

# New Perspectives on Communicating with Visualization

## From Design Inspiration to Performative Presentation

—

October 2021



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See and Understand Data...

**Data** | Analytics

Weather Data

**Dimensions**

- Date
- City
- Country
- Region
- Time
- Measure Names

**Measures**

- Hourly Temp
- Rainfall
- Windspeed
- Latitude (generated)
- Longitude (generated)
- Measure Values

**Marks**

Automatic

- Color
- Size
- Text
- Detail
- Tooltip

**Columns**

**Rows**

# Weather Trends

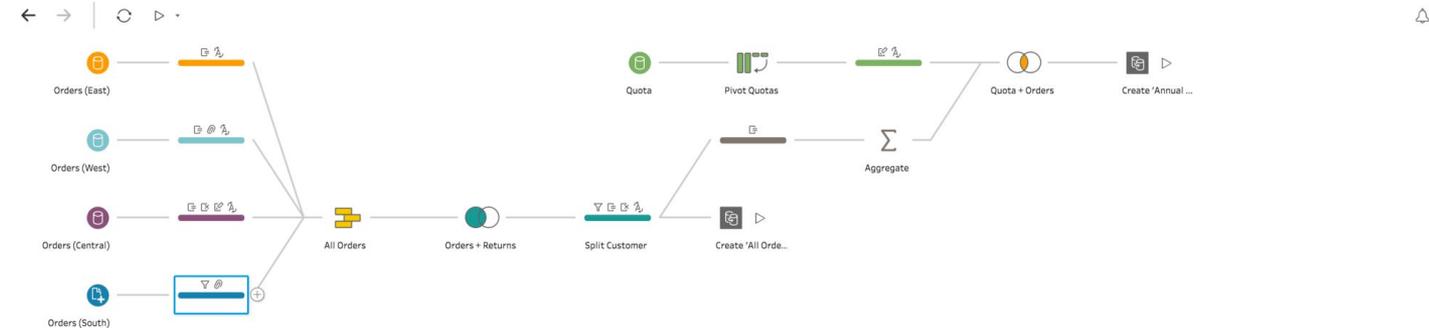
Drop field here

Drop field here

Drop field here

The image shows a data visualization software interface. On the left, there are three main sections: 'Data' with a 'Weather Data' source, 'Dimensions' with a list of fields like Date, City, Country, Region, Time, and Measure Names, and 'Measures' with a list of fields like Hourly Temp, Rainfall, Windspeed, Latitude (generated), Longitude (generated), and Measure Values. In the center, the 'Marks' card is set to 'Automatic' and includes options for Color, Size, Text, Detail, and Tooltip. On the right, the 'Columns' and 'Rows' shelves are empty. The main workspace is titled 'Weather Trends' and contains a large empty area with a grid and three 'Drop field here' prompts. A mouse cursor is visible at the bottom center of the interface.

# Tableau Prep



22 Fields 2K Rows | Keep Only | Exclude | Edit Value | Search

Changes (2)

- State 11: Alabama, Arkansas, Florida, Georgia, Kentucky, Louisiana, Mississippi, North Carolina, South Carolina, Tennessee, Virginia
- Row ID 2K: Horizontal bar chart showing row counts per state.
- Order ID 822: List of order IDs including CA-2015-100293, CA-2015-100706, CA-2015-100895, CA-2015-100916, CA-2015-101266, CA-2015-101560, CA-2015-101770, CA-2015-102274, CA-2015-102673, CA-2015-102988, CA-2015-103317, CA-2015-103366
- Segment 3: Consumer, Contractor, Corporate (highlighted)
- Corporate tooltip: Corporate, 510 rows, 510 (100%) highlighted
- Customer ID 512: AA-10375, AA-10480, AA-10645, AP-10060, F-10105, F-10165, F-10255, AB-10600, AC-10450, AF-10670, AF-10885, AG-10330
- Customer Name 512: Aaron Hawkins, Aaron Smayling, Adam Bellavance, Adam Hart, Adam Shillingsburg, Adrian Bartson, Adrian Hane, Alan Barnes, Alan Haines, Alan Hwang, Alan Schoenberger, Alan Shonely
- Ship Mode 4: First Class, Same Day, Second Class, Standard Class
- Order Date 604: 01/01/2015, 1..., 01/01/2019, 1...

Sales	Quantity	Profit	Discount	Region	State	Row ID	Order ID	Segment	Customer ID	Customer Name	Ship Mode	Order Date	Ship Date
18.648	7	-12.432	0.7	South	North Carolina	231	US-2015-156216	Corporate	EA-14035	Erin Ashbrook	Standard Class	09/13/2015, 12:00:00 AM	09/17/2015, 12:00:00 AM
178.384	2	22.298	0.2	South	Florida	315	CA-2015-167850	Corporate	AG-10525	Andy Gerbode	Standard Class	08/09/2015, 12:00:00 AM	08/16/2015, 12:00:00 AM
15.552	3	5.4432	0.2	South	Florida	316	CA-2015-167850	Corporate	AG-10525	Andy Gerbode	Standard Class	08/09/2015, 12:00:00 AM	08/16/2015, 12:00:00 AM
39.072	6	9.768	0.2	South	North Carolina	404	CA-2015-155208	Corporate	SP-20650	Stephanie Phelps	Standard Class	04/16/2015, 12:00:00 AM	04/20/2015, 12:00:00 AM
10.368	2	3.6288	0.2	South	North Carolina	705	CA-2015-138527	Corporate	BN-11470	Brad Norvell	Standard Class	09/12/2015, 12:00:00 AM	09/17/2015, 12:00:00 AM
166.84	5	18.7695	0.2	South	North Carolina	706	CA-2015-138527	Corporate	BN-11470	Brad Norvell	Standard Class	09/12/2015, 12:00:00 AM	09/17/2015, 12:00:00 AM
15.216	1	2.2824	0.2	South	North Carolina	707	CA-2015-138527	Corporate	BN-11470	Brad Norvell	Standard Class	09/12/2015, 12:00:00 AM	09/17/2015, 12:00:00 AM
11.36	2	5.3392	0	South	Louisiana	764	CA-2015-162775	Corporate	CS-12250	Chris Selesnick	Second Class	01/13/2015, 12:00:00 AM	01/15/2015, 12:00:00 AM

# Tableau Server

Explore / Campaigns and Retention

Search



Performance Indicat... ▾

Home

Explore

Favorites

Recents

Users

Groups

Schedules

Tasks

Site Status

Settings



## Campaigns and Retention



Owner [Emily Chen](#)

Create

Select All

Content type: Show all ▾

Sort by: Type ▾



Content Performance



Email Performance Overview



Google Analytics



Historic Trends



Performance by Week



Renewals by Region



# Tableau Online – Share and collaborate in the cloud

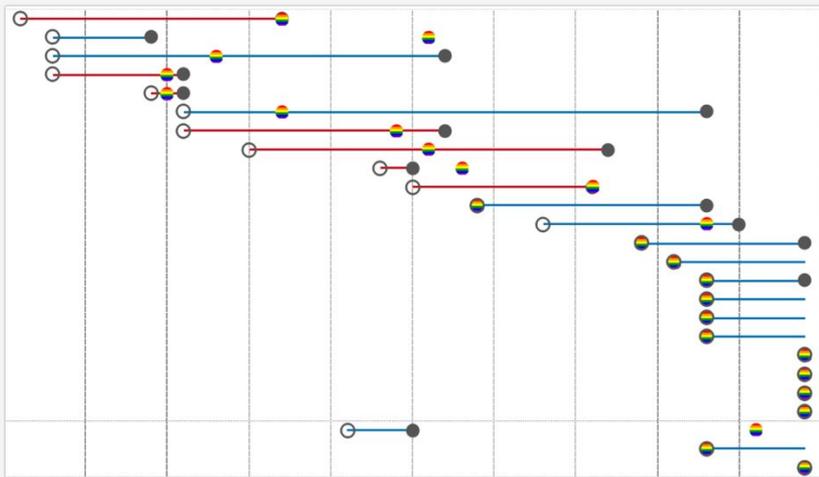


# Gallery / Greatest Hits

Stunning data visualization examples from across the web created with Tableau Public.

Viz of the Day

Featured



## LGBTQ+ Americans in Congress

23 known LGBTQ+ Americans have served in the United States Congress. Ten are active today (the highest number ever!) including eight members of the House of Representatives and two Senators. Learn more about these trailblazing politicians in this visualization by Bo McCready.

June 18, 2019



research.tableau.com



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SARAH BATTERSBY



SENIOR RESEARCH STAFF  
MATTHEW BREHMER



SENIOR RESEARCH STAFF  
MICHAEL CORRELL



SENIOR RESEARCH STAFF  
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ARJUN SRINIVASAN



DIRECTOR, TABLEAU RESEARCH  
MAUREEN STONE



SENIOR RESEARCH SCIENTIST  
DANIEL TING

See and Understand Data...

See and Understand Data...  
...from someone else's point of view

Communicating with and Collaborating around data

## Recent Areas of Interest

1. Expressive visualization design for communication
2. Preparing for and delivering presentations involving visualization

