Making the VISUAL Leap From PROC TABULATE to SAS/GRAPH® Software

Dain Crawford

Abstract

PROC GCHART along with the annotate facility allows you to quickly create large quantities of visual reports that can be personalized to accommodate any specifications. When we decided that the output obtained using PROC TABULATE no longer fulfilled our needs, SAS/GRAPH was the logical choice. We have always produced large numbers of personalized reports (as many as 5000 unique pages of reports for one project), but the prospect of translating them into graphs seemed nearly impossible. PROC GCHART, however, actually allowed us to decrease the number of pages we produced while at the same time greatly improving the quality and usability of our product. We are able to control every aspect of the graph for maximum use of the page space.

Introduction

No one can dispute the power of PROC TABULATE for flexibility and capability. Its ability to distill large amounts of data into neatly formatted reports is unquestioned. For internal use, we will continue to use PROC TABULATE when dealing with large amounts of data.

But what about our customers? Do they want to see PROC TABULATE reports of their data? Or do they want to be able to look at results and immediately be able to identify what kind of action they need to take? How do we present our data to them in a way that is clear, concise and speaks for itself? We made the transition from PROC TABULATE to SAS/GRAPH with impressive results.

We process Employee Opinion Surveys for hospitals around the country. Our surveys are usually comprised of about 80 statements that are summarized into ten categories. The data is presented for the hospital overall, for each department within the hospital, as well as for each individual manager. When it is available, we will compare up to three years of data for these areas. On department and manager output, we also include overall hospital data for greater ease in comparing the data. It is not uncommon to generate 3000-5000 pages of reports by the time we have accounted for all of the various breakdowns.

Exhibit 1 is a typical PROC TABULATE report. It contains a great deal of information and is neatly organized. But how readily can the comparisons between statements, years or personal and hospital data be made?

Exhibit 2 is an example of a horizontal bar chart using PROC GCHART. This type of presentation makes it very easy for anyone to compare the data by category and statement from this year to last year. Because the hospital overall data is represented by "data," it is also possible to make this further comparison by simply glancing at the page. There is no need to make mental calculations to understand the data.

Input Data

For both the PROC TABULATE and PROC GCHART methods of processing, the data is collected from scanable survey instruments and massaged with SAS to create an input file.

Exhibit 3 is an example of the type of input file that would be set up for using PROC TABULATE. While PROC TABULATE handles the question variable very well and wraps text within a column, to achieve the desired look using SAS/GRAPH, it is necessary to use the annotate facility to place the statements on the page.

Generally, multiple years of data are compared for each survey statement. In order to accomplish this using the PROC GCHART method, the input file used must contain a record for each statement for each year. If we have 10 statements and three years of data for each, the data set going into PROC GCHART must have 30 records as shown in Exhibit 4.

Annotate

While the annotate facility has a tremendous amount of flexibility, it can be difficult to master. The old "flexible therefore complex" syndrome certainly applies here. Once the data is organized, the annotate dataset is created. Annotate allows you to place any text, symbol or graphic element on the page in any configuration you require. This is the very feature that makes using SAS/GRAPH in conjunction with the annotate facility worth the effort. Our survey statements can be up to 190 characters long. Since we prefer to show the entire statement and not just an abbreviation when we feedback data to our customers, we had to find a way to create wrapped text. A data step is used to create the annotate data set so all of the SAS programming tools are available for use. We opted to write a quick parsing routine to break the statement into three lines.

\[ \text{lgth} = \text{length}(\text{question}); \]  
\[ \text{do } i = 1 \text{ to } \text{lgth} ; \]  
\[ \text{qst}[i] = \text{substr}(\text{question}, i, 1); \]  
\[ \text{end}; \]  
\[ \text{qa=question}; \]  
\[ \text{if } \text{lgth} > 55 \text{ then do}; \]  
\[ \text{do } j = 55 \text{ to } 1 \text{ by } -1 \text{ until } \text{(flag)} ; \]  
\[ \text{qa=substr}(\text{question}, i, j); \]  
\[ \text{qb=substr}(\text{question}, j); \]  
\[ \text{qs=substr}(\text{question}, j); \]  
\[ \text{if } \text{qst}[j] = ' ' \text{ then } \text{flag} = 1; \]  
\[ \text{end}; \]  
\[ \text{end}; \]

This code parses the entire statement by character and then, starting at position 55, looks backward to find a space. When it finds a space it does a substring from position one to the position of
the space. That data is line one. Another substring sets up the rest of the data as input to a similar routine to build lines two and three. It's not fancy, but we have found it to be very effective.

