Psych 524

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Data Screening 1

Data check entry

- One of the first steps to proper data screening is to ensure the data is correct
  - Check out each person's entry individually
    - Makes sense if small data set or proper data checking procedure
    - Can be too costly so…
  - range of data should be checked

Assumption Checking

Normality

- All of the continuous data we are covering need to follow a normal curve
- Skewness (univariate) – this represents the spread of the data

Normality

- skewness statistic is output by SPSS and SE skewness is $\sqrt{\frac{6}{N}}$

$$\frac{S_{Skewness}}{SE_{Skewness}} \rightarrow Z_{skewness}$$

$$\left|Z_{skewness}\right| > 3.2 \text{ violation of skewness assumption}$$

Normality

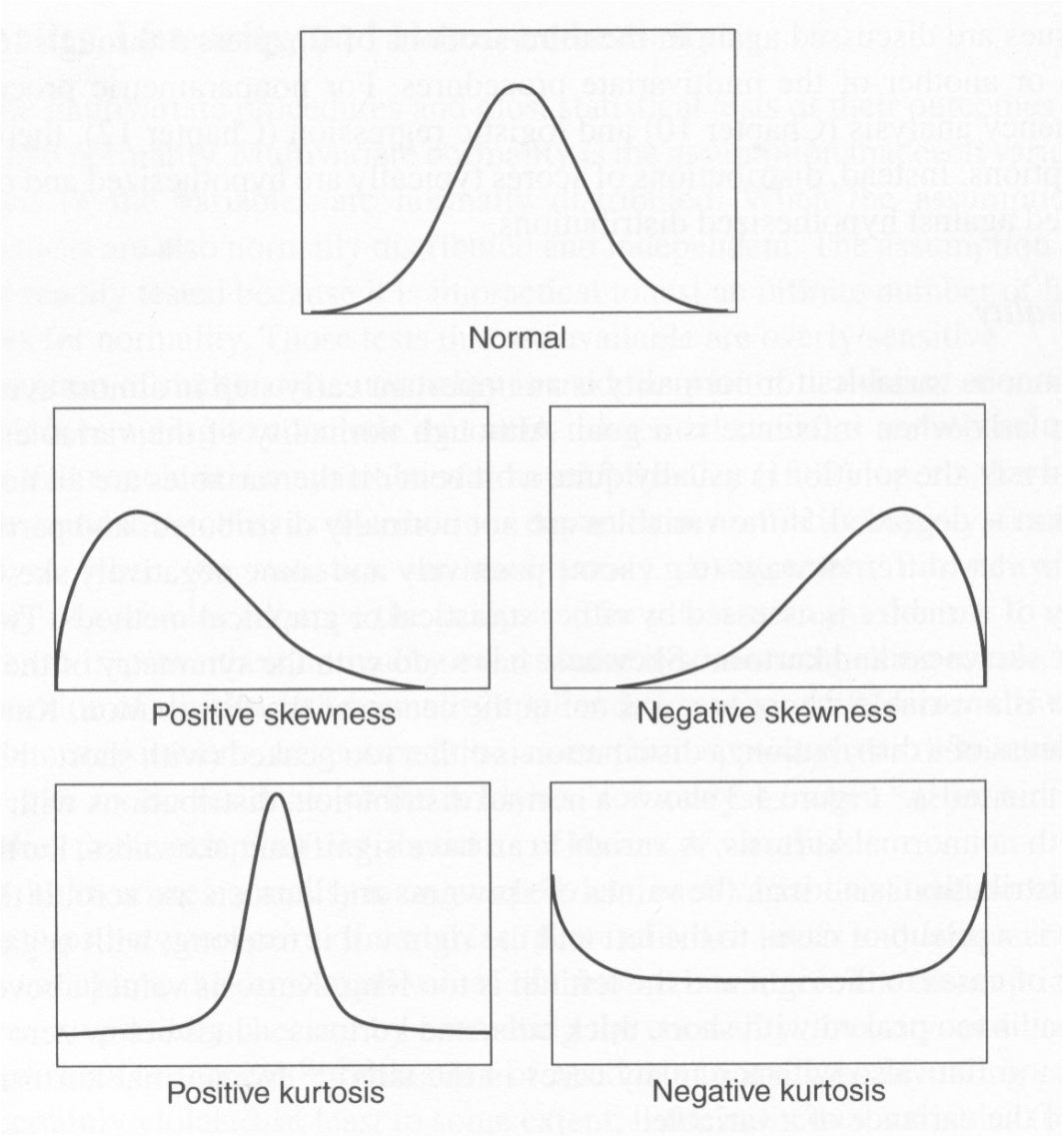
- Kurtosis (univariate) – is how peaked the data is; Kurtosis stat output by SPSS
- Kurtosis standard error = $\sqrt{\frac{24}{N}}$

$$\frac{S_{Kurtosis}}{SE_{Kurtosis}} \rightarrow Z_{kurtosis}$$

$$\left|Z_{kurtosis}\right| > 3.2 \text{ violation of kurtosis assumption}$$

  - for most statistics the skewness assumption is more important that the kurtosis assumption

Skewness and Kurtosis



Outliers

- technically it is a data point outside of you distribution; so potentially detrimental because may have undo effect on distribution