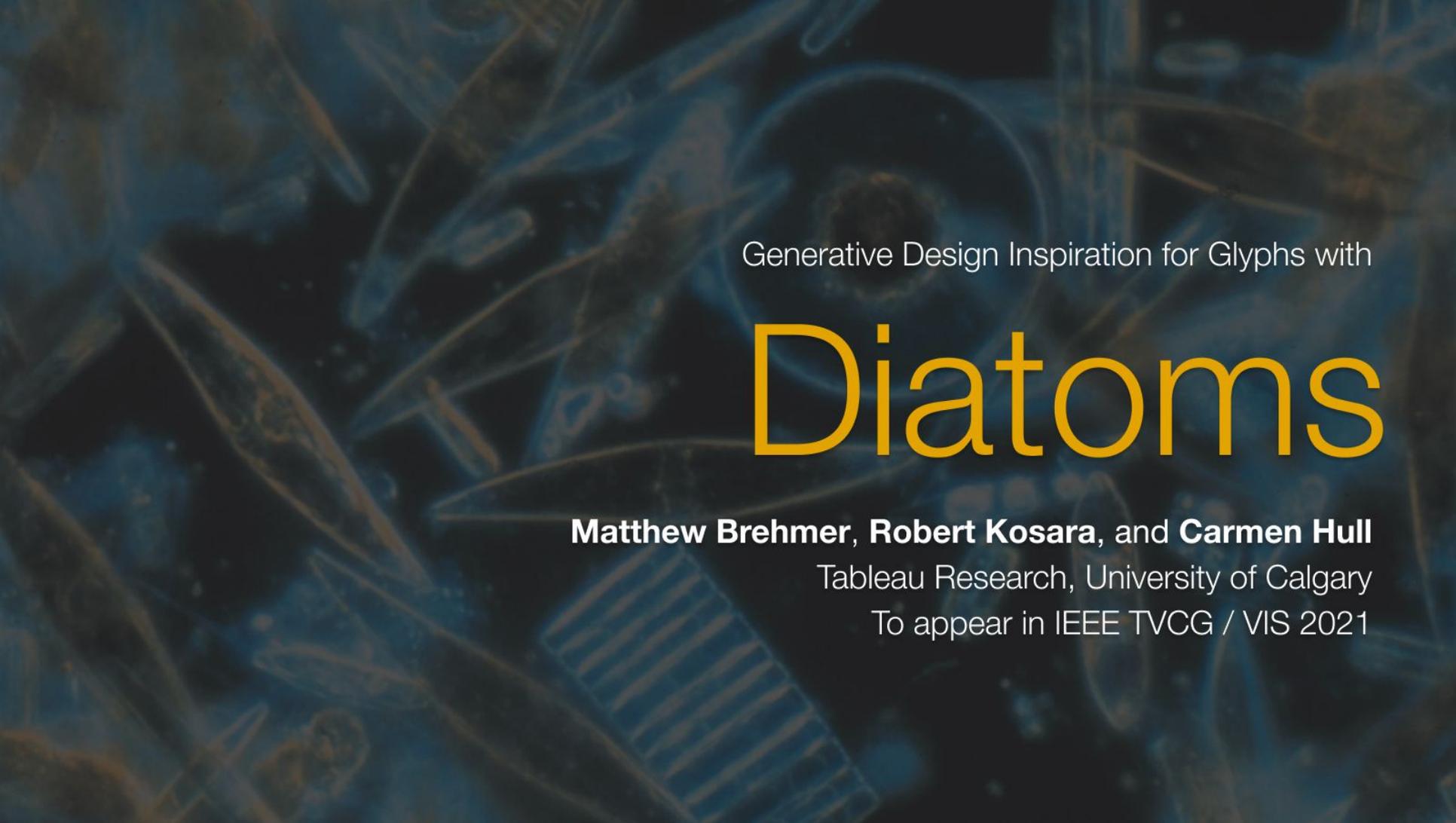
# Recent Areas of Interest

## 1. Expressive visualization design for communication

- **IEEE VIS 2021**: *Generative Design Inspiration for Glyphs with Diatoms*

## 2. Preparing for and delivering presentations involving visualization

- **IEEE VIS 2021**: *From Jam Session to Recital: Synchronous Communication and Collaboration Around Data in Organizations*
- **Information+ 2021**: *The Information in Our Hands*

The background of the slide is a dark blue, textured image featuring various diatoms. These are microscopic, elongated, and often spindle-shaped organisms with intricate, geometric patterns on their surfaces, such as hexagonal and rectangular grids. The diatoms are scattered across the frame, creating a complex, organic pattern.

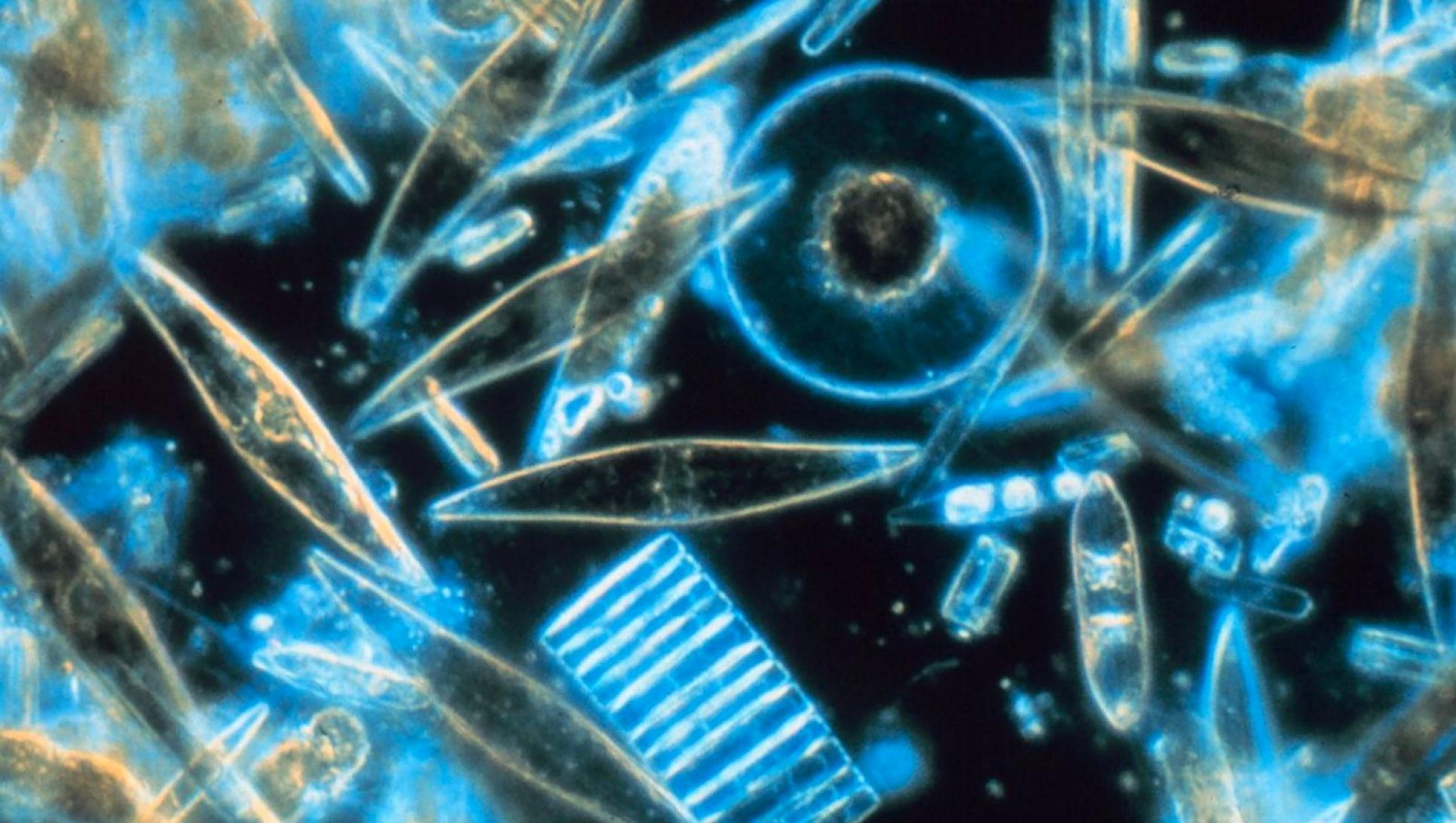
Generative Design Inspiration for Glyphs with

# Diatoms

**Matthew Brehmer, Robert Kosara, and Carmen Hull**

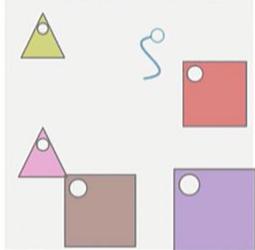
Tableau Research, University of Calgary

To appear in IEEE TVCG / VIS 2021

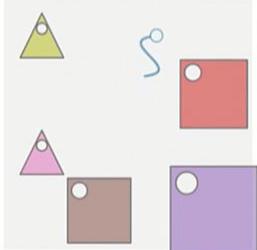




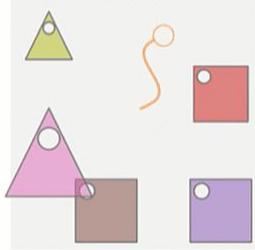
American Beauty



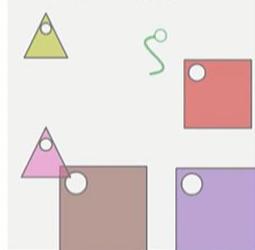
American History X



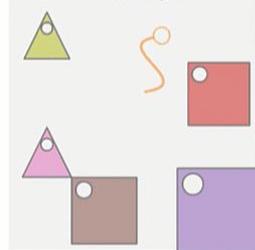
Avatar



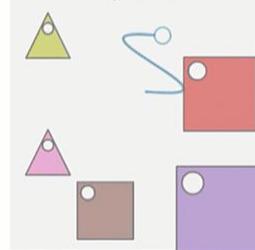
Back to the Future



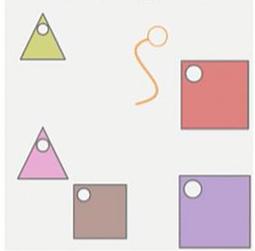
Batman Begins



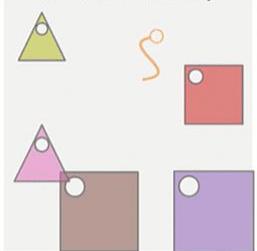
Fight Club



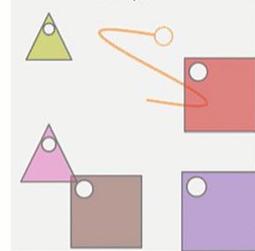
Gladiator



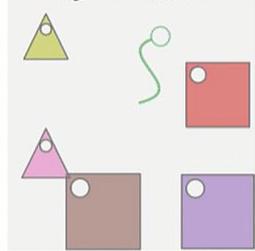
Guardians of the Galaxy



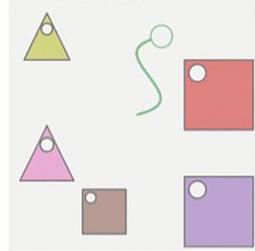
Inception



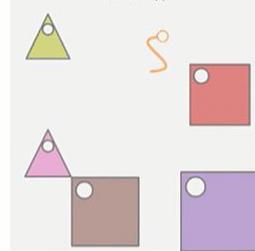
Inglourious Basterds



Interstellar



Kill Bill (I)



Glyphs

Glyphs: *“a small visual object that depicts attributes of a data record.”*

– Borgo et al (2013)

Glyphs: *“a small visual object that depicts attributes of a data record.”*

– Borgo et al (2013)

*“single data points are encoded individually by assigning their dimensions to one or more marks and their visual variables.”*

– Fuchs et al (2016)

# Gender & ethnic disparities in Tech companies

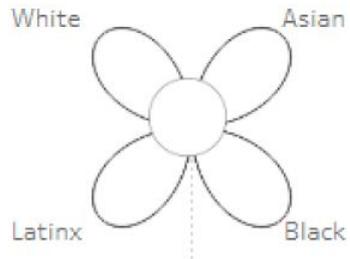


**Dear Tech People** is dedicated to unearthing the data behind diversity in tech, starting with a race/gender ranking of 100 top tech companies.

//Select a company on the bar chart to see its flower.  
 //Click on the center of a flower to look it closer.

## HOW TO READ IT

A leaf of a flower means an ethnicity.



Total #of employees

Size means the #of employees in the specific ethnicity.



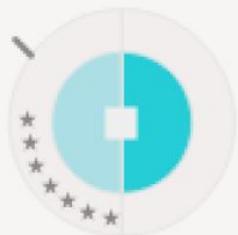
@IvettAlexa + @korompaiistvan on Tableau Public



JUVENTUS  
96



BORUSSIA DORTMUND  
97



REAL MADRID  
98



MANCHESTER UNITED  
99



REAL MADRID  
00



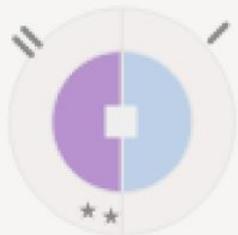
BAYERN  
01



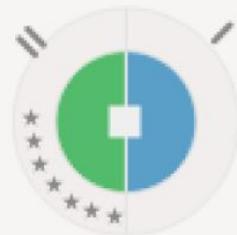
PORTO  
04



LIVERPOOL  
05



BARCELONA  
06



MILAN  
07



MANCHESTER UNITED  
08



BARCE  
09



CHELSEA  
12



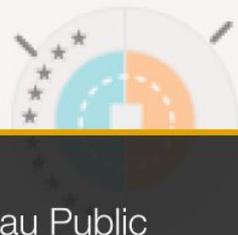
BAYERN MUNICH  
13



REAL MADRID  
14



BARCELONA  
15



REAL MADRID  
16



REAL M  
17

@\_CJMayes on Tableau Public

# 140 YEARS OF MICHIGAN FOOTBALL

This graphic, inspired by Giorgia Lupi's data portraits, shows 140 years of Michigan Football, with each circle representing a season and graphical elements within that circle describing that season's results.

