

To Right Click or Left Click: Choices in SAS-Produced Graphics

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ABSTRACT

SAS provides us with the capability of producing many different types of graphic objects using BASE SAS and SAS/STAT procedures and SAS/GRAPH. Such graphic objects include JAVA enabled graphics (JAVA, JAVAIMG), Active-X enabled graphics (ACTIVEX, ACTXIMG), static HTML graphics, PDF files, and drill-down or animated HTML graphics. In addition to the ability to publish these graphics on intranets and the internet, these graphic objects may be downloaded, uploaded, and/or incorporated into documents, spreadsheets, etc., sometimes without losing their special capabilities. Examples using the PC-Windows platform and SAS V9.1.3 will be presented and discussed. Many of the options are also available in SAS V8.2 and have been tested on both the PC-Windows platform and AIX UNIX platform.

Presentation graphics contained in HTML, XML and PDF files are static and require only an internet browser and/or Adobe Reader to view. They are quickly and easily updatable on the host system even if the server does not have SAS installed. Other presentation options SAS provides such as JAVA and Active-X are interactive, but require specific versions of SAS or special software add-ins supplied with specific versions of SAS to be installed on the host system to allow interactivity. Recent additions to the array of presentation graphic options include the JAVAIMG and ACTXIMG devices, which allow programmers to offer viewers JAVA and ACTIVE-X graphics without the SAS add-ins.

INTRODUCTION

Since I first started using a beta version of SAS on an IBM 360 at MIT to analyze data for a thesis more than 25 years ago, SAS has evolved into an amazing computing tool. The capacity for presentation graphics is enormous. Starting in V7, the Output Delivery System allowed output of SAS-produced graphics to various destinations, such as HTML for viewing on intranets and the internet. In Version 9, production of SAS-produced graphics has expanded to include additional procedures such as some SAS/STAT procedures; additional destinations; and the use of SAS styles (either user-written or SAS-provided.)

A PIECE OF PIE

Below follow eight pie charts created using the SAS system on the same data using different devices. Relevant portions of the code used to create each pie chart precede the images. Note that in every example, the code to produce the pie chart is nearly identical (exceptions will be noted).

```
proc gchart data=ee.daylevel (where=(proccat in
  ('EPOGEN', 'FERRELECIT', 'IRON_DEXTAN', 'HIV', 'CALCIJEX',
   'CARNITOR', 'VENOFER', 'VANCOMYCIN', 'ZEMPLAR', 'OTHER')));
  pie proccat / sumvar=charge type=mean
                percent=outside value=outside;
title1 f=swissb h=1 "MEAN ANCILLARY COSTS";
run;

quit;
```

The primary difference lies in which DEVICES and DESTINATIONS the graphic is output to. Different devices will be highlighted in blue in the code samples, while other important commands will be highlighted in red. For the newer devices, I have demonstrated the use of styles in SAS graphics. These do not work for the older devices such as GIF.

STATIC HTML PIE CHART:

```
ods listing close;
options reset=global;

options device=gif hsize=4 in vsize=4 in ftext=swiss;

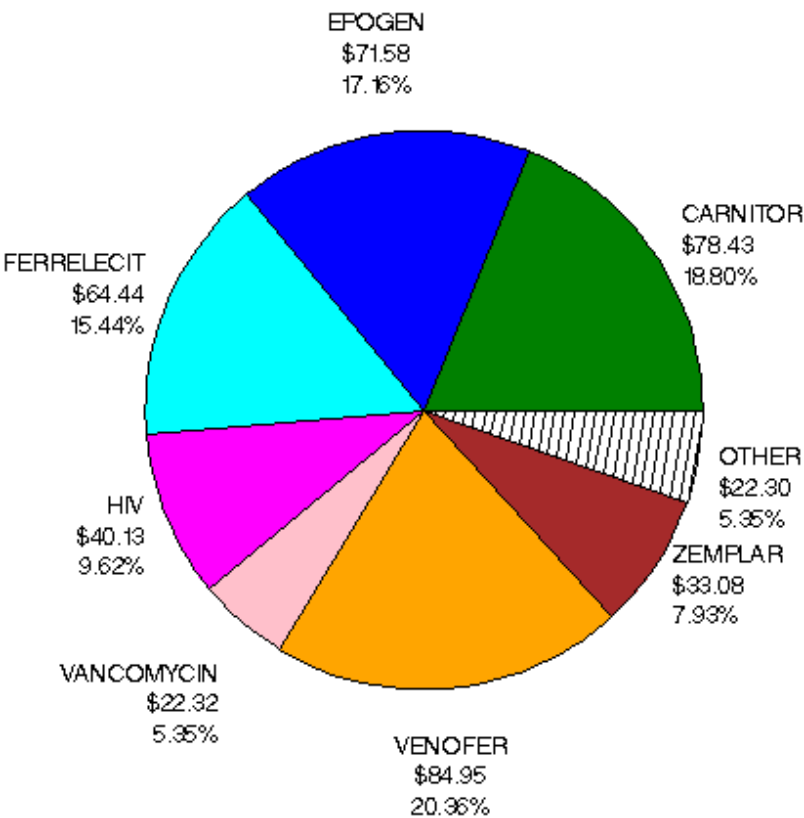
ods html body='daypie1.htm' path=odsout;

proc gchart data=ee.daylevel (where=(proccat in
('EPOGEN','FERRELECIT','IRON_DEXTRAN','HIV','CALCIJEX',
'CARNITOR','VENOFER','VANCOMYCIN','ZEMPLAR','OTHER')));
  pie proccat / sumvar=charge type=mean
               percent=outside value=outside;
title1 f=swissb h=1 "MEAN ANCILLARY COSTS";
run;

quit;

ods html close;
```

