

When Good Looks Aren't Enough



Lisa Eckler

When Good Looks Aren't Enough



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Introduction

- ❑ Holistic, common-sense approach
- ❑ Allocate most effort to what's most important
- ❑ Basic coding techniques:
 - ❑ PROC CONTENTS
 - ❑ PROC COMPARE



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Define terms (1)

Verification is the act of reviewing, inspecting, testing, etc. to establish and document that a product, service, or system meets the regulatory, standard, or specification requirements.

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Define terms (2)

Validation refers to meeting the needs of the intended end-user or customer.

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Define terms (3)

Data **quality assurance** is the process of profiling the data to discover inconsistencies, and other anomalies in the data and performing data cleansing activities to improve the data quality.

– Wikipedia



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Mantra

- ❑ Check your assumptions
- ❑ Confirm similarities
- ❑ Focus on differences

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Is QA a programming task?

- Yes... mostly
- The routine parts can and should be automated and repeatable

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**“Computers are useless.
They can only give you
answers.”**

– Pablo Picasso



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Questions

- Is it packaged properly?
- Have I seen this before?
- Is it – or some part of it – unlike anything I've seen before?



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What parts can be programmed?

	Relationship to existing dataset		
	Entirely new	Similar to existing	Replacing existing
What to check:			
All rows present?	H	A/H	A
All columns present?	H	A/H	A
Reasonable values?	H	A (mostly)	n/a
Does display reflect data?	H	H (mostly)	H
All of the above?	H	A(/H)	A(/H)

H = human task

A = automated, programmable task

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PROC CONTENTS (1)

```
proc contents data = SASHELP.MON1001;  
run;
```

The CONTENTS Procedure

Data Set Name	SASHELP.MON1001	Observations	132
Member Type	DATA	Variables	407
Engine	V9	Indexes	0
Created	Wednesday, May 12, 2004 11:38:23 PM	Observation Length	2036
Last Modified	Wednesday, May 12, 2004 11:38:23 PM	Deleted Observations	0
Protection		Compressed	NO
Data Set Type		Sorted	NO
Label	M-competition 1001 Series, Monthly		
Data Representation	WINDOWS_32		
Encoding	us-ascii ASCII (ANSI)		

Engine/Host Dependent Information

Data Set Page Size	16384
Number of Data Set Pages	19
First Data Page	3
Max Obs per Page	8
Obs in First Data Page	4
Number of Data Set Repairs	0
File Name	C:\Program Files\SAS\SAS 9.1\ets\sashelp\mon1001.sas7bdat
Release Created	9.0101M3
Host Created	XP_PRO

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PROC CONTENTS (2)

Alphabetic List of Variables and Attributes

#	Variable	Type	Len
2	S0387	Num	5
3	S0388	Num	5
4	S0389	Num	5
5	S0390	Num	5
6	S0391	Num	5
7	S0393	Num	5
8	S0394	Num	5
9	S0395	Num	5
10	S0396	Num	5
11	S0397	Num	5
12	S0398	Num	5
13	S0401	Num	5
14	S0403	Num	5
15	S0404	Num	5
16	S0405	Num	5
17	S0406	Num	5
18	S0407	Num	5
19	S0409	Num	5
20	S0410	Num	5
21	S0412	Num	5

... etc. (listing all 407 variables,
spanning ~ 10 pages)

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Storing CONTENTS listing in dataset