## HOW TO READ

SHADING AT TOP LEFT INDICATES CONFERENCE

PALE YELLOW = INDEPENDENT;  
TAN = WESTERN;  
YELLOW = BIG TEN

A FILLED BLACK STAR UP HERE IS A NATIONAL CHAMPIONSHIP

AN OUTLINED BLUE STAR IS A CONFERENCE CHAMPIONSHIP



Year  
1997

DOTS ON THE LEFT ARE WINS

DOTS ON THE RIGHT ARE LOSSES

BLUE SHADING REPRESENTS A TOP 25 RANKING AT THE END OF THE YEAR

AN ARC ON THE LEFT IS A BOWL WIN

AN ARC ON THE RIGHT IS A BOWL LOSS

\* BEAT OHIO STATE

S BEAT MICHIGAN STATE



@boknowsdata on Tableau Public

Take my breath away

Cities around the world are **ailing** to meet the World Health Organisation (WHO) guidelines for **air particulate** - tiny material in the air that can be harmful if breathed in.

Context

In 1800 years, we amassed a World population of 1 bn people - fast forward 200 years and we are now at near 8 bn.

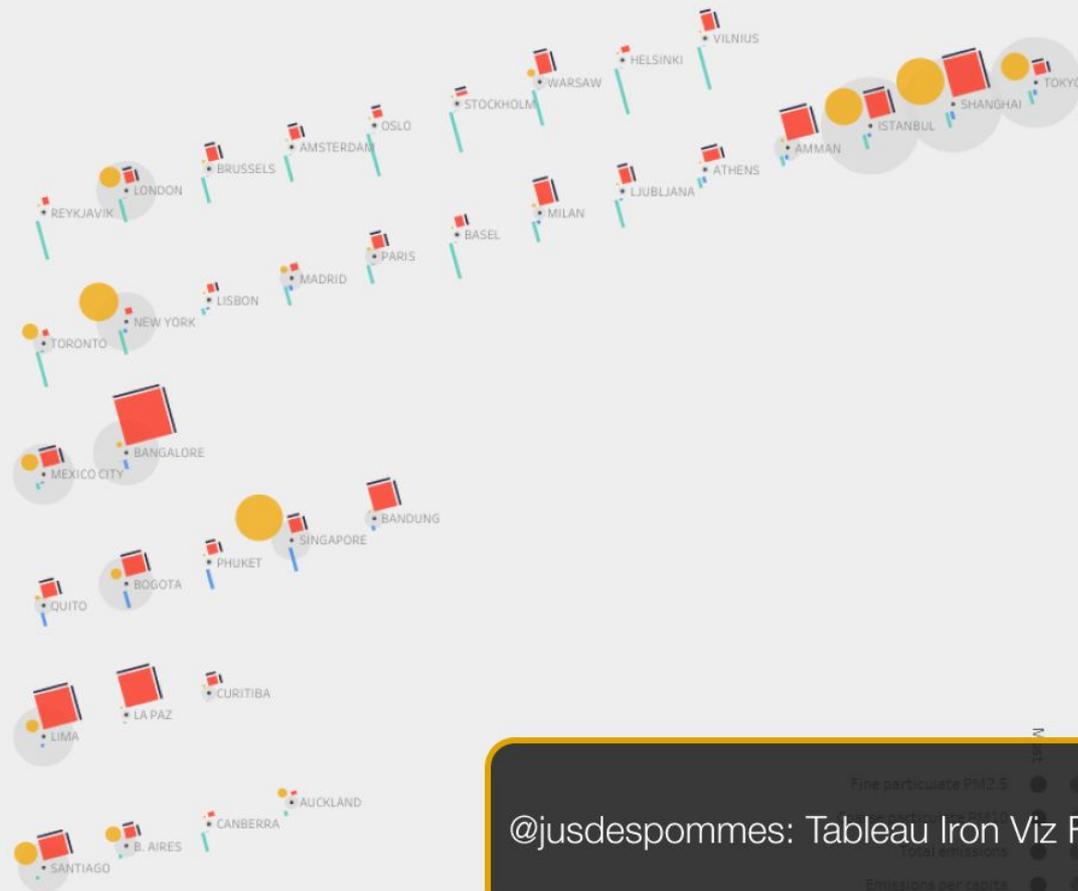
Common-sense dictates that more people means more consumption of energy and the raw materials needed to produce it - this consumption has byproducts.

These byproducts are now causing unprecedented air pollution from emissions that affect our planet and air particulate that affects our health.

How to read chart



latitude buckets of 20°



@jusdespommes: Tableau Iron Viz Finalist 2020

Emissions per capita  
 Population  
 Total energy need



@moritz\_stefaner for the OECD Better Life Index

# Brain drain

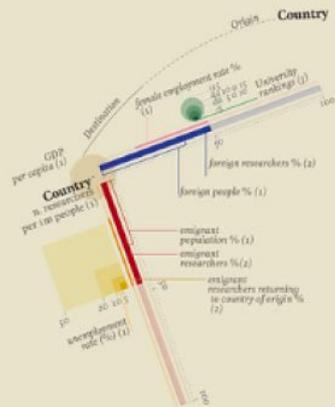
The phenomena of so-called «brain drain» is explored through a map showing incoming and outgoing flows of researchers in 16 countries.

Using a series of parameters, the map is an attempt to discover the motivations that move researchers from one country to another.

Each country is visualized through the representation of GDP per capita, female employment rate, overall unemployment rate, university rankings, percentage of foreign researchers, percentage of overall foreign population, percentage of emigrant researchers, percentage of overall emigrant population, percentage of researchers returning to their country of origin, and the main countries researchers come from and move to.

## How to read it?

The countries are positioned according to:  
 % of GDP invested in R&D (x axis)  
 + n. of researchers per 1m people (y axis)  
 The analysis is based on the following data



y axis: n. of researchers per 1m people (1)

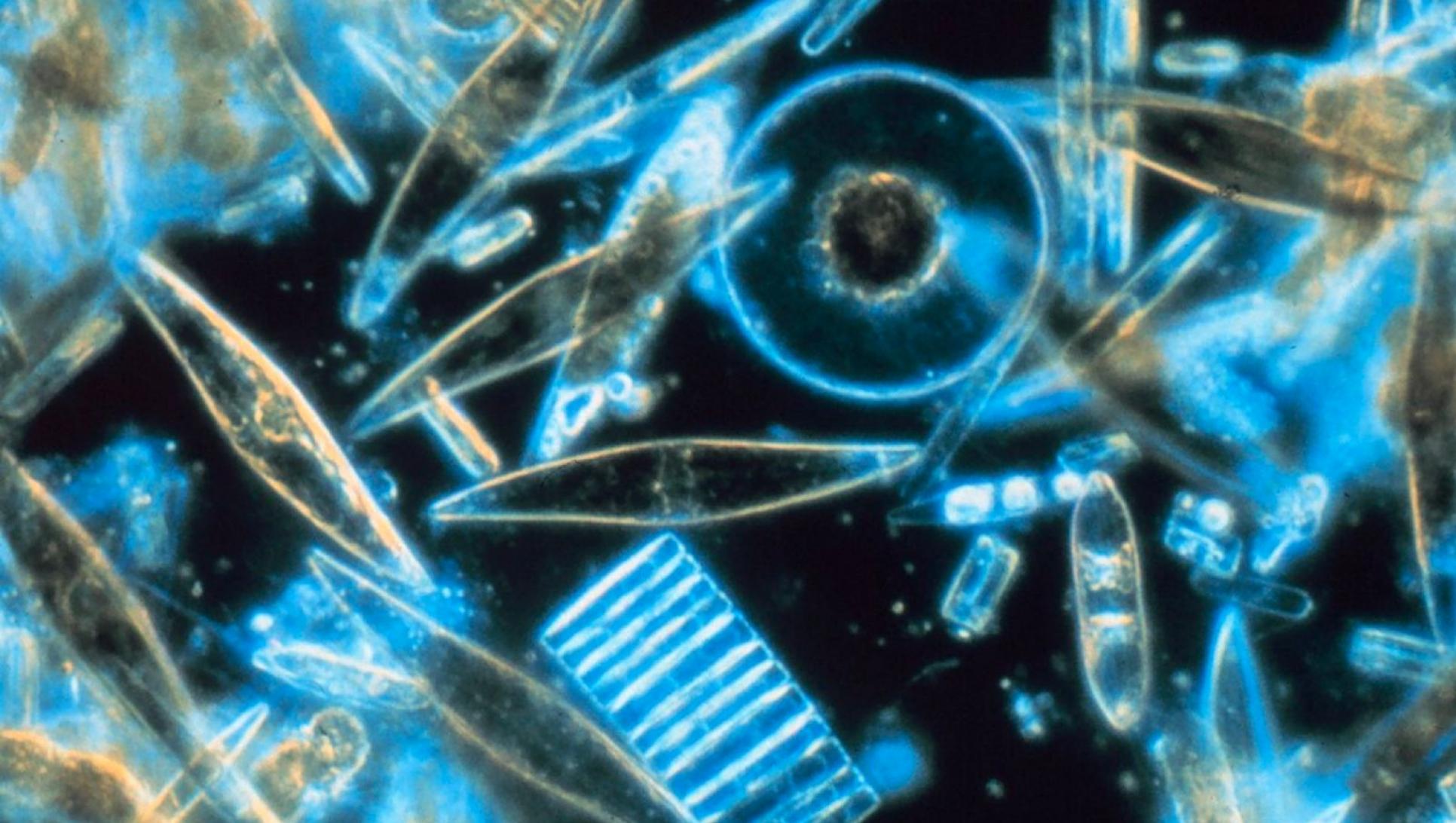


@accuratstudio for La Lettura

Glyph    Glyph  
Design    Authoring

# Glyph Design

Inspiration from existing designs,  
visual metaphors, figurative associations,  
Gestalt groupings, perceptual clarity,  
symmetry, visual hierarchy, ...



