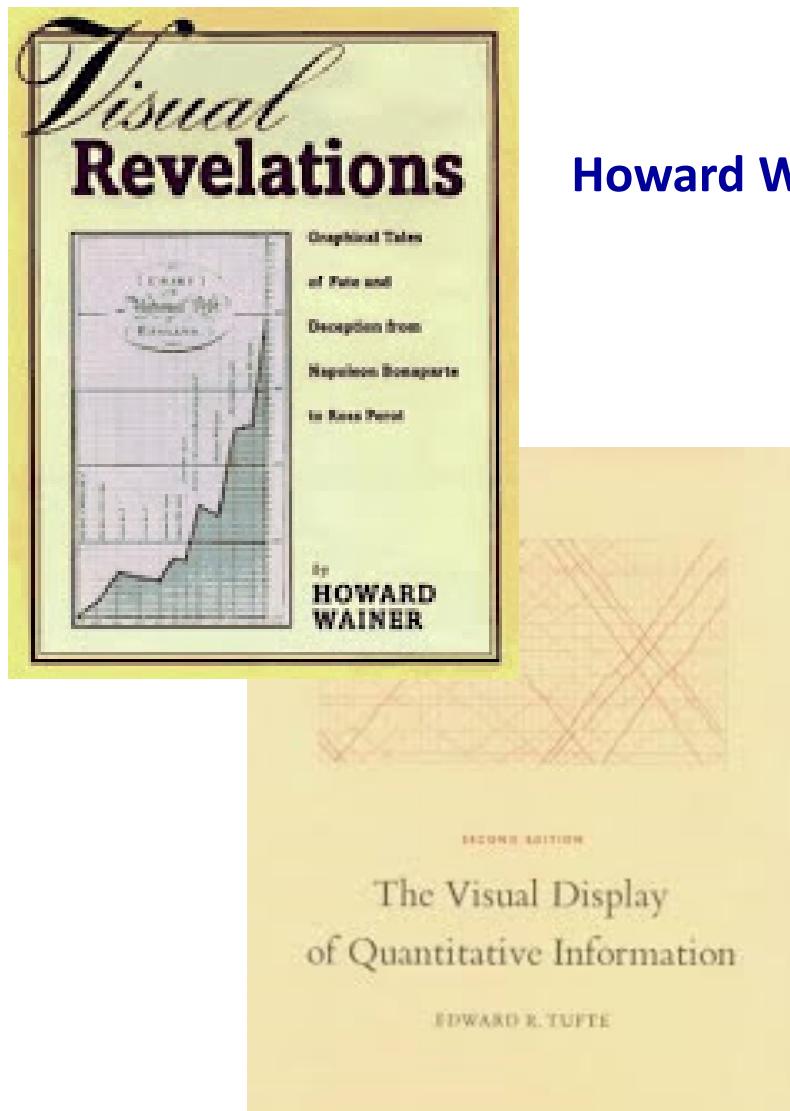


Correcting graphical lies



Howard Wainer

Edward Tufte

and others

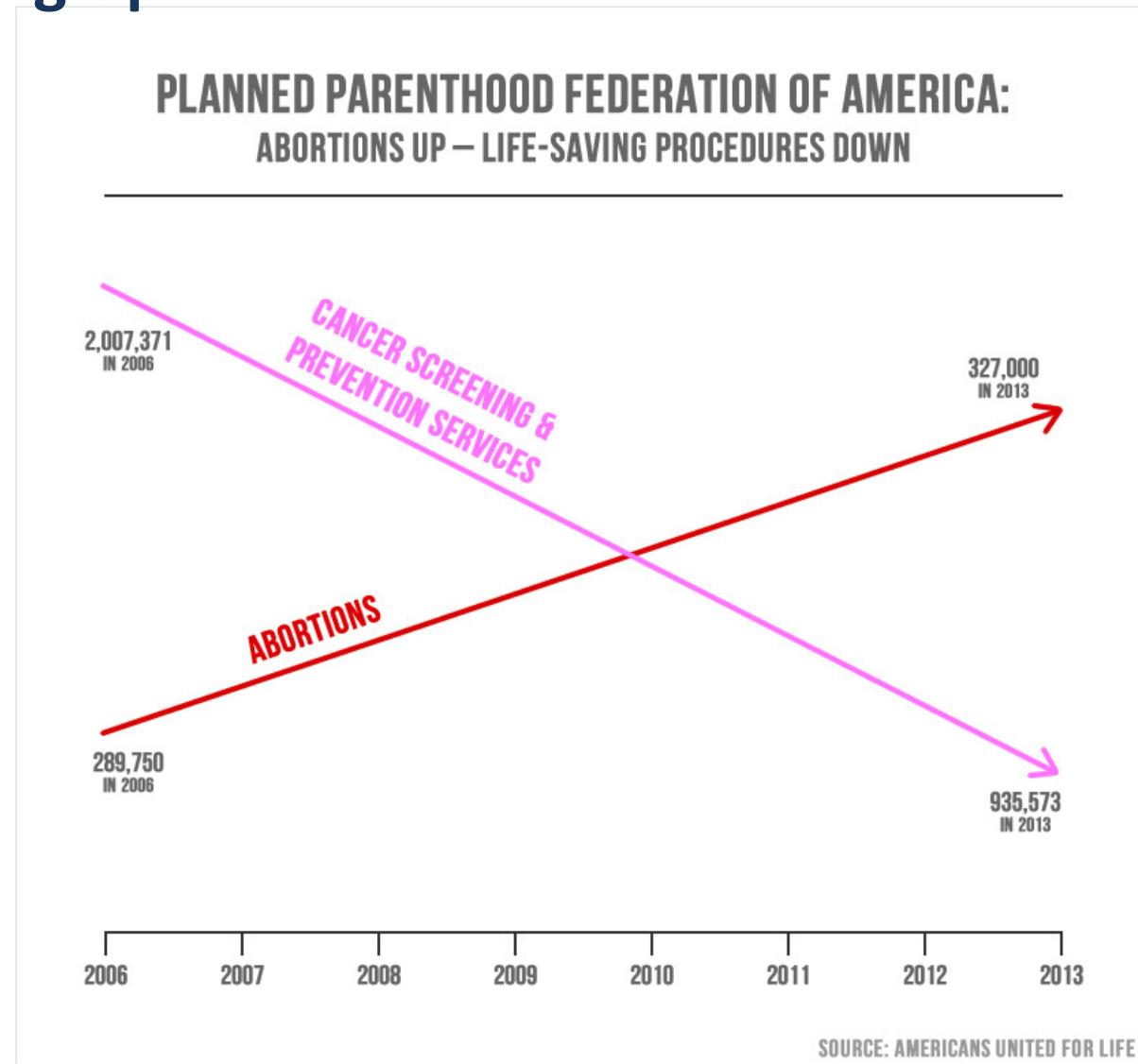
a deliberate deception

visual lie
missing data
uses emotion-laden color
lack of context
not adjusted for population

<http://www.graphdoctor.com/archives/1248>

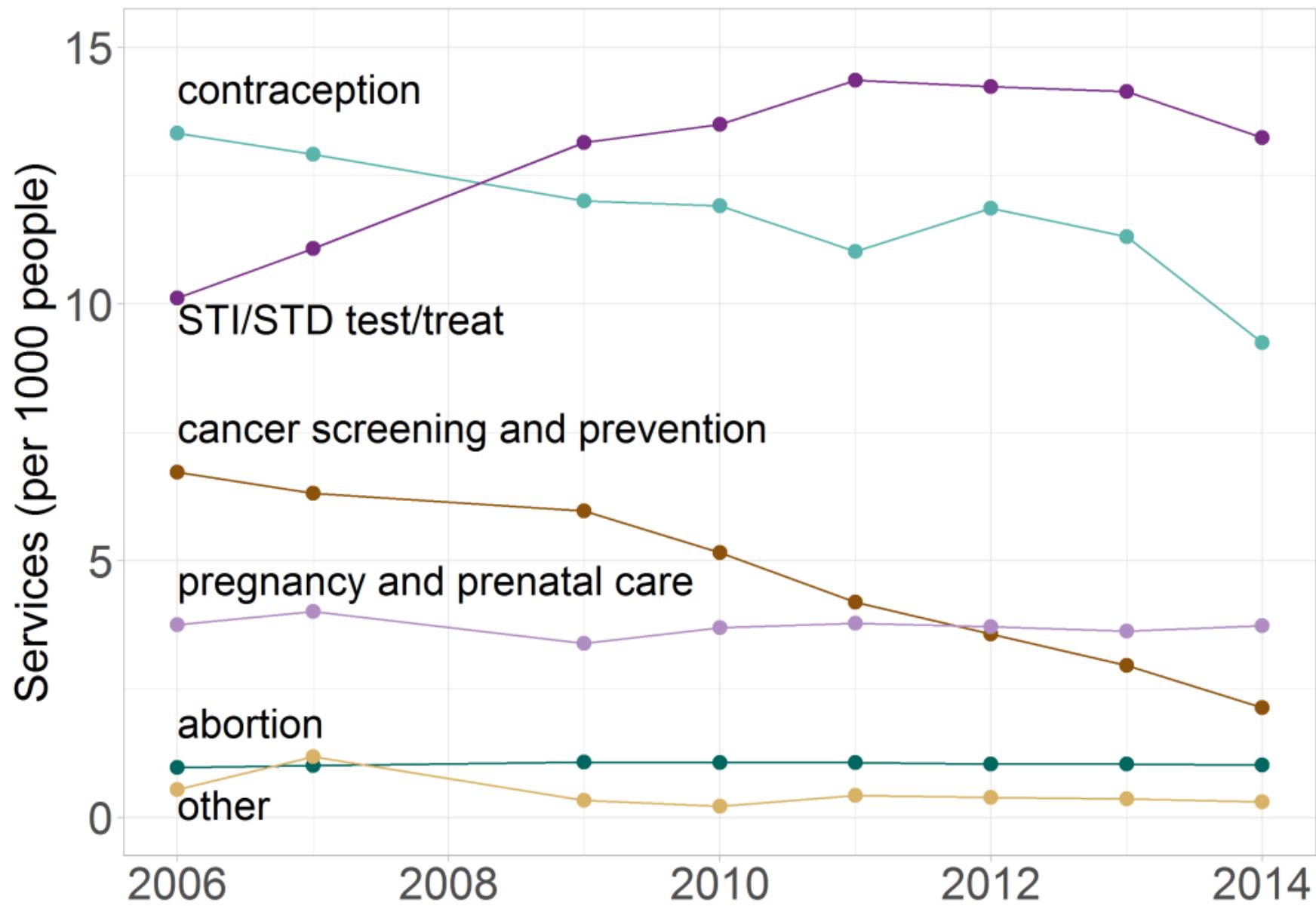
Sep. 29, 2015, Rep. Jason Chaffetz supported his assertion with this graph.

"In 2006, Planned Parenthood performed more prevention services and cancer screenings than abortions, but in 2013, there were more abortions."



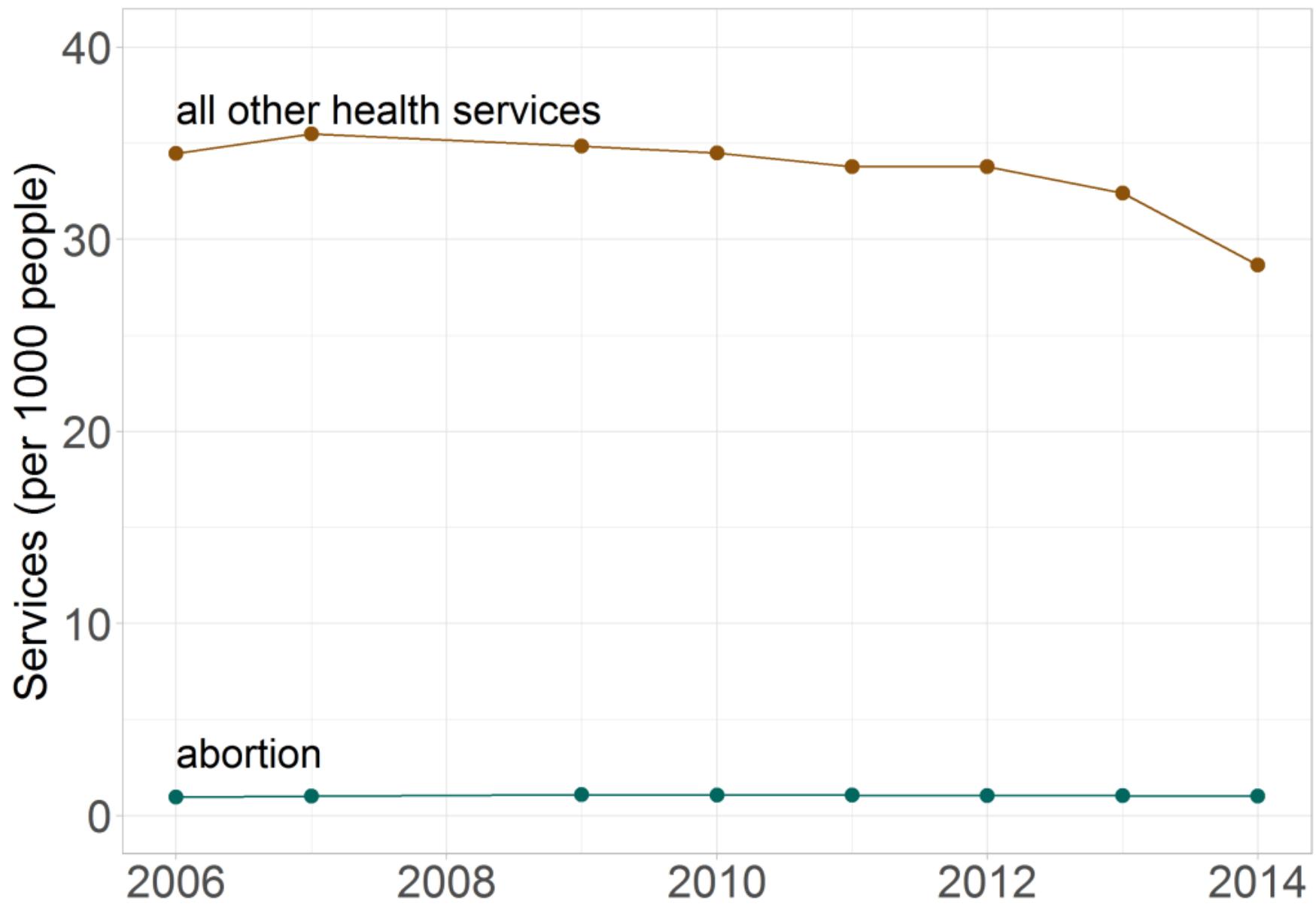
Linda Qui (2015-10-01) [Chart shown at Planned Parenthood hearing is misleading and 'ethically wrong'](http://www.politifact.com) www.politifact.com

