

USING TYPE *to* **ADD DATA** *to* **DATA VISUALIZATIONS**

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PhD Research Synopsis
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supervisor: Ebad Banissi

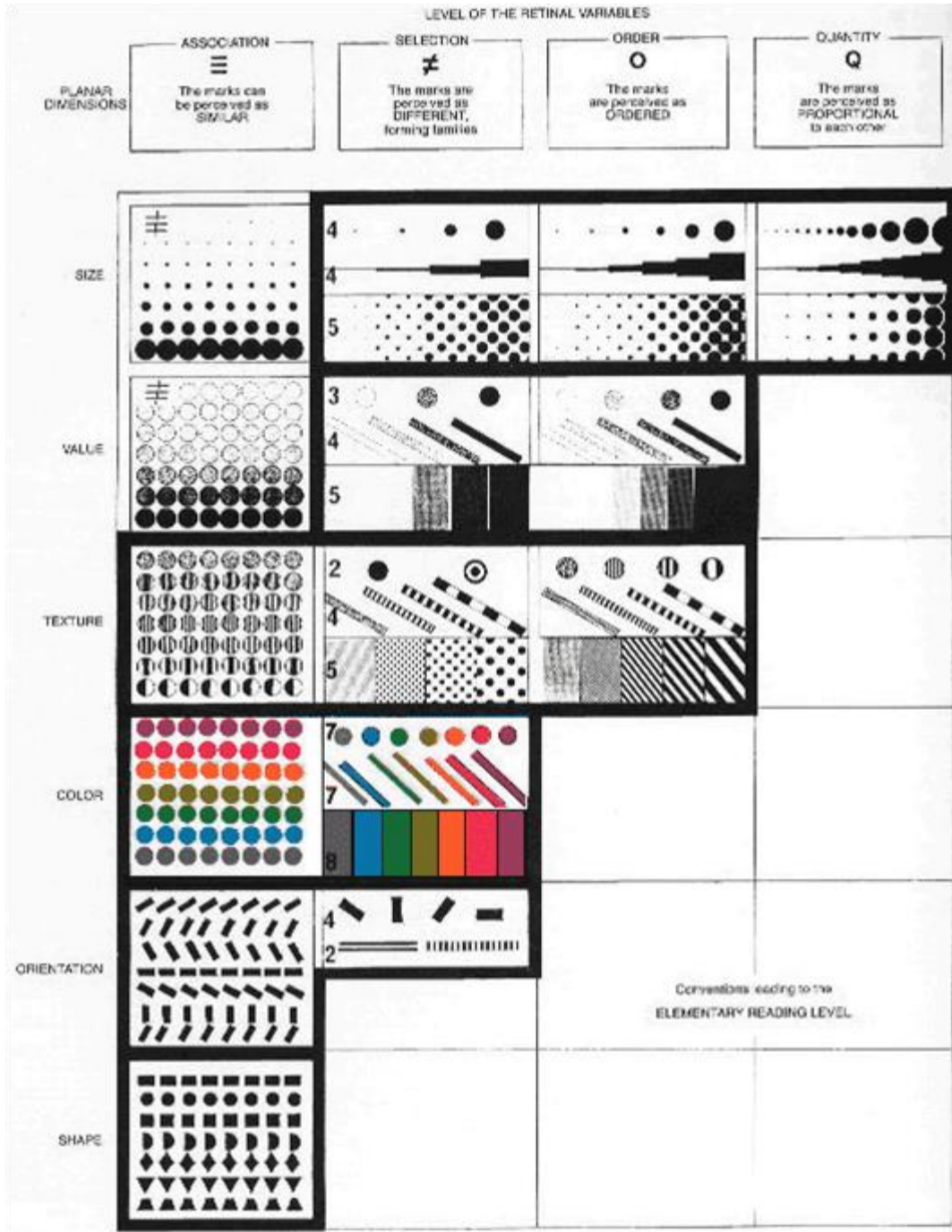
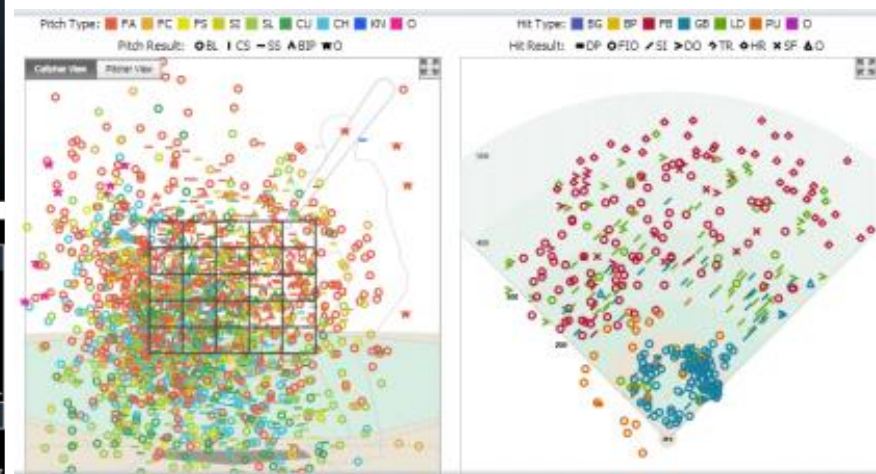
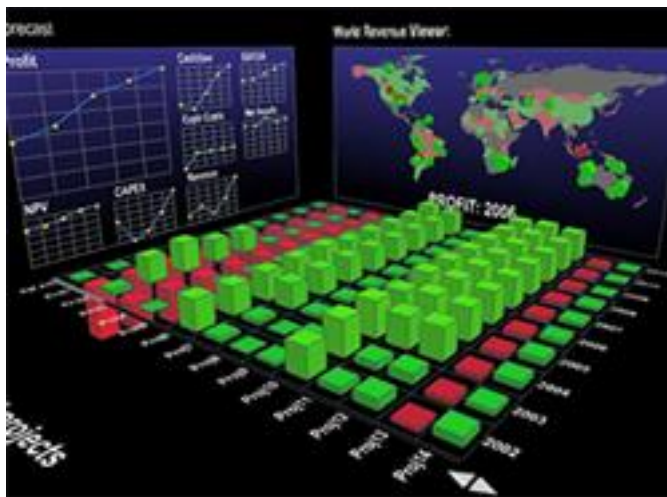
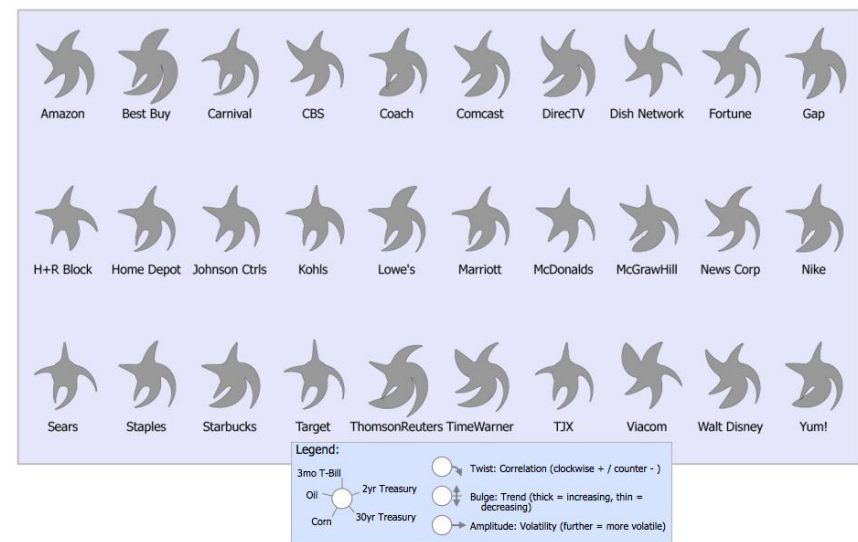
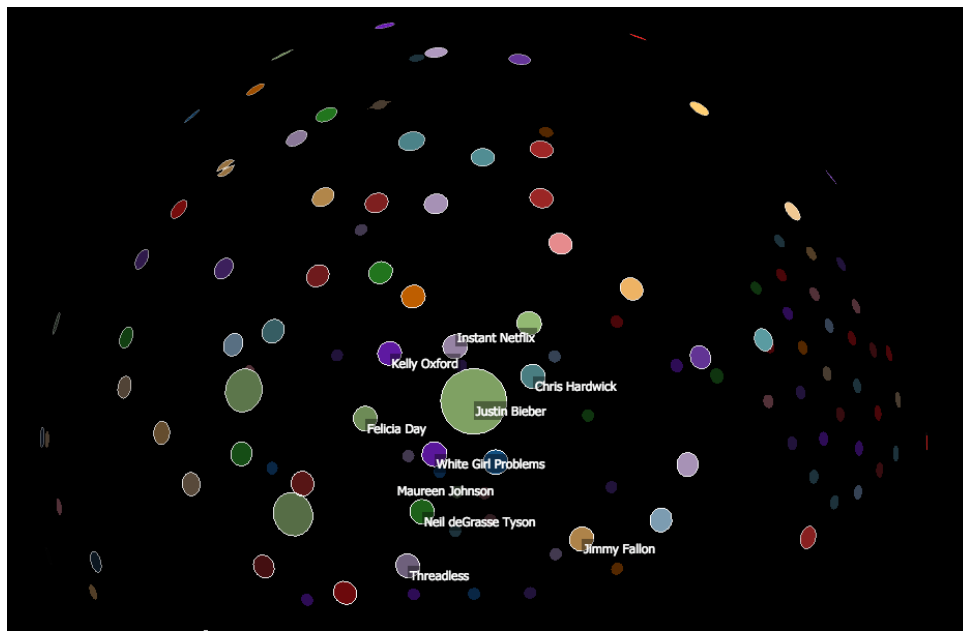
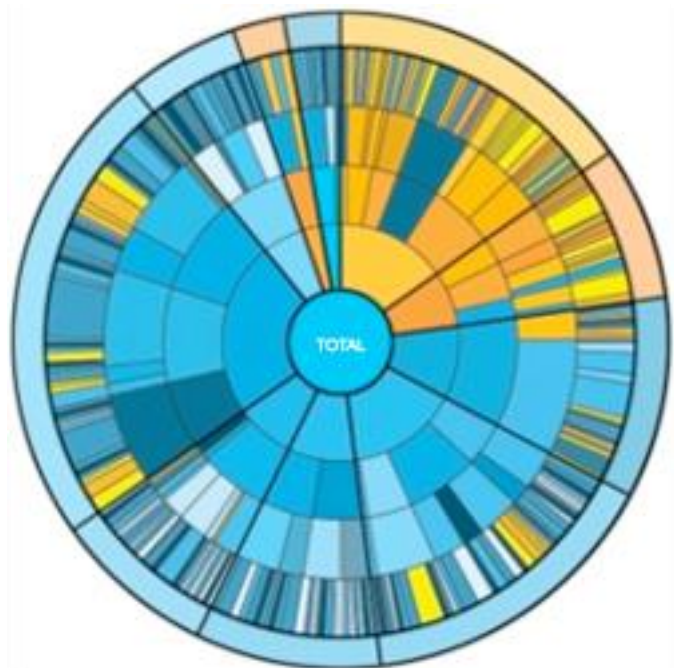
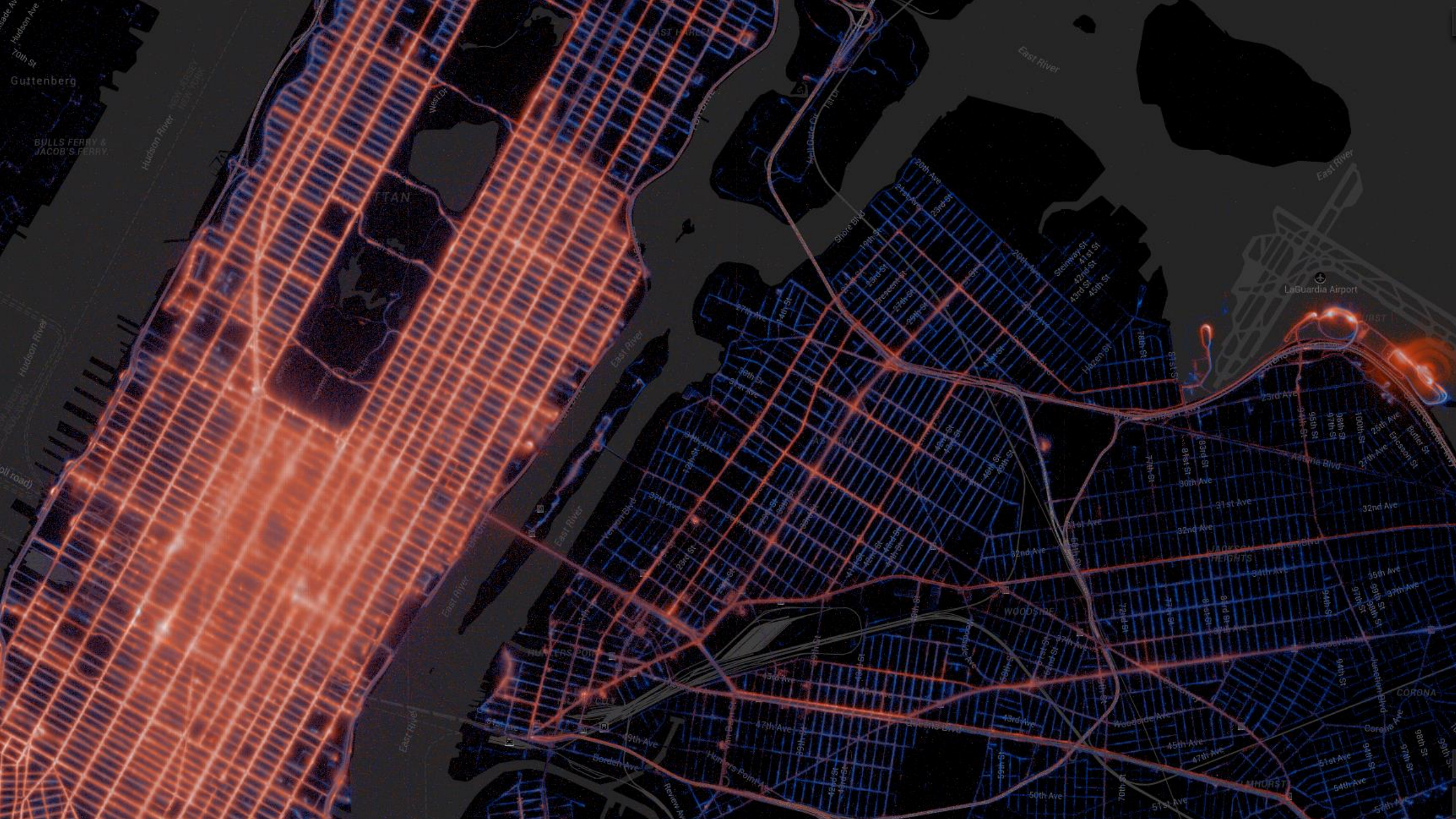


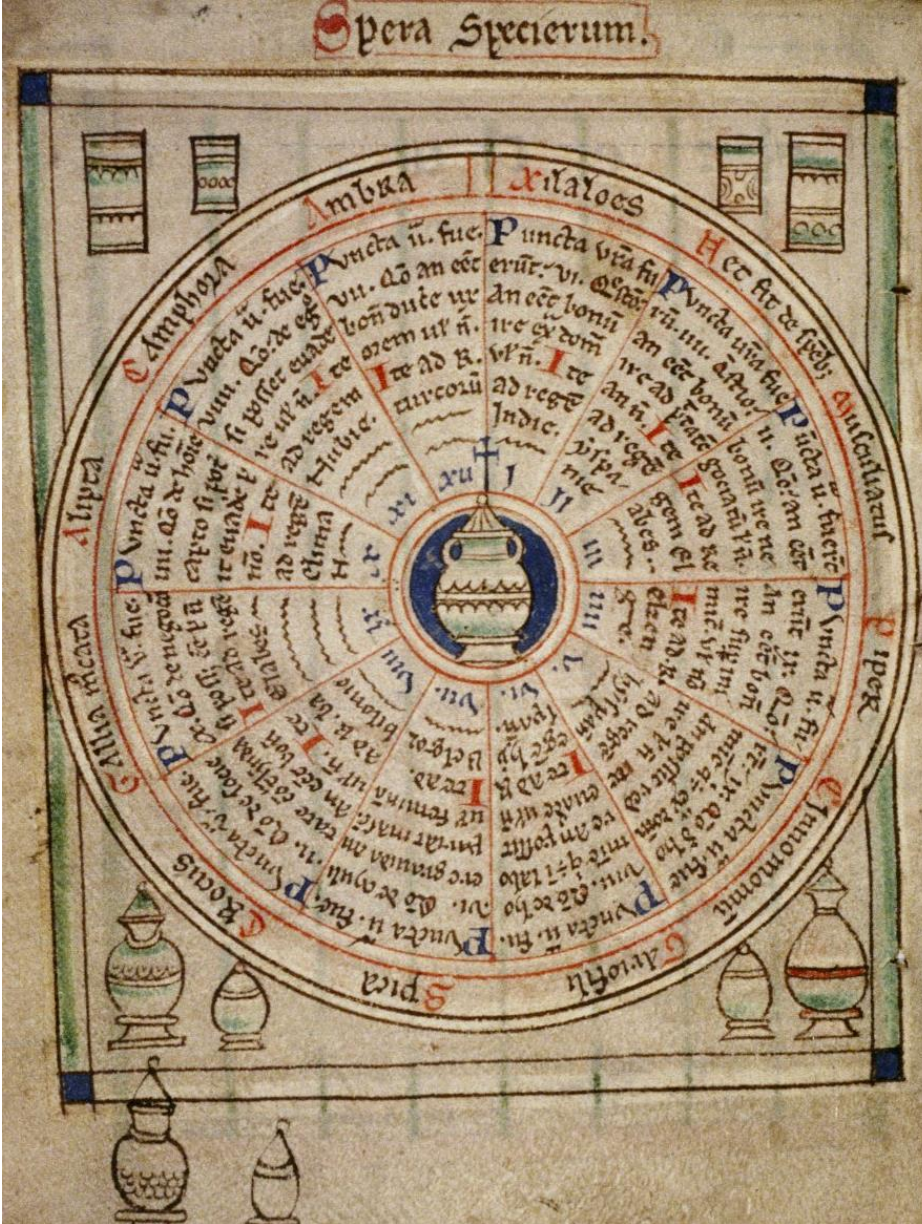
Table of
Visual
Attributes

		Information Visualization Researchers										Vision Rsch	Cartography	
		Bertin 1967	Cleveland 1985	MacKinlay 1986	Wilkinson 1999	Ware 2000	Mazza 2009	Brath 2011	Iliinsky 2012	Chen, Florida 2013	Preattentive Perception		MacEachren 1995	Tyner 2010
Trans-form	Position	X	X	X	X	X	X		X	X			X	X
	Length		X	X		X	X		X	X	X			
	Size (Area)	X	X	X	X	X	X		X	X	X		X	X
	Orientation	X		X	X	X	X		X	X	X		X	X
	Volume		X	X		X								X
Shape	Shape	X		X	X	X	X	X	X	X			X	X
	Angle		X	X				X		X				
	Curvature							X			X			
	Mark							X			X			
	Line Ending						X	X	X	3	X			
	Closure							X		X	X			
Colour	Brightness	X		X	X	X	X		X	X	X		X	X
	Hue	X	X	X	X	X	X		X	X	X		X	X
	Saturation			X	X	X	X		X	X			X	X
Texture	Granularity	X		X	X	X	X		X	X			X	X
	Pattern				X	X	X		X					
	Orientation				X	X								
Relation	Connection			X			X		X	X				
	Containment			X			X		X					
Optics	Blur				X					X			X	X
	Transparency				X					X			X	X
	Stereo Depth										X			
	Concavity									X	X			
	Light Direction									X	X			
	Shadow									X				
	Partial occlusion									X				
Move-ment	Flicker					X				X	X			
	Speed					X				X	X			
	Direction									X	X			
Misc	Numerosity									X	X			
	Spatial Grouping									X	X			X
	Arrangement												X	X
	Resolution												X	X
	Artistic Effects										X			
	Text Labels				X		X		X	X				



BB ON Equity (Research In Motion Ltd) InfoVis-RIM 111 Daily 043AN2011-31DEC201 Copyright© 2013 Bloomberg Finance L.P. 02-May-2013 22:37:17





c. 1225-1250 – Peter of Poitiers. **Compendium historiae in genealogia Christi**, folio 001r. <http://bodley30.bodley.ox.ac.uk:8180/luna/servlet/s/6e12c7> accessed 07/23/2016

c. 1250 – Socrates the King. **The Prognostics**, folio 033a verso. <http://bodley30.bodley.ox.ac.uk:8180/luna/servlet/s/7l98th>

c. 1300-1325. **Breviary of Chertsey Abbey, fragments of the temporale and sanctorale.**
<http://bodley30.bodley.ox.ac.uk:8180/luna/servlet/detail/ODLodl~1~1~46209~120705:Breviary-of-Chertsey-Abbey-fragmen?trs=376&qvq=w45%3A%2Fwhen%2F14th+century%2C+beginning%2F%3B%3A%3AODLodl%7E29%7E29%2CODLodl%7E7%7E7%2CODLodl%7E6%7E6%2CODLodl%7E14%7E14%2CODLodl%7E8%7E8%2CODLodl%7E23%7E23%2CODLodl%7E1%7E1%2CODLodl%7E24%7E24&mi=349>

chart would be free for a numerical statement such as is found at the top of Fig. 68.

The scales of any curve chart should be so selected that the chart will not be exaggerated in either the horizontal or the vertical direction. It is possible to cause a visual exaggeration of data by carelessly or intentionally selecting a scale which unduly stretches the chart in either the horizontal or the vertical direction. Just as the English language can be used to exaggerate to the ear, so charts can exaggerate to the eye.

A curve permits of finer interpretation than any other known method of presenting figures for analysis. Fig. 69 gives some information which many persons might not fully grasp if only a column of figures were used to indicate the average yearly earnings of Princeton graduates. The fairly uniform slope of the curve for the first six years after graduation indicates that the men were receiving almost uniform raises in pay each year. It must be remembered that a straight-line curve simply indicates that the amounts of the increases year by year are uniform in numerical value. If a curve were started at the lower left-hand corner of the chart and drawn diagonally across each of the rectangles of the chart, it would be seen at once that there would be a straight line indicating an increase in salary of \$500 per year. With such a straight line across the chart, the increase in salary for the first year would be \$500. As compared with a zero beginning-wage there would be an increase of an infinite percentage at the end of the first year. The next year the increase would again be \$500. Compared to the \$500 salary, the increase would be 100 per cent. The third year the increase would be \$500, and compared to a \$1,000 salary the increase would be only 50 per cent. A curve of uniform slope on any chart of rectangular co-ordinate lines indicates only that there has been a uniform increase or decrease in actual numbers, not

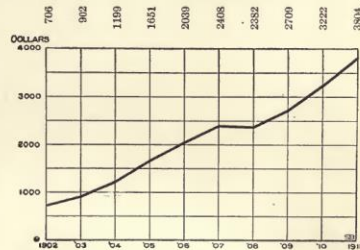


Fig. 69. Average Income of 155 Princeton Graduates of the Class of 1901 for Ten Years After Graduation

Note the effect of the 1907 panic on incomes in 1908

that there has been a uniform increase or decrease in actual numbers, not

a uniform rate of change on a percentage basis. A plotted line representing a uniform rate of increase from year to year on a percentage basis may be seen in the curve given in Fig. 121.

