

## Cronbach Alpha

An industrial psychologist was interested in developing a global scale to reliably measure employee affective (evaluative) reactions to the procedures used by an affirmative action officer to implement the policy of affirmative action at a company. To develop the scale, the participants used in a test sample were asked to read a detailed description of the affirmative action procedures the officer planned to use. After reading these procedures, the employees used in the test sample were asked to indicate their affective reactions to the affirmative action officer's procedures by placing a check-mark along **each** one of the scale items listed below. For each of the six items below a check mark placed adjacent to the positive word of each pairing (pleased, satisfied, tolerant, favorable, like, and wise) was scored as a 7. A check mark next to each negative word (displeased, dissatisfied, intolerant, unfavorable, dislike, and unwise) was scored as a 1. Check marks placed in intermediate positions received intermediate numbers between 2 and 6. **The responses of Employee A are indicated below by the X marks.**

Item 1            pleased: X : \_ : \_ : \_ : \_ : \_ : \_ : displeased  
 Item 2            dissatisfied: \_ : \_ : \_ : \_ : \_ : X : \_ : satisfied  
 Item 3            tolerant: \_ : \_ : \_ : \_ : \_ : \_ : X : intolerant  
 Item 4            unfavorable: \_ : \_ : \_ : \_ : \_ : \_ : X : favorable  
 Item 5            like: X : \_ : \_ : \_ : \_ : \_ : \_ : dislike  
 Item 6            unwise: X : \_ : \_ : \_ : \_ : \_ : \_ : wise

The issue of interest to the industrial psychologist was whether these six items “hung” together and measured the same construct, namely, **affective** reactions to the actions taken by the affirmative action officer. If they did the psychologist could then add the scores of each participant in the study across each of the six items to come up with one total or global affective score. To determine whether one such global affective score could be computed the psychologist needed to calculate a statistic for the global scale known as Cronbach’s Alpha. In order for the global affective scale to have good reliability, the Cronbach Alpha should minimally have a value of .7. The responses of ten test employees to each of the eight items are listed below:

<u>Employee</u>	<u>Item1</u>	<u>Item2</u>	<u>Item3</u>	<u>Item4</u>	<u>Item5</u>	<u>Item6</u>
A	7	6	1	7	7	1
B	6	7	1	5	3	1
C	5	6	3	6	4	1
D	4	6	5	4	3	2
E	3	5	3	2	3	2
F	2	4	2	3	4	1
G	1	2	4	1	1	1
H	7	4	5	6	5	1
I	6	5	2	7	6	1
J	2	5	6	5	7	1

1. Logon to system
2. **Click Start > Programs > SPSS for Windows > SPSS 10.1 for Windows.** At this point a window will appear asking you what you would like to do. Click on the circle next to Type in Data (2<sup>nd</sup> option in list) and then click **OK** at the bottom of the window.
3. A Data Editor will appear. Look in the lower left corner of the screen. You should see a **Data View** tab and to the right of it a **Variable View** tab. The **Variable View** tab will be used first for the Data **Definition** Phase of creating a data file. The **Data View** tab will be used to actually enter the raw numbers listed above. (See pages 1-3 for a more detailed explanation of creating data files.)

## DATA DEFINITION PHASE

4. Click on the **Variable View** tab in the lower left corner. A new screen will appear with the following words at the top of each column.  
**Name** Type Width Decimals **Label** **Values** Missing Columns Align Measure
5. Click on the white cell in **Row 1** under the word **Name** and type in the word **Item1**
6. Click on the white cell in **Row 1** under the word **Label** and type in **Pleased**. (Doing this will provide you with a more expansive label in the results output).
7. Click on the white cell in **Row 2** under the word **Name** and type in the word **Item2**
8. Click on the white cell in **Row 2** under the word **Label** and type in **Satisfied**. (Doing this will provide you with a more expansive label in the results output).
9. Click on the white cell in **Row 3** under the word **Name** and type in the word **Item3**
10. Click on the white cell in **Row 3** under the word **Label** and type in **Tolerant**. (Doing this will provide you with a more expansive label in the results output).
11. Click on the white cell in **Row 4** under the word **Name** and type in the word **Item4**
12. Click on the white cell in **Row 4** under the word **Label** and type in **Favorable**. (Doing this will provide you with a more expansive label in the results output).
13. Click on the white cell in **Row 5** under the word **Name** and type in the word **Item5**
14. Click on the white cell in **Row 5** under the word **Label** and type in **Like**. (Doing this will provide you with a more expansive label in the results output).
15. Click on the white cell in **Row 6** under the word **Name** and type in the word **Item6**
16. Click on the white cell in **Row 6** under the word **Label** and type in **Wise**. (Doing this will provide you with a more expansive label in the results output).

