

## Chapter 112

# Creating Contrast Variables

## Introduction

The Contrast Variable tool in **NCSS** can be used to create contrasts and/or binary variables for use in various analyses. This chapter will provide information about the various options available on the contrast creation tool and also provide several examples to help you use the tool effectively. This tool can be accessed through the Data menu on the Data window.

## Contrast Variables Tool Options

The options on Contrast Variable tool window are described below.

### Type

#### Type of Contrast Variables to Create

Choose the type of contrast variables to create from the categorical input data. The descriptions assume that the categorical input column has  $K$  unique values.

The options are

- **Binary (0's and 1's)**

Creates  $K$  binary variables (also known as "indicator" or "dummy" variables) with zeros and ones.

*Example – Creation of binary variables from C1*

C1	C1_A	C1_B	C1_C	C1_D
A	1	0	0	0
A	1	0	0	0
B	0	1	0	0
B	0	1	0	0
C	0	0	1	0
C	0	0	1	0
D	0	0	0	1
D	0	0	0	1

## Creating Contrast Variables

- **Polynomial (1st, 2nd, 3rd Order, etc.)**

Creates  $K - 1$  polynomial contrasts starting with the 1<sup>st</sup> order polynomial and continuing to the polynomial of order  $K - 1$ .

*Example – Creation of polynomial contrast variables from C1*

C1	C1_Poly1	C1_Poly2	C1_Poly3
A	-3	1	-1
A	-3	1	-1
B	-1	-1	3
B	-1	-1	3
C	1	-1	-3
C	1	-1	-3
D	3	1	1
D	3	1	1

- **Each with Reference Value**

Creates  $K - 1$  contrasts using the value specified by “Reference Value” as the basis for the contrasts.

*Example – Creation of contrast variables from C1 with “B” as the Reference Value*

C1	C1_AvsB	C1_CvsB	C1_DvsB
A	1	0	0
A	1	0	0
B	-1	-1	-1
B	-1	-1	-1
C	0	1	0
C	0	1	0
D	0	0	1
D	0	0	1

Creating Contrast Variables

- **Each with Next**

Creates  $K - 1$  contrasts that compare each value with the next after values are sorted.

*Example - Creation of contrast variables from C1 using "Each with Next"*

C1	C1_AvsB	C1_BvsC	C1_CvsD
A	1	0	0
A	1	0	0
B	-1	1	0
B	-1	1	0
C	0	-1	1
C	0	-1	1
D	0	0	-1
D	0	0	-1

- **Each with Average of All Subsequent**

Creates  $K - 1$  contrasts that compare each value to the average of all remaining after sorting.

*Example - Creation of contrast variables from C1 using "Each with Average of All Subsequent"*

C1	C1_AvsAveNext	C1_BvsAveNext	C1_CvsAveNext
A	-3	0	0
A	-3	0	0
B	1	-2	0
B	1	-2	0
C	1	1	-1
C	1	1	-1
D	1	1	1
D	1	1	1

- **Each with Prior**

Creates  $K - 1$  contrasts that compare each value with the previous after values are sorted.

*Example - Creation of contrast variables from C1 using "Each with Prior"*

C1	C1_BvsA	C1_CvsB	C1_DvsC
A	-1	0	0
A	-1	0	0
B	1	-1	0
B	1	-1	0
C	0	1	-1
C	0	1	-1
D	0	0	1
D	0	0	1

## Creating Contrast Variables

- **Each with Average of All Prior**

Creates  $K - 1$  contrasts that compare each value to the average of all previous after sorting.

*Example - Creation of contrast variables from C1 using "Each with Average of All Prior"*

C1	C1_DvsAvePrev	C1_CvsAvePrev	C1_BvsAvePrev
A	1	1	1
A	1	1	1
B	1	1	-1
B	1	1	-1
C	1	-2	0
C	1	-2	0
D	-3	0	0
D	-3	0	0

- **Each with Average of All Others**

Creates  $K$  contrasts that compare each value to the average of all others.

