Visualising Data

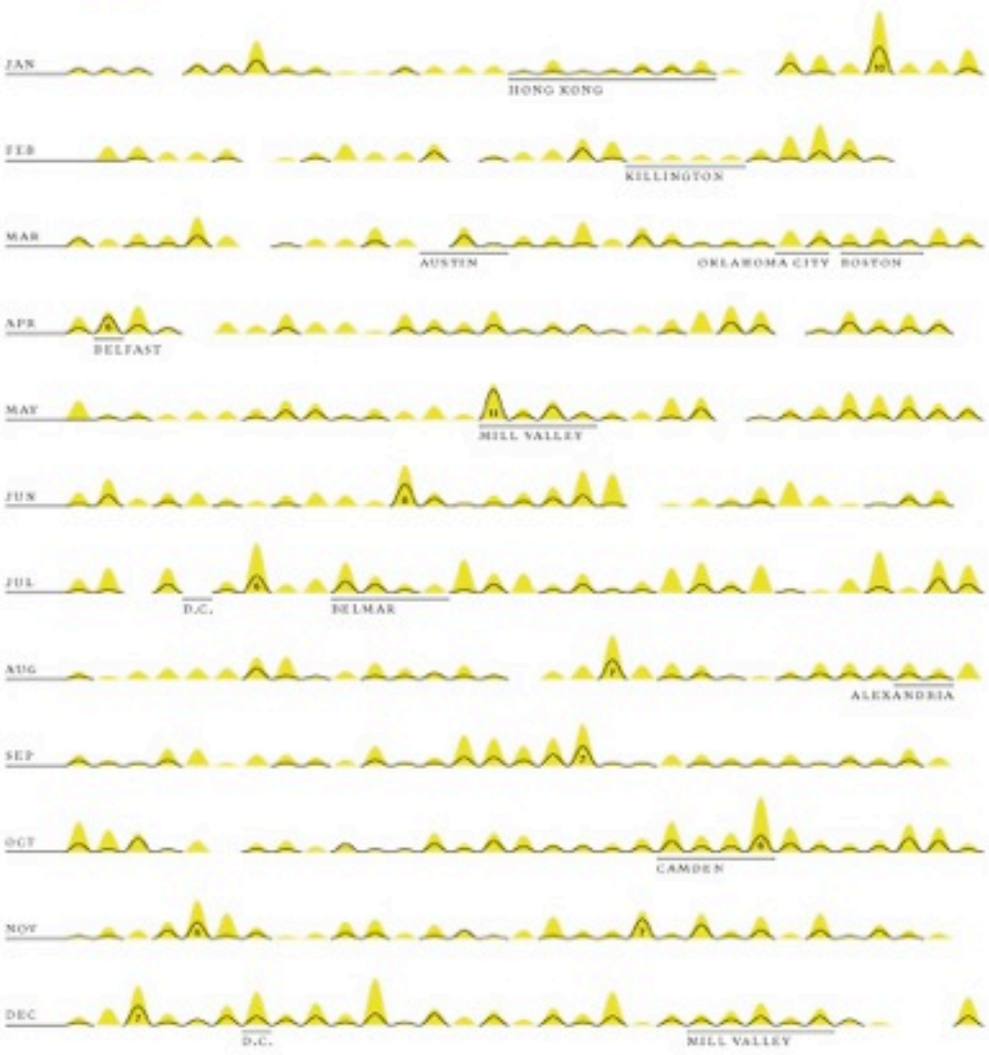
Brian Suda
suda.co.uk
April 13th

Edinburgh, Scotland
55°57′11″N
3°11′20″W

Distribution

Date and location of encounters.

FIGURE 1. ENCOUNTERS / RESPONSES



METHODOLOGY

Throughout 2009, friends, family, co-workers and acquaintances of Nicholas Felton were asked to report on his activities whenever they met.

All data on the following pages was compiled from the responses of these participants to a variety of questions concerning their encounter.

TOTAL ENCOUNTERS

1,761

AVERAGE ENCOUNTERS PER DAY

4.8

SURVEYS COMPLETED

560

CUMULATIVE RESPONSE RATE

32%

COUNTRIES INCLUDED

Three

U.S.A., HONG KONG AND NORTHERN IRELAND

STATES INCLUDED

Nine

CALIFORNIA, MAINE, MASSACHUSETTS, NEW JERSEY, NEW YORK, OKLAHOMA, TEXAS, VERMONT, VIRGINIA, PLUS WASHINGTON D.C.

DAYS WITH REPORTS

254

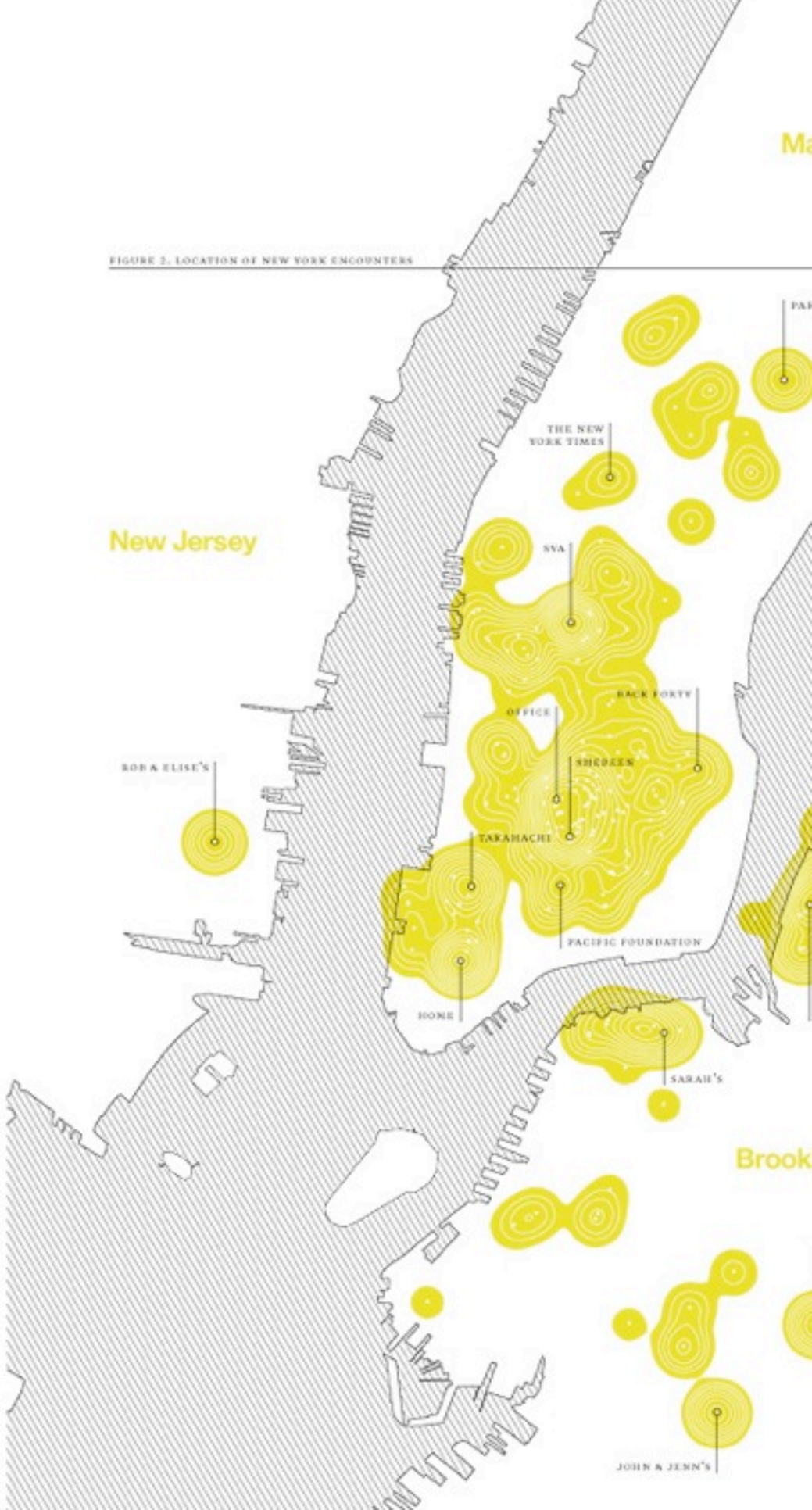
70% OF THE YEAR

CONTRIBUTORS

210

AVERAGE 2.66 REPORTS PER PERSON

FIGURE 2. LOCATION OF NEW YORK ENCOUNTERS



(optional.is)

@briansuda


eyjafjallaj-kull
futurists
webs-best
developer
read
dotdreams-webers
webbie-blokes
weberati
italianala-authors-translated
speakers
teymid
webbies
icelandic-greats
technophiles
fronteers
business-a
web-devs
editors
innovatie
datasearchtwitter
ux
icelanders
likeminded
webdevs
bedroll
social-media
bloggers
web-ninjas
web-types
iceweb2010-attendees
infoesthetique
persons
design-and-illustration
design-ux
scando-land
dconstruct2010
web-development
interesting
fromthefuture
web-directions-media-11
mrtweet-suggested
programmers
tech-proactive
techies
ux-usability
my-favstar-fm-list
conversationlist
who-my-friends-talk-to
designers
rockstar-designers
data-solutions
clara
publishing
webdev-webdesign-ux
ux-ui-dev
semantic-web
webdesign
openweb
admins
hcard
mobile
authors
design-dataviz-ui
open-web-people
webdev-webdesign
code
twentyfour-ways-2008
hiddenpeople
awesome
designer
microformats
code-monkey
iceland
ux-europe-20
podcasters
poi
netnerds
north
ixd
web-people
open-standards
webdev
cs
personalities
speakers2010
mobile-web
shift
developers
iaers
dev
global
web
film
suda
html5
tech
web-design
hci
devs
godlikgeniuses
w3c
open-source
art
technology
design
watchlist
javascript
ror-and-develop
people-ive-drunk-with
webfolk
marketing
codebits09speakers
web-design-code
digerati-2009
pythonpe
workers-of-the-web
mutual-friends
web-intelligencia
semantic
usabilityidealists
educatorsuk
network-weavers
zeitgeist
sland
validators
individual
colleagues
fangirlworthy
tech-news
findability
black-and-white
must-read
semweb
hcalendar
clara-team
codebits
europe
science
ux-i-follow
trends

$$\oint \frac{k}{(k+i\mu)(k-i\mu)} e^{ikr} dk =$$

$$\int_{-\infty}^{\infty} \frac{k}{(k+i\mu)(k-i\mu)} e^{ikr} dk = 2\pi i \frac{i\mu e}{i}$$

$$\frac{}{(k-i\mu)} e^{ikr} dk + \int_{0}^{\infty} \frac{k}{(k+i\mu)(k-i\mu)} e^{ikr} dk =$$

$$k' =$$

$$\frac{}{i\mu)} e^{-ik'r} \int_{0}^{\infty} \frac{k}{(k+i\mu)(k-i\mu)} e^{ikr} dk$$

$$-\int_{0}^{\infty} \frac{k'}{k'^2+\mu^2} e^{-ik'r} dk' + \int_{0}^{\infty} \frac{k}{k^2+\mu^2} e^{ikr} dk =$$

$$k = k$$

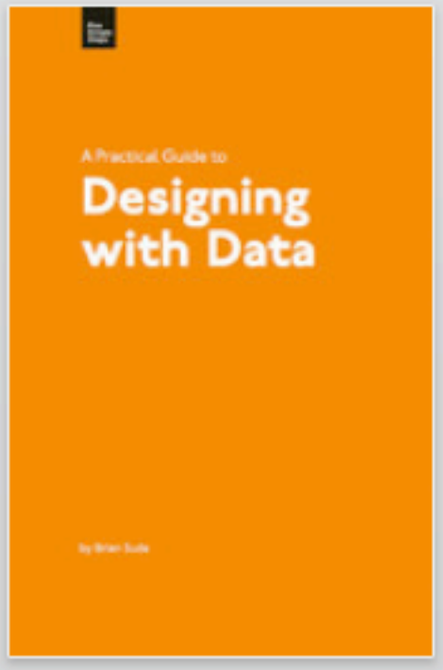
$$\int_{}^{\infty} \frac{k}{k^2+\mu^2} e^{-ikr} dk + \int_{0}^{\infty} \frac{k}{k^2+\mu^2} e^{ikr} dk = \pi i e$$

$$\frac{k}{} e^{ikr} dk - \int_{0}^{\infty} \frac{k}{k^2+\mu^2} e^{-ikr} dk = \pi i e^{-}$$

science

wonder

art



$9.99

SAMPLE DOWNLOADED

Published: Aug 01, 2010
Publisher: Five Simple Steps
Seller: BookBaby
Category: Internet
Print Length: 223 Pages
Language: English

Brian Suda

A Practical Guide to Designing with Data

Author Page ›

Alert Me ›

Tell a Friend ›

Description

In recent years, the terms Visualization, Infographic and others have been bantered around with almost no regard to their use or meaning. There is a new vernacular emerging in the realms of data representations, but that doesn't mean we can ignore the much simpler origins and best practices of charts and graphs. Brian Suda takes you on a journey through the basics and makes it easy to produce beautiful looking, accurate representations of data. He'll walk you through how to visualize and design data in such a way that it engages the reader and tells a story rather than just being flashy, cluttered and confusing. Foreword by Jeremy Keith

Customer Ratings

Tap to rate ☆ ☆ ☆ ☆ ☆

We have not received enough ratings to display an average for this book.

Customer Reviews

Be the first to write a review ›

Today's focus

MON
TUE
WED
THU
FRI 1
SAT 2
SUN 3
JANUARY
03
2010 January First Weeks
Life Designs Moment
MON
TUE
WED
THU
FRI 1
SAT 2
SUN 3
JANUARY
02
2010 January First Weeks
Life Designs Moment
MON
TUE
WED
JANUARY

jan	s	m	t	w	t	f	s	
feb	w	t	f	s	s	m	t	■
mar	t	f	s	s	m	t	w	
apr	s	m	t	w	t	f	s	●
may	t	w	t	f	s	s	m	
jun	f	s	s	m	t	w	t	●
jul	s	m	t	w	t	f	s	
aug	w	t	f	s	s	m	t	
sept	s	s	m	t	w	t	f	●
oct	m	t	w	t	f	s	s	
nov	t	f	s	s	m	t	w	●
dec	s	s	m	t	w	t	f	

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29	30	31		(optional.is)		

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may	w	t	f	s	s	m	t	
jun	s	s	m	t	w	t	f	●
jul	m	t	w	t	f	s	s	
aug	t	f	s	s	m	t	w	
sept	s	m	t	w	t	f	s	●
oct	t	w	t	f	s	s	m	
nov	f	s	s	m	t	w	t	●
dec	s	m	t	w	t	f	s	

02013

1	2	3	4	5	6	7
8	9	10	11	12	13	14
15	16	17	18	19	20	21
22	23	24	25	26	27	28
29	30	31		(optional.is)		


optional.is
jan s m t w t f s
feb w t f s s m t
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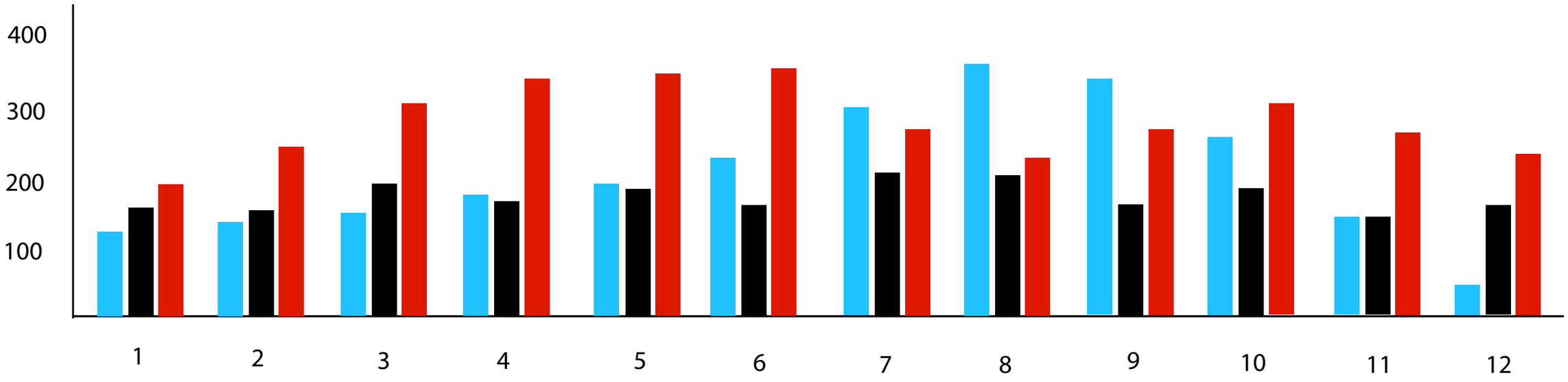
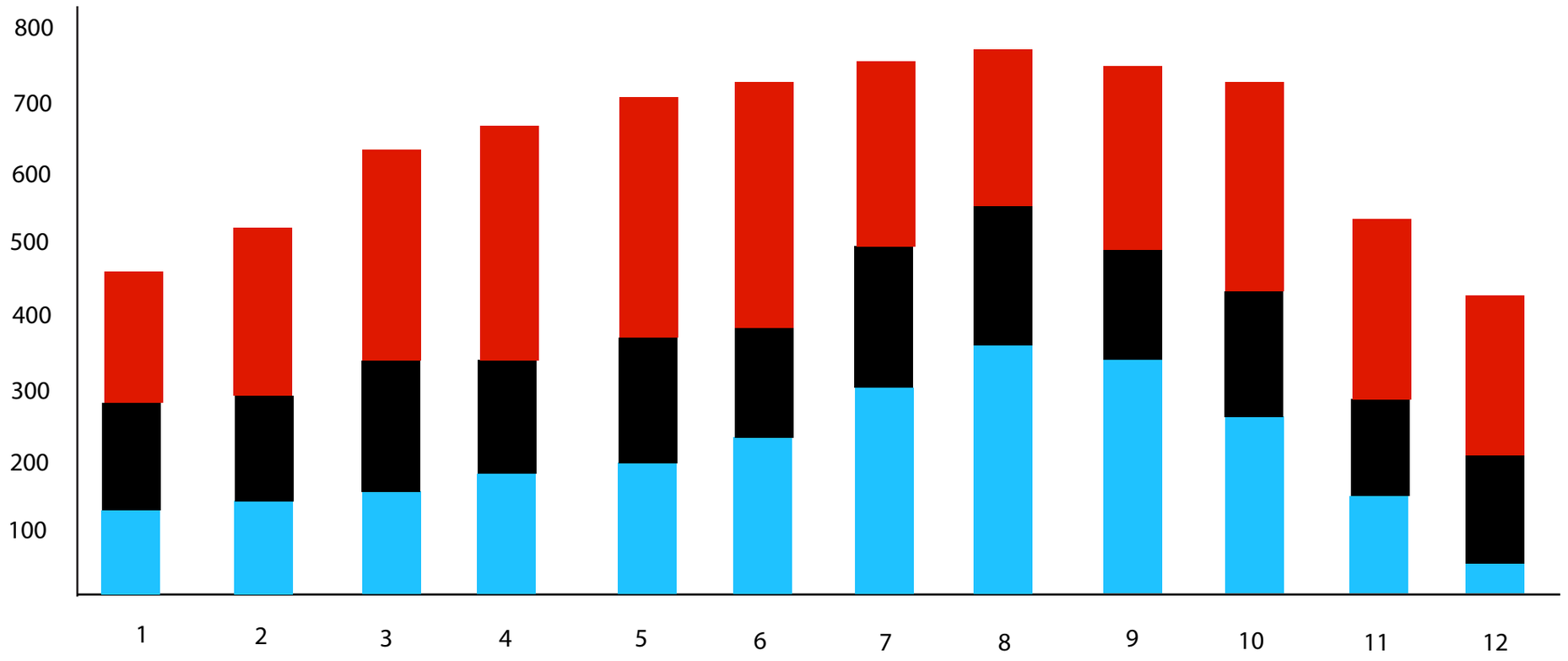
dec s s m t w t f
2012
1 2 3 4 5 6 7
8 9 10 11 12 13 14
15 16 17 18 19 20 21
22 23 24 25 26 27 28
29 30 31
(optional.is)

