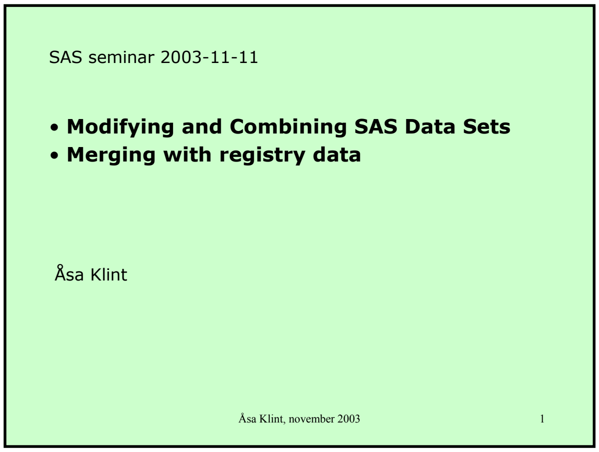
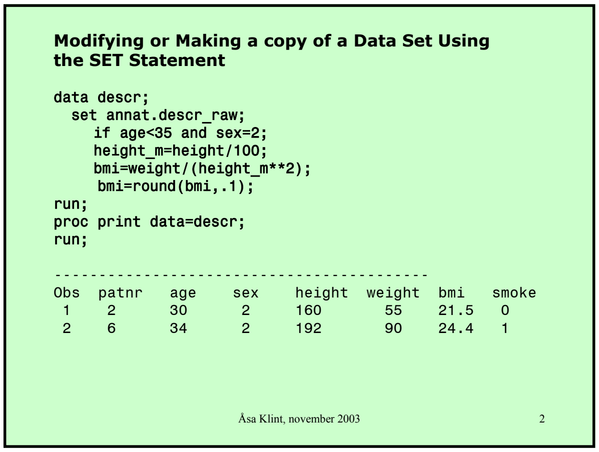


SAS seminar 2003-11-11

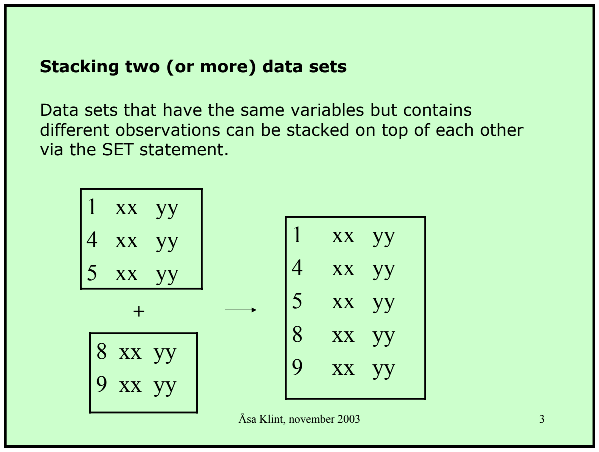
- **Modifying and Combining SAS Data Sets**
- **Merging with registry data**

Åsa Klint



Modifying or Making a copy of a Data Set Using the SET Statement

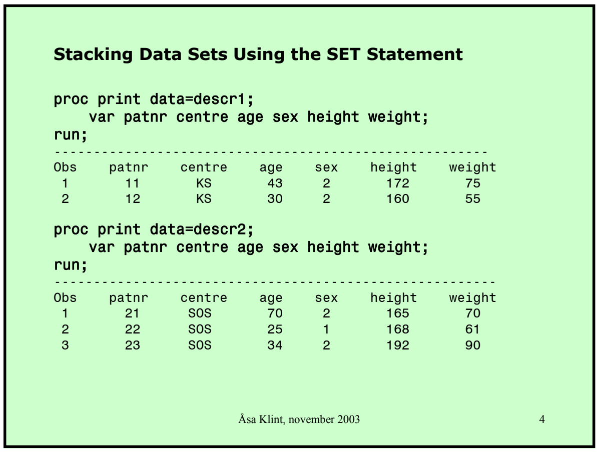
```
data descr;
  set annat.descr_raw;
     if age<35 and sex=2;
     height_m=height/100;
     bmi=weight/(height_m**2);
      bmi=round(bmi,.1);
run;
proc print data=descr;
run;

-------------------------------------------
Obs  patnr   age    sex    height  weight  bmi   smoke
 1    2      30      2     160       55    21.5   0
 2    6      34      2     192       90    24.4   1
```



