Unlock the Treasure of Geographic Data with Colorful Maps Kate Amorella & Tracy Stegmair Institutional Research Texas Woman's University









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- A few definitions
- **Geoset** A geoset contains geographic information needed to draw a map. When a map based on a geoset is drawn, the tables appear as layers in the map.
- Data Binding The linking of data to a map

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• **FIPS** – Federal Information Processing Standards



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# **Creating a Texas Geoset**

A geoset contains geographic information needed to draw a map. When a map based on a geoset is drawn, the tables appear as layers in the map.<sup>1</sup>

- Open the SPSS Geoset Manager
  - Start > SPSS > Geoset Manager
     OR
    - OR
  - o Navigate to C:\Program Files\SPSS\Maps\geosetmanager40.exe
- Open the US map (filename: US.GST)
  - Note: the file can be found in the Maps folder within ProgramFiles\SPSS.
- To protect the original file, save the map under a different name within the Maps folder
  - Change the Geoset Name (text box in the toolbar) to Texas
  - File > Save As
  - o Name the file Texas
  - Click <u>Save</u>
- Change the projection of the map
  - Map > Projection...
  - o Under Category, select Regional Mercator Systems
    - This will give the map a flat appearance
  - o Under Category Members, select Mercator 60
  - o Click OK
- Focus on Texas
  - Select the Zoom In (1) tool
  - Using this tool, draw a square around the state of Texas
  - Select the Hand tool (D), and center the map
- Edit the county map layers
  - Map > Layer Control... OR select the Layer Control ( $\checkmark$ ) tool from the toolbars
  - Under Layers, select <u>US County Boundaries</u>, and click <u>Display</u>

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ľ	Layers:		
	US Top 20 Cities	^	Up
I	US Major Cities		Down
I	US 5 Digit Zipcode Centers		
I	US Highways Mexico		Add
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- Check Display within Zoom Range
- Change <u>Max Zoom</u> to 50,000 (no comma)
  - Doing this allows you to see the county borders

Display Properties - US County Boun 🔀	Display Properties - US County Boun 🔀
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isplay within Zoom Range:	☑ Display within Zoom Range:
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Max Zoom: 500000 mi	Max Zoom: 500000 mi
Show Line Direction	Show Line Direction
Show Nodes	Show Nodes
Show Centroids	🗖 Show Centroids
OK Cancel	OK Cancel

- Within the Display Properties window, check <u>Override Style</u> (see illustration above)
- Click the <u>Display Mode</u> button (to the right of Override Style)
- o Select a Map Color
  - Within the <u>Pattern</u> drop-down menu, select the Solid Black square (next to N)
  - Within the Foreground drop-down menu, select Light Grey
    - Selecting a subtle color, such as light grey for the overall map will make allow counties to stand out once data is added.

Region Style       Pattern       Foreground       Border       Style       Color       Wath       Points       DK	Region Style   Pattern   Foregound   Background   Background   Background   Background   Points   OK	
~ 5V /		

- Select a Border Style
  - Within the <u>Style</u> drop-down menu, select one of the Dotted Line styles
  - Within the <u>Color</u> drop-down menu, select Dark Grey
  - Click OK in the Region Style window

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- o Click OK in the Display Properties window
- Edit the areas surrounding Texas
  - Reopen the Layer Control window
  - o Under Layers, select Mexico, and click Display
  - o Within the Display Properties window, check Override Style
  - Click the <u>Display Mode</u> button (to the right of Override Style)
    - Within the <u>Pattern</u> drop-down menu, select the Solid Black square (next to N)
      - Within the <u>Foreground</u> drop-down menu, select Light Grey
        - All the above steps give Mexico the same appearance as the United States counties. It is necessary to retain Mexico as a layer, so the southwest border of Texas is visible.
  - Click OK twice
  - Under Layers, select US Top 20 Cities, and uncheck Visible within the Properties box
    - Repeat the above step for <u>US Capitals</u>, <u>US Major Cities</u>, <u>US 5 Digit</u> <u>Zipcode Centers</u>, <u>US Highways</u>, and <u>USA</u>
    - This will remove these layers from the map, allowing focus to remain on the counties.