All Planned Parenthood services, per capita



data source: Annual Reports, Planned Parenthood, 2006–2014

Abortion services compared to all other services

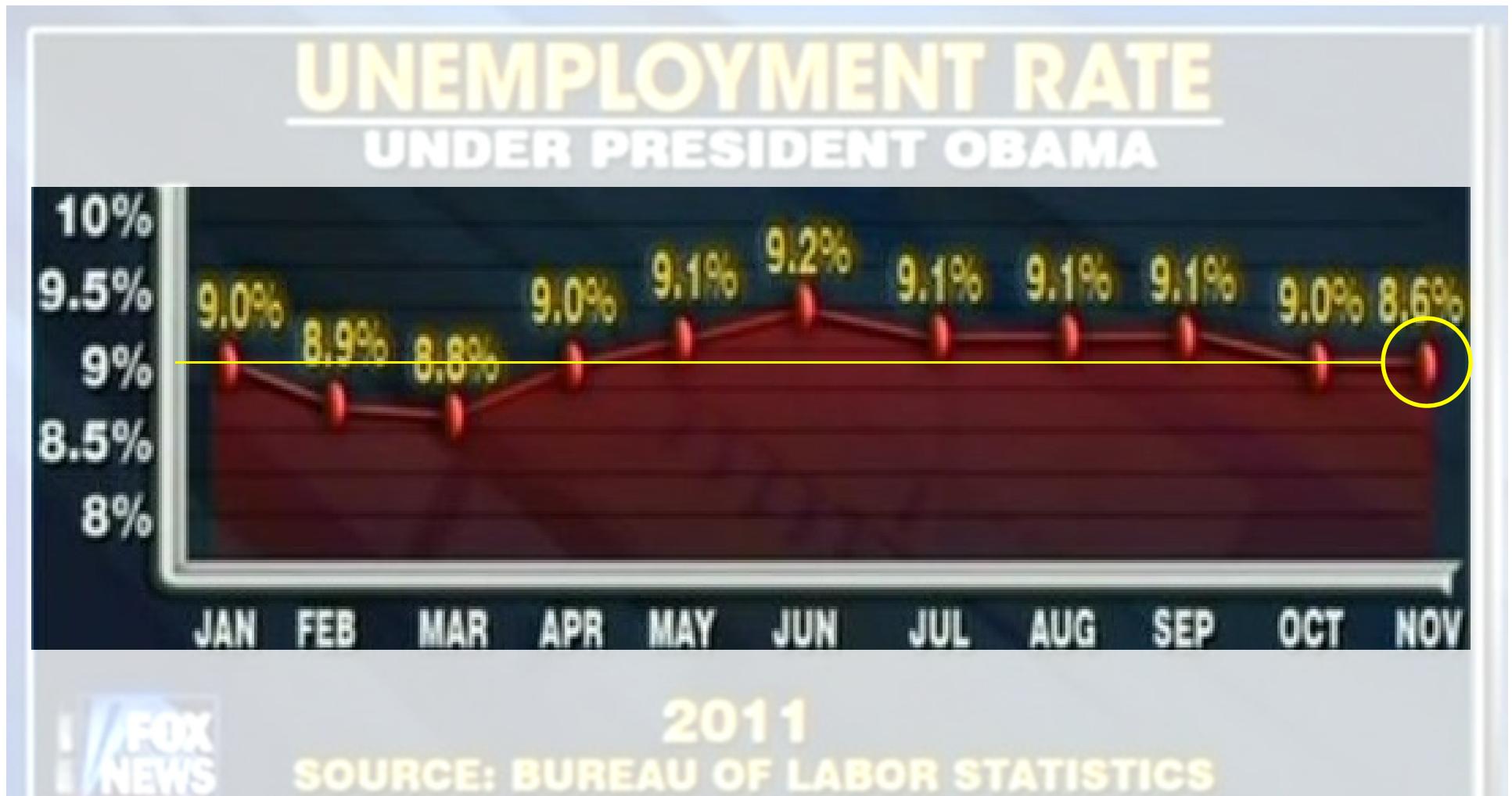


data source: Annual Reports, Planned Parenthood, 2006–2014

a deliberate deception

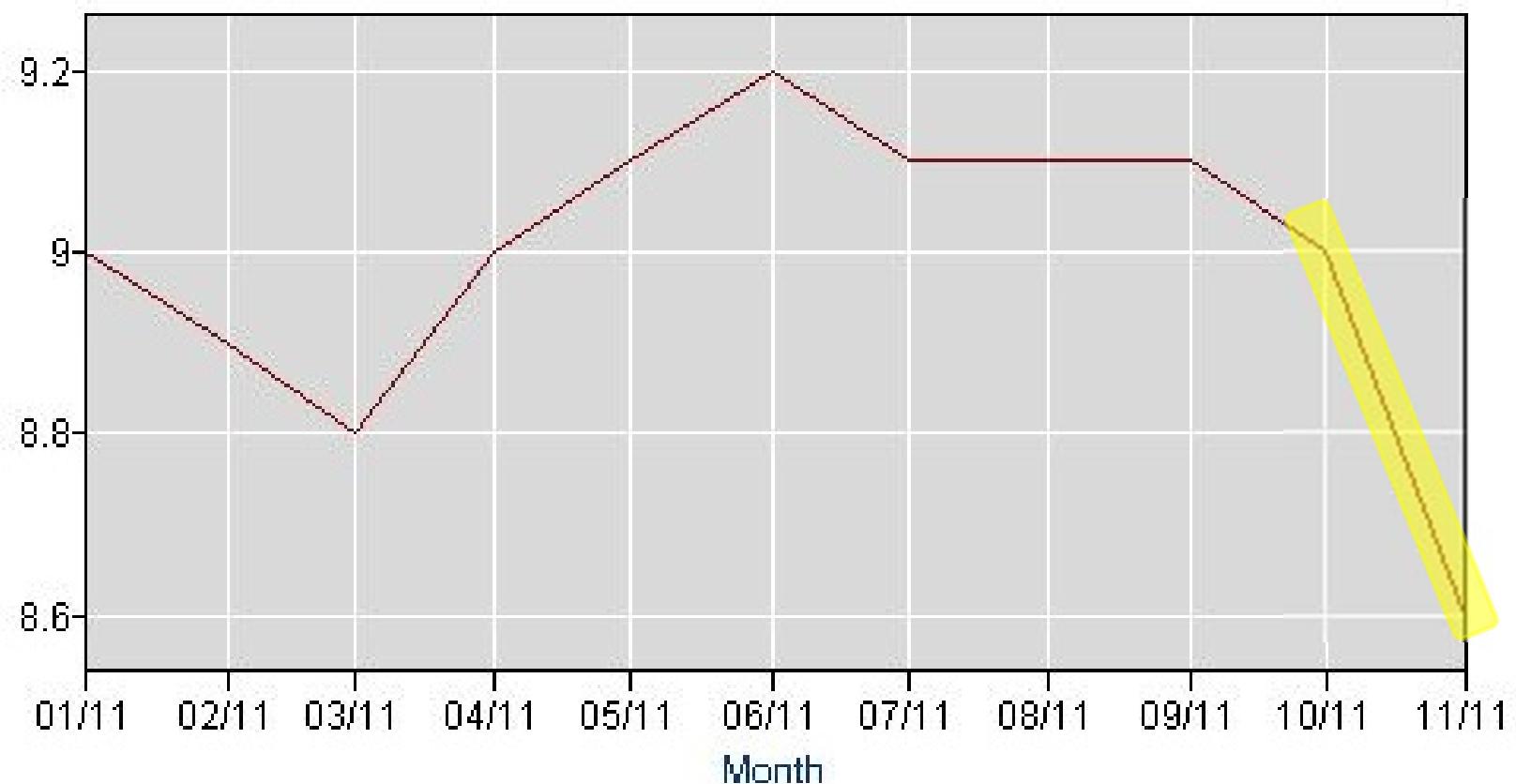
visual lie
lack of context

The November data **label** (8.6%) is correct. What is amiss?

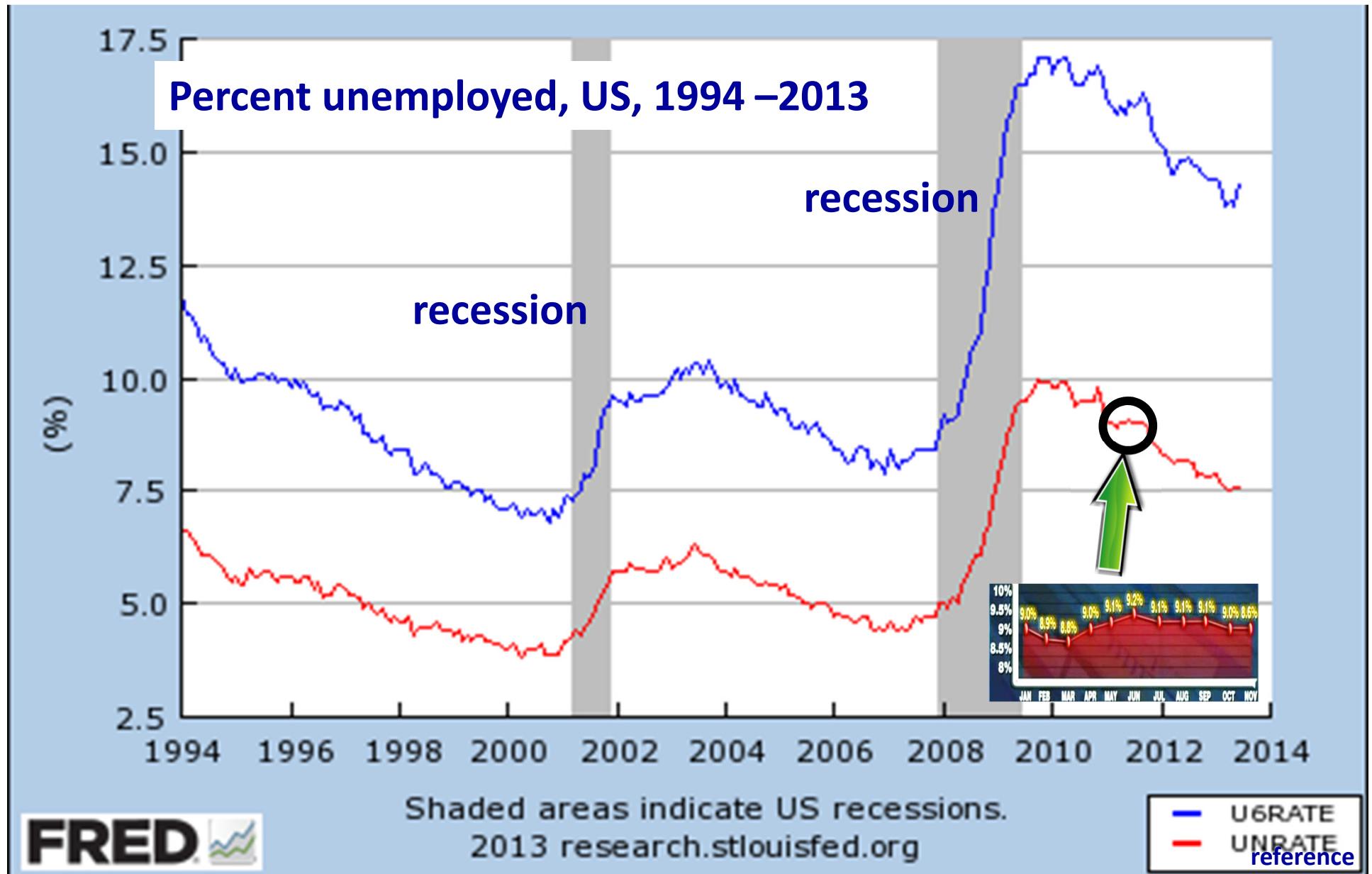


With the same data drawn truthfully, we see what appears to be a dramatic drop in unemployment...