Stacking two (or more) data sets

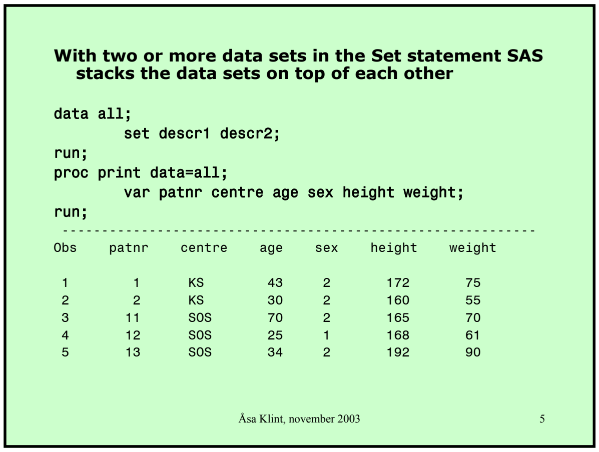
Data sets that have the same variables but contains different observations can be stacked on top of each other via the SET statement.

```
1 xx yy
4 xx yy
5 xx yy                 1  xx  yy
                        4  xx  yy
   +          ──→       5  xx  yy
                        8  xx  yy
8 xx yy                 9  xx  yy
9 xx yy
```



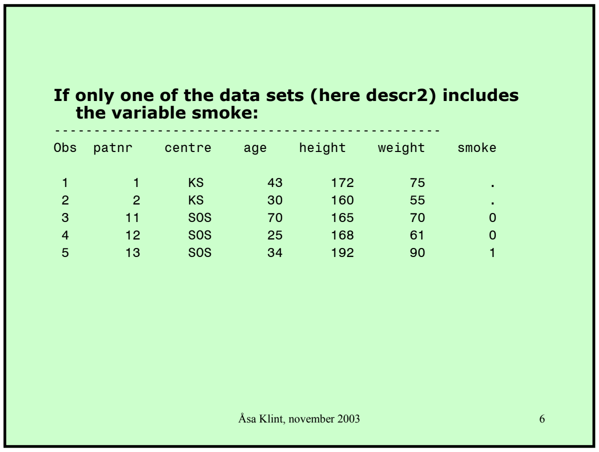
Stacking Data Sets Using the SET Statement

```
proc print data=descr1;
    var patnr centre age sex height weight;
run;
----------------------------------------------------
Obs    patnr    centre    age    sex    height    weight
 1       11       KS       43     2      172        75
 2       12       KS       30     2      160        55

proc print data=descr2;
    var patnr centre age sex height weight;
run;
-----------------------------------------------------
Obs    patnr    centre    age    sex    height    weight
 1       21      SOS       70     2      165        70
 2       22      SOS       25     1      168        61
 3       23      SOS       34     2      192        90
```



