

## Paper RIV-43

# I've JMP®ed in, but how do I get out? Exporting JMP discoveries for reports and publications

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## ABSTRACT

JMP® is an excellent tool for visualizing data, but the only way for others to know what has been discovered in the data is to share the results. When creating graphs and reports in JMP, output options are not always readily evident. To add to this confusion, web searches on outputting graphics from JMP predominantly direct the user to “copy and paste” solutions. While “copy and paste” can be useful for some applications, more control is needed, especially when the results are needed for publications and formal reports. This presentation looks at a variety of options for exporting JMP visualizations and reports.

Examples used in this paper were created with JMP 11.1. The techniques represented are not platform-specific and can be adapted by beginning through advanced JMP users.

## INTRODUCTION

JMP was developed by John Sall and others at SAS Institute in the late 1980s as an interactive statistical visualization and discovery tool. While no longer an acronym, the JMP name came from “John’s Macintosh Project.” According to Sall, the JMP name also conveys “the idea of a lively product that jumped responsively to the user’s wishes.” JMP Version 1 shipped on October 5, 1989 as a Macintosh desktop product with a graphical user interface. JMP found its customer base among scientists and engineers and therefore originally focused on improvement in three areas; 1) design of experiments (DOE), quality and productivity support (Six Sigma), and reliability modeling. JMP was later released for Microsoft Windows (v. 3.1) in 1993. JMP includes support for both 32- and 64-bit systems. This paper uses the 32-bit version of JMP.

JMP is not SAS®-mini. It is a visual discovery tool that can reside on a desktop or server. Through point-and-clicks, statisticians and data analysts from all industries can visually look at relationships in their data. The suite of visual tools and graphs allow not only exploration but output display without SAS graphics code. JMP is used for data exploration and display, experiment design, quality control, qualitative analysis, statistical modeling and report building. JMP output can also be exported for use in other applications, publications, and reports.

## THE JUMPING OUT PROBLEM

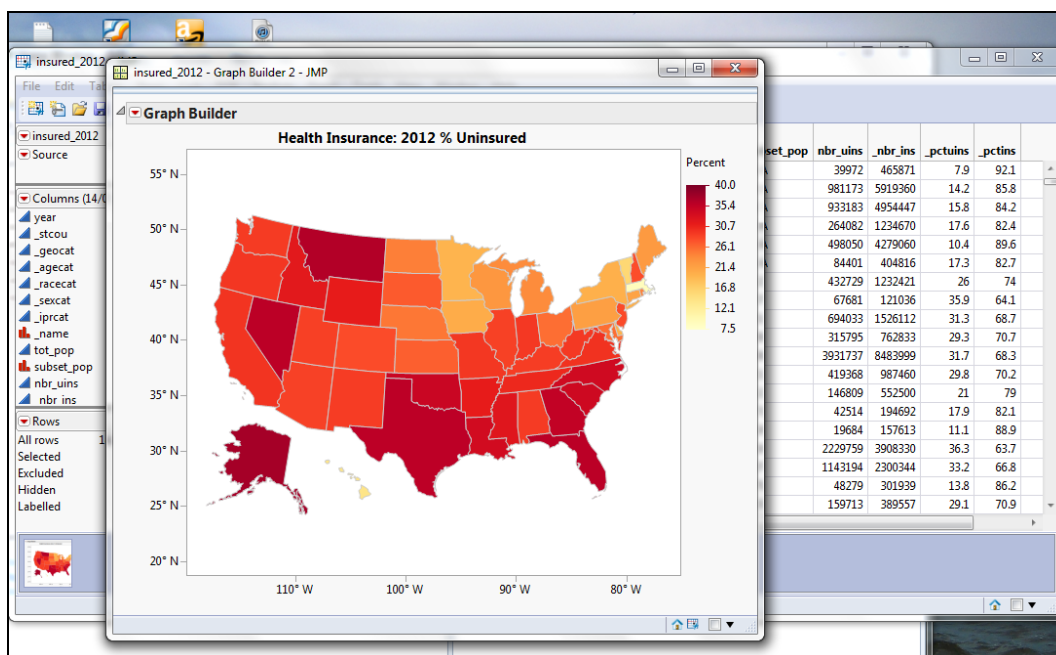
My task for this exercise is to create a graphic showing areas of the United States with low rates of health insurance. A map is an excellent tool for this type of graphical display. Since choropleth maps can be created in JMP with drag-and-drop ease, I read my SAS data set into JMP and created a map that displayed this information by following the following steps. My state field contained the full state name which JMP used with ease.

