

CT09

PROC TEMPLATE and its application IN TABLES & CROSSTABULATION TABLES

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DISCLAIMER

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TEMPLATE Procedure

- The TEMPLATE procedure enables us to customize the appearance of SAS output.
- ODS then uses these templates to produce formatted output.
- Navigate and manage the templates stored in template stores

INTRODUCTION

- Customizing the appearance

- Styles
- Crosstabulation Tables
- Tables
- Columns
- Headers
- Footers
- Tagsets
- ODS Graphics

Syntax

```
PROC TEMPLATE;  
  DEFINE COLUMN <...>END;  
  DEFINE FOOTER <...>END;  
  DEFINE HEADER <...>END;  
  DEFINE STYLE <...>END;  
  DEFINE TABLE <...>END;  
  DEFINE TAGSET <...>;  
  DEFINE EVENT <...>END;  
  DEFINE CROSSTABS <...>END;  
  DEFINE STATGRAPH <...>END;  
  DELETE template-path <...>;  
  EDIT template-path<...>END;  
TEST DATA=data-set </ STORE=libref.template-  
  store>;  
RUN;
```

- Navigate and manage the templates

- Edit an existing template
- Create links to an existing template
- Change the location where we write New templates
- Search for existing templates
- View the source code of a template

STYLE

- Describes how to display the presentation aspects (color, font face, font size, and so on).
- Each style consists of style elements.
- Style elements are collection of style attributes.
- Default Style for HTML output is HTMLBlue.
- We can modify the layout of the output by customizing these styles.

Syntax

```
DEFINE STYLE style-path |  
Base.Template.Style </  
STORE=libref.template-store>;  
  PARENT=style-path;  
  NOTES "text";  
  CLASS style-element-name(s) <"text">  
  </ style-attribute-specification(s)>;  
  IMPORT style-specification <media-type-  
  1 <, media-type-2> ...>;  
  STYLE style-element-name(s) <FROM  
  style-element-name | _SELF_ > <"text">  
  </ style-attribute-specification(s)>;  
  
END;
```

STYLE (cont.) : Example #1

```
/*Fig 1.1 Default Style*/  
ods listing close;  
ods html file="style.html";  
TITLE "List of Adverse Events";
```

/*Fig 1.1 Default Style*/

List of Adverse Events

AE Reported Term	System Organ Class
Diarrhea	Gastrointestinal disorders
Gastrointestinal Infection	Infections and infestations
Infection	Infections and infestations
Nausea	Gastrointestinal disorders
Respiratory Infection	Infections and infestations
Urinary Tract Infection	Infections and infestations
Vomiting	Gastrointestinal disorders

```
/*Fig 1.2 Journal2 Style*/  
ods listing close;  
ods html file="style.html"  
style=Journal2;  
TITLE "List of Adverse Events";
```

/*Fig 1.2 Journal2 Style*/

List of Adverse Events

AE Reported Term	System Organ Class
Diarrhea	Gastrointestinal disorders
Gastrointestinal Infection	Infections and infestations
Infection	Infections and infestations
Nausea	Gastrointestinal disorders
Respiratory Infection	Infections and infestations
Urinary Tract Infection	Infections and infestations
Vomiting	Gastrointestinal disorders

STYLE (cont.)

Recommended Styles for ODS Destinations

Destination	Recommended Styles	Default Style
RTF	RTF	RTF
HTML	HTMLBlue, Analysis, BarrettsBlue, BlockPrint, Journal, Statistical etc.	HTMLBlue
LISTING	LISTING	LISTING
ODS destination for PowerPoint	PowerPointDark PowerPointLight	PowerPointLight
SASREPORT for Enterprise Guide	EGDefault HTMLBlue	HTMLBlue

STYLE (cont.)