New York City, NY



New York City, NY



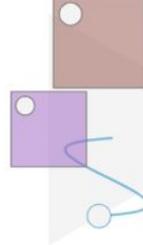
New York City, NY



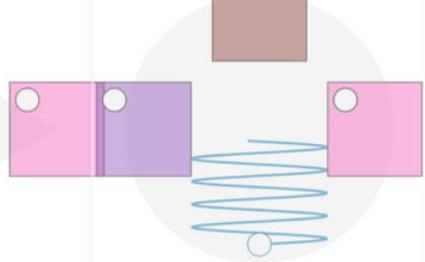
New York City, NY



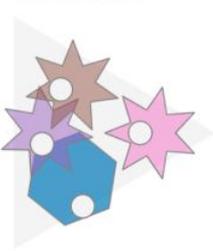
New York City, NY



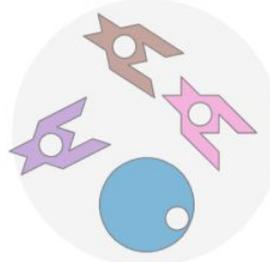
New York City, NY



New York City, NY



New York City, NY



New York City, NY



Diatoms

Design Inspiration +

Design Externalization

# Generative Design

Repetition, Randomness, and Logic:

*“...traditional craftsmanship recedes into the background, and abstraction and information become the new principal elements.”*

– Groß et al (2018)

Glyph  
Scaffold  
Palette



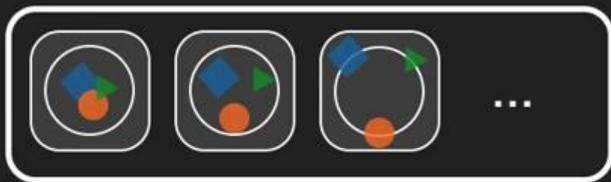
Encoding  
Channel  
Palette



Mark  
Shape  
Palette



## Scaffold Gravity



Scaffold



Channel Assignment



Mark Assignment



Conjunction



Repeat

### Column Set #1

### Column Set #2

Place	Region	Area	Population	Bike Score	Transit Sc.	Walk Score
Boston	Northeast	232	672,840	70	73	81
Chicago	Midwest	607	2,704,965	70	65	78
...	...	...	...	...	...	...

# Small Multiples Design B

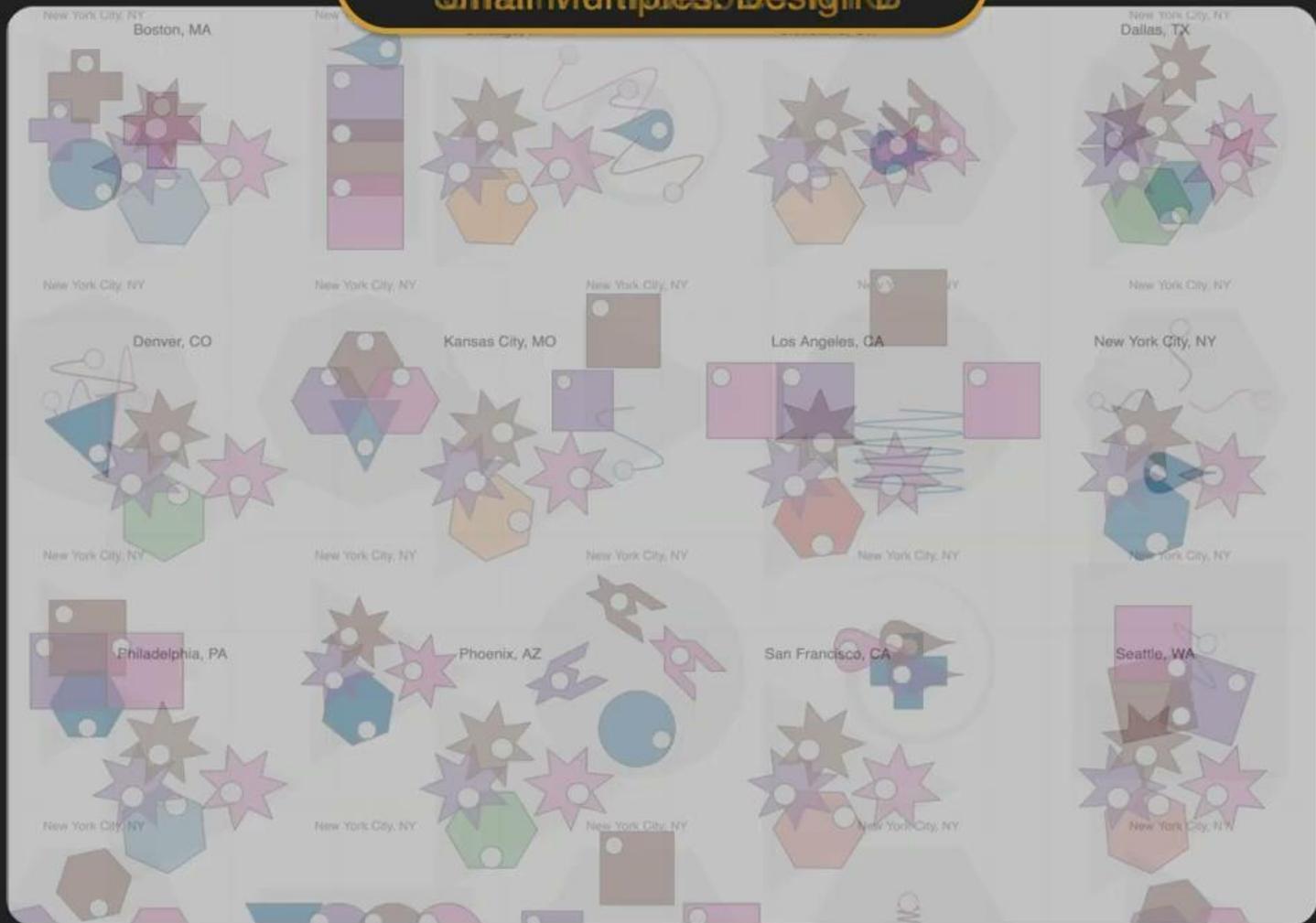
Mark Shapes



Encoding Channels



Glyph Scaffolds



# Diatoms in Tableau

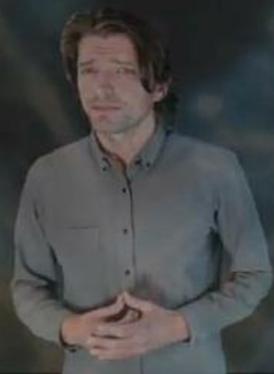
Generative Design Inspiration for Glyphs with

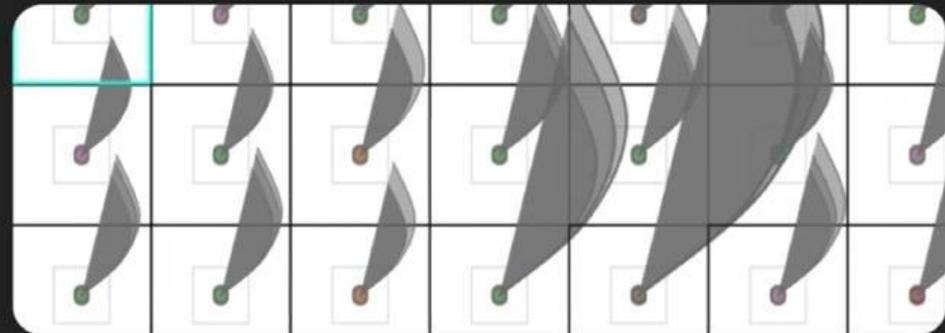
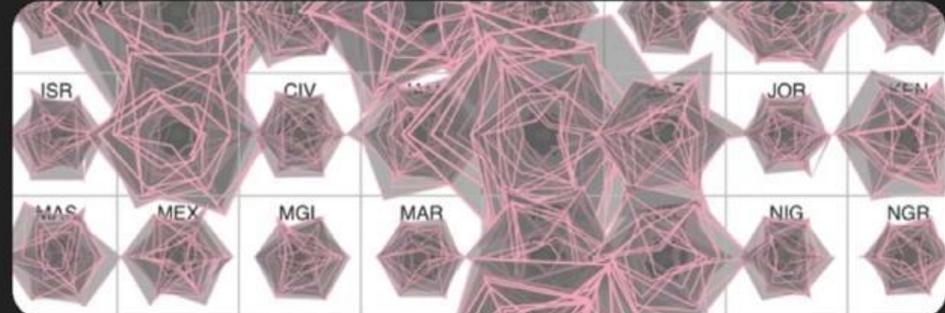
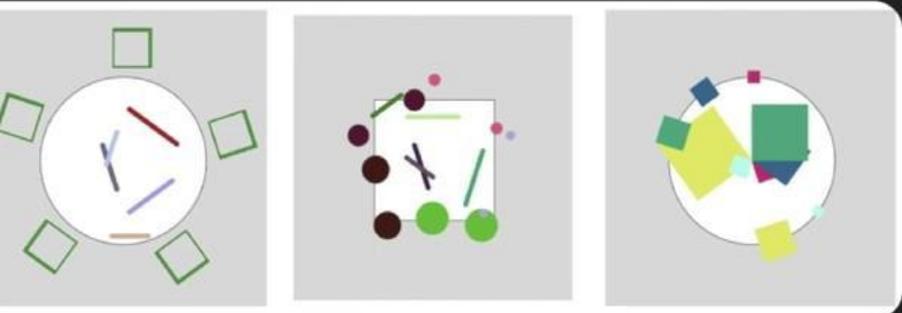
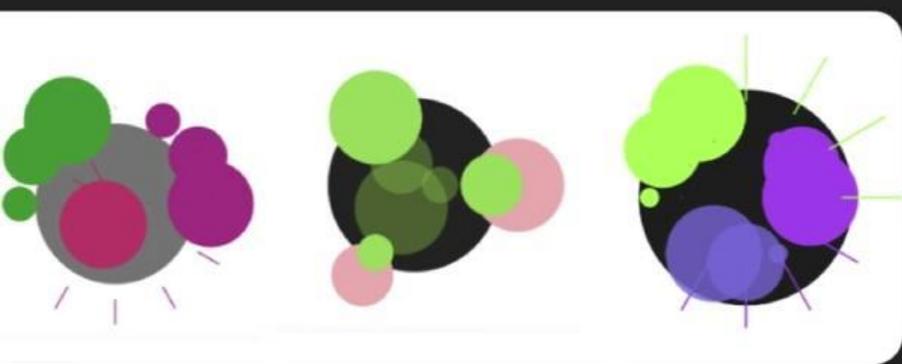
# Diatoms

**Matthew Brehmer, Robert Kosara, and Carmen Hull**

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The background is a dark blue field filled with various geometric shapes and lines in a lighter blue and yellowish-gold color. These shapes include circles, rectangles, triangles, and lines, some of which are arranged in patterns that suggest architectural or design elements. The overall effect is a complex, layered composition of abstract forms.