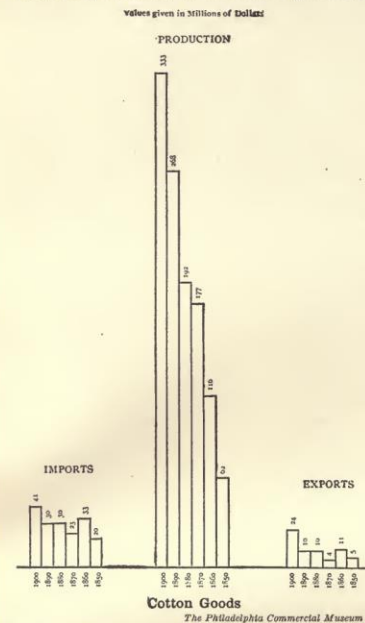


Fig. 70. Cotton Goods Production, Import and Export for the United States. Values are Given in Millions of Dollars

The order of years here reading from right to left gives the first impression that production is decreasing. Compare this illustration with Fig. 71

that though there was a larger yearly increase in salary after 1909, salaries at the end of 1911 had not attained the point which it would seem they would naturally have reached if no panic had occurred at a time so shortly preceding this date.

The untrained reader of curves will probably not be able to tell instantly what made the flat portion of the curve in Fig. 69 during the year 1907 to 1908. One of the chief advantages of the curve method of presenting information is that a curve forces one to think. A little thought here will at once bring out the fact that the flattening of the curve was caused by the 1907 panic. Though the panic started in October of the year 1907, the year 1907 was really one of the most prosperous years the country has ever known. It would be more fitting if the panic were called the 1908 panic, since the main effect of the panic came in 1908 rather than in the year 1907. It can be seen that the Princeton men had their incomes reduced during the year 1908 so that the average fell below that of 1907. By looking along the curve it will be noticed



The 2012 Money Race: Compare the Candidates

FACEBOOK TWITTER

Below is a tally of the money raised and spent through September by the presidential candidates, the national party committees and the primary "super PACs" whose sole purpose is to support a candidate. Contribution and spending totals do not include money raised or held by each candidate's "victory fund," a joint fund-raising committee that will distribute funds to the campaigns and party committees. In addition to these committees, nonprofit groups that do not have to file with the Federal Election Commission and other super PACs have spent at least \$65 million more on television advertising, almost all of it against President Obama or in support of Mitt Romney.



Barack Obama +
Democratic Party +
Priorities USA Action Super PAC



Mitt Romney +
Republican Party +
Restore Our Future Super PAC

Totals

Raised
\$1072.6m

Spent
\$985.7m

Raised
\$992.5m

Spent
\$992.0m

By Month Cumulative

Nov.
Oct.
Sept.
Aug.
July
June
May
April
March
Feb.
Jan. '12
Dec.
Nov.
Oct.
Sept.
Aug.
July
June
May
April
March
Feb.
Jan. '11

2012

2012

2012

2012

2012

Cash on hand

As of Nov. 26

\$28.3m

\$29.8m

Three goals

1. *Explore* type history for examples where differences in typographic attributes convey data.
2. *Catalogue* those attributes and how they could be used.
3. *Invent* some new kinds of typographic visualizations.

1. Typographic Attributes

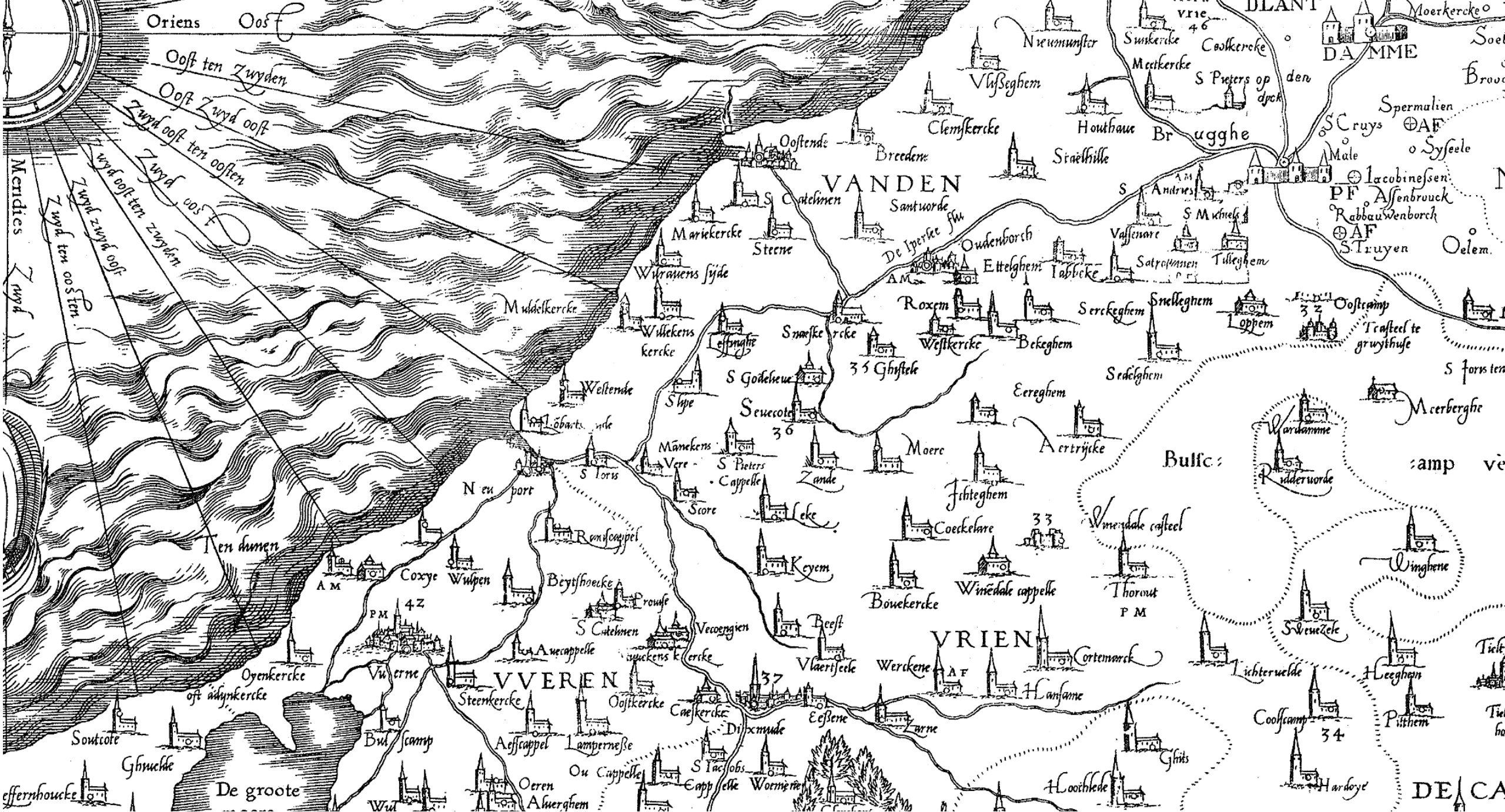


Gough Map 1370 Bodleian Library. Note, towns black; counties in red, London is gold. Counties red in a box. (<http://www.goughmap.org/map/>). Photo by author.

ITALIA XIII> NOVA TABVLA



Sebastian Munster, *Italia XIII> Nova Tabula* in **Geographia Universalis**, University of Basel(?) 1540. Woodcut with typeset lettering. All Caps (SARDINIA), Roman (Mare Tyrrhenum), Italics (Sardoi). Isotype collection, Maps 83. Image used with permission. See also: <http://www.swaen.com/munster1540.php>



Gerardus Mercator, **Map of Flanders**, 1540. Hand engraved. All Caps Roman, Mixed case Italic with flourishes. (image via Wikipedia).

E E

Prepared at the Census Office.

Under direction of
Jas. C. Kennedy
Superintendent

References

- | | | | | | |
|---|----------------|----------------|------|----------------|----------------|
| 1 | Boys | Man | Girl | Grave | House |
| 2 | D ^o | D ^o | Boys | D ^o | |
| 3 | D ^o | D ^o | or | Boys | D ^o |
| | | | Boys | D ^o | |
| | | | Boys | D ^o | |
| | | | Boys | D ^o | |

W. 17 & 18 boxes
P.C. Five Colored
S. Silver
M. Millings-Mixes from 10 and 15 per box
I.L. Assort of Toys, Toys, Toys
H & M. Assort and Mixes
N.C. Toys, Toys, Toys
S. Silver
W. Assort of Toys
C. Toys
C. Toys
M. Toys
D. Toys
B. Toys
R. Toys

Sherman's map of Georgia and Alabama, 1864 annotation of 1839 postal map, Font size, italics; additionally annotated with tables with acronyms, font size/color.

KNOWLEDGE, is either

Natural and Scientifical,
which is either

Sensible; consisting in the Perception of Phænomena, or External Objects—called **PHYSIOLOGY**, or **NATURAL HISTORY**; and which according to the different Kinds of such Objects, divides into

METEOROLOGY¹.
HYDROLOGY².
MINEROLOGY³.
PHYTOLOGY⁴.
ZOOLOGY⁵.

OR,

Rational; consisting in the Perception of the intrinsic Characters or Habitudes of sensible Objects—either

Their *Powers* and *Properties*—called **PHYSICKS**, and **NATURAL PHILOSOPHY**⁶.
Abstracts thereof—called **METAPHYSICS**⁷ } **ONTOLOGY**.
which subdivides into } **PNEUMATOLOGY**.

Quantities thereof, called **MATHEMATICS**—which divides, according to the Subject of the Quantity, into

ARITHMETIC⁸—whence { **ANALYTICS**⁹.
{ **ALGEBRA**¹⁰.
GEOMETRY¹¹—whence { **TRIGONOMETRY**.
{ **CONICS**.
{ **SPHERICS**.

Relations thereof to our Happiness—called **RELIGION**, or the Doctrine of **OFFICES**, which subdivides into—

ETHICS¹³, or **NATURAL RELIGION**—whence { **POLITICS**¹⁴.
{ **LAW**¹⁵.
THEOLOGY¹⁶, or **REVELATION**.

OR,

Internal; employ'd in discovering their Agreement and Disagreement; or their Relations in respect of Truth—call'd **LOGICS**¹⁷.

Further *Powers* and *Properties* of Bodies—called **CHYMISTRY**¹⁸—whence

{ **ALCHEMY**.
{ **NATURAL MAGIC**, &c.

OPTICS¹⁹, **CATOPTRICS**, } **PERSPECTIVE**²⁰.
DIOPTRICS—whence } **PAINTING**²¹.
PHONICS—whence **MUSICK**²².
HYDROSTATICS²³, **HYDRAULICS**.
PNEUMATICS²⁴.

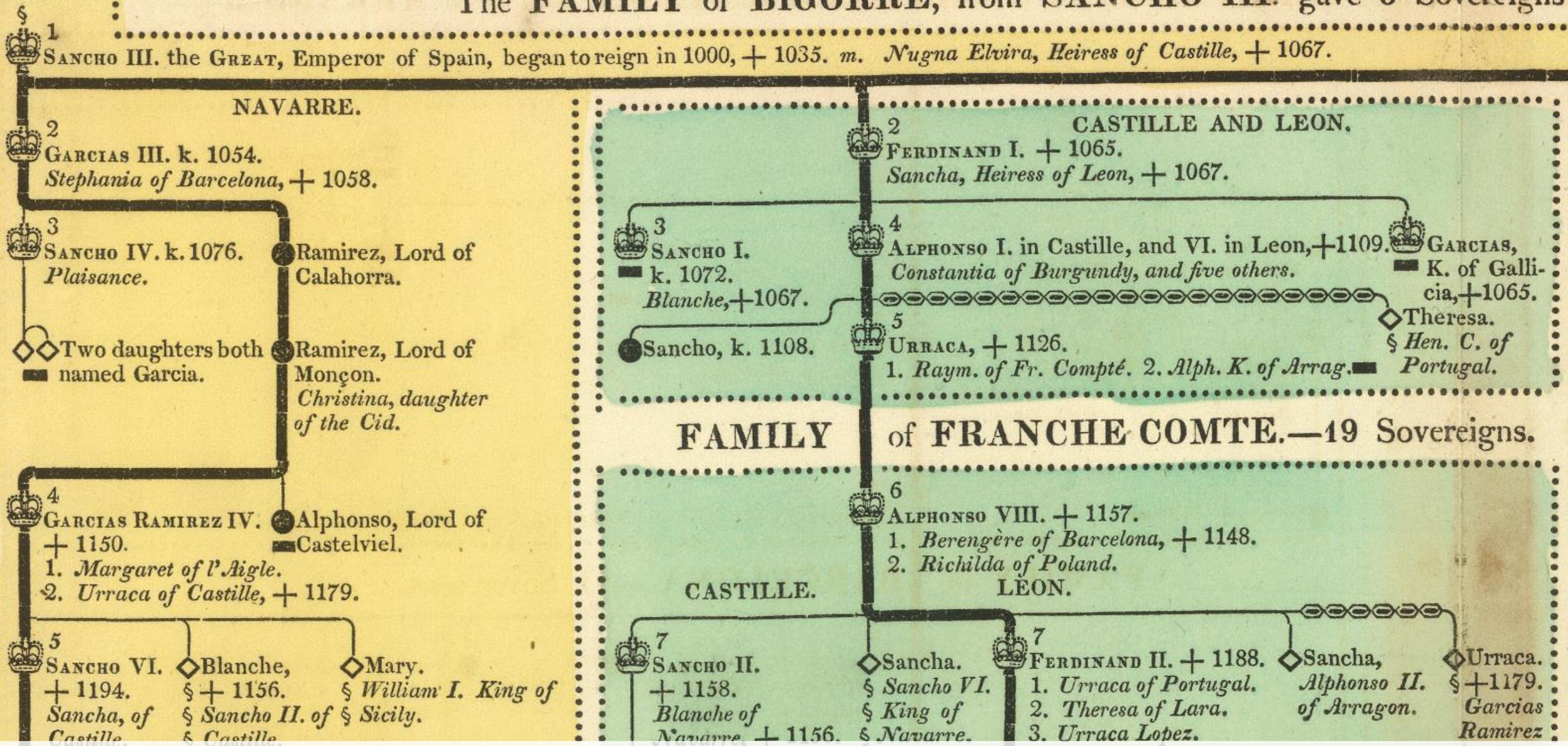
Quantities of Bodies—call'd **MIX'D MATHEMATICS**; which accor-

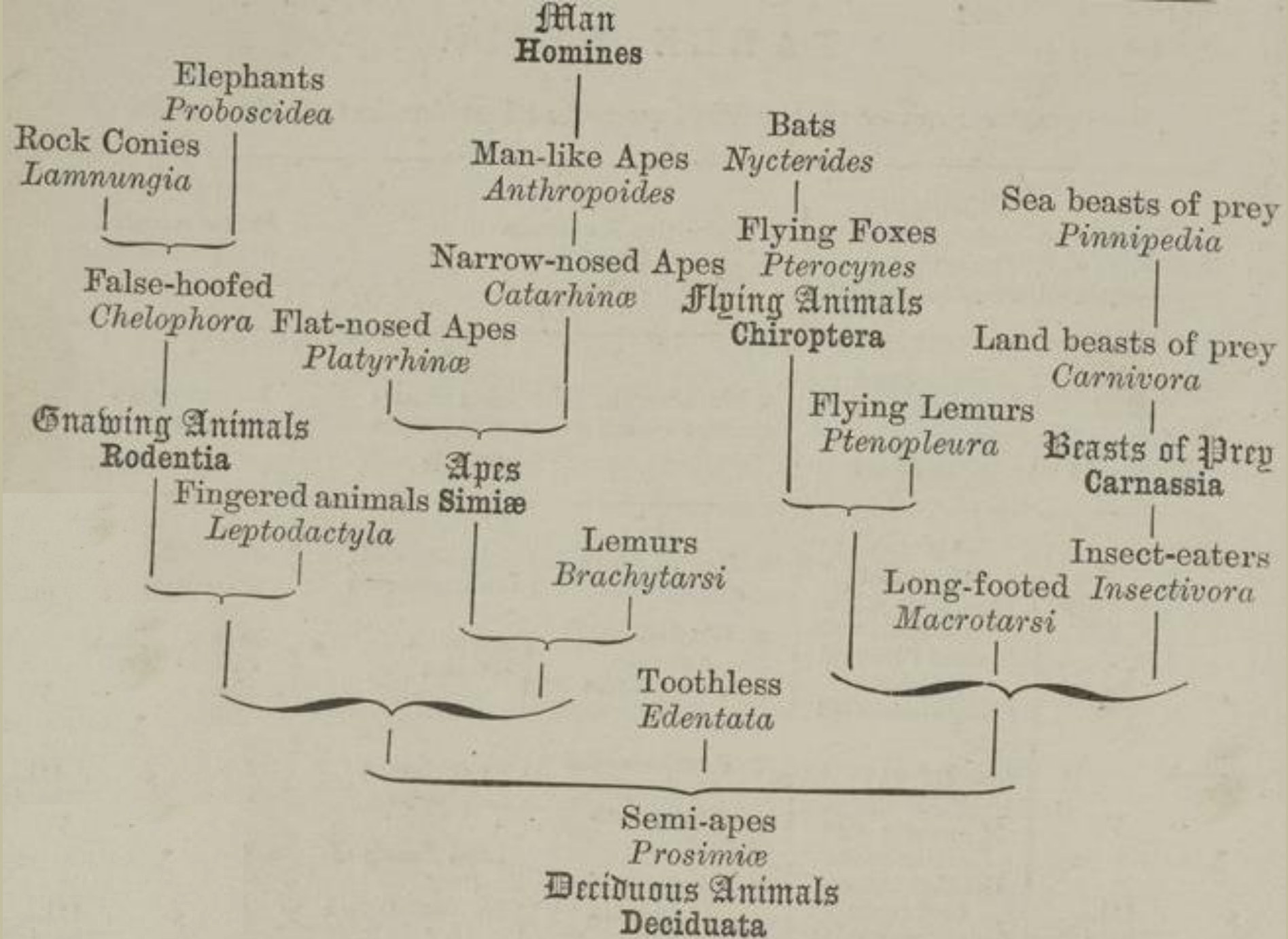
MECHANICS²⁵—whence { **ARCHITECTURE**²⁶.
{ **SCULPTURE**²⁷.
{ **TRADES**²⁸ and **MANUFACTURES**.

Artificial and Technical,
(consisting in the Application of Natural Notices to

OR,

The FAMILY of BIGORRE, from SANCHE III. gave 6 Sovereigns





THE CRYES
of the City of
LONDON
Drawne after the Life.

Les Cris
de la Ville de
Londres
Designez apres la Nature.

L'Arti Comuni
che uanno p
Londra
Fatto dal Naturale

L'Imperio excudit.

Cum Privilegio



Mauron delin.

P. Tempest. exc.

ENGLISH, FRENCH and ITALIAN

Marcellus Laroon II, "Second Title Page", *The Cryes of the City of London Drawne after the Life*, (London: Pierce Tempest, 1688) [Print, 245mm x 162mm]. British Museum. [Museum Number: Gg.4U.1]

http://www.britishmuseum.org/research/collection_online/collection_object_details/collection_image_gallery.aspx?assetId=430139001&objectId=3062527&partId=1 (accessed April 28, 2016).

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ARION SAUVÉ PAR UN DAUPHIN.

Arion preserved by a Dolphin.

Arion durch einen Delphin errettet.

Arion door een Dolfyn behouden.

FRENCH, ENGLISH, GERMAN, DUTCH

Cornelis Bloemaert, "Arion", *Le Temple des Muses* (Amsterdam: Chatelain, 1733) [Print, 247mm x 173mm]. British Museum. [Museum Number: 1914.0214.237]

http://www.britishmuseum.org/research/collection_online/collection_object_details/collection_image_gallery.aspx?assetId=562664001&objectId=1540334&partId=1 (accessed April 28, 2016).

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R. Pyle pinx.

Gabriel Bodenehr fecit.

Feeling. Das Gefühl.
Sentiment. Tactus. il Sentimento.
Printed for Carington Bowles in St. Pauls Church Yard London.

ENGLISH, GERMAN, ITALIAN, LATIN and FRENCH

Robert Pyle, *Feeling*, (London: Carington Bowles in St. Pauls Church Yard, 1766-1799) [Print, 158mm x 1103mm]. British Museum. [Museum Number: 2010.7081.1474]

http://www.britishmuseum.org/research/collection_online/collection_object_details/collection_image_gallery.aspx?assetId=966668001&objectId=3350969&partId=1 (accessed April 28, 2016).

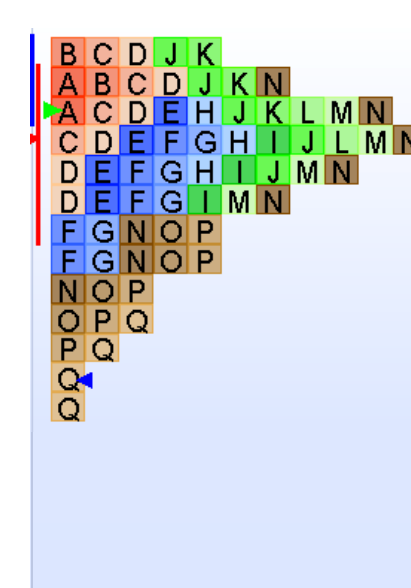
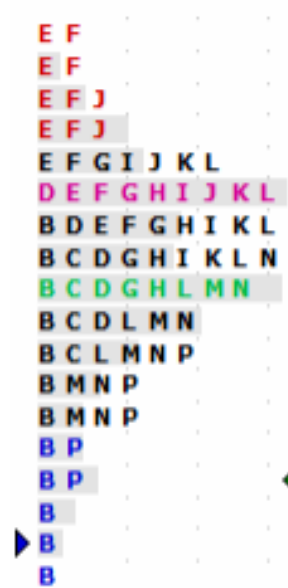
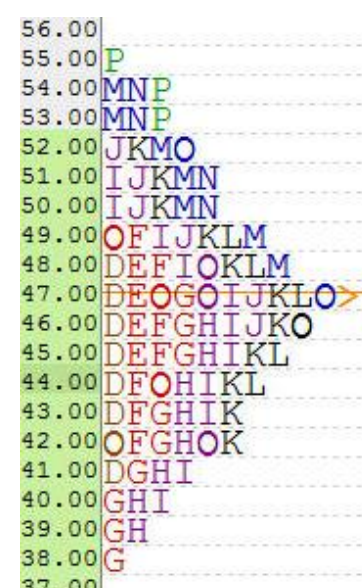
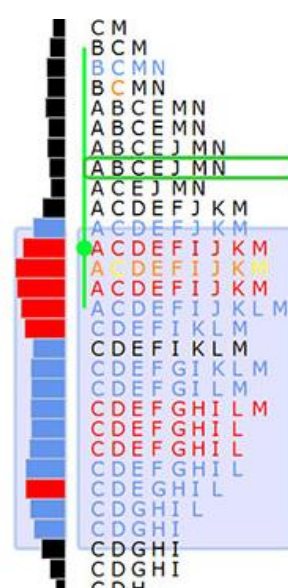
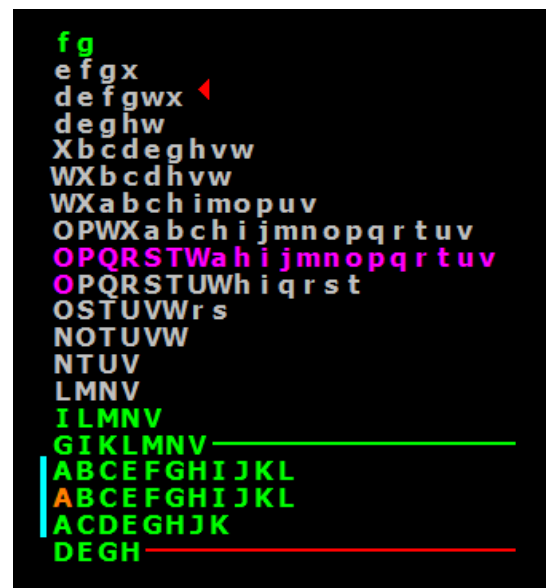
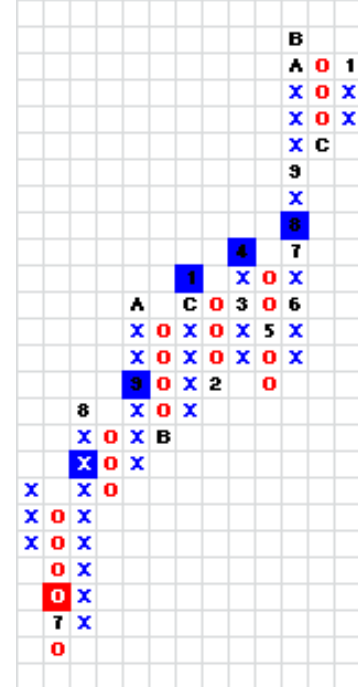
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1925 - A. Stieler and H. Haack. **Stieler's Atlas of Modern Geography**. 254 Maps & Insets on 108 Sheets Engraved on Copper. Tenth (Centenary) Edition. Completely Revised & Largely Redrawn under the Direction of Professor H. Haack in Justus Perthes' Geogr. Institute. (in two parts). Justus Perthes' Geogr. Institute, 1925. davidrumsey.com 06/06/2015