1. **Open** the SAS data set with a geographic component (in this case state).
2. Select **Graph > Graph Builder**.
3. Drag and drop the state variable into the Shape zone.
4. Drag and drop variable to be mapped into the Color zone.

I did interactively make a few changes to the resulting map:

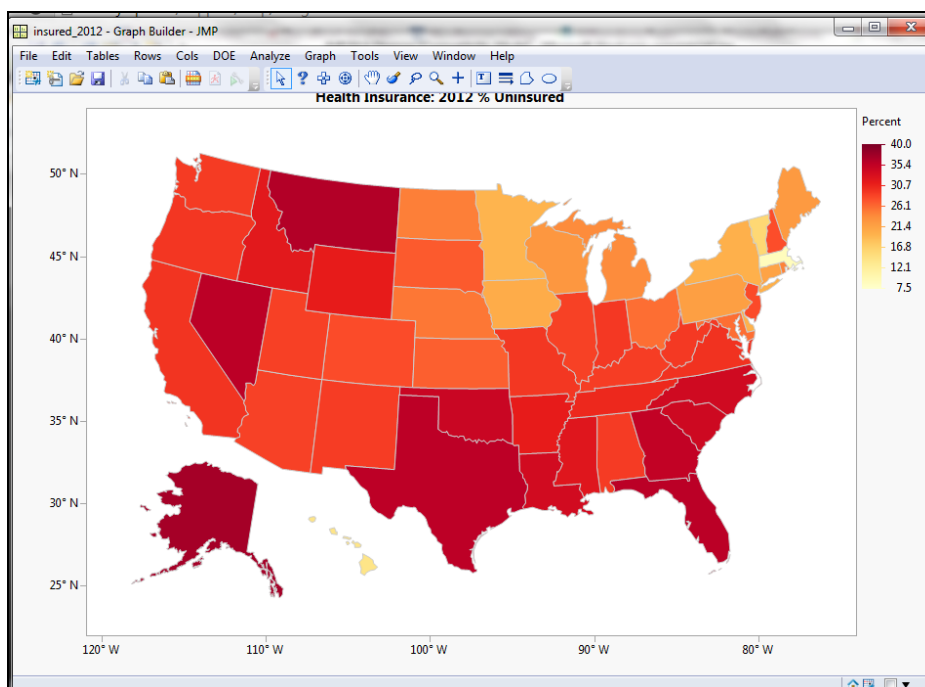
- Changed the color scheme to be a single color gradient.
- Changed the default title.
- Relabeled the legend.

The screen shot below shows the resulting map. Since I am happy with the map, I now want to export for use in my report and also in other applications. How do I do that? Note in the graphic that there are no visible pull-down menus or menu bars in the Graph Builder window. The pull-down menus from the main JMP window are grayed out. I tried right-clicking but there are no apparent SAVE or SAVE AS options.