Labor force status: Unemployment rate
Type of data: Percent or rate
Age: 16 years and over

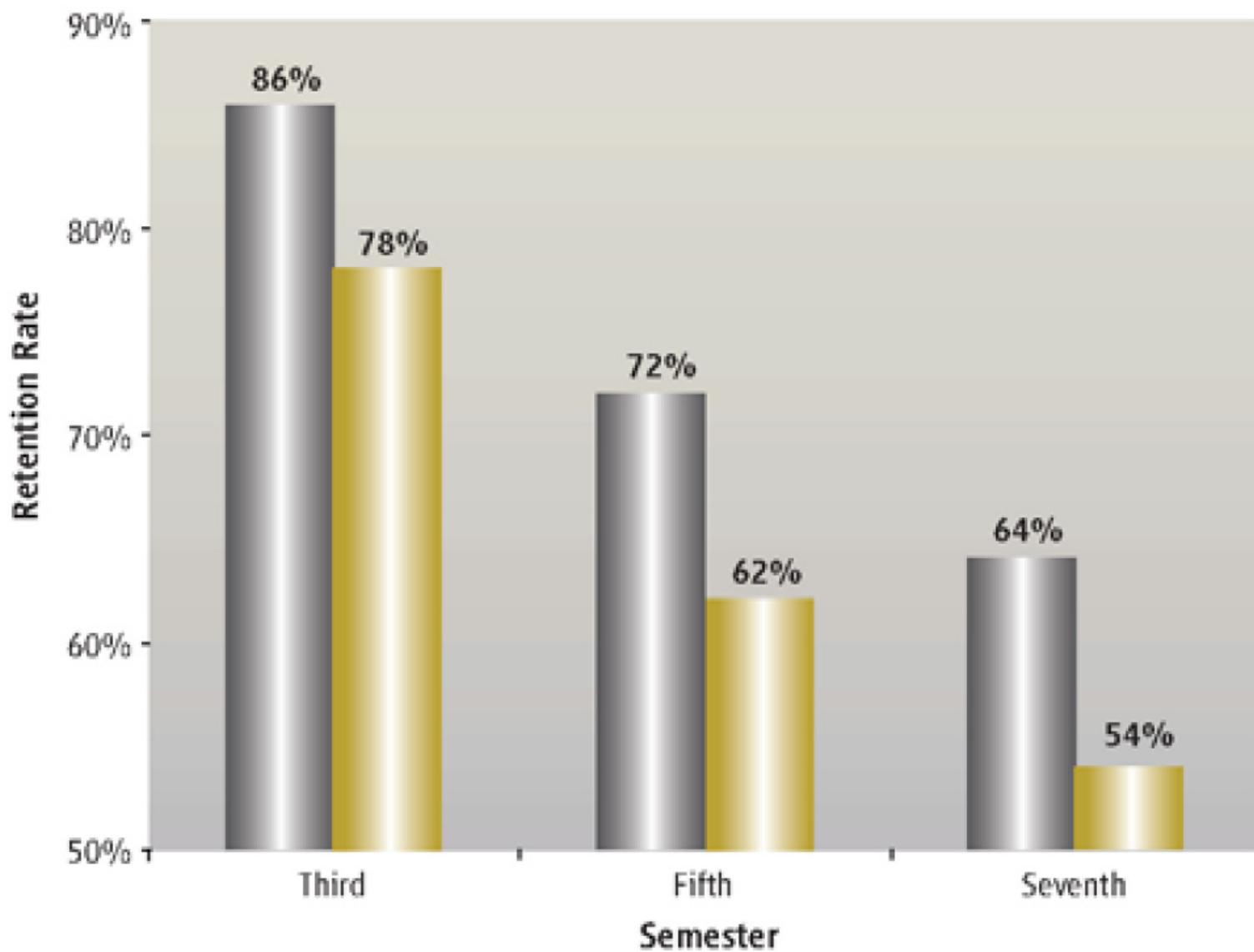


... until we add more data for context.



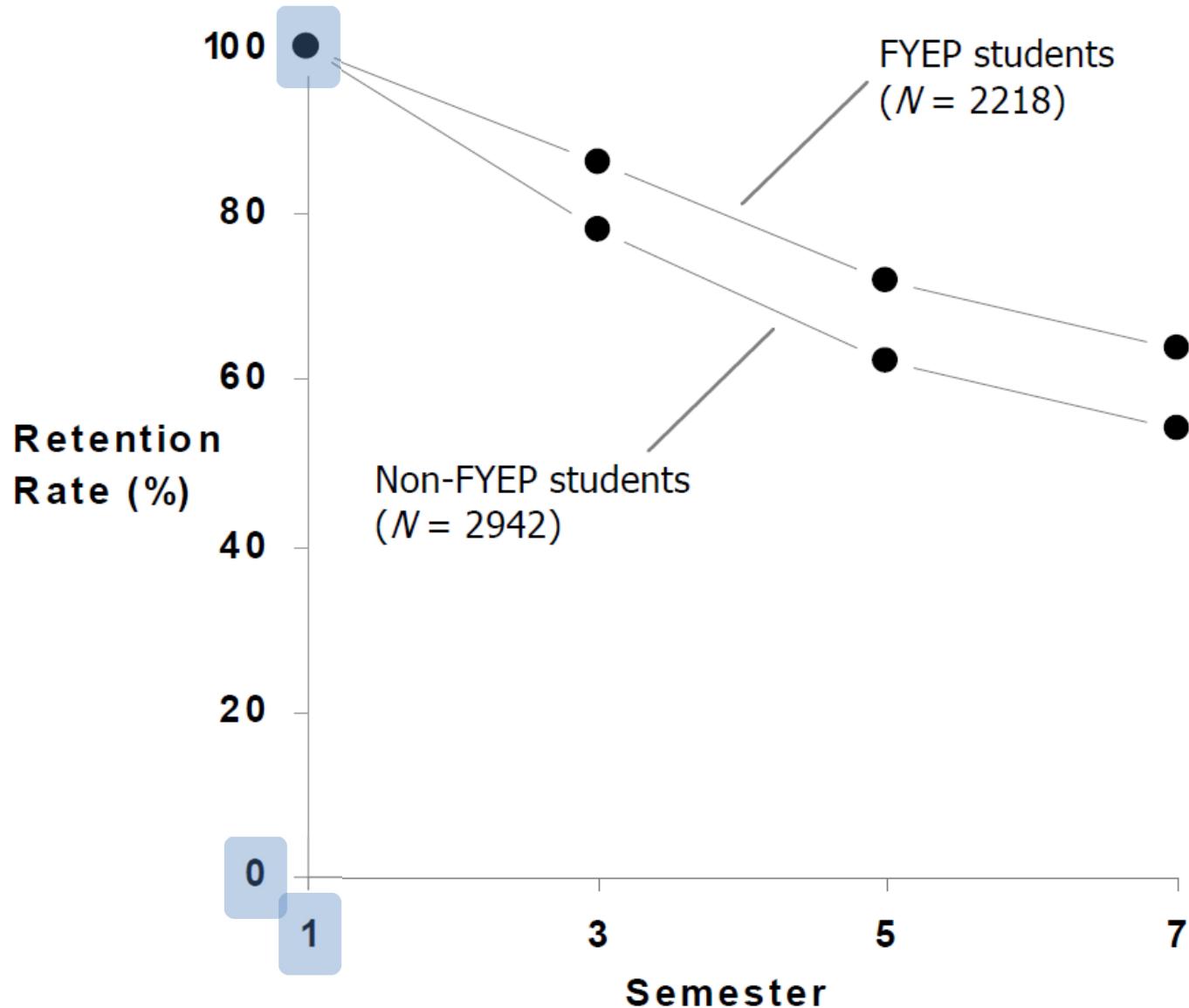
an inadvertent deception

bars that don't start at zero
missing data



Gains in retention. The FYEP course improved retention of engineering students into the third, fifth, and seventh semester. There were 2128 students who took the FYEP course (gray) and 2942 students who did not (gold). All retention gains over expected retention rates shown are significant ($P < 0.05$).

[reference](#)



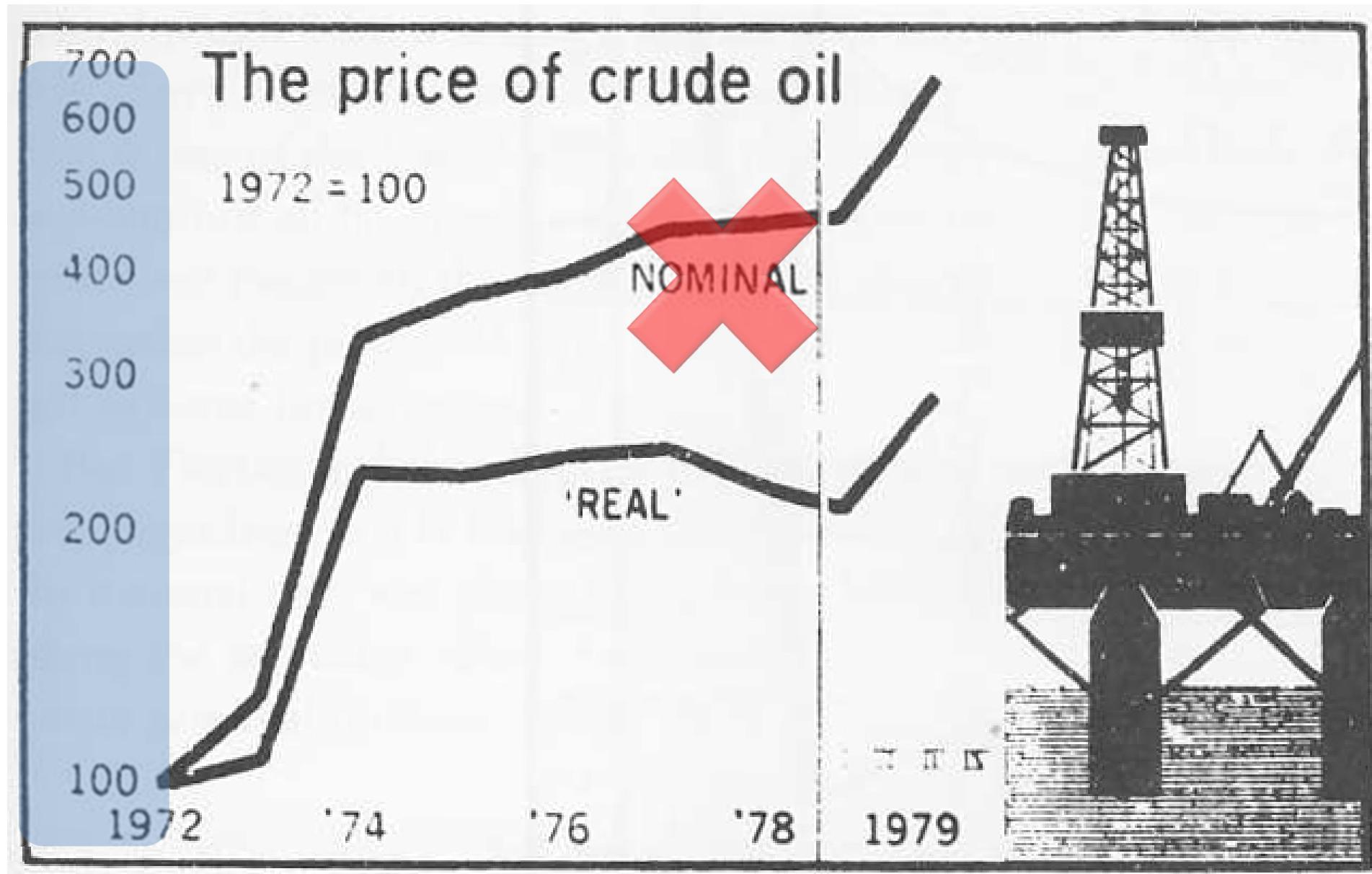
First-year gains in retention. The primary impact of the first-year engineering projects (FYEP) course is in the higher retention rate in the third semester. Subsequently, both groups lose students at about the same rate with a persistent 10% difference between FYEP and non-FYEP students.