MEAN ANCILLARY COSTS
MEAN of Billed Amount by Procedure Category



STATIC HTML 3D PIE CHART with tool tips:

```

goptions reset=global;

goptions device=javaimg xpixels=800 ypixels=600 ftext=swiss;

ods html body='tooltippie1.htm' path=odsout style=styles.gears;

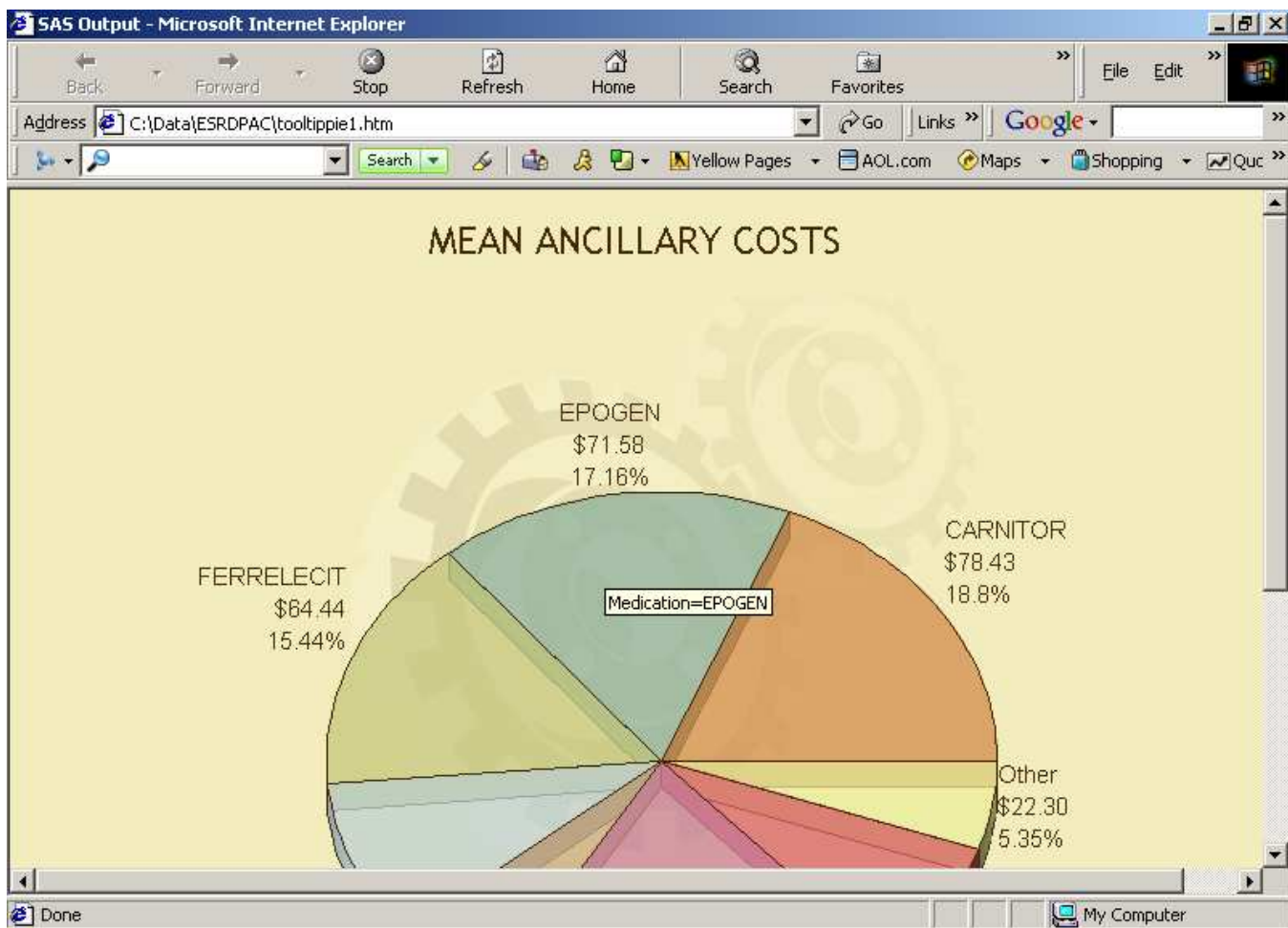
data temp;
  length htmlvar $ 40;
  set ee.daylevel;
  htmlvar='alt='||quote('Medication='||trim(left(proccat)) );
run;

proc gchart data=temp (where=(proccat in
  ('EPOGEN','FERRELECIT','IRON_DEXTRAN','HIV','CALCIJEX',
  'CARNITOR','VENOFER','VANCOMYCIN','ZEMPLAR','OTHER')));
  pie3d proccat / sumvar=charge type=mean
    percent=outside value=outside
    html=htmlvar name='tooltippie1';
title1 f=swissb "MEAN ANCILLARY COSTS";
run;

quit;

ods html close;

```



JAVA PIE CHART:

JAVA graphics can be manipulated by right clicking on the image with the mouse. They can be displayed in environments other than Windows. Rolling over portions of the graphics gives additional information as portrayed below. You can change the graph type, colors, etc. with a single click. *Note: You MUST have SAS Version 8 or above OR the special JAVA applet installed on the displaying system or the JAVA capabilities will not work.*

```

options reset=global;

options device=java xpixels=800 ypixels=600 ftext=swiss;

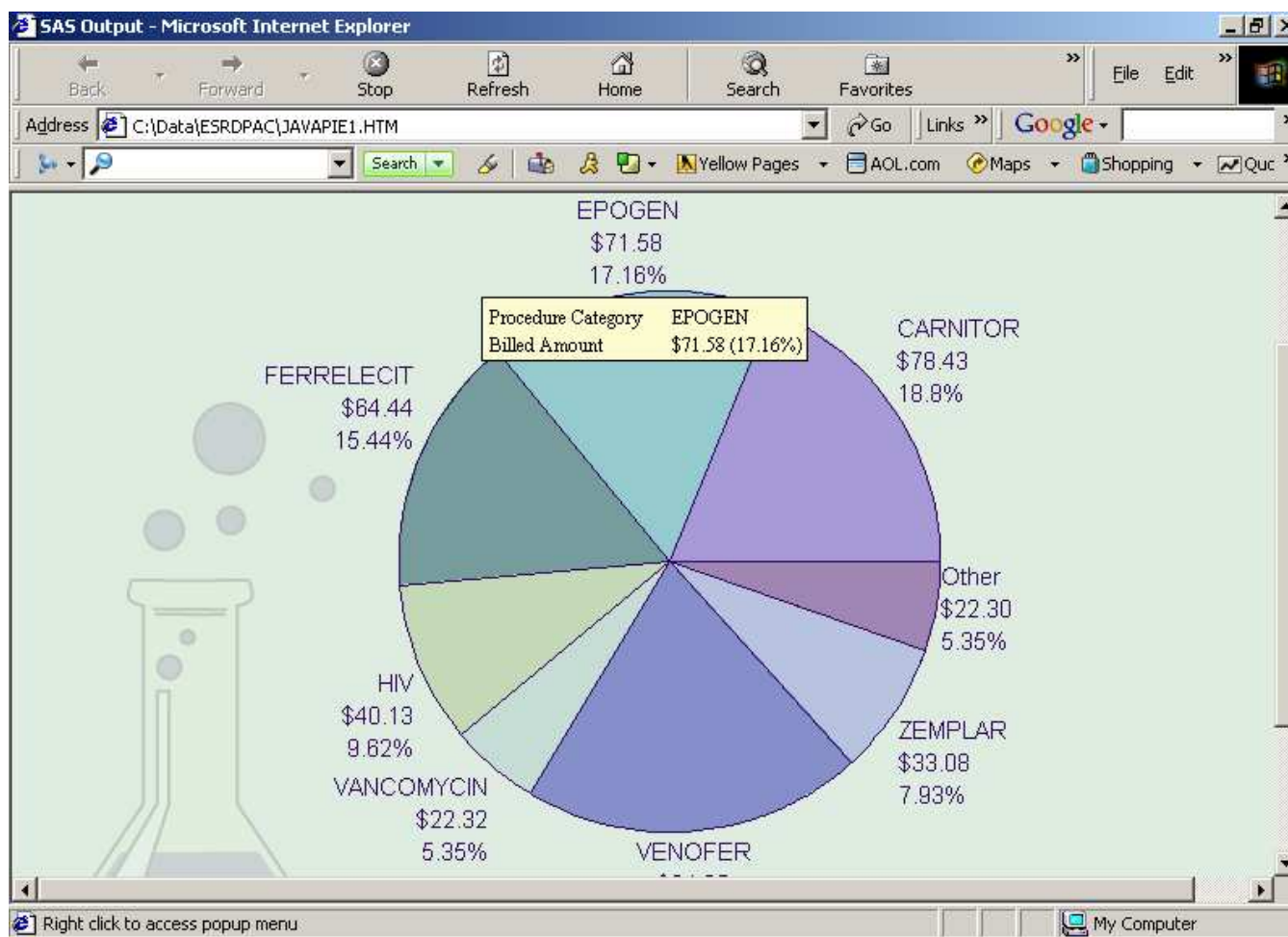
ods html body='javapie1.htm' path=odsout style=styles.science;

proc gchart data=ee.daylevel (where=(proccat in
('EPOGEN','FERRELECIT','IRON_DEXTAN','HIV','CALCIJEX',
'CARNITOR','VENOFER','VANCOMYCIN','ZEMPLAR','OTHER')));
  pie proccat / sumvar=charge type=mean
              percent=outside value=outside name='javapie1';
title1 f=swissb "MEAN ANCILLARY COSTS";
run;

quit;

ods html close;

```



JAVAIMG PIE CHART:

JAVAIMG graphics are JAVA graphics that do not require the JAVA plug-in. These graphics lack the interactive features of JAVA graphics, but have the same look as the JAVA graphics.

```

goptions reset=global;

goptions device=javaimg xpixels=800 ypixels=600 ftext=swiss;

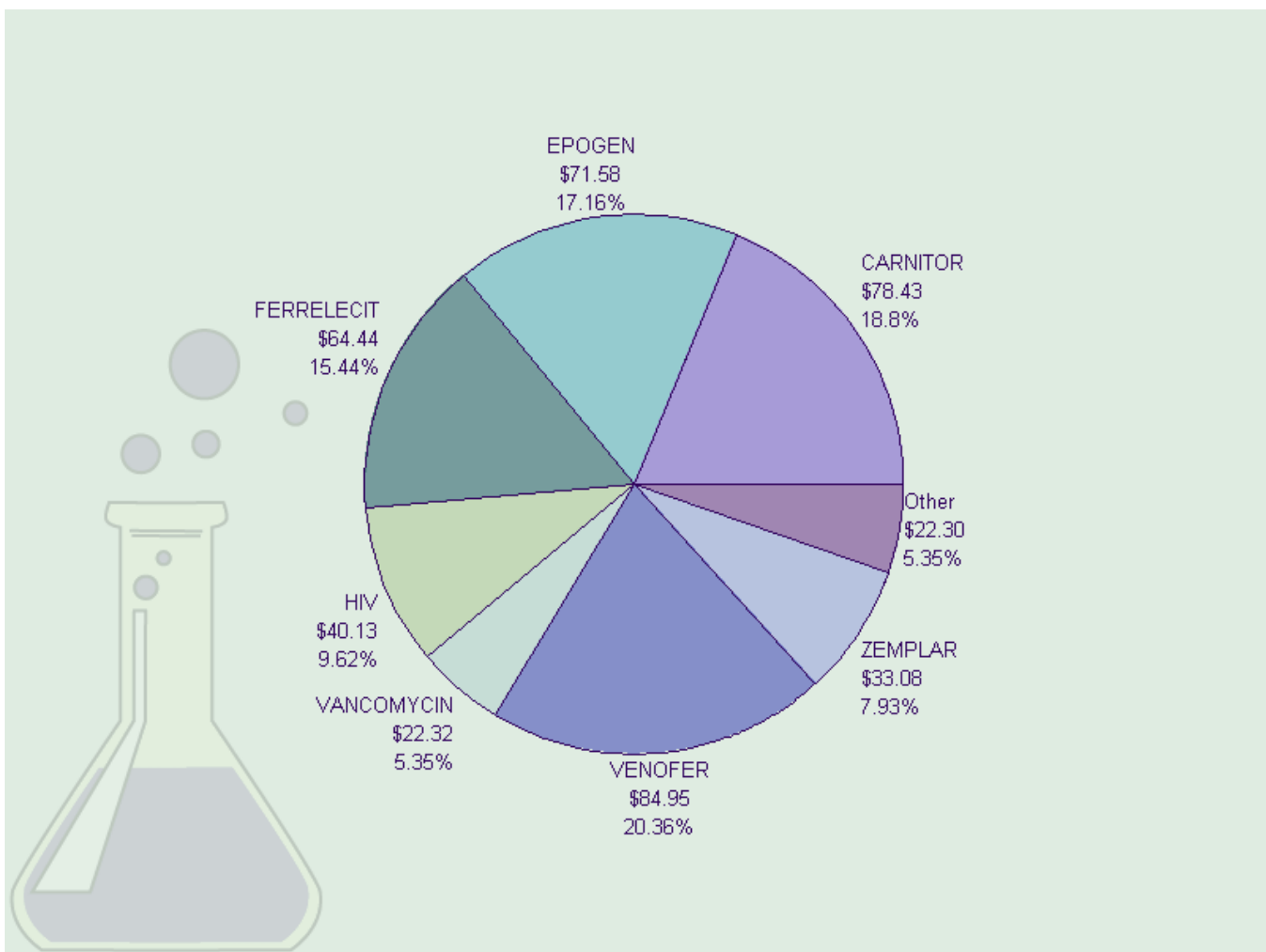
ods html body='javaimgpie1.htm' path=odsout style=styles.science;

proc gchart data=ee.daylevel (where=(proccat in
  ('EPOGEN','FERRELECIT','IRON_DEXTRAN','HIV','CALCIJEX',
  'CARNITOR','VENOFER','VANCOMYCIN','ZEMPLAR','OTHER')));
  pie proccat / sumvar=charge type=mean
    percent=outside value=outside name='javaimgpie1';
title1 f=swissb "MEAN ANCILLARY COSTS";
run;

quit;

ods html close;

```



ACTIVE-X PIE CHART:

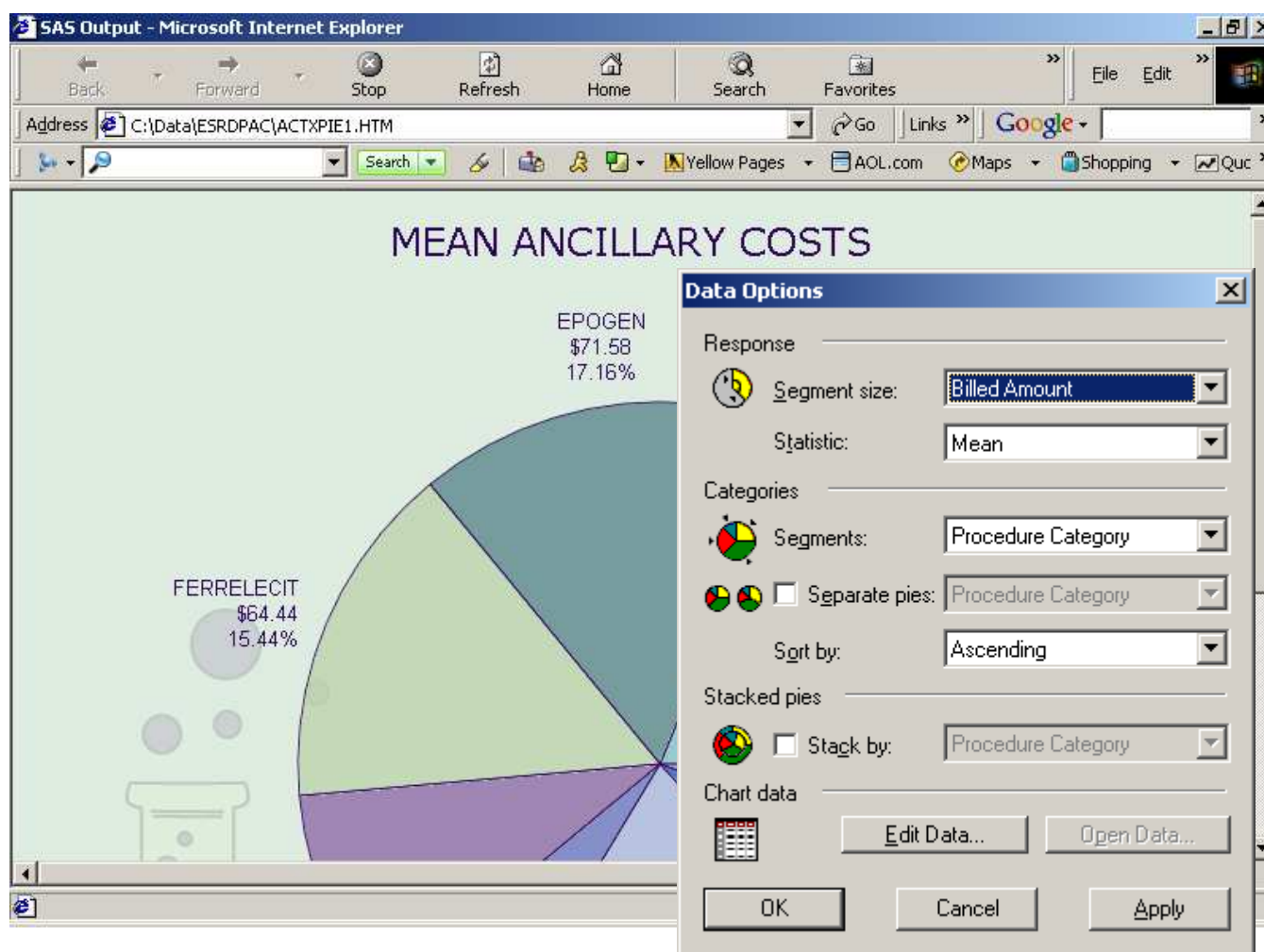
Active-X graphics can also be manipulated by right clicking on the image with the mouse. These graphics are specifically designed to be displayed in Windows only environments. The capabilities and looks are slightly different from those of JAVA graphics. *Note: You MUST have at least SAS Version 8 or above OR the Active-X control downloaded from Microsoft installed on the displaying system or the Active-X capabilities will not work.*

```
goptions reset=global;
goptions device=activex xpixels=800 ypixels=600 ftext=swiss;
ods rtf file='rtfxpie1.rtf' path=odsout style=styles.science;

proc gchart data=ee.daylevel (where=(proccat in
('EPOGEN','FERRELECIT','IRON_DEXTRAN','HIV','CALCIJEX',
'CARNITOR','VENOFER','VANCOMYCIN','ZEMPLAR','OTHER')));
  pie proccat / sumvar=charge type=mean
               percent=outside value=outside name='rtfxpie1';
title1 f=swissb "MEAN ANCILLARY COSTS";
run;

quit;

ods rtf close;
```



ACTXIMG PIE CHART:

ACTXIMG graphics are ACTIVE-X graphics which do not require the ActiveX control. They have the same look as ACTIVE-X graphics, but lack their interactivity. These static graphics are ideal for publishing in any RTF-based documents.

```
options reset=global;

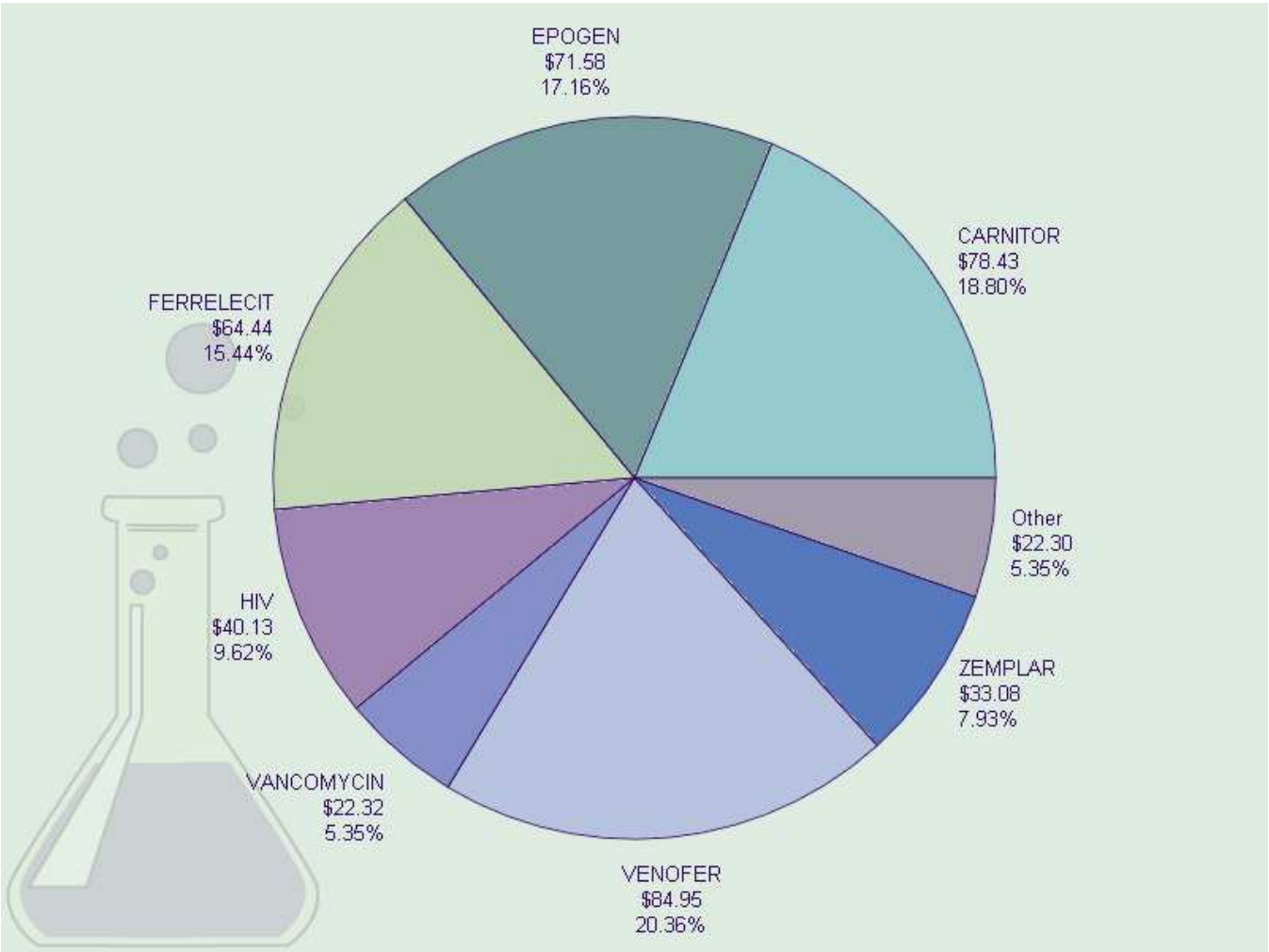
options device=actximg xpixels=800 ypixels=600 ftext=swiss;

ods html body='actximgpie1.htm' path=odsout style=styles.science;

proc gchart data=ee.daylevel (where=(proccat in
('EPOGEN','FERRELECIT','IRON_DEXTAN','HIV','CALCIJEX',
'CARNITOR','VENOFER','VANCOMYCIN','ZEMPLAR','OTHER')));
  pie proccat / sumvar=charge type=mean
               percent=outside value=outside name='actximgpie1';
title1 f=swissb "MEAN ANCILLARY COSTS";
run;

quit;

ods html close;
```



RTF PIE CHART:

ACTXIMG graphics may be published in or as RTF-based documents, as noted above.

```

options reset=global;

options device=actximg xpixels=800 ypixels=600 ftext=swiss;

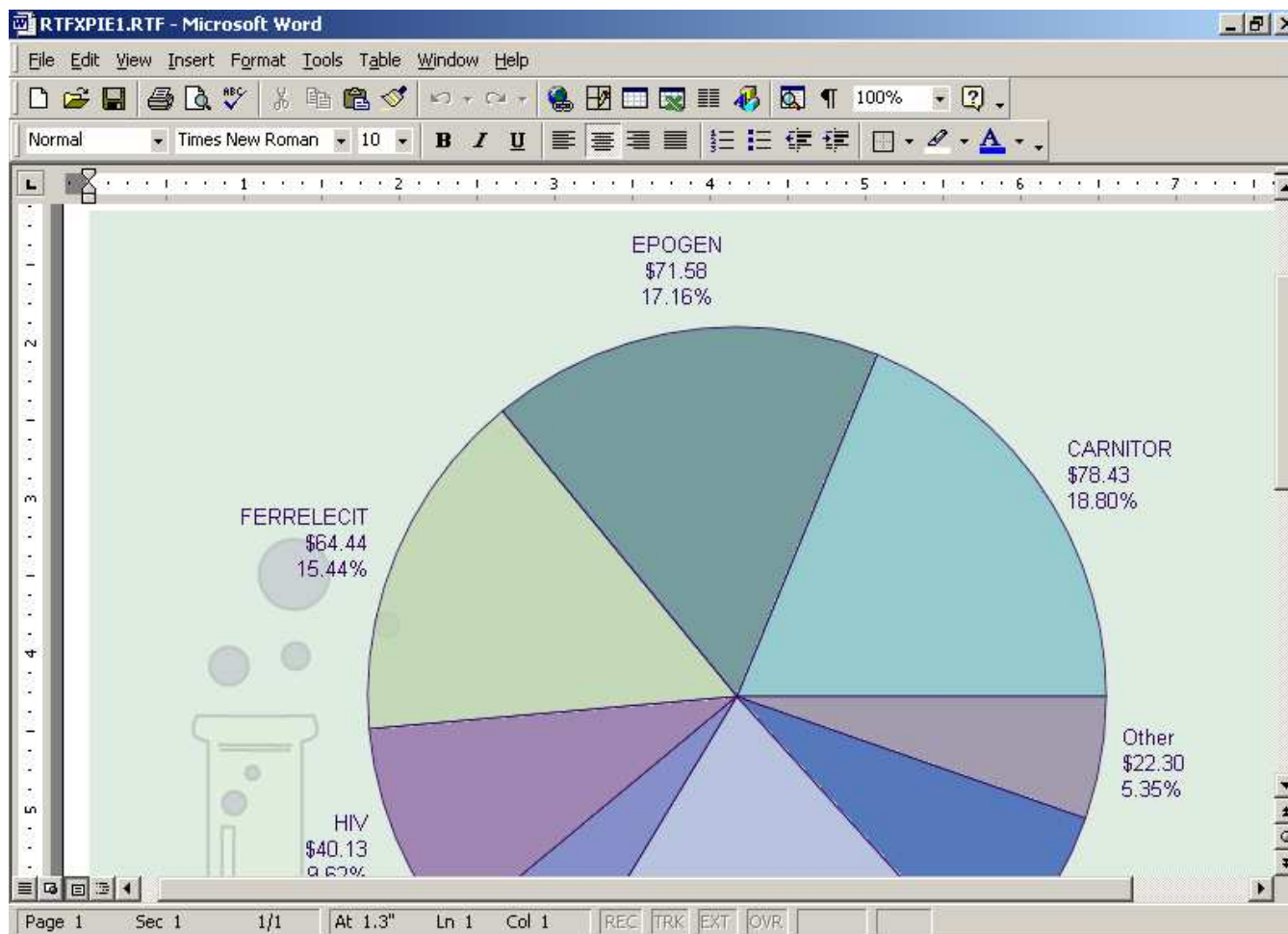
ods rtf file='rtfxpie1.rtf' path=odsout style=styles.science;

proc gchart data=ee.daylevel (where=(proccat in
  ('EPOGEN','FERRELECIT','IRON_DEXTAN','HIV','CALCIJEX',
   'CARNITOR','VENOFER','VANCOMYCIN','ZEMPLAR','OTHER')));
  pie proccat / sumvar=charge type=mean
    percent=outside value=outside name='rtfxpie1';
title1 f=swissb "MEAN ANCILLARY COSTS";
run;

quit;

ods rtf close;