Each Chart and Graph type tells a different story

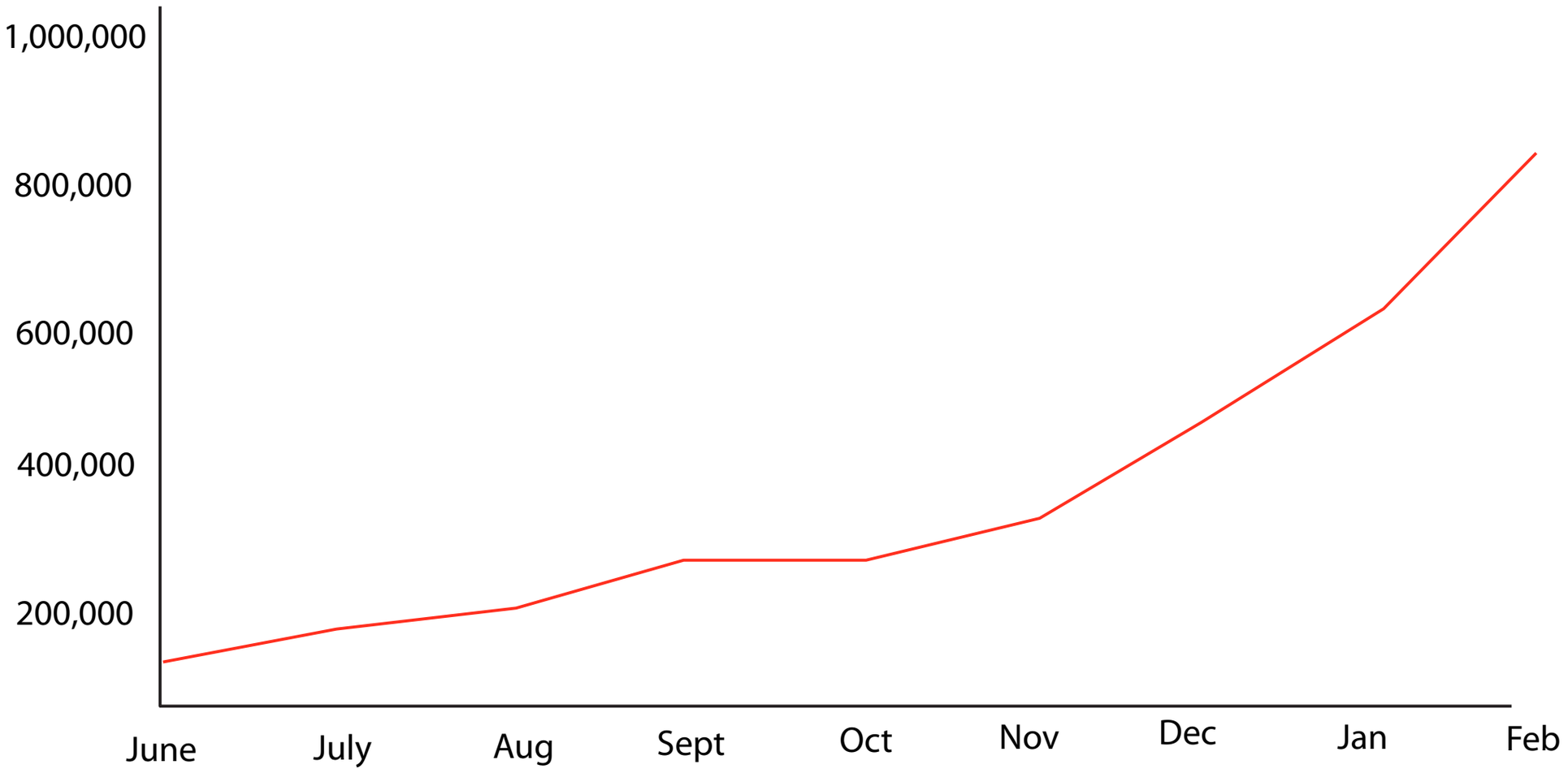
Bar Charts



Area Charts



Line Charts


1,000,000
800,000
600,000
400,000
200,000
June
July
Aug
Sept
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Nov
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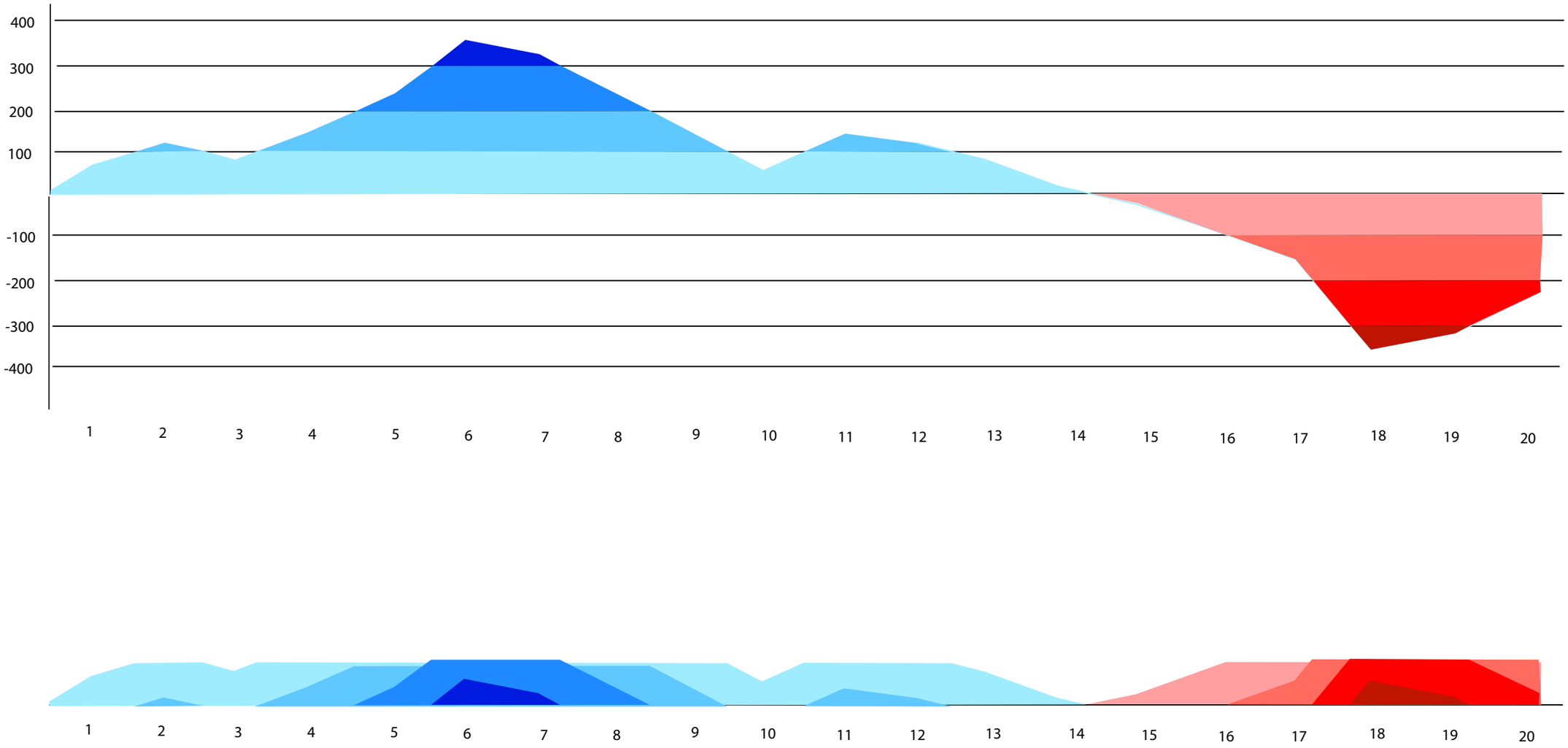
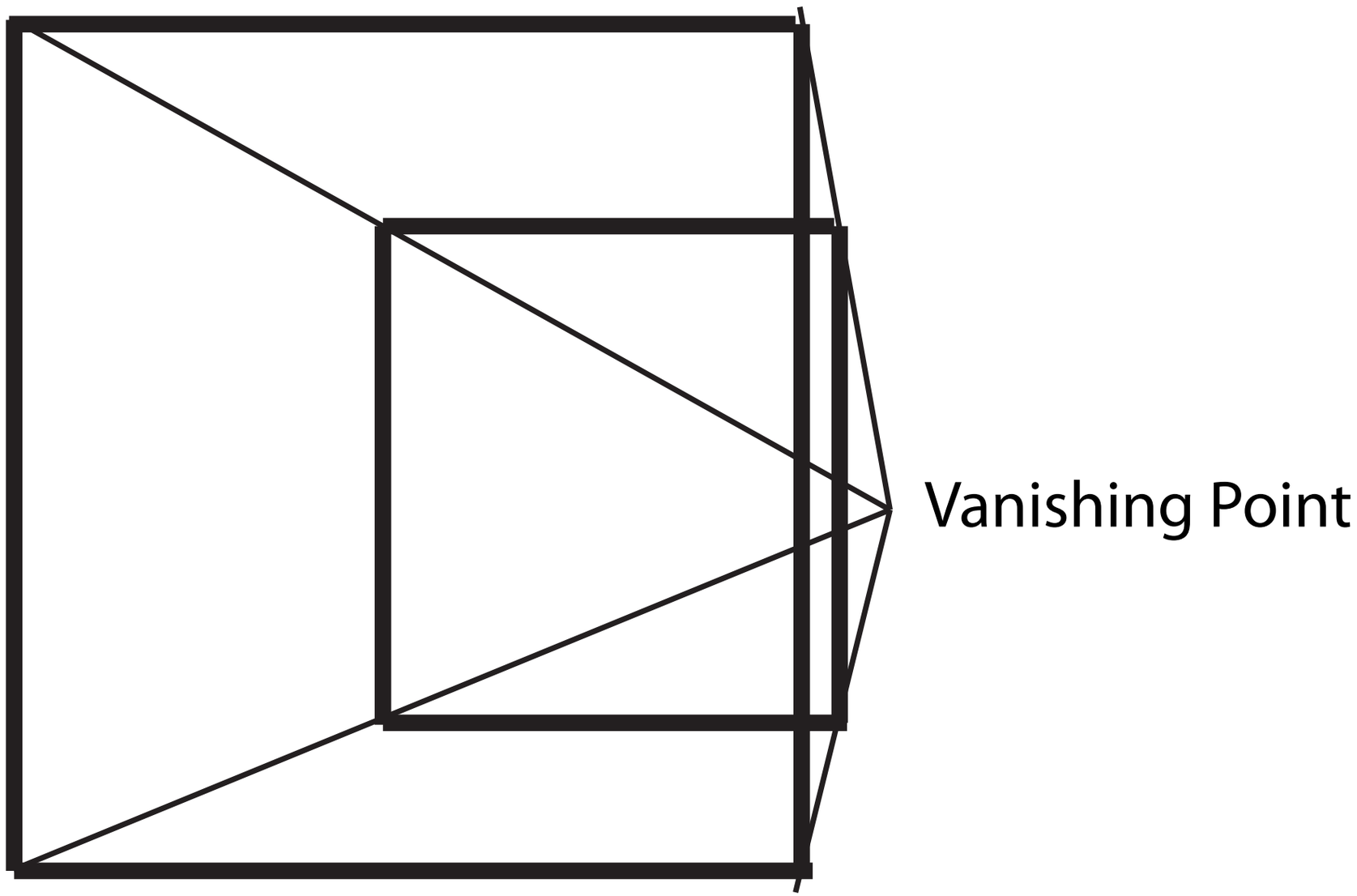
Jan
Feb

Horizon Graphs

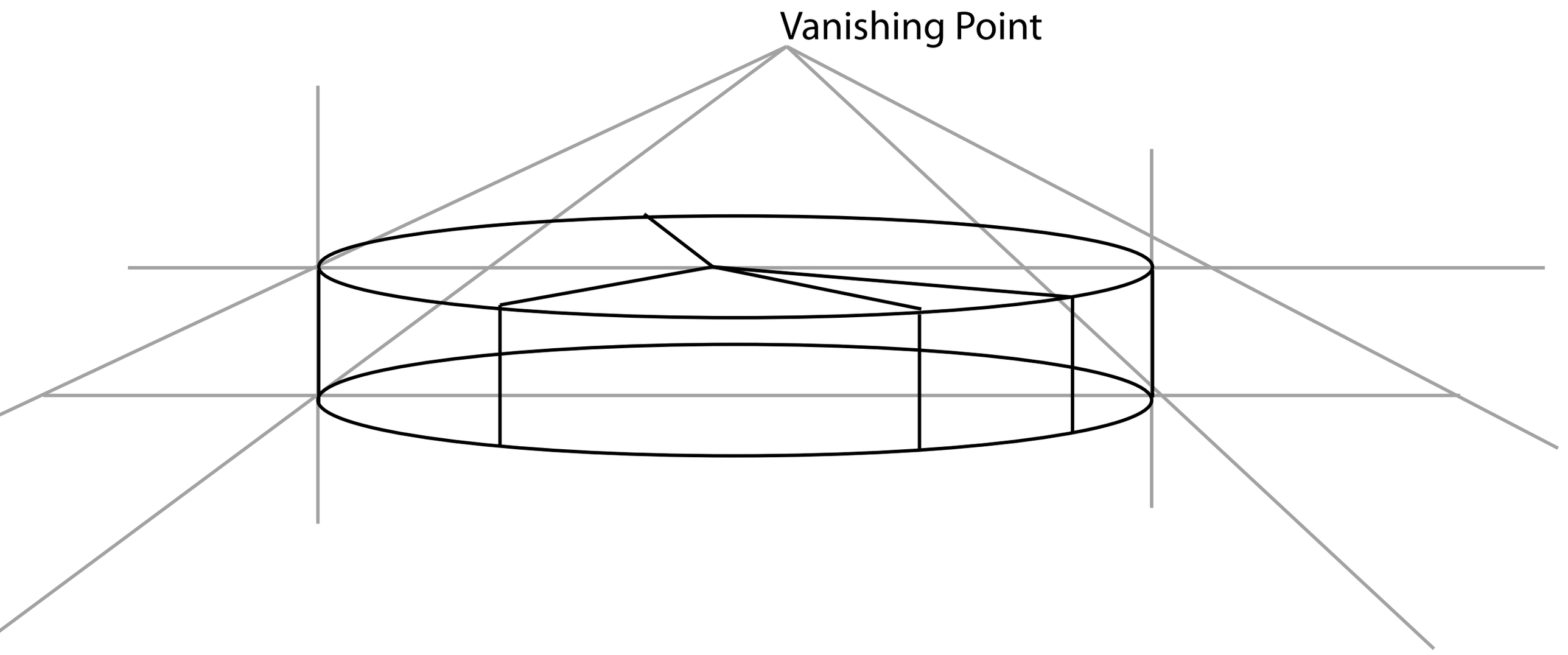


3D

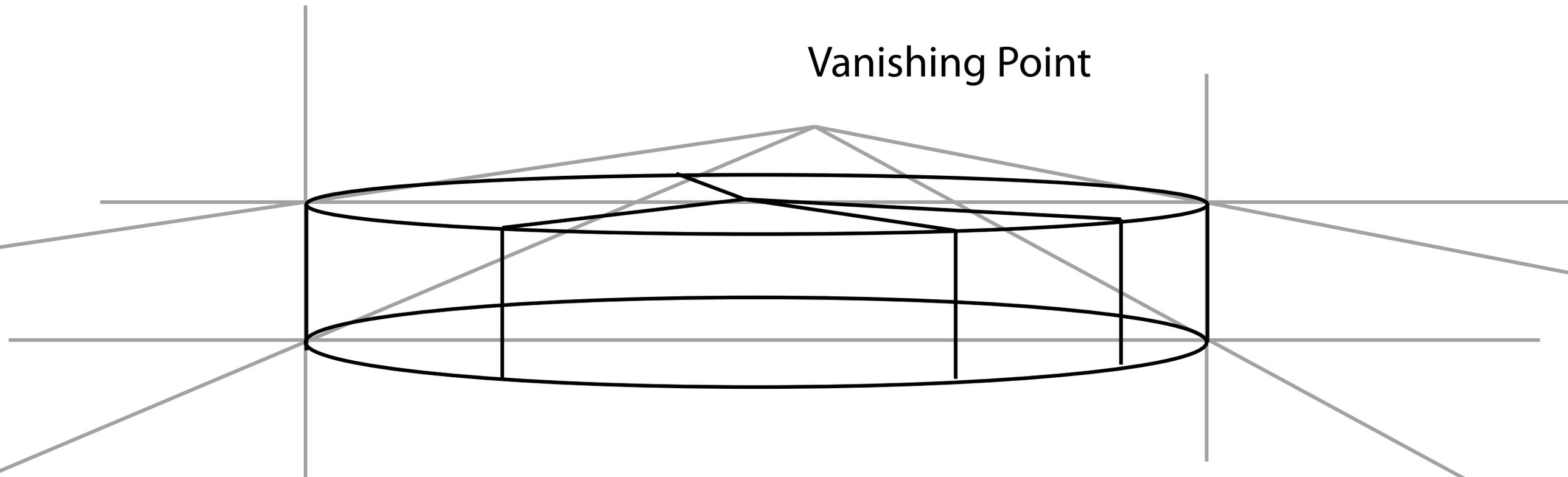
3D Charts!



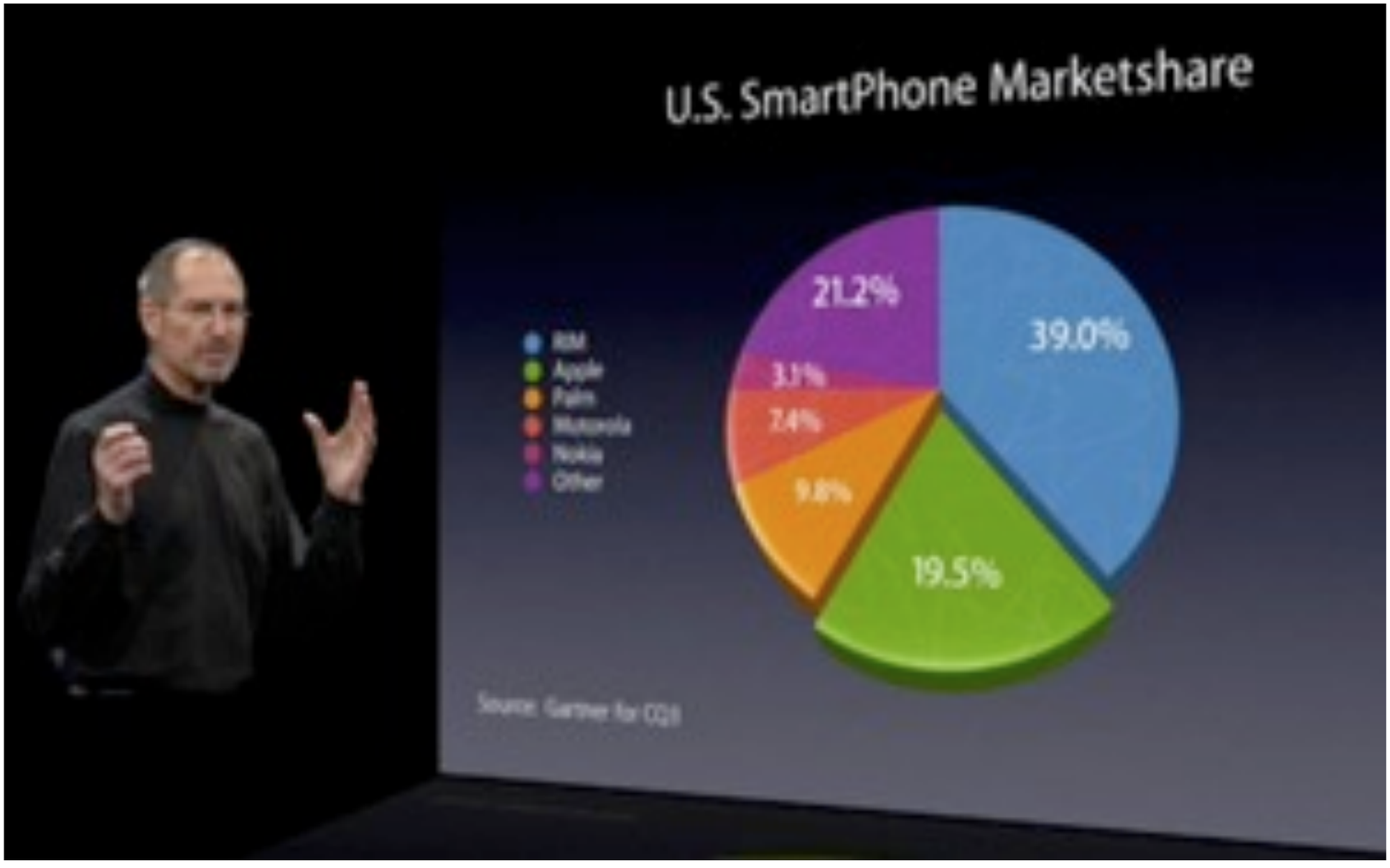
3D Charts!



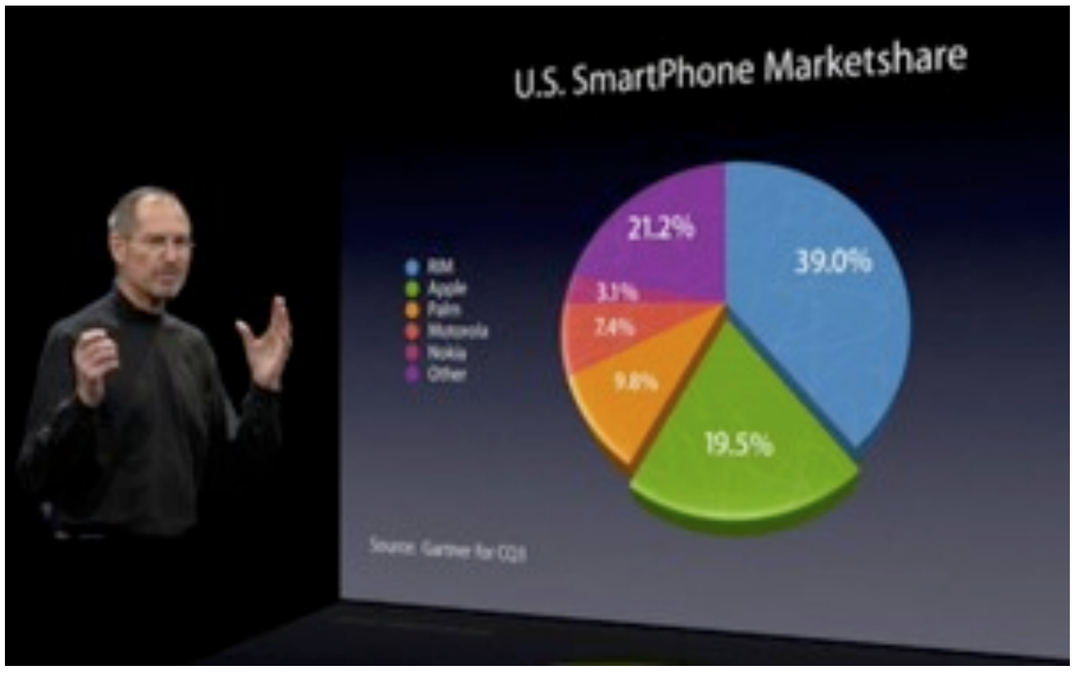
3D Charts!

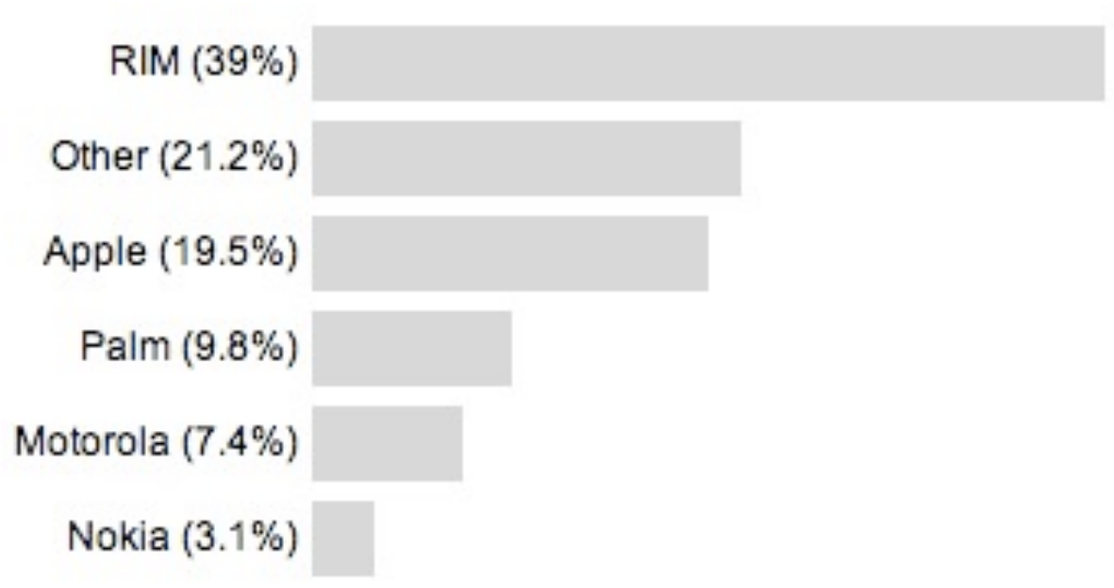


3D Charts!

