Visualising world data

Andy South
andysouth.co.uk
@southmapr

Software Sustainability
Research Data Visualisation Workshop
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What's the AIM© of your visualisation ?

1. Attract
2. Inform
3. Motivate
   - to read your tweet
   - cite your paper
   - remember
   - do something

andysouth.co.uk

2000 2006 2010 2012 2016

biology

data visualisation

programming

Figure 1 A solid fruit pictogram has a low level of abstraction for children

Pattern Seeking

Science & mathematics

DEVELOPING CREATIVITY AND ABSTRACTION IN REPRESENTING DATA

There are many ways to represent data. Andy South shares some ideas for doing this and shows how they all relate to the use of symbols, size, colour and position

The world has entered the 'Information Age' with unprecedented access to data and information. The livelihoods and leisure time of adults are increasingly dependent upon their ability to access and interpret information. Graphic designers, IT wizards and scientists are addressing the problem of how to represent data in simple, accessible and visual ways such that it becomes useful information. We now see more data graphics in our newspapers and on television about everything from sport to climate change to election results. Children will need to develop the skills to interpret information presented in a diversity of ways.

Abstraction

Creating charts and graphs is all about abstraction. The way in which the data are represented can be abstract to children as they try to make the link between the 'real' and the 'image' of the information they have produced.

This abstraction can be achieved using symbols, size, colour and position. Where the representation is close to what we are representing, abstraction is relatively low; for example, using colours to represent favourite colours or pictures to represent favourite fruit. Abstraction is higher when the size or position of the symbols is used to represent quantities; for example, bars on a chart or points on a graph. These abstractions are not obvious to all children and need to be taught.

Data can be represented using solid objects, paper and computer graphics. To help children develop the skills to understand such abstractions we can challenge them to create and interpret representations in a diversity of ways.

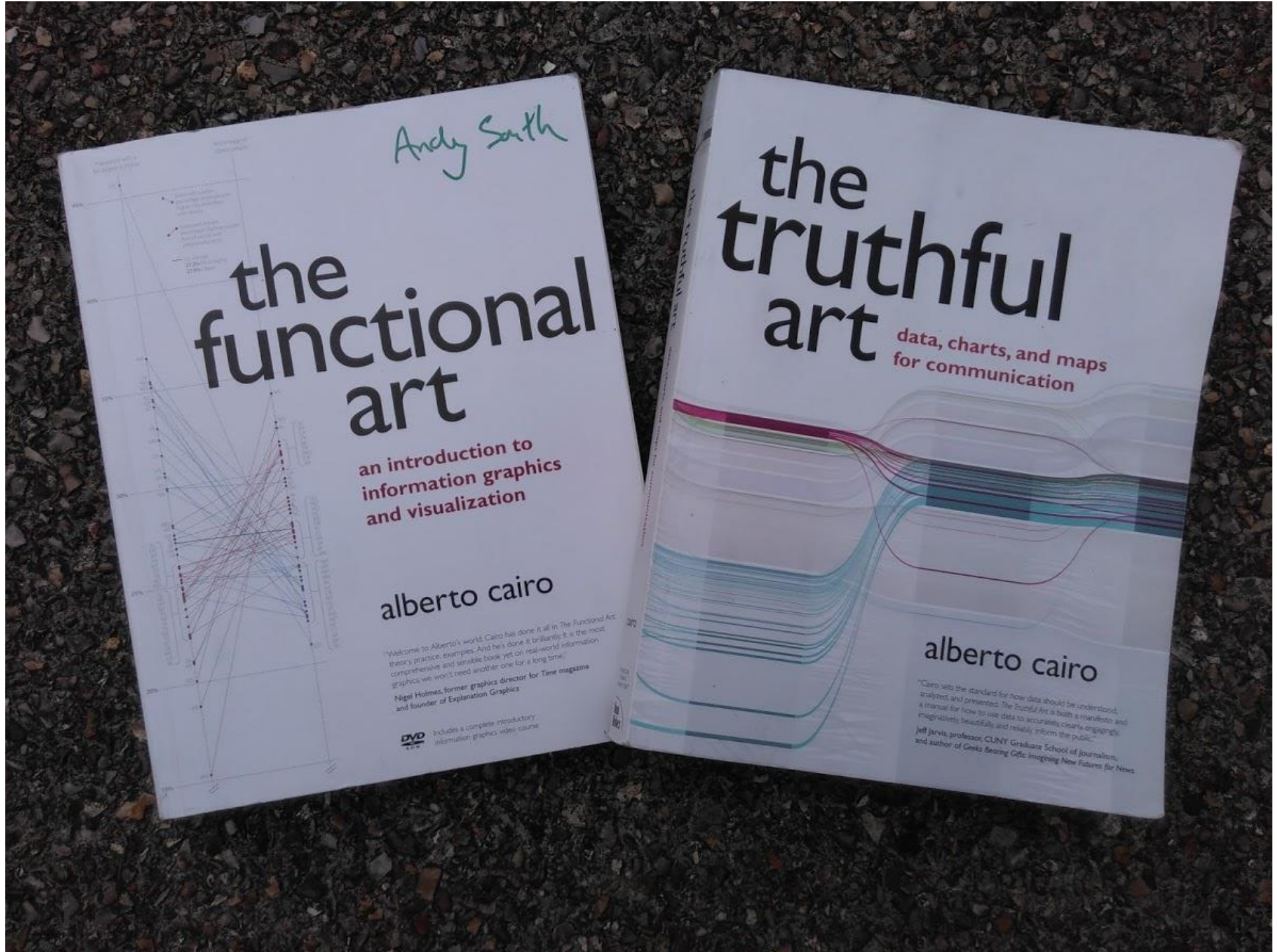
Solid representations

At the lowest level of abstraction, children can use real objects to create a solid pictogram. Because the children are using the items themselves to create a

Key words:
Enquiry skills
Cross curricular

datavis for 8 year olds

http://www.academia.edu/4460518/Developing_creativity_and_abstraction_in_representing_data


Andy Smith
the functional art
an introduction to information graphics and visualization
alberto cairo
"Welcome to Alberto's world. Cairo has done it all in The Functional Art: theory, practice, examples. And he's done it brilliantly. It is the most comprehensive and sensible book yet on real-world information graphics; we won't need another one for a long time."
Nigel Holmes, former graphics director for Time magazine and founder of Explanation Graphics
DVD
Includes a complete introductory information graphics video course
the truthful art
data, charts, and maps for communication
alberto cairo
"Cairo sets the standard for how data should be understood, analyzed, and presented. The Truthful Art is both a manifesto and a manual for how to use data to accurately, clearly, engagingly, imaginatively, beautifully, and reliably inform the public."
Jeff Jarvis, professor, CUNY Graduate School of Journalism, and author of Geeks Bearing Gifts: Imagining New Futures for News

One definition

“data visualisation[s] …enable analysis, exploration and discovery … aren’t intended mainly to convey messages that are pre-defined … tools that let people extract their own conclusions from data.”

Alberto Cairo, The Truthful Art. 2016

Tensions (not absolute rules)

