

# visualization for communication (data comm)

*Ben Watson  
NC State*

*bwatson@ncsu.edu  
go-vxlab.csc.ncsu.edu/viscommtalk*

# a bit about me/us

a bit about me/us  
the vis we know  
the vis that is emerging  
bottom line  
why now?  
trad vis fails  
data comm wins  
data comm breadth  
research  
instruction?  
sources

# BENJAMIN WATSON

ASSOC PROF COMP SCI NCSU  
LEAD VX LAB, COFOUNDER NEXUX

UX CG VIZ MOBILE HCI VR



## UX Lunch @ the Experience Innovation Studio, March 2, 12-1p

Please join **nexUX** and **LexisNexis** for our first UX monthly lunch Friday at noon at the **Experience Innovation Studio**. This is a casual event, an opportunity to build the interdisciplinary and industry relationships that are at the foundation of great research and UX work. Lunch is provided. Please **RSVP!**



## Help make the new year a great experience! Reception @ Experience Innovation Studio, Jan 4, 3-5p

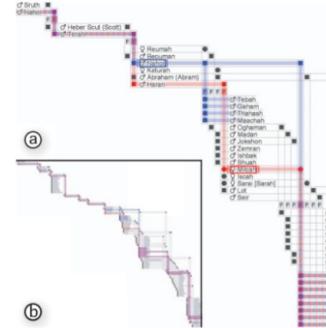
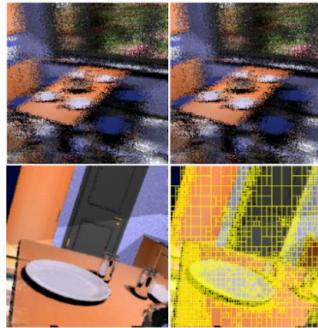
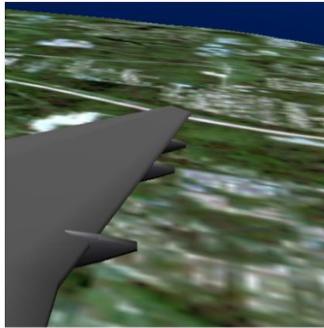
Please join **nexUX**, the **Centennial Partnership Office**, and **LexisNexis** for a reception at the **Experience Innovation Studio**. You'll see the Studio up close, learn how it supports user experience collaboration, and meet like-minded user experience practitioners and researchers. Refreshments and stimulating conversation provided.

# VISUAL EXPERIENCE LAB

BENJAMIN WATSON, LEAD  
ASSOC PROF COMP SCI NCSU

VISUAL TECHNOLOGY THAT MOVES US —  
HOW DIGITAL IMAGES AFFECT EMOTION, THINKING & BEHAVIOR





## User experience

Simulating the flying experience for treating phobias, testing spatial and wayfinding ability, relating stress to mobile security, visual communication, [course projects](#) and currently, gaming experience and the relationship of UX to machine learning.

flying flying flying spatial  
wayfinding stress stress viscomm  
viscomm uxxml uxxml

## Computer graphics

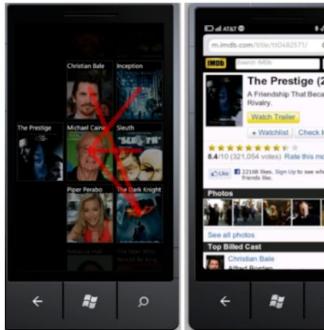
Controlling visual fidelity and frame rates, foveated rendering, simplification, low latency rendering, procedural urban modeling, [course projects](#) and currently, multiview rendering.

book latency latency latency  
foveation foveation foveation  
foveation simplification  
simplification fidelity fidelity fidelity  
lowlatency lowlatency urban urban  
urban urban urban multiview

## Visualization

Depicting text, graphs, network traffic and urban commuters for retail, genealogy, security, search and sustainability. Also, visual communication, mobile visualization and currently, categorical visualization.

text text text graphs graphs  
security security search urban  
viscomm viscomm mobile



## Mobiles

Relating stress and sensing to mobile security, improving mobile search, [course projects](#), and currently, mobile shortcuts, location and visualization.

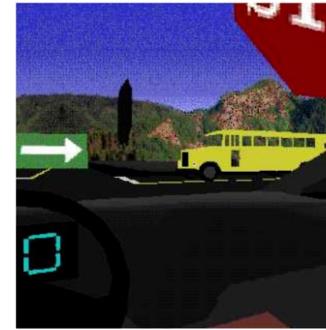
[stress](#) [stress](#) [search](#) [location](#)  
[visualization](#)



## Human-computer interaction

Search, placement and fidelity in virtual reality; tangible and tabletop interfaces for education, assessment and training; mobile search, security and sensing; and currently, shortcircuiting for desktops and mobiles.