reference

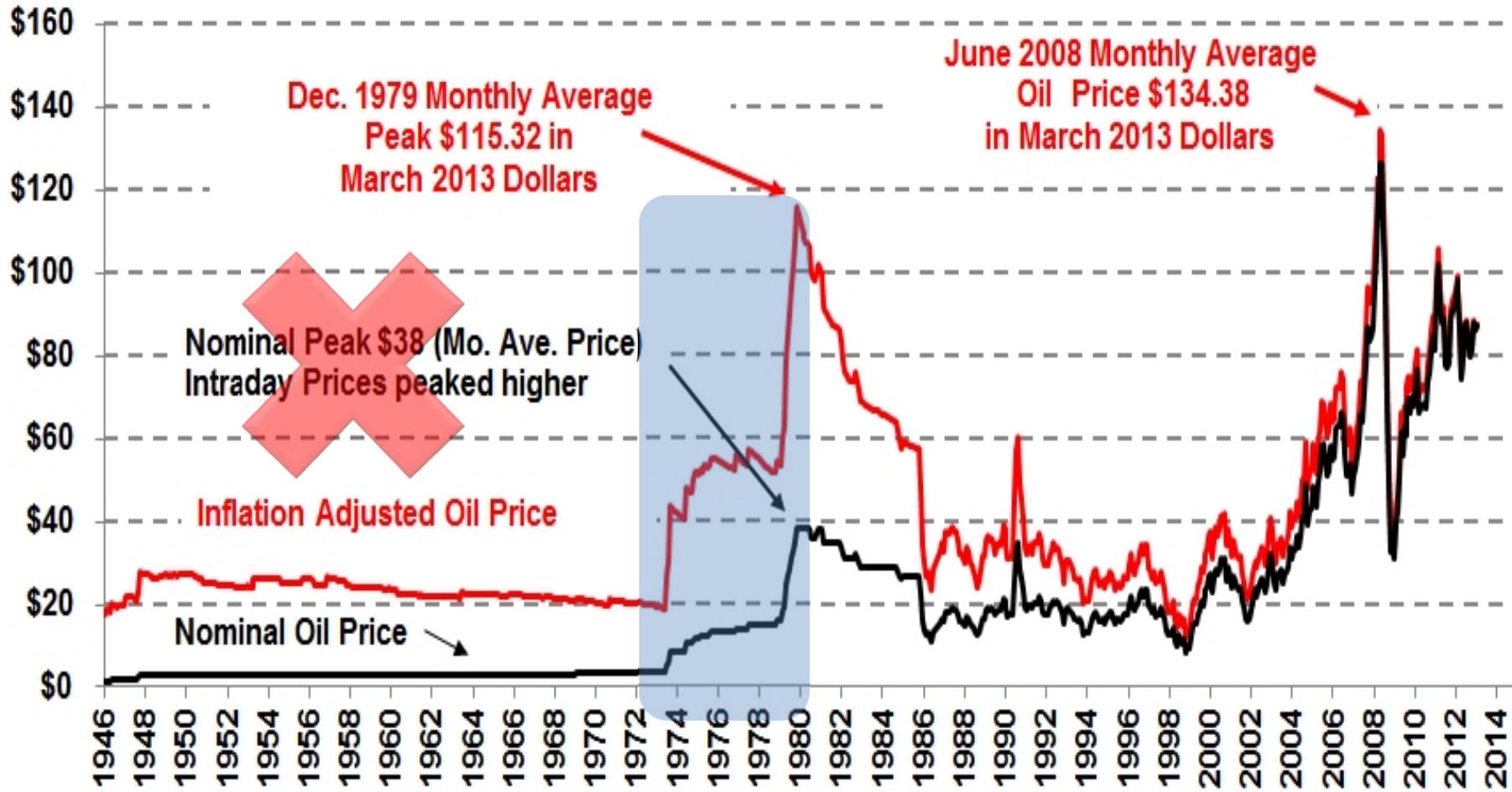
panic journalism

scale is misleading
shows non-constant dollars
lack of context

The price of crude oil is out of control.



Monthly crude oil prices, constant 2013 dollars



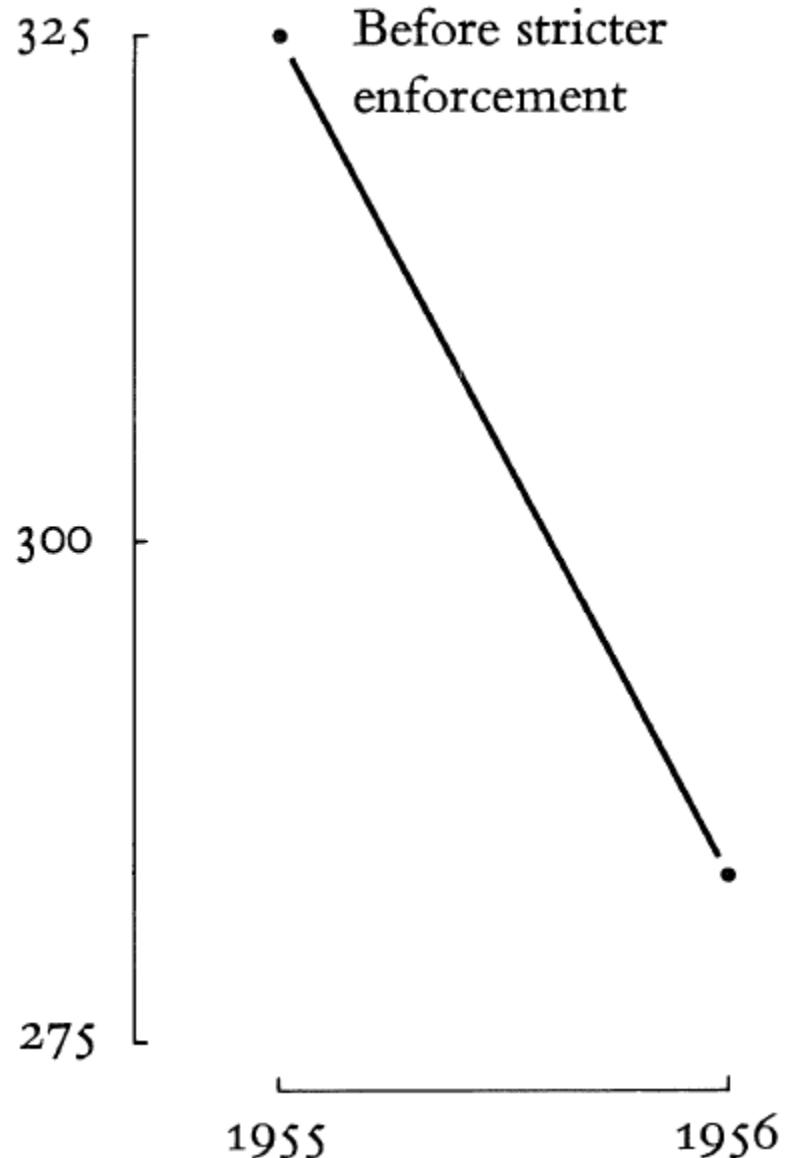
Source of Data:

Oil Prices- www.PlainsAllAmerican.com -- illinois Crude
CPI-U Inflation index- www.bls.gov

reference

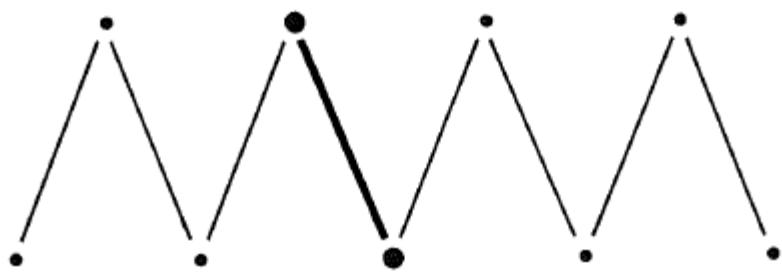
lie by omission

missing data
lack of context

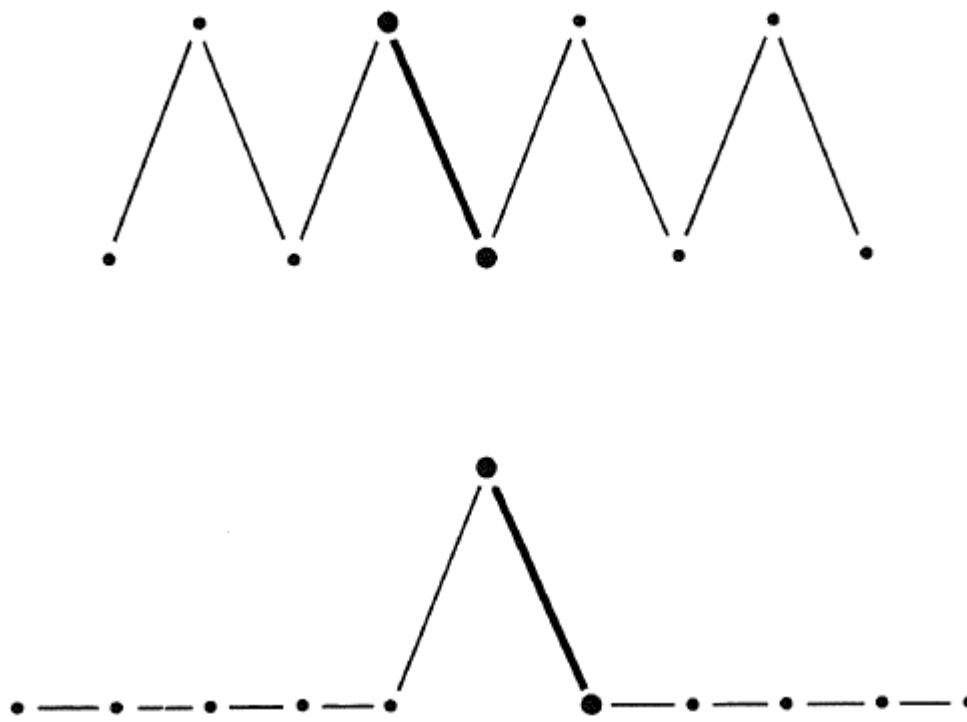


Connecticut Traffic Deaths,
Before (1955) and After (1956)
Stricter Enforcement by the Police
Against Cars Exceeding Speed limit

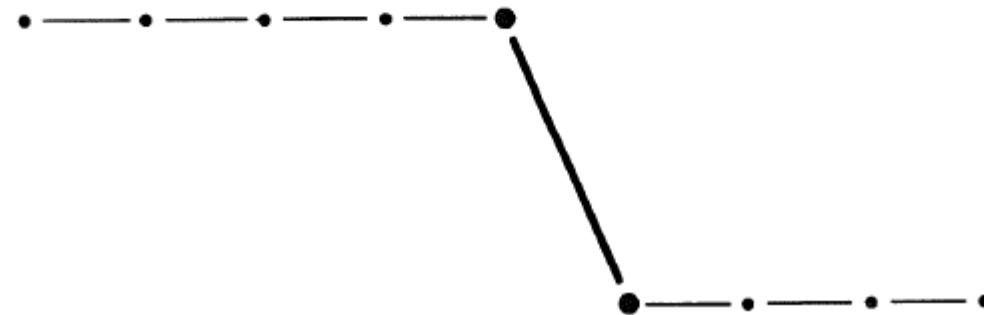
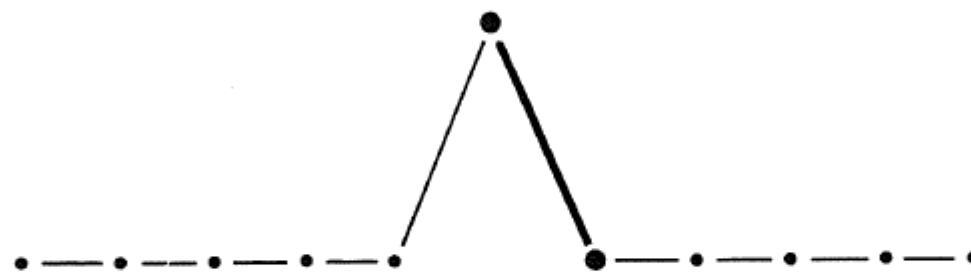
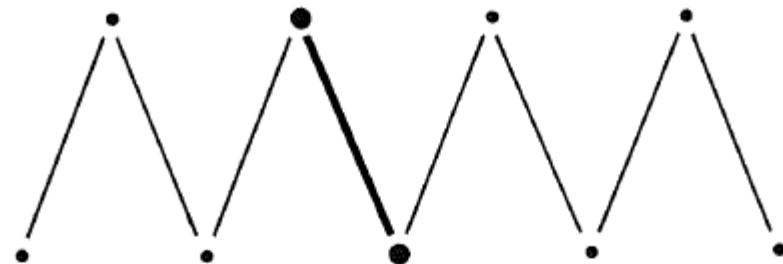
Compared to what?