Defined message ⟷ Encouraging exploration

Originality ⟷ Tried & tested

Simplicity ⟷ Including uncertainty

Journal of the American Statistical Association, September 1984

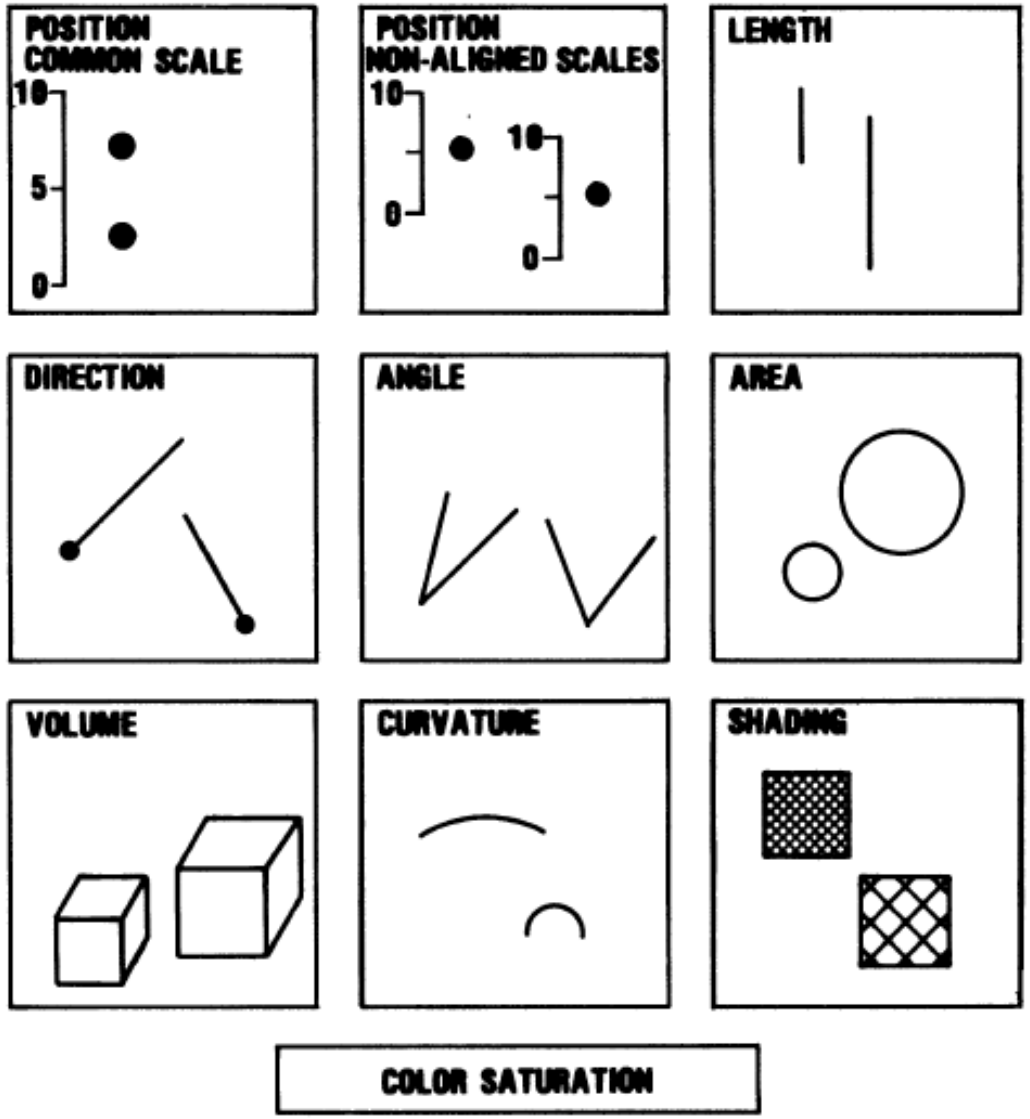
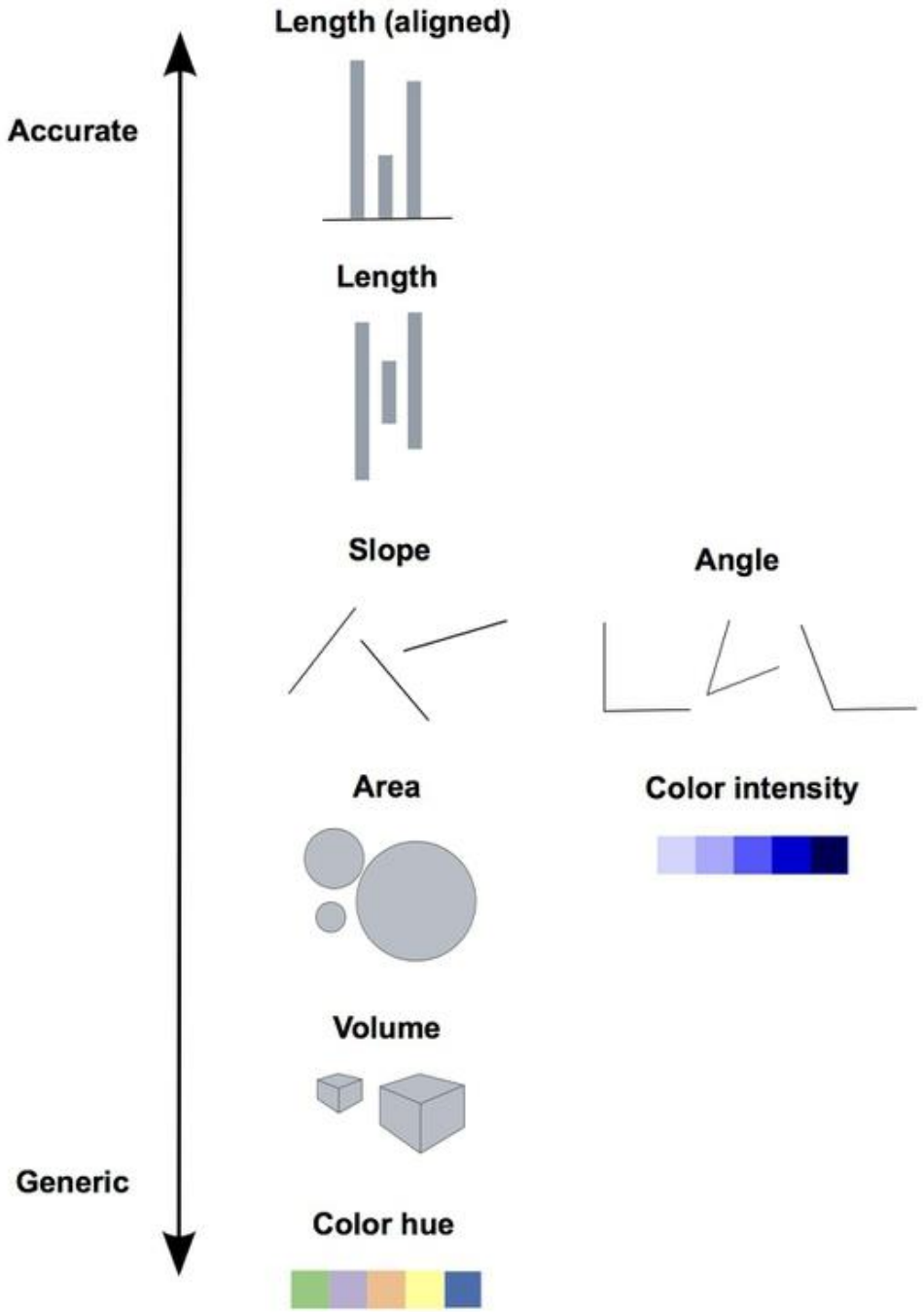


Figure 1. Elementary perceptual tasks.

Graphical Perception: Theory, Experimentation, and Application to the Development of Graphical Methods