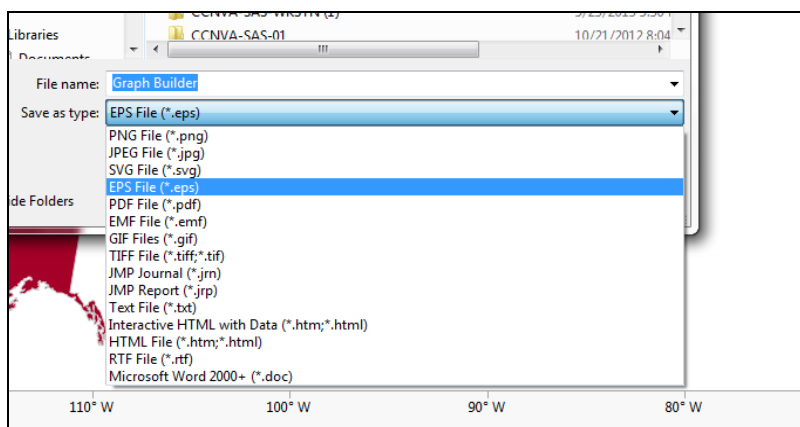


## THE HIDDEN SOLUTION

The question I hear most after users begin using **Graph Builder** in JMP is how to save the results. While in earlier versions of JMP, alternative options were the only options, in the most recent versions of JMP, the menu is available (albeit hidden) in the **Graph Builder** window. Clicking on the little white bar above the Graph Builder text will display the pull down menus as illustrated below:



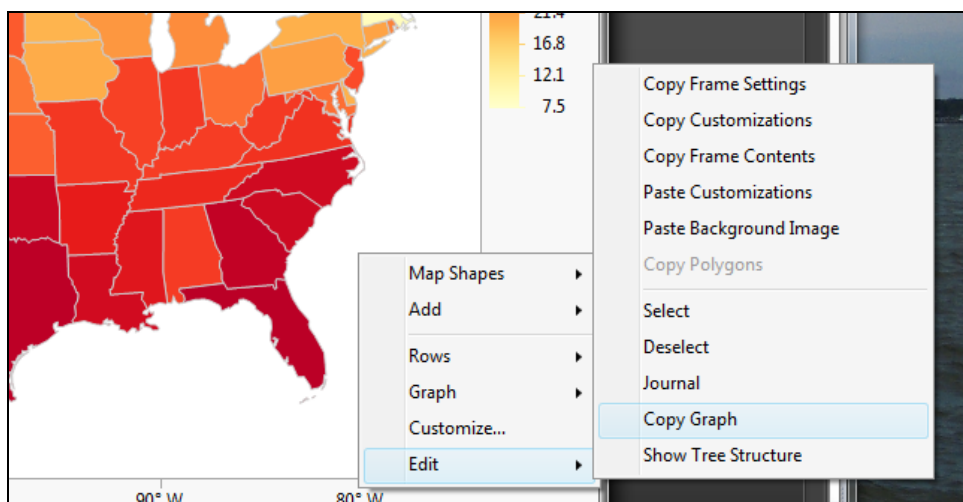
From the file menu, select **Save As**. While there is not a bitmap (.bmp) option, the image can then be saved as .png (portable network graphics), .jpg, .eps (encapsulated postscript), .emf (enhanced metafile), .gif (graphics interchange format), and .tiff (tag image file format) in addition to JMP report and .pdf formats. See the menu below:



The image file can now be used as a stand-alone image or imported into the application of the user's choice. The destination is extremely important in the selection of output type. Graphics that are intended for inclusion in a printed report require greater care in creation than those created only for viewing on a computer screen. Printers require many more dots per inch (DPI) to reproduce both accurate colors and crisp text within the image. While JMP allows dynamic resizing of graphics within the program without loss of clarity, many output formats will degrade the quality of the graphic when enlarged. Selecting either encapsulated post script (.eps) saves the graphic as a vector image that can be resized without losing clarity or quality. Vector images use a set of mathematical functions (vectors) to draw the images. Output formats such as bitmap (.bmp) images are in reality just matrices of fixed pixel-based values.

## THE COPY AND PASTE SOLUTION

The easiest solution is cut-and-paste. To copy-and-paste the graphic that was created, right click on the image and then select **Edit**, then select **Copy Graph** as illustrated below. The copied information is copied to an active windows clip board.