[latency](#) [latency](#) [latency](#) [foveation](#)  
[foveation](#) [foveation](#) [foveation](#)  
[fidelity](#) [fidelity](#) [fidelity](#) [tangible](#)  
[tangible](#) [spatial](#) [wayfinding](#)  
[wayfinding](#) [education](#) [education](#)  
[stress](#) [stress](#) [search](#)



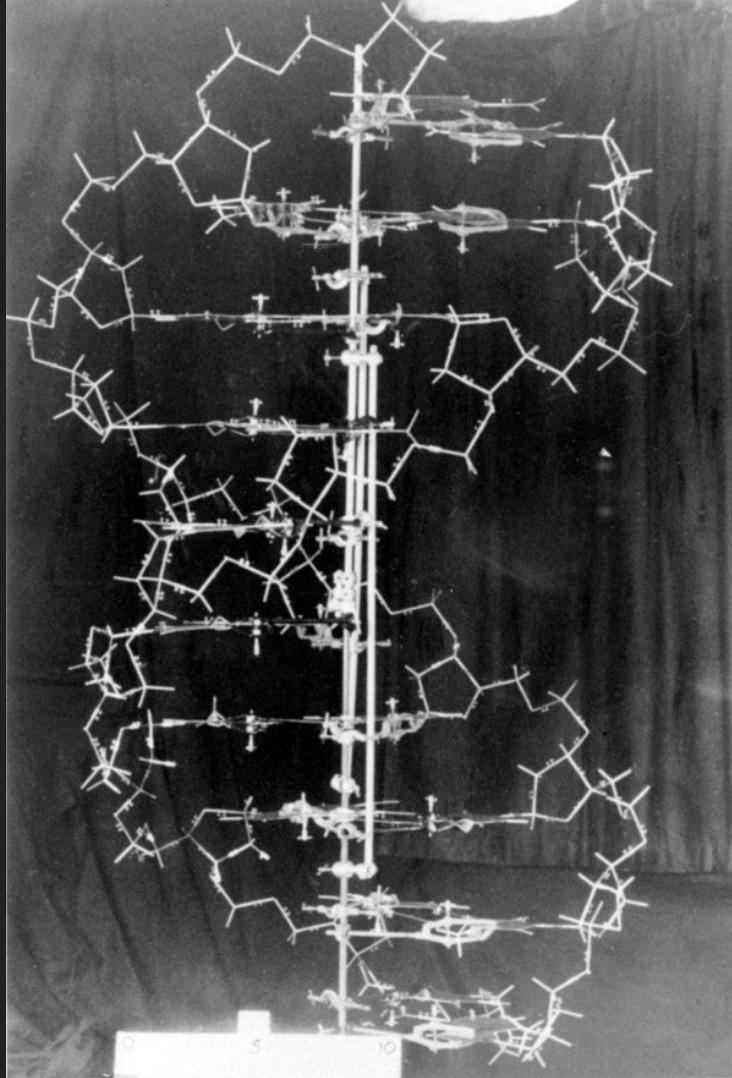
## Virtual reality

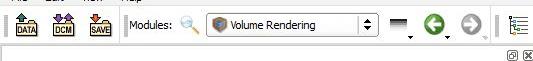
For therapy, health and training; foveation and latency control; with elderly users; in Japan; tracking, interaction and optical distortion.

[flying](#) [flying](#) [flying](#) [driving](#) [latency](#)  
[latency](#) [latency](#) [foveation](#) [foveation](#)  
[foveation](#) [foveation](#) [elderly](#) [japan](#)  
[tracking](#) [3dinteraction](#) [distortion](#)

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## Help &amp; Acknowledgement

Volume: 4: t1\_MPRage\_iso\_sag\_

## Inputs

## Display

Preset: MR-Default

Shift:

Crop:  Enable  Display ROI  Fit to Volume

Rendering: VTK CPU Ray Casting

## Advanced...

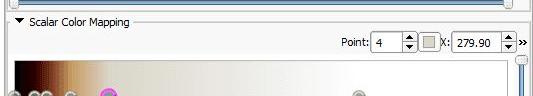
Techniques Volume Properties ROI Misc

Synchronize with Volumes module

## Scalar Opacity Mapping



## Scalar Color Mapping



## Gradient Opacity

## Advanced

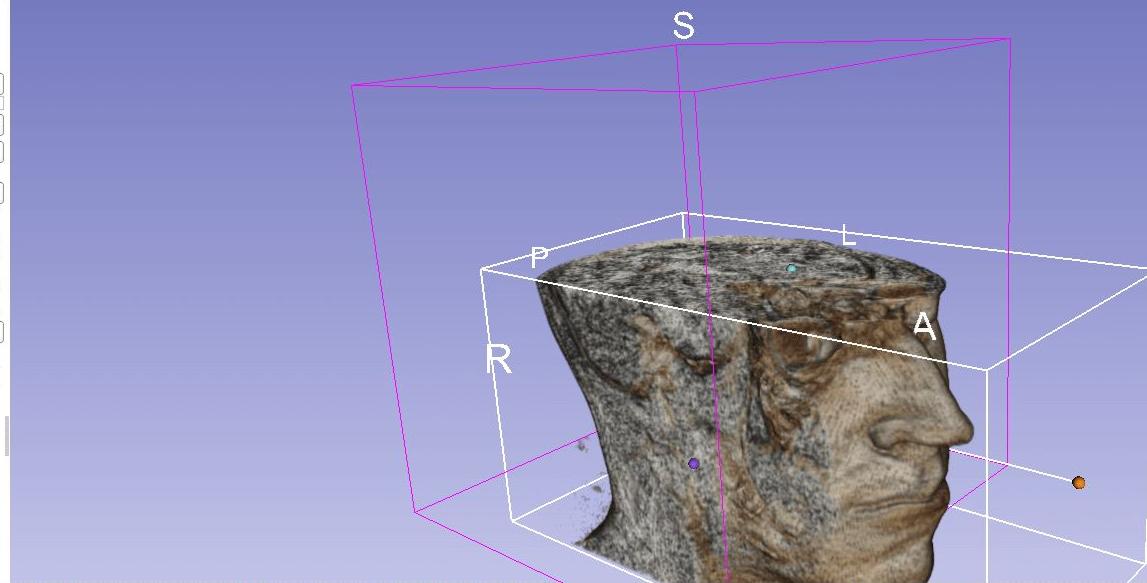
## Data Probe

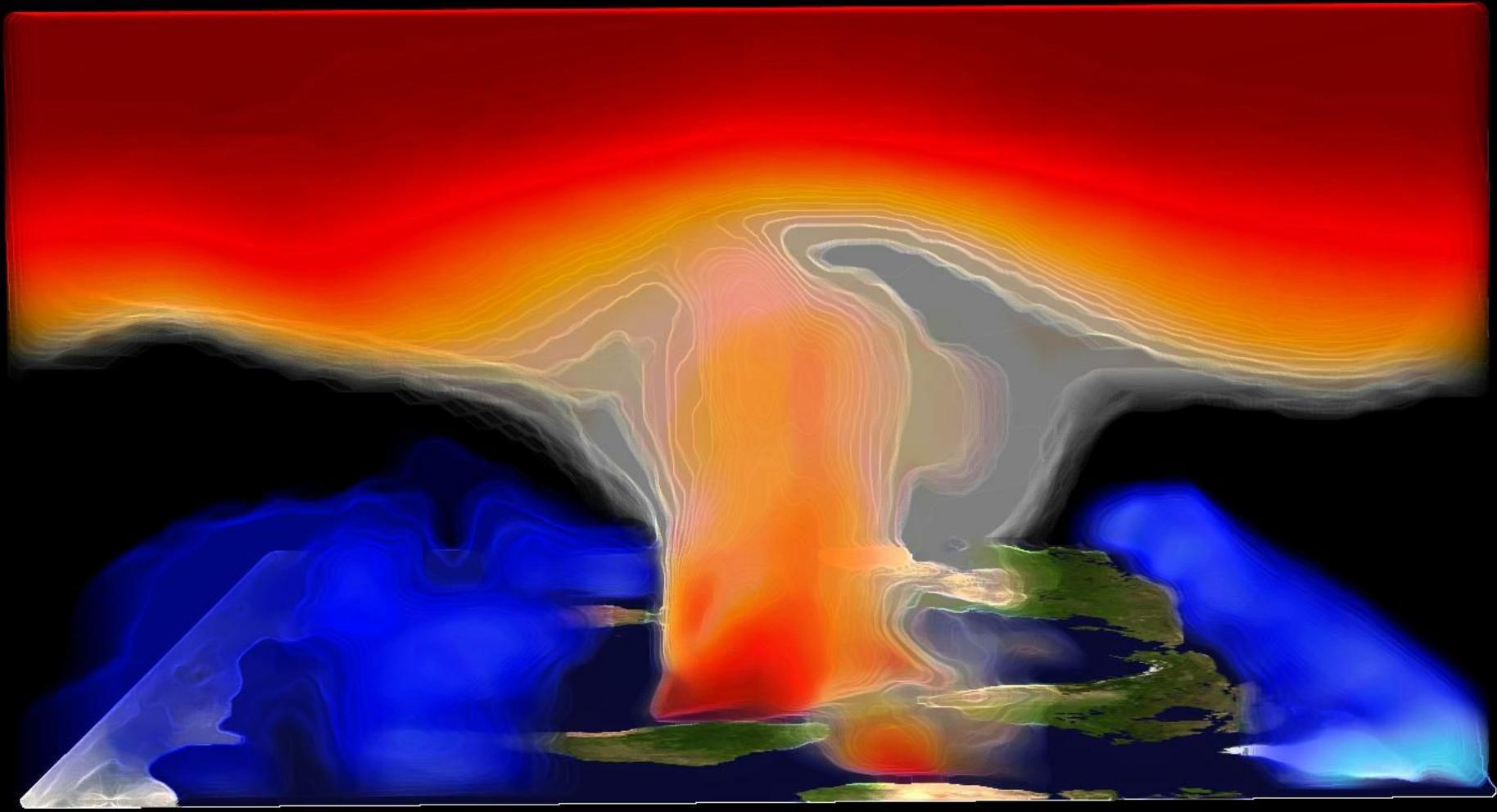
 Show Zoomed Slice

L

F

B



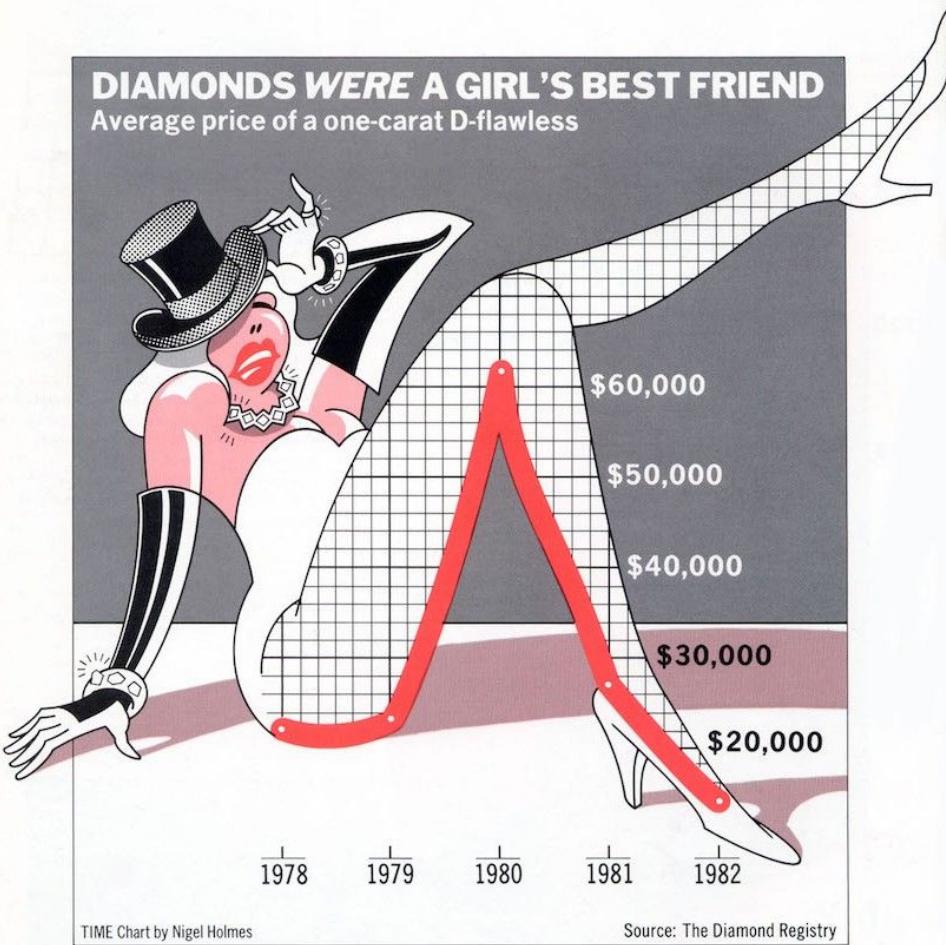


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## DIAMONDS WERE A GIRL'S BEST FRIEND