WILLIAM S. CLEVELAND and ROBERT McGILL*

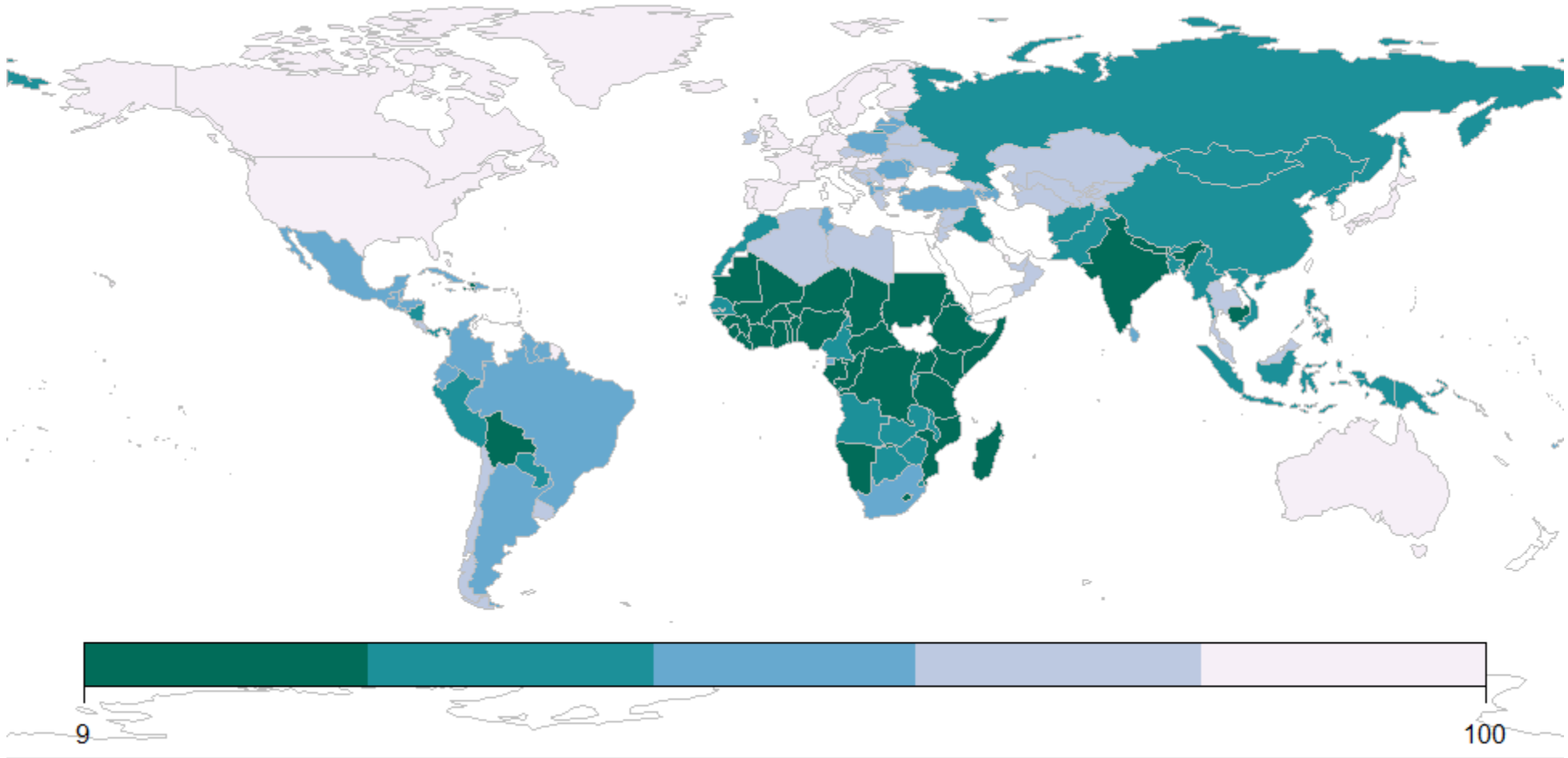


http://paldhous.github.io/NICAR/2016/infodesign.html

Questions I ask myself when choosing a datavis method ?

1. Is it free & open ?
2. Can I learn it in a ~~day~~ few hours ?
3. Does it make pretty things ?
4. Does it follow good visualisation practice ?
5. Is it flexible enough to do the complicated thing at the end that I didn't realise I'd need to do when I started …

Access to Sanitation 2005



What might you want to say with world data ?

