

I love SAS logs (and You Can Too)

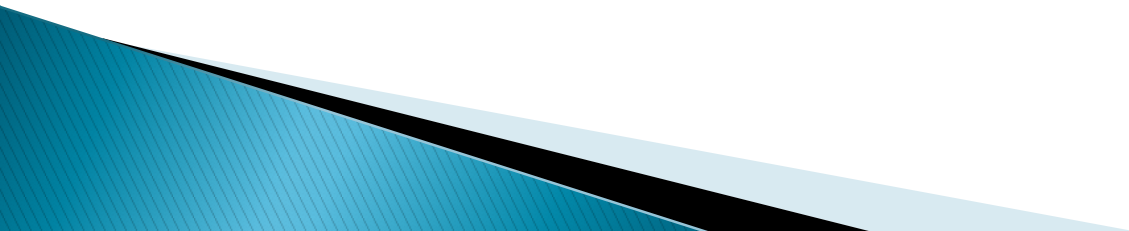
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Coding Tips & Tricks CT01
PhUSE 2019

ERRORs are red

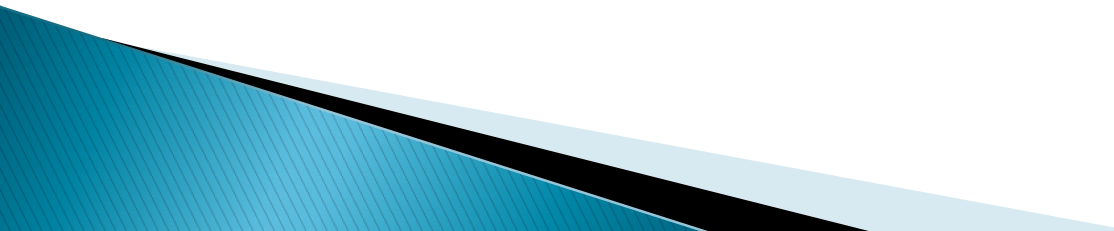
NOTEs are blue

WARNINGs are green

Assuming we're using the same SAS colour scheme



Things we will cover

- ▶ Errors that are clear
 - Variable doesn't exist
 - Incorrect options used
 - ▶ Errors that are annoying
 - Missing semicolon
 - Non-matched quotes
 - ▶ Notes of Concern
 - Merges
 - Truncated plots
 - ▶ User generated
 - Errors, warnings and notes
 - ▶ Notes of interest
- 

Also in the paper

- ▶ There is more in the paper than can be presented in 8 minutes.
- ▶ You can refer to the paper or come find me if I miss something that interests you.

Setup

► Create a dataset

```
data phuse1 ;
```

```
    input year 1-4 city $ 6-14 country $ 16-30 ;
```

```
datalines ;
```

```
2016 Barcelona Spain
```

```
2017 Edinburgh Scotland
```

```
2018 Frankfurt Germany
```

```
2019 Amsterdam The Netherlands
```

```
;
```

```
run ;
```

	year	city	country
1	2016	Barcelona	Spain
2	2017	Edinburgh	Scotland
3	2018	Frankfurt	Germany
4	2019	Amsterdam	The Netherlands

Errors that are clear

- Variable doesn't exist

```
proc print data=phuse1 ;  
    var place ;  
run ;
```

```
457      +proc print data=phuse1 ;  
458      + var place ;  
ERROR: Variable PLACE not found.  
459      +run ;  
  
NOTE: The SAS System stopped processing this step because of errors.  
NOTE: PROCEDURE PRINT used (Total process time):  
      real time          0.01 seconds  
      cpu time           0.00 seconds
```

Errors that are clear

- Variable doesn't exist

```
proc print data=phuse1 ;  
    var place ;  
run ;
```

```
457      +proc print data=phuse1 ;  
458      + var place ;  
ERROR: Variable PLACE not found.  
459      +run ;  
  
NOTE: The SAS System stopped processing this step because of errors.  
NOTE: PROCEDURE PRINT used (Total process time):  
      real time          0.01 seconds  
      cpu time           0.00 seconds
```

```
proc print data=phuse1 ;  
run ;  
proc print data=phuse1 ;  
    var year city ;  
run ;
```

Errors that are clear

– Incorrect options used

```
proc freq data=phuse1 ;  
    tables year / output=phuse3 ;  
run ;
```

```
1215      +proc freq data=phuse1 ;  
1216      + tables year / output=phuse3 ;
```

```
      22  
      76
```