Layer Control		
Layers:		
US Top 20 Cities	^	Up
US Lapitais US Major Cities		Down
US Cities US 5 Digit Zipcode Centers		
Mexico		Add
Canada US County Boundaries	~	Remove
Properties ✓ Visible ✓ Selectable ✓ Automatic Labels ✓ Editable		Display
ОК	Cancel	

- o Under Layers, select Ocean, and click Display
- Click the <u>Display Mode</u> button (to the right of Override Style)
  - Change the Ocean color to a lighter color
- o Click OK twice
- Save the **geoset**
- Exit Geoset Manager

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# **Creating a Data File**

The date file will contain geographic information as well as the information you want to map. For the purpose of this demonstration, we will create a data file containing county names and their respective enrollments. To avoid name mismatches, we will use a county file provided by SPSS and add enrollment data to it. We will also create our own value ranges for the data. Different maps may require different data formats.

- Open the SPSS County file
  - Open > C:\Program Files\SPSS\MapsData\County Age Demographics by Gender
- To protect the original file, save the data under a different name
- Remove all non-Texas data
  - o File > New > Syntax
    - Type: FILTER OFF. USE ALL. SELECT IF (st\_fips='48'). EXECUTE.
    - Run > All (on the menu bar)

### OR

- o Data > Select Cases
  - Check <u>If condition is satisfied</u>, then click the <u>If...</u> button
  - Type <u>st\_fips='48'</u> in the text box, and click Continue
  - Under <u>Unselect Cases Are</u>, select <u>Deleted</u>
  - Click OK
- Under <u>Variable View</u> (Ctrl+T), select and clear all columns *except* <u>cnty</u> <u>fip</u>, <u>county</u>, <u>st\_fips</u>, and <u>state</u>
- Add enrollment data
  - o Under Variable View, add the variable enrollment

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		3	st_fips	String	2	0	2-Digit State Fl	None	None	8	Left	Nominal
		4	state	String	2	0	State Abbrevia	None	None	12	Left	Nominal
		- (5	enrollment	)								
		6	$\smile$									
		- 7										
1		- 0					1					

- o Under Data View, add the enrollment for each county listed
  - Manually enter the number for each county OR
  - Copy and paste data from Excel
    - Note: Make sure data is sorted by county and that numbers do not contain commas.

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- Create data ranges
  - o This will create a new column containing the enrollment range for each county.
  - Transform > Visual Bander
  - Move <u>enrollment</u> from the <u>Variables</u> box to the <u>Variable to Band</u> box
  - Click Continue
  - o Select enrollment from the Scanned Variable List box
  - Under Banded Variable, in the Name and Label textboxes, type EnrollmentGroup
  - o Click <u>Make Cutpoints...</u>
    - Check Equal Width Intervals
    - <u>First Cutpoint Location:</u> 0
    - Number of Cutpoints: 6
    - Click <u>Apply</u>
  - Under <u>Value</u> enter the following information (see illustration below):
    - 1) 0
    - 2) 10
    - 3) 100
    - 4) 500
    - 5) 1000
    - 6) 2000
    - 7) HIGH
  - Under <u>Upper Endpoints</u>, check <u>Included (<=)</u>
  - o Click Make Labels
  - o Click OK

/isual Bander					
Commod Veriable List:					
Scanneu valiable List.	Na	ame:	Label:		
L Variable	Current Variable: er	nrollment			
enrollment [enrollment]	Banded Variable: E	nrollmentGroup	EnrollmentGroup		
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	.00 254.67 5 127.33 382.0	09.33 764.00 1018.67 127 0 636.67 891.33 1146.00	3.33 1528.00 1782.67 203 1400.67 1655.33 1910.01	37.33 2292.00 2546 0 2164.67 2419.33	.67 2801.33 2674.00
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To Other Variables	8			i neveise si	cale

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### • \*LEGEND WORK-AROUND\*

• If you generate an Individual Value map using the variable EnrollmentGroup, the legend SPSS generates will be out of order and look similar to this:



- 0 To create a legend that reads in ascending order, you must recode EnrollmentGroup
  - Transform > Recode > Into Different Variables
  - Move <u>EnrollmentGroup</u> to the <u>Numeric Variable</u> -> Output Variable box
  - In the <u>Name</u> and <u>Label</u> textboxes type <u>category</u>
  - Click <u>Old and New Values</u>