EXAMPLE#2: CHANGING THE STYLE ATTRIBUTES

- Using the default style(HTMLBlue), we get the output as Fig1.1 with following code

```
ods listing close;  
ods html file="style.html";  
TITLE "List of Adverse Events";  
proc sql;  
select UNIQUE(AETERM), AEBODSYS FROM DATA.ADAE;  
QUIT;  
ODS LISTING;
```

/*Fig 1.1 Default Style*/

List of Adverse Events

AE Reported Term	System Organ Class
Diarrhea	Gastrointestinal disorders
Gastrointestinal Infection	Infections and infestations
Infection	Infections and infestations
Nausea	Gastrointestinal disorders
Respiratory Infection	Infections and infestations
Urinary Tract Infection	Infections and infestations
Vomiting	Gastrointestinal disorders

STYLE (cont.)

EXAMPLE#2: CHANGING THE STYLE ATTRIBUTES

- “cellcontents”, “header”, “systemtitle” and “table” statements are used to customize the HTML output to alter the appearance.

```
style cellcontents / fontfamily="helvetica" fontweight=medium  
backgroundcolor=blue fontstyle=roman fontsize=3 color=grey;
```

g 1.3 Changing Style Attrs*/

```
style header / backgroundcolor=#BFCFFF fontfamily="arial"  
fontweight=medium fontstyle=roman fontsize=3 color=white;
```

```
style systemtitle / fontfamily="arial"  
fontweight=bold backgroundcolor=white  
fontstyle=roman fontsize=4 color=salmon;
```

```
style table /borderspacing=5  
borderwidth=7;  
end;
```

List of Adverse Events

Reported Term	System Organ Class
	Gastrointestinal disorders
Gastrointestinal Infection	Infections and infestations
	Infections and infestations
	Gastrointestinal disorders
Respiratory Infection	Infections and infestations
Urinary Tract Infection	Infections and infestations
Vomiting	Gastrointestinal disorders

STYLE (cont.)

EXAMPLE#3: USE OF INHERITANCE & CELLSTYLE

- INHERITANCE- it will copy all of the style elements from the parent style to the new child style.
- CELLSTYLE - Specify which style element and style attributes to use for different values in the column

```
proc template;  
  /*Change in style using inheritance*/  
  define style style2;  
  parent = style1; .....  
  define table table_cellstyl; mvar sysdate9;  
  cellstyle _val_ IN ("Gastrointestinal Infection"  
  "Respiratory Infection") as {background=blue  
  color=white}; end; ....  
run;
```

List of Adverse Events

AE Reported Term	System Organ Class
Diarrhea	Gastrointestinal disorders
Gastrointestinal Infection	Infections and infestations
Infection	Infections and infestations
Nausea	Gastrointestinal disorders
Respiratory Infection	Infections and infestations
Urinary Tract Infection	Infections and infestations
Vomiting	Gastrointestinal disorders

*Row in BLUE are Adverse Events of Speical Interest

TABLES

- To customize the tabular appearance of SAS output.
- How tables should be constructed.
- Content and placement of headers and footers the content and placement of columns, and style overrides .
- Tabular templates include the following types:
 - column templates
 - header templates
 - footer templates
 - table templates

TABLES (cont.)

EXAMPLE #1

- The default output of the frequency table is presented in fig 2.1 with missing values for AEBODSYS and AETERM.

/*Fig 2.1 default table*/

Obs	TRT01A	AEBODSYS	AETERM	COUNT
1	Treatment A			2
2	Treatment A	Gastrointestinal disorders	Diarrhea	1
3	Treatment A	Gastrointestinal disorders	Nausea	1
4	Treatment A	Infections and infestations	Gastrointestinal Infection	1
5	Treatment A	Infections and infestations	Respiratory Infection	1
6	Treatment A	Infections and infestations	Urinary Tract Infection	1
7	Treatment B			3
8	Treatment B	Gastrointestinal disorders	Diarrhea	2
9	Treatment B	Gastrointestinal disorders	Nausea	1
10	Treatment B	Gastrointestinal disorders	Vomiting	3
11	Treatment B	Infections and infestations	Gastrointestinal Infection	2
12	Treatment B	Infections and infestations	Infection	1
13	Treatment B	Infections and infestations	Respiratory Infection	5
14	Treatment B	Infections and infestations	Urinary Tract Infection	1