# Interviews with Designers

- 12 Participants (7F, 5M)
  - 7 Information design students
  - 5 Professional designers
- Interview + chauffeured demos
- Follow-up with students after glyph design assignment

Comparing and winnowing glyph designs

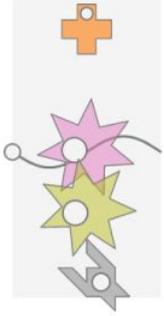
Observations on mark and channel sampling

Scaffold refinement + hierarchical scaffolds

Semantic and figurative associations

# P2's Glyph Designs

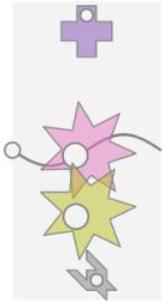
Australia



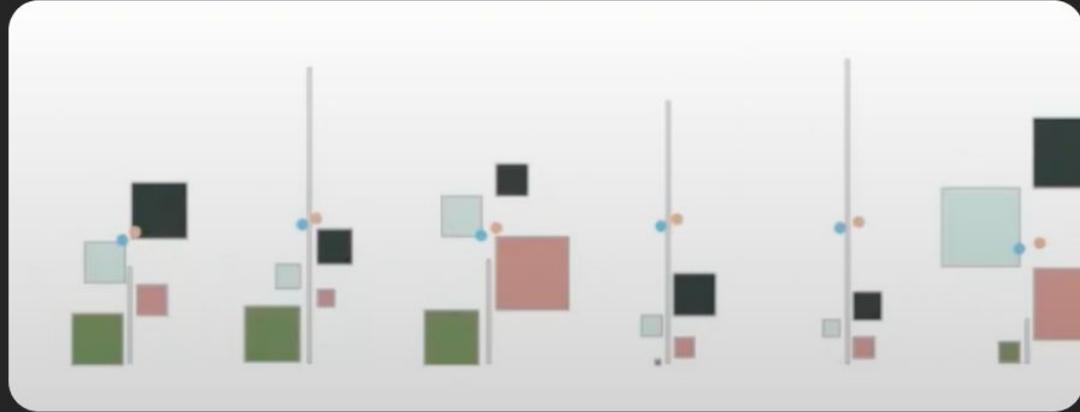
Brazil



United Kingdom

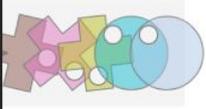


Indonesia



# P3's Glyph Design

WALL-E



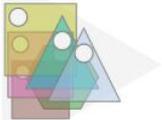
WALL-E



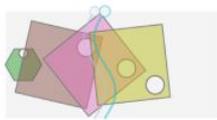
WALL-E



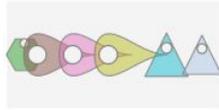
WALL-E



WALL-E



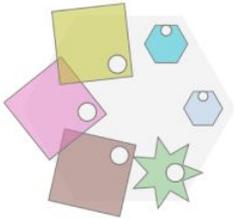
WALL-E



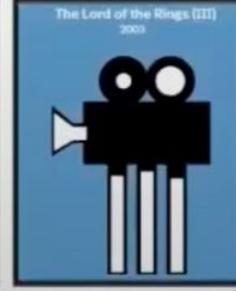
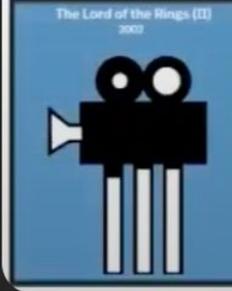
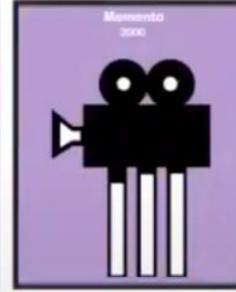
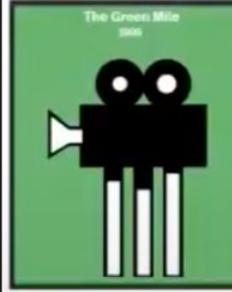
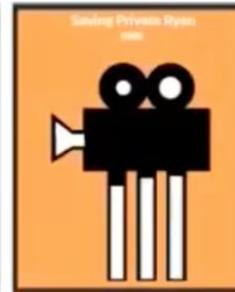
WALL-E



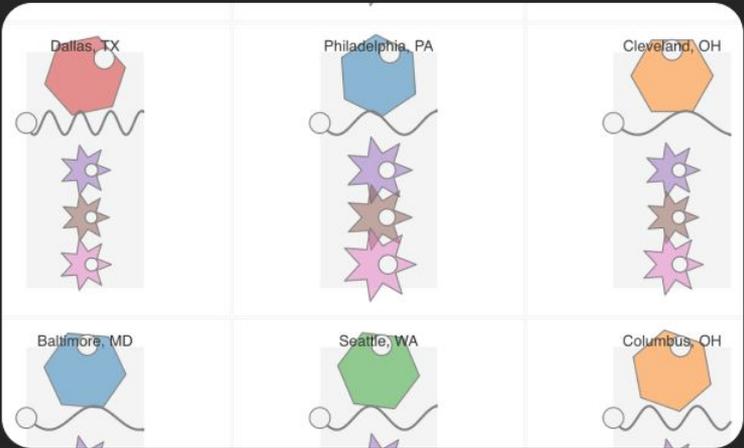
WALL-E



WALL-E



# P5's Glyph Design



The background of the slide is a dark blue, semi-transparent image showing a dense collection of diatoms. These microscopic organisms exhibit a wide variety of shapes, including elongated, needle-like forms, circular structures with intricate internal patterns, and rectangular cells with distinct longitudinal striations. The overall appearance is that of a complex, natural micro-structure.

# Opportunities with Diatoms

Curation: tweaking and breeding designs

Curation: tweaking and breeding designs

Bring-your-own palettes

Curation: tweaking and breeding designs

Bring-your-own palettes

Visualization authoring tool integration

Curation: tweaking and breeding designs

Bring-your-own palettes

Visualization authoring tool integration

Pedagogical use? Divergent thinking exercise

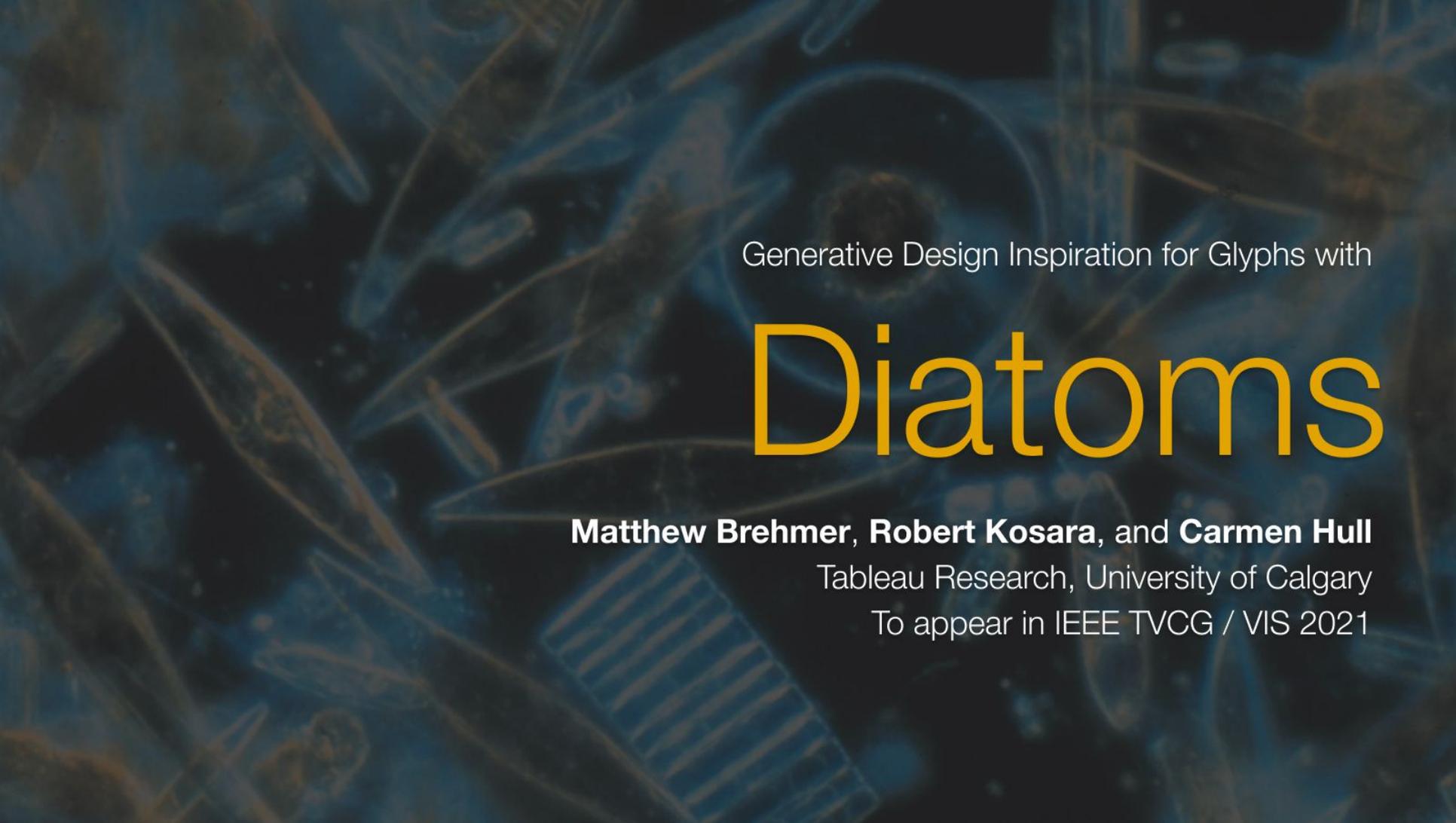
Curation: tweaking and breeding designs

Bring-your-own palettes

Visualization authoring tool integration

Pedagogical use? Divergent thinking exercise

Analytical use? A visual calibration exercise

The background of the slide is a dark blue, textured image featuring various diatoms. These are microscopic, elongated, and often spindle-shaped organisms with intricate, geometric patterns on their surfaces, such as parallel lines and circular structures. The lighting is soft, highlighting the fine details of the diatom shells.

Generative Design Inspiration for Glyphs with

# Diatoms

**Matthew Brehmer, Robert Kosara, and Carmen Hull**

Tableau Research, University of Calgary

To appear in IEEE TVCG / VIS 2021

## Recent Areas of Interest

### 1. Expressive visualization design for communication

- **IEEE VIS 2021**: *Generative Design Inspiration for Glyphs with Diatoms*

### 2. Preparing for and delivering presentations involving visualization

- **IEEE VIS 2021**: *From Jam Session to Recital: Synchronous Communication and Collaboration Around Data in Organizations*
- **Information+ 2021**: *The Information in Our Hands*

A close-up photograph of a projector in the foreground, casting a bright beam of light onto a screen in the background. The scene is dimly lit, with the projector's light illuminating the screen and creating a strong contrast. The projector has a textured, ribbed surface and a prominent lens. The screen shows a blurred image, possibly of a person or a scene, which is the focus of the presentation.

# From Jam Session to Recital

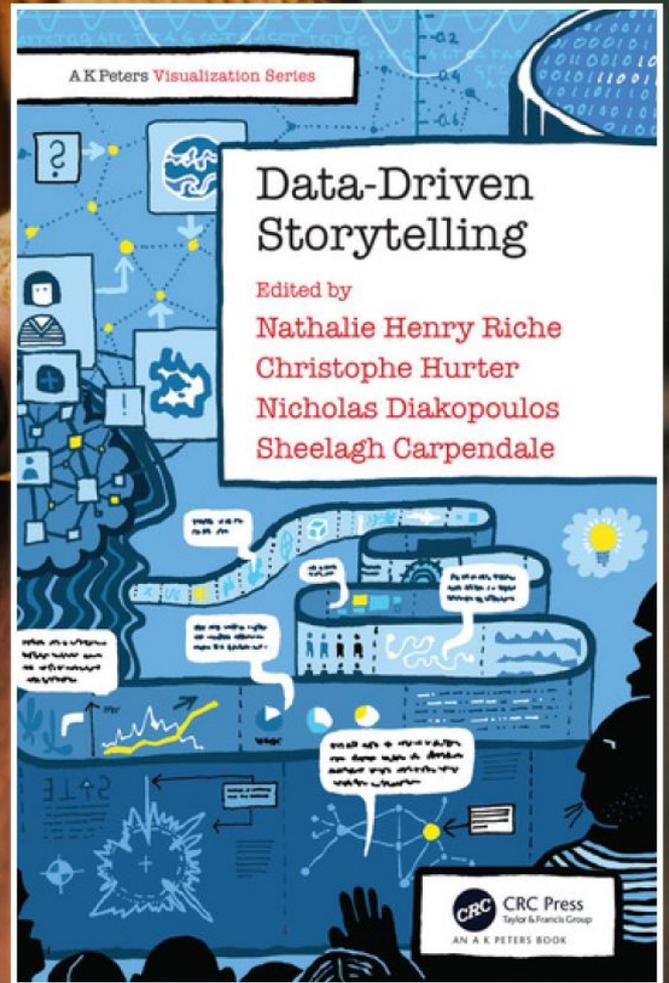
Synchronous Communication and Collaboration  
Around Data in Organizations

To appear in IEEE TVCG / VIS 2021

**Matt Brehmer, Robert Kosara**







Life expectancy at birth, total

60  
55  
50  
45  
40

# 1962



Start

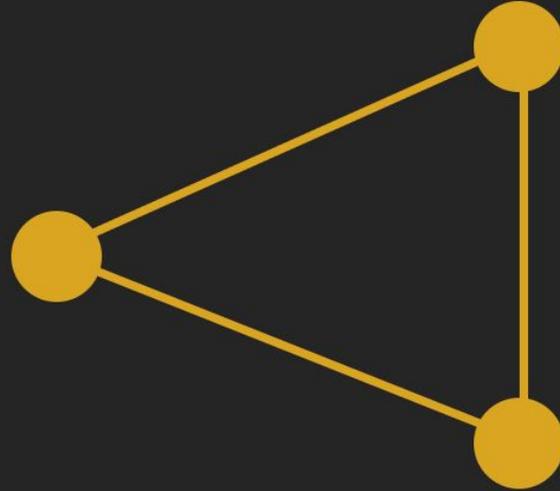
Navigation icons: back, forward, search, etc.

