



Science For A Better Life

A Macro to replace PROC REPORT!?

PhUSE / 16. October 2012 / Katja Glaß



Agenda

- Introduction
- Functionality
- Background
- Summary
- References



Introduction

Macro discussions

- Why do we need them?
- We have done without so far.
- ...

A macro to replace PROC REPORT!?

- Too excessive way of macro usage?
- But no! It's not!

This presentation will show you the reasons!

Introduction

%DATALIST

- Company macro since 90s used instead of PROC REPORT
- Part of a generic macro system called MoSTO
- Create standardized output in a simple way

Reasons for %Datalist macro:

- **Efficiency**
(How often do programmers create & update PROC REPORTs every day?)
- **Validation**
(How complex can a PROC REPORT become?)
- **Standardization**
(How different can the output look when created by different programmers)

Introduction

```
PROC REPORT DATA=sashelp.class (WHERE=(name < 'I')) nowd headline spacing=2;
  COLUMN sex name age height weight;
  DEFINE sex / ORDER;
  DEFINE name / ORDER;
RUN;
```

	S	e	x	Name	Age	Height	Weight

F				Alice	13	56.5	84
				Barbara	13	65.3	98
				Carol	14	62.8	102.5
M				Alfred	14	69	112.5
				Henry	14	63.5	102.5

Introduction

```
%datalist( data      = sashelp.class (WHERE=(name < 'I')),  
           by        = sex name,  
           var        = age height weight);
```

SEX	NAME	AGE	HEIGHT	WEIGHT
F	Alice	13	56.5	84
	Barbara	13	65.3	98
	Carol	14	62.8	102.5
M	Alfred	14	69	112.5
	Henry	14	63.5	102.5

Introduction

```
%datalist(data = sashelp.class
          (WHERE=(name < 'I')),
          by  = sex name,
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PROC REPORT DATA=sashelp.class
  (WHERE=(name < 'I'))
  nowd headline spacing=2;
  COLUMN sex name age height weight;
  DEFINE sex / ORDER;
  DEFINE name / ORDER;
  RUN;
```

SEX	NAME	AGE	HEIGHT	WEIGHT
F	Alice	13	56.5	84
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F	Alice	13	56.5	84
	Barbara	13	65.3	98
	Carol	14	62.8	102.5
M	Alfred	14	69	112.5
	Henry	14	63.5	102.5



Functionality

Advantages for a PROC-REPORT replacing macro

- In-build functionality
- Parameters for options
- Hidden complex tasks
- Standardization of layout
- Simple source code

The following options demonstrate the functionalities of the %Datalist macro.

Functionality

Variable Selections.

%datalist:

- PAGE = sex
- BY = name
- VAR = age height weight

Proc Report:

- COLUMN
- DEFINE, BREAK statements
- COMPUTE blocks

SEX: F

NAME	AGE	HEIGHT	WEIGHT
Alice	13	56.5	84
Barbara	13	65.3	98
Carol	14	62.8	102.5

(Continued)

SEX: M

NAME	AGE	HEIGHT	WEIGHT
Alfred	14	69	112.5
Henry	14	63.5	102.5



Functionality

Variable Selections.

```
%datalist(data = sashelp.class  
           (WHERE=(name < 'I')),  
           page = sex,  
           by   = name,  
           var  = age height weight);
```

SEX: F

NAME	AGE	HEIGHT	WEIGHT
Alice	13	56.5	84
Barbara	13	65.3	98
Carol	14	62.8	102.5

(Continued)

SEX: M

NAME	AGE	HEIGHT	WEIGHT
Alfred	14	69	112.5
Henry	14	63.5	102.5

Functionality

Variable Selections.

```
PROC REPORT DATA=sashelp.class (WHERE=(name < 'I'))  
    nowd headline spacing=2;  
    COLUMN sex name age height weight;  
    DEFINE sex / ORDER NOPRINT;  
    DEFINE name / ORDER;  
    BREAK AFTER sex / PAGE;  
    COMPUTE BEFORE _PAGE_;  
        LINE @1 "Sex: " sex $20.;  
    ENDCOMP;  
RUN;
```

Sex: F

Name	Age	Height	Weight
Alice	13	56.5	84
Barbara	13	65.3	98
Carol	14	62.8	102.5

Sex: M

Name	Age	Height	Weight
Alfred	14	69	112.5
Henry	14	63.5	102.5

Functionality

Lines.

