**Summary Notes**

* Techniques for minimizing cognitive burden
  + Sparklines are tiny charts that show data trends.
  + A small multiple (also trellis chart, lattice chart, grid chart, or panel chart) is a series of similar graphs or charts using the same scale and axes, allowing them to be easily compared to show data trends over time.
* Elements of data science
  + Statistics
  + Programming
  + Communication and Visualization
  + Substantive Knowledge
* Regarding the distinction between space vs. place, per Chris Prener refer to pages 508-509 of the Logan reading.
* Space (and spatial thinking) is the process/idea of locating something on the earth’s surface, and understanding that something’s location relative to other things.
* Place is the social meaning tide to particular phenomena that are spatially rooted.
* Example:
  + We can find the latitude and longitude of a pebble in a parking lot (i.e. define it spatially) but that does not given inherent social meaning.
  + Whereas we can talk about places - like SLU’s campus or Morrissey Hall - as having both a spatial definition and a particular meaning.

**Additional Questions of Interest**

1. None

**Summary Notes**

* As of today, we have access to Morrissey Hall 24 hours a day, 7 days a week.
  + GIS Mapping Lab access code is 1553.
  + If police ask just tell them you’re on the approved list for after-hours access; it they insist that you vacate, leave the premises and inform Chris Prener.
* Push to the cloud; pull from the cloud.
* More commits generally provides a better chain of evidence.
* Fewer commits results in a de facto black box.
* Rule of thumb is to over document and include narrative to explain program code.
* Use of file types
  + .Rmd files are used for performing actions.
  + .md files are what Chris Prener and Brandon Syracuse review.
  + .html files are used to preview the output.
* For next week
  + We’ll discuss types of data.
  + Per Chris Prener, don’t worry about Part 2 (reproducible examples) of Lab-01.

**Summary Notes**

* GitHub Desktop changes identified by color:
  + Green indicates new file
  + Red indicates deleted file
  + Yellow indicates modified file
* String data is more useful for mapping (i.e., ArcGIS); not useful for statistical analysis.
* Logical data
  + 0 indicates False
  + 1 indicates True
* ArcGIS uses the term “qualitative data” for categorical data.
* ArcGIS uses the term “quantitative data” for ordinal data.
* Raster data are actually images.
* Vector data is the building block of mapping (i.e., used the most in mapping applications).
* Spatial autocorrelation is when some aspect of the data is correlated to itself.
  + Relates to Tobler’s First Law of Geography.
* We obtain boundary-related data primarily from the U.S. Census (i.e., Tiger Database).
* We obtain topographical data primarily from the U.S. Geological Survey.
* When mapping quantitative data, normalize it by expressing it variable of interest as a percent or ratio of some uniform variable.
* ArcGIS requires short variable names (i.e., less than 8 characters).

**Summary Notes**

* You have to use data from an R package when creating a reprex.
* At the local government level, the most accurate data tends to come from agencies that collect money.
* Centroid is the geographic middle.
* Latitude and longitude are defined in decimal degrees.
* Mapping presents problems when moving between projection/coordinate systems.
* Use ArcGIS to move shapefiles rather than the computer system file manager to avoid missing components.
* Shapefiles generally are open standard.
* Geodatabases (.gdb) are generally closed standard.
* Handrails are elements of a map that help map readers orient themselves.
* [www.colorhexa.com](http://www.colorhexa.com) provides color hex values.
* R draws maps top to bottom as listed in the geom function.
* ArcMap dataframe is a group of layers that make up a single map.
* Use ArcCatalog to manage data and copy files.
* Use ArcMap to create refined maps.

Final Project Workgroup18-08

* Met via Google Hangouts on Sunday, February 18, 2018.
* Decided:
  + Mike Markee will take responsibility for team member 1 work package.
  + Malcolm Townes will take responsibility for team member 2 work package.
  + Eleanor Bergquist will take responsibility for team member 3 work package.

**Summary Notes**

* Graduated symbols are tools of last resort when creating maps.
* Color palettes are also called color ramps.
* Ground level is used to orient the map reader.
  + Use lower contrast/neutral colors.
* Figure level contains the important features of the map to be studied.
  + Use higher contrast/bright colors.
* Achieve visual contrast through changes in color and pattern.
* Use high value hues for ground layer.
* Use low value hues for figure layer.
* Warm colors rise to into the foreground.
* Cool colors recede into the background.
* Every RGB has corresponding hex value.
* DO NOT use rainbow or ggplot2 default color ramps.
* ColorBrewer and viridis have good color ramps for people with color impairment.