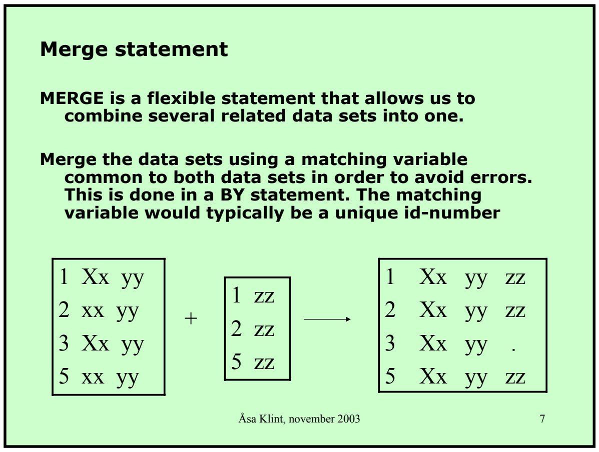
With two or more data sets in the Set statement SAS stacks the data sets on top of each other

```
data all;
        set descr1 descr2;
run;
proc print data=all;
        var patnr centre age sex height weight;
run;
 ------------------------------------------------------------
Obs    patnr    centre    age    sex    height    weight

 1         1    KS         43     2       172       75
 2         2    KS         30     2       160       55
 3        11    SOS        70     2       165       70
 4        12    SOS        25     1       168       61
 5        13    SOS        34     2       192       90
```



If only one of the data sets (here descr2) includes the variable smoke:

```
---------------------------------------------------
Obs  patnr    centre    age    height    weight    smoke

 1       1      KS        43     172       75        .
 2       2      KS        30     160       55        .
 3      11      SOS       70     165       70        0
 4      12      SOS       25     168       61        0
 5      13      SOS       34     192       90        1
```

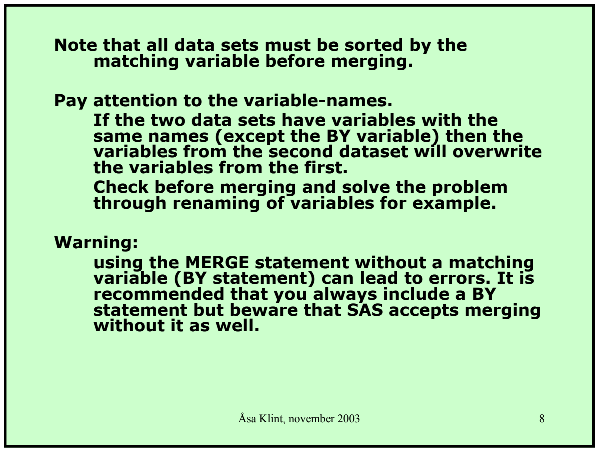


Merge statement

MERGE is a flexible statement that allows us to combine several related data sets into one.

Merge the data sets using a matching variable common to both data sets in order to avoid errors. This is done in a BY statement. The matching variable would typically be a unique id-number

```
1  Xx  yy          1  zz          1   Xx   yy   zz
2  xx  yy    +     2  zz   ───→   2   Xx   yy   zz
3  Xx  yy          5  zz          3   Xx   yy    .
5  xx  yy                         5   Xx   yy   zz
```



Note that all data sets must be sorted by the matching variable before merging.

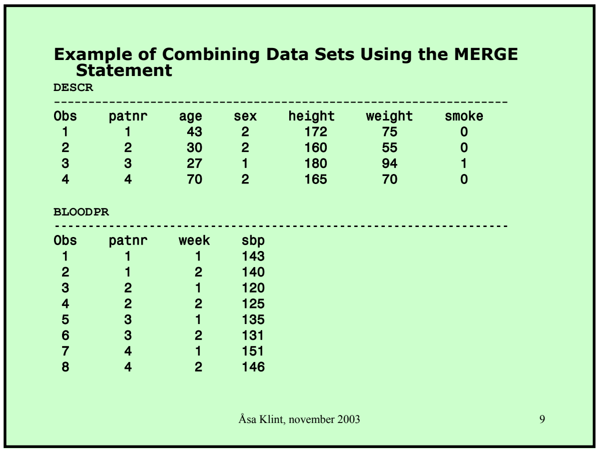
Pay attention to the variable-names.

If the two data sets have variables with the same names (except the BY variable) then the variables from the second dataset will overwrite the variables from the first.

Check before merging and solve the problem through renaming of variables for example.