1921 – **Ordance Survey Leeds & Bradford.** Hodson, Yolande. 1999. Popular Maps, The Ordnance Survey Popular Edition One-Inch Map of England and Wales, 1919-1926. London: The Charles. davidrumsey.com 10/15/2016. <http://www.davidrumsey.com/luna/servlet/s/1sy7l9>



sierrachart.com

windotrader.com

cbot.com

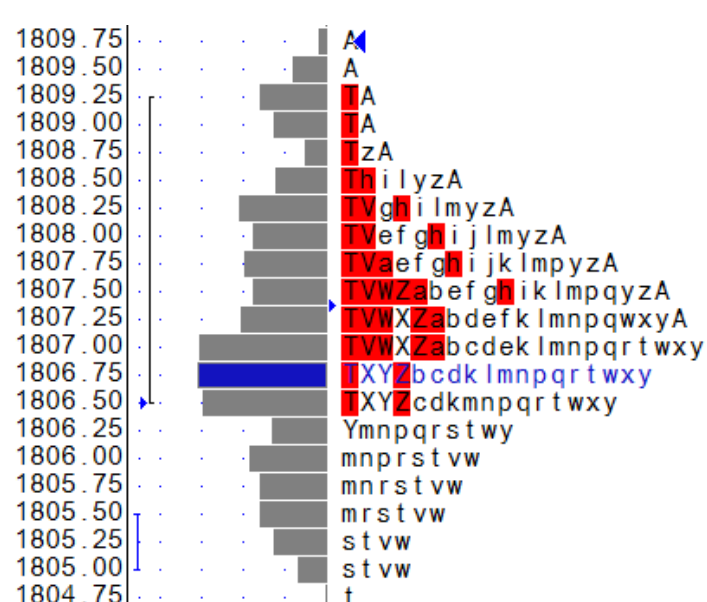
bluewatertradingsolutions.com

prorealtime.com

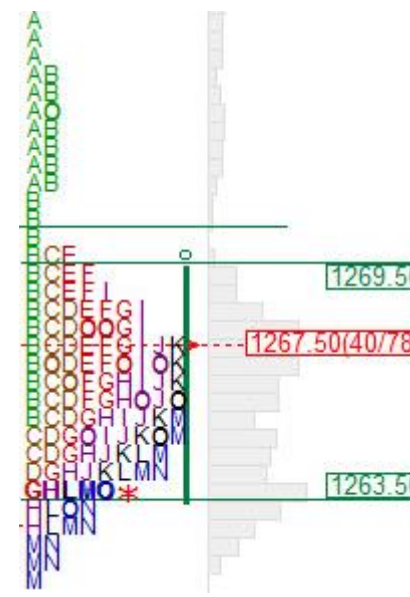
niftypointandfigure.blogspot



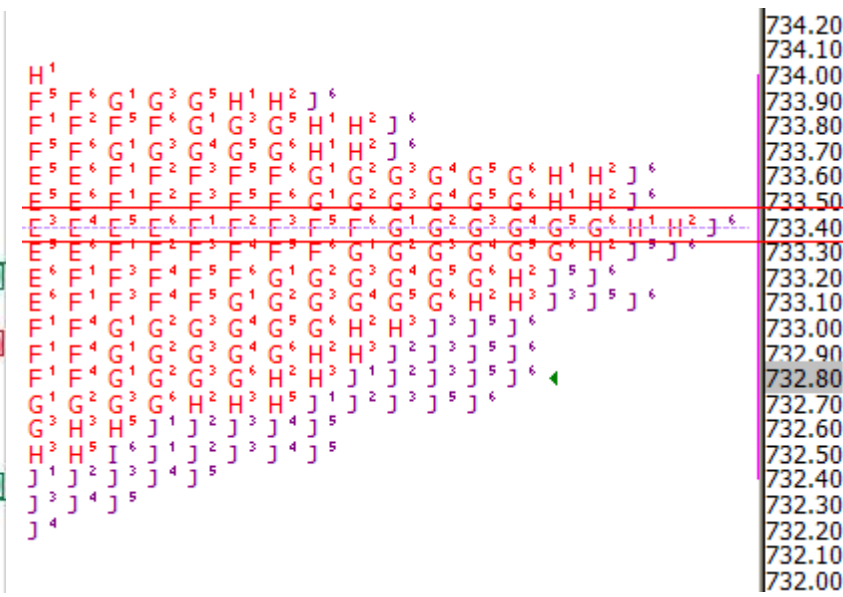
Uoe.com.my



cqg.com



marketdelta.com



esignal.com

Modern Alphanumeric financial charts: *Point and Figure* (left) and *Market Profile* (right). By many different financial software vendors. Note variants add data using attributes such as foreground color, background color, added symbols (e.g. * >) superscripts, bold, outline boxes.


```
static bool
getpn(str)

char *str;

int i = 0;

while (*str != '\0')
    if (i >= PNMAX)
        return FALSE;

Set pn to the digits ignoring spaces and dashes

if (*str != ' ' && *str != '-')
    return FALSE;
```

Annotations:

- Bold**: `getpn`
- Italics**: `char`, `*str`
- Small Caps**: `PNMAX`
- Background shading**: `Set pn to the digits ignoring spaces and dashes`

```
static STATUS
keyrespond(key)

struct keyword *key;

register struct pattern *pat;
register STATUS ret;

for (pat = key->pats; pat != NULL; pat = pat->pnext)
    ret = patrespond(pat);
    if (ret == S_DONE || ret == S_NEXT)
        return (ret);

if (debug)
    printf("---no match\n");
```

Annotations:

- Italics**: `struct keyword`, `*key`, `register struct pattern`, `register STATUS`
- Small caps**: `S_DONE`, `S_NEXT`
- Bold**: `debug`
- Different font**: `printf`

```
function cancelChildAnimations(element) {
    if (node.nodeType != ELEMENT_NODE) {
        // ...
    }
}

function(selectorAll('.' + NG_ANIMATE_CLASS_NAME), function(element) {
    element = angular.element(element);
    var data = element.data(NG_ANIMATE_STATE);
    if (data) {
        cancelAnimations(data.animations);
    }
})
```

Annotations:

- Create Parameter**: `element`
- Create Variable 'node'**: `node`
- Rename Reference**: `angular`

```
it('should compile template when appending', inject(function($compile, $rootScope, log) {
    element = $compile('<div><div append medium-log>ignore</div><div>');
    ($rootScope);
    $rootScope.$digest();
    expect(element.text()).toEqual('Fail this!');
    expect(log).toEqual('HIGH; LOG; MEDIUM');
}));
```

Annotations:

- Background shading**: `it('should compile template when appending', ...)`

```
describe('list <num>', function() {
    it('allows you to select a list', function() {
        // set storage to have 2 lists
        storage.lists = [list1, list2];

        sinon.stub(list2, 'get').returns({
            name: 'grocery'
        });

        text.should.eql(string);
        commands.print.restore();
    });

    commands.setSelectedList(2);
});
```

Annotations:

- Background shading**: `describe('list <num>', ...)`
- Bold**: `storage`
- Italics**: `list1`, `list2`
- Wavy underline**: `string`
- Straight underline**: `commands`
- Text color**: `commands.setSelectedList(2);`

Baecker, R., & Marcus, A. **On enhancing the interface to the source code of computer programs**. In *Proceedings of the SIGCHI conference on Human Factors in Computing Systems*. ACM **1983**. (color image from 1990 book)

Webstorm (2015/06/07). Note use of size, bold, italics, color, background shading, font family, capitalization, small caps, underlines, symbols and delimiters.

Molecular Formulas

Formula	Name	Typographic Feature
NaCl	Salt	Uppercase distinguishes atoms
C ₆ H ₁₂ O ₆	Glucose	Trailing subscripts for # atoms
Al ₂ (SO ₄) ₃	Aluminum Sulfate	(paired delimiter) for functional groups
[SO ₄] ²⁻	Sulfate	Trailing superscript for ionic charge
H ₂ C=CH ₂	Ethylene	= symbol for double bond
³² P O ₄ ³⁻	Radioactive Phosphate	Leading superscript for isotope
M@C ₆₀	Buckminsterfullerene	@ symbol to indicate trapped group

And more

- Mathematical notation
- Musical notation
- Engineering and architectural drawings
- Data Tables / Timetables
- User interface design
- Etc

Type-specific Visual Attributes

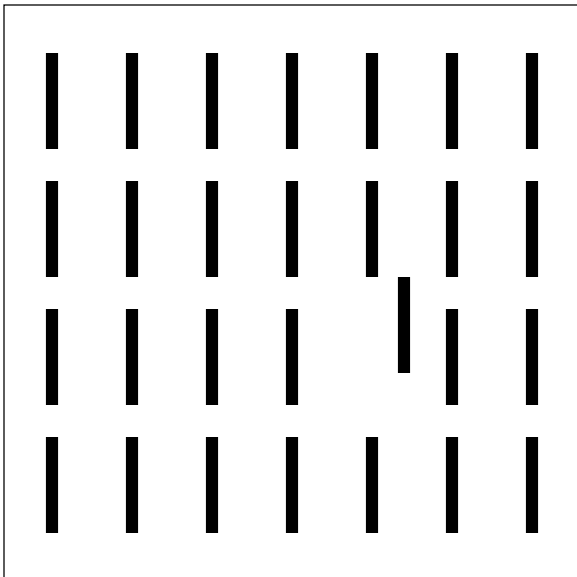
Group	Font Attribute	Best for encoding: Q: quantitative O: ordered C: categoric G: grouping/relationship L: literal	Example
Glyphs	Alphanumeric Text	L, O	ape bat cat dog 123 456
	Symbols	C	! ? # @ #comment \$var
Font Family Attributes	Font weight	Q (2-9 levels)	1.0 2.0 3.0 5.0 8.0
	Oblique / Italic	C, Q using slope angle	-2.0 -1.0 0.0 1.0 2.0
	Case inc small caps	C , possible O (2-3 levels)	BIG Avg. Small tiny
	Typeface	C (2-6 levels)	Swiss French German <i>Italian</i>
	Underline	C, O, Q (using length)	plain <u>dash</u> <u>single</u> <u>double</u>
Sequence	Condensed	Q, O (2-4 levels)	1200 2000 3000
	Squished	Q	<i>anorexic</i> thin plain wide fat
	Spacing	Q, O	tall grand venti
	Baseline shift (e.g. subscript)	C (2 levels)	Normal ^{High} _{Low}
Font Design	Delimiters	G	(but) *and* <or>
	X-height	O, Q (few levels)	ick ick ick
	Contrast / Stress angle	O (few levels)	LOW MED. HIGH
	Serif length / Bracket size	O, Q (too small to see?)	see prototypo.io

Note: does not include traditional visualization attributes such as size, color, texture, outline, blur, shadow, etc., which are applicable to any marker including type.

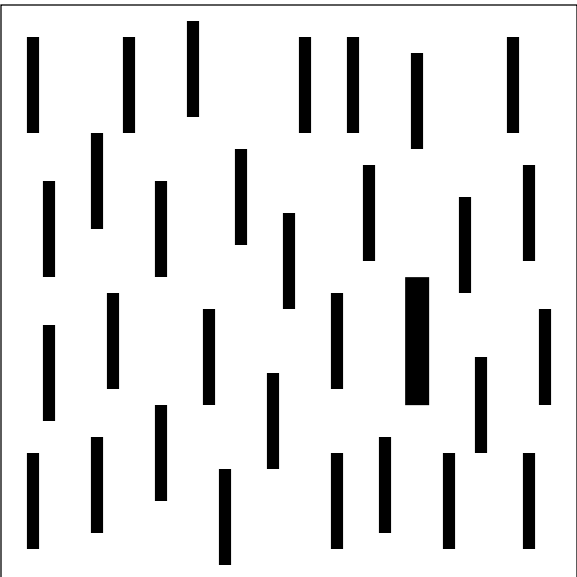
2. Preattentive Properties

Visual Pop-out

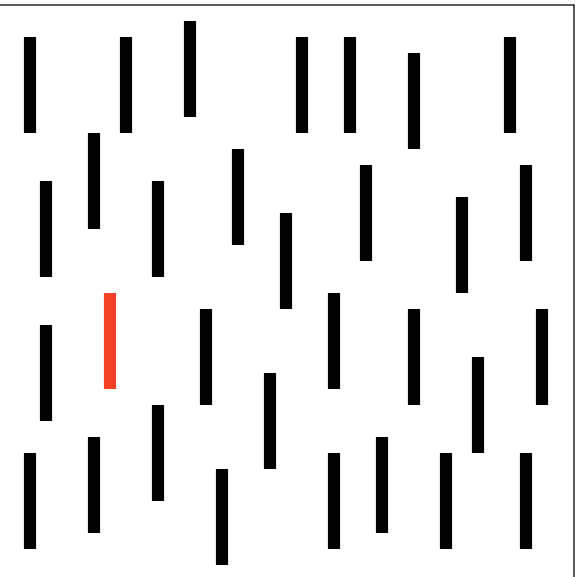
aka Preattentive
Attributes



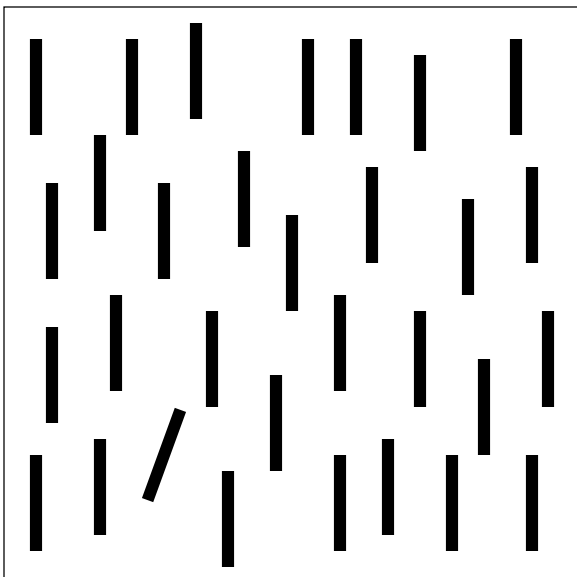
Position



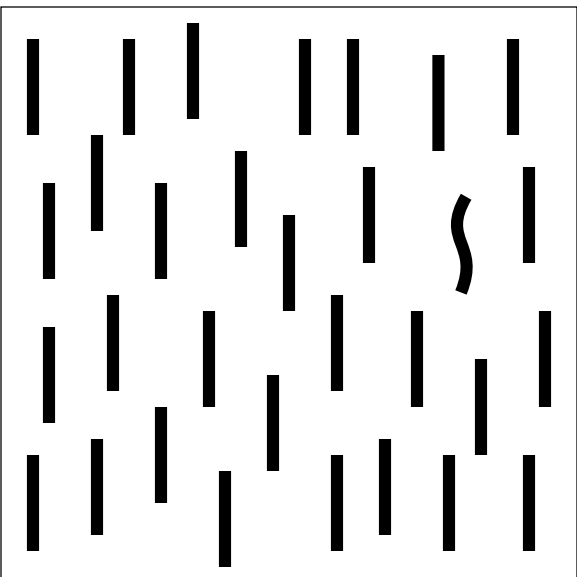
Size



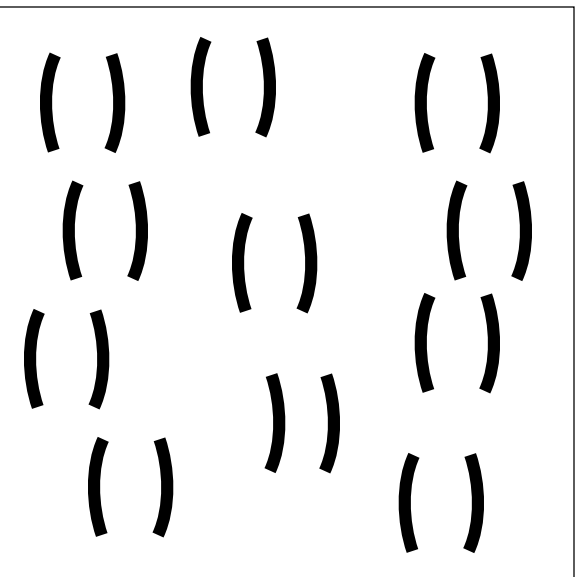
Hue



Orientation



Shape



Containment

Can you spot the different format?

Serif in Sans

Inez	Elia	Vito	Joan	Tena
Alva	Judi	Amos	Jena	Tory
Alta	Dale	Judi	Joel	Alva
Flor	Alta	Gale	Herb	Enid
Herb	Hugo	Tina	Long	Seth

Does font weight pop-out?

Bold in Plain

John	Dawn	Hank	Vito	Gwen
Jill	Joan	Boyd	Nola	Tera
Ines	Dana	Tami	Hope	Alba
Nola	Thea	Earl	Dirk	Teri
Lila	Bill	Luis	Fern	Fred

Plain in Bold

Ruth	Reba	John	Hans	Buck
Olen	Iona	Luke	Nick	Gina
Floy	Jude	Vera	Jude	Niki
Minh	Kaye	Gaye	Shad	Earl
Tony	Ruth	Olin	Kaye	Trey

Italics?

Italics in Roman

Floy	Reed	Enid	Matt	Paul
Hank	Cory	King	Rena	Lisa
Rhea	Fred	Ruby	Eloy	Alex
Etta	<i>Doug</i>	Paul	Luis	Adam
June	Veda	Fern	Eddy	Sang

Roman in Italics

<i>Hoyt</i>	<i>Dian</i>	<i>Josh</i>	Dawn	Olin
<i>Eula</i>	<i>Bret</i>	<i>Elsa</i>	<i>Kurt</i>	<i>Vito</i>
<i>Stan</i>	<i>Gail</i>	<i>Kari</i>	<i>Donn</i>	<i>Vern</i>
<i>Toby</i>	<i>Kris</i>	<i>Neil</i>	<i>Kari</i>	<i>Hung</i>
<i>Gino</i>	<i>Fern</i>	<i>Ruth</i>	<i>Ella</i>	<i>Lupe</i>

Typeface?

Blackletter in Sans

Deon	Cara	Mark	Jude	Lena
Herb	Lila	Alva	Juli	Myra
Lona	Tena	Lynn	Sara	Lori
Greg	Judy	Dara	Trey	Levi
Juan	Iona	Elva	Debi	Noah

Sans in Blackletter

Dana	Gena	Kirk	Alona	Donn
Anne	Mack	Yong	Levi	Joan
Dong	Elmo	Seth	Owen	Bart
Doug	Odis	Lura	Dong	Vera
Debi	Ward	Leon	Russ	Pete

Caps?

Proper in Caps

LUKE	CARY	LILA	JAKE	JOHN
RICO	BOYD	OLIN	IOLA	JAMI
NICK	ELMO	ANDY	DREW	ERMA
IOLA	FERN	FERN	VERA	KATY
CHAD	ELMA	HUNG	Anna	CHET

Caps in Proper

Gino	Bart	Milo	Lona	Reed
Cari	Tuan	LURA	Rich	Ines
Kira	John	Minh	Elmo	Leah
Mary	Lula	Eddy	Dirk	Tana
Pete	Lupe	Ivan	Kyle	King

Lots of attributes, multiple changes

Change in multiple attributes

<u>Dale</u>	<u>Dale</u>	<u>Neil</u>	<u>Lynn</u>	<u>Bart</u>
<u>Iola</u>	<u>Emil</u>	<u>Bret</u>	<u>Omar</u>	<u>Rudy</u>
<u>Jami</u>	<u>Deon</u>	<u>Mona</u>	<u>Greg</u>	<u>Bret</u>
<u>Lino</u>	<u>Jodi</u>	<u>Lacy</u>	<u>Mary</u>	Lina
<u>Dawn</u>	<u>Jake</u>	<u>Bill</u>	<u>Abby</u>	<u>Tyra</u>

Change in multiple attributes

<u>Jodi</u>	<u>Eric</u>	<u>Lois</u>	<u>Kris</u>	<u>Gale</u>
<u>Tera</u>	<u>Gene</u>	<u>Lona</u>	<u>Phil</u>	<u>Lino</u>
<u>Kris</u>	<u>Kari</u>	<u>Liza</u>	<u>Flor</u>	<u>Kate</u>
<u>Gena</u>	<u>Tana</u>	<u>John</u>	<u>Thea</u>	<u>Vida</u>
<u>Sang</u>	<u>Yong</u>	<u>John</u>	<u>Sean</u>	<u>Shad</u>

Change in multiple attributes

<u>Aura</u>	<u>Alec</u>	<u>Rose</u>	<u>Rolf</u>	<u>Sang</u>
<u>Bart</u>	<u>Jeri</u>	<u>Gene</u>	<u>Mari</u>	<u>Lino</u>
<u>Tera</u>	<u>Lana</u>	<u>Mina</u>	<u>Jack</u>	<u>Tena</u>
<u>Jame</u>	<u>Gene</u>	<u>Cody</u>	<u>Rory</u>	<u>Drew</u>
<u>Keri</u>	<u>Dale</u>	<u>Hans</u>	<u>Kate</u>	<u>Kirk</u>

Lots of attributes set, one change

Change in one attribute

<u>Cory</u>	<u>Cody</u>	<u>Yong</u>	<u>Rosa</u>	<u>Emil</u>
<u>Reed</u>	<u>Iola</u>	<u>Carl</u>	<u>Dion</u>	<u>Kyla</u>
<u>Kyle</u>	<u>Juan</u>	<u>Katy</u>	<u>Cary</u>	<u>Jose</u>
<u>Elda</u>	<u>Adan</u>	<u>Cody</u>	<u>Russ</u>	<u>Juan</u>
<u>Glen</u>	<u>Elba</u>	<u>Lynn</u>	<u>Amie</u>	<u>Iola</u>

Change in one attribute

<u>Dina</u>	<u>Lupe</u>	<u>Noel</u>	<u>Judy</u>	<u>Carl</u>
<u>Iris</u>	<u>Nick</u>	<u>Earl</u>	<u>Evan</u>	<u>Reta</u>
<u>Abby</u>	<u>Aida</u>	<u>Shad</u>	<u>Niki</u>	<u>Lesa</u>
<u>Anne</u>	<u>Cody</u>	<u>Jody</u>	<u>Jami</u>	<u>Lina</u>
<u>Thea</u>	<u>Robt</u>	<u>Eddy</u>	<u>Joan</u>	<u>Nina</u>

Font attributes relation to well-studied preattentive visual channels

Group	Font Attribute	Visual Channel						Preattentive Potential†	Best for encoding: Q: quantitative O: ordered C: categoric G: grouping/relationship L: literal	Example
		Position	Length/Size	Intensity	Orientation	Shape	Containment			
Glyphs	Alphanumeric Text Glyph					◆		D	L, O	ape bat cat dog 123 456
	Symbols					◆		D	C	! ? # @ #comment \$var
Font Family Attributes	Font weight		◆	◆				HP	Q (2-9 levels)	1.0 2.0 3.0 5.0 8.0
	Oblique / Italic				◆			HP	C, Q using slope angle	-2.0 -1.0 0.0 1.0 2.0
	Case inc small caps		◆			◆		P	C, possible O (2-3 levels)	BIG AVG. Small tiny
	Typeface					◆		P	C (2-6 levels)	Swiss French German <i>Italian</i>
	Underline	◆	◆					HP	C, O, Q (using length)	plain <u>dash</u> <u>single</u> <u>double</u>
	Condensed		◆	◆				HP	Q, O (2-4 levels)	1200 2000 3000
Sequence	Squished		◆	◆				HP	Q	anorexic thin plain wide fat
	Spacing		◆	◆				HP	Q, O	tall grand venti
	Baseline shift (e.g. subscript)	◆	◆					HP	C (2 levels)	Normal ^{High} _{Low}
	Delimiters						◆	D	G	(but) *and* <or>
Font Design	X-height		◆					HP	O, Q (few levels)	ick ick ick
	Contrast / Stress angle					◆		P	O (few levels)	LOW MED. HIGH
	Serif length / Bracket size		◆					HP	O, Q (too small to see?)	see prototypo.io

◆ / ◆ indicates primary / secondary visual channel for font attribute

† HP: Highly probable, P: probable, D: doubtful

Visual channels based on Wolfe and Horowitz "What Attributes Guide the Deployment of Visual Attention and How Do They Do It?" Nature Reviews Neuroscience, vol 5. no .6 2005, 495-501.