Geographical pattern

Identify key countries quickly

Ranking

Extremes

Hey! Look at my data

Hey! Use my vis method

Difficulties with world maps

countries are different sizes & shapes

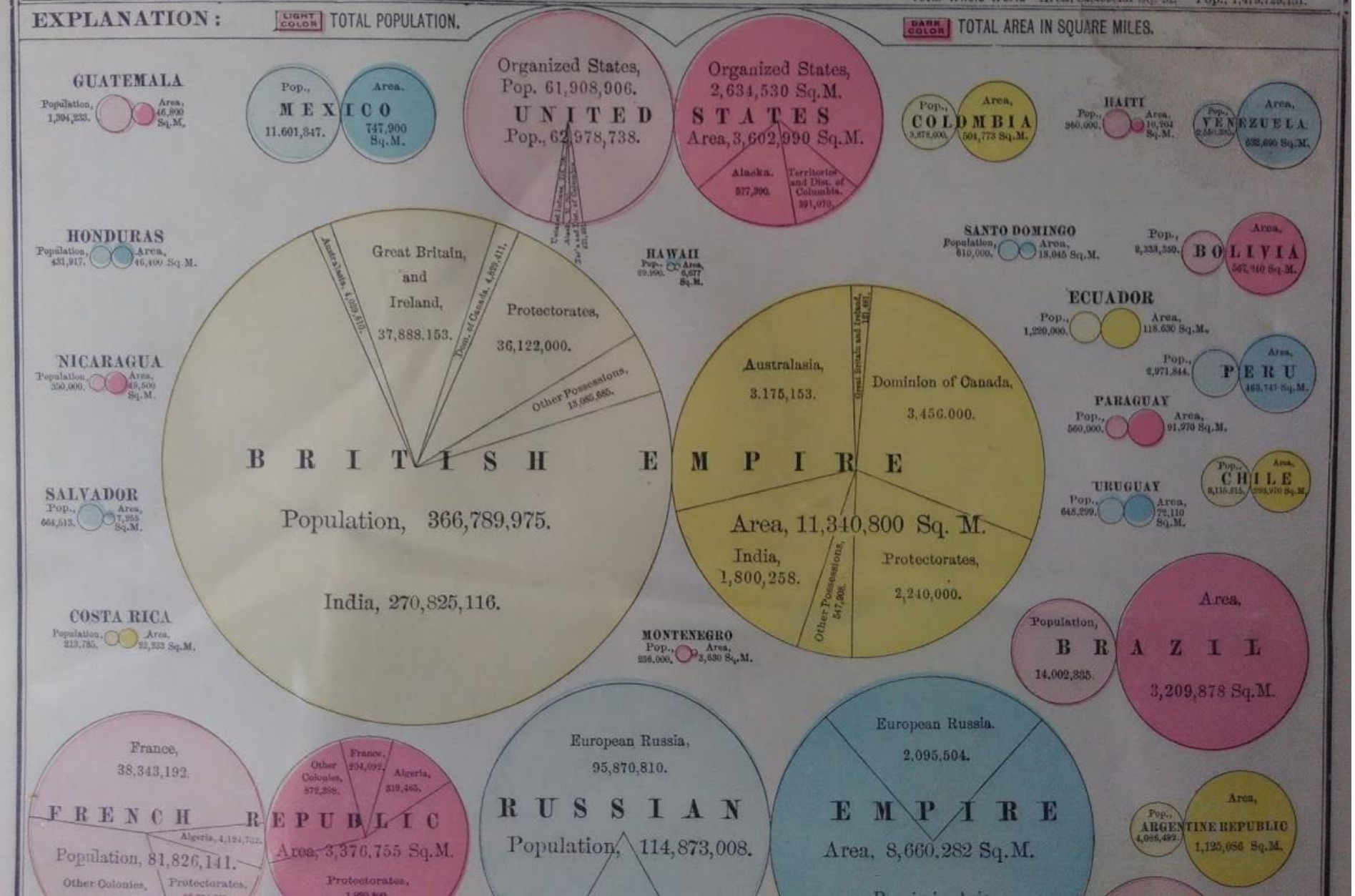
there are too many countries

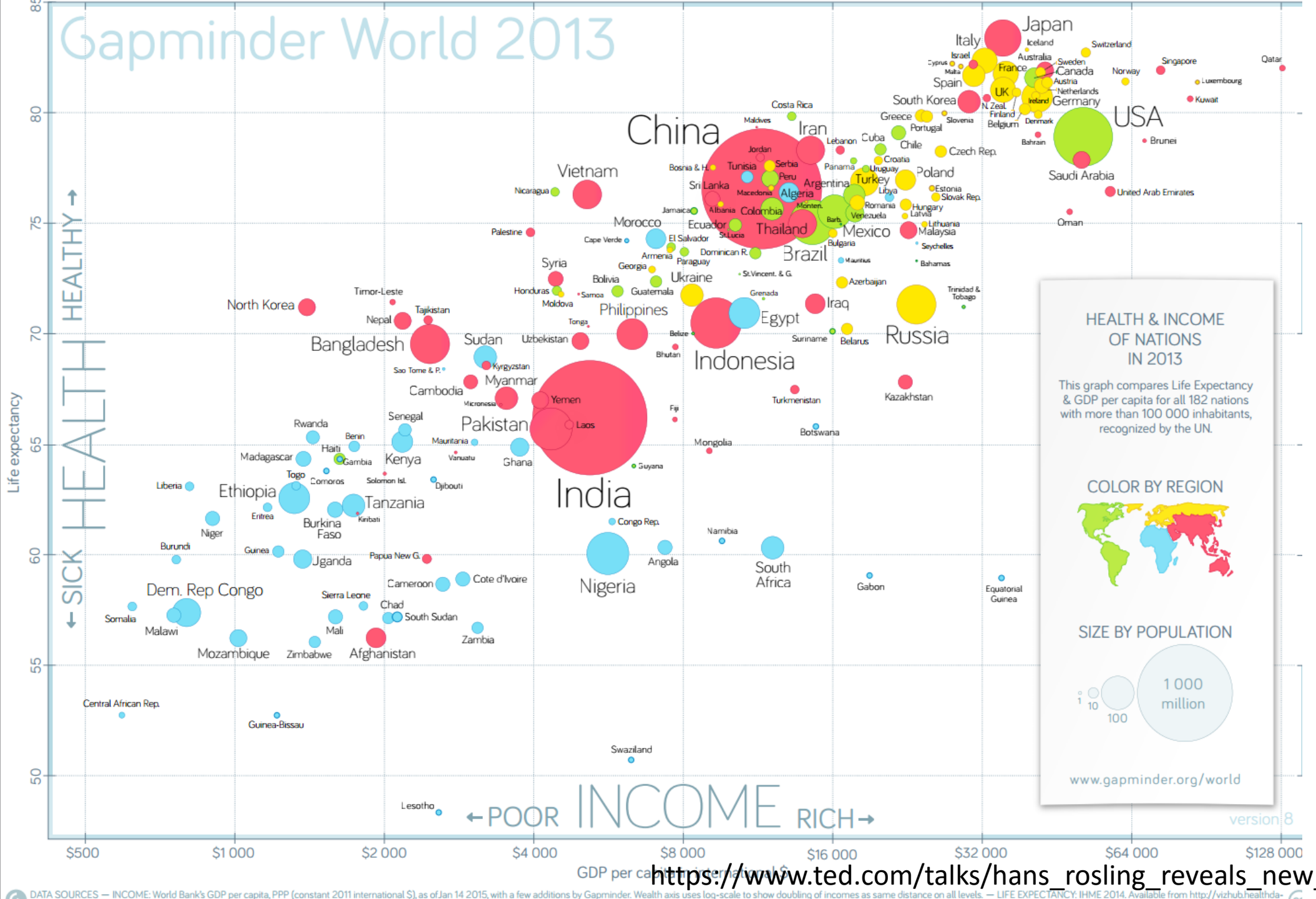
your reader is unlikely to know where all countries are

some countries are too small & disappear

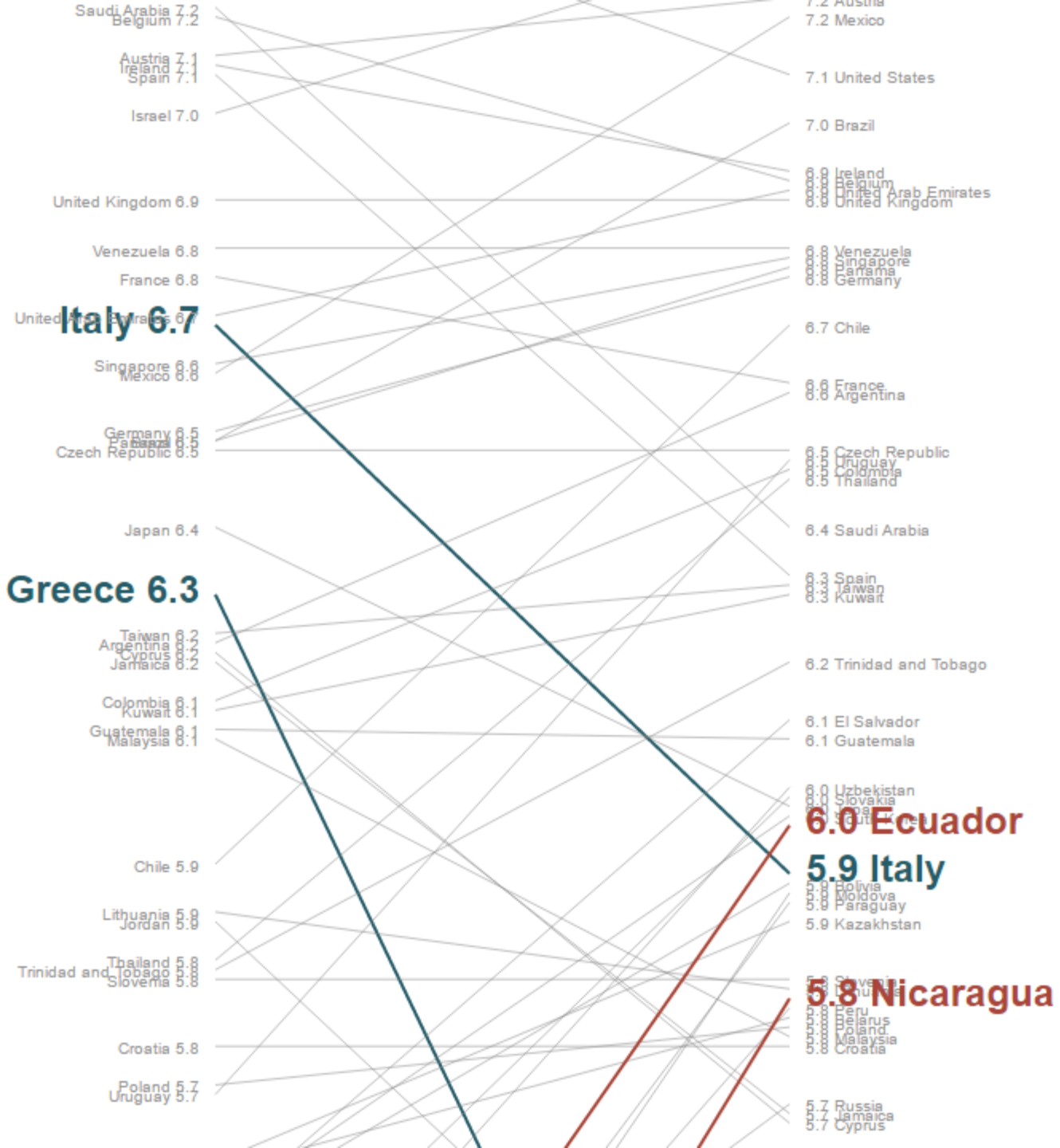
Area and Population of Foreign Countries, compared with the United States, 1890.

Total of Countries Specified in this Diagram—Area, 45,962,806 Sq. M. Pop., 1,421,017,957. *Total Whole World*—Area, 52,299,431 Sq. M. Pop., 1,479,729,151.