Output

The PROC TABULATE code is fairly simple using a "by" variable to generate data for each department or manager.

```sql
proc tabulate order=formatted;
class category question;
by codename-;
var meanh3 meanh1 meanh2 m3 m1 m2 diff;
table category,question,
(meanh1='hosp mean yr i'
meanh2='hosp mean yr ii'
meanh3='hosp mean yr iii'
m1='pers mean yr i'
m2='pers mean yr ii'
m3='pers mean yr iii'
diff='diff'*(mean='f=6,2') / t=25;
format category catfmtn.;
label codename='manager';
```

It is worth noting that the "by" variable works equally well using PROC TABULATE or SAS/GRAPH graphics. By adding a few lines of code we can convert our program from one that generates a single graph into a program that generates 250 graphs - each of which contains unique data.

As with PROC TABULATE, the actual code used for PROC GCHART is fairly simple.

```sql
proc gchart data=pers.dat;
by seqd codename page;
format code 4.2;
hsbar m
/discrete frame sumvar = pers mean
subgroup = m space=0 gspace=1.5
group = quest radio=axis1
maxaxis=axis2
gaxis=axis3 legend=legend1
annotate=sas annotcp1q
autoredf clipref ;
run;
```

You will notice that the chart variable "m" is the same as the subgroup variable. This technique was advised by SAS Tech Support as the best way to group the data for our purposes.

Conclusion

Using PROC GCHART has allowed us to greatly reduce the number of pages we produce and improve the quality of our output in ways we had not previously imagined. The ability to glance at a chart and quickly understand the data is extremely valuable to our customers.

Obviously, your decision to choose SAS/GRAPH should be based upon your individual needs. If you create small numbers of graphs with little or no personalization, then you may find that SAS/GRAPH is more than you need. If, however, you desire the ability to consistently produce large quantities of unique graphic output, then SAS/GRAPH with the annotate facility is an alternative worth considering.

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Exhibit 1

MEMORIAL HOSPITAL
EMPLOYEE OPINION SURVEY - YEAR III

THIS REPORT COMPARES YEARS I, II AND III MANAGER MEANS
BY CATEGORY AND QUESTION
FOR THE MANAGER BELOW

------------------------------- MANAGER=009 Sue --------------------------------

CATEGORY Cooperation

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<th>HOSP MEAN YR III</th>
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<td>#13 Communication between employees is helpful and cooperative.</td>
<td>4.01</td>
<td>4.02</td>
<td>4.03</td>
<td>3.80</td>
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<td>3.62</td>
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<td>#16 Employees are usually helpful and rarely say &quot;That's not my job.&quot;</td>
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<td>3.82</td>
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(CONTINUED)

REPORT: ECSY4R15
THE MEAN VALUES RANGE FROM 5.00(HIGHEST) TO 1.00(LOWEST)
COPYRIGHT 1995 MAGELLAN MANAGEMENT GROUP

933
This Graph Compares Year I Means, Year II Means and Year III Means by Statement.
The means range from 5.00(high) to 1.00(lowest)

Manager = 009 Sue

Cooperation

#10 Departments usually do what is best for the hospital instead of looking after their own interests.

#13 Communication between employees is helpful and cooperative.

#14 Employees are willing to discuss differences of opinion with each other.

#16 Employees are usually helpful and rarely say "That's not my job."

#20 No one department sees itself as more important than others.

#51 The people in my department/unit are helpful and cooperative.

#52 Relationships between my department and other departments are helpful and cooperative.

#59 All people in my department/unit do their fair share of work.

PERS MEAN DIFF
3.33
3.28
-0.11 3.17

3.40
3.20
-0.20 3.00

3.60
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-0.20 4.00

3.20
3.40
-0.73 2.67

3.00
3.60
-0.27 3.33

2.60
2.80
-0.47 2.33

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0.60 4.00

4.00
3.60
0.40 4.00

2.60
2.00

0.00 2.00

Dots represent Total Hospital data

1995 Magellan Management Group

Page 2
### Exhibit 3

**The SAS System**

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### OBS QUESTION

1. #10 Departments usually do what is best for the hospital instead of looking
2. #13 Communication between employees is helpful and cooperative.
3. #14 Employees are willing to discuss differences of opinion with each other.
4. #16 Employees are usually helpful and rarely say "That's not my job."
5. #24 No one department sees itself as more important than others.
6. #51 The people in my department/unit are helpful and cooperative.
7. #52 Relationships between my department and other departments are helpful an
8. #59 All people in my department/unit do their fair share of work.
9. *** Summary Score
10. #10 Departments usually do what is best for the hospital instead of looking
11. #13 Communication between employees is helpful and cooperative.
12. #14 Employees are willing to discuss differences of opinion with each other.
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16. #52 Relationships between my department and other departments are helpful an
17. #59 All people in my department/unit do their fair share of work.
18. *** Summary Score

935
## Exhibit 4

### The SAS System

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