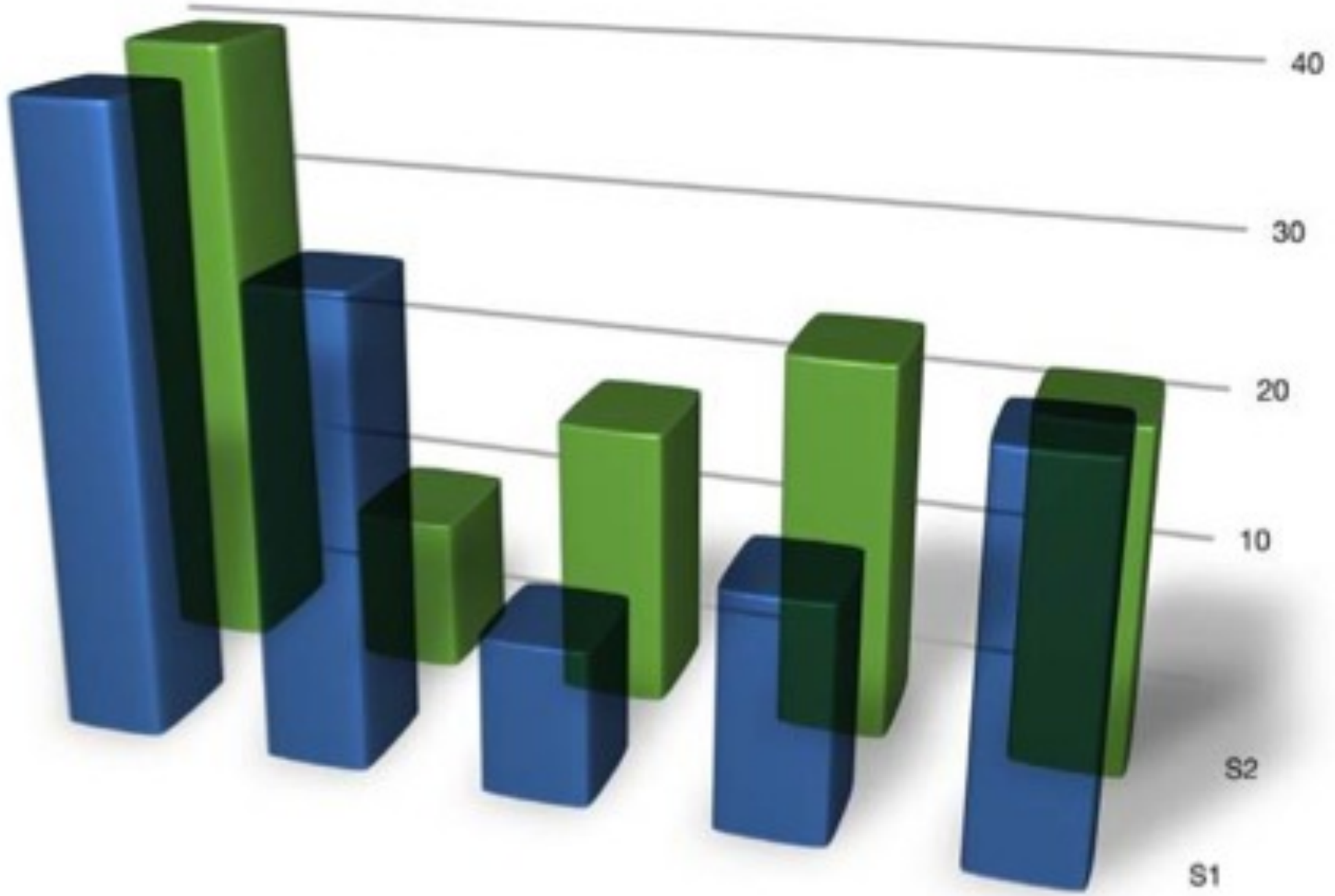

U.S. SmartPhone Marketshare
RIM
Apple
Palm
Motorola
Nokia
Other
21.2%
39.0%
3.1%
7.4%
9.8%
19.5%
Source: Gartner for CQ3

3D Charts!





http://www.guardian.co.uk/technology/blog/2008/jan/21/liesdamnliesandstevejobs


40
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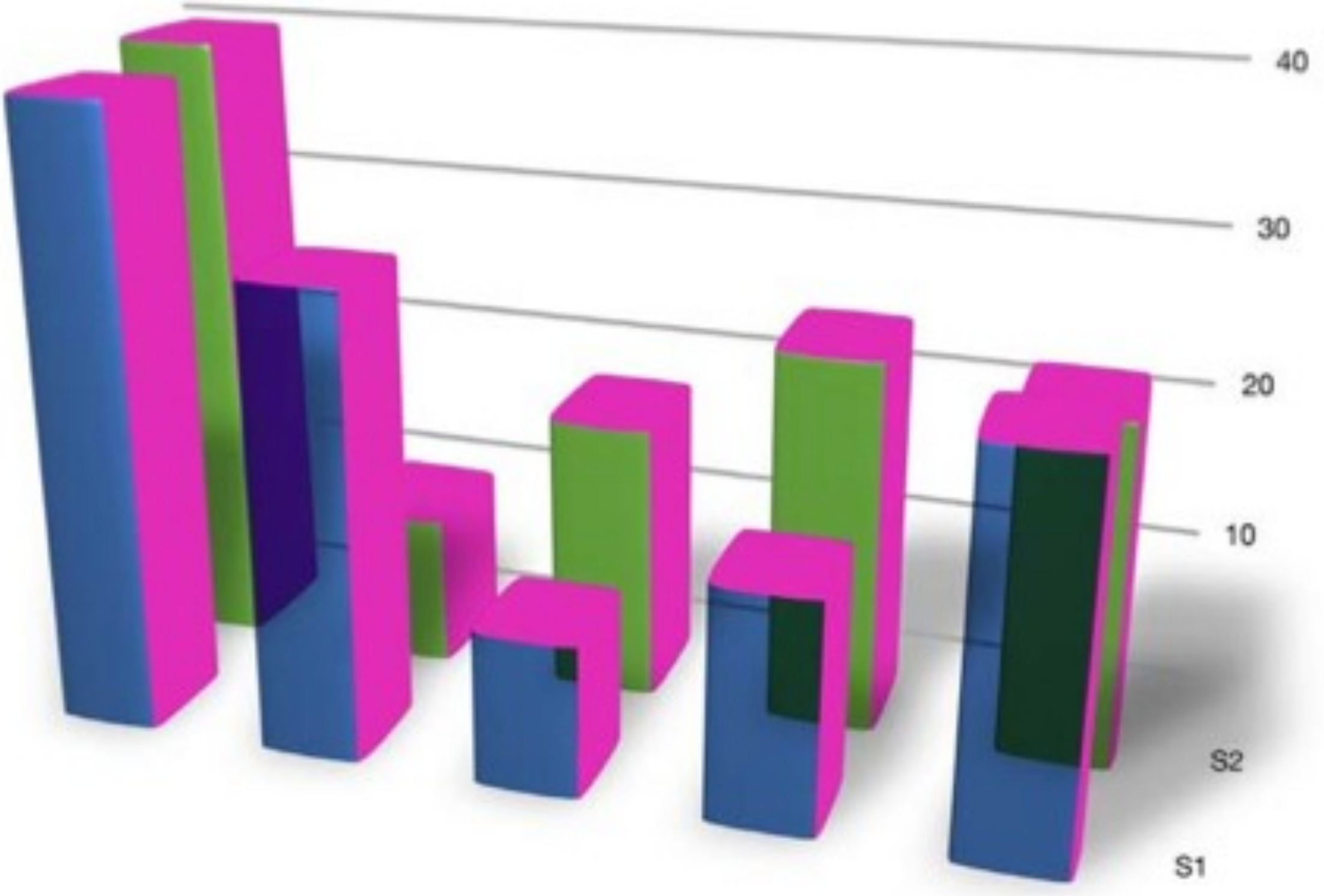
10
S2
S1


40
30
20
10
S2
S1

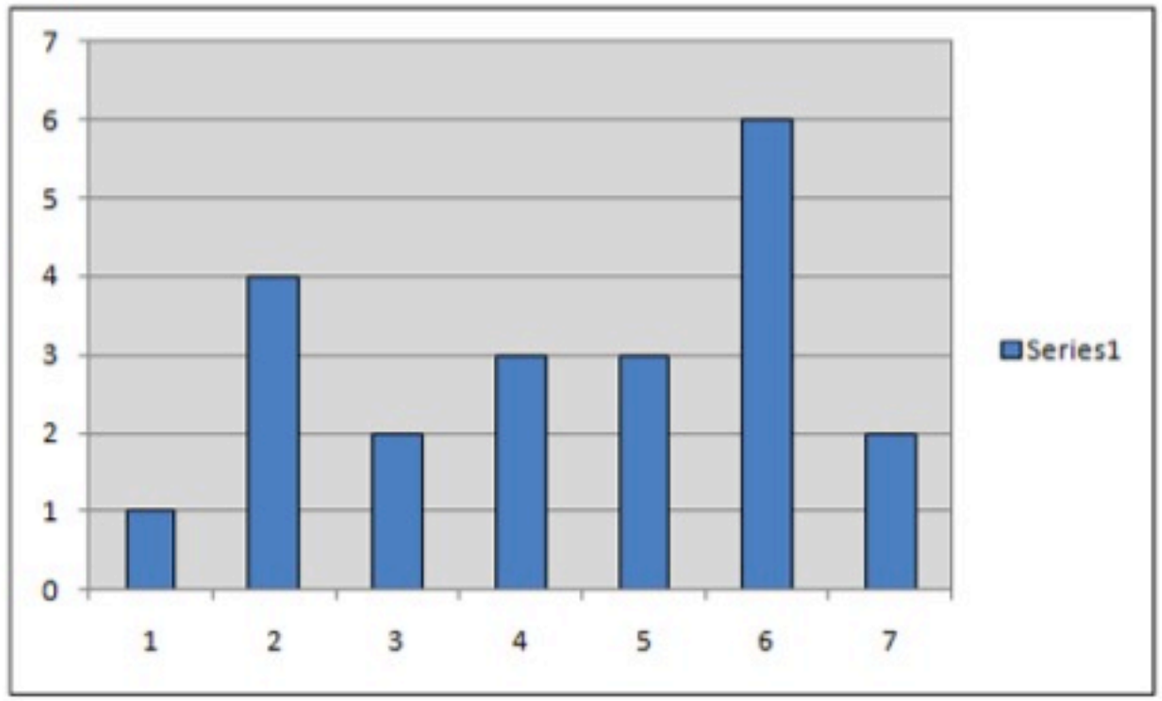
Data to Ink Ratio

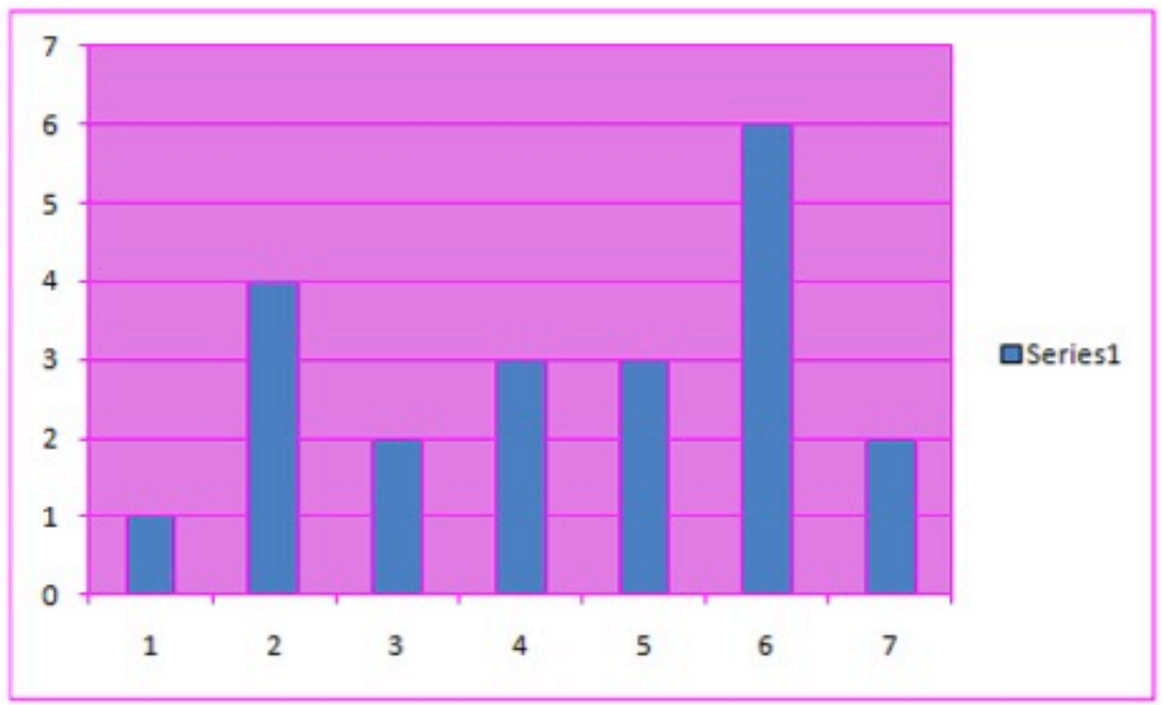
A large share of ink on a graphic should present data-information, the ink changing as the data change. Data-ink is the non-erasable core of a graphic, the non-redundant ink arranged in response to variation in the numbers represented.

Tufte, 1983

Data to Ink Ratio

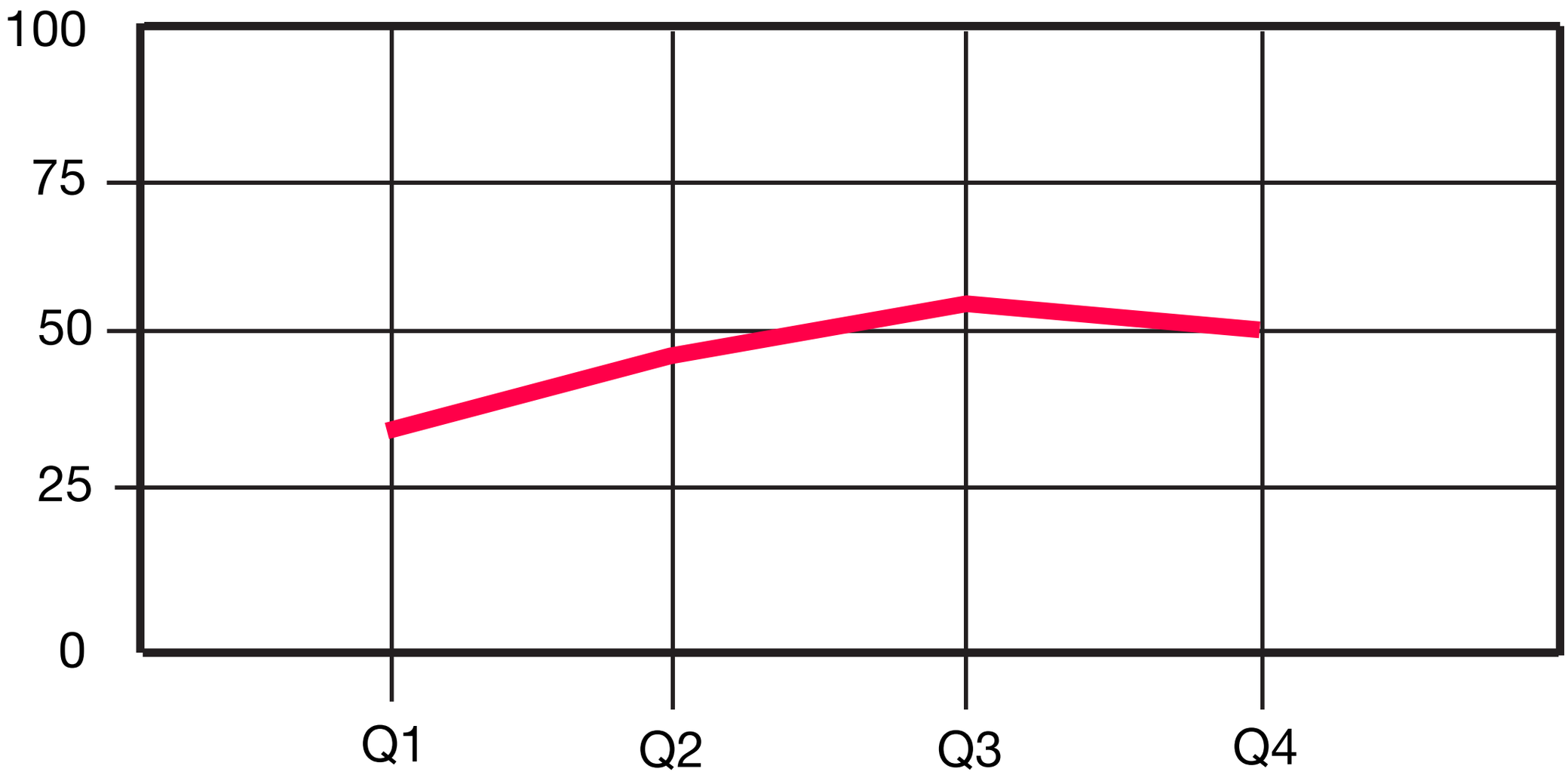
$$\text{Data to ink Ratio} = \frac{\text{Data Ink}}{\text{Total Ink}}$$





Reduce!!!

Reduce!!!



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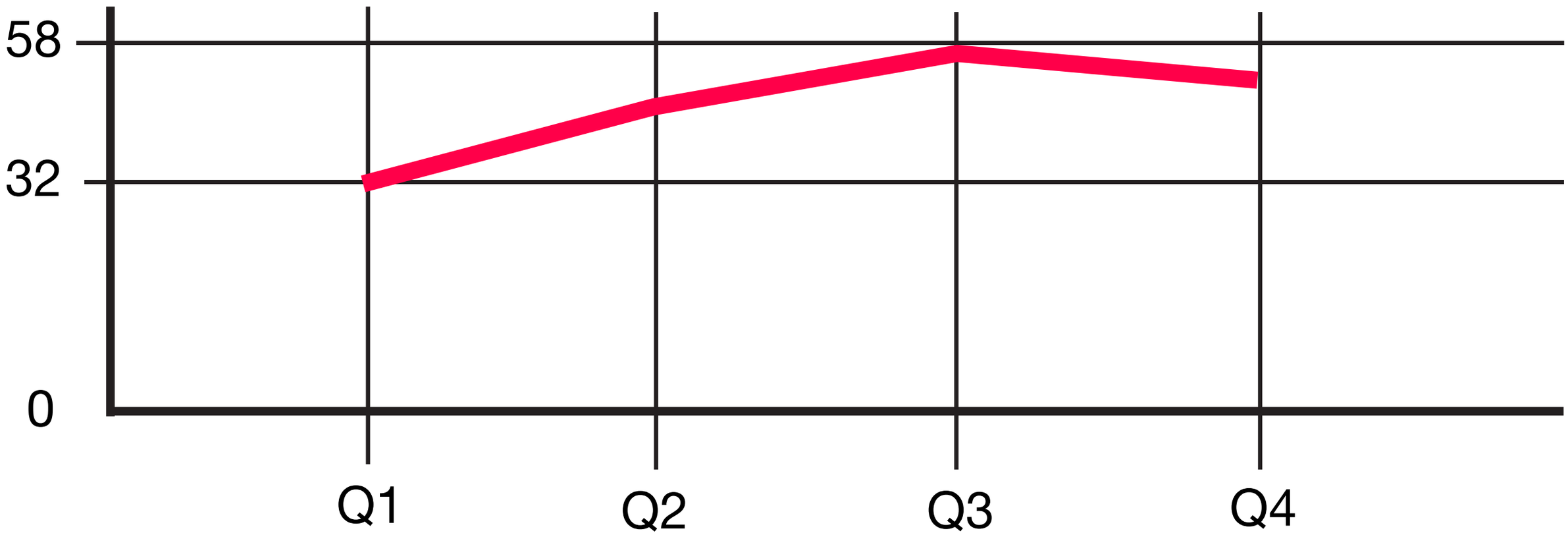
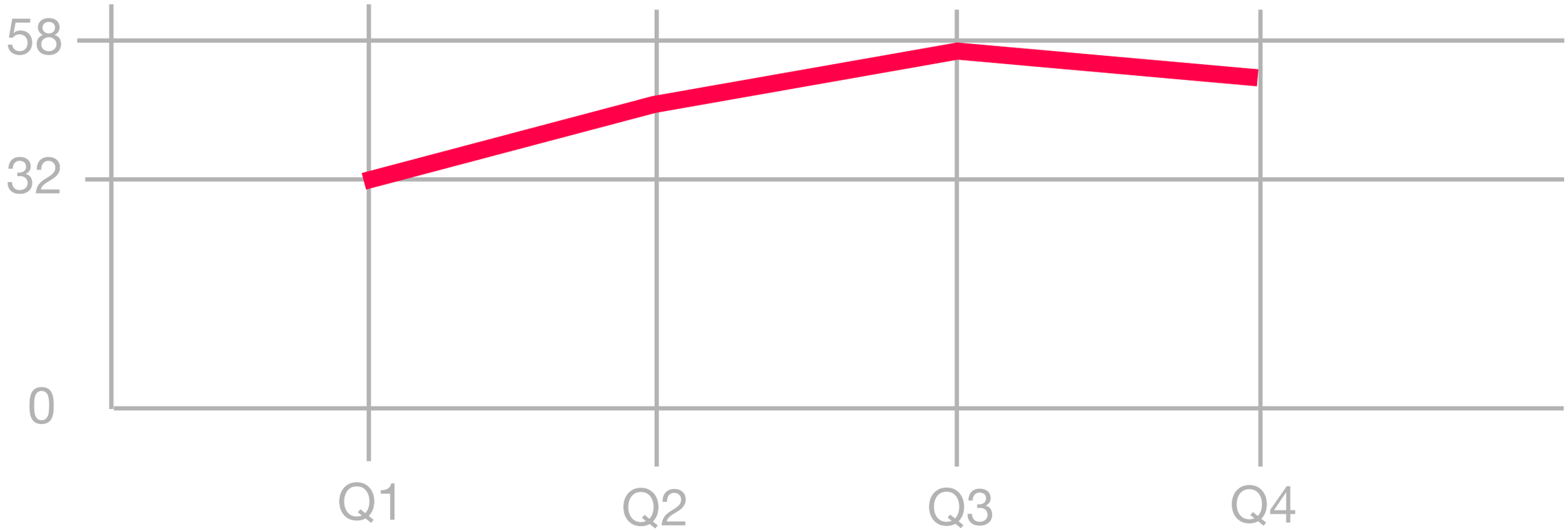
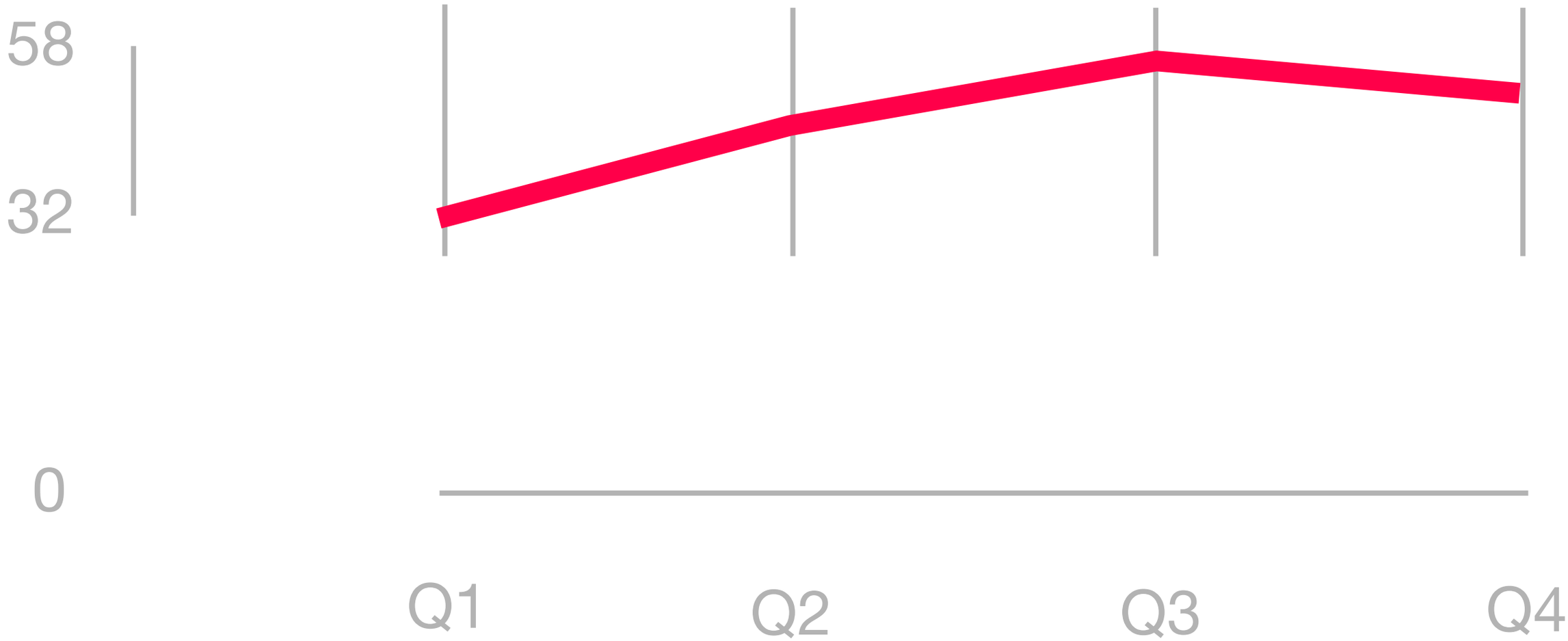


Reduce!!!



Reduce!!!



