# Analysis of Gender Gap in NAEP Reading Scores (2013-2015)

To determine whether the reading achievement gap between males and females grew from 2013 to 2015, I'll conduct a statistical analysis of the difference in differences.

## Data Summary

- 2013: Female mean = 268, SE = 1.3; Male mean = 258, SE = 1.4

- 2015: Female mean = 265, SE = 1.2; Male mean = 256, SE = 1.3

## Gender Gaps

- 2013 gender gap: 268 - 258 = 10 points

- 2015 gender gap: 265 - 256 = 9 points

## Testing the Change in Gap

To test whether the gap changed significantly, I'll analyze whether the difference between these gaps (9 - 10 = -1) is statistically significant.

I'll use a hypothesis test where:

- H₀: The gender gap in 2015 equals the gender gap in 2013

- H₁: The gender gap in 2015 differs from the gender gap in 2013

The test statistic for the difference in gaps can be calculated as:

z = (Δ₂₀₁₅ - Δ₂₀₁₃)/SE(Δ₂₀₁₅ - Δ₂₀₁₃)

The standard error of this difference is:

SE(Δ₂₀₁₅ - Δ₂₀₁₃) = √[SE²(Female₂₀₁₅) + SE²(Male₂₀₁₅) + SE²(Female₂₀₁₃) + SE²(Male₂₀₁₃)]

= √[(1.2)² + (1.3)² + (1.3)² + (1.4)²]

= √[6.78]

= 2.6

The test statistic is:

z = (-1)/2.6 = -0.38

Using a two-tailed test with α = 0.05, the critical value is ±1.96. Since |-0.38| < 1.96, we fail to reject the null hypothesis.

## Conclusion

The data does not provide sufficient evidence to conclude that the gender gap in reading achievement among Texas 8th graders changed significantly from 2013 to 2015. Although the gap decreased slightly from 10 points to 9 points, this 1-point difference is not statistically significant (z = -0.38, p > 0.05). Therefore, policymakers should not conclude that the gender gap grew (or shrunk) during this period; rather, it remained statistically stable.