Average price of a one-carat D-flawless



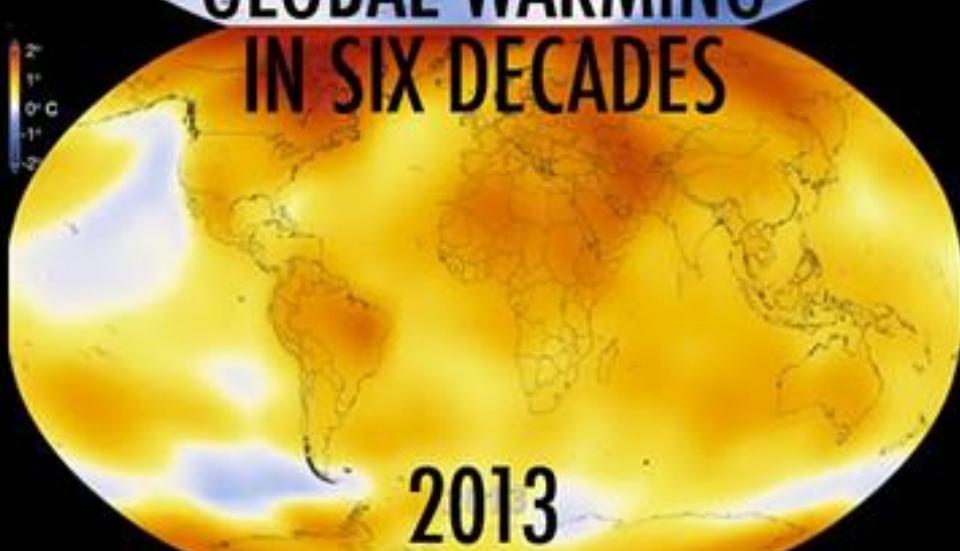
TIME Chart by Nigel Holmes

Source: The Diamond Registry



1950

**GLOBAL WARMING  
IN SIX DECADES**



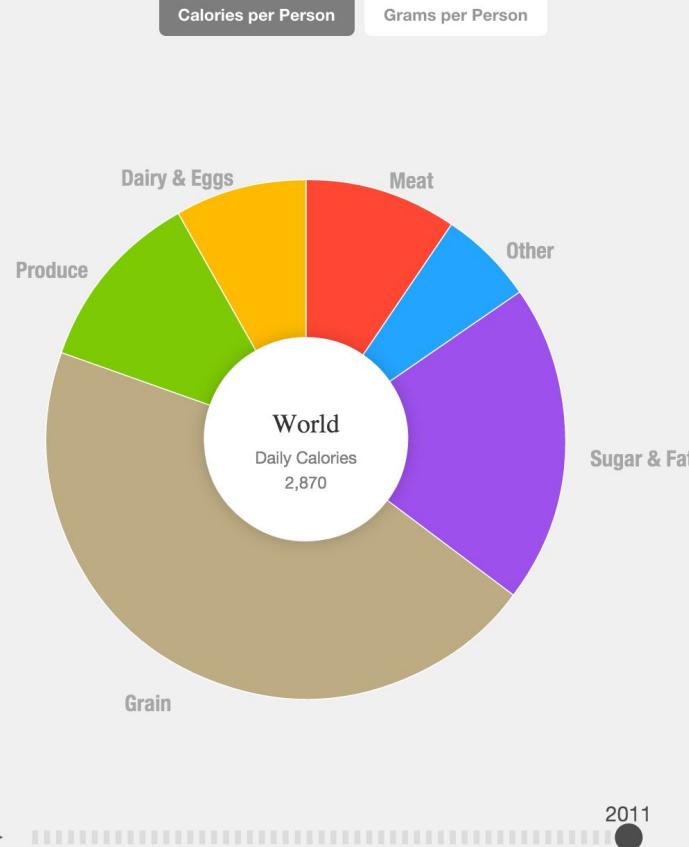
2013



## World

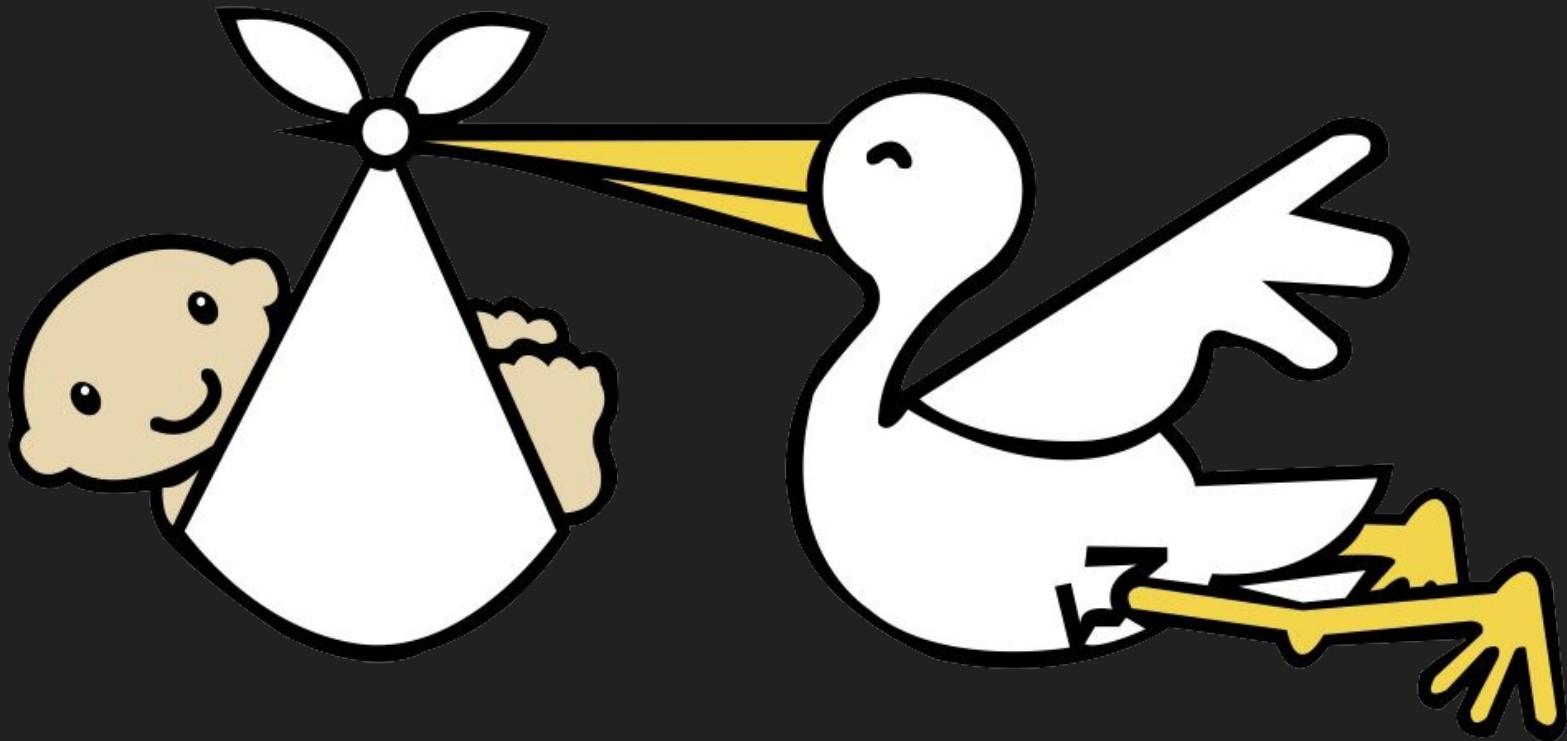
Daily diets vary considerably around the world. Select different countries or regions to see how consumption patterns have changed in the last 50 years.