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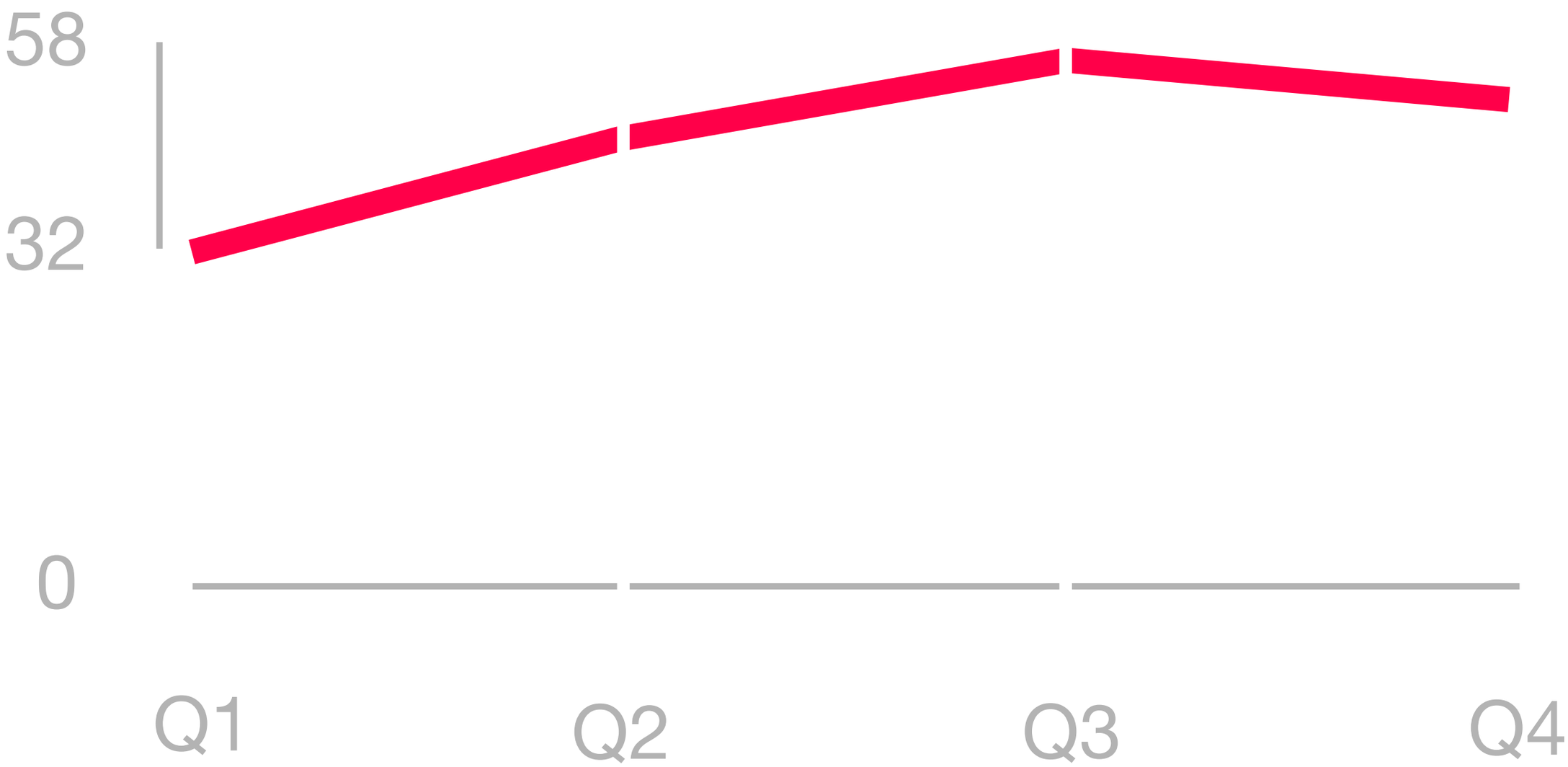
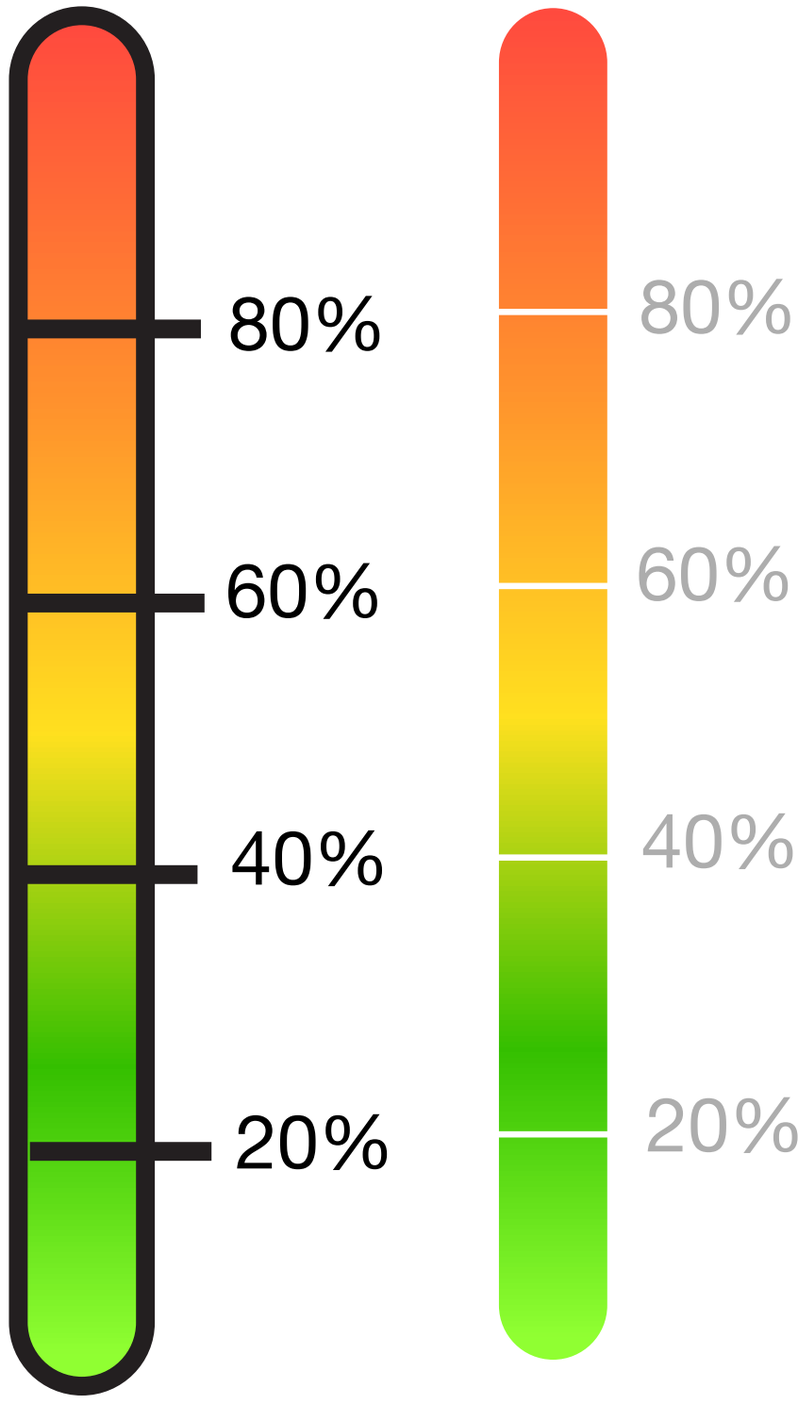
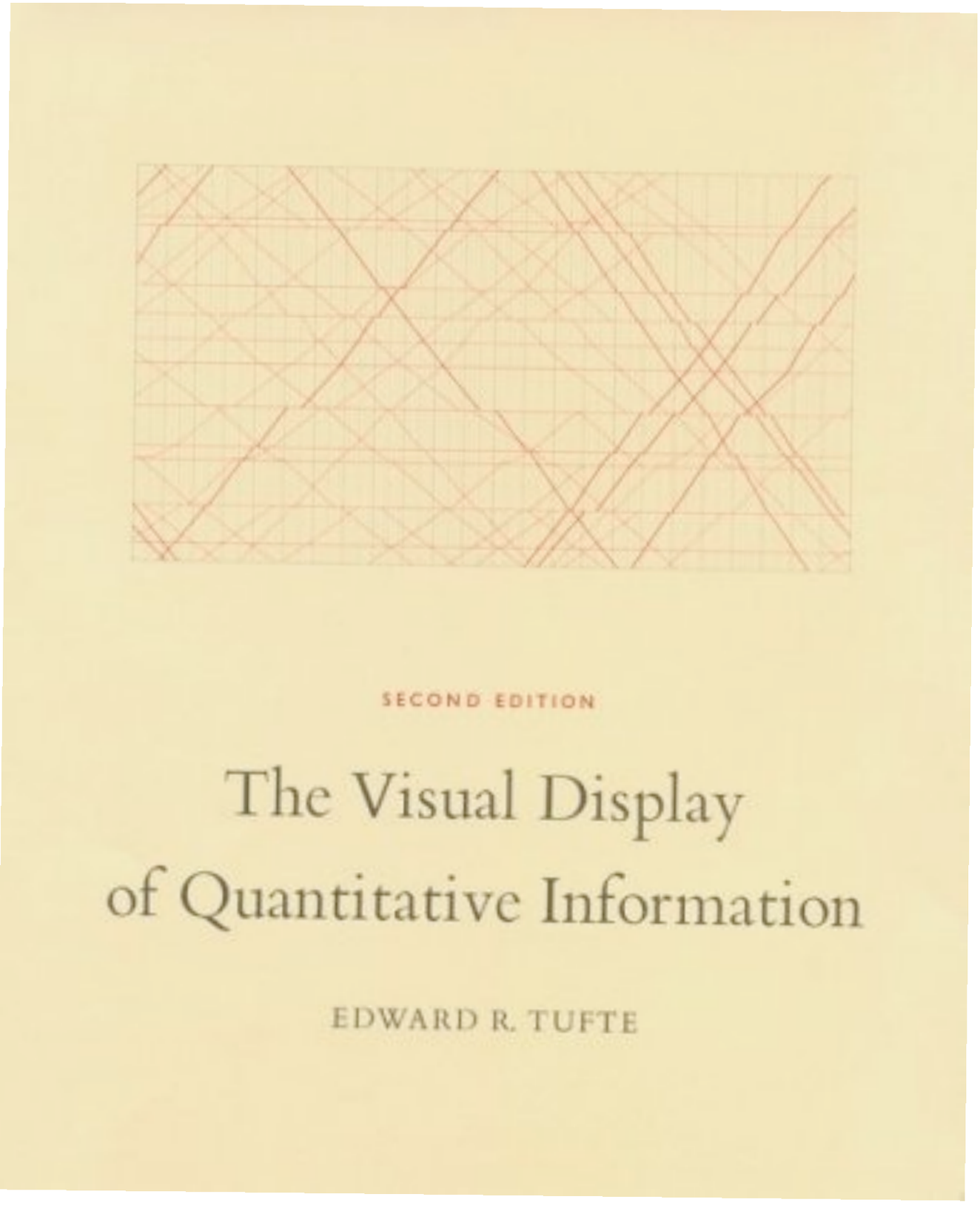


Reduce!!!



Two Camps


SECOND EDITION
The Visual Display
of Quantitative Information
EDWARD R. TUFTE

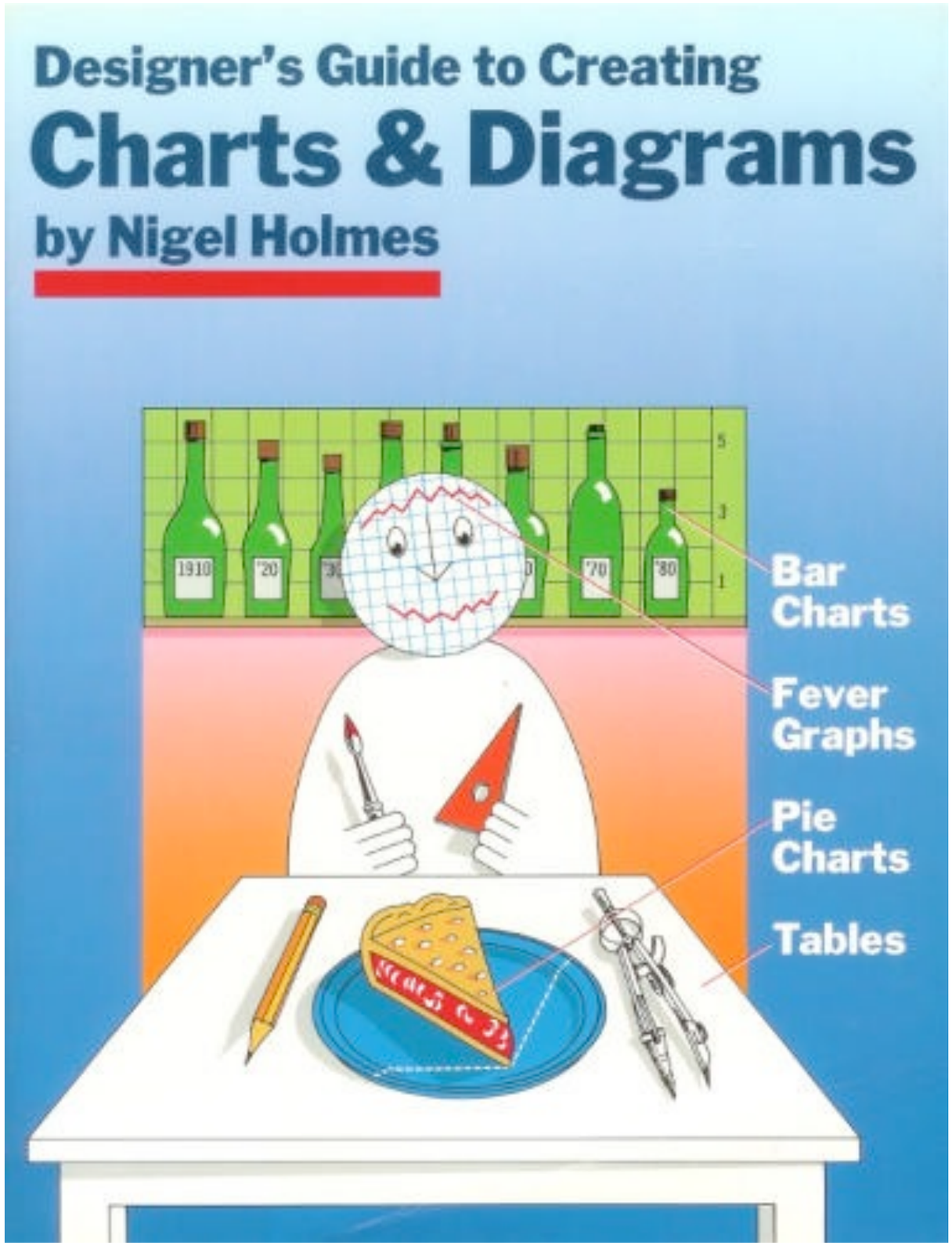
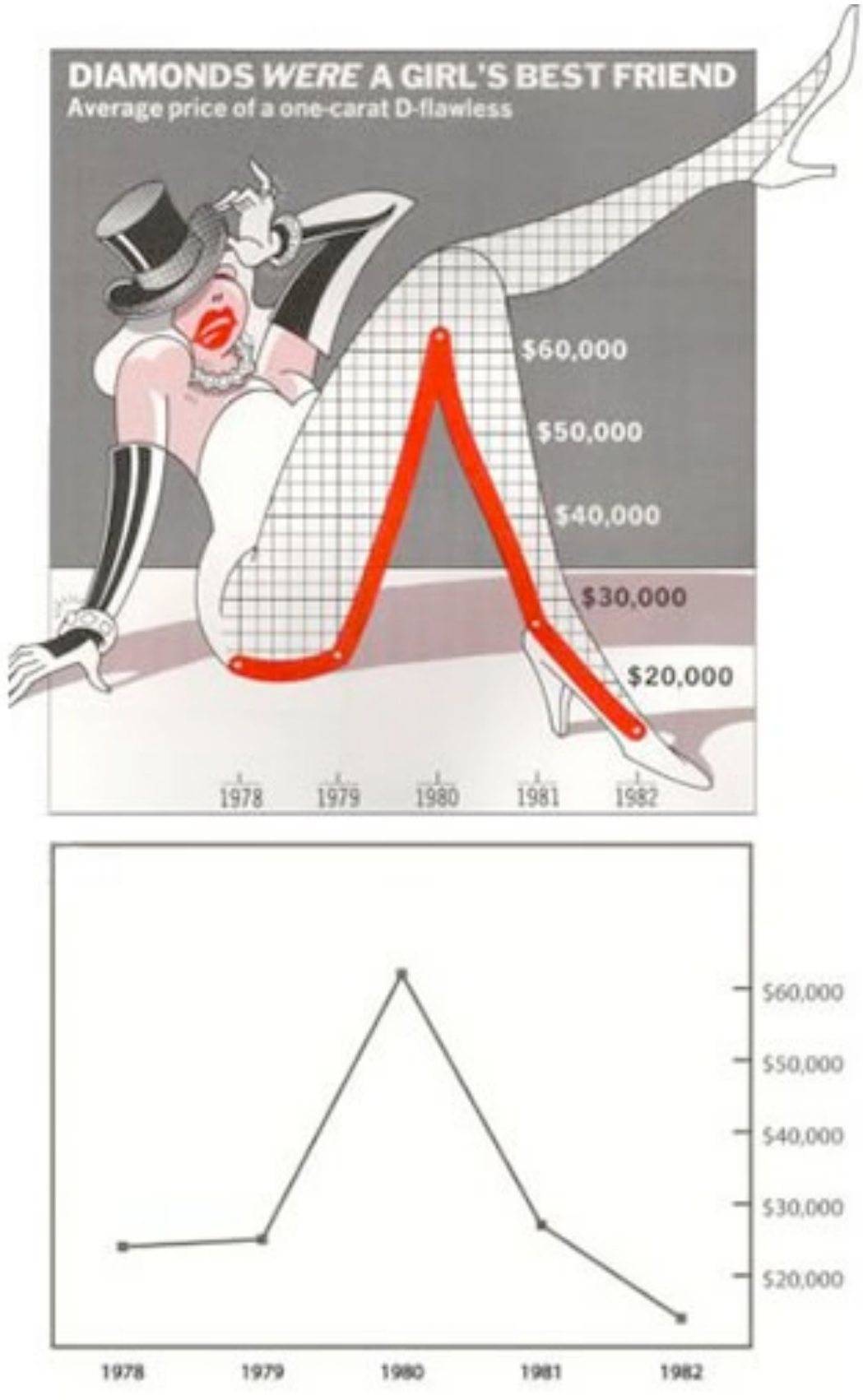

Designer's Guide to Creating
Charts & Diagrams
by Nigel Holmes
Bar Charts
Fever Graphs
Pie Charts
Tables

Chart Junk isn't as bad as you think

http://52weeksofux.com/post/963764999/chart-junk-isnt-as-bad-as-you-think



GetColor()

#36b0cf

$hex = substr(md5(“13:00”),0,6);

April = #3fcf02

13:00 = #36b0cf

Edinburgh = #03cf54

WhiskyWeb = #7b315a

Scotland = #da5dd6

Needs a friend

24
12/2010

Calculating Color Contrast

ARTICLE COMMENTS 23

by Brian Suda

About the author

Brian Suda is a master informatician working to make the web a better place little by little everyday. Since discovering the Internet in the mid-90s, Brian Suda has spent a good portion of each day connected to it. His own little patch of Internet is http://suda.co.uk, where many of his past projects and crazy ideas can be found.

Photo: Jeremy Keith

Some websites and services allow you to customize your profile by uploading pictures, changing the background color or other aspects of the design. As a customer, this personalization turns a web app into your little nest where you store your data. As a designer, letting your customers have free rein over the layout and design is a scary prospect. So what happens to all the stock text and images that are designed to work on nice white backgrounds? Even the Mac only lets you choose between two colors for the OS, blue or graphite! Opening up the ability to customize your site's color scheme can be a recipe for disaster unless you are flexible and understand how to find maximum color contrasts.

In this article I will walk you through two simple equations to determine if you should be using white or black text depending on the color of the background. The equations are both easy to implement and produce similar results. It isn't a matter of which is better, but more the fact that you are using one at all! That way, even with the craziest of Geocities color schemes that your customers choose, at least your text will still be readable.

Let's have a look at a range of various possible colors. Maybe these are pre-made color schemes, corporate colors, or plucked from an image.

```
/* http://en.wikipedia.org/wiki/YIQ */

function yiq_contrast($hexcolor){
        $r1  = hexdec(substr($hexcolor,0,2));
        $g1 = hexdec(substr($hexcolor,2,2));
        $b1 = hexdec(substr($hexcolor,4,2));

        $yiq = (($r1*299)+($g1*587)+($b1*114))/1000;

        if($yiq >= 128)
         { return 'black'; } else { return 'white'; }
}
```

April = #3fcf02

13:00 = #36b0cf

Edinburgh = #03cf54

WhiskyWeb = #7b315a

Scotland = #da5dd6

PARIS 2010
OSLO
TOKYO 2012
TOKYO 2012
TOKYO 2012
SYDNEY 2011
SYDNEY 2011
SYDNEY 2011
STOCKHOLM 2011
STOCKHOLM 2011
SAN FRANCISCO 2011
SAN FRANCISCO 2011
RIO DE JANEIRO 2011
RIO DE JANEIRO 2011
PRAGUE 2011
PRAGUE 2011
PRAGUE 2011
OSLO
OSLO
MILAN 2012
MILAN 2012
MILAN 2012
MIAMI 2012
MIAMI 2012
MIAMI 2012
LONDON 2010
LONDON 2010
LONDON 2010
LOS ANGELES 2012
LOS ANGELES 2012
LOS ANGELES 2012
KYOTO

lonely planet NEW YORK ENCOUNTER
lonely planet NEW YORK ENCOUNTER
lonely planet NEW YORK ENCOUNTER
lonely planet NEW YORK ENCOUNTER
lonely planet MILAN ENCOUNTER
lonely planet MILAN ENCOUNTER
lonely planet MADRID ENCOUNTER
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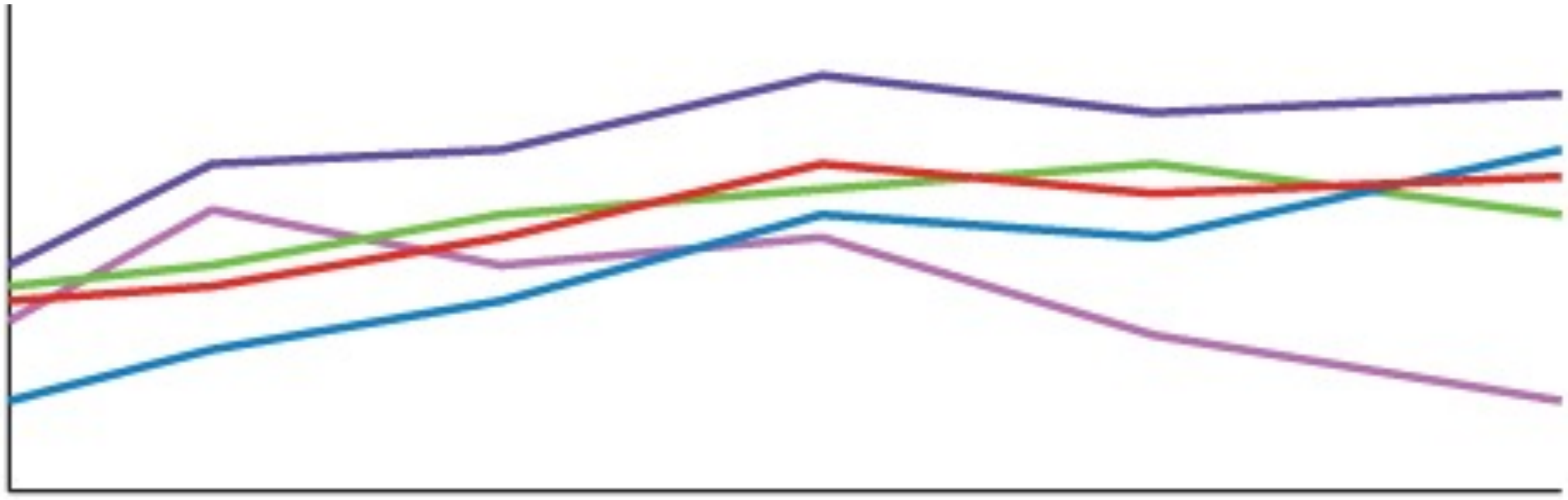
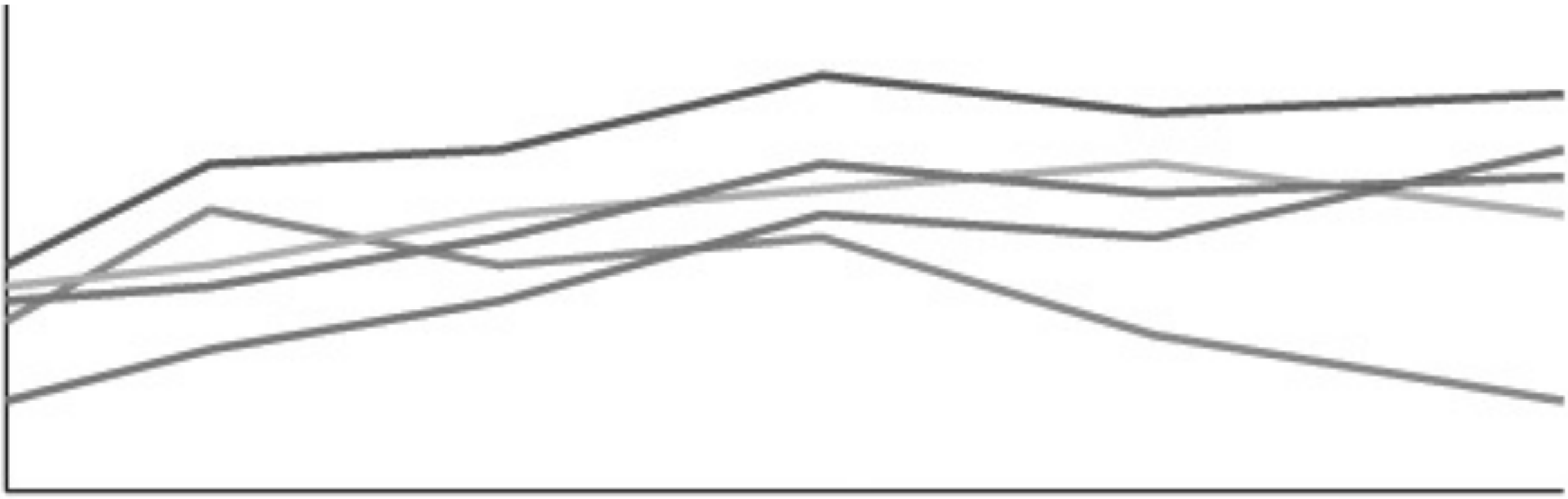
lonely planet CANCÚN ENCOUNTER
lonely planet BUENOS AIRES ENCOUNTER
lonely planet BUENOS AIRES ENCOUNTER
lonely planet BUENOS AIRES ENCOUNTER
lonely planet BOSTON

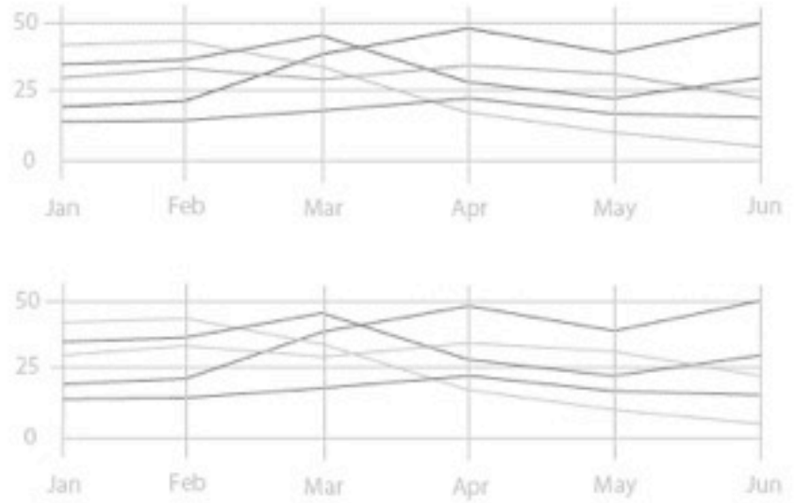
Accessibility





their ink (or paint) supplies.