ERROR 22-322: Syntax error, expecting one of the following: ;, AGREE, ALL, ALPHA, BDT, BIN, BINOMIAL, CELLCHI2, CHISQ, CL, CMH, CMH1, CMH2, COMMONRISKDIFF, COMONMRDIFF, CONTENTS, CONVERGE, CROSSLIST, CUMCOL, DEVIATION, EXACT, EXPECTED, FISHER, FORMAT, GAILSIMON, GS, JT, KAPPA, LINE, LIST, MAXITER, MAXLEVELS, MEASURES, MISSING, MISSPRINT, NOCOL, NOCUM, NOFREQ, NOPERCENT, NOPRINT, NOROW, NOSPARSE, NOWARN, ODDSRATIO, OR, OUT, OUTCUM, OUTEXPECT, OUTPCT, PEARSONRES, PEARSONRESID, PLCORR, PLOTS, PRINTKWTS, PRINTWTS, RELRISK, RISKDIFF, SCORE, SCORES, SCOROUT, SPARSE, STDRES, STDRESID, TABLE, TESTF, TESTP, TOTPCT, TREND, WARN.

ERROR 76-322: Syntax error, statement will be ignored.

```
1217      +run ;
```

Errors that are clear

– Incorrect options used

```
proc freq data=phuse1 ;  
    tables year / output=phuse3 ;  
run ;
```

```
1215      +proc freq data=phuse1 ;  
1216      + tables year / output=phuse3 ;  
  
                22  
                76  
ERROR 22-322: Syntax error, expecting one of the following: ;, AGREE, ALL, ALPHA, BDT, BIN, BINOMIAL, CELLCHI2, CHISQ, CL, CMH,  
CMH1, CMH2, COMMONRISKDIFF, COMONMRDIFF, CONTENTS, CONVERGE, CROSSLIST, CUMCOL, DEVIATION, EXACT, EXPECTED, FISHER,  
FORMAT, GAILSIMON, GS, JT, KAPPA, LINE, LIST, MAXITER, MAXLEVELS, MEASURES, MISSING, MISSPRINT, NOCOL, NOCUM, NOFREQ,  
NOPERCENT, NOPRINT, NOROW, NOSPARSE, NOWARN, ODDSRatio, OR, OUT, OUTCUM, OUTEXPECT, OUTPCT, PEARSONRES, PEARSONRESID,  
PLCORR, PLOTS, PRINTKWTs, PRINTWTs, RELRISK, RISKDIFF, SCORE, SCORES, SCOROUT, SPARSE, STDRES, STDRESID, TABLE,  
TESTF, TESTP, TOTPCT, TREND, WARN.  
ERROR 76-322: Syntax error, statement will be ignored.  
1217      +run ;
```

```
proc freq data=phuse1 ;  
    tables year / out=phuse3 ;  
run ;
```

Errors that are clear

– Incorrect options used

```
proc freq data=phuse1 print ;  
    tables year / out=phuse3 ;  
run ;
```

```
1376      +proc freq data=phuse1 print ;
```

```
                22
```

```
                202
```

```
ERROR 22-322: Syntax error, expecting one of the following: ;, (, COMPRESS, DATA, FC, FORMCHAR, NLEVELS, NOPRINT, ORDER, PAGE.
```

```
ERROR 202-322: The option or parameter is not recognized and will be ignored.
```

```
1377      + tables year / out=phuse3 ;
```

```
1378      +run ;
```

```
NOTE: The SAS System stopped processing this step because of errors.
```

```
WARNING: The data set WORK.PHUSE3 may be incomplete. When this step was stopped there were 0 observations and 0 variables.
```

```
WARNING: Data set WORK.PHUSE3 was not replaced because this step was stopped.
```

```
NOTE: PROCEDURE FREQ used (Total process time):
```

```
    real time          0.00 seconds
```

```
    cpu time           0.00 seconds
```