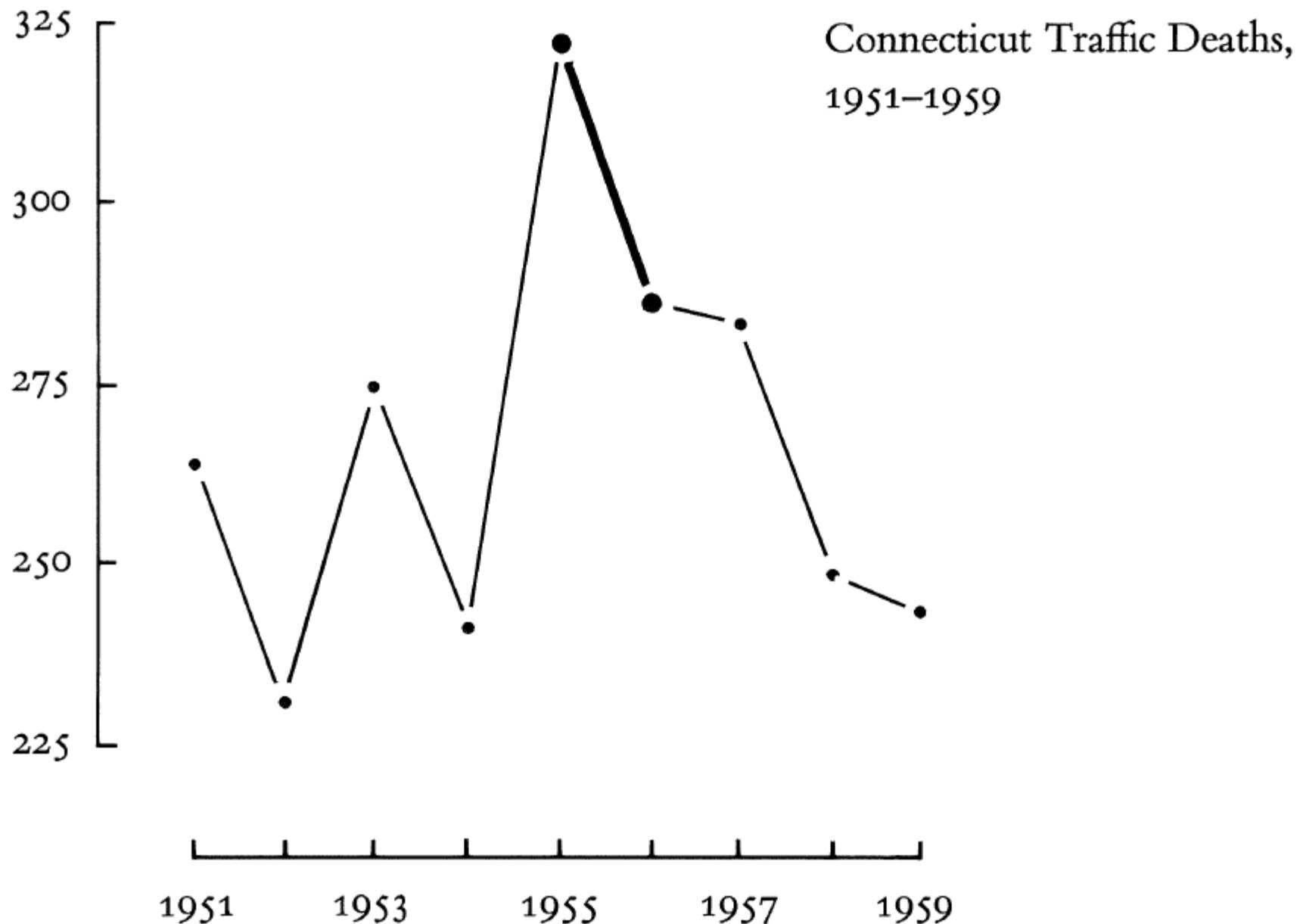
reference



reference

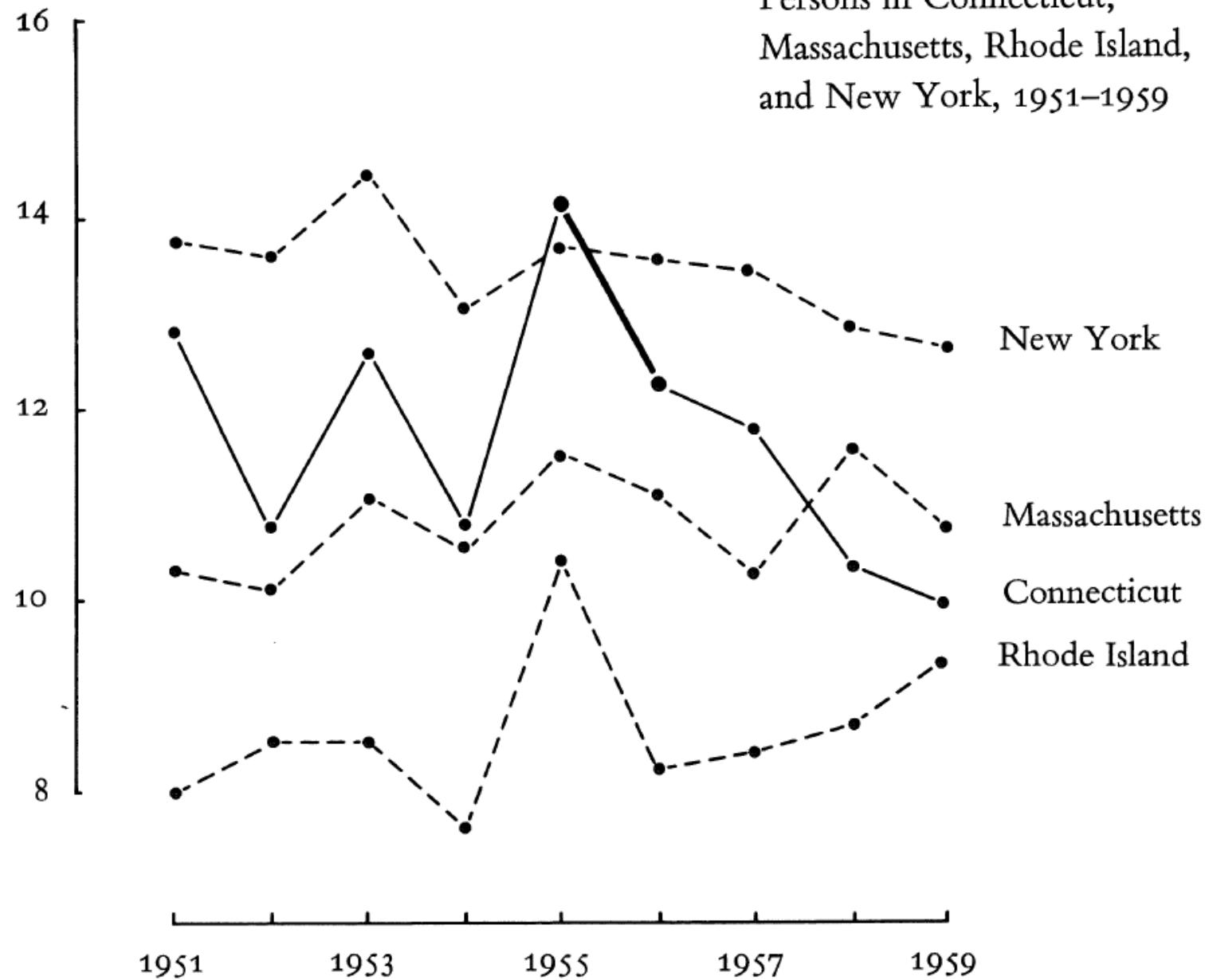


reference



reference

Traffic Deaths per 100,000
Persons in Connecticut,
Massachusetts, Rhode Island,
and New York, 1951–1959



reference

lie by emphasizing the trivial

A graph from a recent paper on the progress of engineering students through a math sequence.

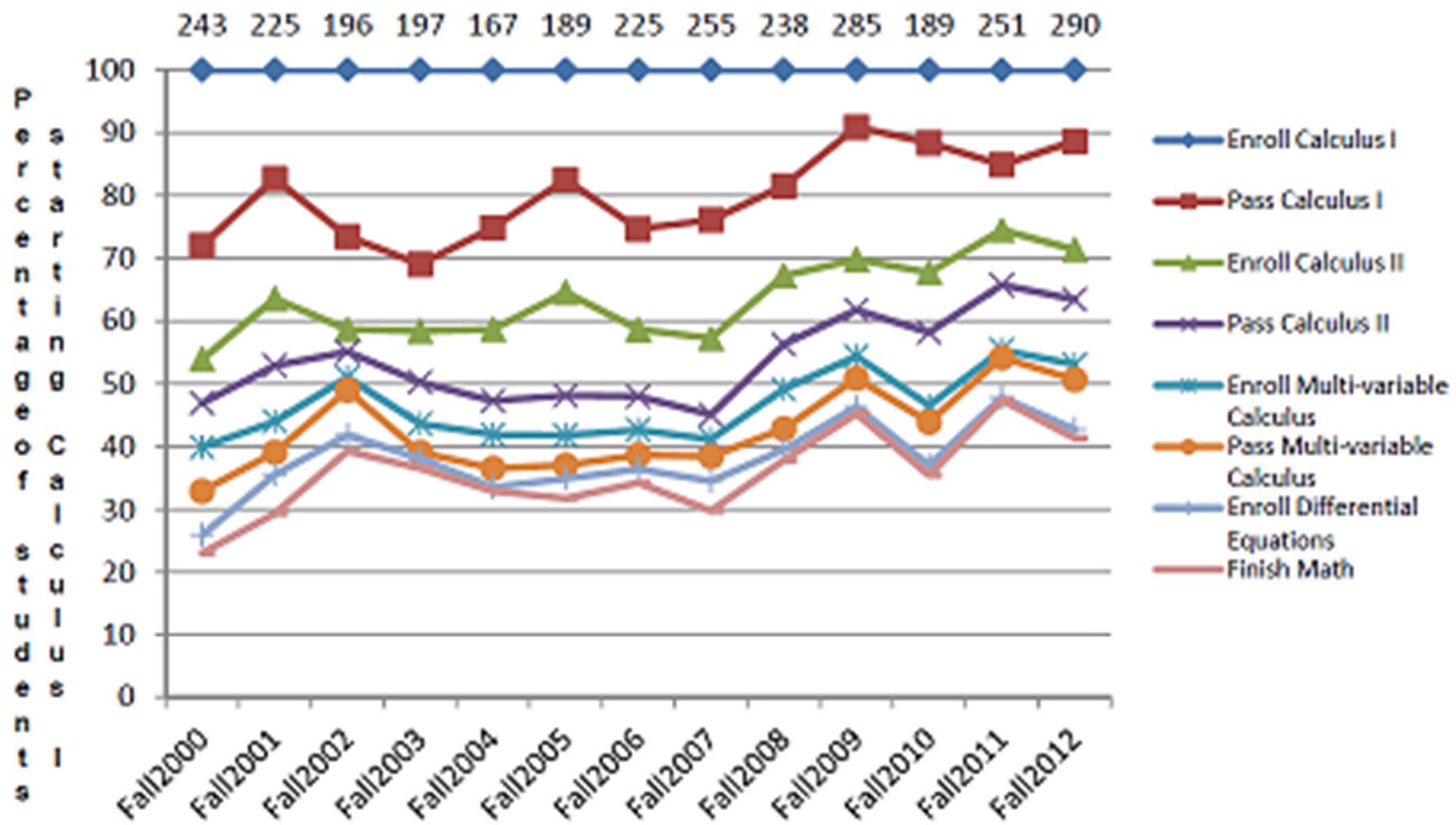


Figure 4. Female engineering student progress through the four-course mathematics sequence in consecutive semesters.

reference

The independent variable is time.

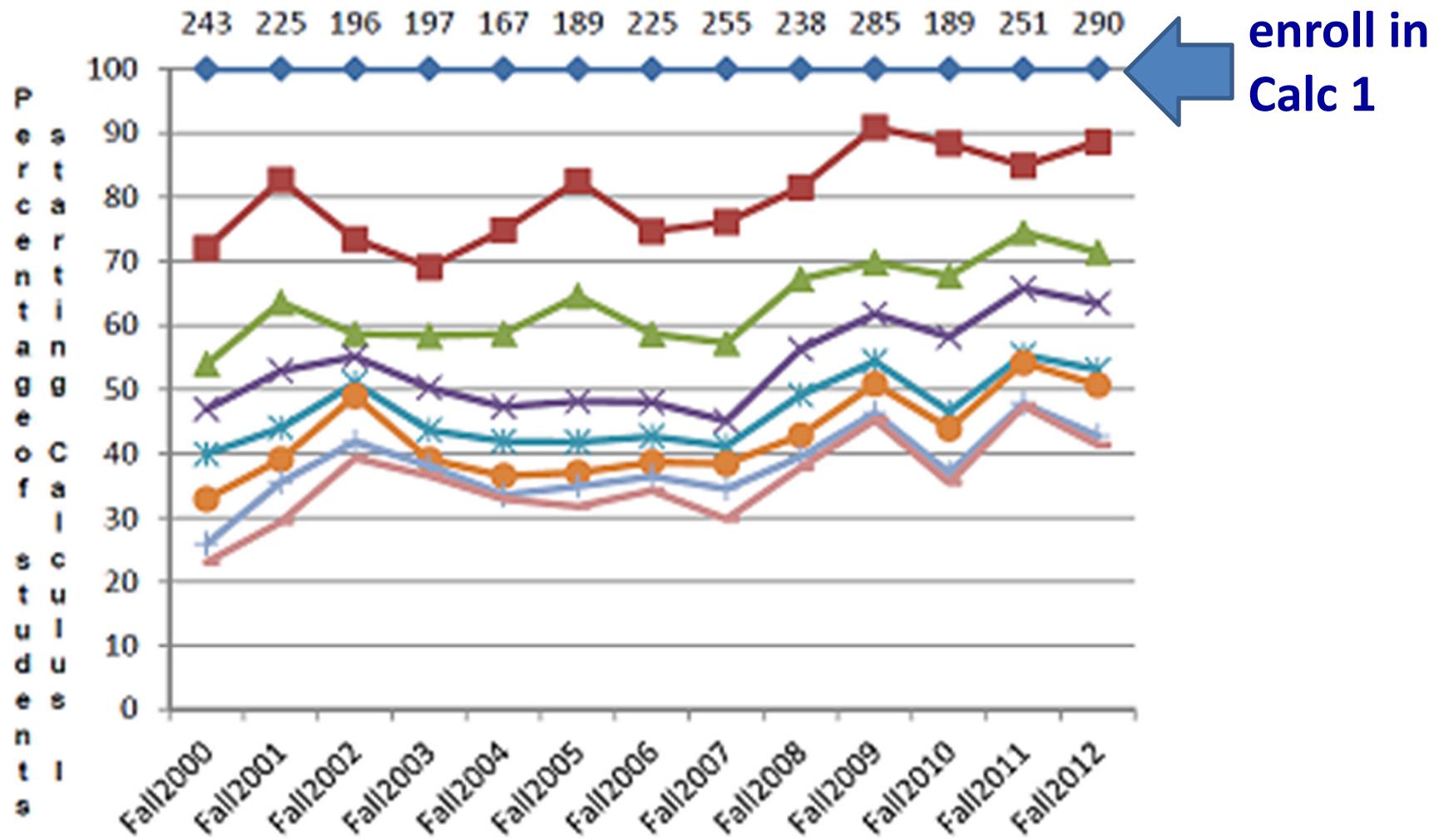


Figure 4. Female engineering student progress through the four-course major across consecutive semesters.

reference

The independent variable is time, but the story lies in the differences between the lines.