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💻 Recode into Di	fferent Varia	bles				$\mathbf{X}$
▲       5-Digit County FI         ▲       County Name [cr         ▲       2-Digit State FIP:         ▲       State Abbreviation         ★       enrollment         ★       category [category]	PS Cc ounty] S Coc on [sta	umeric <del>Variable</del> nrollmentGroup	→ Ωutput Variabl	8:	Butput Varia Name: category Label: category Ch	able
	<	Old and Net	w Values	>		
		lf				
				OK Paste	Reset Ca	ncel Help

- Under <u>Old Value</u>, in the <u>Value</u> text box, type the number 1
- Under <u>New Value</u>, in the <u>Value</u> text box, type the number 7
- Click <u>Add</u>
- Continue this process for the rest of the variables (see illustration below)

Recode into Different Variables: Old and New Values 🛛 🛛 🔀					
Old Value Value: 7 System-missing	New Value           Value:         1           C System-missing         C System-missing				
System- or user-missing	018>New:				
C Range: through C Range: Lowest through	$ \begin{array}{c} Add \\ \hline 1 \rightarrow 7 \\ 2 \rightarrow 6 \\ 2 \rightarrow 5 \\ 4 \rightarrow 4 \\ \hline Remove \\ 5 \rightarrow 3 \\ 5 \rightarrow 2 \end{array} $				
C Range:	Output variables are strings Width: 8     Convert numeric strings to numbers (5->5)				
C All other values	Continue Cancel Help				

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- **Click Continue**
- In the Recode into Different Variables window, click Change
- Under <u>Variable View</u> (Ctrl + T), change the number of <u>Decimals</u> for <u>category</u> to 0
- Save
  - Note: If you plan on creating enrollment maps often then you can • paste the Visual Bander and Recoding processes shown above to syntax. Just click the **Paste** button instead of the **OK** button.

. county	Discue	
Recode into Differen	nt Variables	
S Digit County FIPS C County Name (county 2 Digit State FIPS Cor State Abbreviation (st. Corrollment (errollment Category (category)	Numeric Variable -> Output Variable: enrolmen/Group -> category	Output Variable Name: Category Labet Category Change
	Old and New Values  If (optional case selection condition)  OK Paste	Reset Cancel Help

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# **Creating a Map**

Since we created our own range, we will be making an individual values map. If you would like SPSS to create a range for your data, create a Range of Values (Graphs > Map > Range of Values...) map and use <u>enrollment</u> as your defining variable.

- Open your data file (created within "Creating a Data File" above)
- Graphs > Maps > Individual Values...
  - o Under Individual values for:, drag-and-drop category
  - o Under Geoset, select Texas (created earlier in this How-To)
  - Under Geographic Variable:, drag-and-drop 5-Digit County FIPS Code [cnty\_fip]

Create Individual Values Map	Create Individual Values Map
Assign Variables Titles Advanced Example:	Assign Variables Titles Advanced 2-Digit State FIPS Code [st_fi [errollment] ErrollmentGroup [Enrollment() State Abbreviation [state] Geographic Variable Mismatch Maximum mismatches to report 100 ÷
OK Paste Reset Cancel Help	OK Paste Reset Cancel Help

- Select the <u>Advanced</u> tab from within the <u>Create Individual Values Map</u> window (see illustration above)
- o Under Variables to refine geographic match, drag-and-drop County Name [county]
- o Under Map Layer, select US County Boundaries
- Check <u>Show geographic labels</u>
  - This step is very important! If you do not check Show Geographic Variables, you will not be able to label your map.
- o Click OK

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# **Editing a Map**

Creating a map can help people visualize data; however, the purpose of a map may be lost if it is not readable. The final look of a map falls on user preference. Below are some methods and techniques to help you create a visually aesthetic map.

- Remove the map title
  - Double-click the map in your output viewer
    - This action creates a toolbar at the top of your map
  - Select the Zoom In  $(\textcircled{\textcircled{}})$  tool
  - Using this tool, draw a square around the state of Texas
  - Select the Hand tool (D), and center the map
    - You may want to enlarge your entire map for easier editing
  - o Click Edit Map Title on the toolbar

Edit Map Title  $|\oplus|\Theta|$ 

- o In the Edit Map Title window, uncheck Map Title is Visible
- o Click Close
- Change the theme colors and patterns of Texas counties
  - Click <u>Themes</u> on the toolbar
  - o Under <u>Themes</u>, select <u>Individual Values</u>
  - Click <u>Display</u>

Theme Control	X
Themes	
Individual Values	-
Properties	
Visible	Display
	Legend
Uose	Help

- o Under Individual Value, select the lowest value (should be 1.000000)
  - Note: After recoding the variables, the lowest value you your scale represents the counties with the highest enrollment. The Legend will be adjusted to show this in a later step.