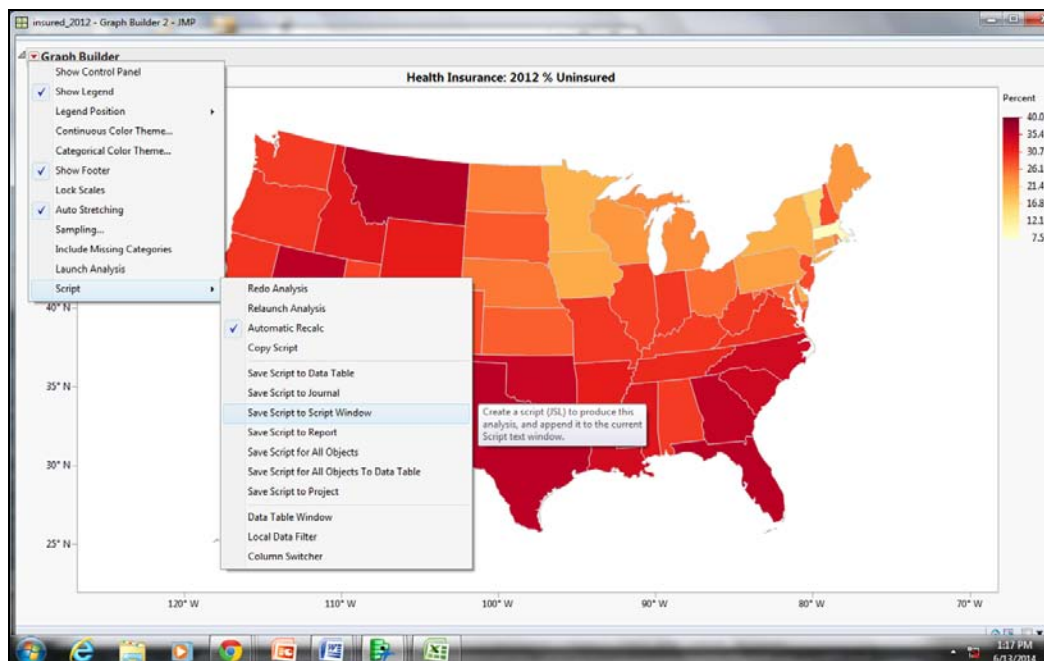


After copying the graphic, open the program where you'd like to paste the content and select **Paste**. Alternatively, you can select **Paste Special** and choose between PNG, Enhanced Metafile and Bitmap. Enhanced Metafile allows sizing of the image while using less storage space. Default format for Microsoft applications is PNG. After pasting the graphic, right-clicking within the image and selecting **Edit Picture** will allow you to manipulate that image, but only if the image is an Enhanced Metafile. For the other options, only **Format Picture** and **Borders and Shading** options are available.

The major drawbacks to this solution are: 1) the image is not saved directly to a file, and 2) common file types such as .GIF and .TIF are not available with this solution. Also not available is the .eps file type, the best choice for printed documents.

## THE SCRIPTING SOLUTION

JMP automatically creates a script of the commands to create the image. A save to file option can be added to this script. First select **Script** from the pull-down menu under the Graph Builder red triangle (upper left). Then select **Save Script to Script Window**.



Add the following to your script to save, save the script, load and run to save the file.

```
img<<Save Image("r:\bokerson\test.gif")
```

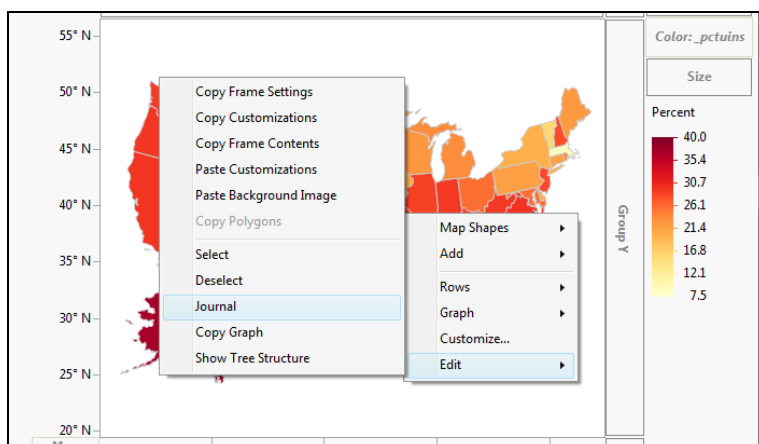
The image will be saved to the specified path and filename.