Errors that are clear

– Incorrect options used

```
proc freq data=phuse1 print ;  
    tables year / out=phuse3 ;  
run ;
```

```
1376      +proc freq data=phuse1 print ;  
                22  
                202  
ERROR 22-322: Syntax error, expecting one of the following: ;, (, COMPRESS, DATA, FC, FORMCHAR, NLEVELS, NOPRINT, ORDER, PAGE.  
ERROR 202-322: The option or parameter is not recognized and will be ignored.  
1377      + tables year / out=phuse3 ;  
1378      +run ;  
  
NOTE: The SAS System stopped processing this step because of errors.  
WARNING: The data set WORK.PHUSE3 may be incomplete.  When this step was stopped there were 0 observations and 0 variables.  
WARNING: Data set WORK.PHUSE3 was not replaced because this step was stopped.  
NOTE: PROCEDURE FREQ used (Total process time):  
      real time           0.00 seconds  
      cpu time            0.00 seconds
```

```
proc freq data=phuse1 noprint ;  
    tables year / out=phuse3 ;  
run ;
```

Errors that are annoying

– missing semicolon

```
proc sort data=phuse1 out=phuse6 ;  
  by country  
run ;
```

```
1986      +proc sort data=phuse1 out=phuse6 ;  
1987      + by country  
1988      +run ;  
ERROR: Variable RUN not found.
```

Errors that are annoying

– missing semicolon

```
proc sort data=phuse1 out=phuse6 ;  
  by country  
run ;
```

```
1986      +proc sort data=phuse1 out=phuse6 ;  
1987      + by country  
1988      +run ;  
ERROR: Variable RUN not found.
```

```
proc sort data=phuse1 out=phuse6 ;  
  by country ;  
run ;
```

Errors that are annoying

– Non-matched quotes

* in base comments it's not a problem to use
(pairwise or not) quotes ;

%* in macro comments it's a problem to use
(non-pairwise) quotes ;

%* in macro comments it's not
a problem as long as quotes ' occur pairwise ;

Notes of Concern

– Merges

```
data phuse7 ;  
    merge phuse1 phuse3 ;  
run ;
```

```
NOTE: There were 4 observations read from the data set WORK.PHUSE1.  
NOTE: There were 4 observations read from the data set WORK.PHUSE3.  
NOTE: The data set WORK.PHUSE7 has 4 observations and 5 variables.  
NOTE: DATA statement used (Total process time):  
      real time           0.01 seconds  
      cpu time            0.01 seconds
```

Notes of Concern

– Merges

```
data phuse7 ;  
    merge phuse1 phuse3 ;  
run ;
```

```
NOTE: There were 4 observations read from the data set WORK.PHUSE1.  
NOTE: There were 4 observations read from the data set WORK.PHUSE3.  
NOTE: The data set WORK.PHUSE7 has 4 observations and 5 variables.  
NOTE: DATA statement used (Total process time):  
      real time           0.01 seconds  
      cpu time            0.01 seconds
```

```
options mergenoby=warn ;
```

```
data phuse7 ;  
    merge phuse1 phuse3 ;  
    by year ;  
run ;
```

Notes of Concern

– Merges

```
data phuse14 ;  
    merge phuse1b phuse1c ;  
    by year ;  
run ;
```

	year	city
1	2016	Barcelona
2	2017	Edinburgh
3	2018	Frankfurt
4	2019	Baltimore
5	2019	Amsterdam

```
NOTE: MERGE statement has more than one data set with repeats of BY values.  
NOTE: There were 5 observations read from the data set WORK.PHUSE1B.  
NOTE: There were 5 observations read from the data set WORK.PHUSE1C.  
NOTE: The data set WORK.PHUSE14 has 5 observations and 2 variables.  
NOTE: DATA statement used (Total process time):  
      real time          0.00 seconds  
      cpu time           0.00 seconds
```

Notes of Concern

– Merges

```
data phuse15 ;  
  merge phuse1 phuse1b ;  
  by year ;  
run;
```

	year	city
1	2016	Barcelona
2	2017	Edinburgh
3	2018	Frankfurt
4	2019	Baltimore
5	2019	Amsterdam

	year	city	country
1	2016	Barcelona	Spain
2	2017	Edinburgh	Scotland
3	2018	Frankfurt	Germany
4	2019	Amsterdam	The Netherlands

	year	city	country
1	2016	Barcelona	Spain
2	2017	Edinburgh	Scotland
3	2018	Frankfurt	Germany
4	2019	Baltimore	The Netherlands
5	2019	Amsterdam	The Netherlands

NOTE: There were 4 observations read from the data set WORK.PHUSE1.
NOTE: There were 5 observations read from the data set WORK.PHUSE1B.
NOTE: The data set WORK.PHUSE15 has 5 observations and 3 variables.
NOTE: DATA statement used (Total process time):
 real time 0.00 seconds
 cpu time 0.00 seconds