**Summary Notes**

* Per Chris Prener, annotated bibliography is due after spring break.
* GISc Public Policy discussion
  + Idea for using GIScc to encourage and facilitate public participation
    - How might we:  
      Use GISc to enable crowdsourcing of potential construction and economic development projects by have citizens identify new business establishments and services needed in their communities and neighborhoods.
* Most cartographers use Adobe Illustrator for fine grain control map development (e.g., labels, etc.)
* For poster maps, use PowerPoint or Keynote to make the legend.
* Make posters using PowerPoint or Keynote.
* 1 pt approx. 1/72 inch
* It’s better to make scale indicators in ArcGIS.
* It’s hard for readers to distinguish more than 5 classes on a map.
* The ArcGIS paradigm is for printed maps.
* For the final project, make the reference maps in ArcGIS.
* Map layouts in ArcGIS
  + Double click dataframe to get to the coordinate system.
  + Use the Layout View to make the map layout after you’re satisfied with the data.
  + Remove neat lines from the dataframes.

**Summary Notes**

* No class on Monday of Spring Break (i.e., 3/12/2018).
  + No lecture prep
  + No problem set
  + No policy discussion
* We DO have class the Monday of Easter Break (i.e., 4/2/2017)
* Character data (string data)
  + Missing data is NOT the same as empty data.
  + Recode empty data as missing data (NA).
* miss\_case\_summary identifies the observations with the most missing data.
  + Different path for arriving at much the same place as miss\_var\_summary.
* There are three (3) different types of Esri geodatabases
  + Personal 🡪 DO NOT USE
  + File 🡪 Use for class
  + Enterprise 🡪 DO NOT USE
* To convert a shapefile to a geodatabase
  + Export > To Geodatabase (single)…
  + Output feature class is simply the name of the feature class
  + This is an irrevocable process so its best practice to keep a copy of the raw shapefile
* Use geodatabases to perform analysis, not shapefiles
  + Geodatabases are more efficient, robust
* R functions
  + str\_detect() is case sensitive.
  + str\_replace() replaces only the first instance of a string in each observation.
  + str\_replace\_all() replaces all instances of a string in each observation.

**Summary Notes**

* NO CLASS – spring break
* Viewed lecture videos posted on YouTube.

**Summary Notes**

* There is less chance of making unintended changes to the data when you manipulate character data.
* If variables in a join are different types, it’s recommend that you change the numeric variable to a character variable.
* When joining data tables in R, it doesn’t matter if the data is sorted.
* Eliminate unnecessary variables in the data before joining to avoid data bloat.

**Summary Notes**

* Decimal values 🡪 use NAD 1984 was used to project data
* Large numbers 🡪 use UTM to project the data
* Small number with large decimals 🡪 use longitude and latitude to project data
* Frequently used projection coordinate systems:
  + NAD 1983
  + NAD 1983 Stateplane Missouri East FIPS 2401 (U.S. feet)
  + NAD 1983 UTM zone 15N
* In ARcGIS, export data in coordinate system for the dataframe.
  + The default is the coordinate system for the data source.
  + Use Toolbox function to change coordinate system of data.
* Workgroup must decide on a projected coordinate system to use for the project.

**Summary Notes**

* Leaflet() doesn’t project UTM coordinates.
  + Export the data and open in ArcGIS to check if the projection is acceptable.
* When you bind data you append one set of data to the bottom of another whereas as when you join data you attach one set of data to the left or right of another (e.g., left join).
* When binding data, the two datasets must be of the same type of object (i.e., both SF objects or both tabular objects).
* When performing joins, SF objects can’t be the right object in a left join.

**Summary Notes**

* Do NOT store annotation in ArcMap map; store them in an ArcMap geodatabase.
* Dissolve only goes up on spatial order.
  + Used primarily when you care about the geometry and not the data.

**Summary Notes**

* Usually you should use the ArcGIS Merge function on data that does NOT overlap.
* The ArcGIS Clip function only modifies the geometry data.
* The ArcGIS Intersect function modifies both the geometry and attribute data.