*Example - Creation of contrast variables from C1 using "Each with Average of All Others"*

C1	C1_AvsAve	C1_BvsAve	C1_CvsAve	C1_DvsAve
A	-3	1	1	1
A	-3	1	1	1
B	1	-3	1	1
B	1	-3	1	1
C	1	1	-3	1
C	1	1	-3	1
D	1	1	1	-3
D	1	1	1	-3

## Creating Contrast Variables

- **Each with First**

Creates  $K - 1$  contrasts that compare each value with the first after values are sorted.

*Example - Creation of contrast variables from C1 using "Each with First"*

C1	C1_BvsA	C1_CvsA	C1_DvsA
A	-1	-1	-1
A	-1	-1	-1
B	1	0	0
B	1	0	0
C	0	1	0
C	0	1	0
D	0	0	1
D	0	0	1

- **Each with Second - Fifth**

Creates  $K - 1$  contrasts that compare each value with the second, third, fourth, or fifth after values are sorted.

*Example - Creation of contrast variables from C1 using "Each with Third"*

C1	C1_AvsC	C1_BvsC	C1_DvsC
A	1	0	0
A	1	0	0
B	0	1	0
B	0	1	0
C	-1	-1	-1
C	-1	-1	-1
D	0	0	1
D	0	0	1

## Creating Contrast Variables

- **Each with Last**

Creates  $K - 1$  contrasts that compare each value with the last after values are sorted.

*Example - Creation of contrast variables from C1 using "Each with Last"*

C1	C1_AvsD	C1_BvsD	C1_CvsD
A	1	0	0
A	1	0	0
B	0	1	0
B	0	1	0
C	0	0	1
C	0	0	1
D	-1	-1	-1
D	-1	-1	-1

- **All Pairs**

Creates  $K(K - 1)/2$  contrasts that compare each value individually with all others.

*Example - Creation of contrast variables from C1 using "All Pairs"*

C1	C1_AvsB	C1_AvsC	C1_AvsD	C1_BvsC	C1_BvsD	C1_CvsD
A	1	1	1	0	0	0
A	1	1	1	0	0	0
B	-1	0	0	1	1	0
B	-1	0	0	1	1	0
C	0	-1	0	-1	0	1
C	0	-1	0	-1	0	1
D	0	0	-1	0	-1	-1
D	0	0	-1	0	-1	-1

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## Input Column

### Input Data Column (Categorical)

Select a single column that contains categorical data values. The data in this column will be used as the basis for the contrast variables created.

## Output

The options in this section allow you to specify where to store the contrast variables. Additional output options are also provided as described below.

### First Output Storage Column for Contrast Variables

Choose the first column in which to store the contrast variables. The data will be stored in contiguous columns, starting with the column specified here. The required number of columns to store everything will be calculated by the tool. The input column cannot be included among the output storage columns.

Usually, you'll select an empty range of columns for the contrast variables.

**Warning:** Existing data in any of the required storage columns will be overwritten and lost. Choose the first output storage column carefully so that needed data is not lost.

### Rename output columns using input data information

Check this box to rename the output storage columns with identifying names from the input columns.

*Example – Creation of binary variables from C1 with "Rename output columns..." checked*

C1	C1_A	C1_B	C1_C	C1_D
A	1	0	0	0
A	1	0	0	0
B	0	1	0	0
B	0	1	0	0
C	0	0	1	0
C	0	0	1	0
D	0	0	0	1
D	0	0	0	1

*Example – Creation of binary variables from C1 with "Rename output columns..." unchecked*

C1	C2	C3	C4	C5
A	1	0	0	0
A	1	0	0	0
B	0	1	0	0
B	0	1	0	0
C	0	0	1	0
C	0	0	1	0
D	0	0	0	1
D	0	0	0	1

## Creating Contrast Variables

**Write output notes to column info table**

Check this box to store information about the input column and the options used to create the contrast variables.

*Example – Column info note in an output column (corresponding to C1 = "B") after creation of binary variables from C1 with "Write output notes..." checked.*

**Contrast Variable Details:**

Name = C1\_B

Number = 2 of 4

Created From = C1

Contrast Type = Binary (0's and 1's)

Contrast = (C1 = B)