%datalist:

- Automatically

Proc Report:

- Use TITLE/FOOTNOTE ^[1]
- Use COMPUTE block ^[2]

SEX: F

NAME	AGE	HEIGHT	WEIGHT
Alice	13	56.5	84
Barbara	13	65.3	98
Carol	14	62.8	102.5

(Continued)

SEX: M

NAME	AGE	HEIGHT	WEIGHT
Alfred	14	69	112.5
Henry	14	63.5	102.5

Functionality

Continued.

%datalist:

- Automatically created „(Continued)“

Proc Report:

- Complex task, possible with conditional footnotes [3] [4]

SEX: F

NAME	AGE	HEIGHT	WEIGHT
Alice	13	56.5	84
Barbara	13	65.3	98
Carol	14	62.8	102.5

(Continued)

SEX: M

NAME	AGE	HEIGHT	WEIGHT
Alfred	14	69	112.5
Henry	14	63.5	102.5

Functionality

Basic functionality.

Basic PROC REPORT options available via parameters as well

- Free lines
- Number of spaces
- Printout of labels / empty labels / variable names
- Split characters
- WHERE conditions
- `_ALL_` and `var:` syntax
- 1-level for spanning headers
- ...

Functionality

Basic options are available ...

... but %Datalist does even provide more!

Column Width.

- Most common task for PROC REPORT
- %Datalist investigates required width and apply them!
 - Define a maximum length (if less is required, less is used)
 - Define „OPTIMAL“ calculations (pre-specified width calculations done internally)



Functionality

Split in Width.

- Marker to demonstrate ongoing tables including table part

REGION	SUBSIDIARY	PRODUCT	Number of Stores	Total Sales
Africa	Cairo	Boot	20	\$4,846
		Men's Casual	25	\$360,209
		Men's Dress	5	\$4,051
				/1.>>
REGION	SUBSIDIARY	PRODUCT	Total Inventory	Total Returns
Africa	Cairo	Boot	\$18,965	\$229
		Men's Casual	\$1,063,251	\$9,424
		Men's Dress	\$45,962	\$97
				/2.

Functionality

Logical Splits.

- Keep groups together, e.g. observations belonging to one subject
- Better for reviewers
- %Datalist provides a parameter TOGETHER
- Alternative 1: Setting manual page breaks costs time and is error prone
- Alternative 2: Calculation routine macro could be implemented ^[5], include macro call

Functionality

TOGETHER =					TOGETHER = SEX				
SEX	NAME	AGE	HEIGHT	WEIGHT	SEX	NAME	AGE	HEIGHT	WEIGHT
F	Alice	13	56.5	84	F	Alice	13	56.5	84
	Barbara	13	65.3	98		Barbara	13	65.3	98
	Carol	14	62.8	102.5		Carol	14	62.8	102.5
M	Alfred	14	69	112.5					
(Continued)					(Continued)				
SEX	NAME	AGE	HEIGHT	WEIGHT	SEX	NAME	AGE	HEIGHT	WEIGHT
M	Henry	14	63.5	102.5	M	Alfred	14	69	112.5
						Henry	14	63.5	102.5

Functionality

Transpose.

- Implemented simple transpose option (e.g. TRANSPOSE = subsidiary)

REGION	PRODUCT	Johannesburg			Nairobi		
		Total Sales	Total Inventory	Total Returns	Total Sales	Total Inventory	Total Returns
Africa	Boot	\$8,365	\$33,011	\$483	\$16,282	\$66,017	\$844
	Men's Dress	.	.	.	\$8,587	\$20,877	\$363
	Sandal	\$17,337	\$63,003	\$809	\$16,289	\$47,406	\$1,175
	Slipper	\$39,452	\$130,025	\$1,565	\$34,955	\$87,438	\$1,320
	Sport Shoe	\$5,172	\$29,368	\$139	\$2,202	\$11,328	\$174
	Women's Dress	\$42,682	\$120,127	\$966	\$28,515	\$62,740	\$678

Functionality

Tablesby.

