List and Column Input INFILE Formatted Input More on moving the pointer

Inputting Raw Data

Shannon Pileggi

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INFILE

Overview

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So far we have learned three methods for working with data in SAS:

- 1. use a LIBNAME statement to access a SAS library that contains SAS data
- 2. use DATALINES in a DATA step to enter data (this is an example of *list input* with instream data)
- 3. use PROC_IMPORT for structured data files like CSV or EXCEL

Today - importing "raw" /less structured data (think .txt or .dat extension) with INFILE.

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List and Column Input

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INFILE

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The Pointer

- ▶ SAS has a virtual *pointer* which keeps track of the 'reading' location in the data file
- ▶ Pointer location depends upon method of data input

Formatted Input

- 1. List pointer moves to next non-empty column to begin reading
- 2. Column pointer moves to the explicitly designated column
- 3. Formatted pointer moves to column depending upon specified informat length

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INFILE statement

```
SAS Code
DATA mydata;
  INFILE "C:/ComputerLocation/datasetname.ext" ;
  INPUT var1 var2 var3;
RUN;
       ______ SAS Code _____
```

- ▶ the INFILE statement specifies the computer location of the data file
 - be sure to include the data set name at the end of the path
 - be sure to include the data set extension at the end of the path
 - ▶ the path goes in quotes
- the INPUT statement names the variables

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About the cheese data

In a study of cheddar cheese from the LaTrobe Valley of Victoria, Australia, samples of cheese were analyzed for their chemical composition and were subjected to taste tests.

case	sample number				
taste	subjective averaged taste				
	test score				
acetic	natural log of concentration				
	of acetic acid				
h2S	natural log of concentration				
	of hydrogen sulfide				
lactic	concentration of lactic acid				

Data_cheese.dat _ 1 12.3 4.543 3.135 0.86 2 20.9 5.159 5.043 1.53 5.438 1.57 3 39 5.366 4 47.9 5.759 7.496 1.81 5 5.6 4.663 3.807 0.99 __ Data_cheese.dat __

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Importing the cheese data

```
_____ SAS Code ____
DATA cheese;
  INFILE "&path.Data_cheese.dat";
  INPUT case taste acetic h2s lactic:
RUN:
         _____ SAS Code _____
```

Which method determined the pointer location?

- 1. list
- 2. column
- 3. formatted
- 4. none of these

List input limitations

We can't use list input when we

- do not have a delimiter (ie, no space or comma or something) between values
- ▶ do not have periods for missing values
- ▶ have non-standard data (ie, dates)
- ▶ have data with embedded spaces
- ▶ have character variables with width > 8 characters

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Column input

- ▶ limitations: data must be lined up in the same columns
- advantages: can work with embedded spaces, character variables > 8, missing data indicated by spaces

_ Data_cheese.dat ___ 4.543 3.135 0.86 12.3 2 20.9 5.159 5.043 1.53 39 5.366 5.438 1.57 47.9 5.759 7.496 1.81 5.6 4.663 3.807 0.99 _ Data cheese.dat __

Can we use the cheese data?

1. Yes

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column input for

2. No

123456789012345678901234567890123456 4.543 12.3 3.135 0.86 20.9 5.159 5.043 3 39 5.366 5.438 1.57

_ Data_cheese.dat _____

More on moving the pointer

Column input

List and Column Input

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Data_cheese.dat ___ 0 1 2 47.9 5.759 7.496 1.81 5.6 4.663 3.807 0.99

Formatted Input

In which columns is the second variable (taste) located?

INFILE

- 1. 2 through 9
- 2. 8 through 13
- 3. 9 through 12
- 4. 9 through 16
- 5. 6 though 16

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Column input example

_____ SAS Code ____ DATA cheese2; INFILE "&path.Data_cheese.dat"; INPUT case 1-2 taste 9-12 acetic 17-21 h2s 25-29 lactic 33-36; RUN: __ SAS Code ___

▶ after each variable name, specify the numeric range of column position

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Discussion

```
_____ SAS Code _____
*Example 3 - change input order;
DATA cheese3:
  INFILE "&path.Data_cheese.dat";
  INPUT lactic 33-36 case 1-2 taste 9-12 acetic 17-21 h2s 25-29:
RUN;
*Example 4 - mix input methods;
DATA cheese4;
  INFILE "&path.Data_cheese.dat";
  INPUT case taste acetic 17-21 h2s 25-29 lactic 33-36;
RUN;
                       SAS Code
```

On your own: Will these examples work or will there be an error?