## THE JOURNALING SOLUTION

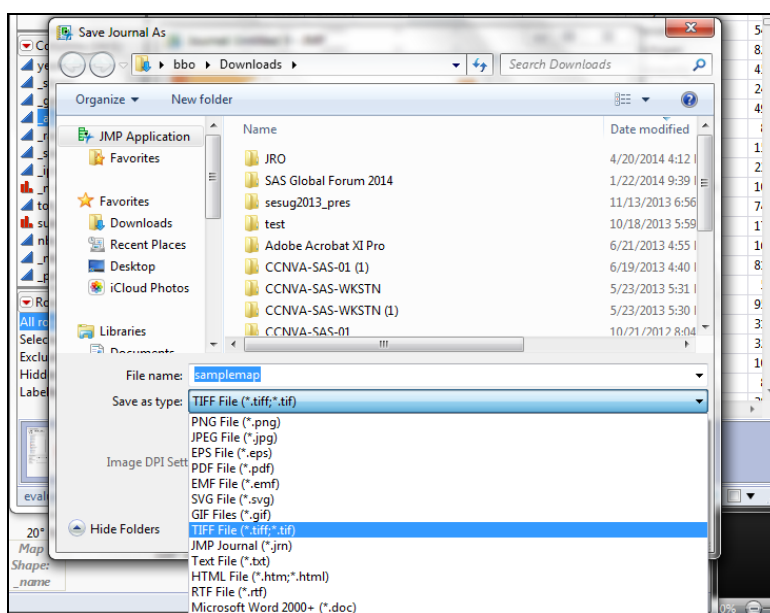
Journaling can be used in much the same way as scripting to direct the complete image to a file. Sometimes, we only want to save part of the image. While this can be done with post-processing, it is more efficient to process the image before exporting.

The first time the Journal command is selected during a JMP session, a journal window opens that includes all graphs and tables from the active report window. Graphs, plots, and outlines can be resized, opened, or closed. This allows for selecting parts of reports or graphics for saving. The journal file is not linked to the JMP session. The journal file can be saved but will not be recreated as part of the saved JMP session. To open the journal window, go to the JMP main page. Select **Edit** from the pull-down menus. Then select **Journal**. Alternatively, **CNTRL-J** will open the journal window. Your graphic must be already added to the report to appear in the journal.

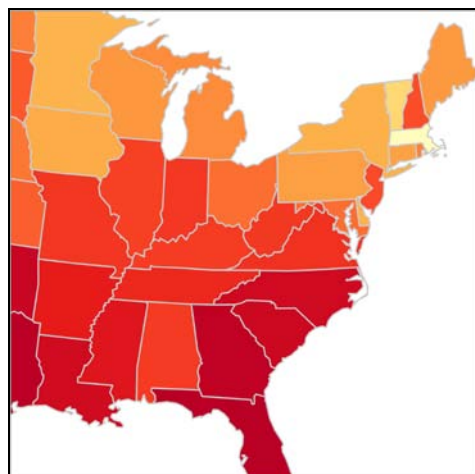
If you just want to modify or save a single graphic, the process is simpler. Right click on the graphic, select **Edit** and then select **Journal** as illustrated below.



Modify and/or select the part of the graphic that you wish to save. In this example, the **Size/Scale** option is combined with the magnifying tool to fill the display with just eastern states. After completing any desired modifications, choose **Save As** from the File menu to save the modified graphic as illustrated below.