```



PDF PIE CHART:

SAS produced PDF graphics are not interactive in any way. There are, however, advantages to producing large volumes of graphics and/or tables using the SAS PDF device, as you can manipulate bookmarks and styles to make accessing the different graphics very easy. It also makes it hard to “manipulate the data”, a very credible fear of web publishers whether using the SAS system or not!

```

options reset=global;

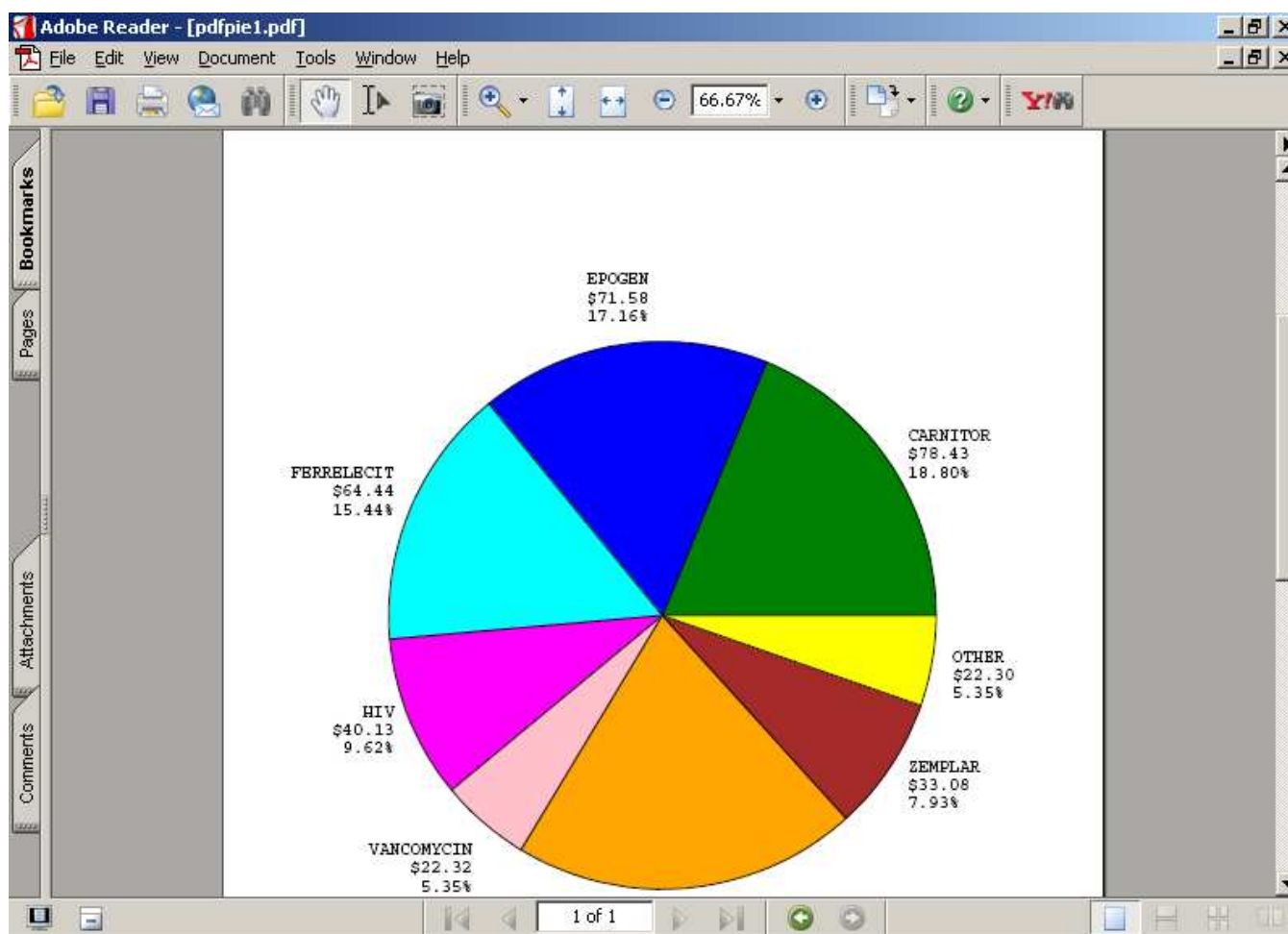
ods pdf file='c:\esrdpac\pdfpie1.pdf';

proc gchart data=ee.daylevel (where=(proccat in
('EPOGEN','FERRELECIT','IRON_DEXTAN','HIV','CALCIJEX',
'CARNITOR','VENOFER','VANCOMYCIN','ZEMPLAR','OTHER')));
  pie proccat / sumvar=charge type=mean
               percent=outside value=outside;
title1 f=swissb h=1 "MEAN ANCILLARY COSTS";
run;

quit;

ods pdf close;