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Review

List and Column Input

Informats are used to read non-standard data.

Character: \$name_of_informatw. Numeric: name_of_informatw.d name_of_informatw. Date:

- w is the width of the *entire* field, including special characters
- ▶ *d* is the number of decimals
- . period indicates that we are establishing an informat (rather than a variable name)

Note: the default width for character variables is 8.

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Discussion

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The DOLLARw.d informat removes embedded characters for numeric data.

```
SAS Code __
DATA test;
INPUT name $11. money ? ;
DATALINES;
Constantine $15,000.35
Billv
            $8,000.05
            $3,000.63
Sue
            $400.45
Megan
RUN;
           _ SAS Code _
```

Which is the correct informat for money?

- 1. DOLLAR5.2
- 2. DOLLAR7.2
- 3. DOLLAR10.2
- 4. DOLLAR12.0

SAS Code _ DATA test: INPUT name \$11. money DOLLAR10.2 ; DATALINES: Constantine \$15,000.35 Billy \$8,000.05 Sue \$3,000.63 Megan \$400.45 RUN: _ SAS Code _

INFILE

More on moving the pointer

- The pointer with formatted input
- ► SAS looks for name in columns 1 through 11.
- ► The pointer moves to column 12.
- ► SAS looks for money in columns 13 through 22.

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Discussion

DATA test2;
INPUT name \$11. money DOLLAR10.2;
DATALINES;
Constantine \$15,000.35
Billy \$8,000.05
Sue \$3,000.63
Megan \$400.45
;
RUN;
SAS Code

SAS Code -

If my data look like this, will it still import correctly?

- 1. Yes
- 2. No

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List and Column Input

Formatted Input

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on moving the pointer INFILE

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List and Column Input

Formatted Input

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INFILE

The colon modifier

- ► A colon modifies an informat
- examples: :COMMA6. :MMDDYY10. :\$10.
- ► A colon allows you to use an informat for reading data in an otherwise list input process. Why?
 - ▶ If you assign an informat like \$10. SAS will read 10 columns every time, and may include unwanted characters
- ▶ Applying the colon modifier tells SAS to read a value *until* it encounters a space (so it doesn't use a set column position)

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List and Column Input

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The ampersand modifier

- ► An ampersand modifies an informat
- ► examples: &COMMA6. &MMDDYY10. &\$10.
- ▶ Continues to read a character value, even if it contains blanks
- ▶ Two or more blanks indicates the data value is complete

On your own: How can we correctly read in the test data from the previous slide?

Moving the pointer

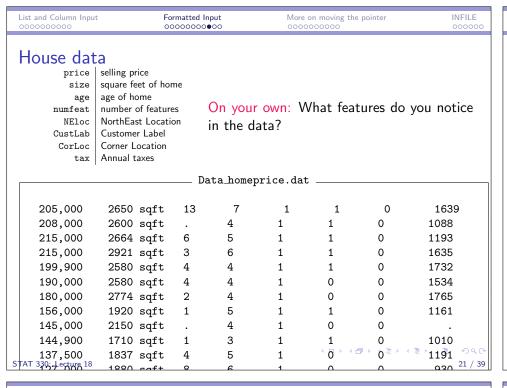
Formatted data can cause issues with the pointer because it forces the pointer to look in specific columns. You can manually move the pointer by specifying pointer location before the variable name.

- ightharpoonup +n Move pointer ahead n columns
- ▶ @n Move pointer directly to column n

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List and Column Input INFILE Formatted Input More on moving the pointer 0000000000 Discussion SAS Code DATA homes; INFILE "&path.Data_homeprice.dat"; INPUT price COMMA7. size 12-15 @23 age numfeat NEloc CustLab CorLoc tax; RUN; _____ SAS Code ____ Which method(s) did I use to import the data? 4. list + column 1. list input 5. list + formatted 2. column input column + formatted 3. formatted input 7. list + column + formatted STAT 330: Lecture 18 22 / 39

Wrap up

- ▶ Importing data correctly may take some trial and error and there can be multiple correct methods.
- ▶ TIP: the pointer moves from left to right. Variable 10 will likely not appear correctly if Variable 1 does not appear correctly. Get variables to appear correctly, one at time, according to their input order.
- ► TIP: Always check PROC CONTENTS to make sure that variables have the correct type (numeric vs character).
- ► TIP: If data file is open in a separate application, you may need to close it before you import it.
- ▶ Input features must go before/after variable names