Click on **grams** to understand the quantities of food consumed per person in each place. Alternatively, view the breakdown by **calories** to measure how that balance of food translates into fuel and energy. Percentages in the pie chart reflect the proportion of each item in the overall diet.



# bottom line

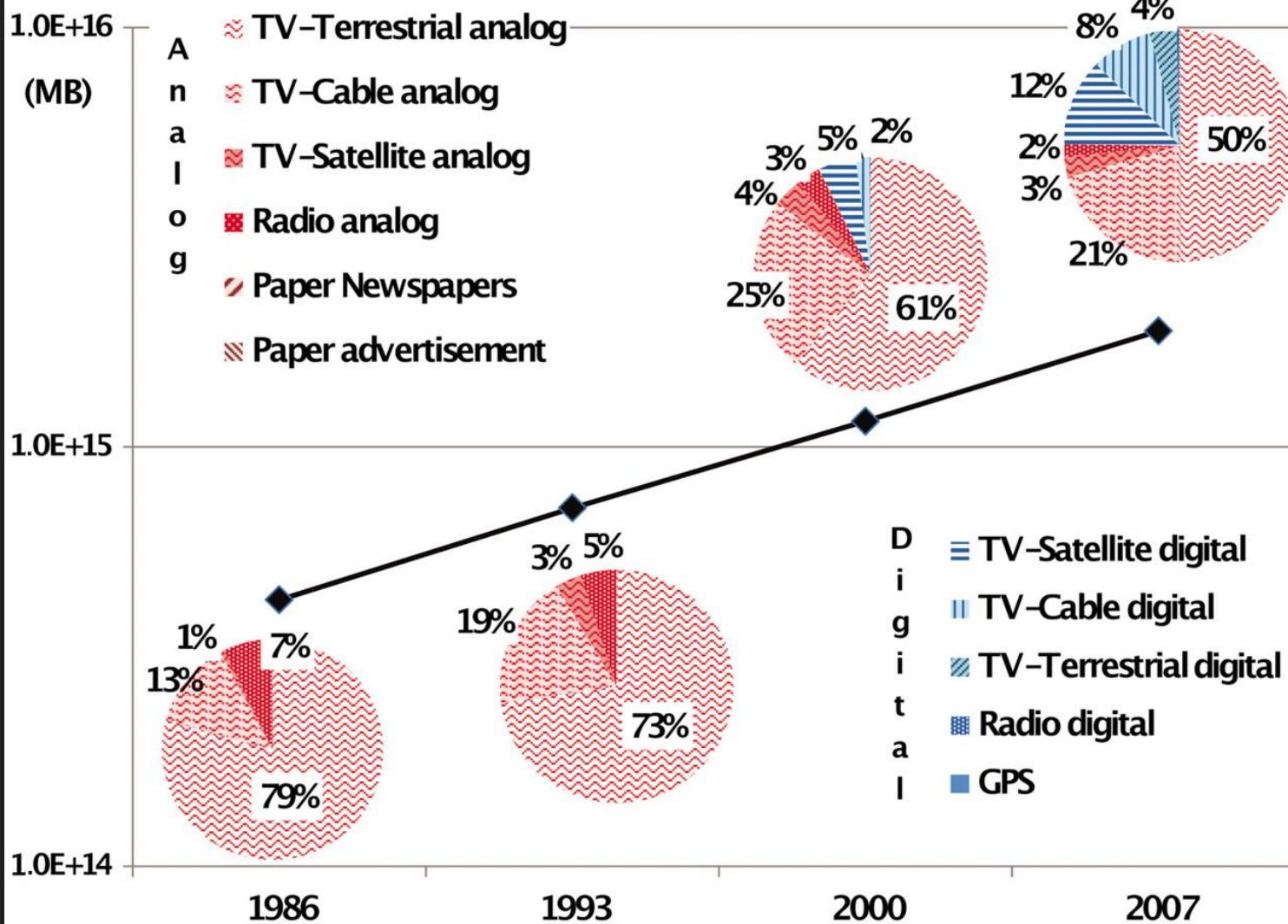
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it's a field! let's name it “data comm”

# why now?

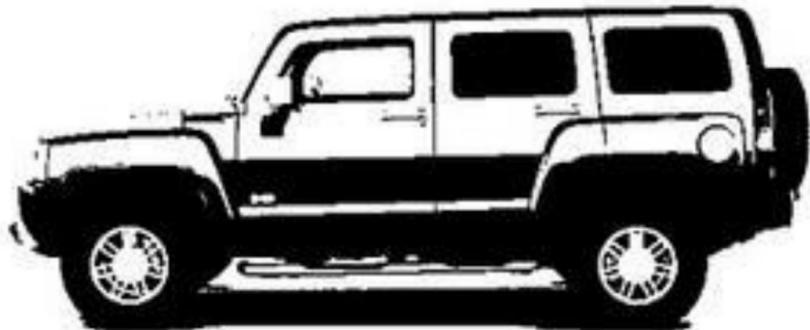
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**THIS ONE RUNS ON FAT  
AND SAVES YOU MONEY**