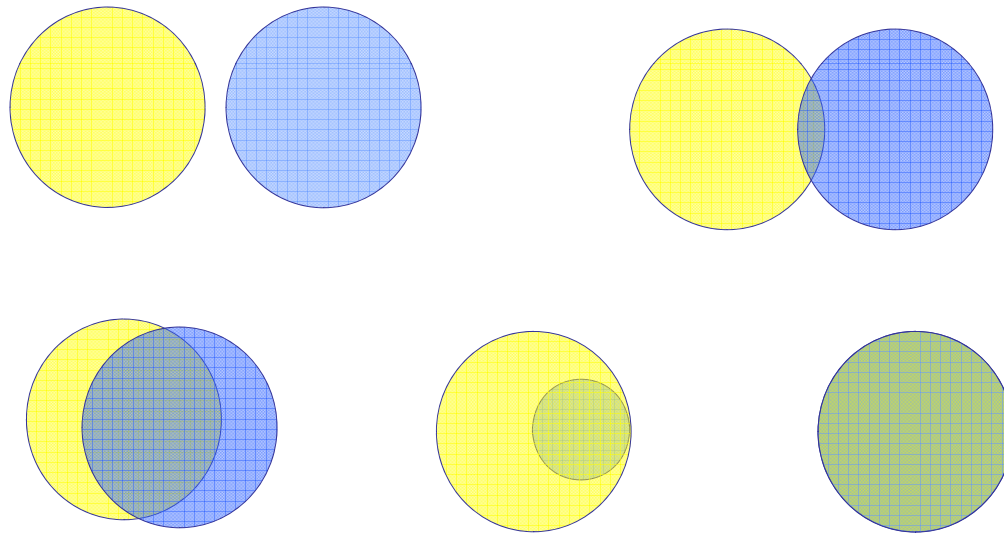
```
proc contents data = SASHELP.MON1001  
              noprint  
              out = CONTENTS_MON1001;  
run;
```

- ❑ produces a dataset with 407 obs
- ❑ no printed output
- ❑ can print, export, etc. as needed

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Have I seen this before?

How is this result *expected* to compare to what you have seen before?



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When the new dataset should be identical

record_id	a	b	c
1	*	*	*
2	*	*	*
3	*	*	*

record_id	a	b	c
1	*	*	*
2	*	*	*
3	*	*	*

```
proc compare compare = NEW  
              base   = ORIG;  
run;
```

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When the new dataset should be identical

• • •

Number of Observations in Common: 3.

Total Number of Observations Read from WORK.ORIG: 3.

Total Number of Observations Read from WORK.NEW: 3.

Number of Observations with Some Compared Variables Unequal:
0.

Number of Observations with All Compared Variables Equal: 3.

NOTE: No unequal values were found. All values compared are
exactly equal. ←



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When some columns should be the same

record_id	a	b	c
1	*	*	
2	*	*	
3	*	*	

record_id	a	b	d
1	*	*	
2	*	*	
3	*	*	

```
proc compare compare = NEW (keep = record_id a b)
      base = ORIG(keep = record_id a b);
run;
```

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When some "cells" should be the same

record_id	a	b	c
1	*	*	
2			
3	*	*	

	a	b	d
1	*	*	
3	*	*	
4			

```
proc compare compare = NEW (keep = record_id a b)
    base = ORIG(keep = record_id a b);
    where record_id in (1,3);
run;
```

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Capturing the structure of each table

```
proc contents data = ORIG_105  
    out = CONTENTS_ORIG(keep = name type);  
run;
```

```
proc contents data = NEW_106  
    out = CONTENTS_NEW(keep = name type);  
run;
```

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Joining the descriptions of table structures

```
proc sql;
  create table CONTENTS_EITHER as
  select CONTENTS_ORIG.name,
         CONTENTS_NEW.name as name2,
         CONTENTS_ORIG.type,
         CONTENTS_NEW.type as type2
  from CONTENTS_ORIG full join CONTENTS_NEW
  on CONTENTS_ORIG.name = CONTENTS_NEW.name;
quit;
```

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Show only differences in table structure

```
proc print data = CONTENTS_EITHER noobs n  
  split = '*';  
  where (name <> name2) or (type <> type2);  
  title1 'List DIFFERENCES ONLY';  
run;
```

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List DIFFERENCES ONLY

Variable Name	Variable Name	Variable Type	Variable Type
var_a100	var_a100	1	2
	var_a106	.	1
	var_a107	.	1
var_a99		1	.

N = 4

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Summary

- ❑ Simple, automated steps to confirm that the parts that are supposed to be familiar are
- ❑ Check your assumptions
- ❑ Confirm similarities
- ❑ Focus on differences

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Questions?

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Thank you!

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Removing stored formats from data

```
data COPY_OF_NEW;  
    set NEW;  
run;  
  
proc datasets lib = work;  
    modify COPY_OF_NEW;  
    attrib _all_ format=;    ** ← **;  
quit;
```

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See you in Baltimore!



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