Population, 1962

0:00:00

# Data in Organizations

Narrative Vis



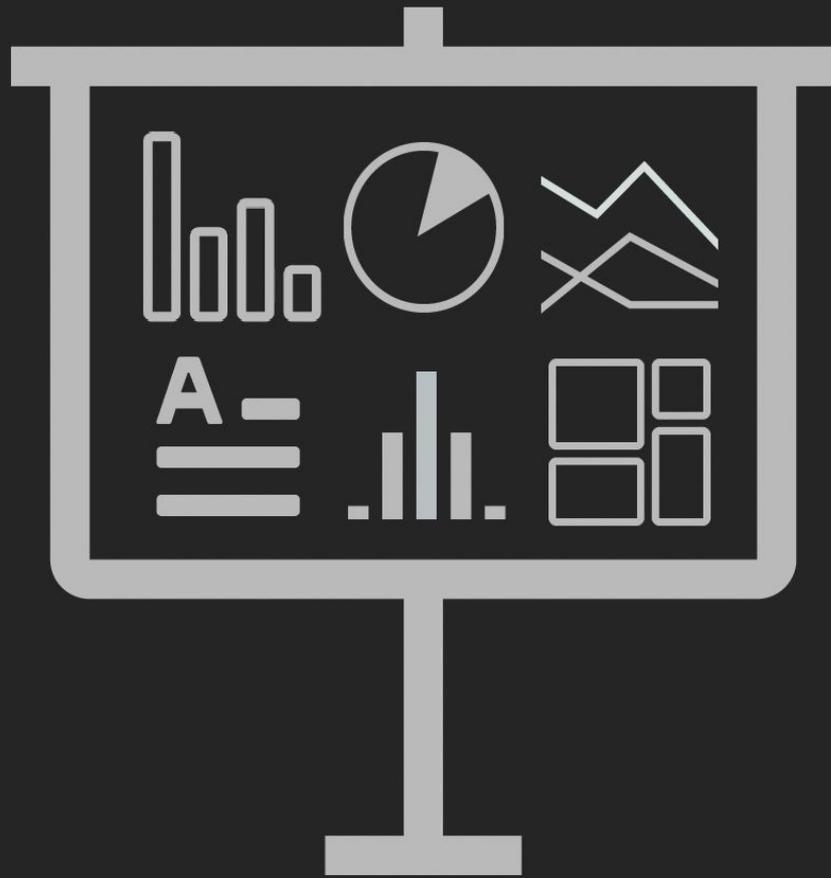
Collaborative Vis

# Interviews

Retrospectives + Design Probes

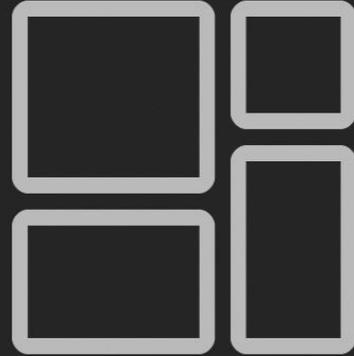
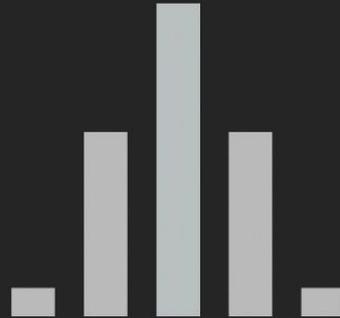
# Design Probes







A =



# Findings

# Scenarios





*“...showing them the doors,  
metaphorically speaking,  
the doors that are available that I  
found in the data, and then they  
would open them.”*

**– P4, retail consulting analyst**

...[presentation materials used to]  
*“prove our point with charts.”*

– P3, manufacturing association analyst

SOCIAL

Live

JAZZ

\*30

*“If you go to my engineering team, [...] they care about the meaning [...]; for the sales team, [...] you are just looking at quotas: have you met the goal or not?”*

– P13, data strategist



*“As soon as everyone’s tied off on the validity and the accuracy of the numbers, we screenshot what we have here and put that image directly into a slide.”*

– P05 + P06, sales analyst + communication specialist

*“I get this sense of failure every time I’m going into PowerPoint [...].”*

*“if it will take three hours to build a ten minute presentation, I ain’t gonna do it”.*

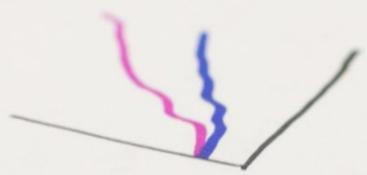
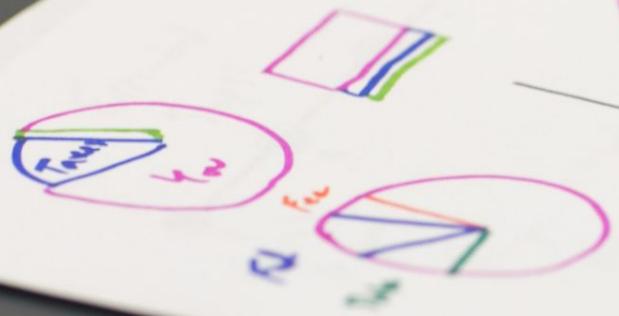
– P18, regional vice-president of sales

*“I want to break up an otherwise boring series of charts [...].”*

*“I hate bar charts [...].”*

*“sometimes you need to do it in different ways to keep the attention.”*

– P09, marketing manager



Fwd 1  
 Fwd 2  
 Fwd 3  
 0% 6000  
 0% 4356  
 7% 6000  
 2% 4356

Accessible presentation / attention mgmt.

Reveal for suspense and drama.

Flexibility and scope of reveals.

Tool-switching / material unrelated to data.

Presenter tools beyond filters and notes.

Presentations, not tool demonstrations.

No concern for changes behind the curtain.

Simple loop-based audience experience.

Timely yet unexpected presentation tools.

Analytical onboarding presentations.

Presenter tool templates.

Presentation authoring complexity.

Accessible presentation / attention mgmt.

Flexibility and scope of reveals.

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Presenter tool templates.

**Reveal for suspense and drama.**

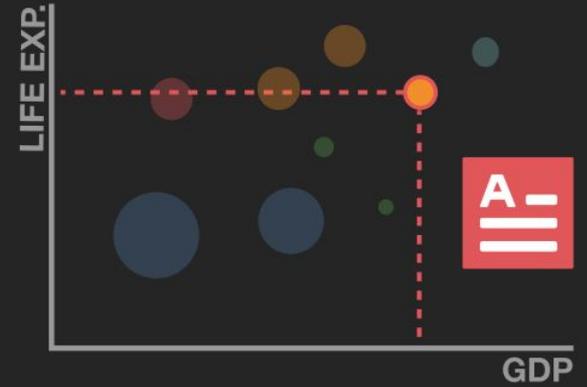
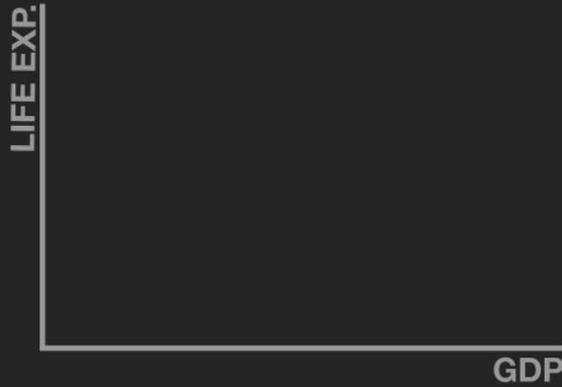
Tool-switching / material unrelated to data.

**Presentations, not tool demonstrations.**

Simple loop-based audience experience.

**Analytical onboarding presentations.**

Presentation authoring complexity.



*“when we’ve had a big week, having a big reveal speaks to that.”*

– P18, regional vice-president of sales



*“it really feels like a presentation  
versus a demo.”*

– P05, communications specialist



*“The useful idea would be to use this for for teaching people how to interact with the dashboard.”*

– P13, data strategist



- Synch. communication around data beyond slideware
  - Creativity support for presenting data

A close-up photograph of a projector in the foreground, casting a bright beam of light onto a screen in the background. The scene is dimly lit, with the projector's light illuminating the screen and creating a strong contrast. The projector has a textured, ribbed surface and a prominent lens. The screen shows a blurred image, possibly of a person or a scene, which is the focus of the light.