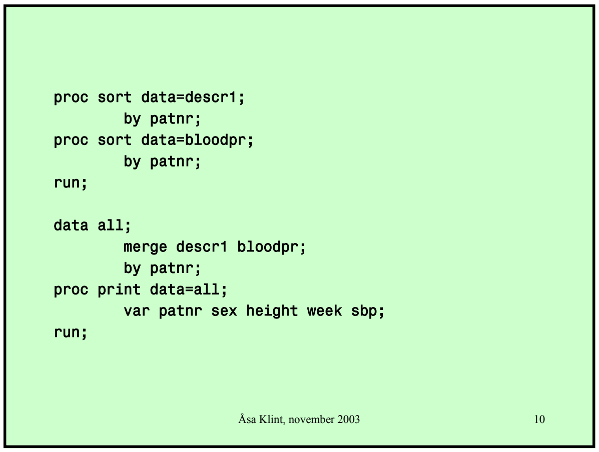
Warning:

using the MERGE statement without a matching variable (BY statement) can lead to errors. It is recommended that you always include a BY statement but beware that SAS accepts merging without it as well.

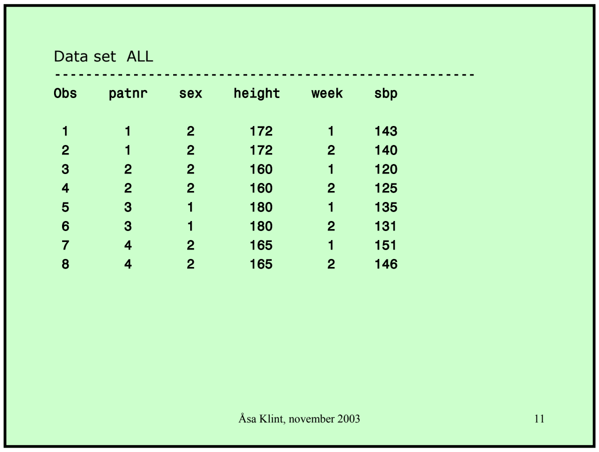


Example of Combining Data Sets Using the MERGE Statement

```
DESCR
---------------------------------------------------------------------
Obs    patnr    age    sex    height    weight    smoke
 1       1       43     2      172        75        0
 2       2       30     2      160        55        0
 3       3       27     1      180        94        1
 4       4       70     2      165        70        0

BLOODPR
---------------------------------------------------------------------
Obs    patnr    week    sbp
 1       1        1     143
 2       1        2     140
 3       2        1     120
 4       2        2     125
 5       3        1     135
 6       3        2     131
 7       4        1     151
 8       4        2     146
```

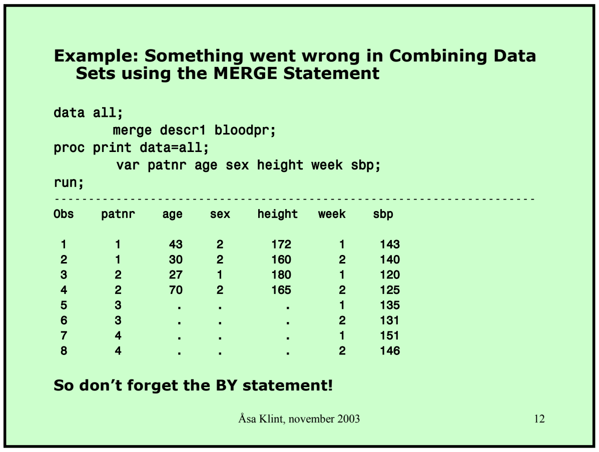


```
proc sort data=descr1;
        by patnr;
proc sort data=bloodpr;
        by patnr;
run;

data all;
        merge descr1 bloodpr;
        by patnr;
proc print data=all;
        var patnr sex height week sbp;
run;
```



Data set ALL

```
-------------------------------------------------------------
Obs    patnr    sex    height    week    sbp

 1       1       2      172        1     143
 2       1       2      172        2     140
 3       2       2      160        1     120
 4       2       2      160        2     125
 5       3       1      180        1     135
 6       3       1      180        2     131
 7       4       2      165        1     151
 8       4       2      165        2     146
```