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• Click <u>Region Style</u> (see illustration below)

T	Individual Value Theme Options 🛛 🔀
	Style Individual Value:
	Apply Call Attribute Color
	OK Cancel

- Under <u>Pattern</u>, select the Solid Black square
- Under <u>Foreground</u>, select the darkest color you would like for your map
  - *Note: As stated earlier, this will represent the county with highest enrollment.*
- Click OK
- Under <u>Individual Value</u>, select the next value (2.000000)
  - Note: For each lesser enrollment range, you will want to select a lighter color and possibly a pattern to help differentiate from other ranges.
  - Click <u>Region Style</u>
  - Under <u>Pattern</u>, select a pattern of your choosing
  - Under <u>Foreground</u>, select a lighter color than the previous value
  - Under <u>Background</u>, choose a color to go with your foreground
    - Note: It make take several attempts to find colors and patterns that agree with your map.

R	egion Style					
- Fill						
	Pattern:					
	Foreground:	<b>±</b>				
	🔽 Backgound:	<u>•</u>				
Border						
	Style:	<b>±</b>				
	Color:	±				
	Width					
	<ul> <li>Pixels</li> </ul>	<b>±</b>				
	C Points	0.2				
Sample						
	OK	Cancel				

- Click OK
- Repeat the above steps for each <u>Individual Value</u>, varying the color/patterns into lighter shades.

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- Create Labels
  - o Click Map Layers on the toolbar



- o Under Layers, select US County Boundaries, click Labels
- Within the <u>DataSet</u> drop-down menu, select <u>DataSet5</u>
- o Within the Field drop-down menu, select County Name
- o Check Display within Range
- o Set <u>Min Zoom</u> to 0 and <u>Max Zoom</u> to 50,000 (no commas)
- o Check Allow Overlapped Text
- o Uncheck Allow Duplicated Text
- Click <u>Text Style</u> (see illustration below)

Label Properties	
Label with: DataSet: Field:	DataSet5
Visibility Visibility Min Zoom: 0 Max Zoom: 150	Allow Overlapped Text C Allow Duplicated Text Label Partial Segment Maximum labels: 100
Styles Label Lines C None C Arrow	Position Orientation ityle
ОК	Cancel

- o Under Font, select Verdana and size 4
- Under <u>Text Color</u>, select black
- o Under <u>Background</u>, select <u>Halo</u> and choose <u>Color</u> white
- o Uncheck <u>Bold</u>
- Uncheck <u>All Caps</u>

Text Style	X
Font: Verdana 💌 🖣 💌	Sample
Text Color:	We guided in our for a party over the title day.
Background C None I Halo C Box Color:	Effects Bold Underline Shadow
ОК	Cancel

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- Click OK three times
- Modify the legend
  - Click <u>Themes</u> on the toolbar
  - Under <u>Themes</u>, select <u>Individual Values</u>
  - o Click <u>Legend</u>
  - o Change Title, Compact Title, and Subtitle as needed
    - Note: To save on space, you can eliminate all titles, leaving simply the range of values key.
  - o Under Legend Text, select 1.000000
  - Change the value in the textbox to 2001+
  - Continue the above steps for each <u>Individual Value</u>, changing the values to the appropriate ranges
    - Warning: Modify your legend at the end. SPSS will not save the values, so should you close the map, you will lose legend changes.

Legend Style						
<ul> <li>Legend is Visible</li> <li>Compact Legend</li> </ul>	Show Empty Ranges					
Title:		Аа				
Compact Title:		Aa				
Subtitle:		Аа				
Legend Text						
2001+	<u>∧</u> = 0					
501-2000 501-1000 101-500 11-100 1-10	Text Style:	Aa				
OK Cancel						

# **Exporting to Other Software**

Additional modifications can be made in word processing and image editing software by copying and pasting the map into these other applications. You can also print a map to PDF.

<sup>1</sup>SPSS Training Department. <u>Introduction to SPSS Maps.</u> Chicago. 2000.

Texas Woman's University Texas Enrollment Distribution by County Map Fall Semester, 2005









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