## DATA ENTRY PHASE

17. Click on the **Data View** tab in the lower left corner. The data **view** screen will now appear with Column 1 named **Item1**, Column 2 named **Item2**, Column 3 named **Item3**, Column 4 named **Item4**, Column 5 named **Item5**, and Column 6 named **Item6**.
18. Enter the data for each of the 10 participants (employee A through J) as follows. Mouse to the top cell under the first column which is Item1 and enter the following:

7 tab 6 tab 1 tab 7 tab 7 tab 1  
 6 tab 7 tab 1 tab 5 tab 3 tab 1  
 5 tab 6 tab 3 tab 6 tab 4 tab 1  
 4 tab 6 tab 5 tab 4 tab 3 tab 2  
 3 tab 5 tab 3 tab 2 tab 3 tab 2  
 2 tab 4 tab 2 tab 3 tab 4 tab 1  
 1 tab 2 tab 4 tab 1 tab 1 tab 1  
 7 tab 4 tab 5 tab 6 tab 5 tab 1  
 6 tab 5 tab 2 tab 7 tab 6 tab 1  
 2 tab 5 tab 6 tab 5 tab 7 tab 1

The data may also be entered one column at a time entering all the responses to item 1 first, and then entering all the responses to item 2, then item 3, then item 4, then item 5 and finally item 6.

## Data Analysis

1. Click on **Analyze** at top of screen then
  - a. Click on **Scale** then
  - b. Click on **Reliability Analysis**
2. Highlight **item1, item2 item3, item4, item5, and item6** by clicking on item1 and **dragging the pointer down all items**. When all items are highlighted
  - a. Click on **arrow >** to transfer all names to the **Item(s) Box**
3. In the **Model Box** make sure the word **Alpha** is there. If not click on down arrow and highlight alpha

4. Make sure a check mark is in the **List Items labels** box. If not click on white square.
5. Click on **Statistics** button
6. Place check marks in the white squares next to the following items by clicking on the white square
  - a. **Descriptives for Item**
  - b. Descriptives for **Scale**
  - c. Descriptives for **Scale if Item Deleted**
7. Place check marks in the white squares next to the following items by clicking on the white square
  - a. **Summaries for Means**
  - b. Summaries for **Variiances**
  - c. Summaries for **Co-Variiances**
  - d. Summaries for **Correlations**
8. Place check marks in the white squares next to the following items by clicking on the white square
  - a. **Inter-item Correlations**
  - b. Inter-item **Co-Variiances**
9. Click on **Continue** Button
10. Click **OK**. Doing this will result in analysis being conducted. These results are below.

\*\*\*\*\* Method 2 (covariance matrix) will be used for this analysis \*\*\*\*\*

RELIABILITY ANALYSIS - SCALE (ALPHA)

1. ITEM1 pleased  
 2. ITEM2 satisfied  
 3. ITEM3 tolerant  
 4. ITEM4 favorable  
 5. ITEM5 like  
 6. ITEM6 wise

		Mean	Std Dev	Cases
1.	ITEM1	4.3000	2.2136	10.0
2.	ITEM2	5.0000	1.4142	10.0
3.	ITEM3	3.2000	1.7512	10.0
4.	ITEM4	4.6000	2.0656	10.0
5.	ITEM5	4.3000	1.9465	10.0
6.	ITEM6	1.2000	.4216	10.0