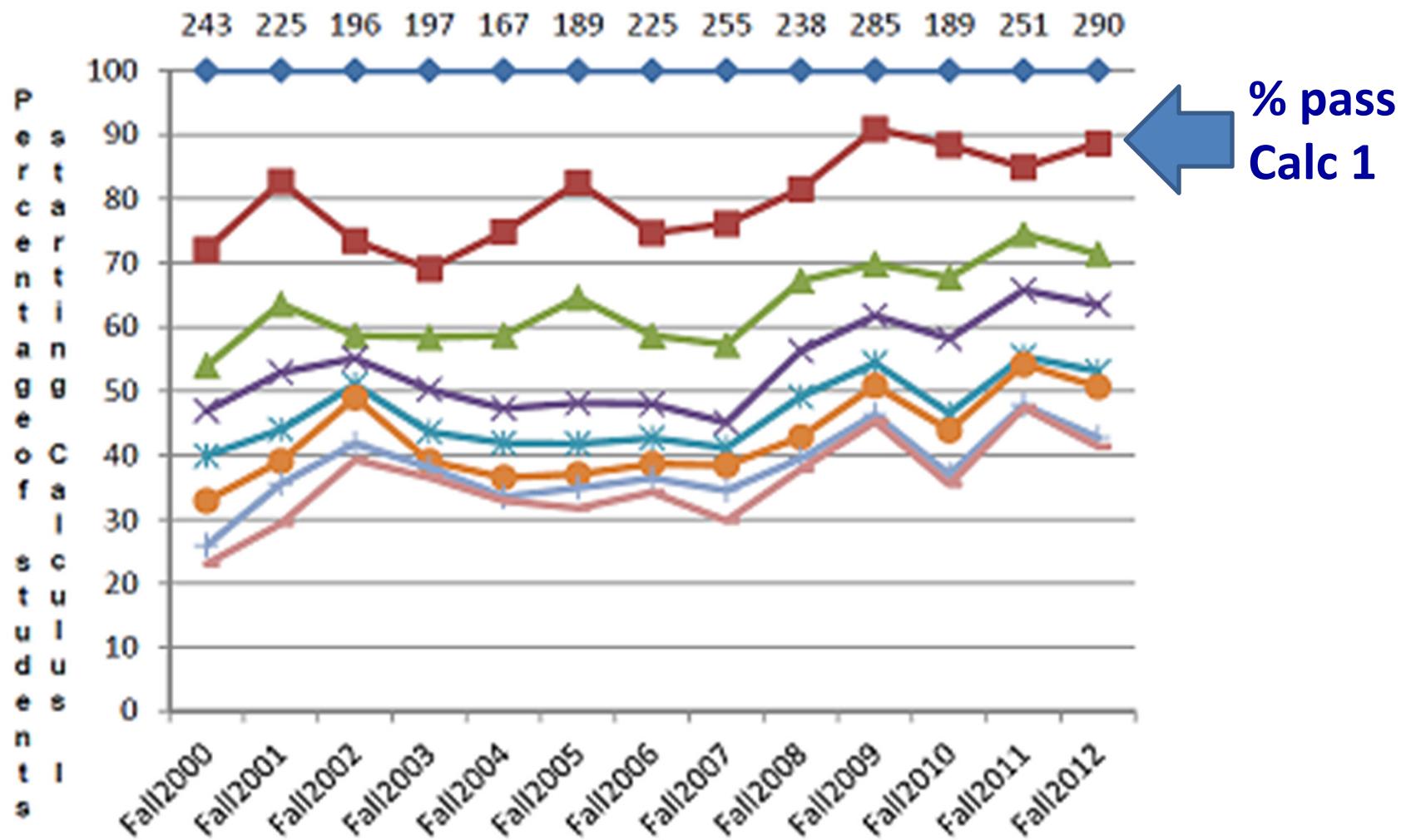


Figure 4. Female engineering student progress through the four-course major across consecutive semesters.

reference

The independent variable is time, but the story lies in the differences between the lines.

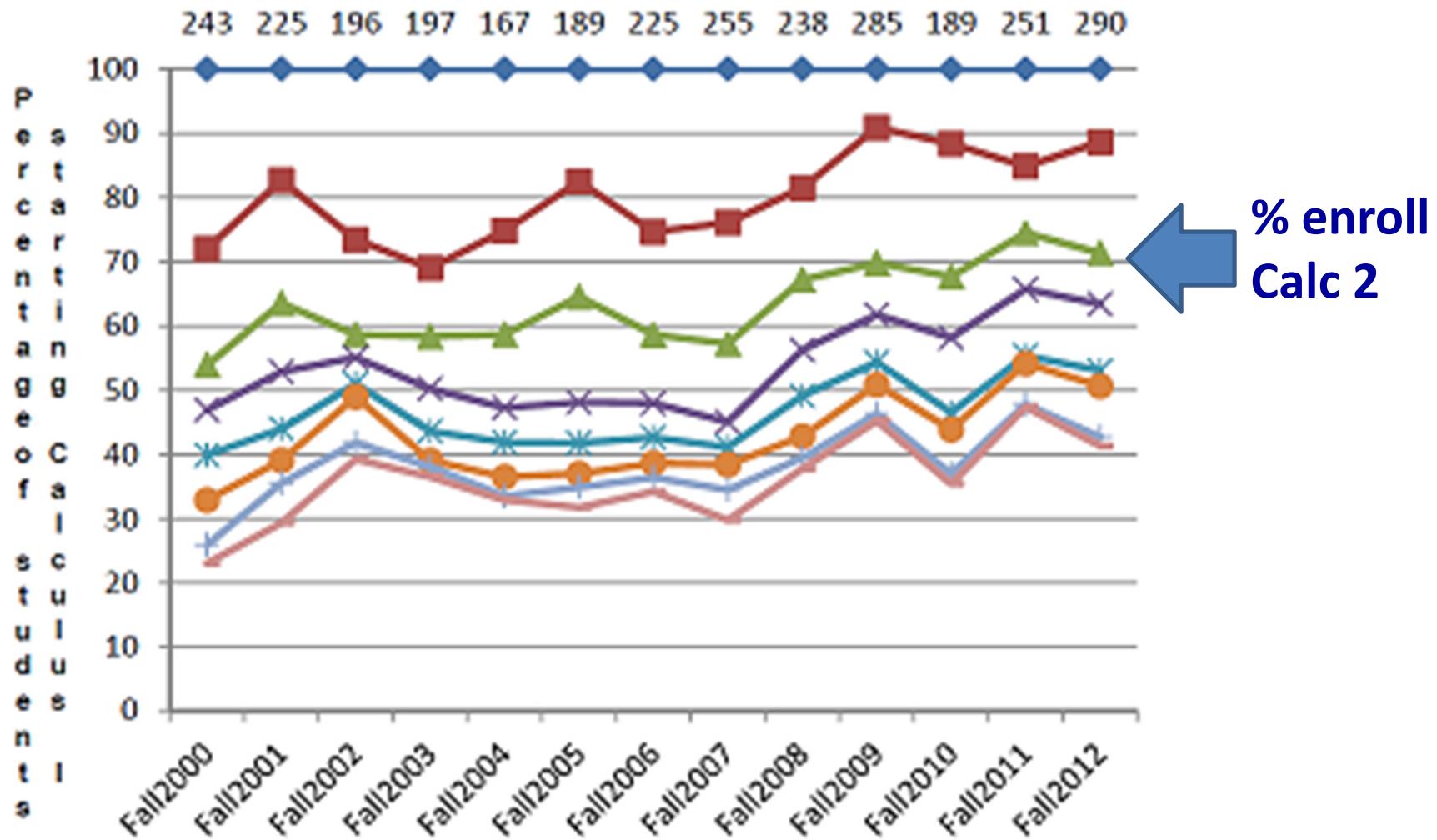


Figure 4. Female engineering student progress through the four-course major over consecutive semesters.

reference

The independent variable is time, but the story lies in the differences between the lines.

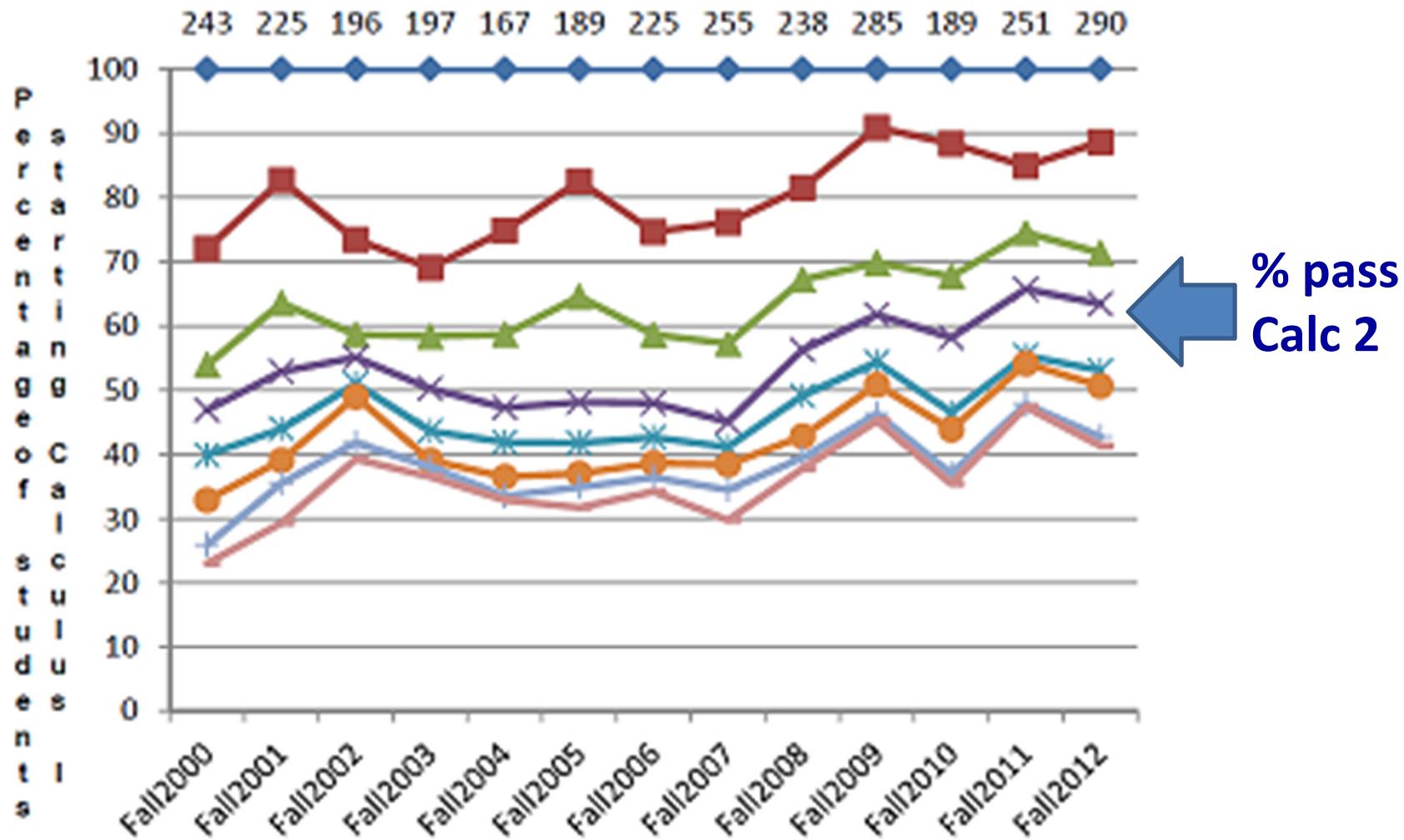


Figure 4. Female engineering student progress through the four-course major across consecutive semesters.

reference

The independent variable is time, but the story lies in the differences between the lines.