With graphs and charts, we should take into account that each new colour introduced costs someone money. Knowing this, we also need to make sure that our visualizations work for the lowest common denominator: poor quality black and white inkjet printers. The information needs to convey the same story with or



We've all seen ugly faxes that are so poor in

If your projects revolve around a large set of values that need to be shown in relation to one another, then this algorithm might be a useful tool for you.

Types of color blindness


PURINA
Cat
Chow

Deuteranopia

Protanopia

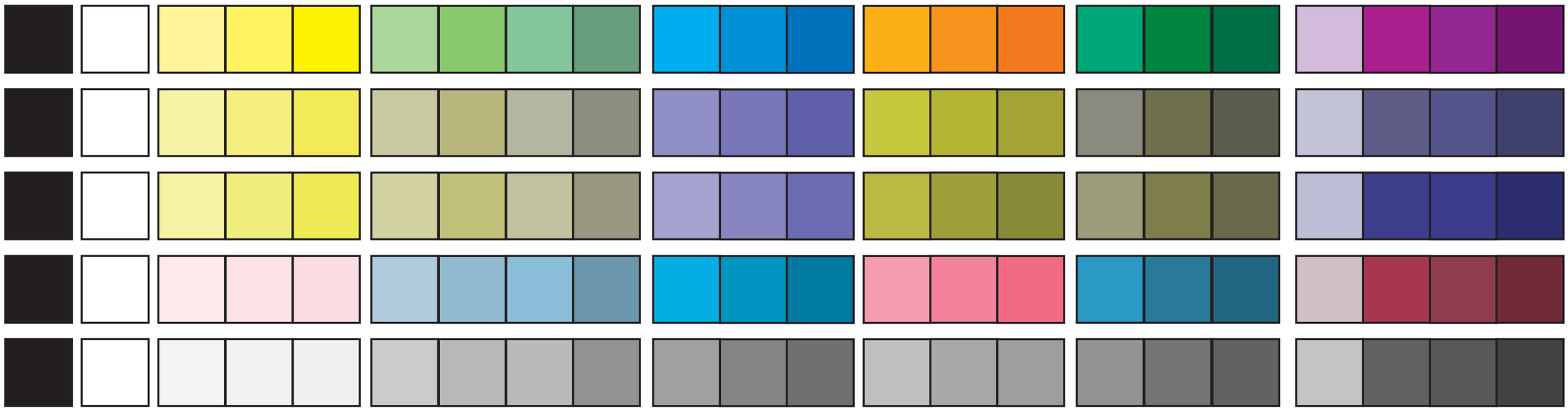
Tritanopia

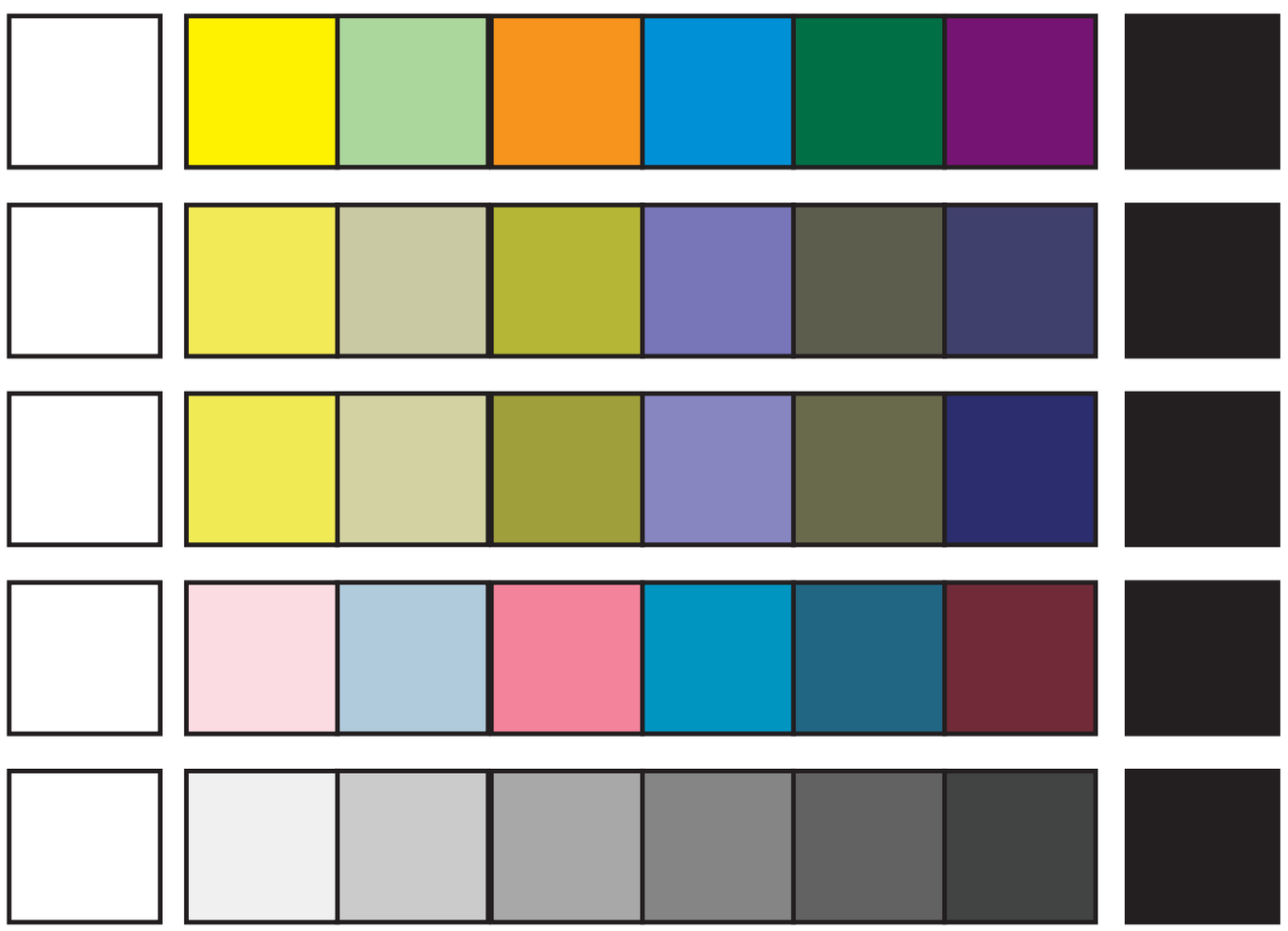

Cat Club
KONINGIN
DEN BIEKEN


Cat Club
KONINGIN
DEN BIEKEN


Cat Club
KONINGIN
DEN BIEKEN


Cat Club
KONINGIN
DEN BIEKEN





(optional.is)


50
100
MONOPOLY
100
COPYRIGHT 1935 BY
PARKER BROTHERS INC.
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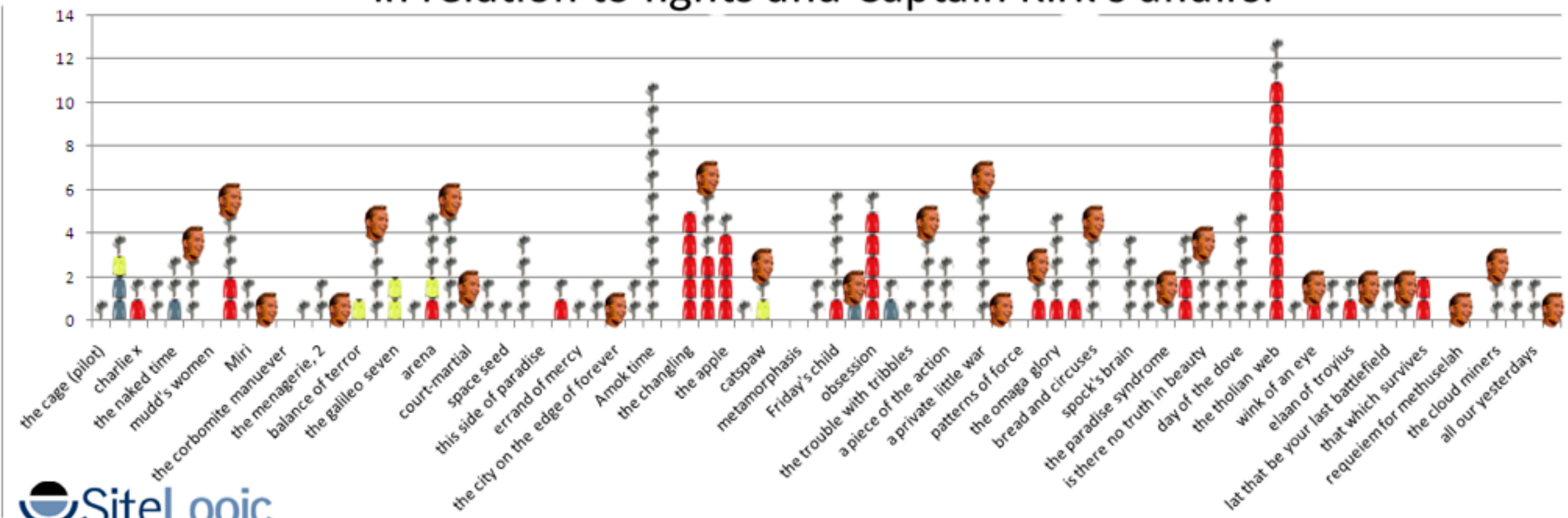
10

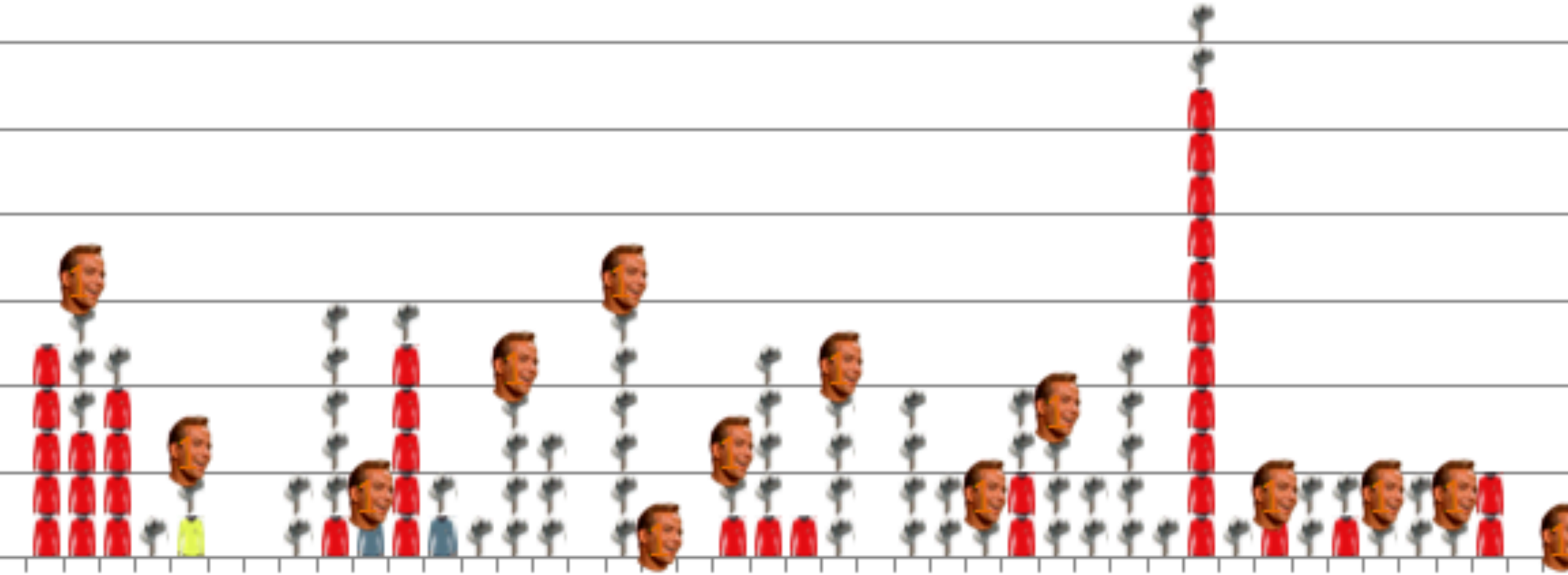
Monopoly Money

Red shirt theory

Crewmember Deaths; by shirt color, by episode, in relation to fights and Captain Kirk's affairs.



eaths; by shirt color, by episode,
ights and Captain Kirk's affairs.



Deterministic Design

NORDKYN

WHERE
NATURE
RULES

NORDKYN
10.01.09
SSW 14.3M/S
3.2°

NORDKYN
11.01.09
S 8.9M/S
3.3°

NORDKYN
12.01.09
NW 12.1M/S
-2.8°

NORDKYN
13.01.09
N 9.4M/S
-5.8°

NORDKYN
14.01.09
NW 8.2M/S
-5.9°

NORDKYN
04.02.09
E 13.4M/S
-4.5°

NORDKYN
05.02.09
WSW 9.8M/S
-8.5°

NORDKYN
06.02.09
ENE 11.1M/S
-3.8°

NORDKYN
07.02.09
SW 7.2M/S
-13.5°

NORDKYN
08.02.09
SSE 4.4M/S
-13.3°

NORDKYN
01.03.09
SSW 7.1M/S
-3.8°

NORDKYN
02.03.09
SSW 12.2M/S
-8°

NORDKYN
03.03.09
SW 6.7M/S
-0.7°

NORDKYN
04.03.09
SW 3M/S
-2.2°

NORDKYN
05.03.09
WSW 4.1M/S
-2.7°

NORDKYN
26.03.09
S 9.8M/S
-6.1°

NORDKYN
27.03.09
SE 6.9M/S
-5.4°

NORDKYN
28.03.09
SW 3.1M/S
-3.8°

NORDKYN
29.03.09
SSE 3.4M/S
-1.9°

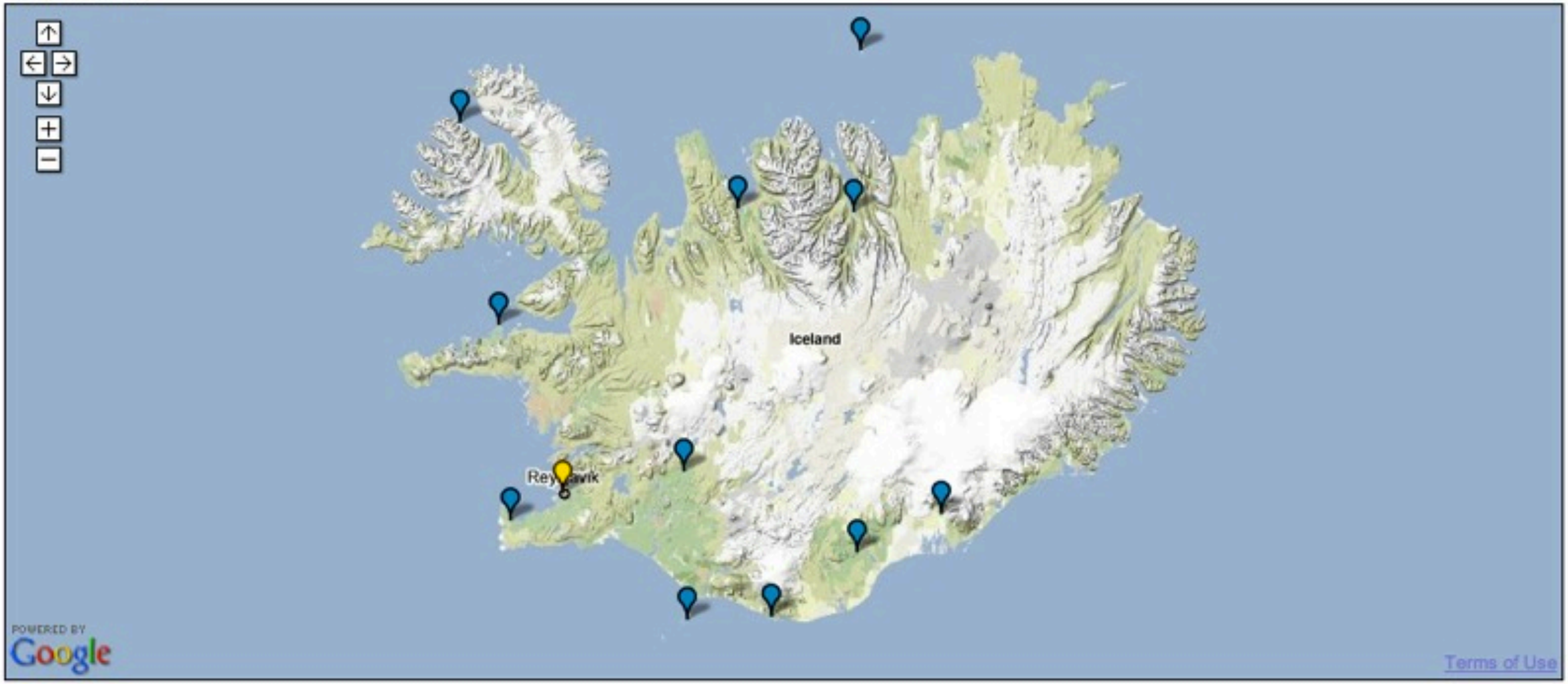
NORDKYN
30.03.09
ESE 6.7M/S
1.1°

Gagnatorg veðurupplýsinga

Tímabil

* Frá 30. 10. 2009 * Til 30. 10. 2010 * Tíðni Mánuður

Veðurstöðvar



Reykjav
Kirkjuba
Stykkish
Bolunga
Vatnssk
Stórhöfð
Skaftafe
Bergsta
Grímsey
Hjarðarl
Akureyr
Keflavík

Select

Mæling

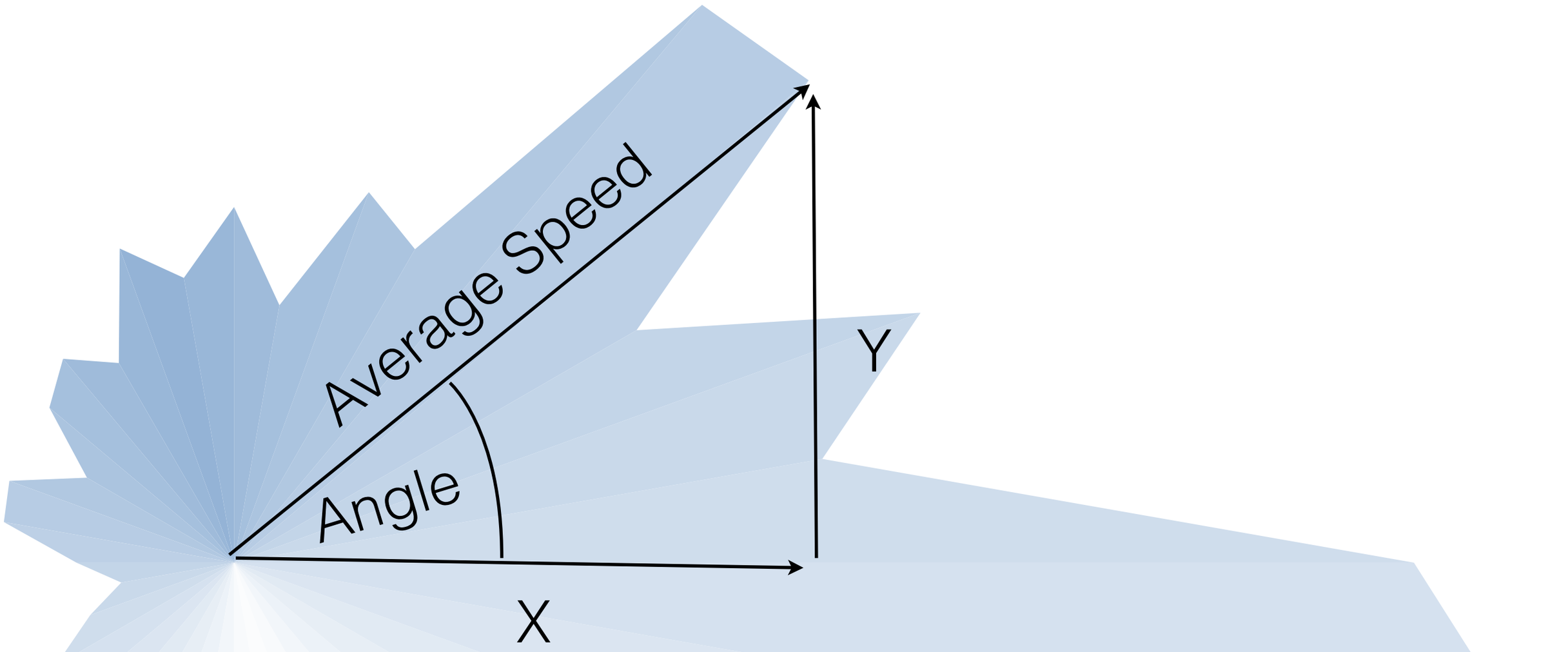
- [ ] Lofthiti
- [x] Vindátt
- [x] Rakastig
- [x] 10 mín. meðalvindhraði
- [ ] Úrkoma

Select Clear

Upprunaleg gildi

Gæðastimplar

```
echo '<!DOCTYPE svg PUBLIC "-//W3C//DTD SVG 1.1//EN"
"http://www.w3.org/Graphics/SVG/1.1/DTD/svg11.dtd">
<svg xmlns="http://www.w3.org/2000/svg" version="1.1">';

$arm_pos = 0;
foreach($dirs as $k=>$v){
  $length = (($v/$counter)*$scaler);
  $x = 100+(sin(deg2rad($k)) * $length);
  $y = 100+(cos(deg2rad($k)) * $length);

  $arm_pos = $k+10;
  if($arm_pos > 360) { $arm_pos = 10; }

  $length = (($dirs[$arm_pos]/$counter)*$scaler);

  $x1 = 100+(sin(deg2rad($arm_pos)) * $length);
  $y1 = 100+(cos(deg2rad($arm_pos)) * $length);

  echo '<polygon points="100,100 '.$x.','.$y.' '.$x1.','.$y1.'" fill="#'.stepper($k).'"/>';
}
echo '</svg>';
```



X = sin(Angle) * Average Speed;
Y = cos(Angle) * Average Speed;

NORDKYN

WHERE
NATURE
RULES

ARCTIC WINTER | ARCTIC SUMMER

Facebook

yr.no Forecast from yr.no

EVERYTHING ELSE

The distance is short between the coast and the mountain plain, and the seconds few between the calm and the storm. And when the hunting is successful and the fish are biting, it's easy to choose to travel up here. This is the top, as far north as you can get in mainland Europe and up here nature rules.