Strobelt et al tested preattentive effects

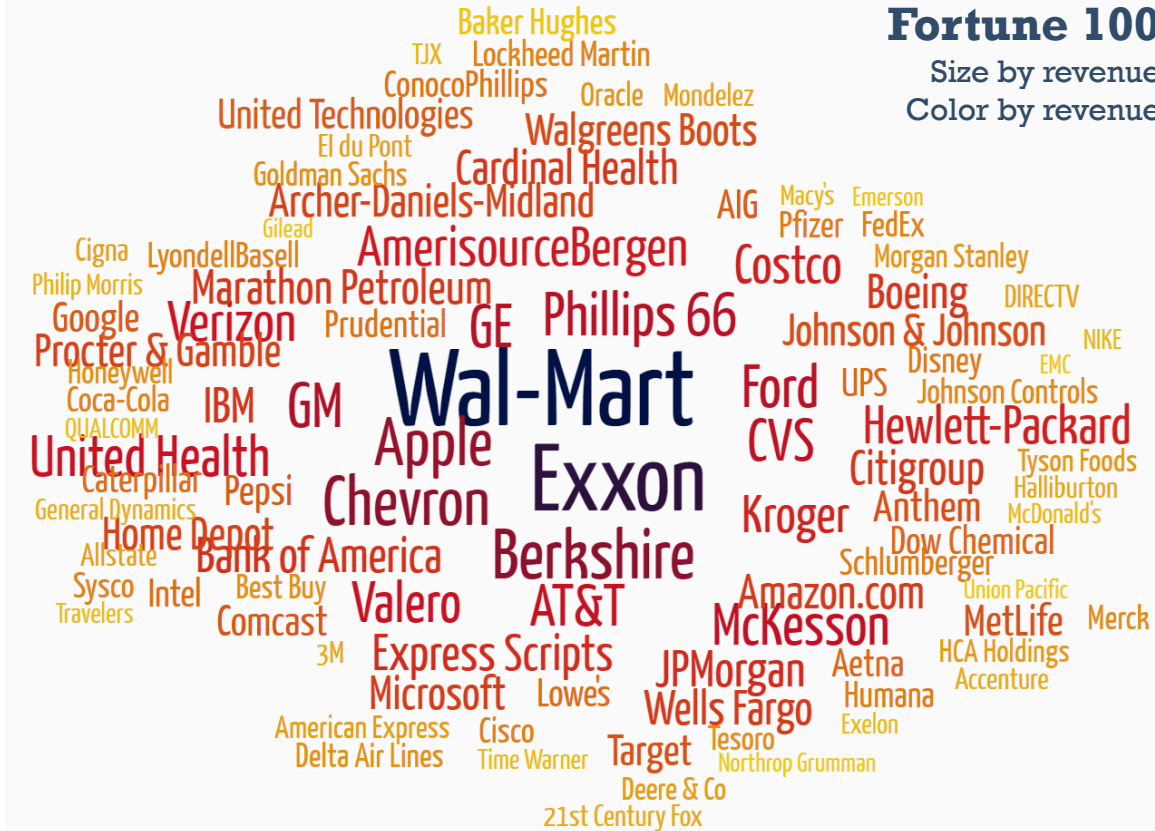
Technique	Use	Typical variations	Technique	Perf. Rank	Mean/StDev
Font color	c q	Saturation, luminance, hue	border	A	0.67 (0.22)
Background color	c q	Saturation, luminance, hue	font size	A B	0.65 (0.25)
Underlined	c q	Styles, thicknesses	background	A B	0.64 (0.19)
Font size	- q	% increase	red	A B	0.63 (0.20)
Font style	- -	Italics, subscript,...	bold	B C	0.62 (0.19)
Font weight	- -	Font weight	shadow	C	0.58 (0.22)
Rectangular border	c q	Styles of border, lines, thickness	underlined	D	0.51 (0.20)
Spaced out font	- q	Letter spacing	spacing	E	0.41 (0.20)
Text shadow	- -	Offset, intensity,...	italic	F	0.22 (0.14)
Font family	(c) -	Sans-serif, Times, Helvetica,...			

Note: only tested preattentive effects, not legibility, readability, etc.

3. So What?

Fortune 100

Size by revenue
Color by revenue



Fortune 100

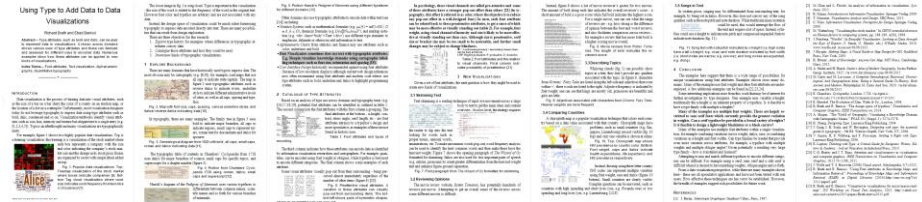
Weight by revenue
Color by revenue



Invent new typographic
visualizations

some examples...

Type attributes apply to many levels of text

Mark	Scope	Literal	Categoric	Quantitative	Sample
Point	Glyph	LG	CG	QG	A B C though answer Gloucester
	Word	LW	CW	QW	Abe Ben Cam
Line	Sentence	LS	CS	QS	<i>President Obama nominates Merrick Garland</i>
Area	Paragraph	LP	CP	QP	Mr Phileas Fogg lived, in 1872, at No. 7, Saville Row, Burlington Gardens, the house in which Sheridan died in 1814. He was one of the most noticeable members of the Reform Club , though he seemed always to avoid attracting attention; an enigmatical personage , about whom little was known, except that he was a polished man of the world.
	Document	LD	CD	QD	
	Corpus	LC	CC	QC	

Microtext Linechart

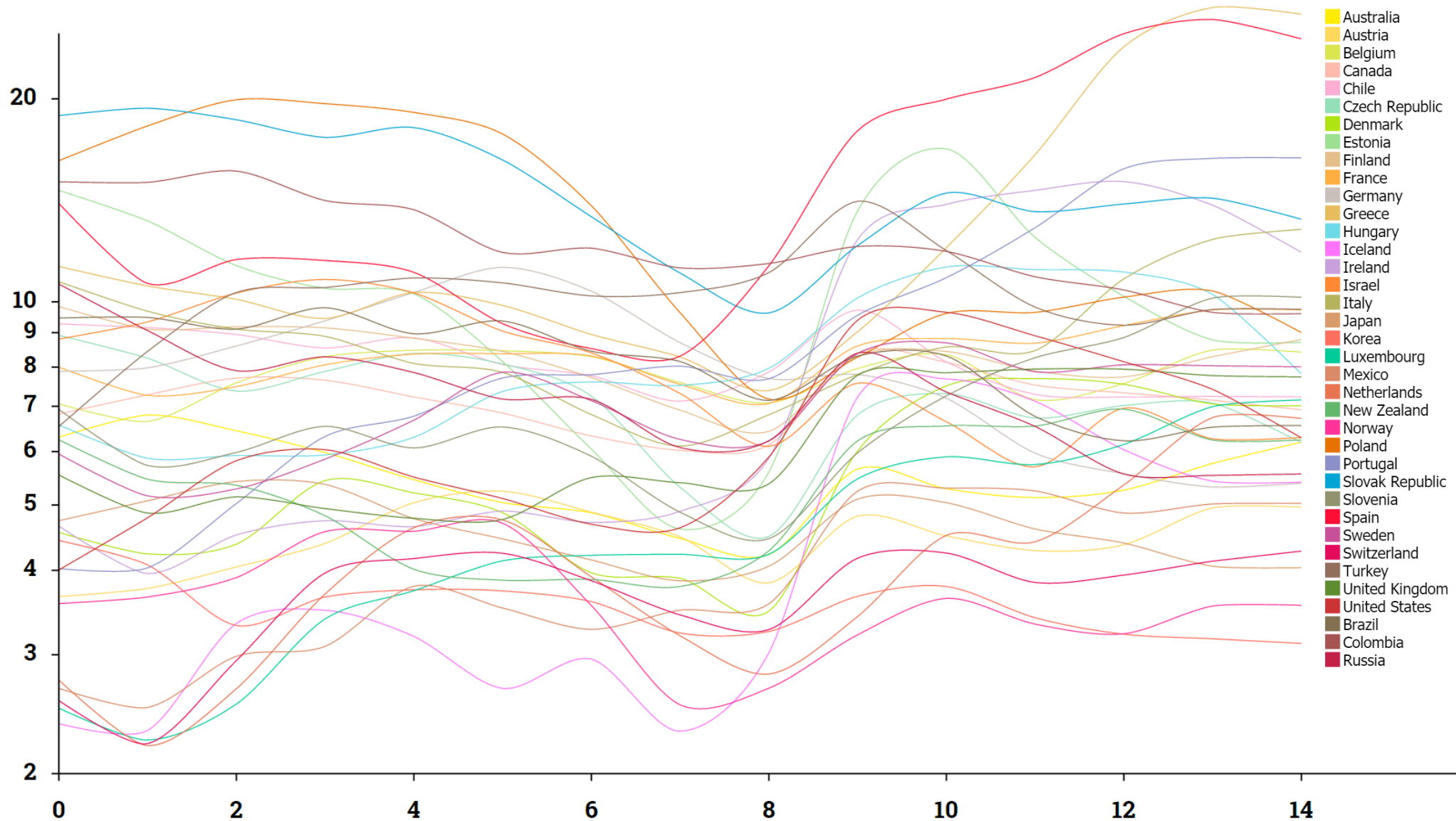
LS: literal sentences

Line Chart

- Which line is which?

Unemployment Rate as Percent Civilian Labour Force

2000-2014 by Country.



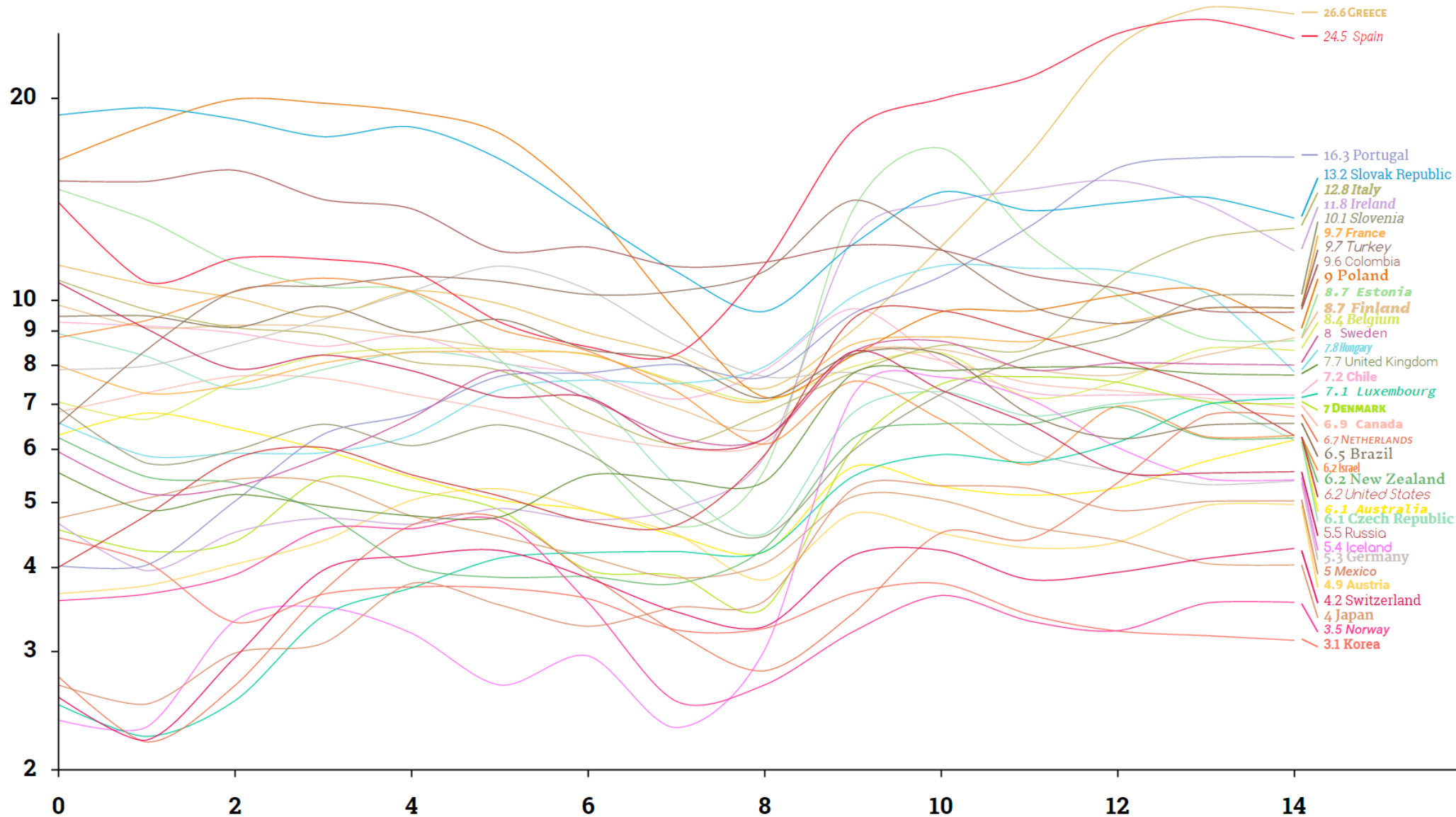
Source: OECD (stats.oecd.org, retrieved Oct 24, 2015). Author: Richard Brath/ London South Bank University 2015 (richardbrath.wordpress.com)

Line Chart

- Legend associated with line is better...
- But, still hard to trace lines through congested areas
- So, why stop there?

Unemployment Rate as Percent Civilian Labour Force

2000-2014 by Country.



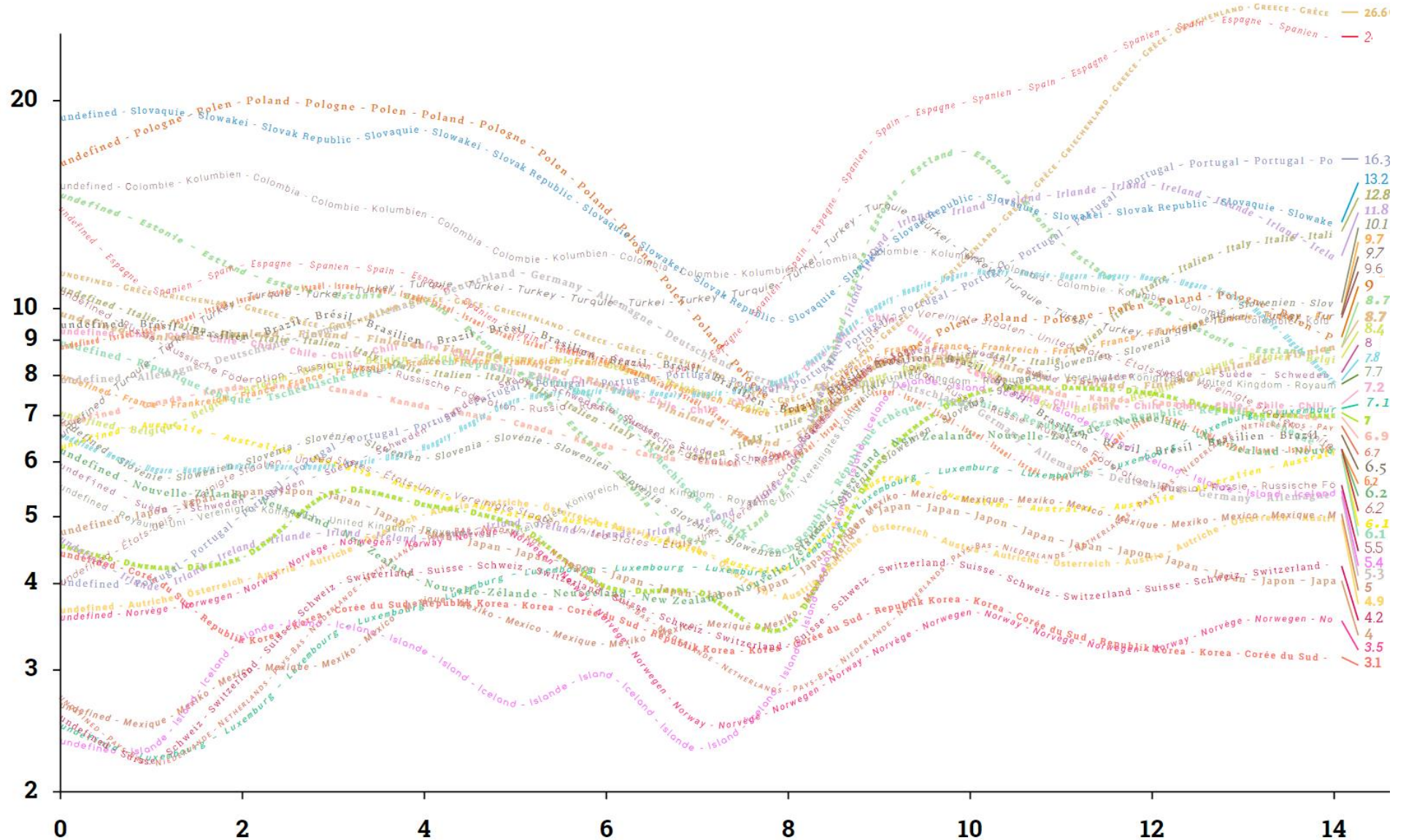
Source: OECD (stats.oecd.org, retrieved Oct 24, 2015). Author: Richard Brath/ London South Bank University 2015 (richardbrath.wordpress.com)

Line Chart

- Turn the line into text

Unemployment Rate as Percent Civilian Labour Force

2000-2014 by Country. Each line is labeled with microtext in multiple languages.

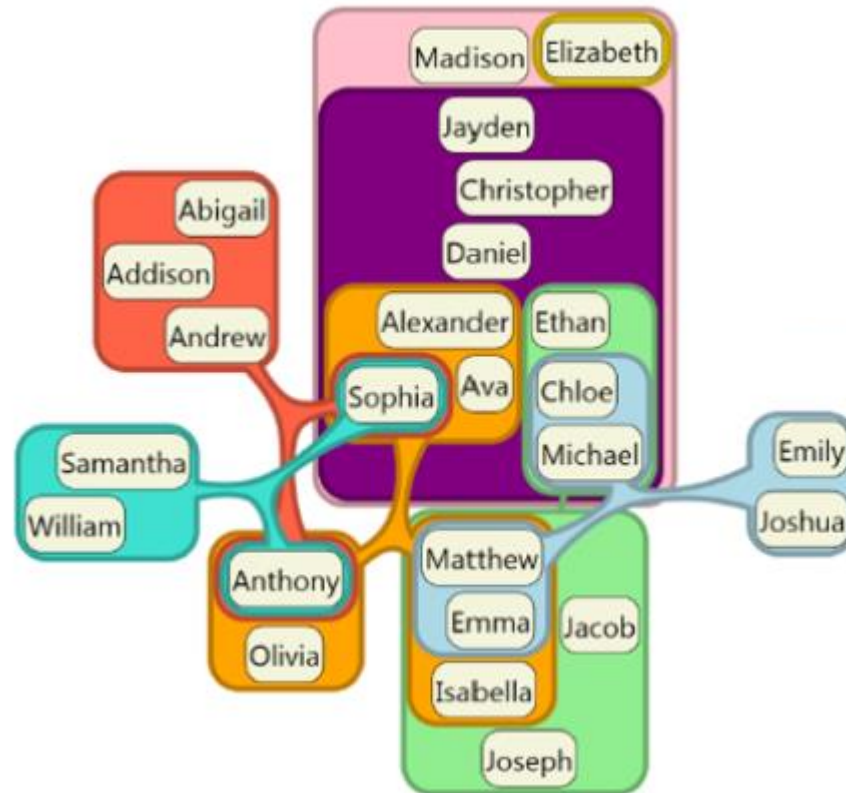
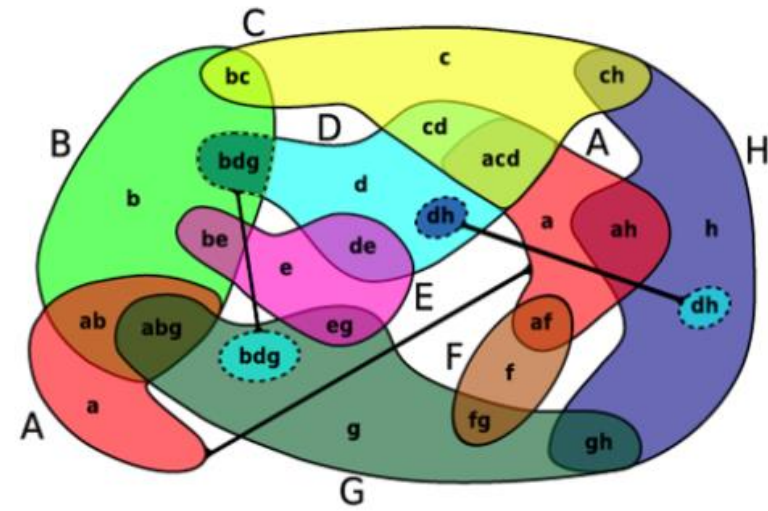


Source: OECD (stats.oecd.org, retrieved Oct 24, 2015). Author: Richard Brath/ London South Bank University 2015 (richardbrath.wordpress.com)

Set Elements

CW: Categorical Words

- Sets contain elements
- Elements may belong to multiple sets
- Most approaches are
 - 1) difficult to scale to many elements;
 - 2) difficult to scale to many sets; or
 - 3) don't try to label the individual elements

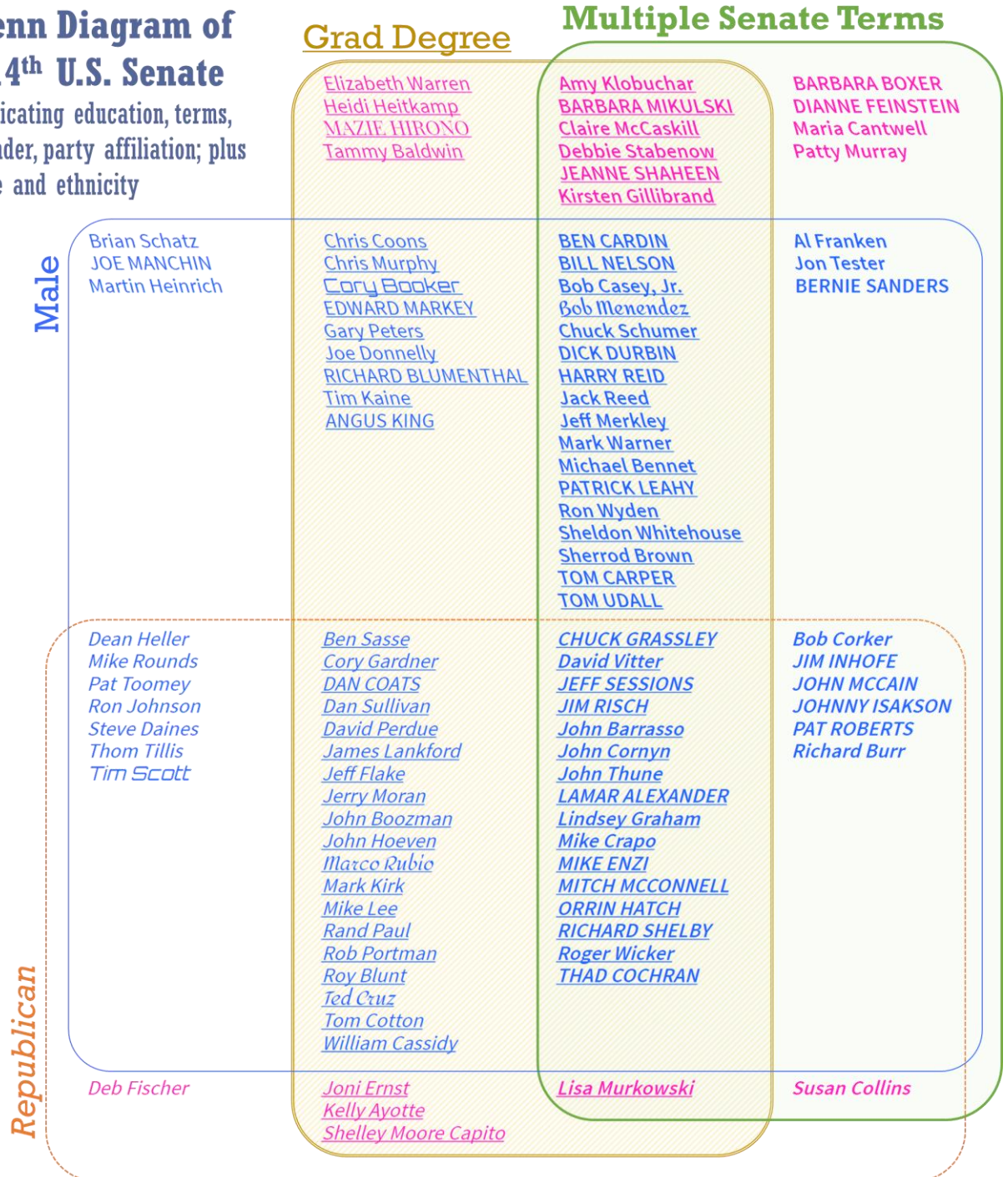


Labelled Venn

- Every person explicitly labelled
- Set sizes explicitly visible as stacks
 - More men then women
 - More democrat women than republican women...
- Persons uniquely nameable
 - Susan Collins and Lisa Murkowski are only Republican women with multiple terms.
 - Bernie Sanders and Angus King are the only Independents.
- Semantic encoding
 - Left leaning democrats, right leaning republicans
 - Gender colors
 - More terms = more weight (allusion to more clout)
 - Grad degree or professional degree is underline, i.e. an add-on
 - All Caps = old
 - Ethnicity = font.