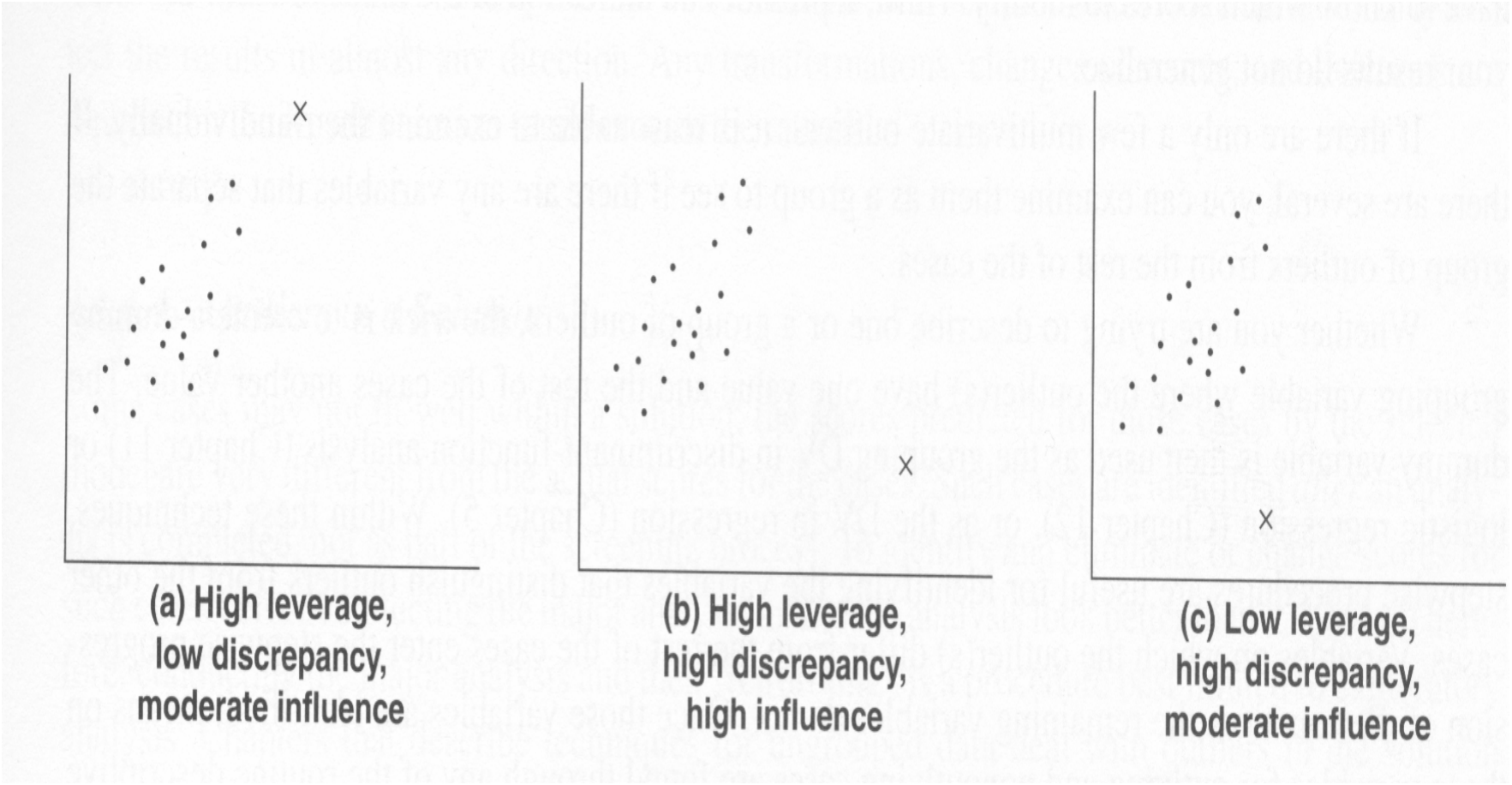
Outliers

- Univariate (brains in arc)
  - Should always check that data is coded correctly
  - Two ways of looking at it
    - a data point represents an outlier if it is disconnected from the rest of the distribution
    - Data is an outlier if it has a Z-score above 3.3
    - If there is a concern – run data with and without to see if it has any influence on the data

Outliers

- Leverage – is how far away a case is from the rest of the data
- Discrepancy – is the degree to which a data point lines up with the rest of the data
- Influence – amount of change in the regression equation (Bs) when a case is deleted. Calculated as a combination of Leverage and Discrepancy

Outliers


(a) High leverage, low discrepancy, moderate influence
(b) High leverage, high discrepancy, high influence
(c) Low leverage, high discrepancy, moderate influence

Dealing w/ univariate outliers

- Once you find outliers
  - Look into the case to see if there are indicators that the case is not part of your intended sample
    - If this is true delete the case
  - Reduce influence of outlier
    - Move value inward toward the rest of the distribution, while still leaving it extreme

Multivariate Outliers

- Subject score may not be an outlier on any single variable; but on a combination of variables the subject is an outlier
- “Being a teenager is normal, making $50,000 a year is normal, but a teenager making $50,000 a year is a multivariate outlier”.

Multivariate Outliers

- Mahalanobis distance – measurement of deviance from the centroid (center of multivariate distribution created by the means of all the variables)
- Computing Mahalanobis distances you get a chi square distribution
  - χ^2 (df = # variables),
  - Lookup critical value (with a = .001) if MD is above the CV the participant is a multivariate outlier
- If Multivariate outliers found, not much to do except delete the case

Linearity

- relationships among variables are linear in nature; assumption in most analyses
- Example resptran in arc

Homoscedasticity (geese in arc)

- For grouped data this is the same as homogeneity of variance
- For ungrouped data – variability for one variables is the same at all levels of another variable (no variance interaction)

Multicollinearity/Singularity

- If correlations between two variables are excessive (e.g. .95) then this represents multicollinearity
- If correlation is 1 then you have singularity
- Often Multicollinearity/Singularity occurs in data because one variable is a near duplicate of another (e.g. variables used plus a composite of the variables)