Covariance Matrix

	ITEM1	ITEM2	ITEM3	ITEM4	ITEM5
ITEM1	4.9000				
ITEM2	1.7778	2.0000			
ITEM3	-1.5111	-.8889	3.0667		
ITEM4	3.8000	1.6667	-.8000	4.2667	
ITEM5	1.9000	.8889	-.0667	3.1333	3.7889
ITEM6	-.1778	.1111	.1778	-.3556	-.2889

ITEM6

ITEM6	.1778
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Correlation Matrix

ITEM1	ITEM2	ITEM3	ITEM4	ITEM5
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ITEM1	1.0000				
ITEM2	.5679	1.0000			
ITEM3	-.3898	-.3589	1.0000		
ITEM4	.8311	.5705	-.2212	1.0000	
ITEM5	.4410	.3229	-.0196	.7793	1.0000
ITEM6	-.1905	.1863	.2408	-.4082	-.3520

ITEM6

RELIABILITY ANALYSIS - SCALE (ALPHA)

Correlation Matrix

ITEM6	1.0000
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N of Cases = 10.0

Statistics for Scale	Mean	Variance	Std Dev	N of Variables		
	22.6000	36.9333	6.0773	6		
Item Means	Mean	Minimum	Maximum	Range	Max/Min	Variance
	3.7667	1.2000	5.0000	3.8000	4.1667	1.9387
Item Variances	Mean	Minimum	Maximum	Range	Max/Min	Variance
	3.0333	.1778	4.9000	4.7222	27.5625	2.9599
Inter-item Covariances	Mean	Minimum	Maximum	Range	Max/Min	Variance
	.6244	-1.5111	3.8000	5.3111	-2.5147	2.2587
Inter-item Correlations	Mean	Minimum	Maximum	Range	Max/Min	Variance
	.1333	-.4082	.8311	1.2393	-2.0357	.1881

Item-total Statistics

	Scale Mean if Item Deleted	Scale Variance if Item Deleted	Corrected Item-Total Correlation	Squared Multiple Correlation	Alpha if Item Deleted
ITEM1	18.3000	20.4556	.5782	.8657	.4373
ITEM2	17.6000	27.8222	.4766	.6903	.5222
ITEM3	19.4000	40.0444	-.2787	.4714	.7776
ITEM4	18.0000	17.7778	.8548	.9492	.2703
ITEM5	18.3000	22.0111	.6096	.7767	.4316
ITEM6	21.4000	37.8222	-.2057	.6528	.6544

RELIABILITY ANALYSIS - SCALE (ALPHA)

Reliability Coefficients 6 items

Alpha = .6087

Standardized item alpha = .4799

Reliability Coefficients      4 items

Alpha =    .8504    Standardized item alpha =    .8496

The Alpha of .8504 to the right of this box was obtained by going back to Step 2 above under Data Analysis and removing item3 and item6 from the item(s) box.

11.    **Interpretation and APA writing template for Results Above:**

A scale was developed to measure employees' affective reactions to the procedures used by an affirmative action officer to implement a policy of affirmative action. A test sample of employees was asked to evaluate those procedures on a series of 7 point bi-polar scales. Initial scale items consisted of pleased-displeased, dissatisfied-satisfied, tolerant-intolerant, unfavorable-favorable, like-dislike, and unwise-wise. The Cronbach Alpha for these six items was only .6087. An inspection of the data analysis indicated that scale reliability could be improved by eliminating the tolerant-intolerant, and unwise-wise sub-scales. A re-analysis with these two items removed from the final scale indicated that scale reliability measurably improved, Cronbach Alpha = .8504 and reached conventional standards for scale reliability. Thus, the final scale used to measure employee affective reactions to the company's affirmative action procedures consisted of the sum total of an employee's responses across the scale items of pleased-displeased, dissatisfied-satisfied, unfavorable-favorable, and like-dislike.