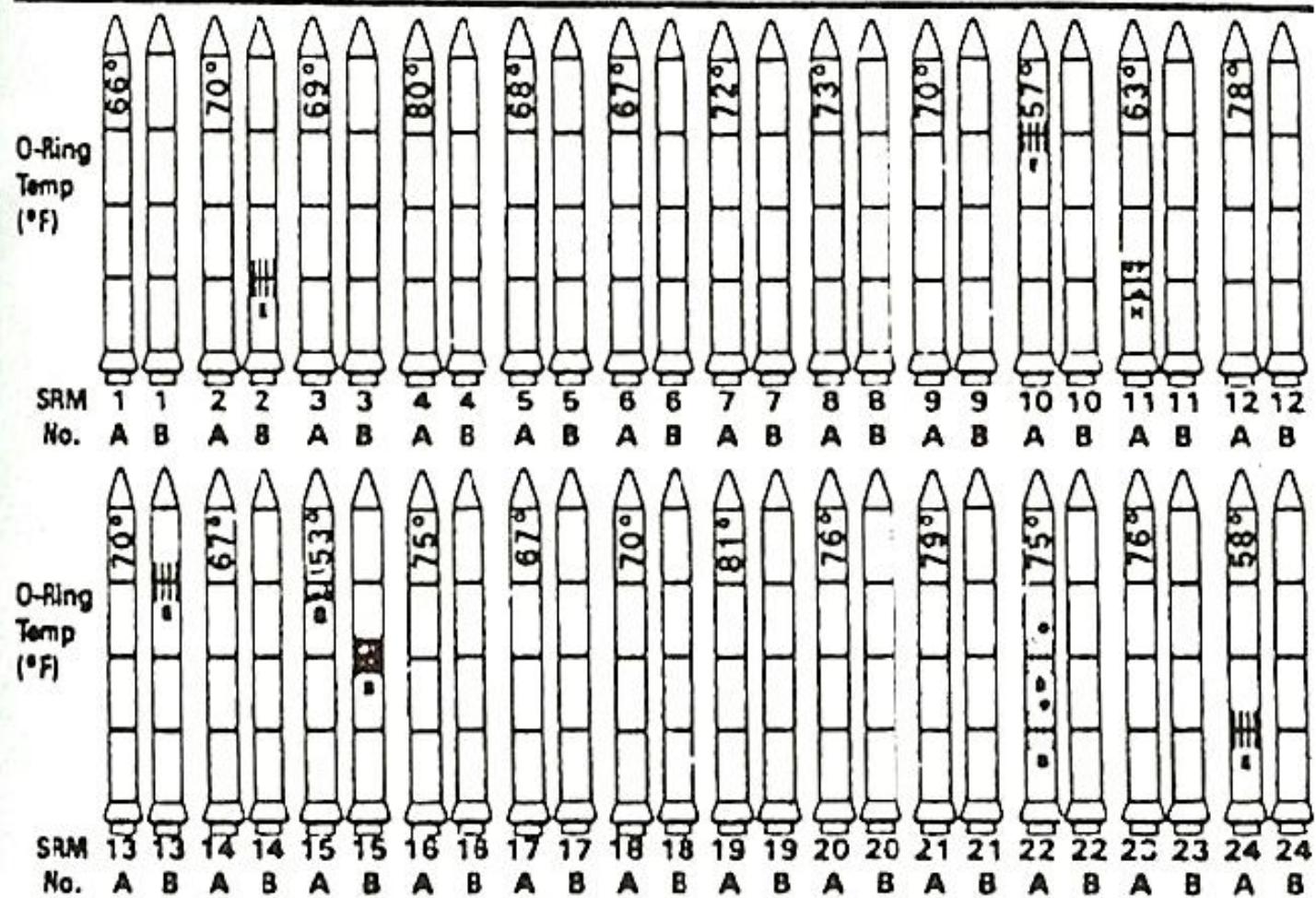


**THIS ONE RUNS ON MONEY  
AND MAKES YOU FAT**

# trad vis fails

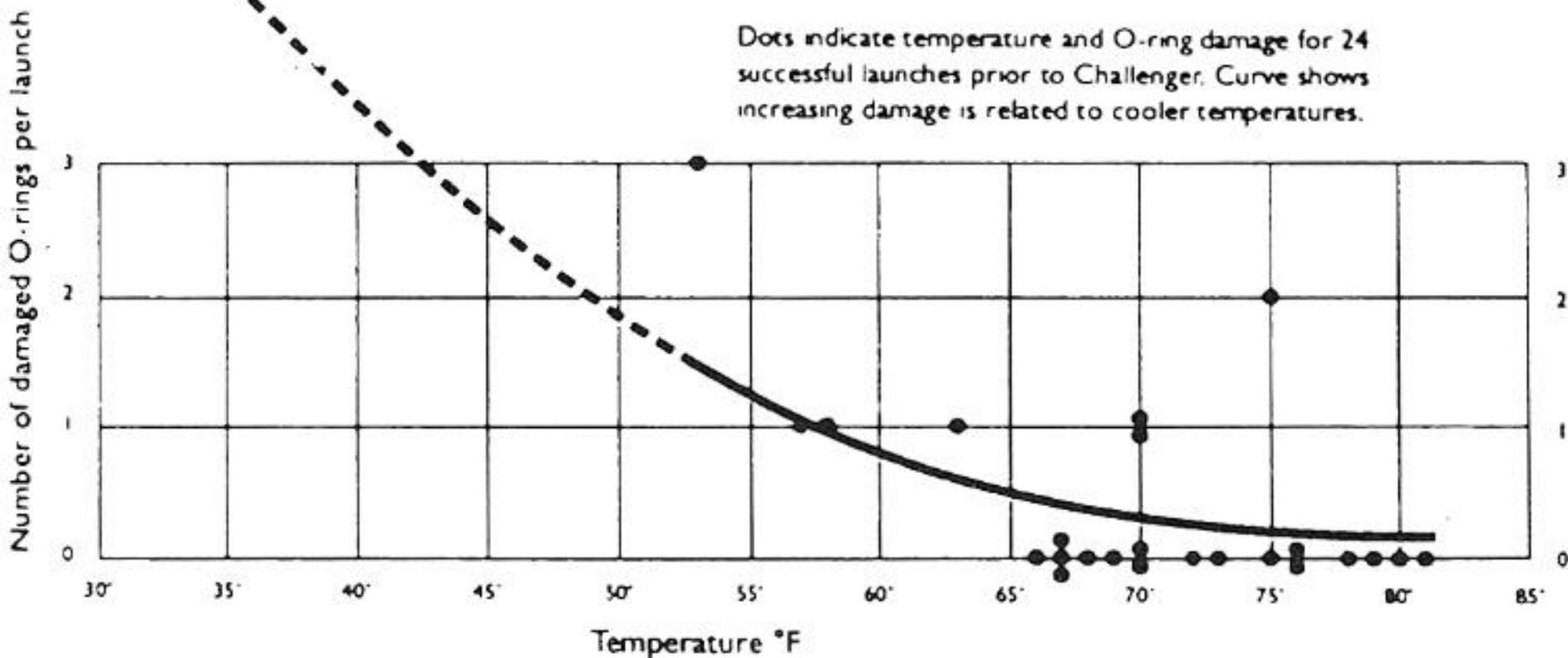
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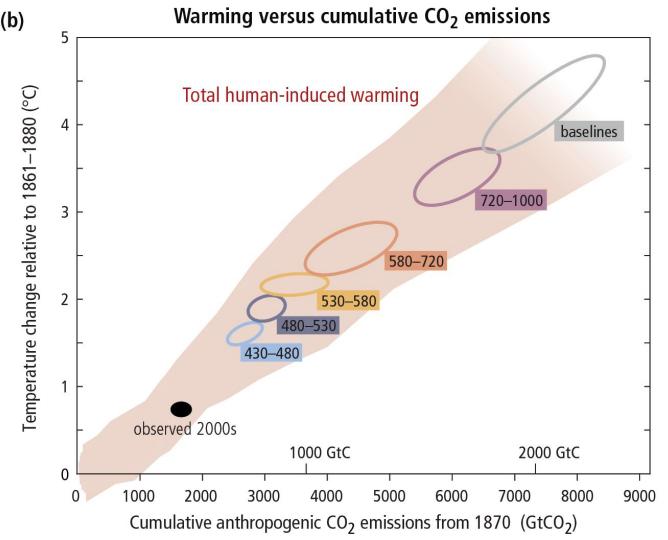