Notes of Concern

– Merges

	year	city
1	2016	Barcelona
2	2017	Edinburgh
3	2018	Frankfurt
4	2019	Baltimore
5	2019	Amsterdam

	year	city	country
1	2016	Barcelona	Spain
2	2017	Edinburgh	Scotland
3	2018	Frankfurt	Germany
4	2019	Amsterdam	The Netherlands

```
data phuse15 ;
  merge phuse1 phuse1b ;
  by year ;
run;
```

	year	city	country
1	2016	Barcelona	Spain
2	2017	Edinburgh	Scotland
3	2018	Frankfurt	Germany
4	2019	Baltimore	The Netherlands
5	2019	Amsterdam	The Netherlands

```
NOTE: There were 4 observations read from the data set WORK.PHUSE1.
NOTE: There were 5 observations read from the data set WORK.PHUSE1B.
NOTE: The data set WORK.PHUSE15 has 5 observations and 3 variables.
NOTE: DATA statement used (Total process time):
      real time           0.00 seconds
      cpu time            0.00 seconds
```

```
data phuse15 ;
  proc sort . . .      merge phuse1 phuse1b ;
                        by year city ;
run;
```

Notes of Concern

– Truncated plots

```
axis1 order=(2017 to 2018 by 1) ;  
proc gplot data=phuse1 ;  
    plot year * city / vaxis=axis1 ;  
run ;  
quit ;
```

```
324      +axis1  order=(2017 to 2018 by 1) ;  
325      +proc gplot data=phuse1 ;  
326      +   plot year * city / vaxis=axis1 ;  
327      +run;
```

NOTE: 2 observation(s) outside the axis range for the year * city request.

Notes of Concern

– Truncated plots

```
axis1 order=(2017 to 2018 by 1) ;  
proc gplot data=phuse1 ;  
    plot year * city / vaxis=axis1 ;  
run ;  
quit ;
```

```
324      +axis1  order=(2017 to 2018 by 1) ;  
325      +proc gplot data=phuse1 ;  
326      +   plot year * city / vaxis=axis1 ;  
327      +run;
```

NOTE: 2 observation(s) outside the axis range for the year * city request.

```
proc gplot data=phuse1 ;  
    plot year * city ;  
run ;  
quit ;
```

User generated

– Errors, warnings and notes

```
data _null_ ;  
  set phuse1 ;  
  if year=2017 then do ;  
    put "ERR" "OR: panic, there is an issue city=" city ;  
  end ;  
  if year=2018 then do ;  
    put "WAR" "NING: oooo, green text city=" city ;  
  end ;  
  if year=2019 then do ;  
    put "NOTE: something to investigate city=" city ;  
  end ;  
  if year=2020 then do ;  
    put "ERR" "OR: nothing to see here city=" city ;  
  end ;  
run;
```

```
ERROR: panic, there is an issue city=Edinburgh  
WARNING: oooo, green text city=Frankfurt  
NOTE: something to investigate city=Amsterdam
```

Notes of interest

Running time

NOTE: PROCEDURE GPLOT used (Total process time):	
real time	0.14 seconds
cpu time	0.10 seconds

Notes of interest

```
data phuse16 ;  
  set phuse1 ;  
run ;
```

NOTE: There were 4 observations read from the data set WORK.PHUSE1.
NOTE: The data set WORK.PHUSE16 has 4 observations and 3 variables.

```
data phuse17 ;  
  set phuse1 ;  
  x=1 ;  
  output ;  
  x=2 ;  
  output ;  
run ;
```

NOTE: There were 4 observations read from the data set WORK.PHUSE1.
NOTE: The data set WORK.PHUSE17 has 8 observations and 4 variables.

Conclusion

- ▶ The SAS log is very powerful in getting good reliable output when using SAS.
- ▶ As we work in an industry where traceability and reuse of code are important, we need to take care in creating programs that are well commented and easy to follow.
 - Good clean logs are an essential part of this.

Any Questions



References

- ▶ <http://support.sas.com/documentation/cdl/en/lrcon/65287/HTML/default/viewer.htm#n1g8q3l1j2z1hjn1gj1hln0ci5gn.htm>
 - SAS 9.3 Language Reference : Concepts