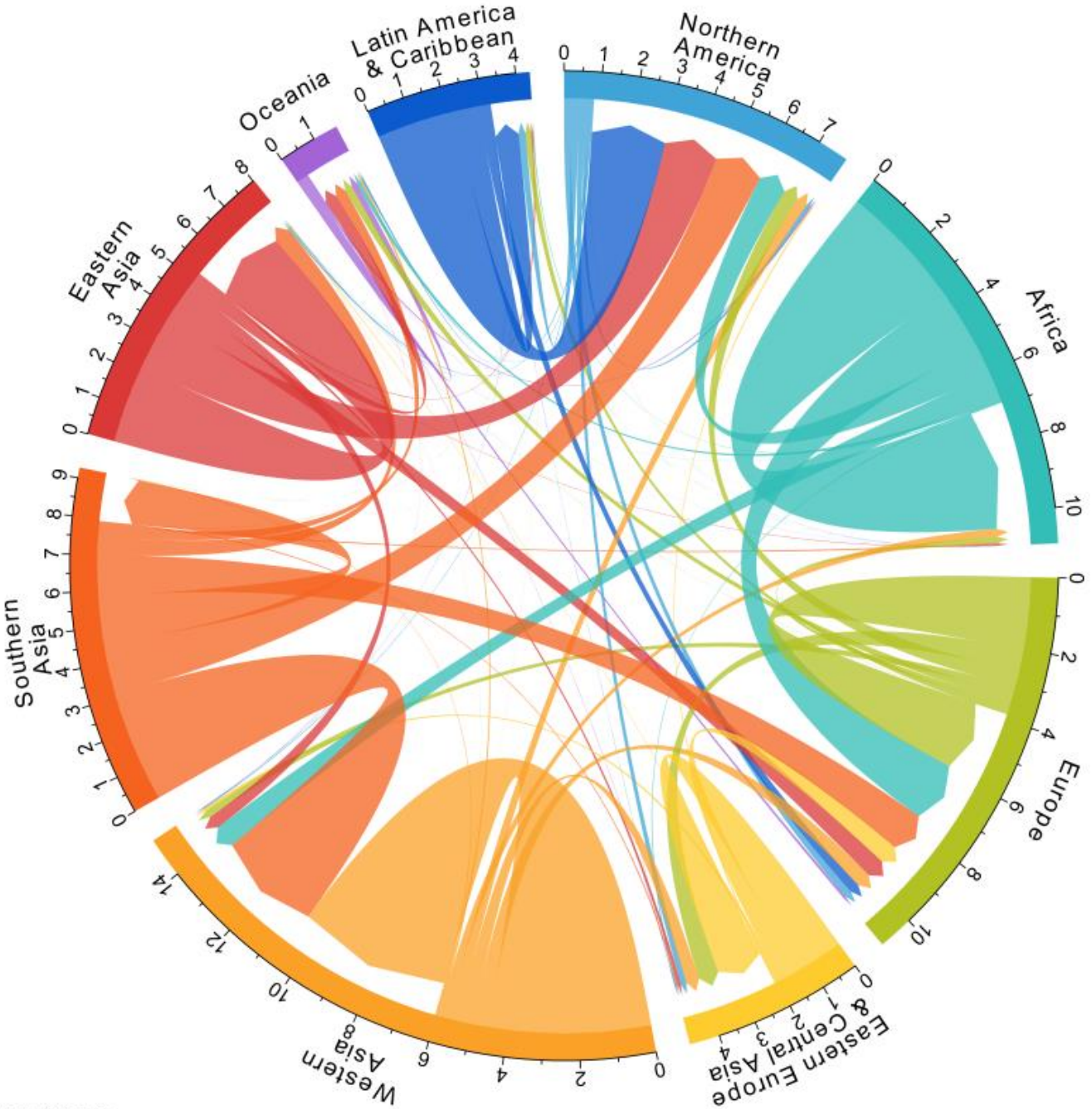


https://www.ted.com/talks/hans_rosling_reveals_new_insights_on_poverty



slope graph

http://thedatajournalist.github.io/happiness/

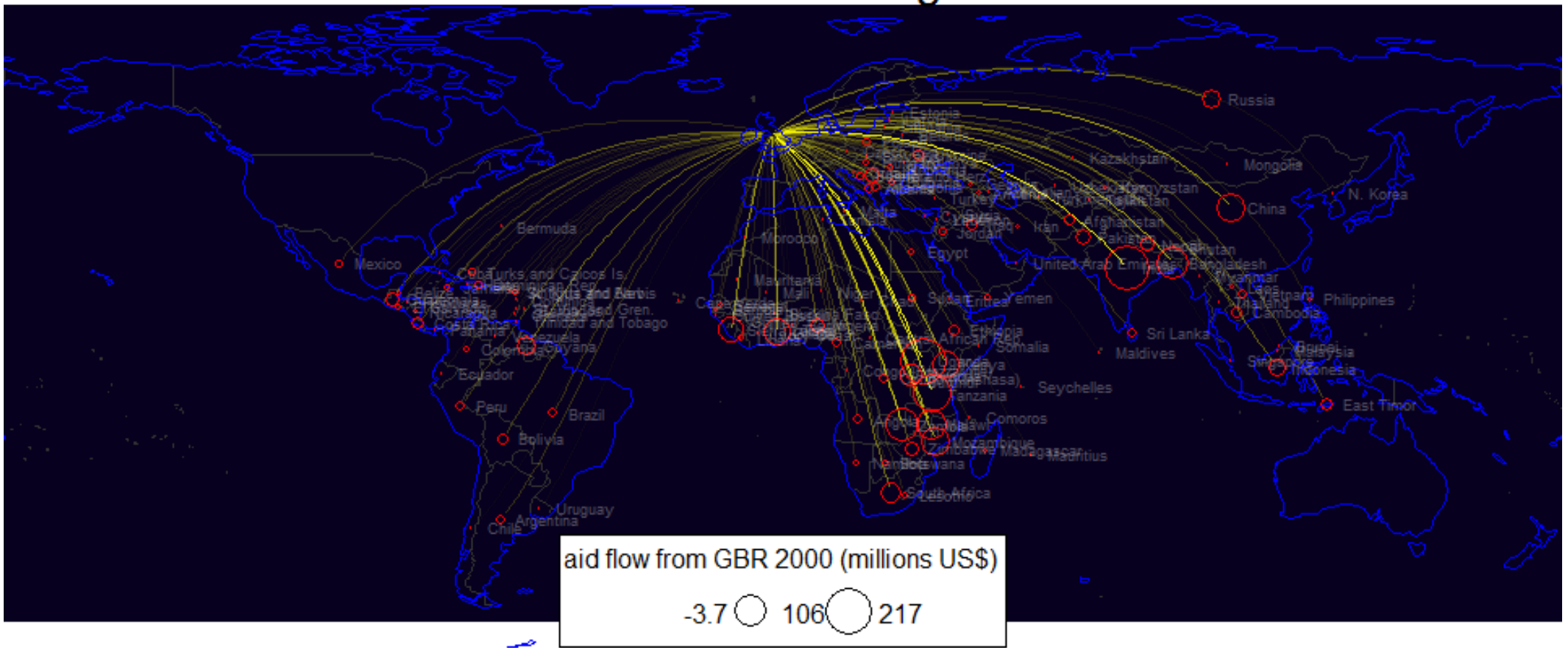


Based on estimates from:
Abel G.J. (2016) *Estimates of Global Bilateral Migration Flows by Gender between 1960 and 2015*. Vienna Institute of Demography Working Papers. 2/2016