/*Fig 2.2 custom table*/

Use of Translate statement and Numeric cell value categorization

Treatment Group	System Organ Class	AE Reported Term	Frequency Count
Treatment A	Uncoded AE term	Uncoded AE term	2
	Gastrointestinal disorders	Diarrhea	1
		Nausea	1
		Infections and infestations	1
			1
Treatment B	Uncoded AE term	Urinary Tract Infection	1
		Uncoded AE term	3
		Gastrointestinal disorders	2
		Nausea	1
		Vomiting	3
	Infections and infestations	Gastrointestinal Infection	2
		Infection	1
		Respiratory Infection	5
		Urinary Tract Infection	1

TABLES (cont.)

EXAMPLE #1 (cont.)

- TRANSLATE statement in table template that alters the specific value/content of a cell value attributes
- COLOR attributes of the text value and change in color based on the frequency values in the cell.

```
proc template;  
    define table table_style;  
        translate _val_="" into "Uncoded AE term";  
        notes "ADAE with Uncoded AETERM";  
    define column char_var;  
        generic=on;  
        blank_dups=on;  
        cellstyle _val_ in ("Gastrointestinal  
Infection" "Respiratory Infection")  
        as {color=red fontweight=bold};  
    end;
```

CROSTABULATIONS

- Control and change the appearance of crosstabulation tables.
- By default, it is formatted with the CrossTabFreqs template by SAS.
- We can create a custom crosstabulation and can do following:
 - specify a style for each value in a cell
 - change the stacking order of values in a cell
 - change and style headers and footers

AE CrossTab										
The FREQ Procedure										
Frequency Percent Row Pct Col Pct	Table of TRT01A by AETERM									
	Row variable Name/ ROWS_HEADER	Column variable value/ COL_VAR_STYLE		AETERM(AE Reported Term)				Column variable name/ COLS_HEADER		
	TRT01A(Treatment Group)	Diarrhea	Gastrointestinal Infection	Infection	Nausea	Respiratory Infection	Urinary Tract Infection	Vomiting	Total	
	Treatment A	1	1	0	2	2	1	0	7	
	4.00	4.00	0.00	8.00	8.00	4.00	0.00	28.00		
Legend/ LEGEND_STYLE	Treatment A	14.29	14.29	0.00	28.57	28.57	14.29	0.00		
		33.33	25.00	0.00	50.00	28.57	50.00	0.00		
		Treatment B	2	3	2	2	5	1	3	18
			8.00	12.00	8.00	8.00	20.00	4.00	12.00	72.00
11.11	16.67		11.11	11.11	27.78	5.56	16.67			
66.67	75.00		100.00	50.00	71.43	50.00	100.00			
Total	3	4	2	4	7	2	3	25		
	12.00	16.00	8.00	16.00	28.00	8.00	12.00	100.00		
Grand total/ GRAND_TOTAL_STYLE										

custom formats for cell values
variable labels in headers and footers
table regions independently
change or remove the legend

Fig 3.1
Regions that can be modified

CROSSTABULATIONS (cont.)

- The crosstabulation template has no parent template.
- It cannot serve as a parent to another template.
- Uses DEFINE CELLVALUE blocks instead of the DEFINE COLUMN blocks.
- CELLVALUE statement is used instead of COLUMN

Fig 3.2 :
Default
output

Frequency of AE by Treatment								
Frequency Percent Row Pct Col Pct	Table of TRT01A by AETERM							
	TRT01A(Treatment Group)	AETERM(AE Reported Term)						
		Diarrhea	Gastrointestinal Infection	Infection	Nausea	Respiratory Infection	Urinary Tract Infection	Vomiting
	Treatment A	1	1	0	2	2	1	0
		4.00	4.00	0.00	8.00	8.00	4.00	0.00
		14.29	14.29	0.00	28.57	28.57	14.29	0.00
	Treatment B	33.33	25.00	0.00	50.00	28.57	50.00	0.00
		2	3	2	2	5	1	3
		8.00	12.00	8.00	8.00	20.00	4.00	12.00
	Total	11.11	16.67	11.11	11.11	27.78	5.56	16.67
		66.67	75.00	100.00	50.00	71.43	50.00	100.00
		3	4	2	4	7	2	3
	Total	12.00	16.00	8.00	16.00	28.00	8.00	12.00

CROSSTABULATIONS (cont.)