Example: Something went wrong in Combining Data Sets using the MERGE Statement

```
data all;
        merge descr1 bloodpr;
proc print data=all;
        var patnr age sex height week sbp;
run;
---------------------------------------------------------------------
Obs    patnr    age    sex    height    week    sbp

 1       1       43     2      172        1     143
 2       1       30     2      160        2     140
 3       2       27     1      180        1     120
 4       2       70     2      165        2     125
 5       3        .     .        .        1     135
 6       3        .     .        .        2     131
 7       4        .     .        .        1     151
 8       4        .     .        .        2     146
```

So don’t forget the BY statement!

Using SAS Data Set Options

The most frequently used data set options:

Options:	**Tells SAS:**
KEEP = *variable list*	variables to keep
DROP = *variable list*	variables to drop
RENAME = (*oldvar* = *newvar*)	rename variable
FIRSTOBS = *n*	start reading at obs *n*
OBS = *n*	stop reading at obs *n*
IN = *newvar-name*	temporary variable for tracking whether that data set contributed to the current observation.

Using SAS Data Set Options

```
data in1;
  set annat.descr_raw (keep = patnr age sex smoke);

data in2;
  set annat.descr_raw (drop = height weight bmi);

data in3;
  set annat.descr_raw (rename = (height = heightcm));


proc print data=in3 (firstobs=2 obs=4);
run;
```

Tracking observations using the IN= option (IN creates a new temporary variable)

```
data all;
        merge descr1 (in=indesc) bloodpr (in=inbp);
        by patnr;
```

The variables ’indesc’ and ’bp’ exist only for the duration of current data step and are not added to the data set being created.

SAS gives IN=variables a value of 0 if that data set did not contribute to the current observation and a value of 1 if it did.

Tracking and selecting observations with the IN=option

```
DESCR                                   BLOODPR
-------------                           --------------
Obs    patnr    age                     Obs    patnr     sbp
 1       12      43                      1       12      150
 2       13      30                      2       13      128
 3       14      27                      3       14      122
                                         4       15      120
```

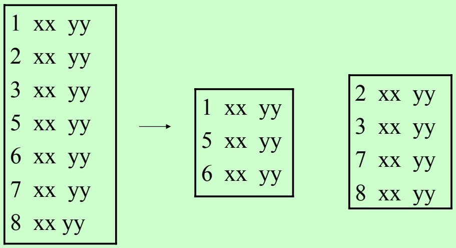
```
    data combined;
        merge descr(in=indescr) bloodpr;
          by patnr;
          if indescr=1;
      run;
```

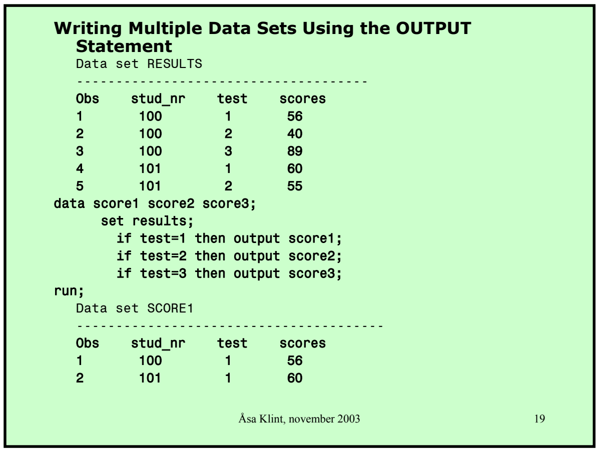
/* Only patients that were in the data set descr will be included in the new combined data set*/

Tracking and selecting observations with the IN=option

```
--------------------------------------------
Obs    patnr    age    sbp

 1       12      43    150
 2       13      30    128
 3       14      27    122
```