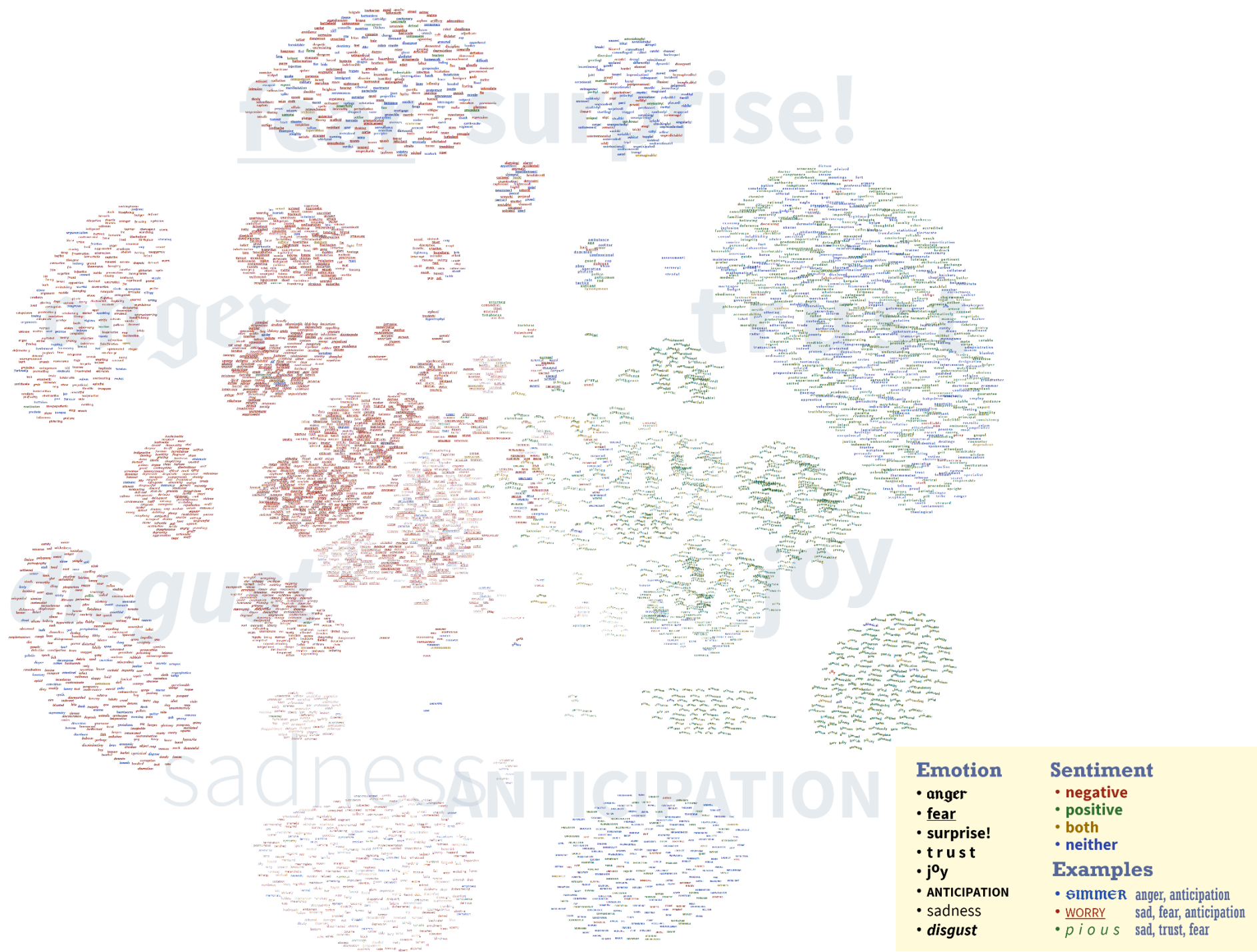
Gender: **Male** **Female** Terms: first, **2 or more** Age: under 65, OVER 65
 Education: Bachelor's Degree Graduate or Professional Degree
 Ethnicity: White *Latino* Asian American African American
 Party: **Democrat** *Independent* **Republican**
 Data sources include measureofamerica.org, wikipedia and govtrack.us

Venn Diagram of 114th U.S. Senate
 indicating education, terms, gender, party affiliation; plus age and ethnicity



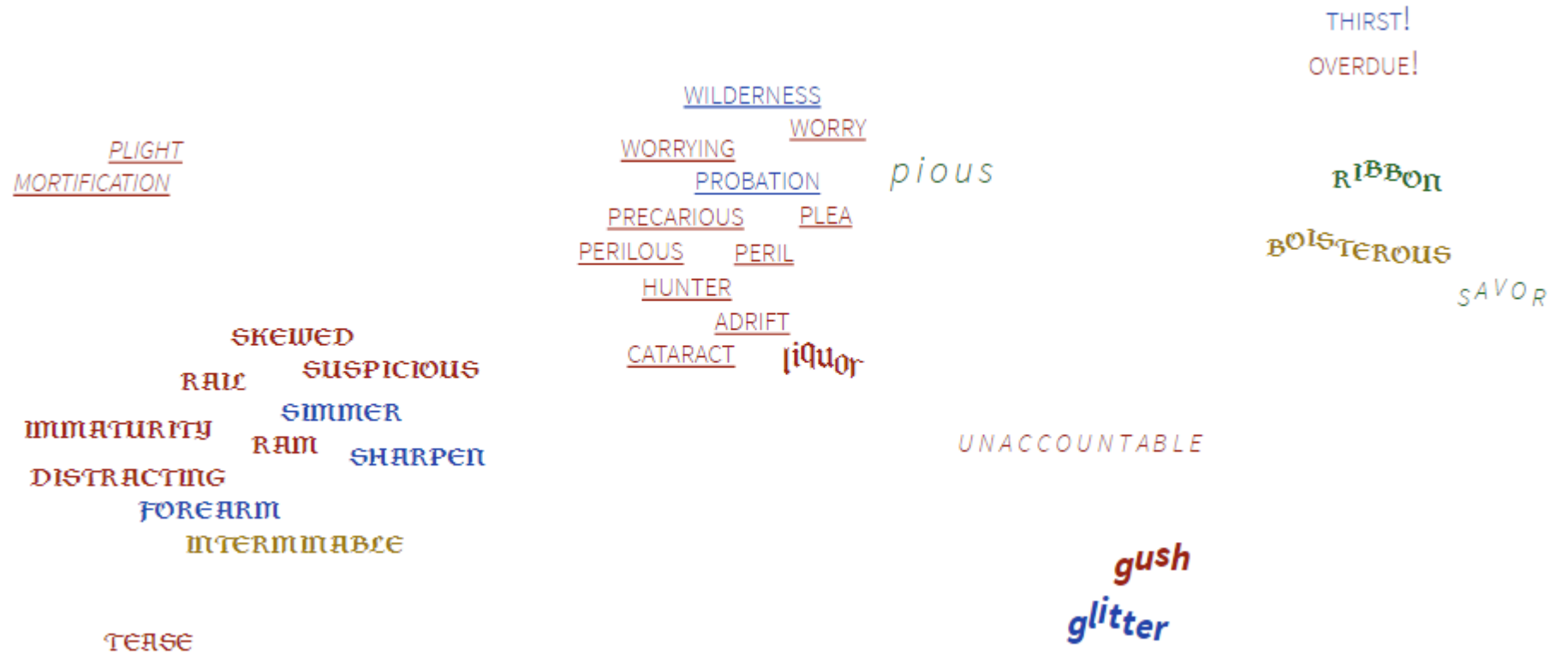
Labelled Graph

- 4463 words associated with 8 different emotions and sentiment (positive/negative)
- 256 possible combinations
- Graph layout: word pulled to the associated emotion
- Color by sentiment; font attribute per emotion



Word Emotions

- Color by sentiment
- Font attribute per emotion
- Close-up – visually distinguish between a homogenous cluster vs. difference



Emotion

- anger
- fear
- surprise!
- trust
- joy
- ANTICIPATION
- sadness
- disgust

Sentiment

- negative
- positive
- both
- neither

Examples

- **simmer** anger, anticipation
- **worry** sad, fear, anticipation
- **pious** sad, trust, fear

Microtext Areas

CD: Categorical Document

Heatmap

- High-level patterns clearly visible
 - size
 - color
- But what about the details?
These are just counts.

Who Survived on the Titanic?

by class, men vs. women & children

died survived
men women & children



Data sources: Dept of Biostatistics, Vanderbilt University & Encycloedia-titanica.org

Labels as Texture

- Fill in boxes with all the names of the passengers.
- And further format those names by the same criteria (or other criteria)
- And further, use those names as affordances, e.g. web links.

Who Survived on the Titanic? by class, men vs. women & children

Hudson Allison Thomas Andrews Ransom Arttagaveytis John Astor John Baumann Quigg Baxter Thomson Beattie Jakob Binsmann Stephen Blackwell John Borebank John Brady Emily Brandeis Arthur Browe Archibald Butt Alexander Cairns Frans Carlsson Francisco Carrau Howard Case Tyrell Cavendish Harbert Chaffee Roderick Chisholm Walter Clark George Clifford Edward Colley Alexander Compton John Crafton Edward Crosby John Cumings Thornton Davidson Walter Douglas William Duff John Farthing Benjamin Foreman Charles Fortune Mark Fortune Thomas Franklin Richard Fry Jacques Futrelle Arthur Gee Victor Giglio George Goldschmidt George Graham Benjamin Guggenheim Charles Harrington Henry Harris William Harrison Charles Hays Christopher Head Herbert Hilliard William Hopkins Alexander Holverson William Hoyt Charles Jones Henry Julian Edwin Keeping Edward Kent Frederick Kenyon Herman Klaber Ervin Levy Mr Lindeberg-Lind Milton Long Joseph Loring John Maguire Daniel Marvin Thomas McCaffry Timothy McCarthy Edgar Meyer Francis Millet William Minahan Harry Molson Clarence Moore Charles Natsch Arthur Newell Arthur Nicholson Engelhart Ostby Servando Ovies y Rodriguez William Parr Austen Partner Vivian Payne Thomas Pears Walter Porter John Reuchlin Sante Ringhini Victor Robbins Washington Roebling Hugh Rood Mr Rosenshine John Ross Martin Rothschild Alfred Rowe Arthur Ryerson William Silvey John Smart James Smith Lucien Smith Richard Smith William Spencer William Stead Albert Stewart Isidor Straus Frederick Sutton Emil Taussig John Thayer Manuel Uruchurtu Wyckoff Van der hoef William Walker Frank Warren John Weir Percival White Richard White George Wick George Widener Harry Widener Charles Williams Fletcher Williams-Lambert George Wright

Helen Allison Bessie Allison Jose Carrau Edith Evans Ann Isham Victor Penasco y Castellana Rosalie Strous

Samuel Abelson Charles Aldworth Frank Andrew William Angle John Ashby Charles Bainbridge Frederick Banfield Robert Bateman Henry Beauchamp William Berrinan William Botsford Solomon Bowerun James Bracken Thomas Brown Kurt Bryhl Reginald Butler Thomas Byles William Campbell William Carlines Ernest Carter Charles Chapman John Chapman Charles Clark Reginald Coleridge Erik Collander Harvey Collier Harry Coterill Alfred Cunningham Jose de Brito Sebastiao do Carlo Herbert Denbury William Downham James Drew George Eitemiller Ingar Enander Harry Fauthorpe Stanley Fox Archie Frost Joseph Fynee Harry Gale Shadrach Gale Lawrence Gavey William Gilbert Edgar Giles Frederick Giles Ralph Giles John Gill William Gillespie Hans Givard Samuel Greenberg Reginald Hale William Harbeck John Harper Walter Harris Benjamin Hart Samuel Herman Leonard Hickman Lewis Hickman Richard Hocking Sams Hocking Henry Hodges Stephen Hold Ambrose Hood Benjamin Howard George Hunt Sidney Jacobsohn John Jarvis Clifford Jefferys Ernest Jefferys Stephen Jenkin Sinai Kantor Daniel Kean Charles Kirkland Robert Knight Johan Kviliuer William Lahtinen John Lamb George Laroche Rene Levy Robert Leyson John Lingane Charles Louch Noel Malachard Alfred Mallet Serafino Mangiavacchi William Matthews Frank Maybery Arthur McCræ James McCrie Peter McKane August Meyer Jack Milling Henry Mitchell Juozas Montvila Ernest Morawek Mr Morley Thomas Myles Nicholas Nasser Louis Navratl Israel Nesson Joseph Nicholls Robert Norman Richard Otter Alfred Pain Clifford Parker Frank Parkes Frederick Pengelly Rene Pernot Joseph Peruschitz Escott Phillips Martin Ponesell Franz Pulbaum David Reeves Peter Renouf Emile Richard Reginald Rogers Edward Schmidt Charles Sedgwick Percival Sharp Ernst Sjøstedt Richard Slesman Samuel Sobel Samuel Stanton Philip Stokes George Swane Moses Troupiansky William Turpin James Veal John Ware William Ware Ennis Watson Leopold Weisz Edwy West Edward Wheldon Frederick Wheeler

Edgardo Andrew Percy Bailey Lilian Carter Sara Chapman Irene Corbett Mary Corey Charles Davies Percy Deacon William Didden Arne Fahlstrom Joseph Fillbrook Annie Funk Alfred Gaskell Maria Hiltunen Ellen Howard Claire Karnes Anna Lahtinen Mary Mack Thomas Mulld George Sweet Dorothy Turpin Mrs Yrois

Anthony Abbing Mauritz Adahl John Adams William Alexander Ilmari Aihomaki Ahmed Ali William Allen William Allen Albert Andersen Anders Andersson Johan Andersson Paul Andreasson Minko Angelhoff Josef Arnold-Franchi Ernst Aronsson Adola Asim Carl Asplund Gerics Assaf Ali Assam Sleiman Attallah Albert Augustsson Raffail Baccos Karl Backstrom Mohamed Badt Cerin Bakkie David Barton William Beavan John Bengtsson Karl Berglund Semon Bertos Tannous Bertos Hans Birkeland Guentcho Bostandeyff Hanna Boules John Bourke Dai Bowen Lewis Brandt Owen Brund Carl Brobeck William Bucklebank Jaenick Burke Luka Cacic Patrick Canavan Ernest Carr Joseph Caran August Carlsson Carl Carlson Alfred Carvel Franceses Celotti David Chastory Emil Christmann Apostolos Chronopoulos Dominos Coelho Patrik Colbert Pegu Collett Satto Coleff Thomas Conlon Michael Cunningham Patrick Connors Jacob Cook Bartol Cor Ivan Cor Lindqvist Cor Harry Cor Daniel Coxon Ernest Crasse John Cribb Shedid Dahur Branko Dakic Ernst Danboun Yoto Danoff Ristin Dantcheff John Davies Alfred Davies Ivan Davies Thomas Davidson Bertram Dean Redjo Delahie Mariako Denotri Mitto Denkooff Samuel Dennis William Dennis Jovan Dmic Valcho Dintcheff Tannous Dohar Patrick Dooley Jozef Drazonoic Frank Duane Adol Dykfor Johan Ekstrom Dibo Elias Joseph Elias William Elsbury Farred Enir Thomas Everett James Farrell James Flynn John Flynn Joseph Foley William Foley Arthur Ford Patrick Fox Charles Franklin Martin Gallagher John Garfirth Stanio Gheorghieff Eliezer Gilinski Nathan Goldsmith Frank Goldsmith Manuel Goncalves Charles Goodwin George Green Daniel Gronnstedt Robert Guest Alfred Gustafsson Anders Gustafsson Johan Gustafsson Karl Gustafsson Ingvald Hagland Konrad Hagland Pekka Hakkarainen Leon Hampe Mansour Hanna Claus Hansen Henrik Hansen Henry Hansen David Harner Henry Hart Ignacij Hendekovic John Holm John Holthm John Horgan Adolf Humblen Yousseff Ibrahim Shawah Ylio Ibleff Kanio Ivanoff Jose Jarkin Hans Jensen Niels Jensen Erik Johansson Gustaf Johansson Karl Johansson Nils Johansson Alfred Johnson William Johnson Malkolm Johnson Andrew Johnston Latio Jonkoff Nils Jonsson Johannes Kalvik Milan Karacic Julius Karlsson Carlos Karlsson Catalvas Katavelas Adey Keane Arthur Keeffe James Kelly James Kelly Betros Khalil John Kiernan Philip Kiernan Thomas Kilgannon Vincenz Kink Theodor Kraeff Sarkis Lahoud Kristo Laleff Len Lam August Larsson Bengt Larsson Edward Larsson-Rondberg Antti Leinonen Peter Lemberopoulos Denis Lennon Lionel Leonard James Lester Rene Lievens Edward Lindell Michael Lineham Lee Ling Simon Lithman William Lobb Edward Lockyer Henry Lovell John Lundahl Stanko Lyntakoff George MacKay Matti Maenpaa John Mahon Simon Maisner Kalki Makinen Sarkis Mardrosian Maria Markoff Johann Markun Nicola Matinoff Michael McEvoy Martin McMahon Neal McNamee Alfonso Mei Robert Memagh Frank Miles Ivan Mineff Lazar Minkoff Stoycho Minooff Mitto Mitkoff Leonard Moore Daniel Moran James Morfok William Morley Thomas Morrow Rahamin Moutal Joseph Murdlin Penko Naidenoff William Nancarrow Minko Nankoff Mustafa Nasr Christo Nenkov Samuel Niklasson August Nilsson Isakki Niiva Richard Nosworthy Mansouret Novel John Nyvesen Thomas O'Brien Timothy O'Brien Patrick O'Connor Nils Odahl Henry Olsen Karl Olsen Ole Olsen Nils Olsson Thor Olsvigen Luka Orskov Jakob Pasic George Patchett Usher Paulner Stefa Pavlovic Ernest Pearce Olof Pedersen Joseph Peduzzi Edward Pekoniemi Nikolai Peltonaki John Perkin Marius Petersen Nedelio Petroff Pentcho Petroff Johan Peterson Vasil Plotcharsky Tome Pokrnic Alexander Radeff Raihed Razi James Reed Tido Rekic Harold Reynolds Matti Rintamaki Samuel Risien Alexander Robius William Rogers Knud Rommetvedt Richard Rouse Patrick Ryan Amin Saad Khalil Saad Jean Saade Matthew Sadlier Simon Saether George Sage John Sage Karl Salander Johan Salonen Hanna Sanaan William Sandaurecock Frederick Sawyer James Scanlan Todot Sdycoff Pentcho Shaugnessy Frederick Shellard Charles Shorney John Simmons Orsen Siranyanian Maurice Sirote Hussein Sivie Antti Sivola Wilhelm Skog Petco Slabenoff Selman Slocovcis Mile Smiljanec Thomas Smyth Peter Soholt Francis Somerton Wolf Spector Henry Spinner Ivan Stanef Ivan Stankevich Edward Stanley Thomas Storey Ila Stoytcheff Ivan Strlicek John Svensson Olof Svensson Thomas Theobald Charles Thomas John Thomas Alexander Thomas Percival Thorncroft John Tikkanen Roger Tobin Latio Todoroff Ernest Tomlin Ernst Torber Aasad Torfa Nalli Toufik Stjepan Turcin Austen van Billiard Jean Van Impe Philemon van Melkebeek Johannes Vande Velde Nestor Vande Walle Leo Vanden Steen Victor Vander Cruysen Julius Vander Planke Olof Vendel Janko Vovk Achille Waelens Frederick Ware Charles Warren James Weber Linhart Wenzel Carl Charles Widgren Karl Wiklund Abi Willer Harry Williams Leslie Williams Einar Windelov Albert Wirz Philipp Wiseman Camille Wittevrongel Antoni Yasbeck Gerious Yousseff Wazli Youssif Marijpedree Zakarian Orlin Zakarian Leo Zimmermann

