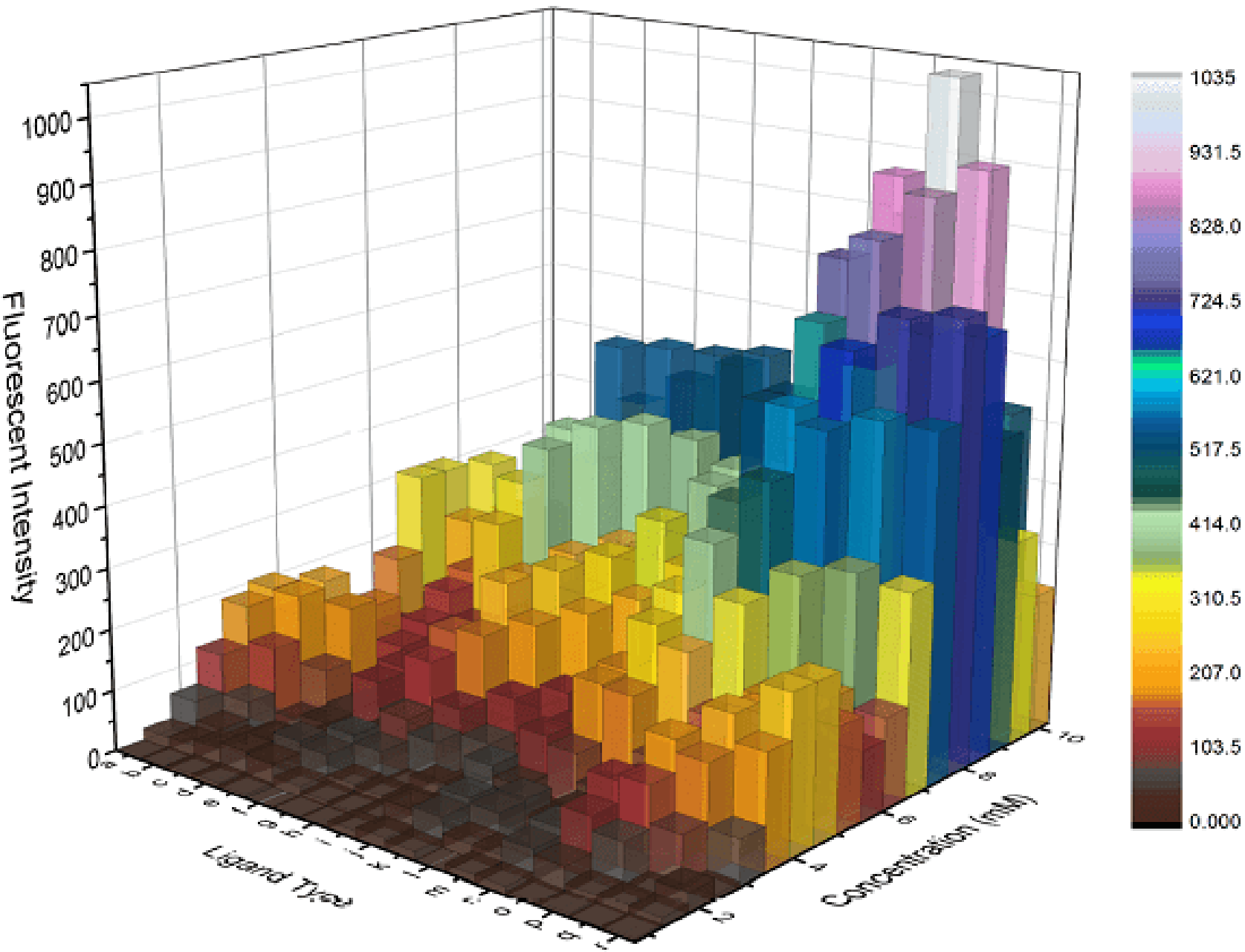


A = 1, but can you really tell?

