**Dynamic Statistical Tests in Tableau to Examine Significance and Effect Sizes of Dimensions**

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Caution

* Statistical analysis is more than just math. Effective and responsible analysis requires thoughtful interpretation and verification that tests are appropriate for the data and question and that assumptions underlying confidence in tests are not being violated.
* As such, the ability to mass produce statistical tests conducted in Tableau should be used to identify areas that require further careful examination and should not be used as the capital-T TRUTH.

Tests! What are they good for?

* t-Test
  + One observation per subject
    - Look for repeated measures t-Tests for longitudinal data
  + Use when comparing continuous data among two groups (i.e., GPA by first generation status)
* Contingency Tables (Chi-Square)
  + One observation per subject
    - Not appropriate for looking at longitudinal data (i.e., Time 1, Time 2, Time 3)
  + Use when comparing students grouped along levels of two categorical variables (i.e., 1 year retention by ethnicity)

Note: When there are 32 (8x4) groups of students, CS-ChiSquareTable values above 33 indicate meaningful differences between two or more groups in expected vs. observed counts. (df = 21; α < .05)

CS-PH\_Adj\_Stnd\_Res (Adjusted Standardized Residual) values smaller than -3.06 or larger than 3.06 indicate noteworthy differences between observed and expected counts (p < .0011). (Alpha corrected for Type I Error - .025/21).

1. Download File: https://github.com/sandipthanki/RMAIR\_2020\_NSC/blob/master/NSC\_2020.xlsx
2. Import File into Tableau
3. Save Extract
4. Drag GPA and Units to Measures
5. Make Year a String
6. N: COUNTD([Sur P])
7. Progression: if ISNULL([Ret or Grad 1 yr Surp]) then 'No' else 'Yes' END
8. Attribute, Success Measure, Service parameters
9. Attribute: case [Parameters].[Attribute] when 'Gender' then [Gender] when 'Ethnicity' then [Ethnicity] end
10. Service: case [Parameters].[Service] when 'Advising' then [Advising] when 'Tutoring' then [Tutoring] END
11. Success Measure: Case [Parameters].[Success Measure] when 'GPA 1 yr' then [GPA 1 yr] when 'Units Passed 1 yr' then [Units Passed 1 yr] END
12. Success Measure Difference: (AVG([Success Measure])- lookup(AVG([Success Measure]),-1))
13. Drag N to Text
14. Drag Success Measure to Text and change it to Average
15. Go to show me and change it to table
16. Drag Attribute to rows
17. Drag Service under Attributes
18. Show parameter control
19. Name the sheet t-test
20. Create new sheet and name it Chi Square
21. Drag N to text
22. Drag Attributes to Rows
23. Drag Progression to Columns
24. Add Year and Attribute to filter with use all
25. Apply the filters to all using this data source
26. Show filter for year and set it to 2018
27. Change N to %
28. Create a Dashboard and drag t-test and Chi Square to it
29. Bring Attribute filter
30. Make filters dropdowns
31. t-test\_variance: VAR([Success Measure])
32. t\_value: (AVG([Success Measure])- lookup(AVG([Success Measure]),-1))/sqrt([t-test\_variance]/[N]+lookup([t-test\_variance]/[N],-1))
33. t-test\_degrees\_of\_freedom: (([t-test\_variance]/[N]+lookup([t-test\_variance]/[N],-1))^2)/((1/([N]-1))\*(([t-test\_variance]/[N])^2) + lookup((1/([N]-1))\*(([t-test\_variance]/[N])^2),-1))
34. t-test\_significance: if [t-test\_degrees\_of\_freedom] > 30 and abs([t\_value]) > 2.042 then '\*' else '' end
35. drag t\_value and t-test\_significance to tooltips
36. Go to Chi Square Sheet
37. drag [N] to tooltip
38. CS-TotalGrand: WINDOW\_SUM([N])
39. drag it to tool tip and make it "down and across"
40. CS-TotalCol: WINDOW\_SUM([N])
41. drag it to tool tip and make it "down"
42. CS-TotalRow: WINDOW\_SUM([N])
43. drag it to tool tip and make it "across"
44. CS-ExpectedValues: ([CS-TotalCol] \* [CS-TotalRow])/ [CS-TotalGrand]
45. CS-ChiSquareCell: SQUARE([N] - [CS-ExpectedValues])/[CS-ExpectedValues]
46. CS-ChiSquareTable: WINDOW\_SUM([CS-ChiSquareCell])
47. drag it to tooltip and make it "down and across" in edit calcuations
48. CS-PH\_Denom: (([CS-TotalRow]\* [CS-TotalCol])\*(1- [CS-TotalRow]/[CS-TotalGrand])\*(1- [CS-TotalCol]/[CS-TotalGrand]))/[CS-TotalGrand]
49. CS-PH\_Adj\_Stnd\_Res: ([N]- [CS-ExpectedValues])/SQRT([CS-PH\_Denom])
50. Done