Eugene Abbott Rossmore Abbott Johanna Ahlin Owen Allum Ida Andersson Sigvard Andersson Alfred Andersson Ingborg Andersson Sigrd Andersson Josefina Arnold-Franchi Carl Asplund Clarence Asplund Filip Asplund Malake Attallah Saide Barbara Catherine Barbara Julia Barry Ernst Bjorklund Ara Boulas Norelain Dahlberg Sultana Boulas Mary Bourke Catherine Bourke Elm Braf Catherine Buckley Mary Burns Manda Cacic Maria Cacic Jogo Cacic Jovo Calic Petar Calic Mary Canavan Maria Caram Jeanne Carr Demetrios Chronopoulos Kate Connolly Jeso Culunovic Gerda Dahlberg Gilbert Danbom Anna Dambom Joseph Davies Alfons de Pelsmaeker Mirko Dika Elizabeth Doyle Gustaf Edvardsson Hans Eklund Joseph Elias Tannous Elias Eberhard Fischer Honora Fleming Daisy Ford Ruby Ford Edward Ford William Ford Margaret Ford Harold Goodwin Sidney Goodwin William Goodwin Jessie Goodwin Lillian Goodwin Charles Goodwin Augusta Goodwin Aloisia Haas Kate Hagardn Alice Harknett Houssein Hassan Nora Hegarty Wendla Heinenen Jenny Henriksson Delia Henry Ida Imakangas Pieta Imakangas Svend Jensen Willie Johnston Carrie Johnston Lily Johnston Katrina Jusilla Mari Jusilla Nikolai Kallio Foreid Kassam Maria Khalil Maria Kink Gertrud Klaser Klas Klaser Hanna Klaser Kristina Laitinen Patrick Lane Henry Lefebvre Ida Lefebvre Jeannie Lefebvre Mathilde Lefebvre Frances Lefebvre Mary Lennon Agda Lindahl Augusta Lindholm Elin Lindell Cordelia Lobb Bridget Mahon Mary Mangon Mary Margaret McGowan Eileen McNamee Bridget McNeill Marion Mcnervell Annie Meek Pehr Myhrman Hamah Naughton Manta Nieminen Patrick O'Connell Maurice O'Connor Bridget O'Donoghue Elna Odell Julia Oreskovic Marija Oreskovic Olof Olsen Bridget O'Sullivan Gosta Palsson Paul Palsson Stina Palsson Torborg Palsson Alma Palsson Eino Pamula Julia Pamula Urho Pamula Ernest Pamula Jaako Pamula Maria Pamula Alfred Peacock Treastell Peacock Edith Peacock Kate Petrics Matilda Petranec Ellen Pettersson Mada Pobrnic Lena Rasmussen Albert Rice Arthur Rice Eric Rice Eugene Rice George Rice Margaret Rice Sami Riihivuori Emma Risien Grace Robins Salli Rosholm Viktor Rosholm Helena Rosholm Alfred Rush Harry Sadovitz Thomas Sage William Sage Ada Sage Constance Sage Dolly Sage Stella Sage Douglas Sage Frederick Sage Annie Sage Elias Samaan Youssef Samaan Harald Skoog Karl Skoog Mabel Skoog Margit Skoog Anna Skoog Ida Strandberg Telma Strom Elsa Strom Tannous Thomas James van Billiard Walter van Billiard Catharina Van Inpe Rosalie Van Impe Augusta Vander Planke Leo Vander Planke Emelia Vander Planke Hulda Vestrom Jakob Wiklund Edward Willey Hilmi Zabour Thamine Zaubur



Harry Anderson Algernon Barkworth Richard Beckwith Karl Behr Dickinson Bishop Mauritz Bjornstrom-Steffanson Henry Blank George Bradley Edward Calderhead Thomas Cardeza William Carter Norman Chambers Paul Chevre Peter Daly Robert Daniel Albert Dick Washington Dodge Mr Duff Gordon Irving Flynn Henry Frauenthal Isaac Frauenthal Maxmillan Frolicher-Stehli Samuel Goldenberg Archibald Gracie William Greenfield George Harder Henry Harper Admah Hassab Walter Hawksford Mr Homer Frederic Hoyt Joseph Ismay Edwin Kimball Gustave Lesurer Pierre Marechal James McGough Philip Mack Alfred Omont Arthur Peuchen George Rheims Mr Romaine Adolph Saelfield Abraham Salomon Frederic Seward Spencer Silverthorne Oberst Simonius-Bilmer William Sloper John Snyder Frederic Spedden Max Stahelin-Maeglin Charles Stengel Elmer Taylor Gilbert Tucker Richard Williams Hugh Woolner

Elisabeth Allen Hudson Allison Kornelia Andrews Charlotte Appleton Madeleine Astor Leontine Aubart Nellie Barber Helene Baxter Albina Bazzani Sallie Beckwith Rosalie Bidaos Ellen Bird Helen Bishop Amelia Bissette Caroline Bonnell Elizabeth Bonnell Grace Bowen Elsie Bowerman Margaret Brown Caroline Brown Emma Bucknell Elizabeth Burns Helen Candee Charlotte Cardeza William Carter Lucile Carter Lucile Carter Eleanor Cassebeer Julia Cavendish Carrie Chaffee Bertha Chambers Victorine Chaudanson Gladys Cherry Edith Chibnall Virginia Clark Alice Cleaver Sara Compton Mary Compton Malvina Cornell Harriet Crosby Catherine Crosby Florence Cumings Sarah Daniels Orian Davidson Vera Dick Washington Dodge Ruth Dodge Mary Douglas Mahala Douglas Lucille Duff Gordon Olive Earnshaw Caroline Endres Elizabeth Eustis Antoinette Flegenheim Margaret Fleming Alice Fortune Ethel Fortune Mabel Fortune Mary Fortune Laura Francatelli Clara Frauenthal Hedwig Frolicher Margaretha Frolicher-Stehli Lily Futrelle Amalie Geiger Dorothy Gibson Pauline Gibson Edwiga Goldenberg Margaret Graham Edith Graham Blanche Greenfield Dorothy Harder Myna Harper Irene Harris Margaret Hays Clara Hays Jean Hippach Ida Hippach Anna Hogeboom Mary Holverson Jane Hoyt Amelie Icard Marion Kenyon Gertrude Kimball Emilie Kreuchen Farnham Leader Bertha LeRoy Sigrd Lindstrom Mary Lines Elizabeth Lines Gretchen Longley Elise Lurette Georgette Madill Roberto Maioni Mary Marvin Mrs Mayne Leila Meyer Daisy Minahan Lillian Minahan Madeleine Newell Marjorie Newell Helen Newsom Fernina Oliva y Ocano Helene Ostby Edith Pears Maria Penasco y Castellana Anne Perreault Lily Potter Elizabeth Robert Edith Rosenbaum Lucy Rother Elizabeth Rothschild John Ryerson Emily Ryerson Emma Sagesser Emma Schabert Augusta Serepeca Elizabeth Shutes Alice Silvey Mary Smith Nelle Snyder Robert Spedden Margareta Spedden Maria Spencer Annie Stengel Martha Stephenson Martha Stone Margaret Swift Ruth Taussig Tillie Taussig Juliet Taylor John Thayer William Thayer Gertrude Thorne Anna Ward Anna Warren Ella White Mary Wick Mary Wick Eleanor Widener Constance Willard Helen Wilson Marie Young

Edward Beane Lawrence Beesley Albert Caldwell Sidney Collett George Harris Masabumi Hosono William Mellors Baron Nourney Percy Oxenham Julian Pedro y Manent Emilio Pallas y Castello Emilio Portaluppi Charles Wilhelmis Charles Williams

Hannah Abelson Mary Angle Ada Ball Ethel Beane Richard Becker Marion Becker Ruth Becker Nellie Becker Lilian Bentham Mildred Brown Edith Brown Elizabeth Brown Dagmar Bryhl Kate Buss Karolina Byström Alden Caldwell Sylvia Caldwell Clear Cameron Julie Christy Alice Christy Ada Clarke Lottie Collier Charlotte Collier Selena Cook John Davies Elizabeth Davies Mary Davis Argentina del Carlo Elsie Doling Ada Doling Marshall Drew Lulu Drew Asuncion Duran y More Florentina Duran y More Elizabeth Fauthorpe Ethel Garside Viljo Hamalainen Anna Hamalainen Nina Harper Eva Hart Esther Hart Alice Herman Kate Herman Jane Herman Mary Hewlett Nellie Hocking Eliza Hocking Anna Held Bertha Ilett Amy Jacobsohn Marie Jerwan Miriam Kantor Nora Keane Fannie Kelly Louise Laroche Simonne Laroche Bertha Lehmann Jessie Leitch Amelia Lemore Alice Louch Andre Mallet Antoinette Mollet Madeleine Mellinger Elizabeth Mellinger Adele Nasser Edmond Navratil Michel Navratil Elizabeth Nye Lucie Parrish Alice Phillips Mrs Phillips Rosa Pinsky Phyllis Kuck Winifred Quick Jane Quick Lillian Renouf Encarnacion Reynaldo George Richards William Richards Emily Richards Lucy Ridsdale Emily Rugg Imanita Shelley Lyll Silven Maude Sinoack Anna Sinkkonen Hilda Slayter John Smith Ellen Toomey Jessie Trout Winnie Trout Nellie Walcroft Florence Ware Bertha Watt Bessie Watt Susan Webber Mathilde Weiss Ralph Wells Joan Wells Addie Wells Barbara West Constance West Ada West Marion Wright

Olaus Abelseth Abraham Abrahamsson Nassee Albimona Wennerstrom Andersson Johan Asplund Hanna Barah Lee Bing Daniel Buckley Chang Chip Karl Dahl Eugene Daly Guillaume de Messemaeker Theodore de Mulder Edward Dorking Joseph Duquemin Luigi Finoli Choong Foo Oskar Hedman Ling Hee Abraham Hyman Ivan Jalsevac Carl Johanson Bert Johansson Bratthammer Oskar Johansson Palmquist Carl Jonsson Erik Jusella Einar Karlsson Franz Karun John Kennedy Anton Kink-Hellmann Neshan Krekorian Ali Lam Fang Lang Philip Leoni Eino Lindqvist Nikola Lili Thure Lundstrom Fridtjof Madsen Hanna Mamee Thomas McCormack Bernard McCoy Carl Midtsjo Albert Moss Sahid Nakid Juha Niskanen Patrick O'Keefe Oscar Olsson Ernst Persson Berk Picard Edward Ryan Julius Sap Jan Sheerlinck John Strandén Johan Sundman Gunnar Tenglin William Tornquist David Vartanian

Rosa Abbott Karen Abelseth Sophie Abraham Philip Aks Leah Aks Carl Andersen-Jensen Erna Andersen Edwin Aslund Lillian Asplund Selma Asplund Miriam Assaf Khalil Banoura Ayoub Maria Backstrom Eugénie Bacini Helene Bacini Maria Bacini Lotfa Bacini Emily Badman Bridget Bradley Ellen Carr Goo Cohen Kate Connolly Neville Coutts William Coutts Minnie Coutts Laura Cribb Maggie Daly Mary Davison Emma de Messemaeker Bertram Dean Milvina Dean Eva Dean Margaret Devaney Elizabeth Dowdell Jennie Drapkin Anna Elin Virginia Emanuel Kate Gillingh Mary Glynn Frankie Goldsmith Emily Goldsmith Erik Hakkarainen Jennie Hansen Nora Healy Laina Heikinen Laila Hellstrom Hildur Hirvonen Helga Hirvonen Eilina Honkanen Moayward Annie Jermy Harold Johnson Elisabeth Johnson Eleanor Johnson Manca Karan Annie Kelly Mary Kelly Lise Kink-Hellmann Luise Kink-Hellmann Aurora Landgren Olga Lundin Maggie Madigan Margaret Mannion Fatima Masselmann Katie McCarthy Agnes McCoy Alicia McCoy Bridget McDermott Mary McGovern Annie McGowan Ellie Mockler Meier Moor Beila Moor Bertha Moran Gerias Moubarek William Moubarek Amenia Moubarek Mantoura Moussa Kate Mullens Bertha Mulvihill Kate Murphy Margaret Murphy Nora Murphy Jane Naib Mary Nakid Mary Nakid Elias Nicola-Yarred Elias Nicola-Yarred Berta Nilsson Helmina Nilsson Anna Nyström Hannah O'Brien Bridget O'Driscoll Nellie O'Dwyer Vein Ohman Norah O'Leary Artur Olson Mara Osman Michael Peter Anna Peter Catherine Peter Hannah Rodan Sarah Roth Anna Saliyalevka Beatrice Sandstrom Agnes Sandstrom Marguerite Sandstrom Ellen Shien Anna Sjöblom Julia Smyth Amy Stanley Victor Sunderland John Svensson Assad Thomas Thelma Thomas Florence Thorncroft Georges Touma Maria Touma Hanne Touma Anna Turja Hedwig Turkula Shawneene Whabee Ellen Wilkes Selini Yasbeck

Skimming Text

QP: Quantitative Paragraphs

Skim

What are some
keywords here?
→

Dorothy lived in the midst of the great Kansas prairies, with Uncle Henry, who was a farmer, and Aunt Em, who was the farmer's wife. Their house was small, for the lumber to build it had to be carried by wagon many miles. There were four walls, a floor and a roof, which made one room; and this room contained a rusty looking cookstove, a cupboard for the dishes, a table, three or four chairs, and the beds. Uncle Henry and Aunt Em had a big bed in one corner, and Dorothy a little bed in another corner. There was no garret at all, and no cellar except a small hole dug in the ground, called a cyclone cellar, where the family could go in case one of those great whirlwinds arose, mighty enough to crush any building in its path. It was reached by a trap door in the middle of the floor, from which a ladder led down into the small, dark hole.

When Dorothy stood in the doorway and looked around, she could see nothing but the great gray prairie on every side. Not a tree nor a house broke the broad sweep of flat country that reached to the edge of the sky in all directions. The sun had baked the plowed land into a gray mass, with little cracks running through it. Even the grass was not green, for the

Skim

What are some
keywords here?
→

Dorothy lived *in the midst of the* great **Kansas prairies**, *with* **Uncle Henry**, *who was a* **farmer**, *and* **Aunt Em**, *who was the* **farmer's** wife. Their house was **small**, *for the* **lumber to build** it had to be **carried** *by* **wagon** many **miles**. There were **four walls**, *a floor and a* **roof**, which made one **room**; *and* this **room contained** *a* **rusty looking cookstove**, *a* **cupboard** *for the* **dishes**, *a table, three or four* **chairs**, *and the* **beds**. **Uncle Henry** *and* **Aunt Em** had *a* **big bed** *in one* **corner**, *and* **Dorothy** *a little* **bed** *in another* **corner**. There was *no* **garret** *at all, and no* **cellar except** *a* **small hole dug** *in the* **ground**, called *a* **cyclone cellar**, *where the* **family** could **go** *in case one of those* great **whirlwinds** **arose**, **mighty enough** *to* **crush** any **building** *in its* **path**. It was **reached** *by a* **trap door** *in the* **middle of the floor**, *from which a* **ladder** led *down into the* **small, dark hole**.

When **Dorothy** stood *in the* **doorway** *and* **looked around**, she could see *nothing but the* great **gray prairie** *on every* **side**. Not *a* **tree** *nor a* **house** broke *the* **broad sweep** *of* **flat country** *that reached to the* **edge** *of the* **sky** *in all* **directions**. The **sun** had **baked** *the* **plowed** *land into a* **gray mass**, *with little* **cracks** *running through it*. Even *the* **grass** was not **green**, *for the*

Skim Formatting

One strategy used at a low-level in text skimming is to dip into the text looking for nouns, proper nouns, unusual words and adjectives.

Therefore, use pre-attentive font characteristics (weight, italic) to distinguish the target words.

The flights of the 1902 **glider** had demonstrated the efficiency of our system for maintaining equilibrium, and also the accuracy of the laboratory work upon which the design of the glider was based.

Font weight by word frequency:		Font <i>italics</i> for:
light	top 100	<i>articles,</i>
regular	100-1000	<i>conjunctions,</i>
bold	1000-20000	<i>prepositions,</i>
black	> 20000	<i>pronouns,</i>
		<i>infinitives</i>

The **flights** of the 1902 **glider** had **demonstrated** *the efficiency of our system for* **maintaining equilibrium**, *and also the* **accuracy** of the **laboratory work** *upon which the* **design** of the **glider** was **based**.

- Uncommon words pop-out by heavy weight
- Least relevant words recede to background with italics using figure/ground separation
- Overall text layout, including line lengths, retained.

Reviewing Opinions

QS: Quantitative Sentences

Opinion

RottenTomatoes.com

- Reviewer Key Quotes and Score
- Who gave the best opinion?
- Which movie has more consistency in reviews?

DESPICABLE ME 2 (2013)



Claudia Puig
USA Today



Slapstick high jinks are plentiful, though never particularly funny.

[Full Review](#) | Original Score: 2/4

July 2, 2013



Sara Stewart
New York Post



Sure, it's not as novel as the first time we were here, but directors Pierre Coffin and Chris Renaud stay true to the clever, slapstick vibe.

[Full Review](#) | Original Score: 3/4

July 2, 2013



Joe Williams
St. Louis Post-Dispatch



"Despicable Me 2" is trying to tickle, not teach. In a marketplace full of toxic messages, that's not such a bad thing.

[Full Review](#) | Original Score: 2.5/4

July 2, 2013



Rafer Guzman
Newsday



Better, or at least sweeter, than the first, with Wiig adding some much-needed romantic charm to the toddler-level humor.

[Full Review](#) | Original Score: 2.5/4

July 2, 2013



Stephen Holden
New York Times



[It] is consistently diverting and so cute you'll want to pet it. Yet it is also weightless and lacks a center.

[Full Review](#) | Original Score: 2.5/5

July 2, 2013



James Berardinelli
ReelViews



Despicable Me 2 feels like a opportunity to get together with some old friends, hang out, and discover what they've been up to.

[Full Review](#) | Original Score: 3/4

July 2, 2013



A.A. Dowd
AV Club



A sequel was a foregone conclusion, but how did those responsible lose sight of what made the original special?

[Full Review](#) | Original Score: C

July 2, 2013



Colin Covert
Minneapolis Star Tribune



For an adult, the predictability could turn you blasé. For kids, revisiting these jokes is a howl. Pinkie promise.

[Full Review](#) | Original Score: 3/4

July 2, 2013

HOW TO TRAIN YOUR DRAGON (2010)



Nancy Churnin
Dallas Morning News



The film truly starts to soar when Hiccup takes his first ride on Toothless.

[Full Review](#) | Original Score: 4.5/5

March 26, 2010



Bob Mondello
NPR



What gives [this] story emotional heft has to do with a different kind of dimension: a depth of feeling surrounding the Black Stallion-style bonding of boy and beast.

[Full Review](#) | Original Score: 8/10

March 26, 2010



Mike Clark
Washington Post



At a time when Hollywood seems to be releasing everything this side of Dead Sea Scrolls documentaries in 3-D, How to Train Your Dragon is a briskly paced computer-animated entertainment that uses the format to maximum effect, the way Avatar does.

[Full Review](#) | Original Score: 3/4

March 26, 2010



Kyle Smith
New York Post



The one interesting aspect of the movie, apart from the design, is that it puts so much effort into projecting a moral, such as it is.

[Full Review](#) | Original Score: 2/4

March 26, 2010



Linda Barnard
Toronto Star



With its messages about acceptance, respect and tolerance, How To Train Your Dragon also brings some lessons of its own, including some valuable tools for doing battle with dragons, should the need arise.

[Full Review](#) | Original Score: 4/4

March 26, 2010



Stephen Whitty
Newark Star-Ledger



It all adds up to a pleasant adventure, and one that doesn't insult parents or children. Lucky kids will find someone to take them this weekend. Even luckier adults will find someone to take.

[Full Review](#) | Original Score: 3.5/4

March 26, 2010



Claudia Puig
USA Today



It's a thrilling action-adventure saga with exhilarating 3-D animation, a clever comedy with witty dialogue, a coming-of-age tale with surprising depth and a sweetly poignant tale of friendship between man and animal.

[Full Review](#) | Original Score: 3.5/4

March 25, 2010

Opinion

Raw quotes

from rottentomatoes.com

Score Key Quote

2/4	Cars might get us into car world as a gimmick,
3.5/4	Though the central idea of nostalgia for a quieter
3/4	Cars made me want to hop in my jalopy and to
3/5	It's beautiful to look at. The talking cars feel more It's impossible to find more joy in the dark at
3.5/4	It's another innovative piece of entertainment. Cars somewhat self-indulgently runs nearly two Like the Toy Story films, Cars is a state-of-the-co
4/4	It achieves the near impossible, turning cars, truc
3/4	It thunders ahead with breezy abandon, scorin
2.5/4	For parents out there whose future holds the c
B+	It's touching, it's funny, it offers cautions abou
4/4	Its characters may be made of steel, but this n
3/4	Cars idles at times. And it's not until its final la
B+	No other outfit can match Pixar's knack for pluck
3/4	The short answer is: Pixar does it again. At 116 minutes, it's a test not of speed but enc
3/4	It tells a bright and cheery story, and then has
+ 30 more quotes...	

- Convert score into 1-10 range



- Pull out 11 quotes evenly from the sorted list
- Format the quote with bold to indicate the reviewers score

Quotes sorted and reviewer score indicated by length of bold

Cars (2006)

At almost 2 hours, the movie, well, exhausts its welcome, somehow man
... **both in its ingratiating vibe** and bland execution, Cars is nothing if not
It's beautiful to look at. The talking cars feel more alive than talking car:
For parents out there whose future holds the certain prospect of the DV
By previous Pixar standards, it's a weak sort of win.

The short answer is: **Pixar does it again**

It tells a bright and cheery story, and then has a little something profou

It's powered by a human heart through a roadway of natural wonders ar

A work of American art as classic as it is modern

Though the central idea of nostalgia for a quieter, small-town life may

It achieves the near impossible, turning cars, trucks, tractors and farm

0 1 2 3 4 5 6 7 8 9 10

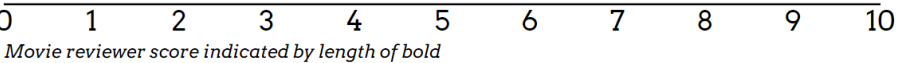
Movie reviewer score indicated by length of bold

Opinion

- Length of black text indicates reviewers score
- Which movie got a really bad review?
- Overall more black means overall higher score

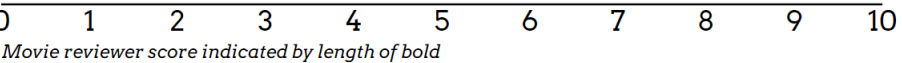
Despicable Me 2

This is a sequel that's even less necessary than Monsters University; often times it feels like Despicable Me, the animated supervillain comedy from 2010, was an average flick with a gimmick. Given the outlandish premise, you'll wish the film twinkled with a more savvy sense of humor. For cynics and detractors, it may at times feel like this sequel exists for nothing more than to be cute. Cute family fun, but lacks the pop of the original. Gru has gone from despicable to dorky. Its hyperactive vibrancy is universally boredom-proof. Not a great movie for sure, but if your kids want to see this there is enough humor to make it worthwhile. Gru still has charm and kids will adore the Minions. Steve Carell's Slavic inflections as Gru do the trick, as before. Wiig's clever hesitation as Lucy is a highlight. Once again, there's nothing here that's particularly original or memorable, but the charm is enough. The film easily surpasses the original, while leaving room for further sequels. An animated sequel that, despite not achieving the inspired lunacy of the first movie, is still a fun watch. Parts James Bond flick, "Get Smart" episode and Pixar-esque family adventure, "Despicable Me 2" ranks as one of the best animated sequels of all time. Though jammed-up with too much pointless plot, Despicable Me 2 remains one of the most entertaining animated films of the year. Not as consistently funny as the original, Despicable Me 2 still proves itself a quite entertaining family comedy. The pratfalls, gizmos and Looney Tunes 'violence' will elicit giggles from kids while adults can appreciate the clever humor.



Frozen (Disney 2013)

Frozen is a glacially stiff, perpetually unamusing animated musical with a talk-singing savior. A deeply conservative Disney animated film that left me unmoved. Disney's brand is showing. Spectacular production and vibrant voices make this a classic piece of Disney eye candy. Frozen feels a little like a Las Vegas tribute show: it hits all the recognizable beats with a polished, predictable charm. FROZEN is just about as intelligent as Disney musicals get. Frozen establishes a strong, confident tone: Cool mythology, rich, vivid animation, and a heartwarming story. "Frozen" is lighthearted and funny when it wants to be, but its dramatic core is where it really shines. Frozen is a fine addition to Disney's animated pantheon, offering a witty and heartfelt story. It is jolly, spectacular and sumptuously 3D'd. At times it is actually funny. You can't go wrong with Disney's absolutely winning animated musical princess fantasy. A dazzling fairy-tale adventure that evokes the studio's early 1990s refreshment of the genre. A return to form for Disney. Frozen is really about all of us learning that we can share our unique qualities with the world. A charming effort that successfully combines gorgeous modern animation with the timeless appeal of a classic Disney story. A hugely enjoyable Disney comedy/musical with strong characters, superb voice performance, and a heartwarming story. Frozen is an exhilarating, joyous, human story that's as frequently laugh-out-loud funny as it is touching.