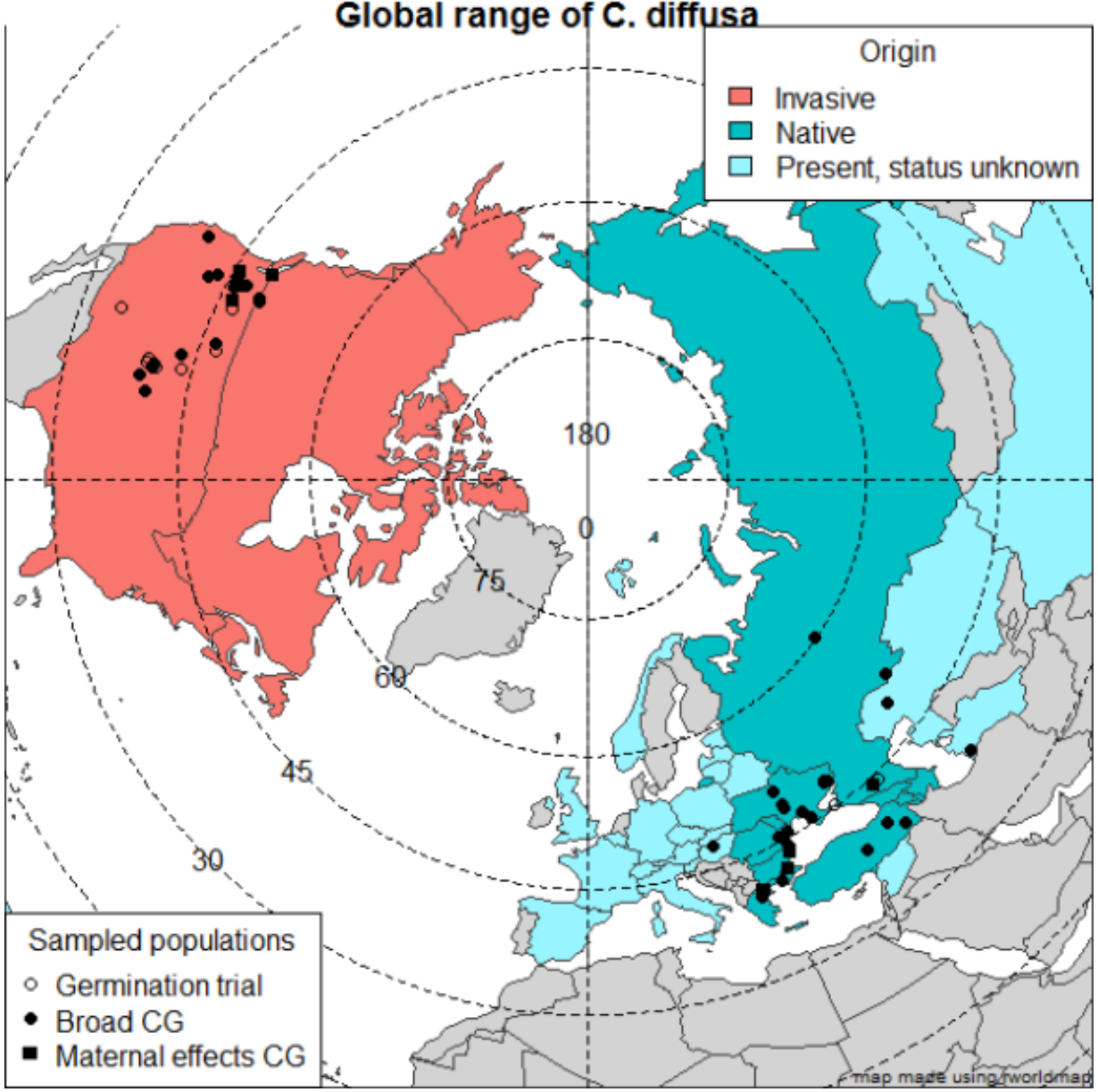
https://gjabel.wordpress.com/2016/05/18/updated-circular-plots-for-directional-bilateral-migration-data/

https://medium.com/airbnb-engineering/using-r-packages-and-education-to-scale-data-science-at-airbnb-906faa58e12d

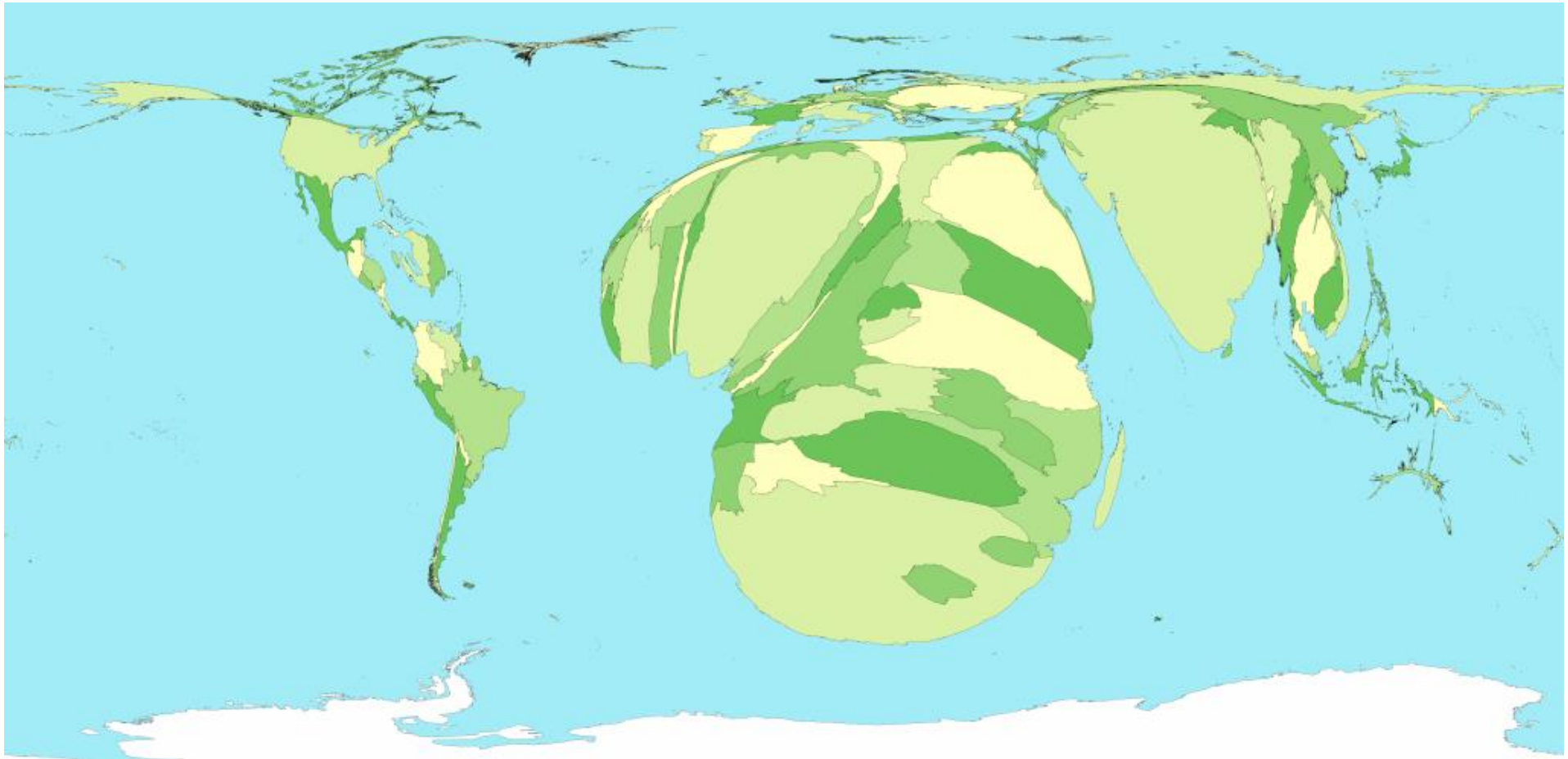
Aid flow from United Kingdom 2000



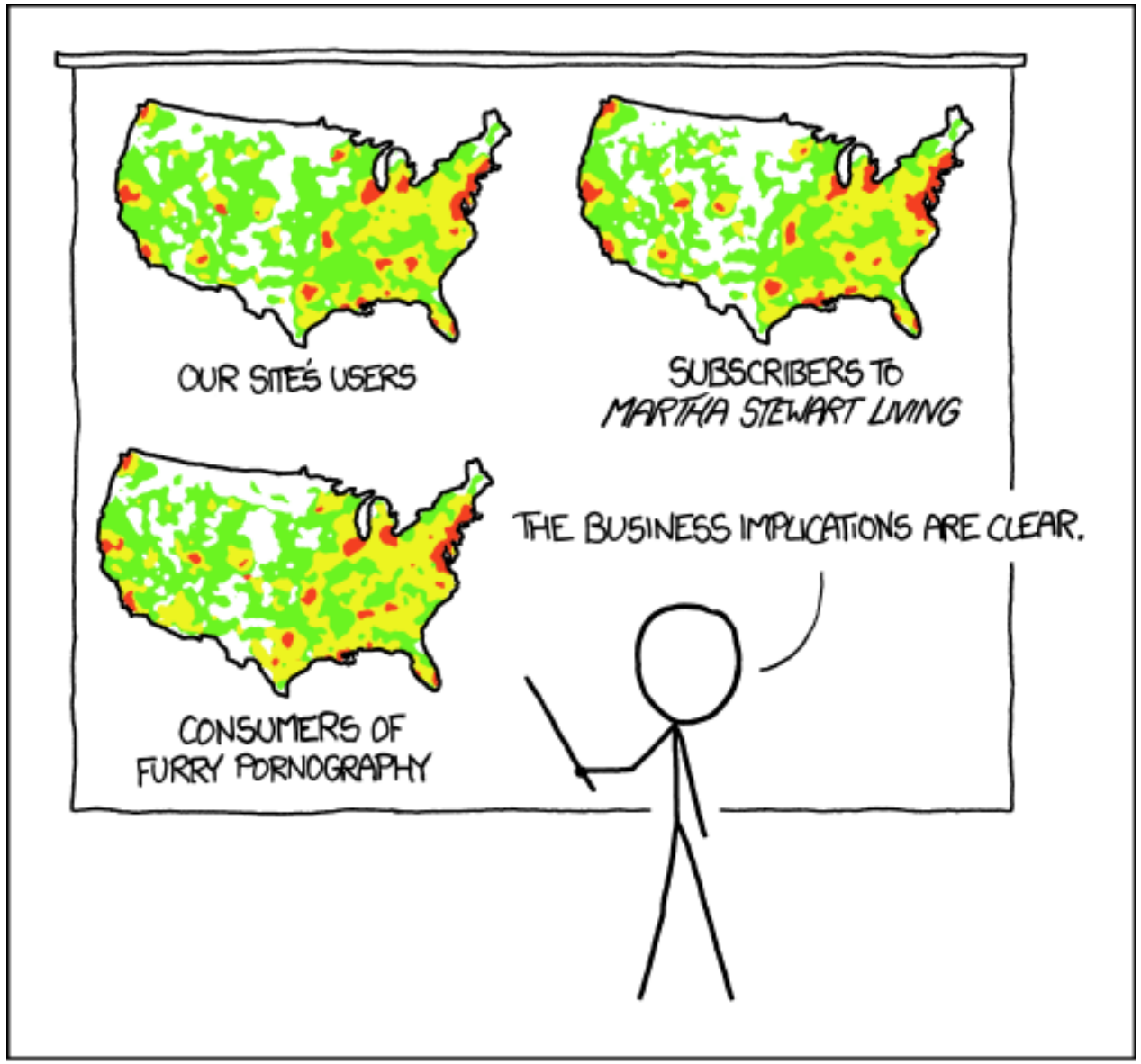
http://stackoverflow.com/a/19695755/1718356