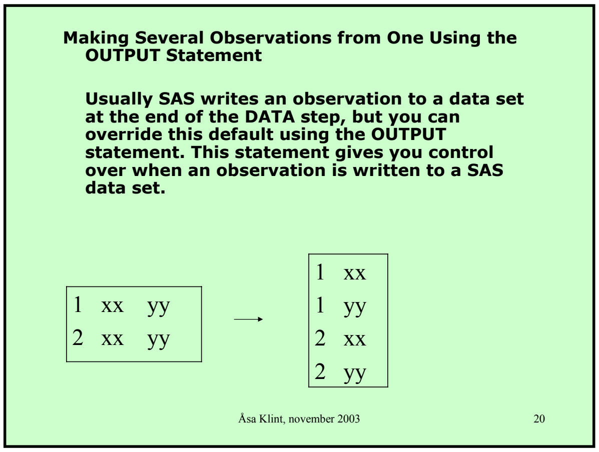
Creating several data sets from one using the OUTPUT statement





Writing Multiple Data Sets Using the OUTPUT Statement

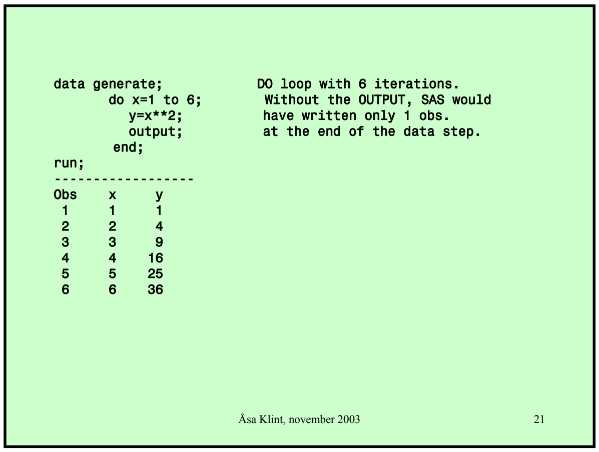
```
   Data set RESULTS
   ------------------------------------
   Obs    stud_nr    test    scores
   1       100        1       56
   2       100        2       40
   3       100        3       89
   4       101        1       60
   5       101        2       55
data score1 score2 score3;
      set results;
        if test=1 then output score1;
        if test=2 then output score2;
        if test=3 then output score3;
run;
   Data set SCORE1
   --------------------------------------
   Obs    stud_nr    test    scores
   1       100        1       56
   2       101        1       60
```



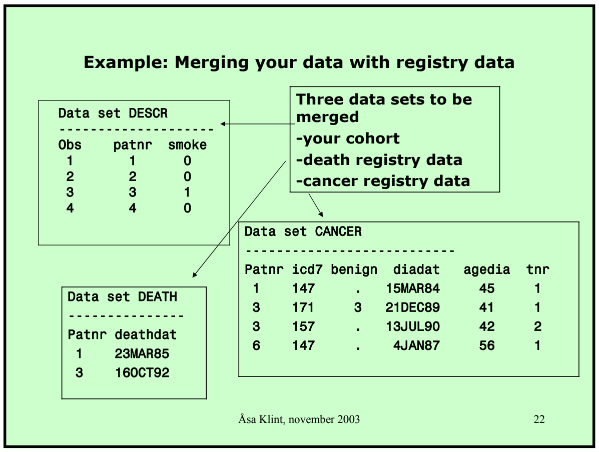
Making Several Observations from One Using the OUTPUT Statement

Usually SAS writes an observation to a data set at the end of the DATA step, but you can override this default using the OUTPUT statement. This statement gives you control over when an observation is written to a SAS data set.

```
1  xx   yy          1  xx
2  xx   yy    →     1  yy
                    2  xx
                    2  yy
```



```
data generate;                DO loop with 6 iterations.
       do x=1 to 6;            Without the OUTPUT, SAS would
          y=x**2;              have written only 1 obs.
          output;              at the end of the data step.
        end;
run;
------------------
Obs    x     y
 1     1     1
 2     2     4
 3     3     9
 4     4    16
 5     5    25
 6     6    36
```