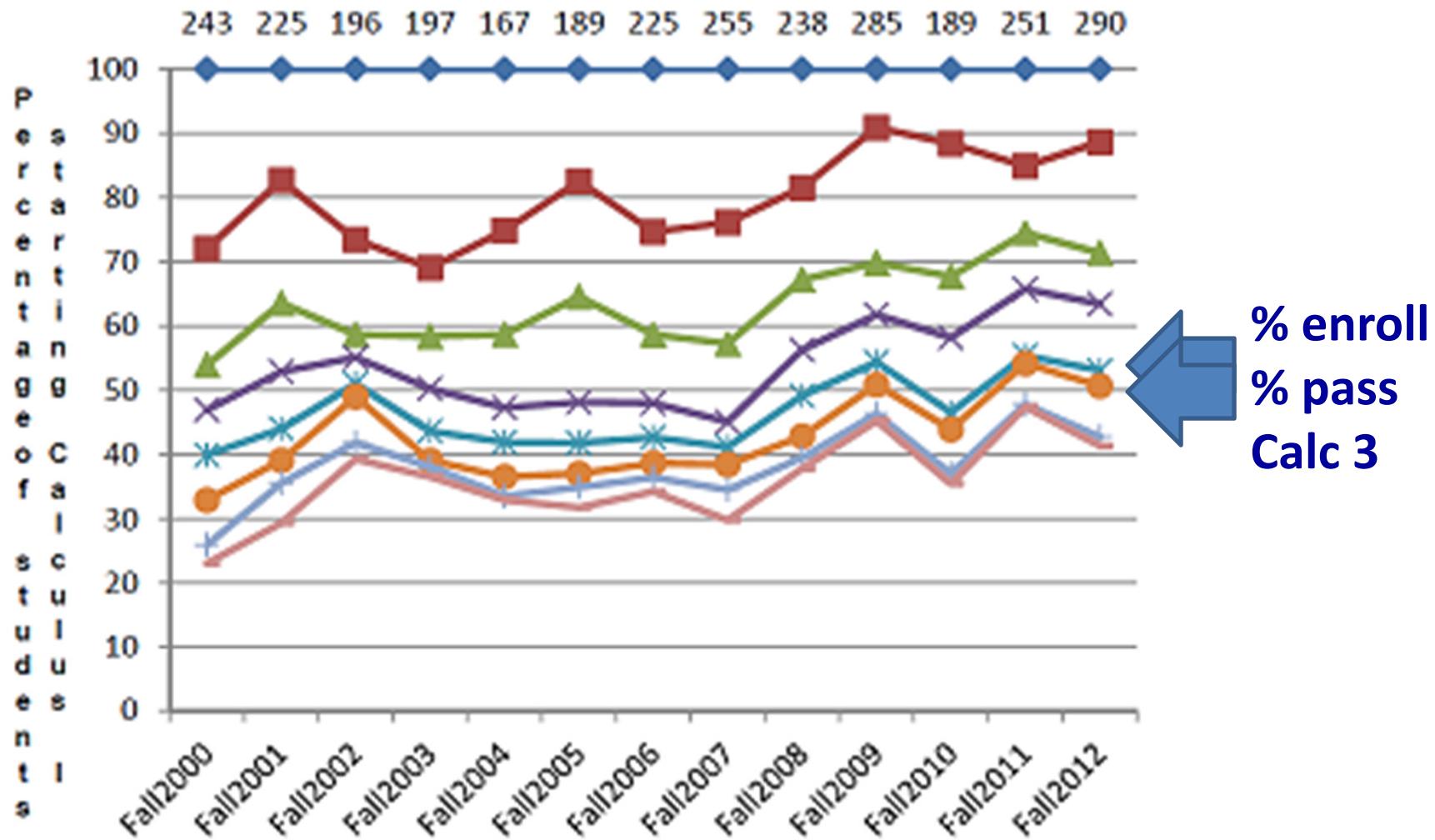
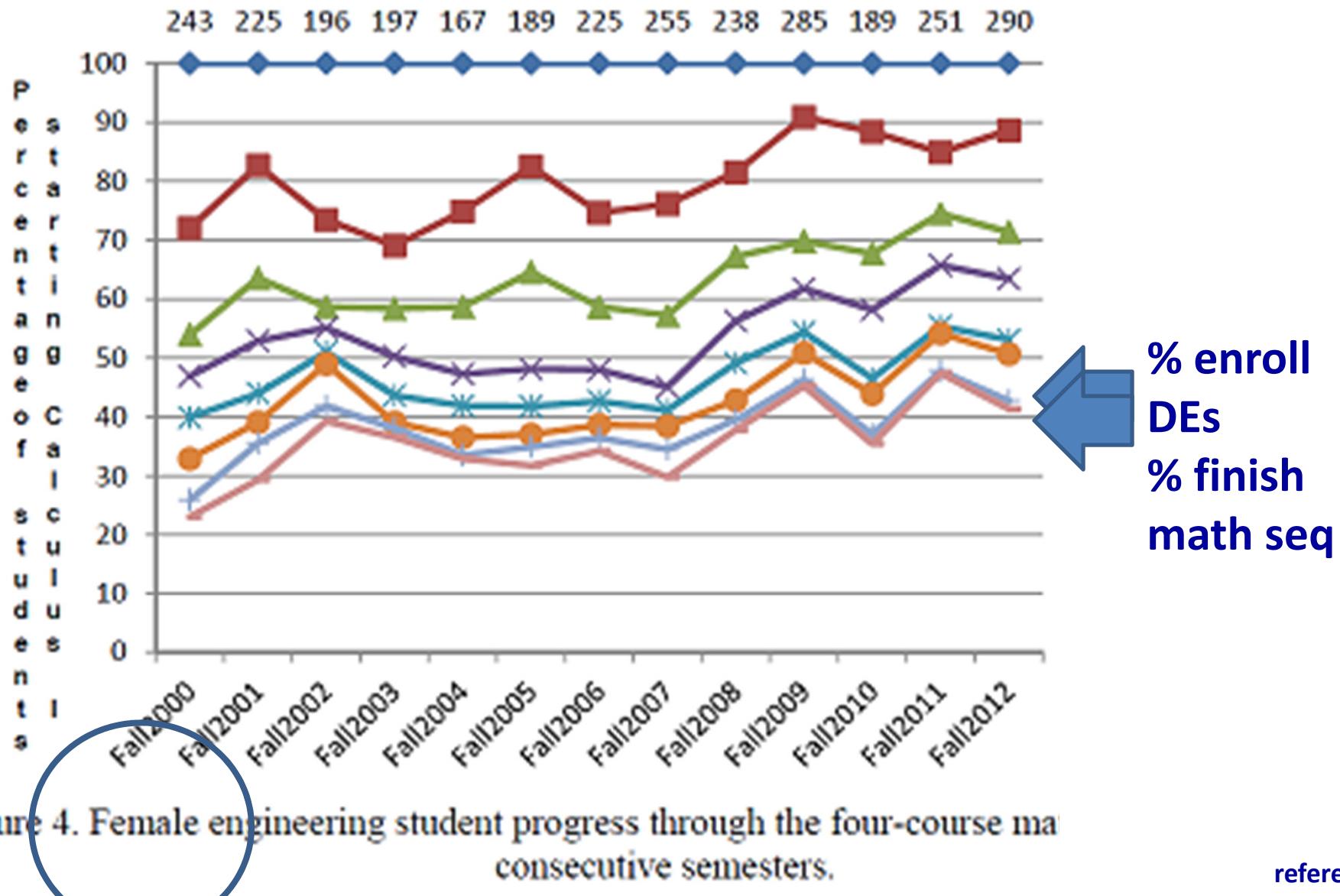


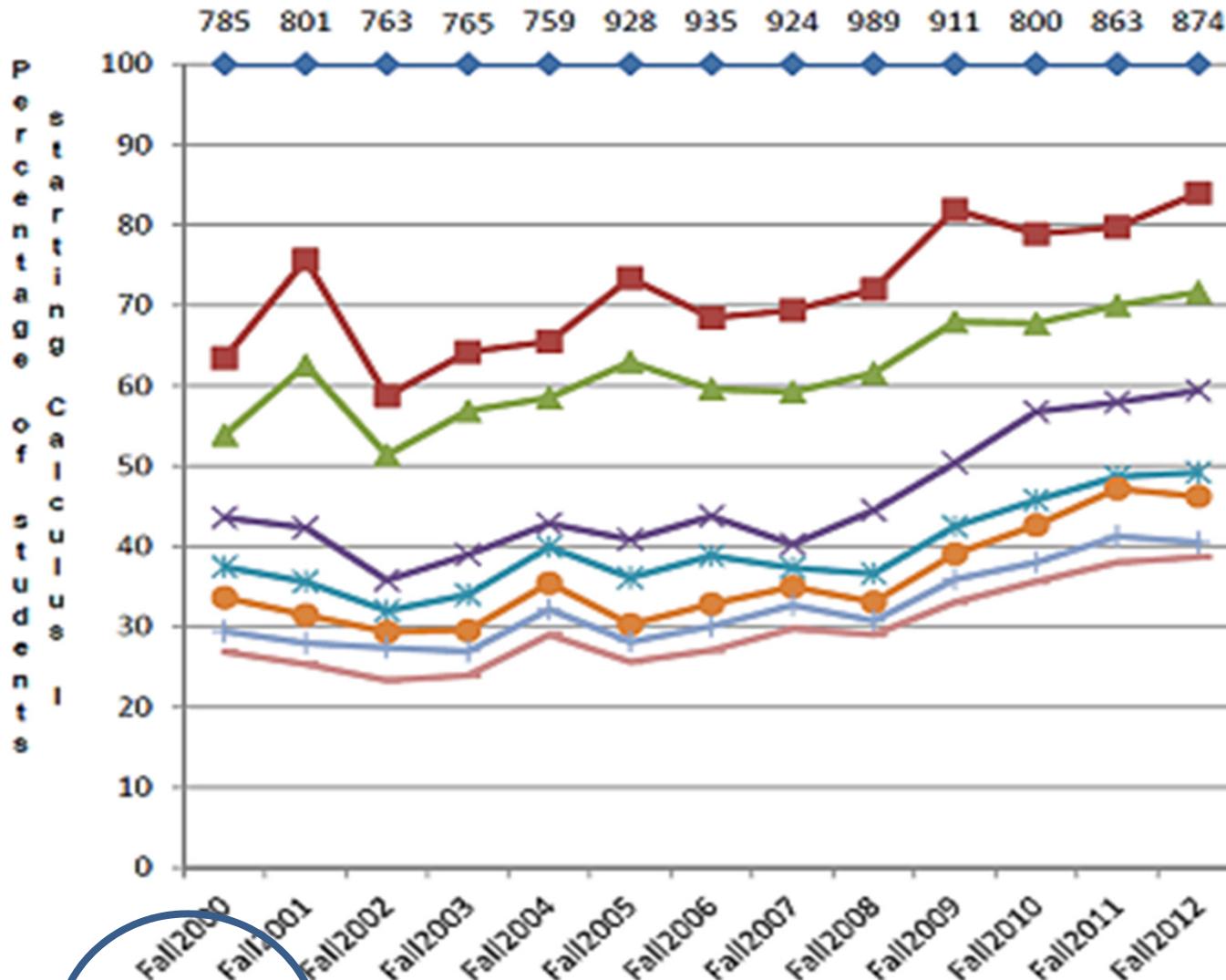
Figure 4. Female engineering student progress through the four-course major across consecutive semesters.

reference

The independent variable is time, but the story lies in the differences between the lines ... and gender.



The same graph design for male students.

