Factor Analysis Theory and Interpretation

What is Factor Analysis?

- A way to group items in a survey
- Acts as your validity test
- See how data “hangs together”

What is an item, anyway?

- Question on a survey
- Column in your data

Types of Factor Analysis

Exploratory (EFA)

- First time

- You'll learn here

Confirmatory (CFA)

- Been done before

- You won't learn

Assumptions of Exploratory Factor Analysis

- Sample size: 300 rows of data

- Absence of Multicollinearity:
  - No correlations > .9 between columns
  - Examine determinants

- Some Relationship between Items
  - Bartlett’s test

What is Factor Rotation?

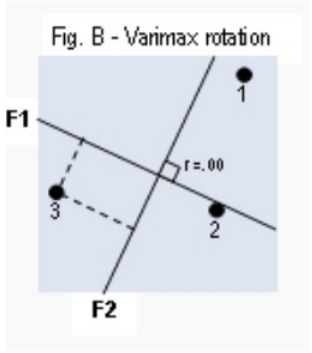
- A way to mathematically “shake up” your data so that interesting things fall out!

- Behind the scenes, your data gets graphed and ends up as points on a graph. These points can be spun around in various ways to help interpret findings

Types of Factor Rotation

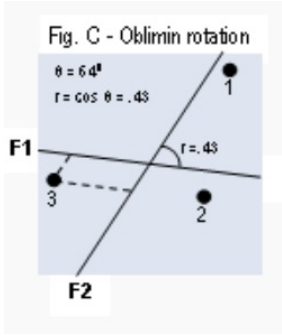
Orthogonal

- When your data isn't theoretically related
- Rotate 90 degrees
- AKA varimax, quartimax



Oblique

- When your data is theoretically related
- Rotate < 90 degrees
- AKA oblimin, promax



Running the Analysis

When you run factor analysis, try variations…

- Number of factors
- Type of rotation
- Eliminating items

Number of Factors

- Look at the SS loadings > 1 for a start
- Examine scree plot
- Examine residuals (should be > 50%)

Type of Rotation

- Varimax
- Oblimin
- Try both at least!

Eliminate Items that…

- Were suspect in your assumptions section
  - Didn’t correlate well <.3 with multiple items
  - Correlated too much > .9 with multiple items
- Don’t load on a factor
  - Isn’t .3 or greater
- Have negative loadings on a factor

Interpreting Factor Analysis Results

Each RC is a factor – group of similar items
Anything > .3 loads on that factor
Pick the highest loading if it is on more than one

	RC1	RC3	RC2	h2	u2	com
FS1_1	0.49	0.69		0.76	0.24	2.0
FS1_2	0.63	0.31	0.34	0.60	0.40	2.1
FS1_3	0.82			0.77	0.23	1.3
FS1_4	0.78	0.38		0.77	0.23	1.5
FS1_5	0.84			0.77	0.23	1.2
FS1_6		0.86		0.83	0.17	1.3
FS1_7	0.34	0.82		0.81	0.19	1.4
FS2_1			0.85	0.78	0.22	1.2
FS2_2			0.87	0.82	0.18	1.1

Use the Codebook to Determine Meaning!

	RC1	RC3	RC2	h2	u2	com
FS1_1	0.49	0.69		0.76	0.24	2.0
FS1_2	0.63	0.31	0.34	0.60	0.40	2.1
FS1_3	0.82			0.77	0.23	1.3
FS1_4	0.78	0.38		0.77	0.23	1.5
FS1_5	0.84			0.77	0.23	1.2
FS1_6		0.86		0.83	0.17	1.3
FS1_7	0.34	0.82		0.81	0.19	1.4
FS2_1			0.85	0.78	0.22	1.2
FS2_2			0.87	0.82	0.18	1.1

A	B
FS1_1	I know how to get myself to follow through on my financial intentions
FS1_2	I know where to find the advice I need to make decisions involving money
FS1_3	I know how to make complex financial decisions
FS1_4	I am able to make good financial decisions that are new to me
FS1_5	I am able to recognize a good financial investment
FS1_6	I know how to keep myself from spending too much
FS1_7	I know how to make myself save
FS2_1	I know when I do not have enough info to make a good decision involving my mo
FS2_2	I know when I need advice about my money
FS2_3	I struggle to understand financial information

Real-Life Use Case for Factor Analysis

- Survey items from chronic pain patients on a new way to screen for fear-avoidance of pain
- Wanted to see if there were subtypes of fear-avoidance so we could better address patients
- Items fell into fear, avoidance, and depression categories that then became subscales

Questions?