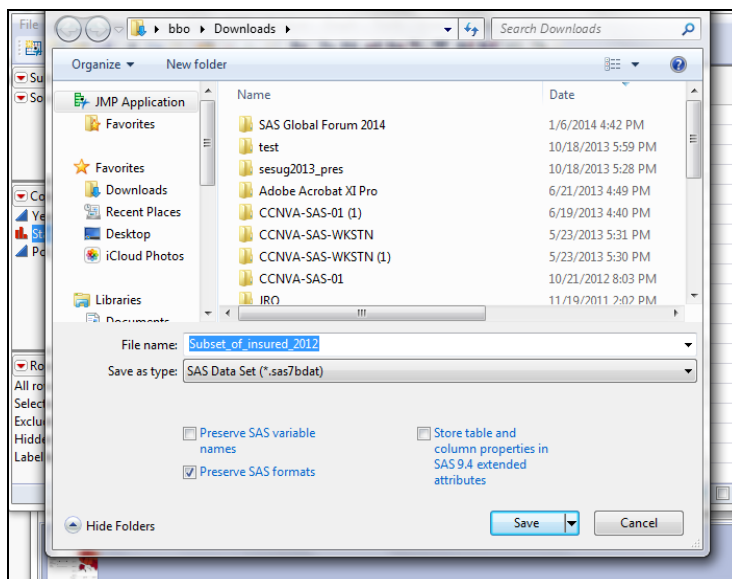
.The resulting .TIFF file as imported directly into this document is below.



## EXPORTING TO SAS

With JMP, users can connect directly to a SAS server and work directly with SAS data sets. The server can either be a SAS metadata server or a SAS workspace server. If the server is a metadata server, the earliest version of SAS supported by JMP connections is SAS 9.1.3. You can only be connected to one metadata server at a time. In addition to metadata servers and workspace servers, JMP will also connect to SAS on your local machine.

The active data table or any report table can be saved as a SAS data set. For the example, the data table is saved to a SAS data set below:



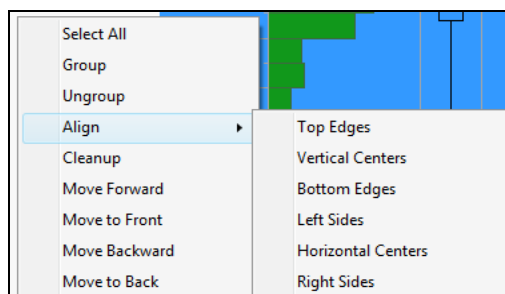
While SAS does not use images saved as part of a JMP session, any images saved as external files can be imported into SAS reports and graphics using ODS preimage and postimage options.

SAS/EG also has an “Open in JMP” task that lets you open your dataset in JMP, analyze it there and return the results as part of your SAS Enterprise Guide process flow. For this to work, the SAS data being analyzed by JMP needs to reside in the same location as JMP.

## EXPORTING A JMP REPORT

By definition, any output created in the JMP report window is referenced by JMP as a report. Generally, editing is necessary before using by other applications. Creating a custom reports from JMP will not be covered in detail here. What is important to know is that active output from report and graphics windows can be combined into a cohesive report by using selecting **Edit** and then selecting **Layout**. Layout can also be selected with **CNTRL-L**.

Your output will open in a window where you can rearrange to meet your needs. Items can be moved anywhere within the output window. The items can be grouped or ungrouped as needed. Edges can be aligned. Unwanted items can be deleted. Text can be added. The Layout menu is shown below.



Output can be organized into pages. There is no limit on the number of pages. Page breaks are shown in the output window by light gray outlines.

After arranging output into a report, the report is ready for export for use by other applications. To export a report created in JMP, select **File > Save As**. On Windows, you can export the report as any of the file types listed in the table below.