Welcome to Nordkyn!

AWARD FOR DESIGN EXCELLENCE
NORWEGIAN DESIGN COUNCIL

http://visitnordkyn.com

Little Delighters

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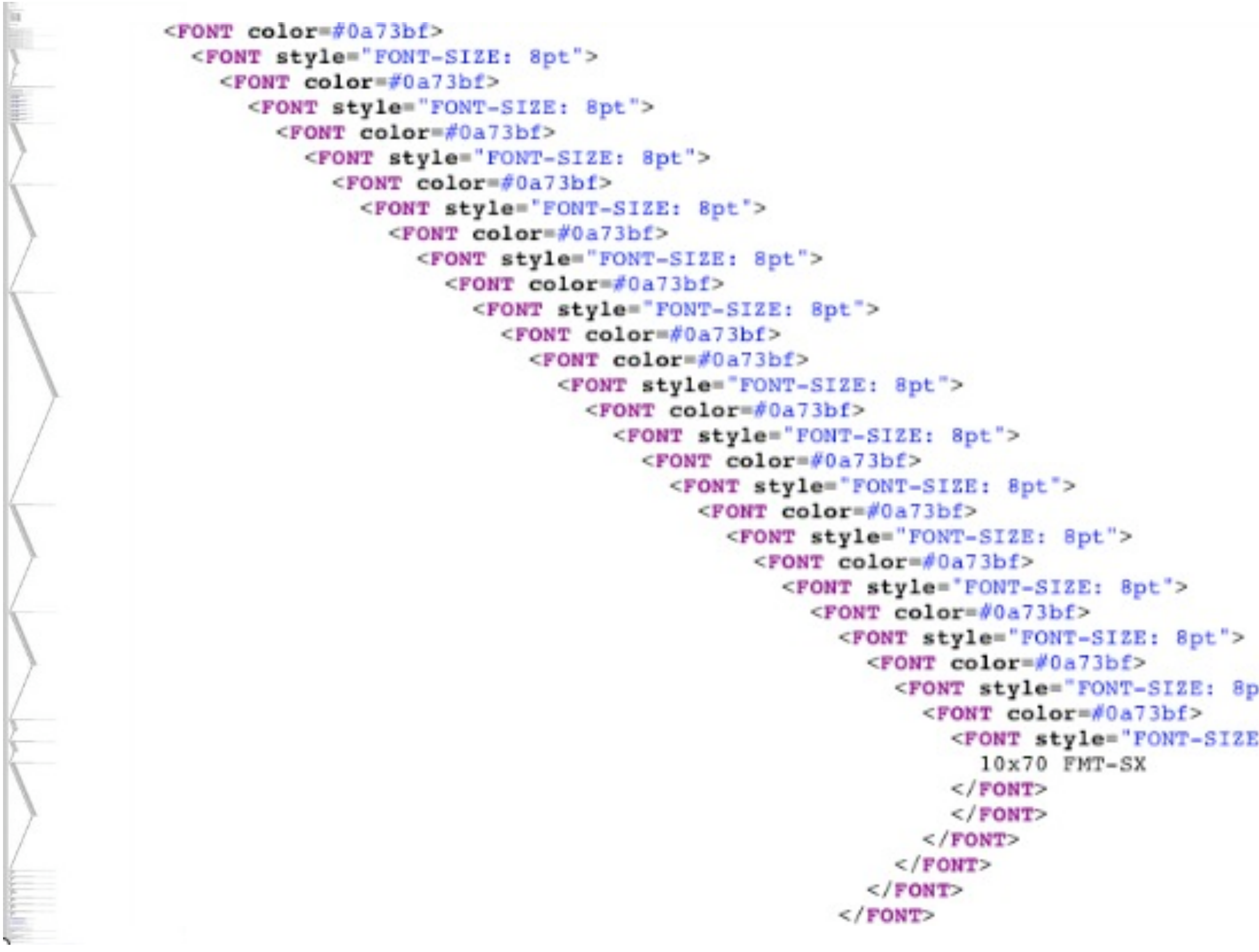
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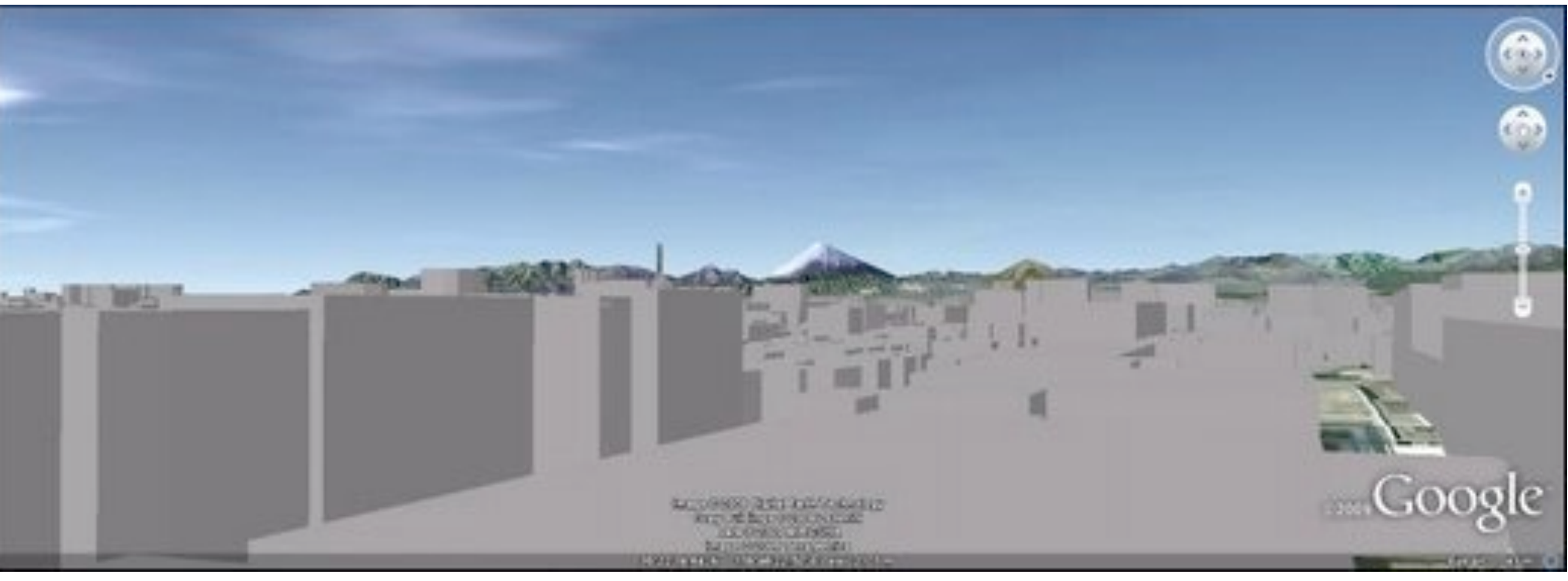
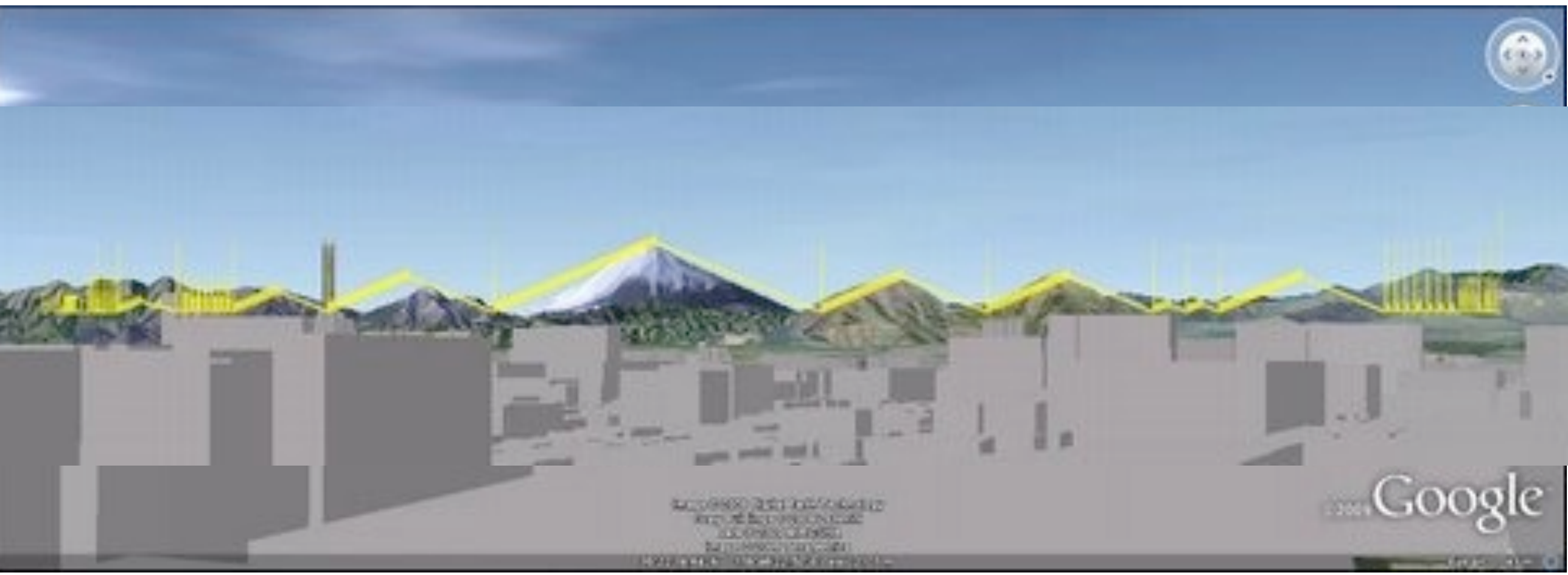

©2009 Google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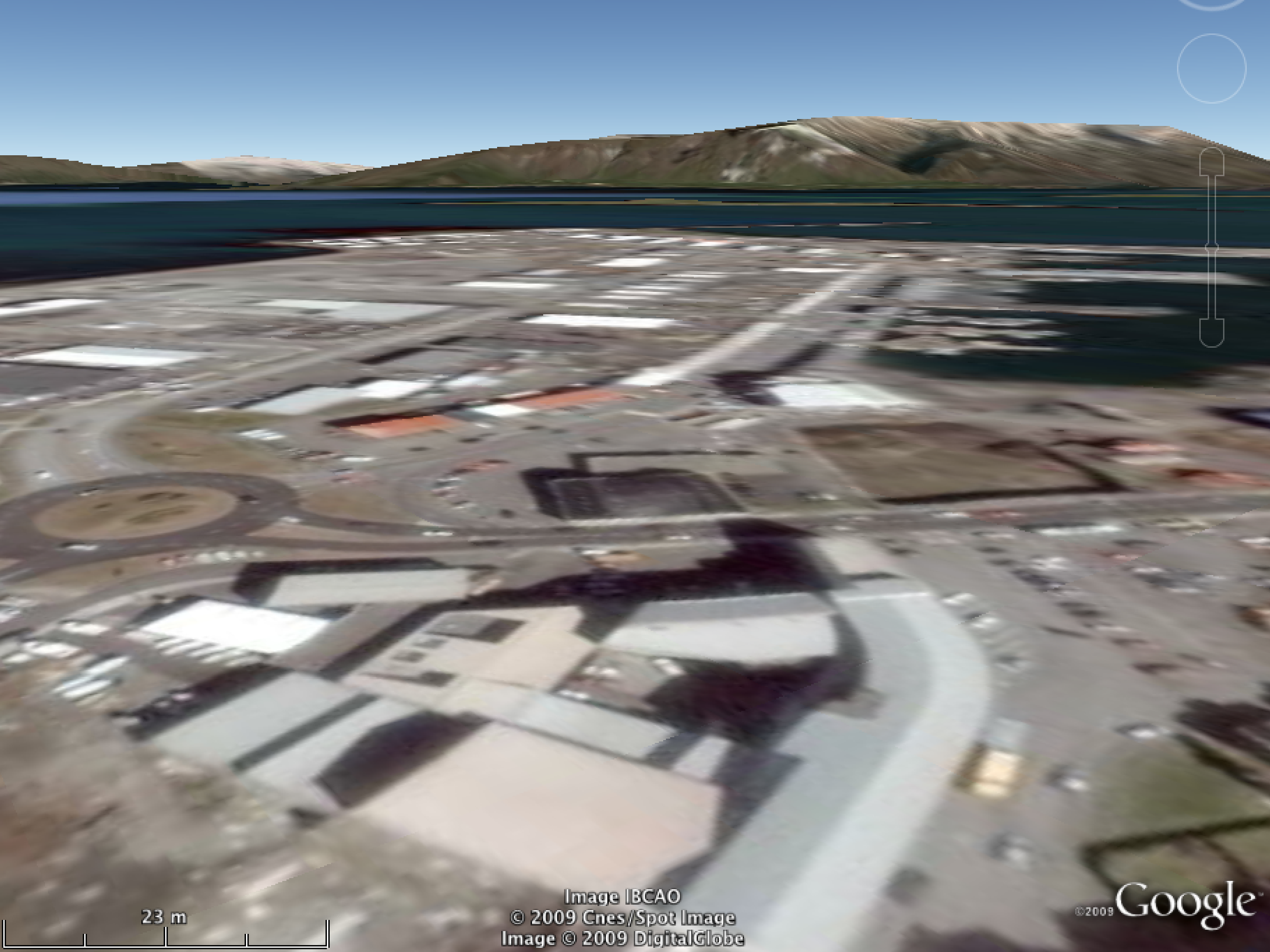
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Image IBCAO
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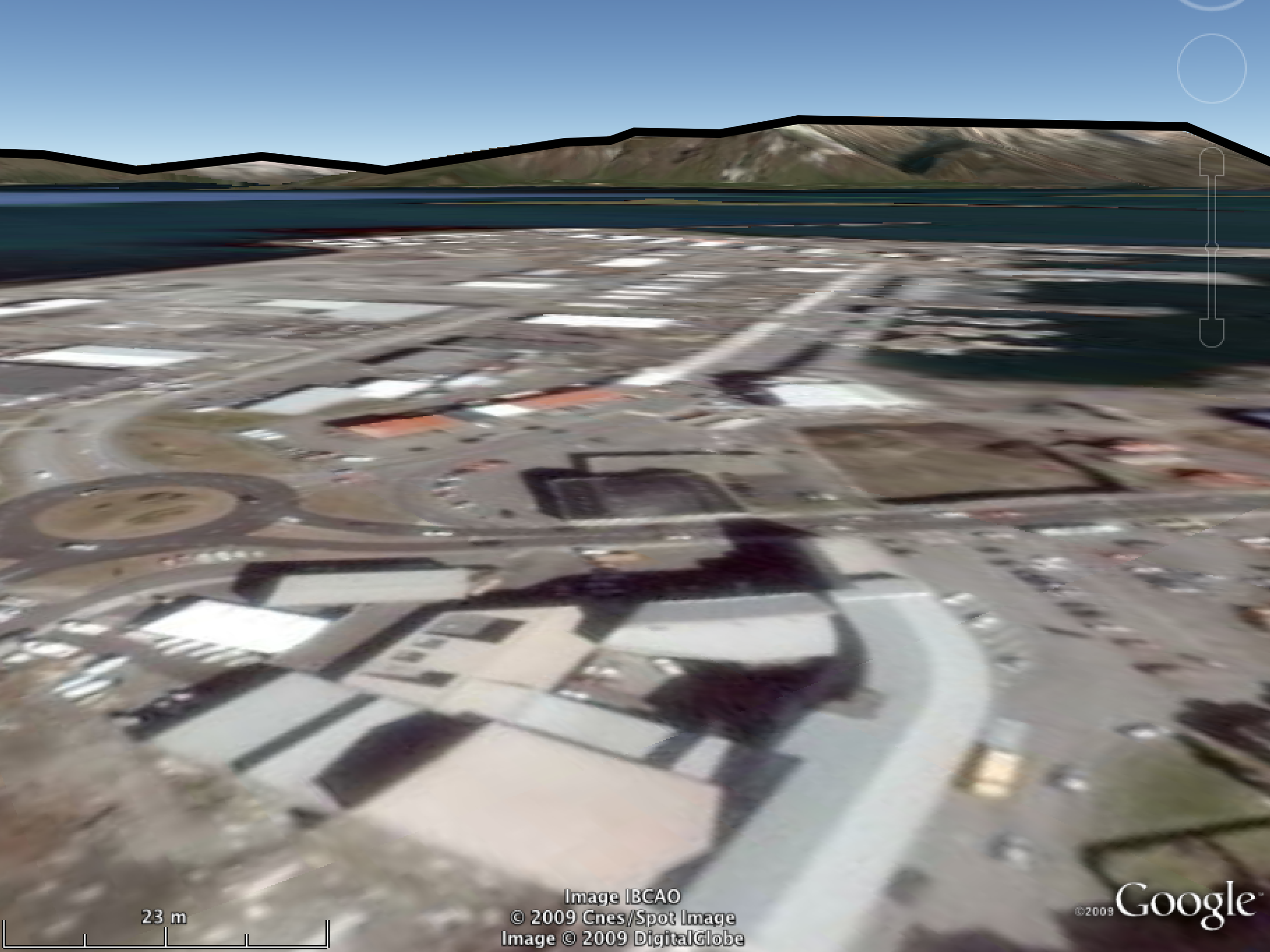
23 m
Image IBCAO
© 2009 Cnes/Spot Image
Image © 2009 DigitalGlobe
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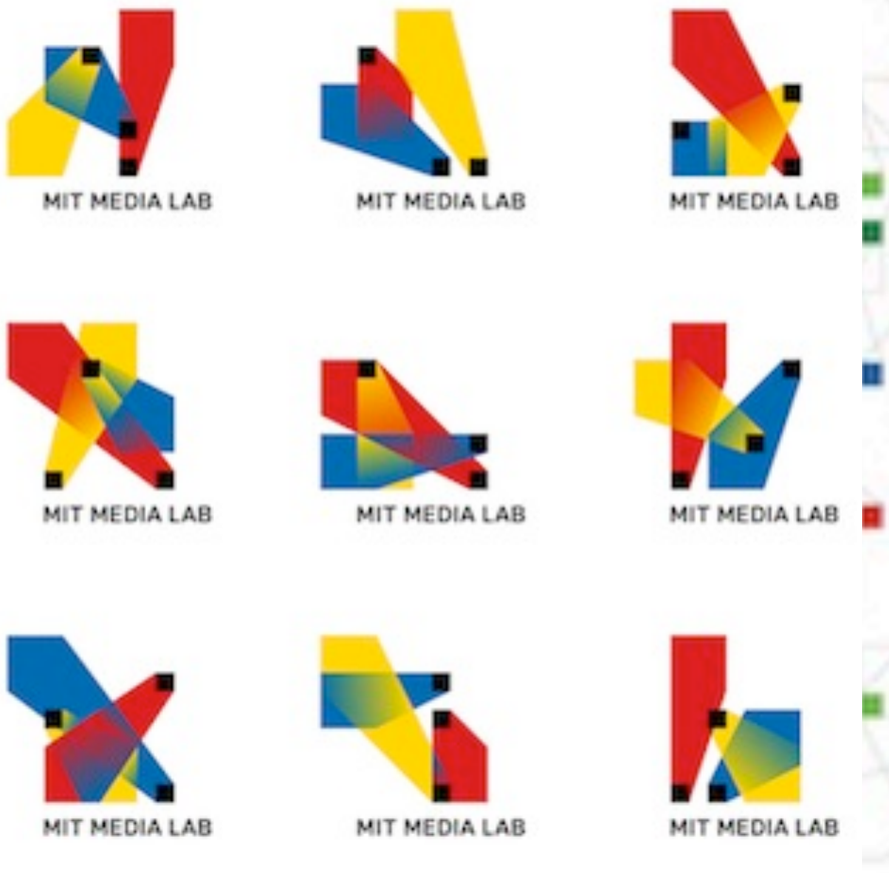
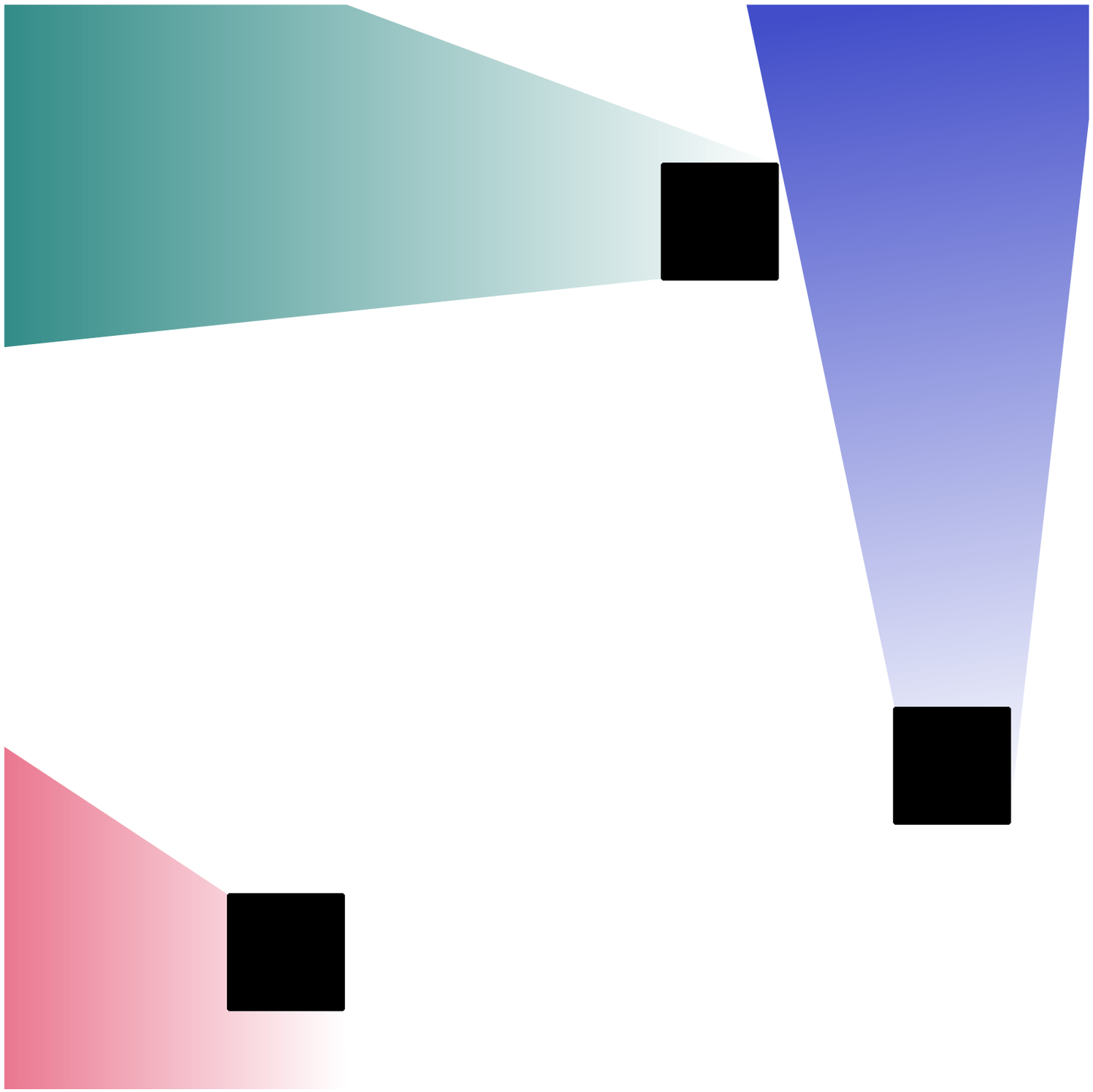
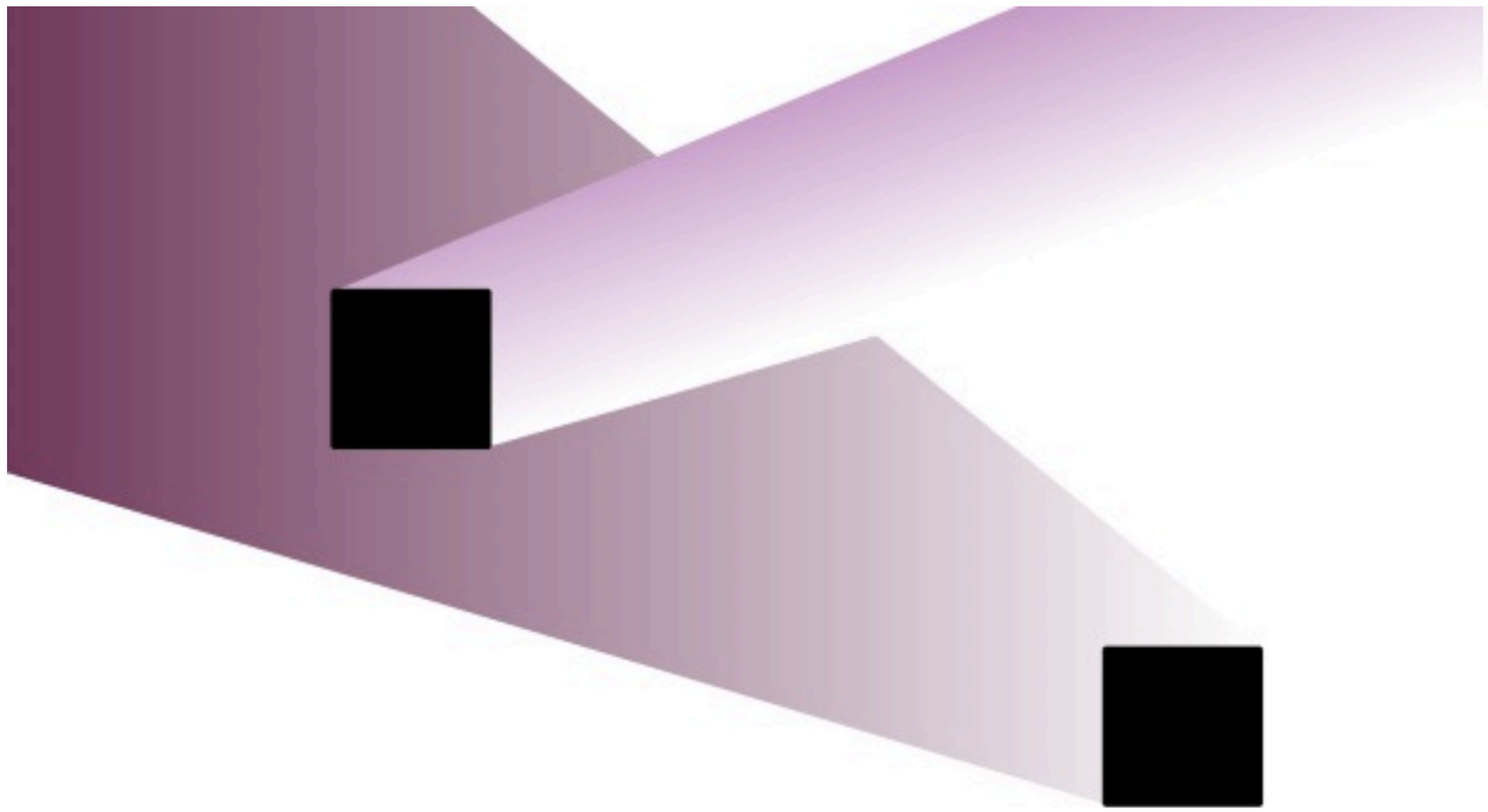
Little delighters for your customers