Describing Topics

QW: Quantitative Words

Topics

Who are the characters?

What are their traits?

THE GOLDEN BIRD

A certain king had a beautiful garden, and in the garden stood a tree which bore golden apples. These apples were always counted, and about the time when they began to grow ripe it was found that every night one of them was gone. The king became very angry at this, and ordered the gardener to keep watch all night under the tree. The gardener set his eldest son to watch; but about twelve o'clock he fell asleep, and in the morning another of the apples was missing. Then the second son was ordered to watch; and at midnight he too fell asleep, and in the morning another apple was gone. Then the third son offered to keep watch; but the gardener at first would not let him, for fear some harm should come to him: however, at last he consented, and the young man laid himself under the tree to watch. As the clock struck twelve he heard a rustling noise in the air, and a bird came flying that was of pure gold; and as it was snapping at one of the apples with its beak, the gardener's son jumped up and shot an arrow at it. But the arrow did the bird no harm; only it dropped a golden feather from its tail, and then flew away. The golden feather was brought to the king in the morning, and all the council was called together. Everyone agreed that it was worth more than all the wealth of the kingdom: but the king said, 'One feather is of no use to me, I must have the whole bird.'

Then the gardener's eldest son set out and thought to find the golden bird very easily; and when he had gone but a little way, he came to a wood, and by the side of the wood he saw a fox sitting; so he took his bow and made ready to shoot at it. Then the fox said, 'Do not shoot me, for I will give you good counsel; I know what your business is, and that you want to find the golden bird. You will reach a village in the evening; and when you get there, you will see two inns opposite to each other, one of which is very pleasant and beautiful to look at: go not in there, but rest for the night in the other, though it may appear to you to be very poor and mean.' But the son thought to himself, 'What can such a beast as this know about the matter?' So he shot his arrow at the fox; but he missed it, and it set up its tail above its back and ran into the wood. Then he went his way, and in the evening came to the village where the two inns were; and in one of these were people singing, and dancing, and feasting; but the other looked very dirty, and poor. 'I should be very silly,' said he, 'if I went to that shabby house, and left this charming place'; so he went into the smart house, and ate and drank at his ease, and forgot the bird, and his country too.

Time passed on; and as the eldest son did not come back, and no tidings were heard of him, the second son set out, and the same thing happened to him. He met the fox, who gave him the good advice: but when he came to the two inns, his eldest brother was standing at the window where the merrymaking was, and called to him to come in; and he could not withstand the temptation, but went in, and forgot the golden bird and his country in the same manner.

Time passed on again, and the youngest son too wished to set out into the wide world to seek for the golden bird; but his father would not listen to it for a long while, for he was very fond of his son, and was afraid that some ill luck might happen to him also, and prevent his coming back. However, at last it was agreed he should go, for he would not rest at home; and as he came to the wood, he met the fox, and heard the same good counsel. But he was thankful to the fox, and did not attempt his life as his brothers had done; so the fox said, 'Sit upon my tail, and you will travel faster.' So he sat down, and the fox began to run, and away they went over stock and stone so quick that their hair whistled in the wind. When they came to the village, the son followed the fox's counsel, and without looking about him went to the shabby inn and rested there all night at his ease. In the morning came the fox again and met him as he was beginning his journey, and said, 'Go straight forward, till you come to a castle, before which lie a whole troop of soldiers fast asleep and snoring: take no notice of them, but go into the castle and pass on and on till you come to a room, where the golden bird sits in a wooden cage; close by it stands a beautiful golden cage; but do not try to take the bird out of the shabby cage and put it into the handsome one, otherwise you will repent it.' Then the fox stretched out his tail again, and the young man sat himself down, and away they went over stock and stone till their hair whistled in the wind.

Before the castle gate all was as the fox had said: so the son went in and found the chamber where the golden bird hung in a wooden cage, and below stood the golden cage, and the three golden apples that had been lost were lying close by it. Then thought he to himself, 'It will be a very droll thing to bring away such a fine bird in this shabby cage'; so he opened the door and took hold of it and put it into the golden cage. But the bird set up such a loud scream that all the soldiers awoke, and they took him prisoner and carried him before the king. The next morning the court sat to judge him; and when all was heard, it sentenced him to die, unless he should bring the king the golden horse which could run as swiftly as the wind; and if he did this, he was to have the golden bird given him for his own.

So he set out once more on his journey, sighing, and in great despair, when on a sudden his friend the fox met him, and said, 'You see now what has happened on account of your not listening to my counsel. I will still, however, tell you how to find the golden horse, if you will do as I bid you. You must go straight on till you come to the castle where the horse stands in his stall: by his side will lie the groom fast asleep and snoring: take away the horse quietly, but be sure to put the old leathern saddle upon him, and not the golden one that is close by it.' Then the son sat down on the fox's tail, and away they went over stock and stone till their hair whistled in the wind.

All went right, and the groom lay snoring with his hand upon the golden saddle. But when the son looked at the horse, he thought it a great pity to put the leathern saddle upon it. 'I will give him the good one,' said he; 'I am sure he deserves it.' As he took up the golden saddle the groom awoke and cried out so loud, that all the guards ran in and took him prisoner, and in the morning he was again brought before the court to be judged, and was sentenced to die. But it was agreed, that, if he could bring thither the beautiful princess, he should live, and have the bird and the horse given him for his own.

Then he went his way very sorrowful; but the old fox came and said, 'Why did not you listen to me? If you had, you would have carried away both the bird and the horse; yet will I once more give you counsel. Go straight on, and in the evening you will arrive at a castle. At twelve o'clock at night the princess goes to the bathing-house: go up to her and give her a kiss, and she will let you lead her away; but take care you do not suffer her to go and take leave of her father and mother.' Then the fox stretched out his tail, and so away they went over stock and stone till their hair whistled again.

As they came to the castle, all was as the fox had said, and at twelve o'clock the young man met the princess going to the bath and gave her the kiss, and she agreed to run away with him, but begged with many tears that he would let her take leave of her father. At first he refused, but she wept still more and more, and fell at his feet, till at last he consented; but the moment she came to her father's house the guards awoke and he was taken prisoner again.

Then he was brought before the king, and the king said, 'You shall never have my daughter unless in eight days you dig away the hill that stops the view from my window.' Now this hill was so big that the whole world could not take it away: and when he had worked for seven days, and had done very little, the fox came and said. 'Lie down and go to sleep; I will work for you.' And in the morning he awoke and the hill was gone; so he went merrily to the king, and told him that now that it was removed he must give him the princess.

Then the king was obliged to keep his word, and away went the young man and the princess; and the fox came and said to him, 'We will have all three, the princess, the horse, and the bird.' 'Ah!' said the young man, 'that would be a great thing, but how can you contrive it?'

'If you will only listen,' said the fox, 'it can be done. When you come to the king, and he asks for the beautiful princess, you must say, "Here she is!" Then he will be very joyful; and you will mount the golden horse that they are to give you, and put out your hand to take leave of them; but shake hands with the princess last. Then lift her quickly on to the horse behind you; clap your spurs to his side, and gallop away as fast as you can.' All went right: then the fox said, 'When you come to the castle where the bird is, I will stay with the princess at the door, and you will ride in and speak to the king; and when he sees that it is the right horse, he will bring out the bird; but you must sit still, and say that you want to look at it, to see whether it is the true golden bird; and when you get it into your hand, ride away.'

This, too, happened as the fox said; they carried off the bird, the princess mounted again, and they rode on to a great wood. Then the fox came, and said, 'Pray kill me, and cut off my head and my feet.' But the young man refused to do it: so the fox said, 'I will at any rate give you good counsel: beware of two things; ransom no one from the gallows, and sit down by the side of no river.' Then away he went. 'Well,' thought the young man, 'it is no hard matter to keep that advice.'

He rode on with the princess, till at last he came to the village where he had left his two brothers. And there he heard a great noise and uproar; and when he asked what was the matter, the people said, 'Two men are going to be hanged.' As he came nearer, he saw that the two men were his brothers, who had turned robbers; so he said, 'Cannot they in any way be saved?' But the people said 'No,' unless he would bestow all his money upon the rascals and buy their liberty. Then he did not stay to think about the matter, but paid what was asked, and his brothers were given up, and went on with him towards their home.

And as they came to the wood where the fox first met them, it was so cool and pleasant that the two brothers said, 'Let us sit down by the side of the river, and rest a while, to eat and drink.' So he said, 'Yes,' and forgot the fox's counsel, and sat down on the side of the river; and while he suspected nothing, they came behind, and threw him down the bank, and took the princess, the horse, and the bird, and went home to the king their master, and said. 'All this have we won by our labor.' Then there was great rejoicing made; but the horse would not eat, the bird would not sing, and the princess wept.

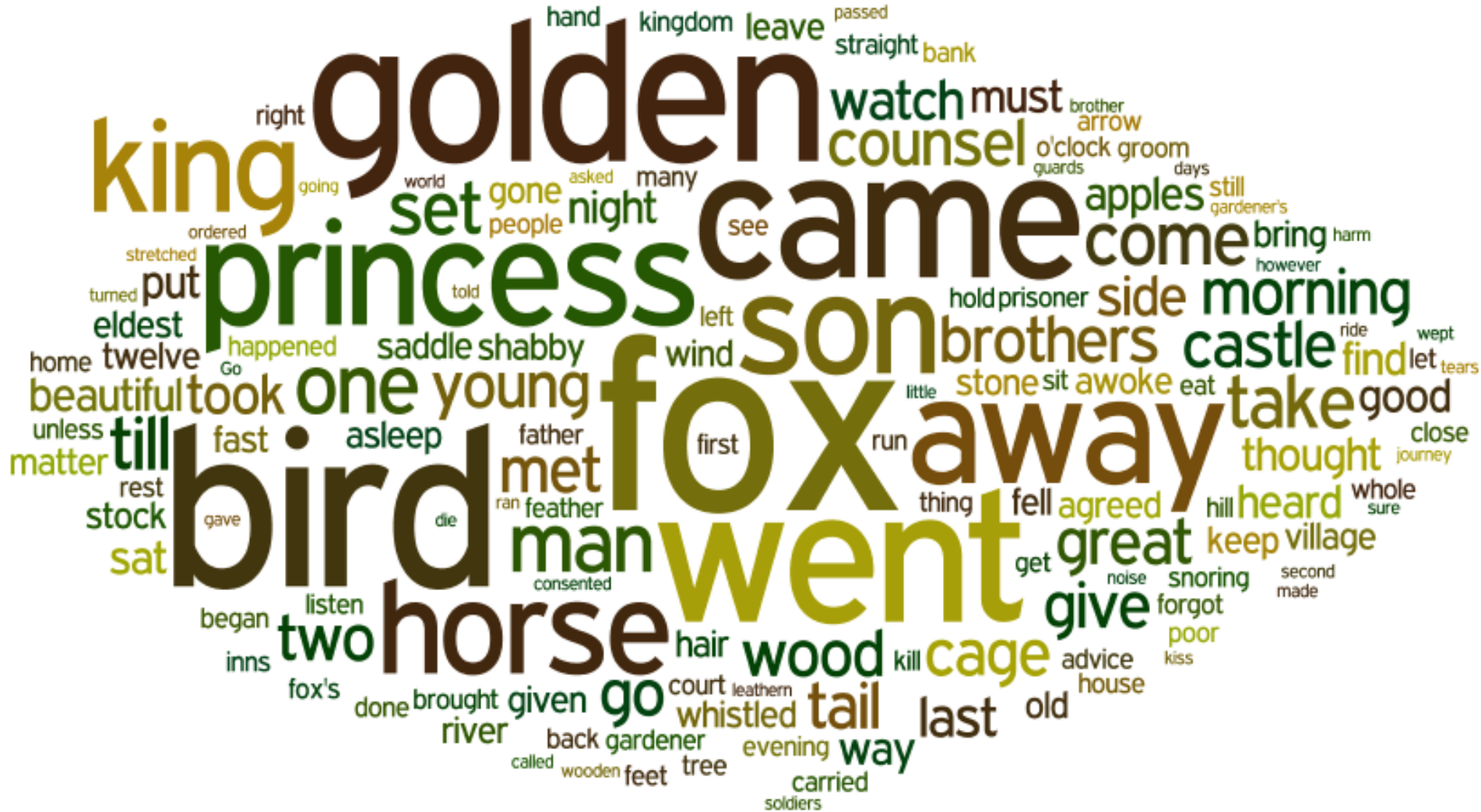
The youngest son fell to the bottom of the river's bed: luckily it was nearly dry, but his bones were almost broken, and the bank was so steep that he could find no way to get out. Then the old fox came once more, and scolded him for not following his advice; otherwise no evil would have befallen him: 'Yet,' said he, 'I cannot leave you here, so lay hold of my tail and hold fast.' Then he pulled him out of the river, and said to him, as he got upon the bank, 'Your brothers have set watch to kill you, if they find you in the kingdom.' So he dressed himself as a poor man, and came secretly to the king's court, and was scarcely within the doors when the horse began to eat, and the bird to sing, and the princess left off weeping. Then he went to the king, and told him all his brothers' roguery; and they were seized and punished, and he had the princess given to him again; and after the king's death he was heir to his kingdom.

A long while after, he went to walk one day in the wood, and the old fox met him, and besought him with tears in his eyes to kill him, and cut off his head and feet. And at last he did so, and in a moment the fox was changed into a man, and turned out to be the brother of the princess, who had been lost a great many many years.

Topics

Who are the characters?

What are their traits?



Topics

- Automatically extract
- Topics and
- Descriptive words associated with each topic.

e.g. This example, one paragraph from Grimms' Fairy Tales.

When you come to the **old king**, and he asks for the **beautiful princess**, you must say, "Here she is!"

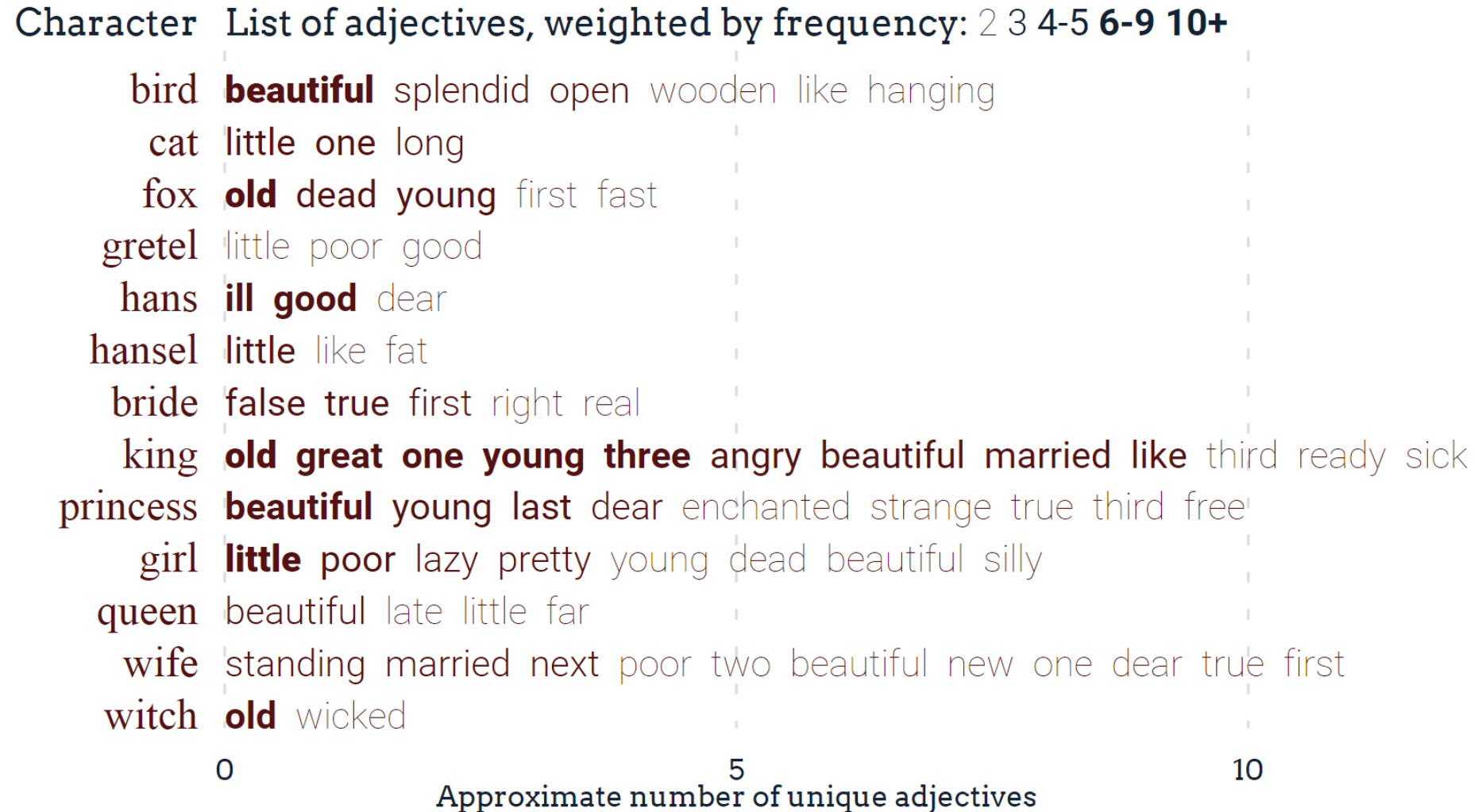


Character	List of adjectives
king	old
princess	beautiful

Topics

- Apply to whole text
 - Find characters
 - Find adjectives within 3 words of a character
 - Plot results
- Stack of adjectives per character
- Any expected characteristics pop-out?

Characters from *Grimms' Fairy Tales* with Associated Adjectives Weighted by Frequency



Comparing Geographies (Typographic Cartograms)

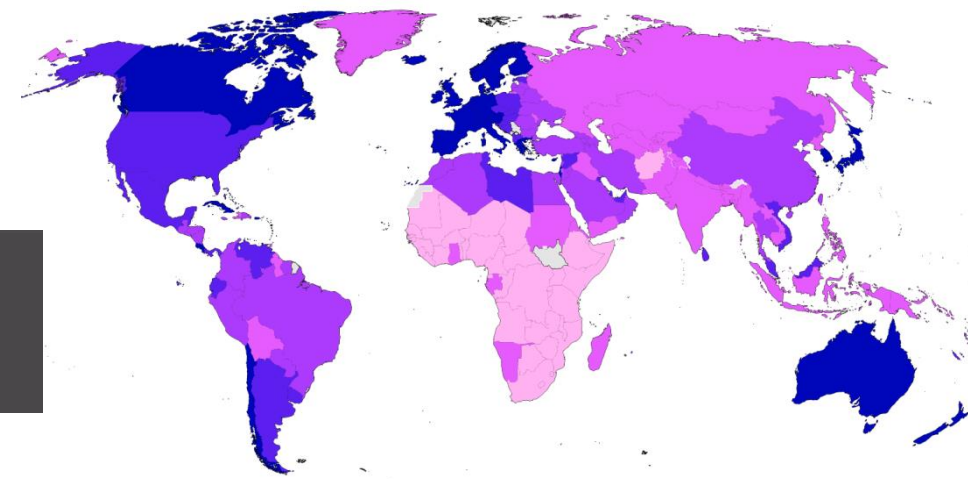
QW: Quantitative Words

Country Comparison

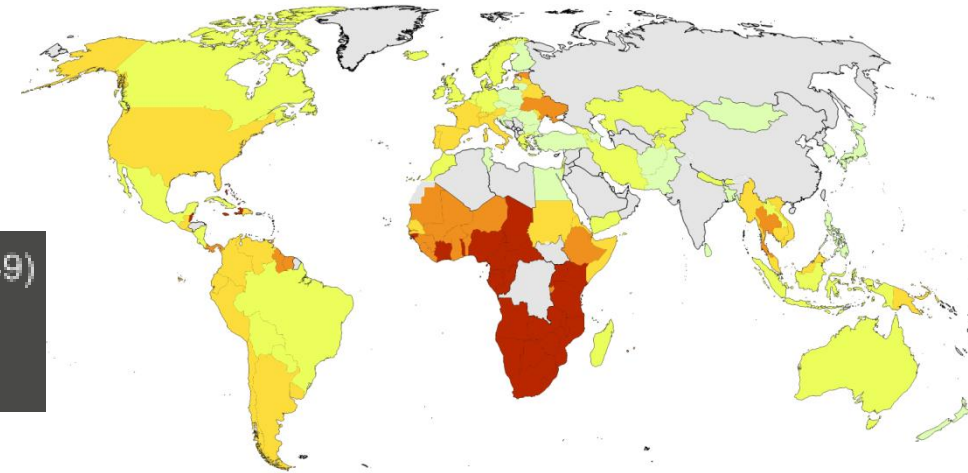
- Super-popular way to present data
- But what about Singapore?
- But try to compare multiple variables?

e.g. Are there countries with high HIV and high health expenditures?