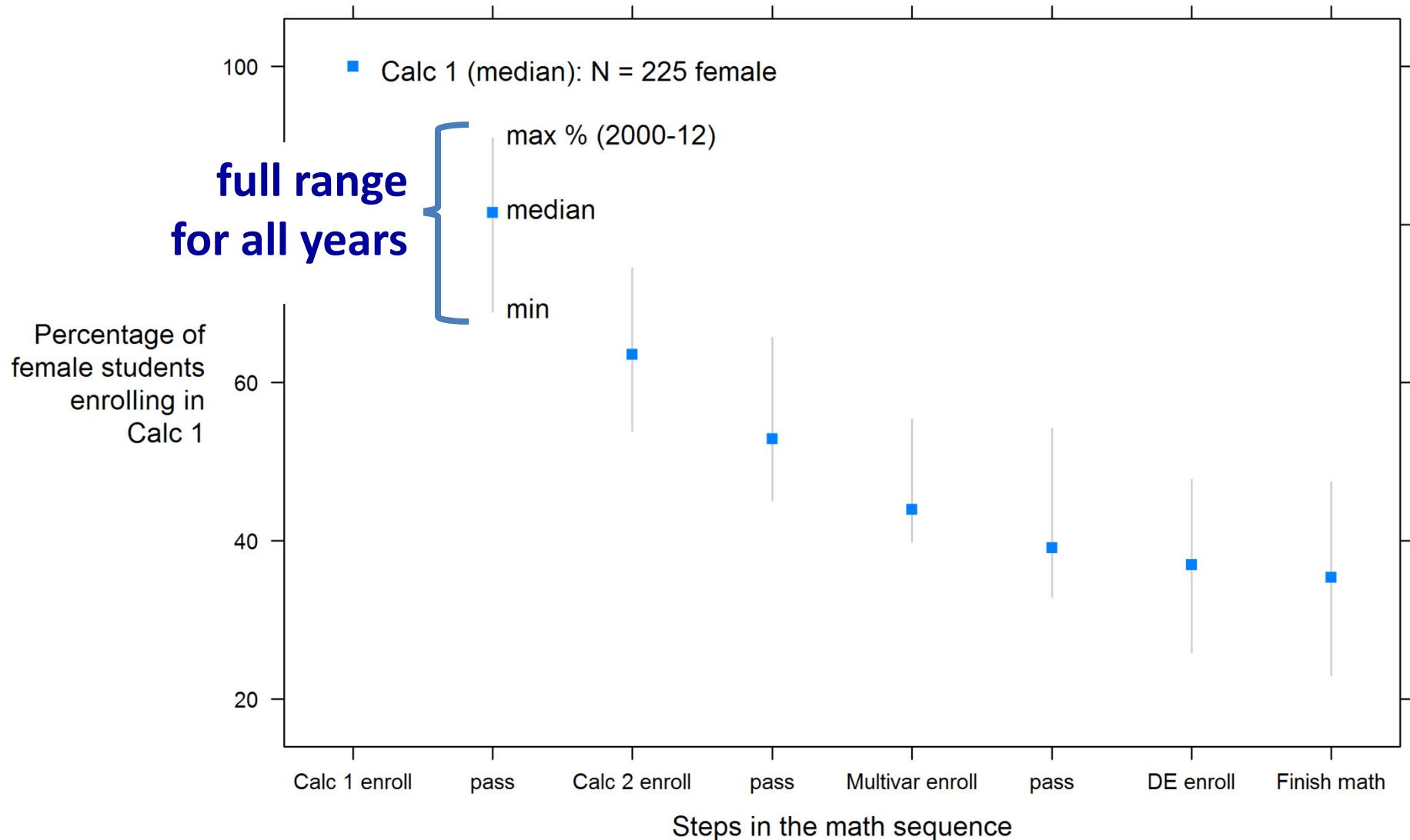


Comparing
women & men
not easy with
this design.

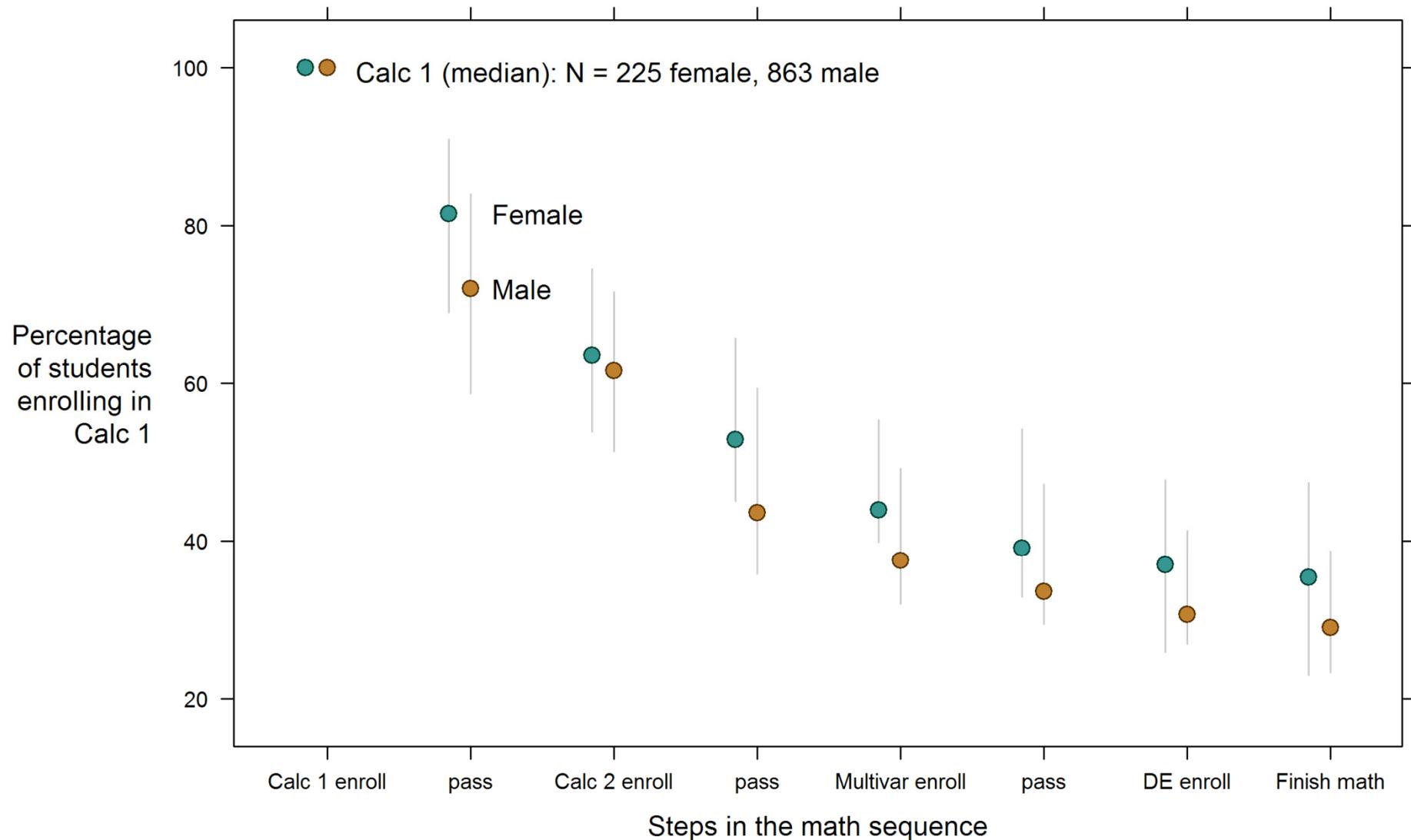
Figure 3. Male engineering student progress through the four-course mathe consecutive semesters.

reference

Steps in the math sequence are the independent variable (not time).



Dependencies are now directly observable.



The lie? Concealing the story by emphasizing the trivial.

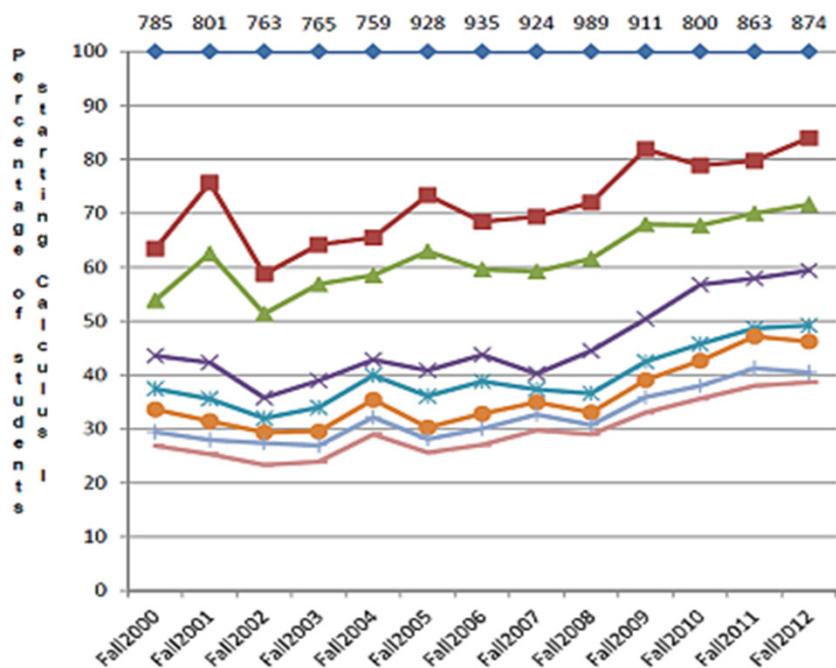


Figure 3. Male engineering student progress through the four-course math sequences over consecutive semesters.

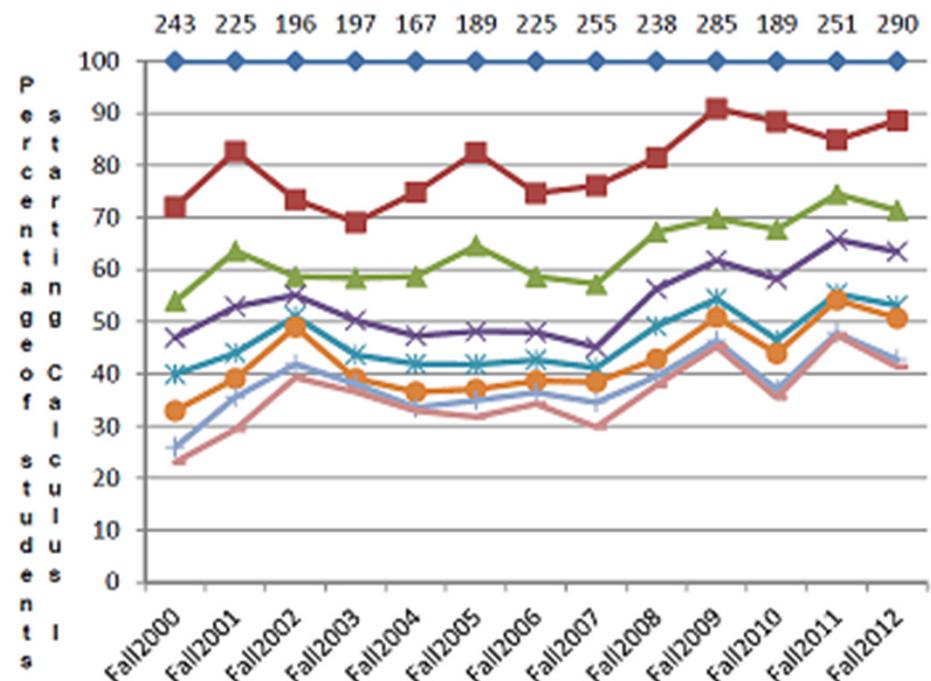


Figure 4. Female engineering student progress through the four-course math sequences over consecutive semesters.

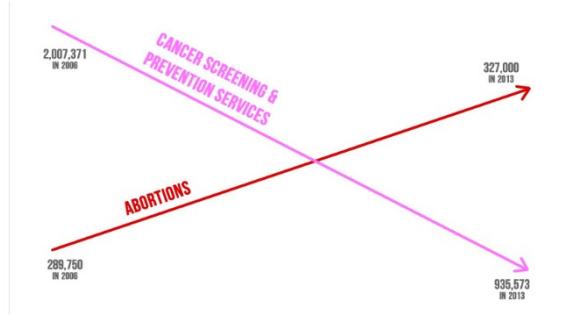


Edward Tufte

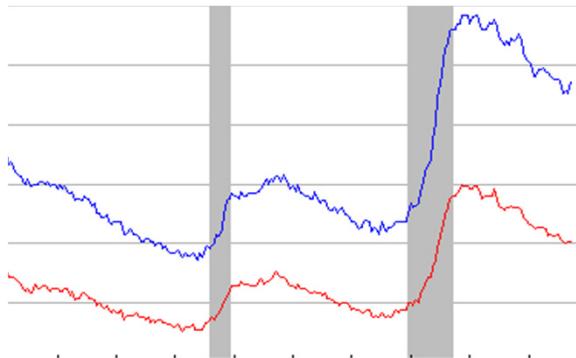
The main defense of the lying graphic is ... “Well, at least it was approximately correct, we were just trying to show the general direction of change.”

A second defense is, “although the design lies, the numbers are printed, as if not lying in one place justifies lying elsewhere.”

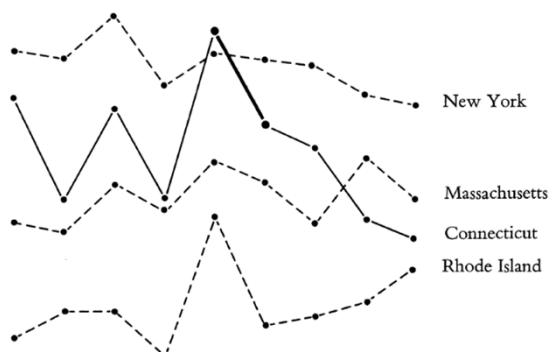
Implications for the designer.



**Some graph designers abuse their power.
Know the tricks used to deceive.**



**Avoid inadvertent deception due to laziness,
bad design, and lack of context.**



Don't defend the lying graphic. Fix it!