https://alienplantation.wordpress.com/2013/06/18/nuts-and-bolts-modern-maps-of-eurasia-in-r/



Cartogram by Mark Newman : http://www.omegahat.org/Rcartogram/



PET PEEVE #208:
GEOGRAPHIC PROFILE MAPS WHICH ARE BASICALLY JUST POPULATION MAPS

HTTP://XKCD.COM/1138/

How good are rows at doing columns ?	Geographic pattern	Ranks	Attract attention
Choropleth			
Bubbles			
Slope graphs			
Cartograms			

The end of the rainbow

November 18, 2014 communication, journals, visualisation Ed Hawkins

An open letter to the climate science community

Ed Hawkins, Doug McNeall, David Stephenson, Jonny Williams & Dave Carlson

Dear colleagues,

This is a heartfelt plea.

A plea to you all to help rid climate science of colour scales that can distort, mislead and confuse. Colour scales that are often illegible to those who are colour blind.

The main culprit is, of course, the 'rainbow':

#endrainbow

http://www.climate-lab-book.ac.uk/2014/end-of-the-rainbow/

The R Journal Vol. 3/1, June 2011

rworldmap: A New R package for Mapping Global Data

by Andy South

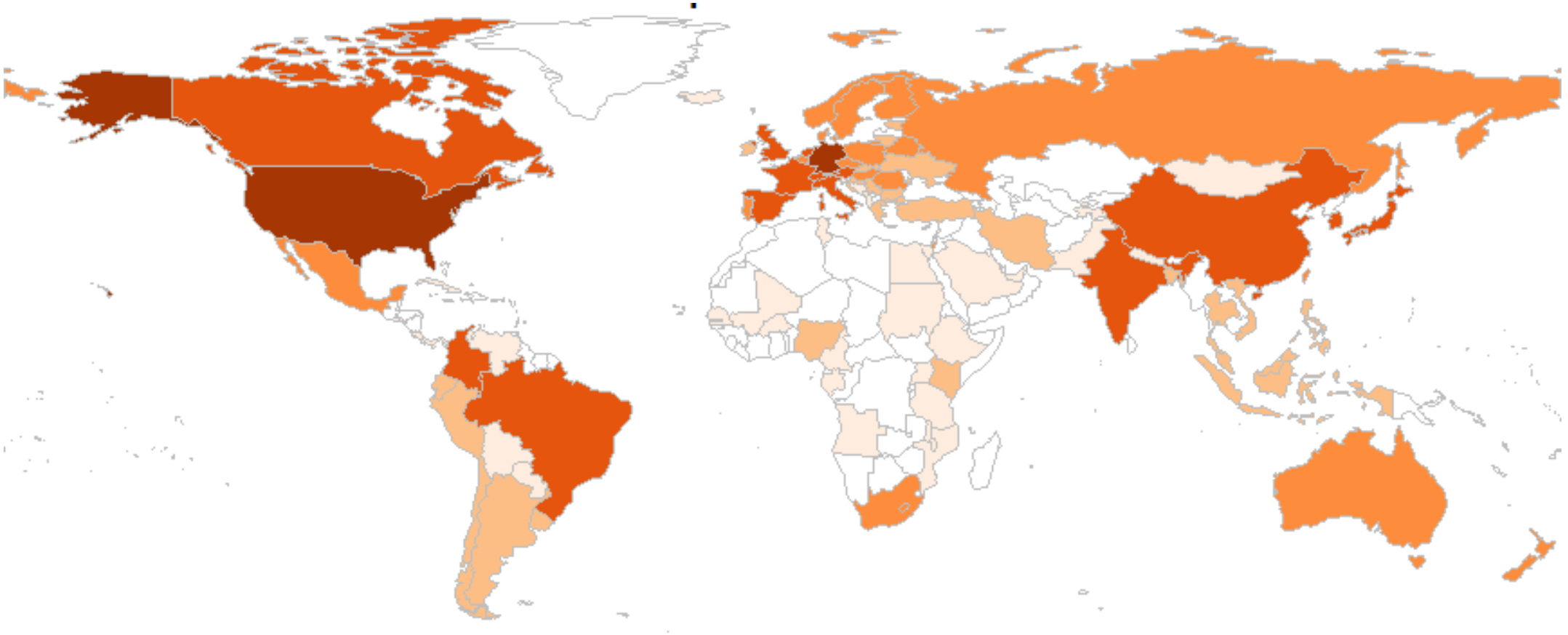
Abstract **rworldmap** is a relatively new package available on CRAN for the mapping and visualisation of global data. The vision is to make the display of global data easier, to facilitate understanding and communication. The initial focus is on data referenced by country or grid due to the frequency of use of such data in global assessments. Tools to link data referenced by country (either name or code) to a map, and then to display the map are provided as are functions to map global gridded data. Country and gridded functions accept the same arguments to specify the nature of categories and colour and how legends are formatted. This package builds on the functionality of existing packages, particularly **sp**, **maptools** and **fields**. Example code is provided to produce maps, to link with the packages **classInt**, **RColorBrewer** and **ncdf**, and to plot examples of publicly available country and gridded data.