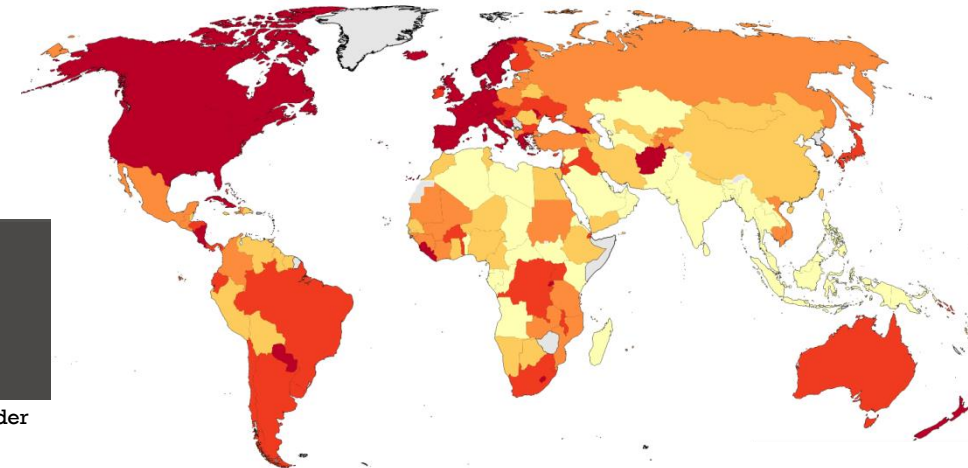
2010-Life expectancy at birth, total (years)
less than 60.6 78.5 or more



2010-Prevalence of HIV, total (% of population ages 15-49)
less than 0.1 1.6 or more



2010-Health expenditure, total (% of GDP)
less than 4.4 9.2 or more

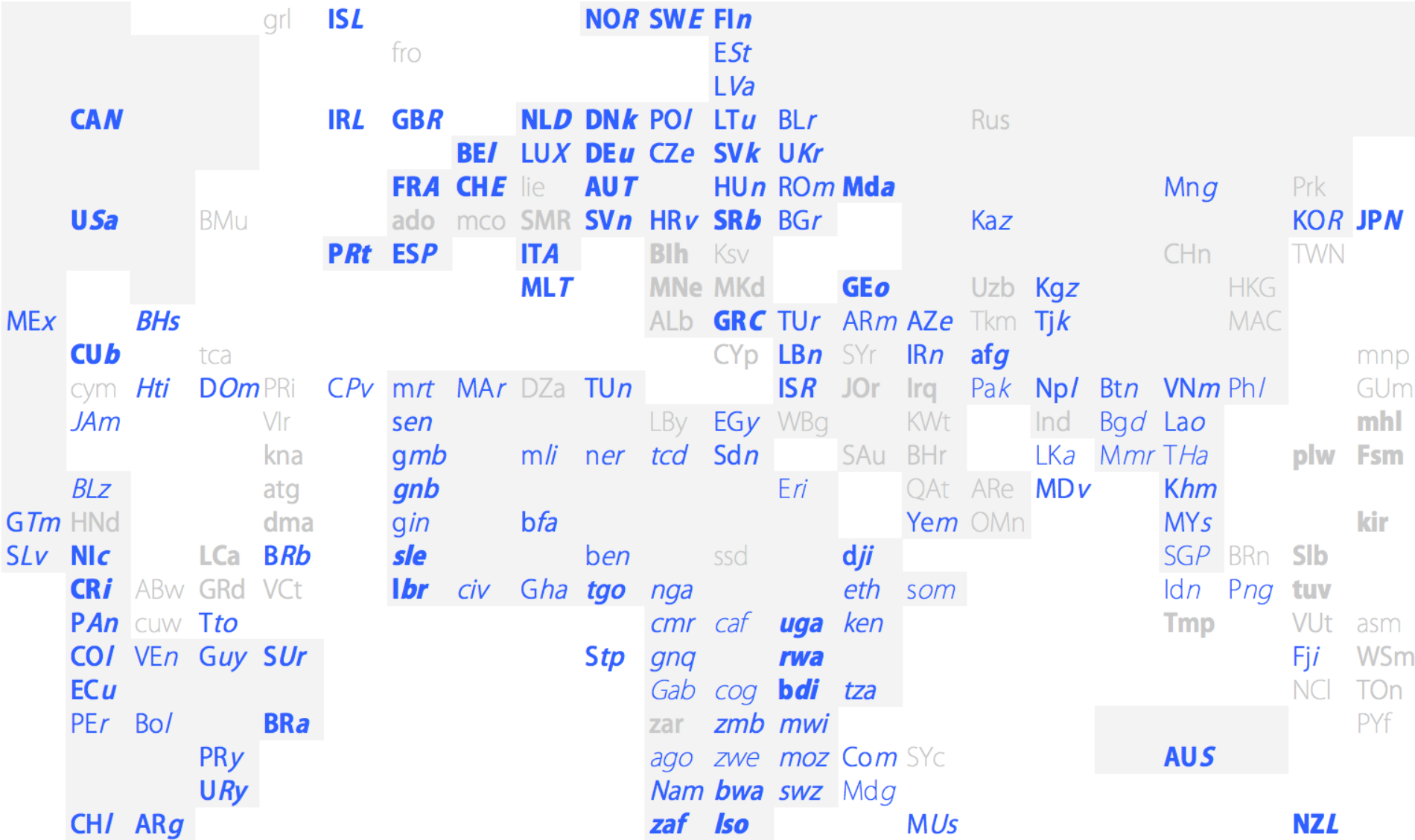


Images sourced directly from data.worldbank.org. Note: hue has been shifted in images in order to differentiate the three different maps to facilitate discussion purposes. Extracted May 2013.

Country Comparison

- Compare multiple variables across countries.

e.g. Are there countries with high health expenditures and short lives?



Health Expenditure

(% of GDP) font weight:

AAA	< 4.0 %	AAA	7.0 - 8.5
AAA	4.0 - 5.5	AAA	8.5 - 10
AAA	5.5 - 7.0	AAA	> 10 %

Data source: data.worldbank.org.

Region color grey if no HIV data

Life Expectancy

(at birth, in years) caps:

abc	< 60
Abc	60 - 70
ABc	70 - 80
ABC	> 80

Prevalence of HIV

(% of population age 15-49) italics:

ABC	abc	< 0.1 %
ABC	abc	0.1 - 0.6
ABC	abc	0.6 - 1.6
ABC	abc	> 1.6 %

UK Postal Codes

2269 post code districts

e.g.

- CB2:
Cambridge West
- TD12:
Cornhill-on-Tweed
- OX16:
Banbury

Lots of
occlusion
problems

Key Industry

- Agriculture, forestry and fishing
- Mining and quarrying
- Manufacturing
- Electricity, gas, steam and air conditioning supply
- Water supply; sewerage, waste management and remediation activities
- Construction
- Wholesale and retail trade; repair of motor vehicles and motor cycles
- Transport and storage
- Accommodation and food service activities
- Information and communication
- Financial and insurance activities
- Real estate activities
- Professional, scientific and technical activities
- Administrative and support service activities
- Public administration and defence; compulsory social security
- Education
- Human health and social work activities
- Other

Population

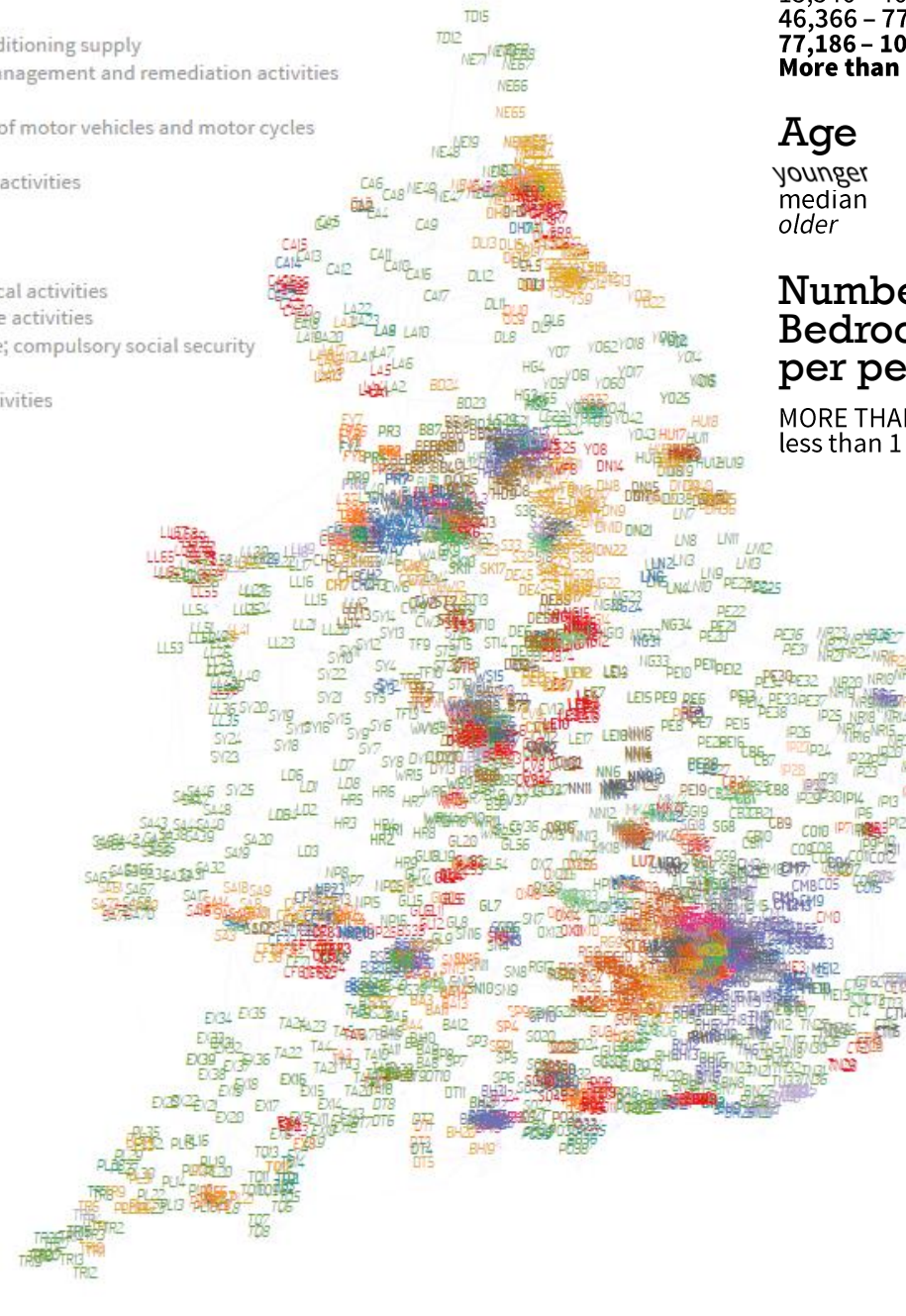
- Less than 15,546
- 15,546 – 46,365
- 46,366 – 77,185
- 77,186 – 108,004
- More than 108,004

Age

- younger
- median
- older

Number of Bedrooms per person

- MORE THAN 1
- less than 1



2269 post code districts, points adjusted

- Regions of color visible
- Some areas with bold visible
- Italic and lower case require more effort – local visual search
- All individual districts are uniquely identifiable – read text.

- Agriculture, forestry and fishing
- Mining and quarrying
- Manufacturing
- Electricity, gas, steam and air conditioning supply
- Water supply; sewerage, waste management and remediation activities
- Construction
- Wholesale and retail trade; repair of motor vehicles and motor
- Transport and storage
- Accommodation and food service activities
- Information and communication
- Financial and insurance activities
- Real estate activities
- Professional, scientific and technical activities
- Administrative and support service activities
- Public administration and defence; compulsory social security
- Education
- Human health and social work activities
- Other



Age

Number of
Bedrooms
per person

MORE THAN 1
less than 1

Long Labels

No codes?
No contractions?

Canada Census Aggregates

Kitchener - Cambridge - Waterloo
Greater Sudbury / Grand Sudbury
Saint-Jean-sur-Richelieu
Salaberry-de-Valleyfield
St. Catharines - Niagara
Abbotsford - Mission
Grand Falls-Windsor
Dolbeau-Mistassini
Portage la Prairie
Temiskaming Shores
Centre Wellington
Ottawa - Gatineau
North Battleford
Sault Ste. Marie
Rivière-du-Loup
Saint-Hyacinthe
Campbell River
Grande Prairie
Kawartha Lakes
Thetford Mines
Trois-Rivières
Charlottetown
Drummondville
Fort St. John
Prince Albert
Prince George
Prince Rupert
Rouyn-Noranda
Saint-Georges
Swift Current
Victoriaville
Williams Lake

US Metropolitan Statistical Areas

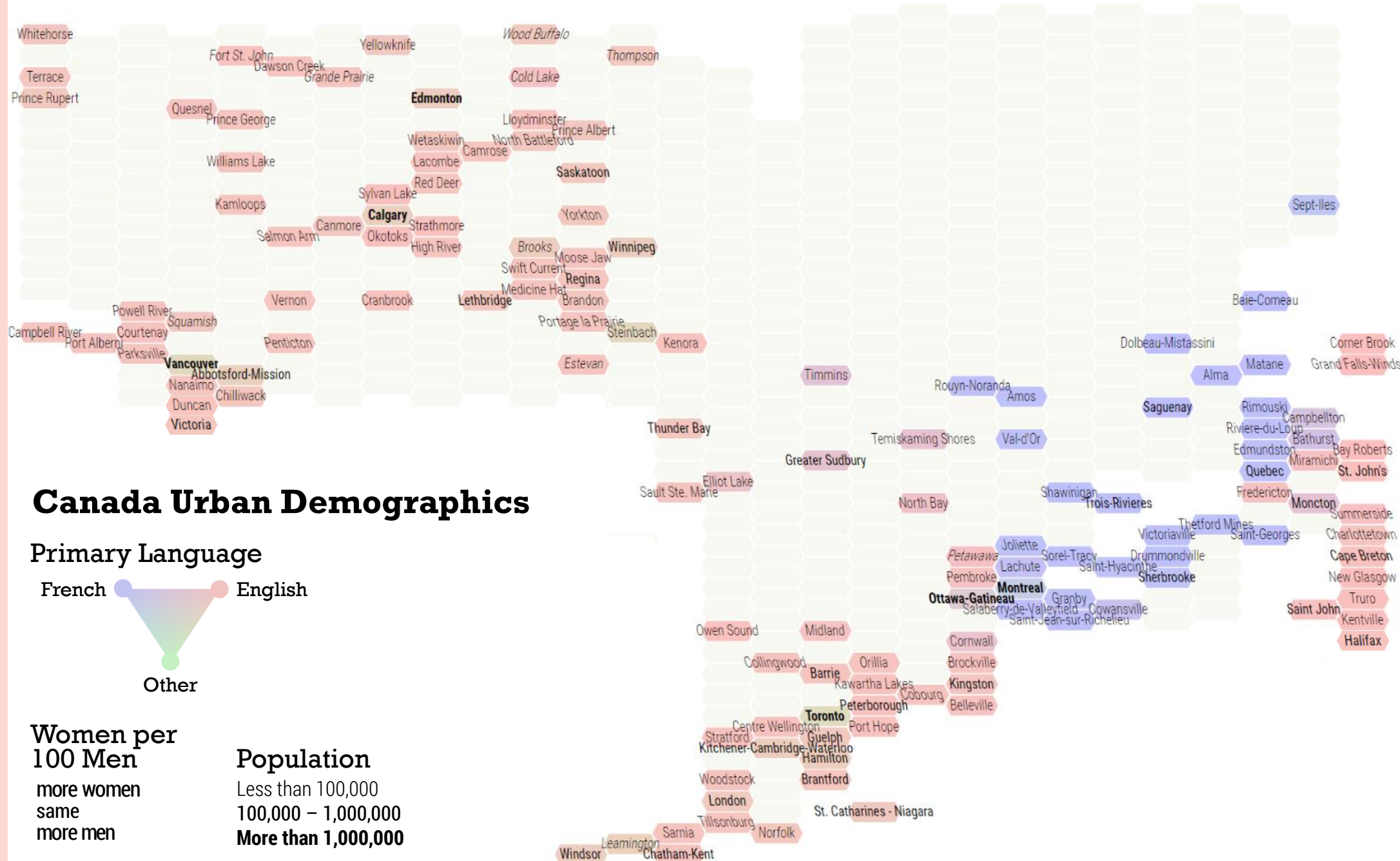
San Luis Obispo-Paso Robles-Arroyo Grande, CA
Myrtle Beach-Conway-North Myrtle Beach, SC-NC
Washington-Arlington-Alexandria, DC-VA-MD-WV
Nashville-Davidson-Murfreesboro-Franklin, TN
Philadelphia-Camden-Wilmington, PA-NJ-DE-MD
Virginia Beach-Norfolk-Newport News, VA-NC
Miami-Fort Lauderdale-West Palm Beach, FL
Little Rock-North Little Rock-Conway, AR
Hilton Head Island-Bluffton-Beaufort, SC
Hartford-West Hartford-East Hartford, CT
Minneapolis-St. Paul-Bloomington, MN-WI
Deltona-Daytona Beach-Ormond Beach, FL
Crestview-Fort Walton Beach-Destin, FL
Sacramento-Roseville-Arden-Arcade, CA
New York-Newark-Jersey City, NY-NJ-PA
Fayetteville-Springdale-Rogers, AR-MO
Buffalo-Cheektowaga-Niagara Falls, NY
Blacksburg-Christiansburg-Radford, VA
Riverside-San Bernardino-Ontario, CA
Houston-The Woodlands-Sugar Land, TX
Tampa-St. Petersburg-Clearwater, FL
Portland-Vancouver-Hillsboro, OR-WA
Davenport-Moline-Rock Island, IA-IL
Scranton-Wilkes-Barre-Hazleton, PA
San Jose-Sunnyvale-Santa Clara, CA
Louisville/Jefferson County, KY-IN
Los Angeles-Long Beach-Anaheim, CA
Chicago-Naperville-Elgin, IL-IN-WI
Youngstown-Warren-Boardman, OH-PA
San Francisco-Oakland-Hayward, CA
Palm Bay-Melbourne-Titusville, FL
North Port-Sarasota-Bradenton, FL

Long Labels

No codes?
No contractions?

Instead:

- Condensed font
- Background container is longer than wide
- Text runs beyond container and make container visually prominent



Songs in Text

QG: Quantitative Glyphs

Song

- A song in the middle of prose.
- No indication of the notes. It's just poetry...

The Hatter shook his head mournfully. 'Not I!' he replied. 'We quarreled last March--just before HE went mad, you know--' (pointing with his tea spoon at the March Hare,) '--it was at the great concert given by the Queen of Hearts, and I had to sing

*"Twinkle, twinkle, little bat!
How I wonder what you're at!"*

You know the song, perhaps?'
'I've heard something like it,' said Alice.

Song

- But, traditional music notation breaks the flow of text...

The Hatter shook his head mournfully. 'Not I!' he replied. 'We quarreled last March--just before HE went mad, you know--' (pointing with his tea spoon at the March Hare,) '--it was at the great concert given by the Queen of Hearts, and I had to sing



5 *Twin - kle, twin - kle, lit - tle bat!*

How I won - der what you're at!

The image shows two staves of musical notation in G major (one sharp) and 4/4 time. The first staff contains the melody for the lyrics 'Twin - kle, twin - kle, lit - tle bat!'. The second staff contains the melody for the lyrics 'How I won - der what you're at!'. The lyrics are written in a cursive, handwritten style below the notes.

You know the song, perhaps?'

'I've heard something like it,' said Alice.

Song

So instead

- X-height for pitch
- Condensed/expanded for duration

All fits in-line,
same size.

The Hatter shook his head mournfully. 'Not I!' he replied. 'We quarreled last March--just before HE went mad, you know--' (pointing with his tea spoon at the March Hare,) '--it was at the great concert given by the Queen of Hearts, and I had to sing

Twin-kle, twin-kle, lit-tle bat!
How I won-der what you're at!

You know the song, perhaps?'
'I've heard something like it,' said Alice.

Song

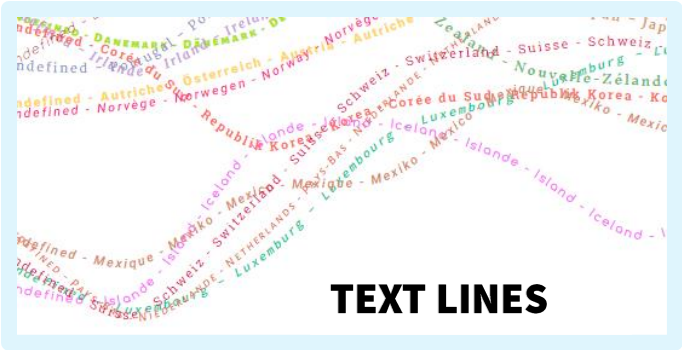
In-line song:

- Split syllables
- X-height for pitch
- Condensed/expanded for duration

Frère Jacques, frère Jacques,
Dormez vous ? Dormez vous ?
Sonnez les matines! Sonnez les matines!
Ding, dang, dong. Ding, dang, dong.

Frè-re Jac-ques, frè-re Jac-ques,
Dor-mez VOUS? Dor-mez VOUS?
Son-nez les ma-ti-nes! Son-nez les ma-ti-nes!
Ding, dang, dong. Ding, dang, dong.

Summary



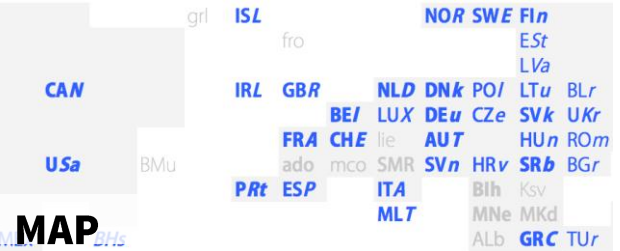
William Berriman	William Botsford	Solomon	Edward Beane	Lawrence Beesley	Albert Cald
an	John Chapman	Charles Clarke	Reginald	Julian Padro y Manent	Emilio Pallas y Castello
mes Drew	George Eitemiller	Ingvar Enander			
alph Giles	John Gill	William Gillespie	Hannah Abelson	Mary" Angle	Ada Ball
Stanley Hickman	Richard Hocking	Samuel	Brown	Elizabeth Brown	Dagmar Bryhl
Stephen Jenkin	Sinai Kantor	Daniel Keane	Clarke	Lottie Collyer	Charlotte Collyer
ch	Noel Malachard	Albert Mallet	Serafino	Drew	Lulu Drew
Atvila	Ernest Moraweck	Mr Morley	Thomas	Harper	Eva Hart
ngelly	Rene Pernot	Joseph Peruschitz	Eseott	Esther Hart	Alice Herman
Ernst Sjostedt	Richard Slemen	Samuel Sch	Jacobsahn	Marie Jerwan	Miriam Kantor
ry West	Edward Wheadon	Frederick Wheel	Angela Lemore	Alice Smith	Andre Mallet
			George Mahara	William Richards	Emily Rich
			Marian Smith	Eileen Toomey	Jessie Trout
Joseph Fillbrook	Annie Funk	Alfred Gaskell			



Scope	Literal	Categoric	Quantitative
Glyph	LG	CG	QG
Word	LW	CW	QW
Sentence	LS	CS	QS
Paragraph	LP	CP	QP
Document	LD	CD	QD
Corpus	LC	CC	QC

Frère Jac-ques, frère Jac-ques,
Dor-mez-vous? Dor-mez-vous?
Son-nez les ma-ti-nes! Son-nez les ma-ti-nes!
SONG Ding, dang, dong. Ding, dang, dong.

king old great one young three angry beautiful married
princess beautiful young last dear enchanted strange true th
girl little poor lazy pretty young dead beautiful silly
queen beautiful late little far
wife standing married next poor two beautiful new one c
Approximate number of unique adjectives



Cars (2006)
At almost 2 hours, the movie, well, exhausts its welcome, somehow man
... both in its ingratiating vibe and bland execution, Cars is nothing if not
It's beautiful to look at. The talking cars feel more alive than talking car:
For parents out there whose future holds the certain prospect of the DV
It tells a bright and cheery story, and then has a little something profou
It's powered by a human heart through a roadway of natural wonders ar
A work of American art as classic as it is modern
Though the central idea of nostalgia for a quieter, small-town life may
It achieves the near impossible, turning cars, trucks, tractors and farm
OPINION 3 4 5 6 7 8 9 10
Movie reviewer score indicated by length of bold

Dorothy lived in the midst of the great Kansas prairies, with Uncle Henry,
who was a farmer, and Aunt Em, who was the farmer's wife. Their house
was small, for the lumber to build it had to be carried by wagon many
miles. There were four walls, a floor and a roof, which made one room; and
this room contained a rusty looking cookstove, a cupboard for the
dishes, a table, three or four chairs, and the beds. Uncle Henry and Aunt
Em had a little bed in one corner, and Dorothy a little bed in another
corner. There was no garret at all, and no cellar except a small hole dug in
the ground, called a cyclone cellar, where the family could go in case one

More Info

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Posters, Papers and Journals

- “The Design Space of Typeface,” at *VisWeek*, 2014 (Paris 2014). [Paper](#). [Poster](#).
- “Using Font Attributes in Knowledge Maps and Information Retrieval,” at *First Workshop on Knowledge Maps and Information Retrieval*, 2014 (London 2014). [Paper](#).
- “Evaluating Lossiness and Fidelity in Information Visualization” at *SPIE 2015* (San Francisco 2015). [Paper](#).
- “Using Text in Visualizations for Micro/Macro Readings” at *TextVis Workshop 2015* (Atlanta 2015). [Paper](#).
- “Using Type to Add Data to Data Visualizations” at *TypeCon 2015*, (Denver 2015). [Paper](#).
- “Font Attributes enrich Knowledge Maps and Information Retrieval” in *International Journal on Digital Libraries*, 2016. [Article](#).
- “Using Typography to Expand the Design Space of Data Visualization.” in *She Ji: The Journal of Design, Economics, and Innovation* vol. 2, no. 1 (Spring 2016): 59–87. [Article](#).
- “Typographic Sets: Labelled Set Elements with Font Attributes,” at *International Workshop on Set Visualization and Reasoning 2016* (Philadelphia 2016). [Paper](#).
- “Evaluation of Visualization by Critique”. At BELIV 2016. Proceedings of the Sixth Workshop on Beyond Time and Errors on Novel Evaluations Methods for Visualization. [Paper](#).