# From Jam Session to Recital

Synchronous Communication and Collaboration  
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**Matt Brehmer, Robert Kosara**

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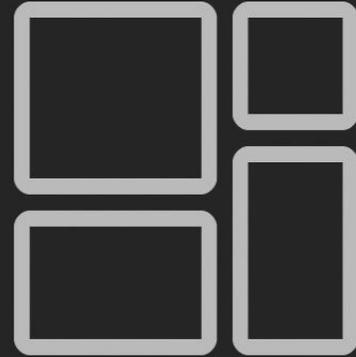
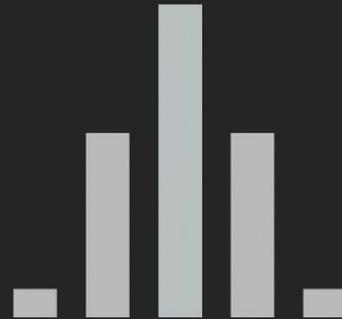
- **IEEE VIS 2021**: *From Jam Session to Recital: Synchronous Communication and Collaboration Around Data in Organizations*
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# The Information in Our Hands

Information+ 2021 - Matthew Brehmer

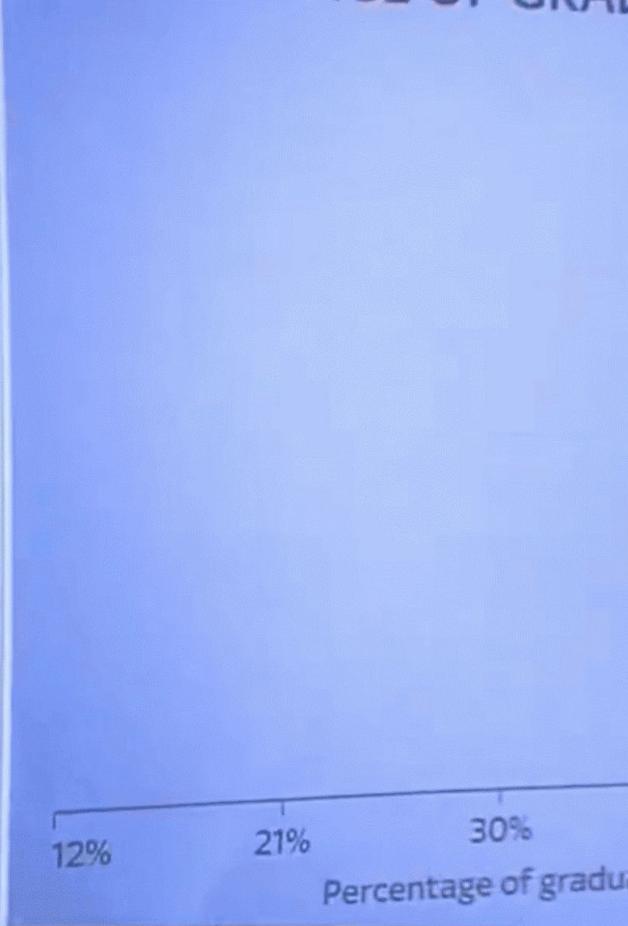
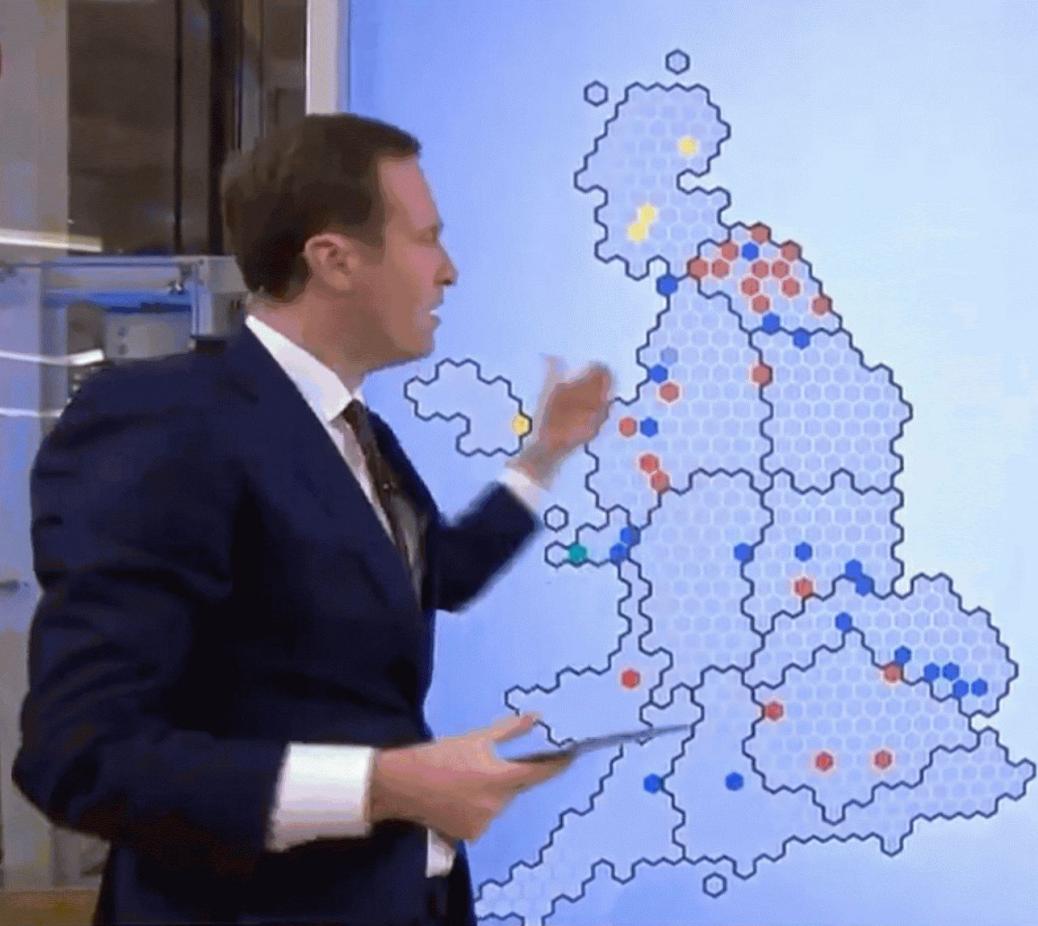


A =









EXIT POLL	ALLIANCE GAIN DOWN NORTH FROM IND	TARGET		326 TO WIN			
CONSERVATIVE WIN MAJORITY 86	CON HOLD HARLOW CON GAIN LEIGH FROM LAB	20	23	0	0	3	2
skynews.com	RITY OF 86 IN THE HOUSE OF COMMONS	+5	-7	0	0	+2	0

# TRAJECTORIES Confirmed

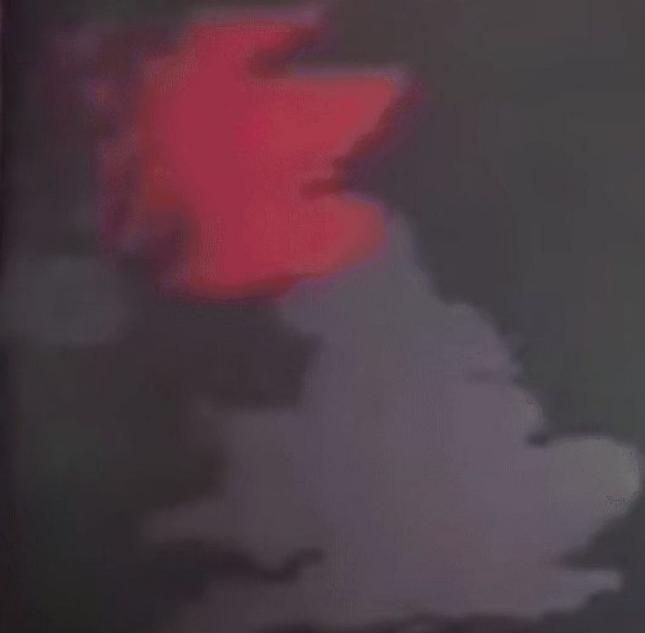


Data courtesy Johns Hopkins University

- HOME
- MAP
- GLOBAL TOTALS
- COUNTRIES
- TRAJECTORIES
- AUSTRALIAN TYPE
- AUSTRALIAN CASES
- AUSTRALIAN TOTALS
- MAIN POINTS
- EXTRA

# SWING BY REGION

Con-Lab



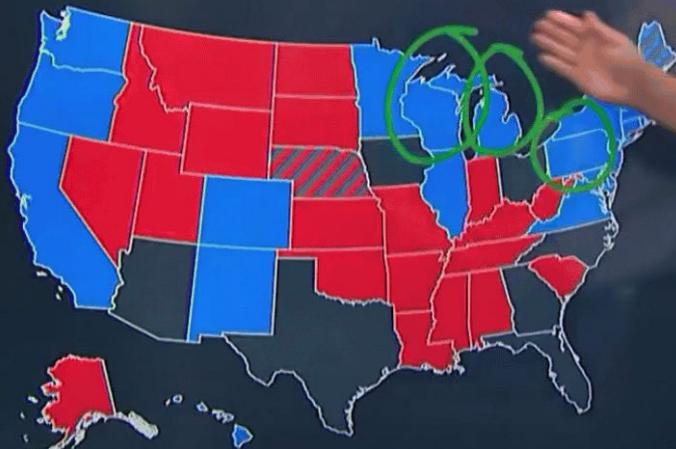
# ROAD TO 270 WHAT IF?



**BIDEN WIN**

**272**

**131**



CLEAR



MAP

CART

GAME

NBC

PATHS

2016

DATA

**BREAKING NEWS**

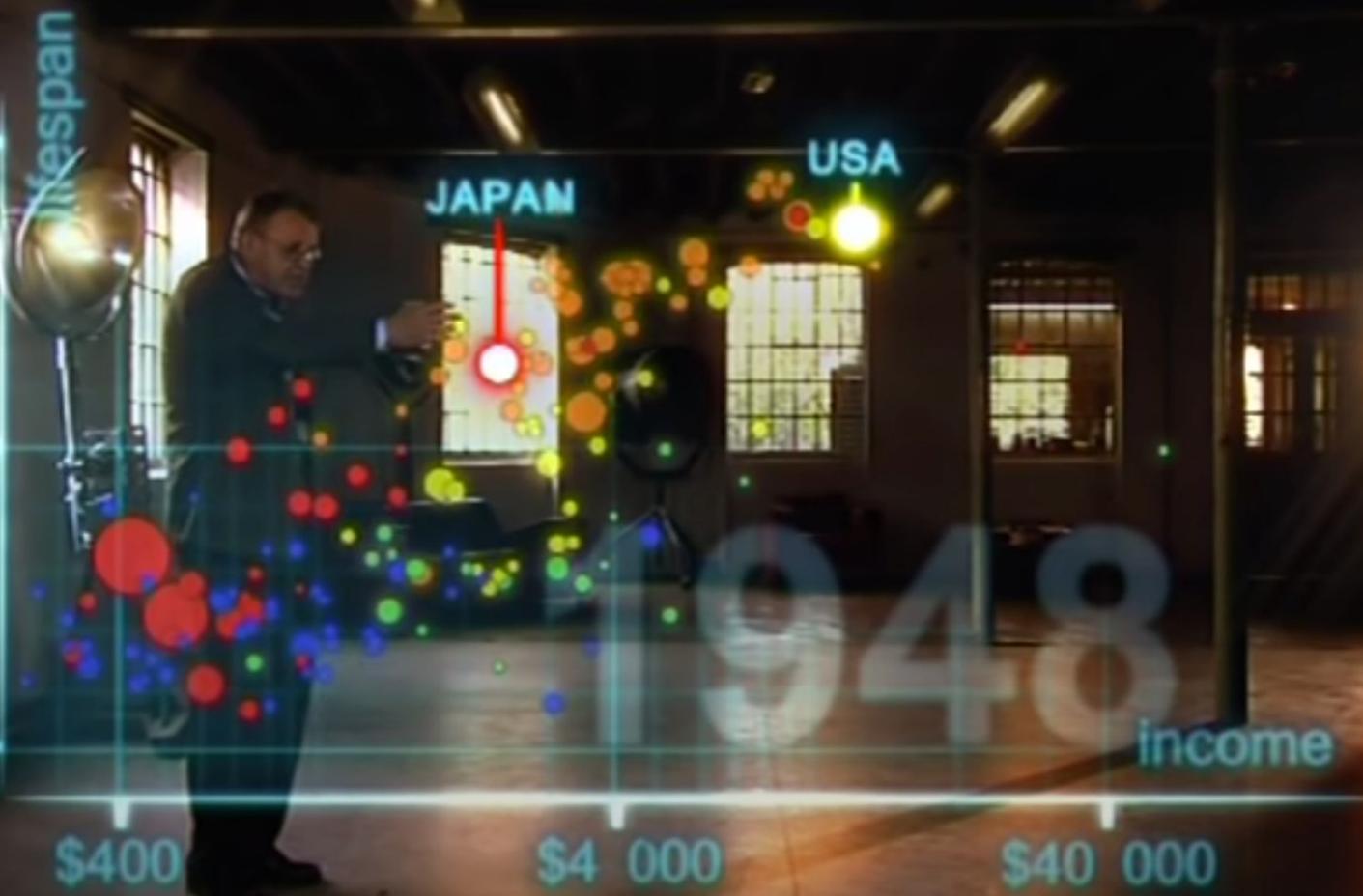
**NBC NEWS/TARGETSMART: 82 MILLION+ AMERICANS HAVE VOTED EARLY**

**MSNBC**











# Using space to talk and gesture about numbers

## Evidence from the TV News Archive

Bodo Winter, Marcus Perlman\*, and Teenie Matlock

University of California, Merced / \*University of Wisconsin, Madison

This paper examines naturally occurring gestures produced in descriptions of numbers and quantities in television newscasts. The results of our analysis show that gestures reveal the metaphorical and spatial nature of numerical thinking. That is, speakers' hands mimic known spatial mappings between space and quantity, including horizontal mappings (smaller quantities left, larger quantities right), vertical mappings (smaller quantities down, larger quantities up) and size-based mappings (smaller quantities “small”, larger quantities “large”). Speakers frequently switch between these different spatial mappings, and they sometimes combine them within the same gesture. This points to the flexibility of how metaphors can become expressed in gesture, and how domains such as number and quantity can be conceptualized through multiple compatible source domains.