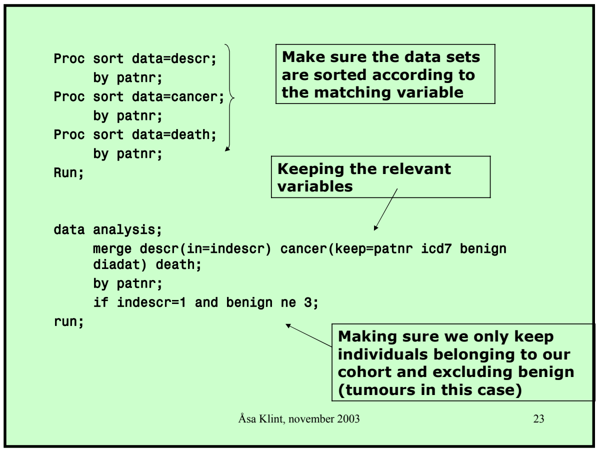
Example: Merging your data with registry data

Three data sets to be merged
-your cohort
-death registry data
-cancer registry data

```
Data set DESCR
--------------------
Obs    patnr  smoke
 1       1      0
 2       2      0
 3       3      1
 4       4      0
```

```
Data set DEATH
---------------
Patnr  deathdat
 1      23MAR85
 3      16OCT92
```

```
Data set CANCER
---------------------------
Patnr  icd7  benign   diadat    agedia   tnr
 1     147     .     15MAR84     45      1
 3     171     3     21DEC89     41      1
 3     157     .     13JUL90     42      2
 6     147     .      4JAN87     56      1
```

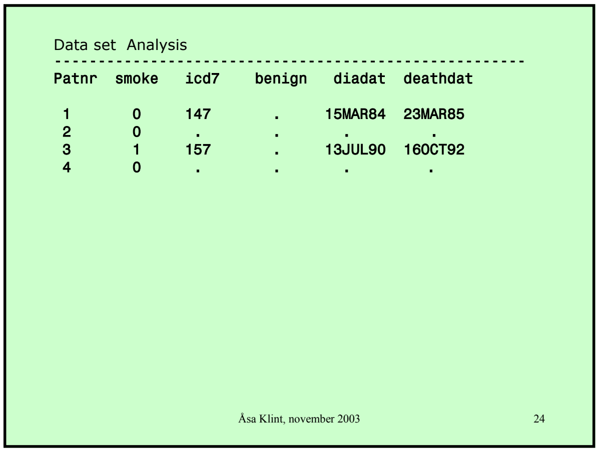


```
Proc sort data=descr;
     by patnr;
Proc sort data=cancer;
     by patnr;
Proc sort data=death;
     by patnr;
Run;


data analysis;
     merge descr(in=indescr) cancer(keep=patnr icd7 benign
     diadat) death;
     by patnr;
     if indescr=1 and benign ne 3;
run;
```

Make sure the data sets are sorted according to the matching variable

Keeping the relevant variables

Making sure we only keep individuals belonging to our cohort and excluding benign (tumours in this case)



```
Data set  Analysis
------------------------------------------------------------
Patnr  smoke   icd7    benign   diadat   deathdat

 1       0     147       .     15MAR84  23MAR85
 2       0      .        .        .         .
 3       1     157       .     13JUL90  16OCT92
 4       0      .        .        .         .
```

Using SAS Automatic Variables

FIRST.*variable* and LAST.*variable*: Available only in special circumstances i.e when you are using the BY statement in a data step.

Example: FIRST.*variable*

```
Data set CANCER
-----------------------
Patnr icd7 benign  diadat
 1    147     .   15MAR84
 3    171     3   21DEC89
 3    157     .   13JUL90
```

```
proc sort data=cancer;
        by patnr diadat;

/* Include only the first diagnosis of cancer*/
data firstcan;
     set cancer;
        by patnr diadat;
        if first.lopnr;
run;
```

```
Data set FIRSTCAN
----------------------------------
 Patnr icd7 benign  diadat
  1    147     .   15MAR84
  3    171     3   21DEC89
```

Flipping your data Using PROC TRANSPOSE

The TRANSPOSE procedure creates a restructured data set where observations have been turned into variables or variables into observations.