- Create one table per variable value
 - change the title
- Common for tables per laboratory parameters

Table: Subjects listed by sex = 'F'

NAME	AGE	HEIGHT	WEIGHT
Alice	13	56.5	84
Barbara	13	65.3	98
Carol	14	62.8	102.5

Table: Subjects listed by sex = 'M'

NAME	AGE	HEIGHT	WEIGHT
Alfred	14	69	112.5
Henry	14	63.5	102.5

Background

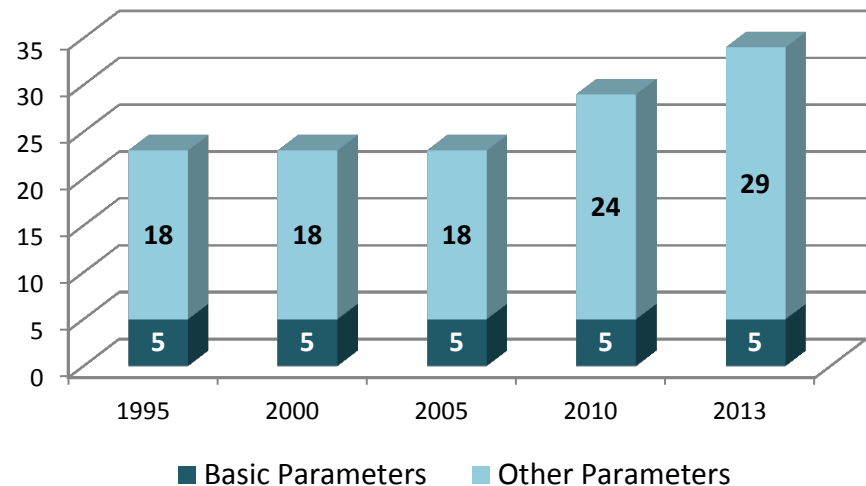
How was this created?

- A lot of functionality was implemented at the beginning
- Continuously new user requirements have been implemented
 - New / changed parameters
 - Syntax support, e.g. „descending“

Release Time:

- ½ - 1 year major release
- Bugfix releases in between

Parameter numbers over time



Background

Advantages? Yes!

- Efficient programming and validation
- Standardized outputs
- Simple macro call

Furthermore:

- Simple switch to other destinations (RTF 2005, PDF 2013)
 - Implementation through macro
 - No user training for ODS destinations
 - No destination specific commands
 - Simple „use it“ via macro call (start/close destination)
 - Standardized layout options like for ODS Listing destination (together, freeline, ...)



Background

User Acceptance? Yes!

- Apart from the advantages (efficient, standardized, simple to use)
- Massive documentation
 - User manual with 57 pages, including one overview and 30 example pages
 - Additional training material (newcomer / update training)
- Massive validation (131 tests for this one macro)
- User involvement (Collection and implementation of change requests)
- Good balance of Flexibility and Complexity

%Datalist at Bayer

- 95% of Global Biostatistics outputs are created with %datalist, exceptions are re-runs of old programs which should not be touched

Background

Limitations? Yes.

- not supported are e.g.
 - Manual single column width definition
 - Several spanning header lines
 - Separating text line
 - Summary and other calculations possible within PROC REPORT

Why?

- Reduce complexity on behalf of flexibility
- Only defined standard layouts are supported
- When new layouts are required, they will be implemented then



Summary

A macro to replace PROC REPORT! Yes, it makes sense!

The benefit is worth the effort!

Advantages:

- Efficiency, Validation, Standardization
- Simply provide options also for complex tasks
- No learning curve for ODS destinations

References

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- [3] Yumi Sembongi [2010], „PROC REPORT COMPUTE Block and Conditional Footnote“, Paper PharmaSUG 2010
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Thank you!

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