**Keywords:** metaphor, mathematics, number, quantity, TV news



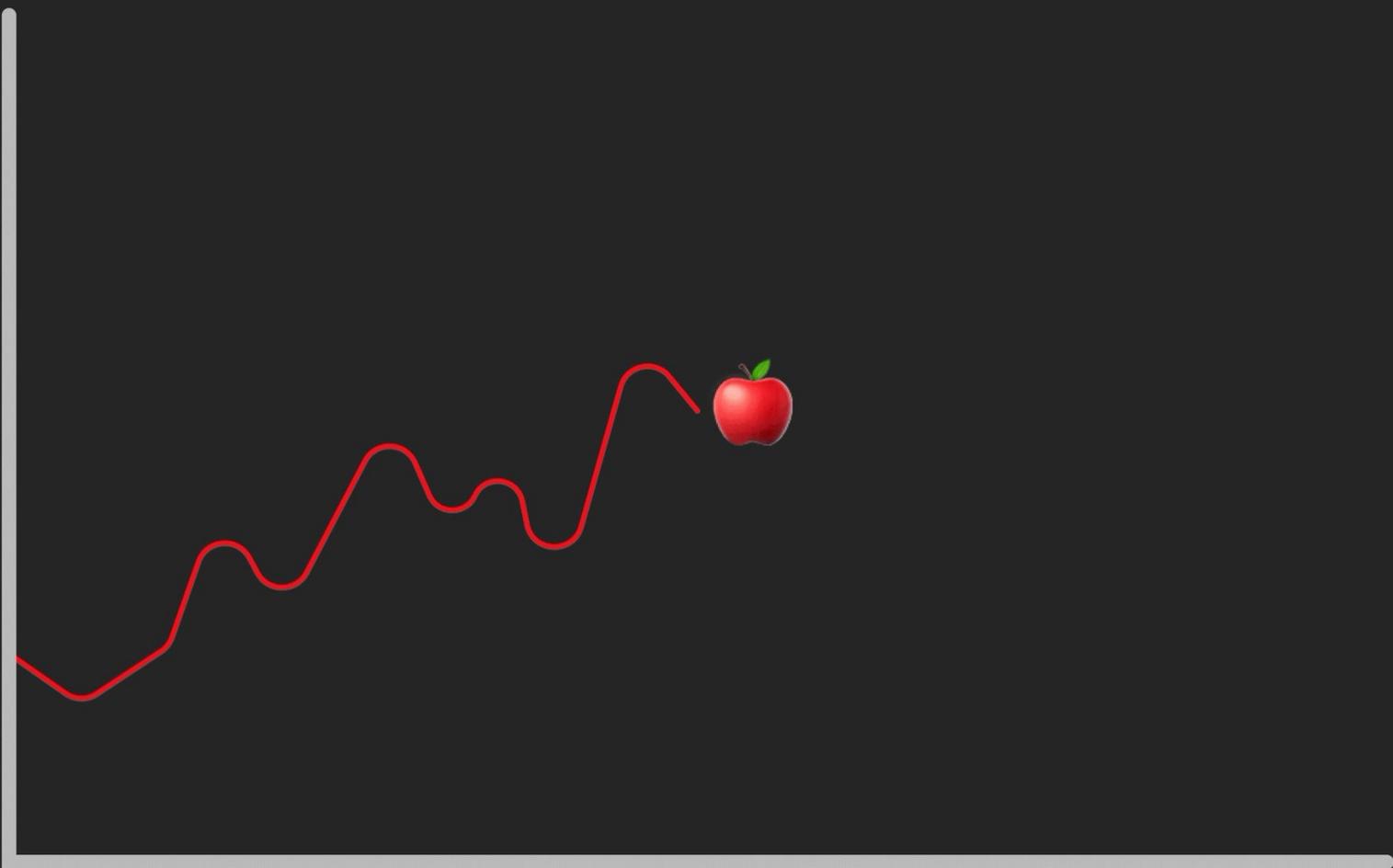




**SALES**



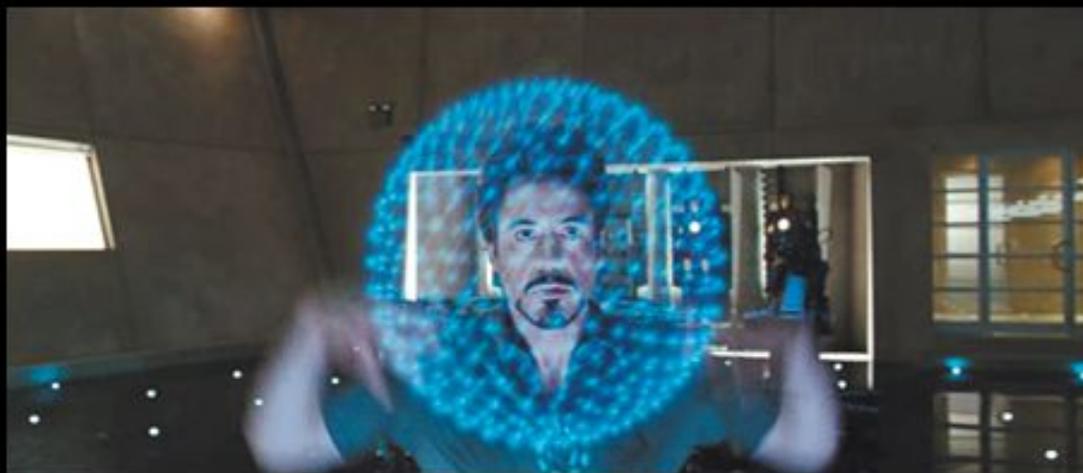
**Sales**



**Time →**



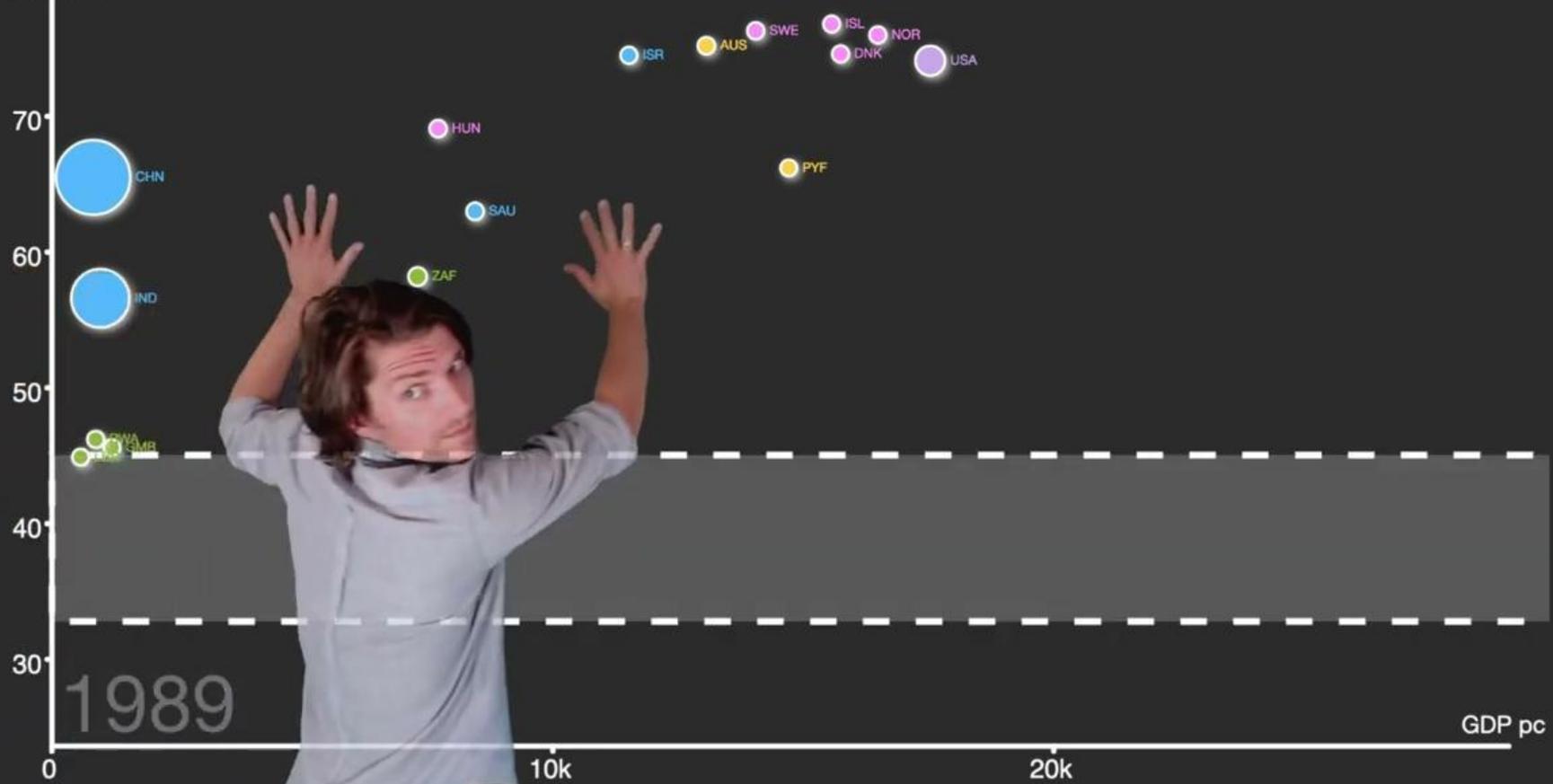








Life Exp.



1989

GDP pc

0

10k

20k

# The Information in Our Hands

Information+ 2021 - Matthew Brehmer

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# New Perspectives on Communicating with Visualization

From Design Inspiration to Performative Presentation

## We're hiring interns in 2022! Questions?



Matthew Brehmer

Senior Research Staff, Tableau Research

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