EXAMPLE #1

Fig 3.3 : Customized Output

Frequency of AE by Treatment

Table of AE with Frequency Category								
Treatment Group	Diarrhea	Gastrointestinal Infection	Infection	Nausea	Respiratory Infection	Urinary Tract Infection	Vomiting	Total
Treatment A	1	1	0	2	2	1	0	7
	4.00	4.00	0.00	8.00	8.00	4.00	0.00	28.00
	14.29	14.29	0.00	28.57	28.57	14.29	0.00	
	33.33	25.00	0.00	50.00	28.57	50.00	0.00	
Treatment B	2	3	2	2	5	1	3	18
	8.00	12.00	8.00	8.00	20.00	4.00	12.00	72.00
	11.11	16.67	11.11	11.11	27.78	5.56	16.67	
	66.67	75.00	100.00	50.00	71.43	50.00	100.00	
Total	3	4	2	4	7	2	3	25
	12.00	16.00	8.00	16.00	28.00	8.00	12.00	100.00

Frequency Category of AE

Green - % 0- 10

Orange- % 10- 20

Red - % > 20

CROSSTABULATIONS (cont.)

Statements used in Example #1

- The **DEFINE** statement creates the crosstabulation template Base.Freq.CrossTabFreqs.

- ROWS HEADER=** `style=table {backgroundcolor= white};`
the header `define c` `cell_style=data {backgroundcolor=white};`
`row_total_style=data {backgroundcolor=salmon};`
- COLS** `notes` `col_total_style=data {backgroundcolor=salmon};`
header for columns. `grand_total_style=datastrong {backgroundcolor=salmon};`
`rows_header=RowsHeader cols_header=ColsHeader;`

- The **DEFINE CELLVALUE IF** statements : to define values that will appear in the cell

- The **CELLSTYLE A** `TRT01A(Treatment Group)`
element of the cells conditionally.

- The `_VAL_` variable represents the value of a cell.

Row variable Name/ ROWS_HEADER		define cellvalue RowPercent;	
AETERM(AE Reported Term)		Column variable name/ COLS_HEADER	
TRT01A(Treatment Group)	8.00	4.00	10 < _val_ <= 20 as
	28.57	14.29	datastrong {color=orange},
	28.57	50.00	_val_ > 20 as datastrong
			{color=red};
			end;

CROSSTABULATIONS (cont.)

Other Statements in Template

- The **HEADER** statement specifies which header templates are applied to the output.
- The **FOOTER** statement specifies which footer templates are applied to the output.
- **EDIT statement** : Enables us to edits an existing template.
- **Delete statement**: Custom templates/styles can be deleted using Delete statement.

Different Destinations

RTF and PDF Outputs:

RTF

- Use PARENT=RTF.
- The Date and Page Number will be printed by default in every page. Use NODATE and NONUMBER to remove.
- Has Narrow page margin by default. Use TOPMARGIN, BOTTOMMARGIN, LEFTMARGIN and RIGHTMARGIN
- Uses only one font(specified first).
- Title and Footer will appear as Page Header and Footer instead of above and below the result table(vs HTML).

PDF

- Use PARENT=PRINTER style.
- Similar to RTF, the Date and Page Number will be printed by default in every page. Use NODATE and NONUMBER to remove.
- Might Need to register Font using PROC FONTREG if getting a warning “specification failed”
- Footnote will appear in the bottom of the page instead of right below the result table.

CONCLUSION

PROC TEMPLATE can help us control and improve the appearance of the output in many ways. There are many other different statements and options available to make the custom tables.

RECOMMENDED READING

SAS® 9.4 Output
Delivery System:
Procedures Guide,
Third Edition

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