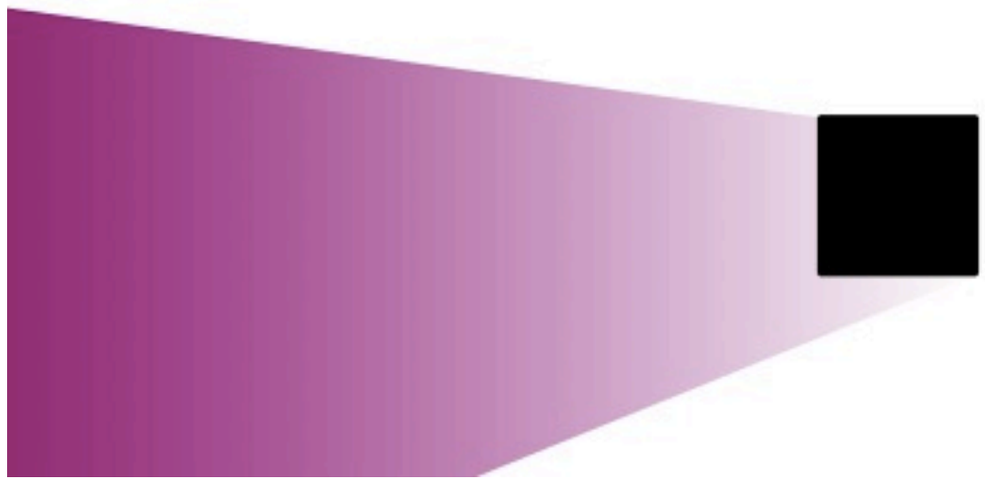
MIT MEDIA LAB





http://mitmedialab.heroku.com/logo?seed=Brian%20Suda





http://mitmedialab.heroku.com/logo?seed=WhiskyWeb

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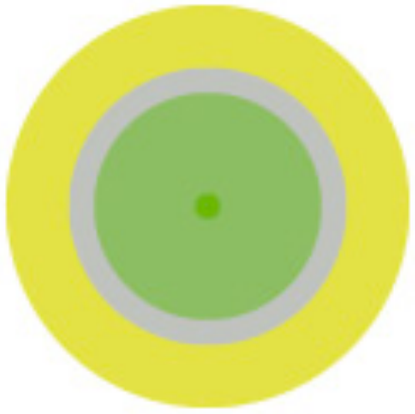
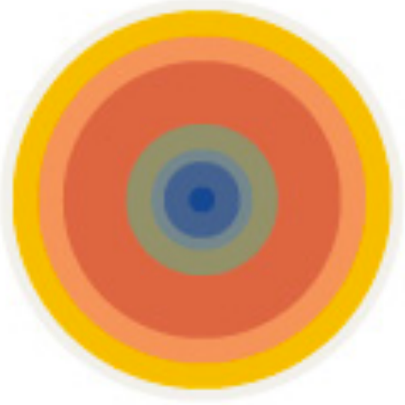
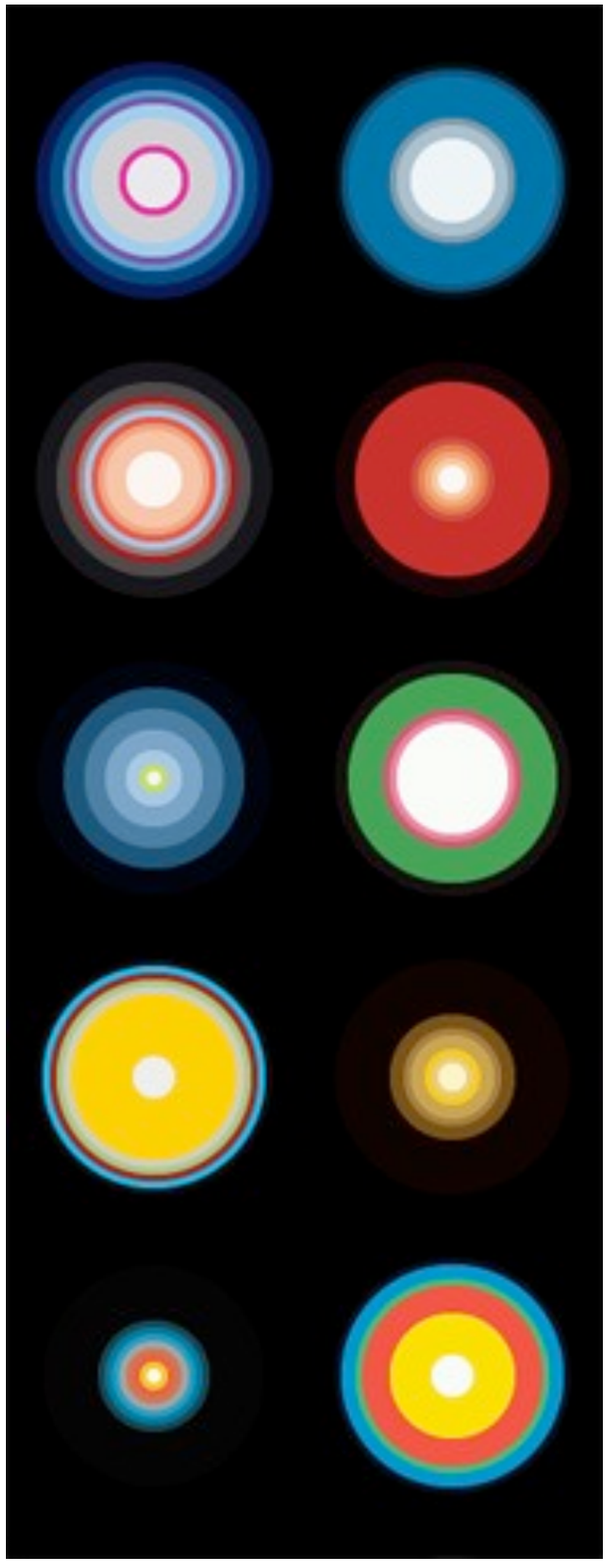
NOTES

This visualization ran as a full page in the June 2008 issue of WIRED.

The custom algorithm in our visualization produces a signature "bull's-eye" pattern for each cover:

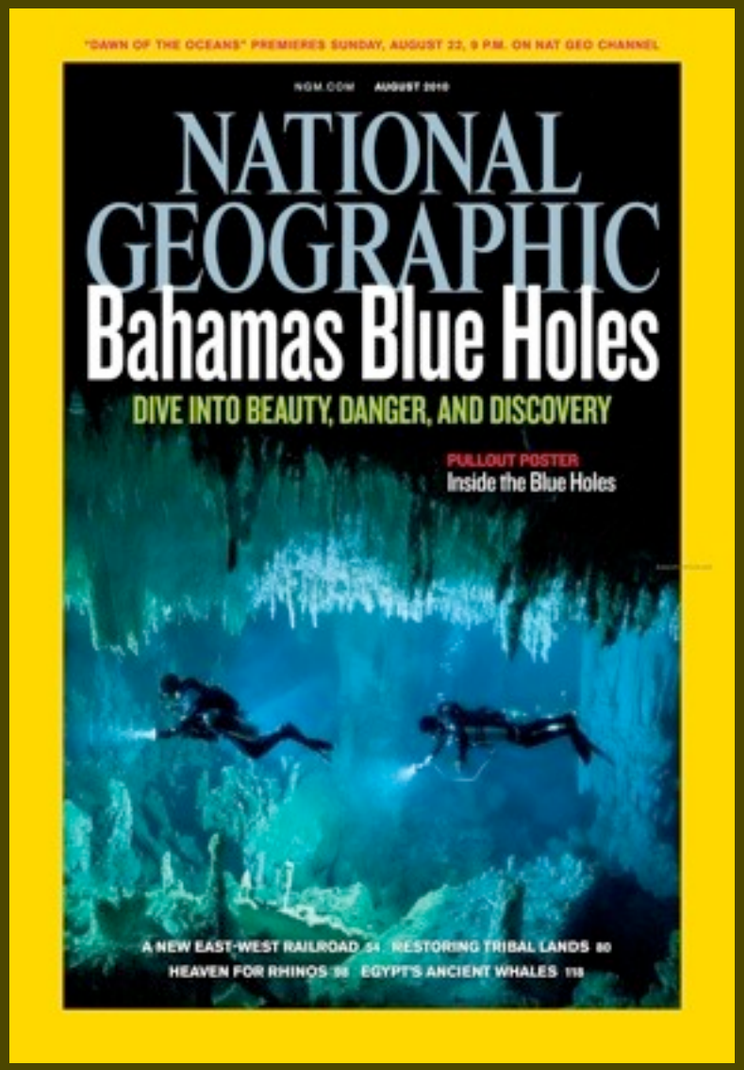


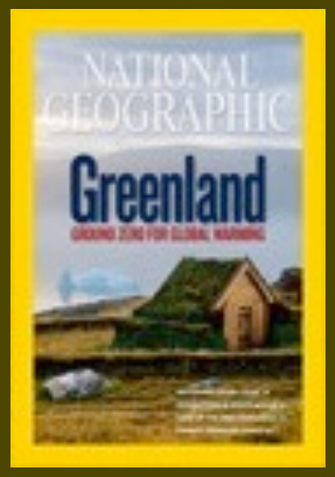


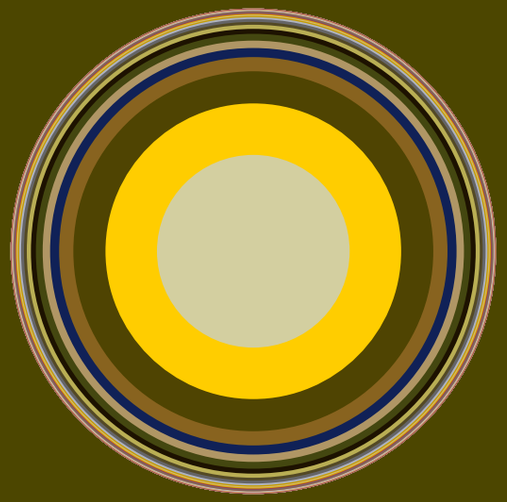


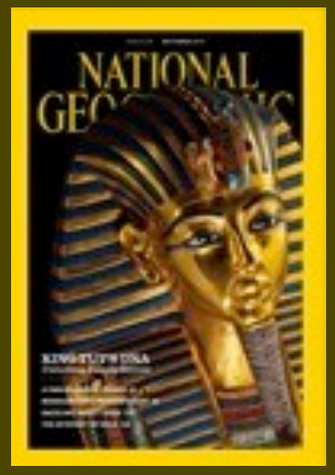
http://hint.fm/projects/wired2008/

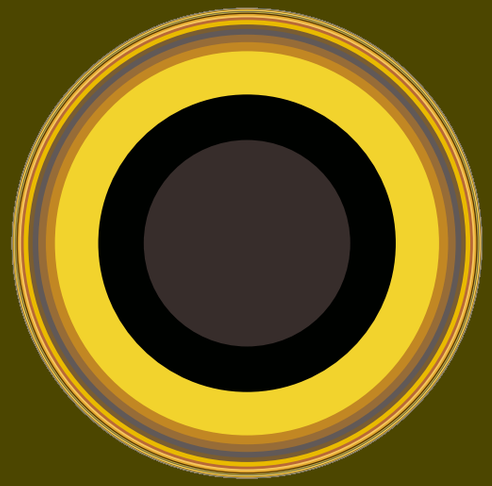
```
echo '<?xml version="1.0" standalone="no"?>
<!DOCTYPE svg PUBLIC "-//W3C//DTD SVG 1.1//EN"
"http://www.w3.org/Graphics/SVG/1.1/DTD/svg11.dtd">

<svg width="100%" height="100%" version="1.1"
xmlns="http://www.w3.org/2000/svg">';

$c = (int)(($x*$y)/$scaler);
$prev = 0;
foreach($rgb as $k=>$v){
  if($v > 0) {
    $r = ($k >> 16) & 0xFF;
    $g = ($k >> 8) & 0xFF;
    $b = $k & 0xFF;

    $hex = str_pad(dechex($r),2,'0',STR_PAD_LEFT).str_pad(dechex($g),
2,'0',STR_PAD_LEFT).str_pad(dechex($b),2,'0',STR_PAD_LEFT);
    echo '<circle cx="'.$c.'" cy="'.$c.'" r="'.($c-$prev).'" fill="#'.$hex.'" />';
    echo "\n";
    $prev += (int)($v/$scaler);

  }
}

echo '</svg>';
```


"DAWN OF THE OCEANS" PREMIERES SUNDAY, AUGUST 22, 9 P.M. ON NAT GEO CHANNEL
NGM.COM AUGUST 2010
NATIONAL GEOGRAPHIC
Bahamas Blue Holes
DIVE INTO BEAUTY, DANGER, AND DISCOVERY
PULLOUT POSTER
Inside the Blue Holes
A NEW EAST-WEST RAILROAD 54 RESTORING TRIBAL LANDS 80
HEAVEN FOR RHINOS 98 EGYPT'S ANCIENT WHALES 118


NATIONAL GEOGRAPHIC
Greenland




NATIONAL



GeoNames

The GeoNames geographical database covers all countries and contains over eight million placenames that are available for download free of charge.

all countries

search | show on map | [advanced search]

enter a location name, ex: "Paris", "Mount Everest","New York"

Browse the names

- Countries
- Largest cities
- Highest mountains
- Capitals
- Postal codes
- Wikipedia
- Country statistics
- Recent modifications

Information

- About GeoNames
- Data sources
- User manual
- Ambassadors and Team
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- Blog
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- Documentation
- Client libraries
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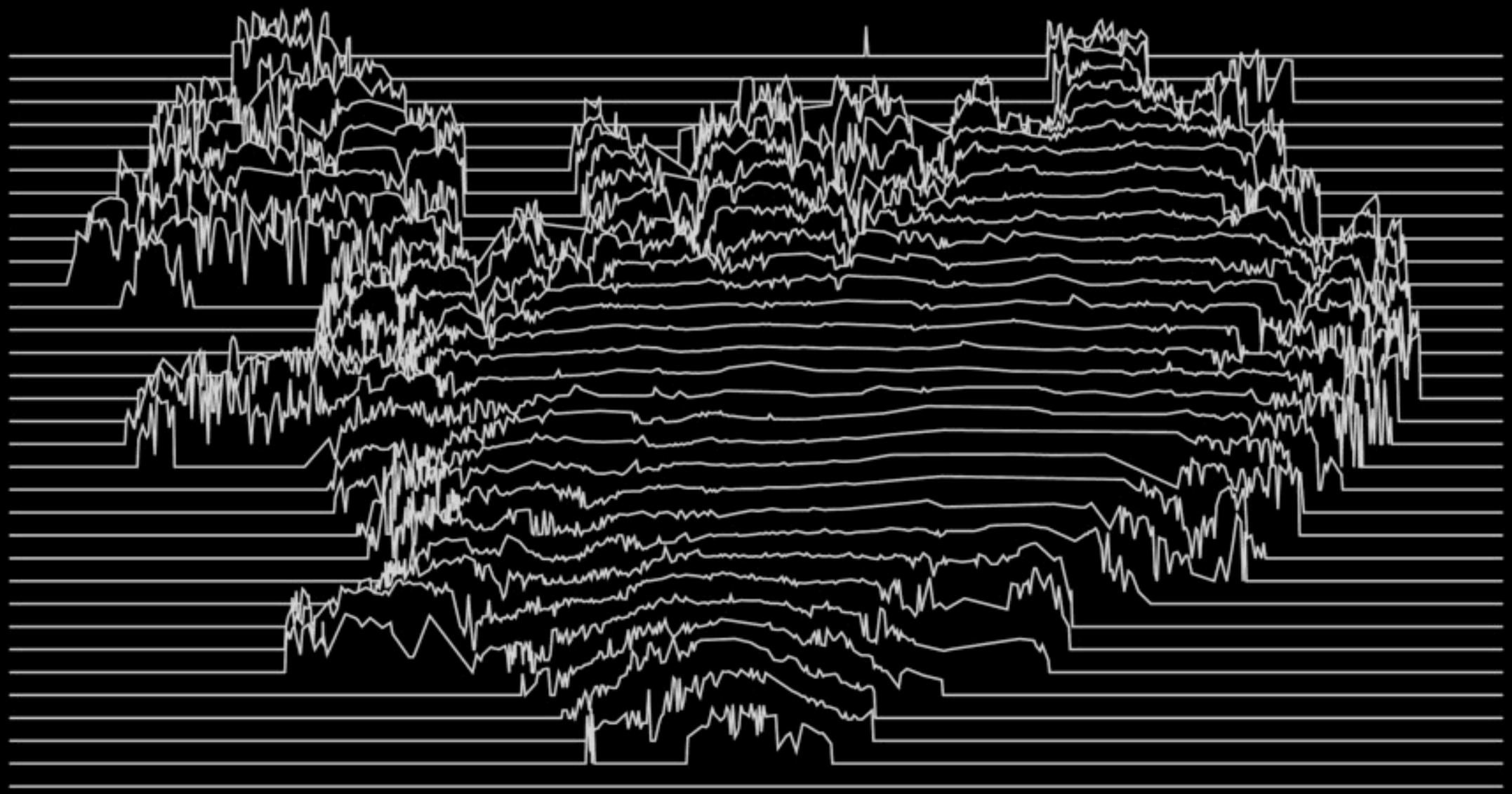
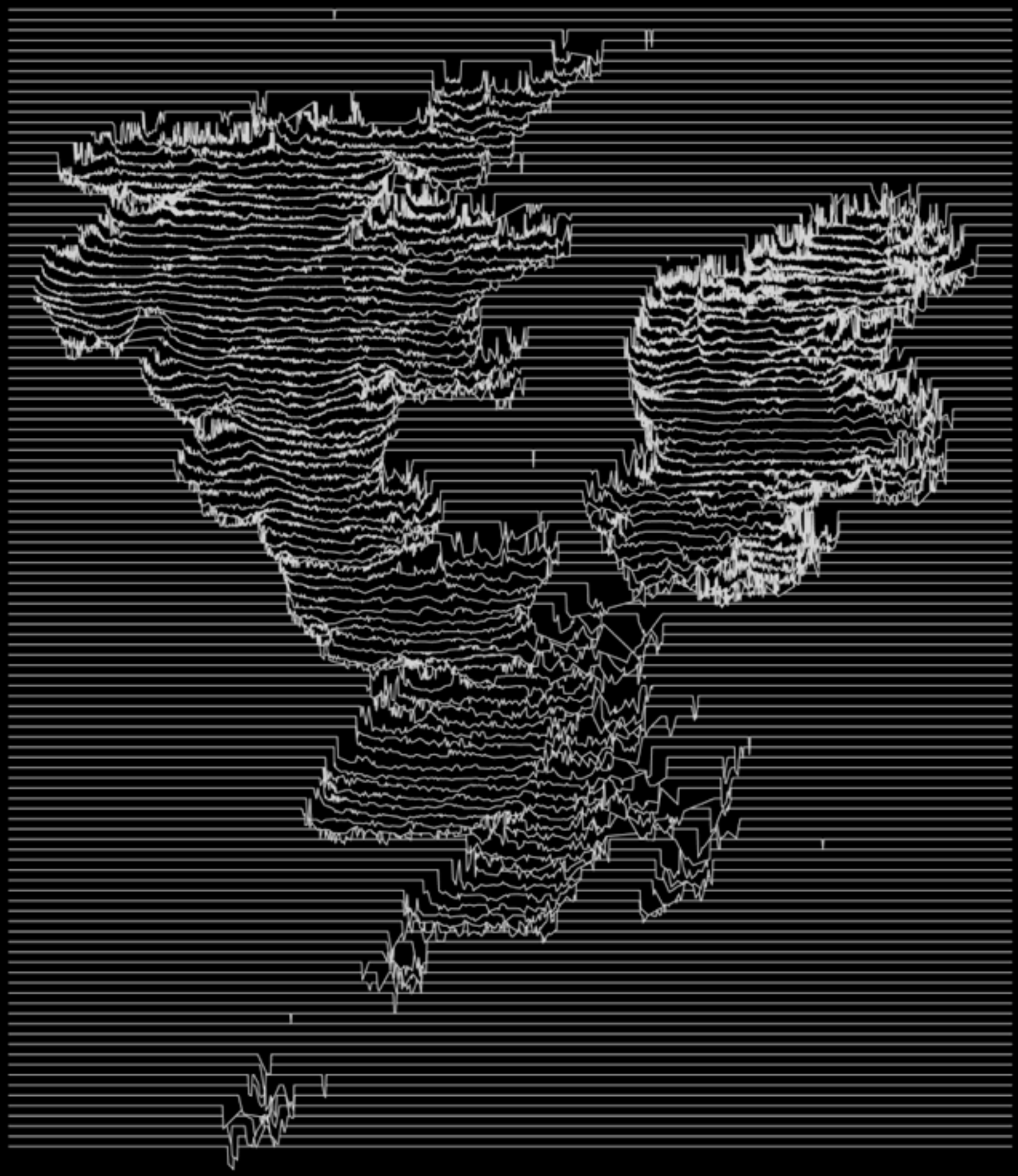