File Type	Extension	Description
Microsoft Word	.doc	Word processing format; mixture of pictures, text, and tables.
Enhanced Metafile	.emf	Can contain both vector and bitmap components.
Encapsulated PostScript File	.eps	Line drawing (or <i>vector</i> image) that can show a bitmap preview.
Graphics Interchange Format	.gif	Compressed bitmap pictures.
Hypertext Markup Language	.htm, .html	Browser format; Save pictures within the HTML file by selecting one of these formats: PNG, JPEG, SVG, or GIF.
Interactive HTML	.htm, .html	Saves the data, reports, and graphs in an HTML 5 web page.
Joint Photographics Expert Group	.jpg	Compressed bitmap pictures; standard for photographs.
Portable Document Format	.pdf	Format for sharing documents regardless of operating system.
Portable Network Graphics	.png	Compressed bitmap pictures; successor to GIF.
Rich Text Format	.rtf	Word processing format; mixture of pictures, text, and tables.
Scalable Vector Graphic	.svg	Pictures stored as text; best used for 2-D graphics.
Tagged Image File Format	.tiff	Raster file format
Text Format	.txt	Plain text format; no pictures.

If you are saving the report as a .png, .tiff, or .jpg file, you can set the dots per inch (DPI) to either Default or 300. The Default option refers to the default setting of your operating system not a default set in JMP. Select **Always use this setting** if you want to retain your DPI choice across multiple JMP sessions.

## NOTE FOR MAC USERS

While there are more output file type options in JMP software for Windows users than for Mac users, Mac systems do have the option to output uncompressed raster graphics (.tiff) as well as vector images (.eps). The results need to be journaled first with the desired output selected. Then click File -> Export, and then pick .eps or .tiff. Complete reports can also be exported for use in other applications if running JMP on the Mac. If you want to save the report as a text, image, HTML, or RTF file, select File > Export. Supported image files include .eps, .png, .svg, and .tiff.

## CONCLUSION

JMP's development as an interactive discovery tool has masked its ability to create production ready graphics and reports. Adding to this export functions are not always readily apparent. With the added connectivity between JMP and other applications including SAS, as well as improvements to the interactive interface, JMP users no longer need to ask how to JMP out. JMP output can be directly incorporated into other applications or saved in many different formats for later use.

## REFERENCES

Creighton, Lee with Bradley Jones, John Sall and Annie Sangi. The JMP Advantage.  
[http://www.jmp.com/software/whitepapers/pdfs/349306\\_jmpadvantage.pdf](http://www.jmp.com/software/whitepapers/pdfs/349306_jmpadvantage.pdf), Accessed June 2014.

Hemedinger, Chris. "Open in JMP" from SAS Enterprise Guide."  
<http://blogs.sas.com/content/sasdummy/2009/02/02/open-in-jmp-from-sas-enterprise-guide/>.

"JMP 11 Online Documentation." <http://www.jmp.com/support/help/>.

Lai, Eric. "Billionaire SAS Co-Founder Keeps on Coding: SAS Executive Vice President John Sall, who developed the data visualization tool JMP, remains its chief architect." *Computerworld*. September 18, 2009.

Loveless, M. "Saving Graphs, Tables and Reports in JMP" <http://blogs.sas.com/content/jmp/2010/02/22/saving-graphs-tables-and-reports-in-jmp/>. Accessed May 2014.

Sall, John. JMP is 20 Years Old. <http://blogs.sas.com/content/jmp/?s=JMP+is+20+Years+Old>, Accessed June 2014.

Sall, John. "Deep Interactivity." *JMPer Cable*. Fall 1996. [http://www.jmp.com/about/newsletters/jmpcable/pdf/03\\_fall\\_1996.pdf](http://www.jmp.com/about/newsletters/jmpcable/pdf/03_fall_1996.pdf). Accessed June 2014.

Valente, Daniel. "Preparing print-ready graphics that look great using JMP". <http://blogs.sas.com/content/jmp/2011/12/15/preparing-print-ready-graphics-that-look-great-using-jmp/>. Accessed Jun 2014.

U.S. Census Bureau. Small Area Health Insurance (SAHIE) Program/March 2014. <http://www.census.gov/did/www/sahie/data/20082012/index.html>. Accessed June 2014.

## ACKNOWLEDGMENTS

Thanks go to SAS JMP support and documentation teams for their contributions to this paper. Also thanks go to section chair Mira Shapiro for her JMP knowledge as well as encouragement in the development of this idea.

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