F∈	eature	Before	After				
Co	olumn position (e.g., 3-4)	X	√	-			
In	format (e.g., COMMA7.2)	X	\checkmark				
+r	n/@n	\checkmark	√ □X	● → = → → = →	=	990	
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List and Column Input

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@"XXXX" column pointer

__ Data_Dogs.dat _____

Name- Kia Breed: Shepherd Vet Bills: 325.25 Name- Sam Breed: Beagle Vet Bills: 478.78 Name- Sydney Breed: Boxer Vet Bills: 733.54 Name- Bugsy Breed: Pug Vet Bills: 518.09

__ Data_Dogs.dat _____

- When data have a consistent prefix use the @"XXXX" column pointer
- XXXX represents the prefix

What are the exact prefixes for...

- 1. Name of the dog

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2. Breed of the dog

3. Amount spent at the vet

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Importing the dog data

_____ SAS Code ___ DATA dogs; INFILE "&path.Data_dogs.dat"; INPUT @"Name- " name \$ @"Breed: " breed \$ 0"Bills: " spending COMMA6.2; RUN; __ SAS Code __

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List and Column Input

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Address data

__ mailing.dat _____

Brenda Smith email: Bsmith@charter.net 123 Grand Ave.

Arroyo Grande CA 93420

David White email: david6060@gmail.com

456 Traffic Wy.

Arroyo Grande CA 93420

Alexandra Jones email: AJJ43@yahoo.com

789 Foothill Blvd.

San Luis Obispo CA 93405

_____ mailing.dat _____

On your own: What features does this data have that we will need to address when importing?

List and Column Input Formatted Input More on moving the pointer INFILE 0000000000

Line pointers

- ▶ Raw data sets typically consist of one observation per line
- ▶ Line pointers tells SAS to to skip to a new line
 - / skip to next line
 - ▶ #n skip to line n
- ▶ This is used to read multiple lines of data into a single observation

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List and Column Input Formatted Input More on moving the pointer INFILE

Reading the mail data

```
DATA mailing;
INFILE "&path.mailing.dat";
INPUT fname :$10. lname $ @"email: " email :$20.

/ street &$30.
/ city &$30. state $2. zip;

/*this also works:
INPUT fname :$10. lname $ @"email: " email :$20.

#2 street &$30.

#3 city &$30. state $2. zip;

*/
RUN;
```

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List and Column Input

Double trailing at @@

- ► SAS assumes that a single line of data corresponds to a single observation
- If a single line of a data corresponds to multiple observations, need to use
- ► Tells SAS to keep reading data into new observations until it runs out

Trailing at @

- Use when interested in specific records from raw data
- ► Tells SAS to wait for more information
- Syntax is typically

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- input statement with @
- if-then statement to select obs
- new input statement

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@@ example

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```
_ baggagefees.dat _
```

- 1 Delta 863,608 2 American 593,465
- 3 US Airways 506,339 4 Continental 353,416
- 5 United 276,817 6 AirTran 164,670
- 7 Alaska 157,013 8 Spirit 133,970
- 9 JetBlue 64,078 10 Hawaiian 56,590
- 11 Frontier 54,862 12 Allegiant 53,562
- 13 Virgin America 33,482 14 Southwest 32,035
- 15 Sun Country 13,398 16 Mesa 1,683
- 17 USA 3000 1,650

_____ baggagefees.dat _____

DATA baggage;
INFILE "&path.baggagefees.dat";
INPUT rank airline &\$20. revenue :COMMA. @@;
RUN;
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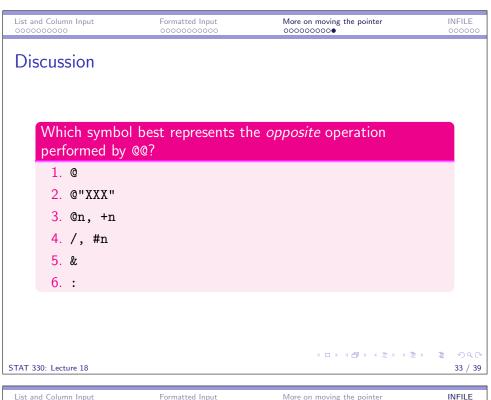
@ example potassium.dat _ Mollusk, clams 534 85 3 oz. Objective: 439 85 3 oz. Cod Halibut 490 85 3 02. observations Salmon 319 85 3 oz. potassium Trout 375 85 3 oz. greater than 500 Tuna 484 85 3 02. 814 70 10 med. Apricots, dried ___ potassium.dat _____ ____ SAS Code _____

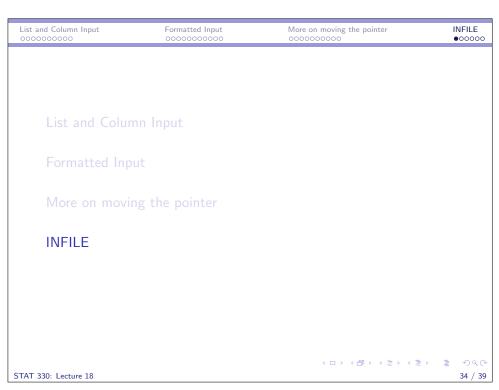
Formatted Input