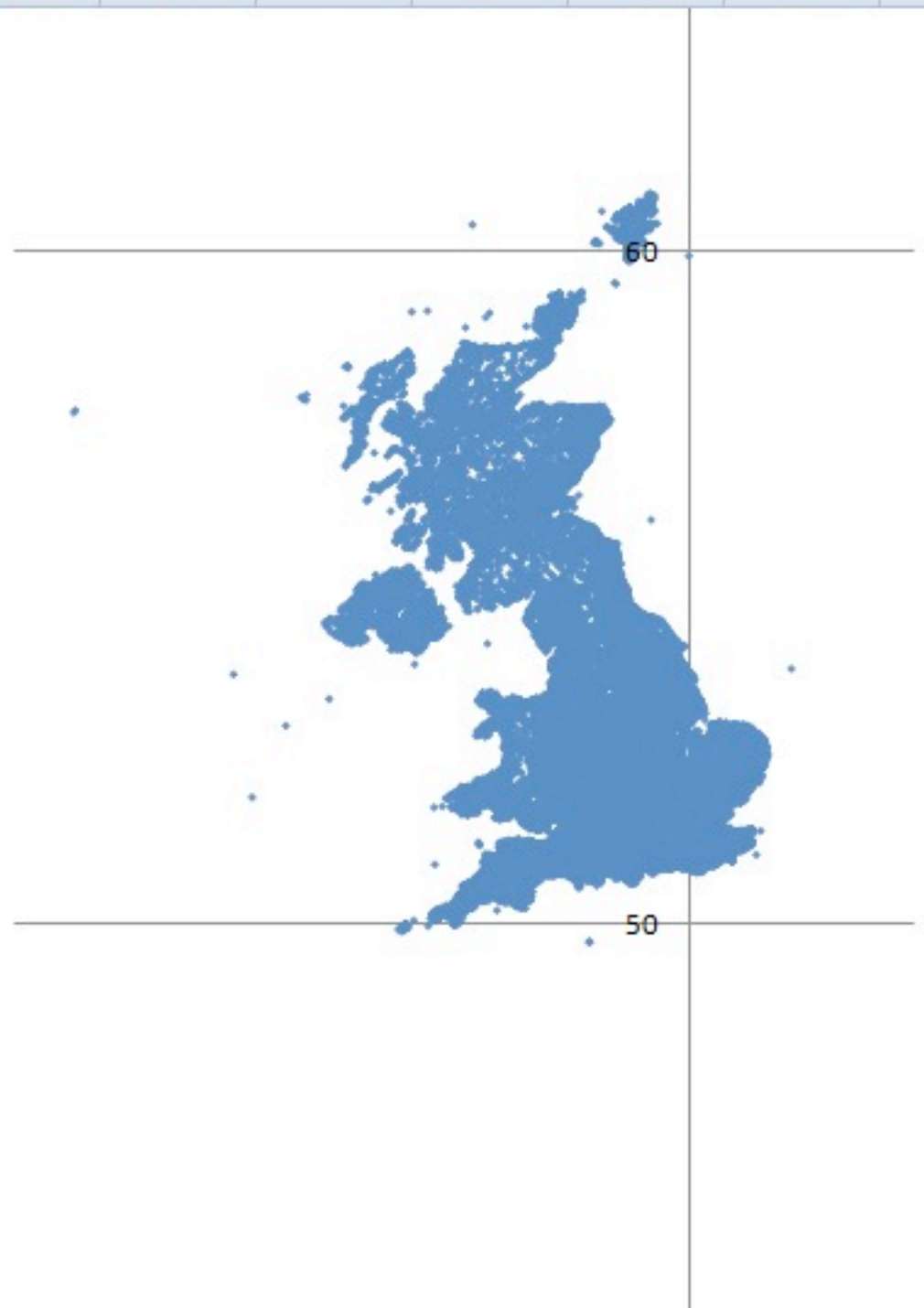
GB - Microsoft Excel | Chart Tools

Home | Insert | Page Layout | Formulas | Data | Review | View | Acrobat | Design | Layout | Format

PivotTable | Table — Tables
Picture | Clip Art | Shapes | SmartArt — Illustrations
Column | Line | Pie | Bar | Area | Scatter | Other Charts — Charts
Hyperlink — Links
Text Box | Header & Footer | WordArt | Signature Line | Object | Symbol — Text

Chart 2

	A	B	D	E	F
38785	6296601	Southend-On-Sea	EGMC,SEN	51.57139	0.69556
38786	6296602	Lydd Airport	EGMD	50.95611	0.93917
38787	6296603	Manston, South East	EGMH,Ker	51.34194	1.34611
38788	6296604	Carlisle	CAX,EGNC	54.9375	-2.80917
38789	6296605	Blackpool Airport	BLK,EGNH	53.77167	-3.02861
38790	6296606	Humberside International	EGNJ,HUY	53.57444	-0.35083
38791	6296607	Walney Island	BWF,EGNI	54.13117	-3.26367
38792	6296608	Leeds And Bradford	EGNM,LBA	53.8659	-1.66057
38793	6296609	Hawarden	CEG,EGNR	53.17806	-2.97778
38794	6296611	Newcastle International A	EGNT,NCL	55.0375	-1.69167
38795	6296612	Tees-Side	EGNV,MM	54.50919	-1.42941
38796	6296613	East Midlands	EGNX,EMA	52.83111	-1.32806
38797	6296614	Llanbedr	EGOD	52.81174	-4.12358
38798	6296615	Spadeadam	EGOM	55.05	-2.55
38799	6296616	Pembrey Sands	EGOP	51.71667	-4.36667
38800	6296617	Shawbury	EGOS	52.79817	-2.66804
38801	6296618	Valley	EGOV	53.2481	-4.53534
38802	6296619	Woodvale	EGOW	53.58167	-3.05556
38803	6296620	West Freugh	EGOY	54.85	-4.95
38804	6296621	Kirkwall Airport	EGPA,KOI	58.95778	-2.905
38805	6296622	Sumburgh Cape	EGPB,LSI	59.87889	-1.29556
38806	6296623	Wick	EGPC,WIC	58.45889	-3.09306
38807	6296624	Aberdeen / Dyce	ABZ,EGPD	57.20194	-2.19778
38808	6296625	Inverness / Dalcross	EGPE,INV	57.5425	-4.0475
38809	6296626	Glasgow Airport	EGPF,GLA	55.87194	-4.43306
38810	6296627	Edinburgh Airport	EDI,EGPH	55.95	-3.3725
38811	6296628	Islay	EGPI,ILY	55.68194	-6.25667

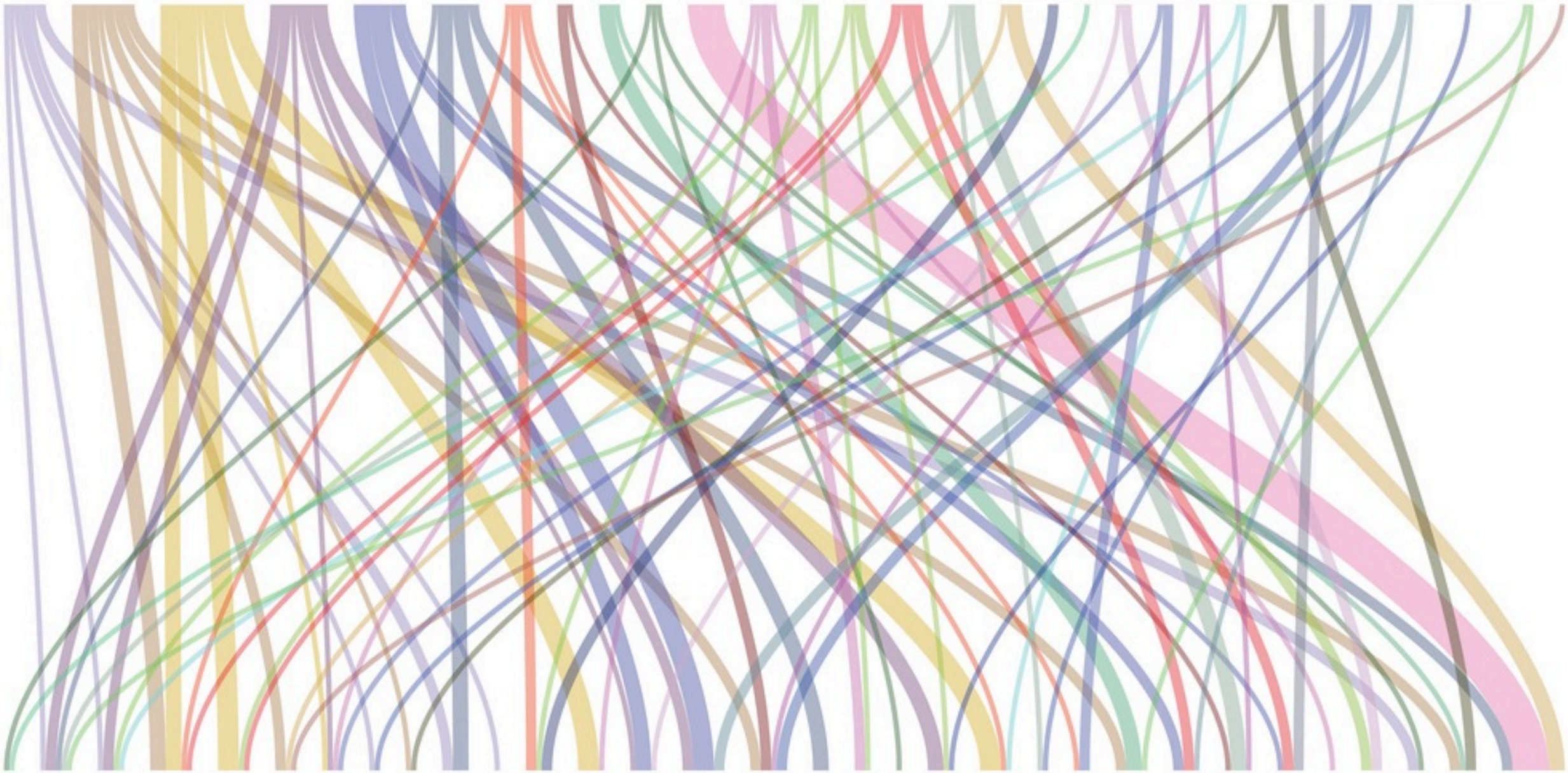


https://github.com/briansuda/Deterministic-Design/

World Cup 2010

Goals Scored

Spain	Netherlands	Germany	Uruguay	Argentina	Brazil	Ghana	Paraguay	Japan	Chile	Portugal	USA	England	Mexico	S.Korea	Slovakia	Ivory Coast	Slovinia	Swiss	S.Africa	Australia	N.Zealand	Serbia	Denmark	Greece	Italy	Nigeria	Algeria	France	HON	CMR	N.Korea
8	12	16	11	10	9	5	3	4	3	7	5	3	4	6	5	4	2	1	3	3	2	2	3	2	4	3	0	1	0	2	1



Spain	Netherlands	Germany	Uruguay	Argentina	Brazil	Ghana	Paraguay	Japan	Chile	Portugal	USA	England	Mexico	S.Korea	Slovakia	Ivory Coast	Slovinia	Swiss	S.Africa	Australia	N.Zealand	Serbia	Denmark	Greece	Italy	Nigeria	Algeria	France	Honduras	Cameroon	N.Korea
2	6	5	8	6	4	4	2	2	5	1	5	5	5	8	7	3	3	1	5	6	2	3	6	5	5	5	1	4	3	5	12

Out in semi-finals

Out in quarter-finals

Out in round of 16

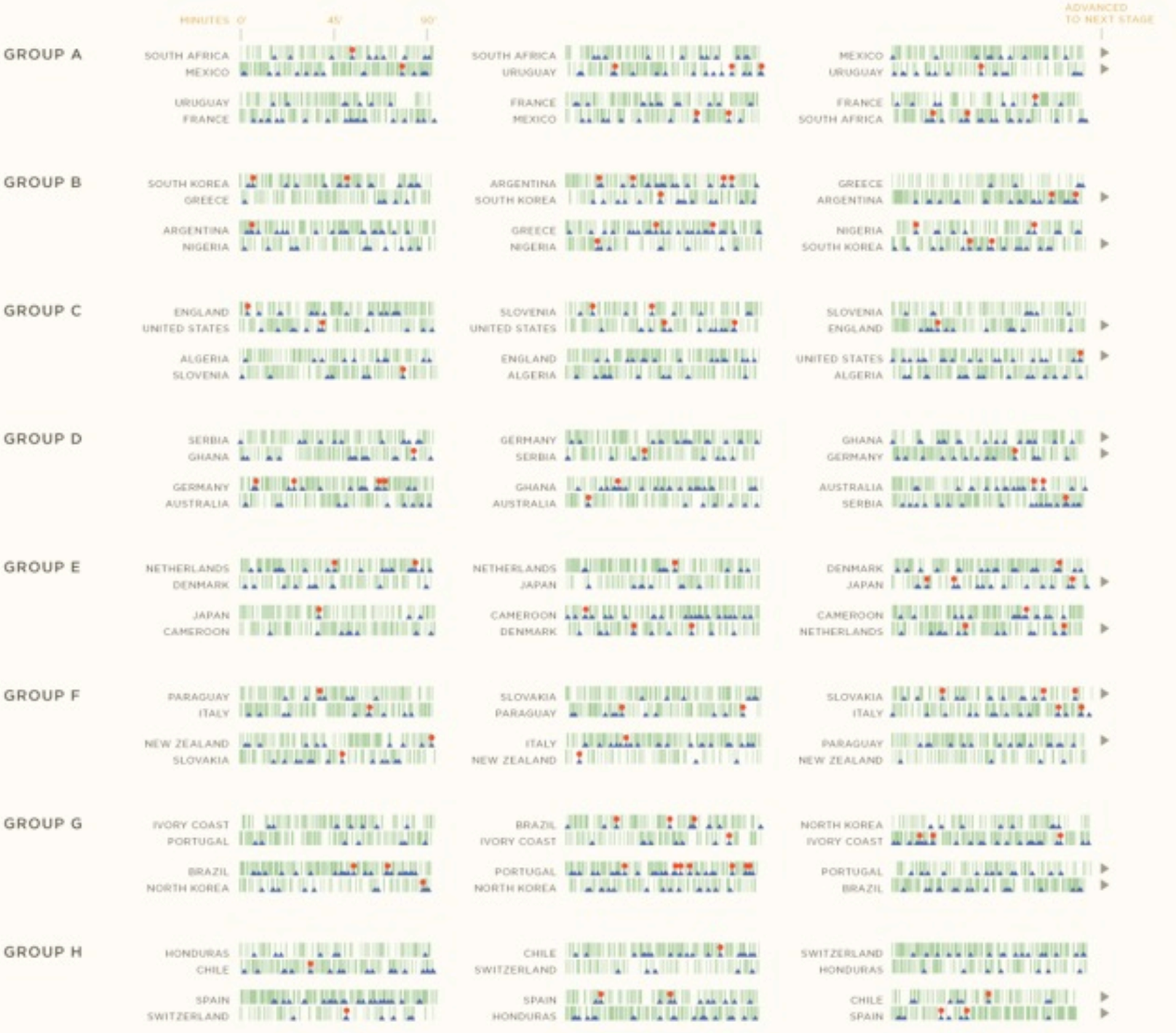
Out in group stage

Goals Conceded

SOUTH AFRICA'S FOOTBALL WORLD CHAMPIONS OF 2010

COMPLETED PASS ▲ SHOT ● GOAL

GROUP STAGE



KNOCKOUT STAGE

NS OF 2010

COMPLETED PASS ▲ SHOT ● GOAL

ADVANCED TO NEXT STAGE

KNOCKOUT STAGE

ROUND OF 16

URUGUAY
SOUTH KOREA

OVERTIME

UNITED STATES
GHANA

NETHERLANDS
SLOVAKIA

BRAZIL
CHILE

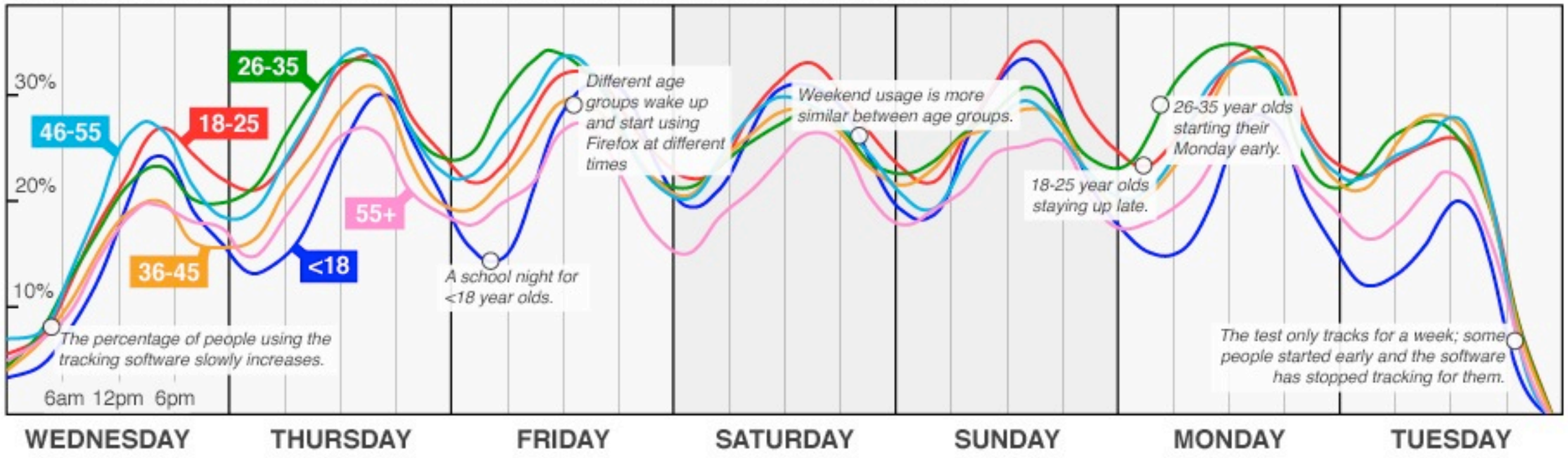
ARGENTINA
MEXICO

GERMANY
ENGLAND

SHOOTOUT

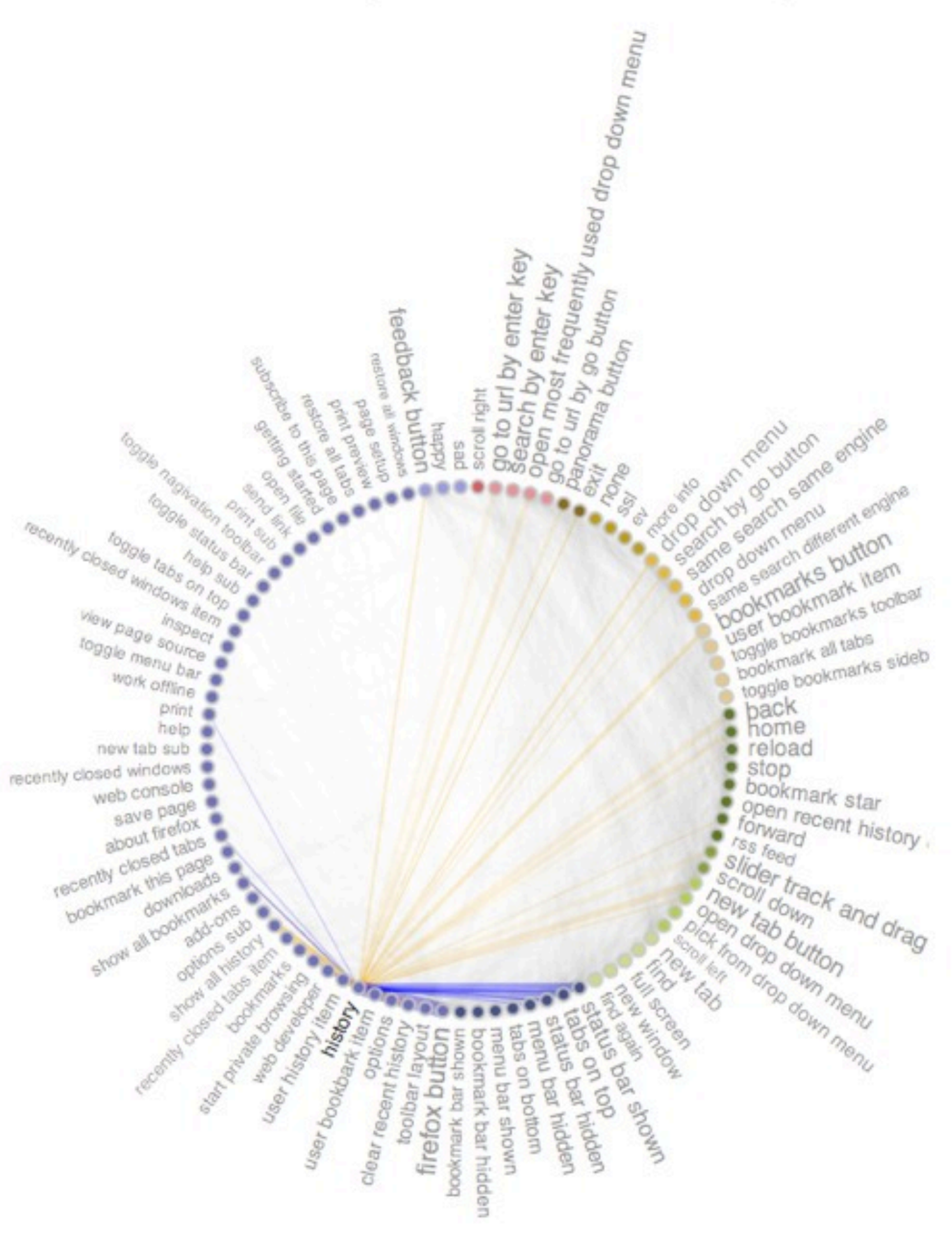
PARAGUAY
JAPAN

SPAIN
PORTUGAL



http://mozillalabs.com/testpilot/

A brief look at Firefox users



Firefox browser - event sequences

Click/hover event types.

Event font size represents its relative frequence.

Blue lines link this event to **preceding events**, orange lines to **following events** types.

Line width represents the **frequency of such event sequence**, whereas line opacity represents **sequence average rapidity**.

Only event sequences under 8secs were considered.

Submission to the Mozilla Open Data Analysis Competition (Fall 2010)

Visualization by B. Pointet, with Protovis.

Tell one story and only one story!

Thanks

@briansuda
http://suda.co.uk
http://optional.is
http://designingwithdata.com