```



DISCUSSION

The examples shown above cover “vanilla” HTML output, HTML output with tool tips, JAVA output, JAVAIMG output, ACTIVE-X output, ACTXIMG output, RTF output, and PDF output. Each of the examples cover different combinations of DEVICES and DESTINATIONS, which can be used for publishing SAS graphics in different media. The destinations I have shown include HTML (most often used for intranet/internet publication), RTF and PDF. Outputting graphics to the RTF destination requires the use of the ACTIVE-X or ACTXIMG devices. Within the HTML destination, I have demonstrated the use of a number of different devices, including JAVA, JAVAIMG, ACTIVEX, ACTXIMG, and GIF files. It is important to note that each of these combinations behave in different ways.

ACTIVEX and JAVA graphics have special capabilities. Right-clicking on the graphic gives you special menus with which you can completely alter the appearance of the graphic. You can change the style used, the type of graph, fonts, colors, etc. It's a lot of fun to play with. However, the ACTIVEX and JAVA devices both require special add-ins which are present in newer versions of SAS. ACTIVEX requires the ActiveX control, while JAVA requires a JAVA plug-in. **If these add-ins are not present on the computer or server on which the graphic is being displayed, you will get a blank screen.** (I learned this the hard way!) This applies to the use of the ACTIVEX device when output to the RTF destination. Not only will you not be able to manipulate the graphics, you won't be able to see them. In V9, JAVAIMG and ACTXIMG devices were added. These devices allow you to publish graphics with the look (but not the feel) of JAVA and ACTIVEX graphics for viewers without SAS or the special add-ins. As noted in the examples above, ACTIVEX is the device to use for presentations on Windows only environments when you want to take advantage of the interactive capability, while JAVA can be used for interactive graphic presentations on other operating environments such as LINUX or UNIX.

Graphics produced for the PDF destination and those produced with the GIF, ACTXIMG and JAVAIMG drivers are (largely) static and do not require any special add-ins. When output to the HTML destination as opposed to print destinations such as PDF or RTF, SAS-produced graphics sometimes have some special capabilities as we saw in the “tool tips” example above.

You may have wondered why the new SAS/STAT graphs look so much better on screen than the older SAS graphics. Here's the answer – in your goptions statement, put “xpixels=800 ypixels=600”. For web publishing, instead of specifying size in inches, specify in pixels. You may need to play with your numbers to get just the look you want, but I found that 800/600 fits pretty well on a screen.

The static devices all produce secondary graphic files. The GIF device produces a GIF file for each procedure, while the ACTXIMG and JAVAIMG devices produce PNG files. These “extra” files must be paired with the HTML graphic file in order for the graphic to be viewed (i.e. present in the same directory.) SAS generates some not very helpful names such as GCHART1.GIF, GCHART2.PNG, etc. unless you specifically name your procedural output. On the pie (or whatever) statement, include “name='mypie'” after the slash. It's a good idea to name your GIF and PNG files the same first node as your HTML file name. It makes them easier to keep together. I did find that if you are stacking up a number of procedures in the same program, that SAS ignores any number you may assign in your defined name, and just numbers the files sequentially. I'm sure there's a way to prevent this, but I haven't figured it out yet!

Those secondary files have their uses. They may be inserted directly into (for example) Microsoft Word documents without the surrounding HTML file just as I have done above. But wait! Don't throw out your interactive devices with the bath water! Both the JAVA and ACTIVEX devices allow you to play with your graphics, get them just the way you like them, and then SAVE the modified (or not) graphic as a BMP, JPEG or the like. These also can be inserted directly into documents, email, etc.

CONCLUSION

SAS Version 9 provides many new, and some improved older tools, to produce some truly amazing results. Intranet or internet publishing of SAS graphics in a variety of useful forms becomes easy using the Output Delivery System. In addition, it is possible to enhance printed documents with SAS graphics (via the PDF and RTF destinations). It is even possible, with some clever coding, to animate the graphics, all completely within the SAS system. Presentation of data using the SAS system has come a long way since the ubiquitous PROC

PRINT output of the 70's, and has carried the SAS system into the new millennium in STYLE!

REFERENCES

SAS Online Documentation (PC SAS V9, AIX UNIX SAS V8)

<http://support.sas.com/sassamples/index.html> (samples and tips)

<http://support.sas.com/rnd/papers>

<http://support.sas.com/rnd/datavisualization>

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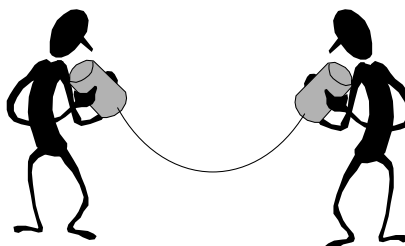
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