```
DATA potassium;
INFILE "&path.potassium.dat";
INPUT @21 K COMMA5. @;
IF K < 500 THEN DELETE;
INPUT food $ 1-20 @28 weight measure &$10.;
RUN;

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SAS Code
```





000000 **INFILE** options FIRSTOBS= tells SAS at which line to start reading useful to skip variable names ▶ OBS= tells SAS at which line to *stop* reading useful to read in part of data file ► FLOWOVER default value; SAS jumps to next line if current line does not have enough values to read. After a jump, SAS reads the next line regardless of whether it has enough values. MISSOVER Set a variable to missing value if missing or if length is too short TRUNCOVER Allows SAS to handle data values of varying lengths appropriately with column or formatted input ◆ロト ◆個ト ◆夏ト ◆夏ト 夏 りへで 35 / 39 STAT 330: Lecture 18

000000 Try it What values should I use names.txt below to read in the A FirstName LastName through D names? Allison Allen Billy Bryson 1. 1, 5 Carmen Cottle 2. 2, 5 David Decker Enrique Edwards 3. 1. 4 Faith Firth 4. 2, 4 $_$ names.txt $_$ 5. 4, 2 SAS Code DATA names ; INFILE "&path.names.txt" FIRSTOBS= | OBS= |; INPUT fname \$ lname \$: RUN: SAS Code ___ STAT 330: Lecture 18 36 / 39

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List and Column Input

```
List and Column Input
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                                                                          INFILE
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Try it
                                                          numbers.txt -
                                                         666666
                       SAS Code
                                                         1
                                                         22
         %MACRO checkoptions(option);
                                                         333
         DATA test;
                                                         4444
           INFILE "&path.numbers.txt" &option;
                                                         55555
           INPUT numbers 6.;
        RUN;
                                                         _ numbers.txt _
        TITLE "&option";
         PROC PRINT; RUN;
                                                      On your own: Try
         %MEND;
                                                      changing the
                                                      numeric format to
         %checkoptions(flowover);
         %checkoptions(missover);
                                                               (nothing)
         %checkoptions(truncover);
                                                       2. :6.
                    ___ SAS Code -
                                                      What differences do
                                                     you observe?
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```

List and Column Input Formatted Input More on moving the pointer 00000 Example beer.csv -Consumption per capita [1],,, Country, Consumption (liters), 20092010 (change 633-ml bottles), Total Vietnam, 19,, Venezuela,83,-4.7,2259 Uzbekistan, 11,, United States, 78, -2.5, 24138 United Kingdom, 74, -3.4, 4587 _ beer.csv _ _____ SAS Code _ DATA beer; INFILE "&path.beer.csv" DSD FIRSTOBS=3 DLM=","; INPUT country :\$30. consumption change total; RUN; ____ SAS Code _____ STAT 330: Lecture 18 39 / 39
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Delimited files

- ► A delimited file contains a specific character that separates data values
- ▶ with list input, SAS assumes the delimiter is a space
- ▶ DLM= option in the infile statement specifies the delimiter
 - ▶ DLM=',' for commas
 - ▶ DLM='09'x for tabs
- ▶ by default, SAS assumes that ≥ 2 delimiters in a row is a single delimiter; to override this, the DSD option:
 - treats two delimeters in a row as a missing value
 - ignores delimiters enclosed in quotes
 - does not read quotes as part of the data value