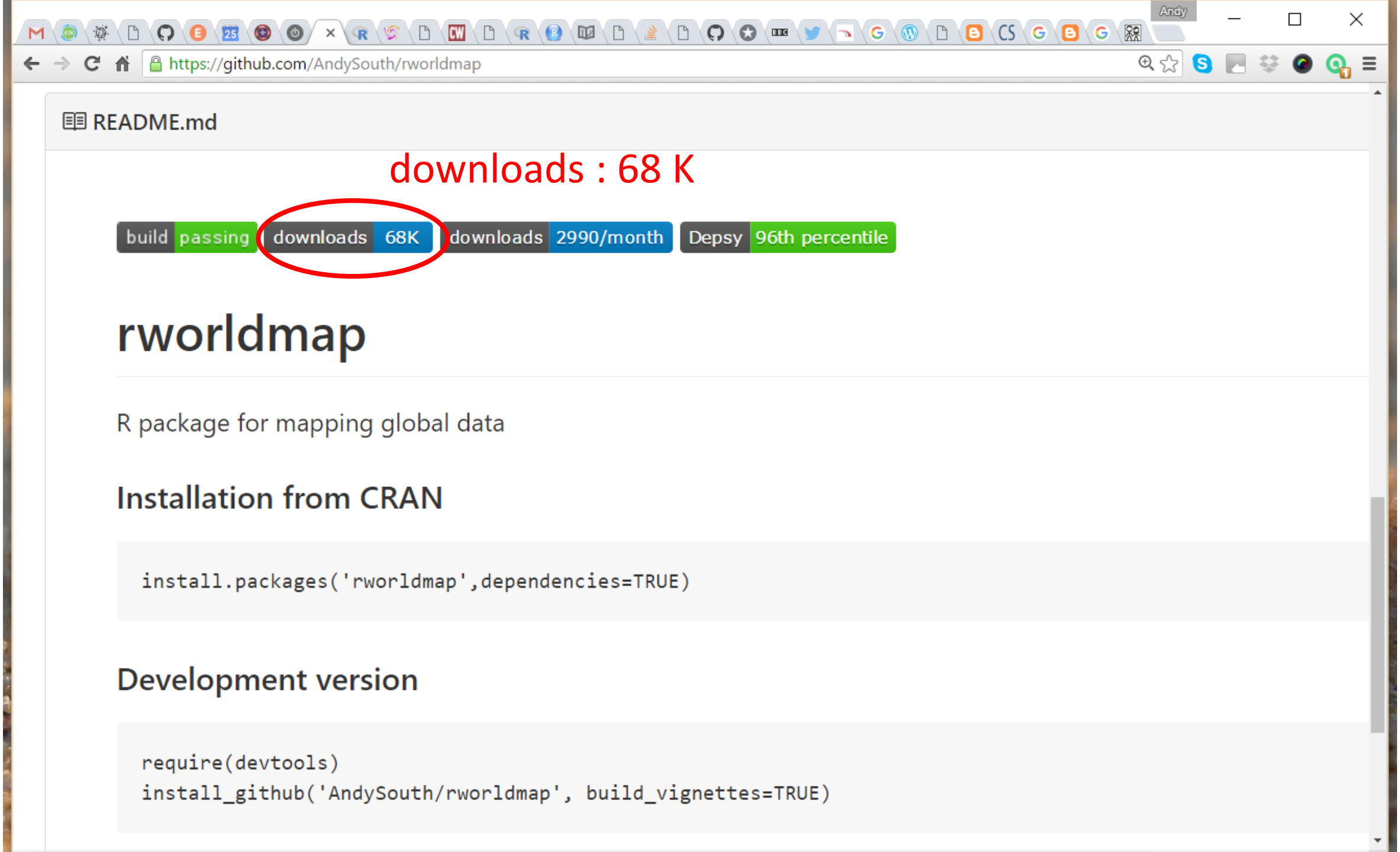
There appears to be a gap in the market for free software tools that can be used across disciplinary boundaries to produce innovative, publication quality global visualisations. Within R there are great building blocks (particularly **sp**, **maptools** and **fields**) for spatial data but users previously had to go through a number of steps if they wanted to produce world maps of their own data. Experience has shown that difficulties with linking data and creating classifications, colour schemes and legends, currently constrains researchers' ability to view and display global data. We aim to reduce that constraint to allow researchers to spend more time on the more important issue of what they want to display. The vision for **rworldmap** is to produce a package to facilitate the visualisation and mapping of global data. Because the focus is on global data, the package can be more specialised than existing packages, making world mapping easier, partly because it doesn't have to deal with detailed local maps. Through **rworldmap** we aim to make it easy for R users to explore their global data and also to produce publication quality figures from their outputs.

http://journal.r-project.org/archive/2011-1/RJournal_2011-1_South.pdf

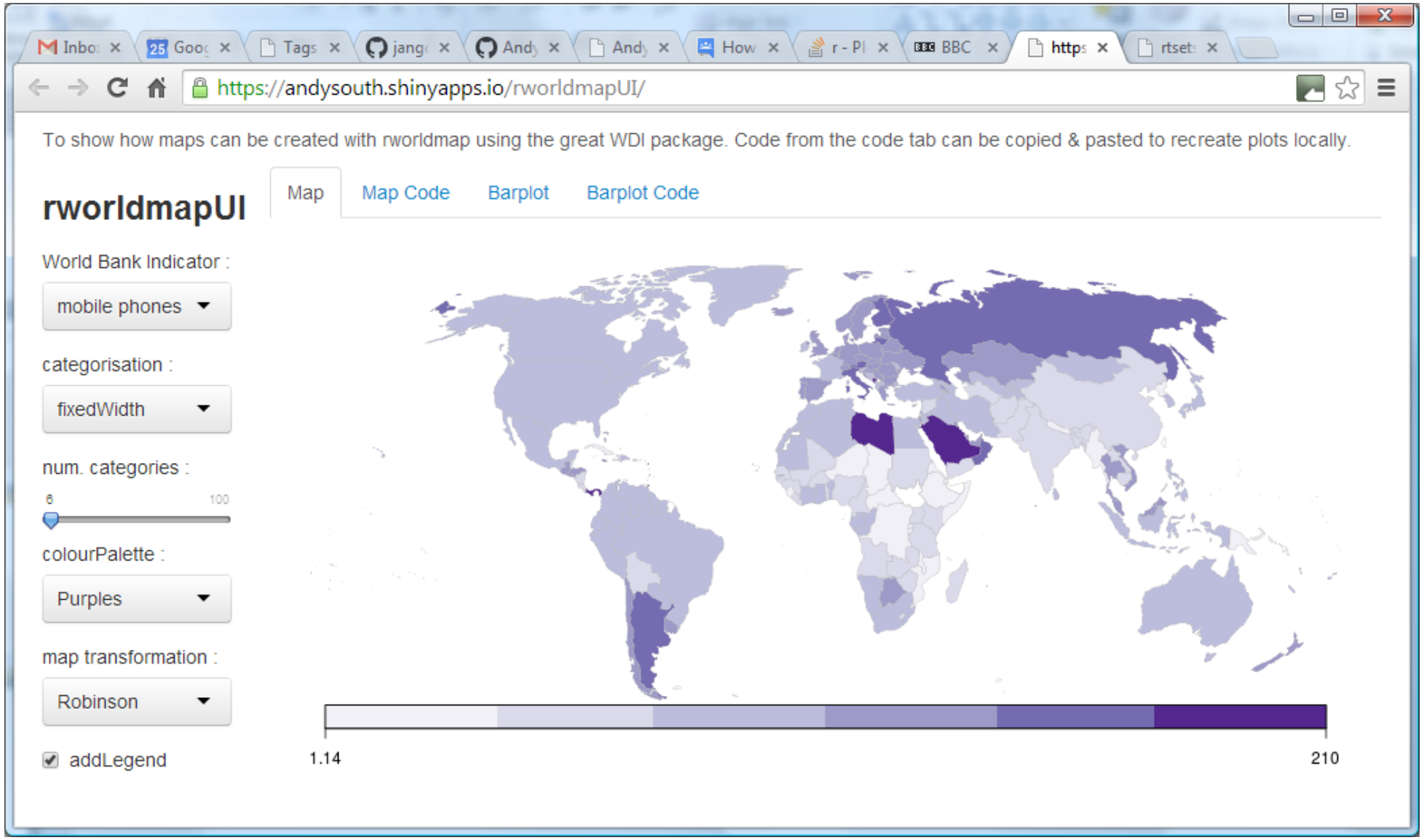
Meta-mapping

(using rworldmap to map the downloads of rworldmap)




https://github.com/AndySouth/rworldmap
README.md
downloads : 68 K
build passing
downloads 68K
downloads 2990/month
Depsy 96th percentile
rworldmap
R package for mapping global data
Installation from CRAN
install.packages('rworldmap',dependencies=TRUE)
Development version
require(devtools)
install_github('AndySouth/rworldmap', build_vignettes=TRUE)

shiny



https://andysouth.shinyapps.io/rworldmapUI/

recap

- What’s your main AIM : Attract, Inform or Motivate ?
- Assess trade-offs of different methods
- Lots of great resources out there
- & opportunities to contribute

Further reading :

- https://medium.com/@kennelliott/39-studies-about-human-perception-in-30-minutes-4728f9e31a73#.ncjiy0js5
- http://www.storybench.org/understanding-what-makes-a-visualization-memorable/