Unreadable Visualizations



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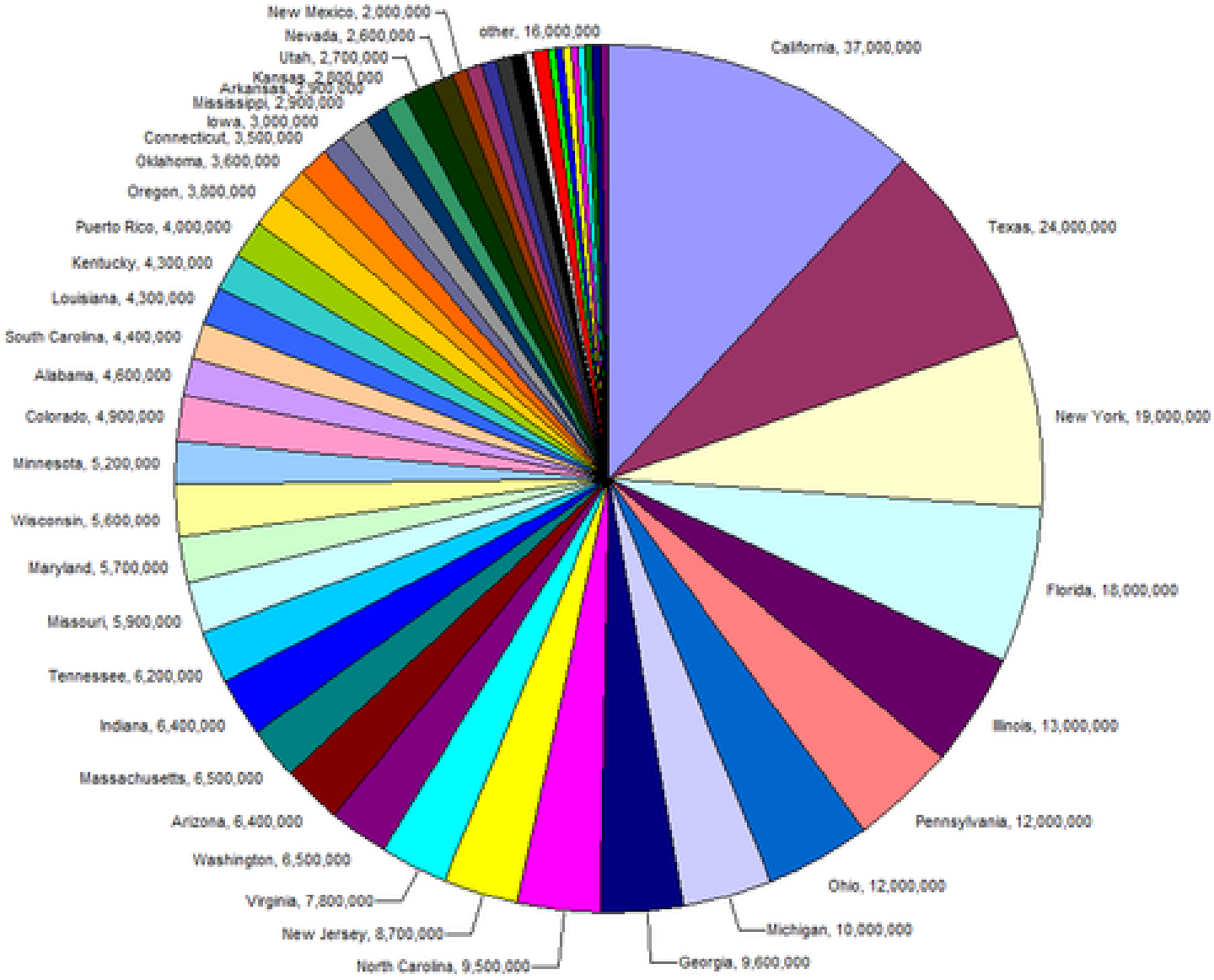

Your Critical Review

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A good critical review should have.

- Clear and concise summary of the text.
- Analysis on why the text is (or isn't) convincing.
- What can the author do to be more convincing (more experiments? look at data differently?)
- Good structure, grammar, readability, etc.

References

These slides borrow heavily from the following material:

[0] Nia McNash's CSC290 slides
[1] https://www.cs.ox.ac.uk/people/michael.wooldridge/teaching/lect04.pdf
[2] https://pdfs.semanticscholar.org/presentation/6e54/bf3d8dc44dd7552fb1e9fe86127401f9c259.pdf
[3] http://www.cs.toronto.edu/~arnold/290/09s/lectures/03/