The output data set can be used in subsequent DATA or PROC steps for analysis, reporting, or further data manipulation.

X	Y	Z
1	A	zz
1	B	zz
2	A	zz
2	B	zz

→

X	A	B	_NAME_
1	aa	bb	z
2	aa	bb	z

```
proc transpose data = oldname out = newname;
      by variable-list;
       id variable;
       var variable-list;
run;
```

BY statement: for grouping variables you want to keep as variables

ID statement: names variable whose formatted values will become the new variable names

VAR statement: names the variables whose values you want to transpose

Example: Using PROC TRANSPOSE

```
BLOODPR
--------------------------------
Obs    patnr    week    sbp

 1       1        1     143
 2       1        2     140
 3       2        1     120
 4       2        2     125
 5       3        1     135
 6       3        2     131
 7       4        1     151
 8       4        2     146
```

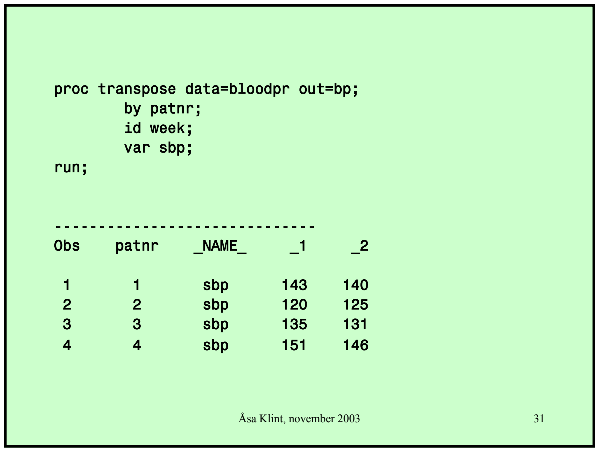
→

?

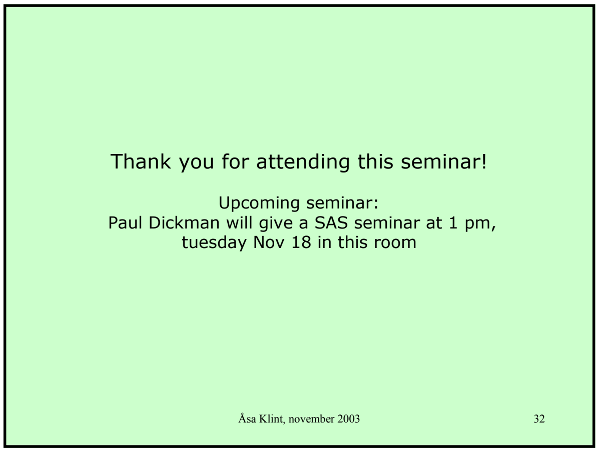
```
BLOODPR
--------------------------------
Obs    patnr    week    sbp

 1       1        1     143
 2       1        2     140
 3       2        1     120
 4       2        2     125
 5       3        1     135
 6       3        2     131
 7       4        1     151
 8       4        2     146
```

→

```
 WISH
------------------------
patnr sbp_w1 sbp_w2

1       143     140
2       120     125
3       135     131
4       151     146
```



```
proc transpose data=bloodpr out=bp;
        by patnr;
        id week;
        var sbp;
run;


------------------------------
Obs    patnr    _NAME_     _1     _2

 1       1       sbp      143    140
 2       2       sbp      120    125
 3       3       sbp      135    131
 4       4       sbp      151    146
```



Thank you for attending this seminar!

Upcoming seminar:
Paul Dickman will give a SAS seminar at 1 pm,
tuesday Nov 18 in this room