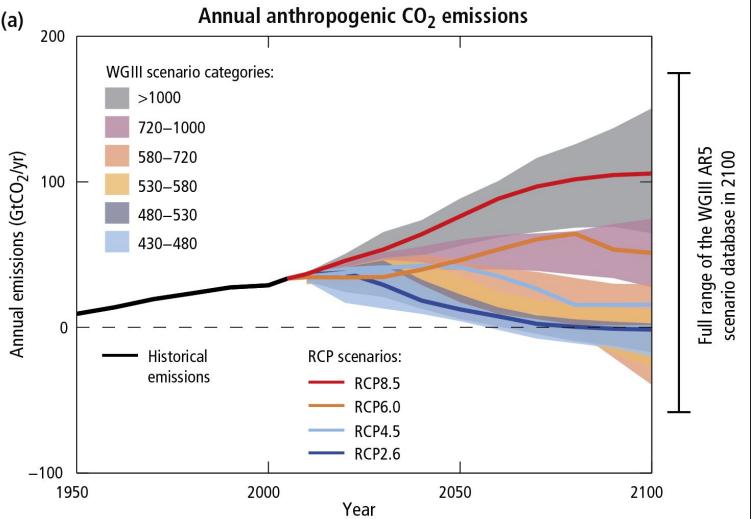
## History of O-Ring Damage in Field Joints (Cont)



Extrapolation of damage curve to the cold  
Challenger: 31° forecasted temperature for  
launch on January 28, 1986

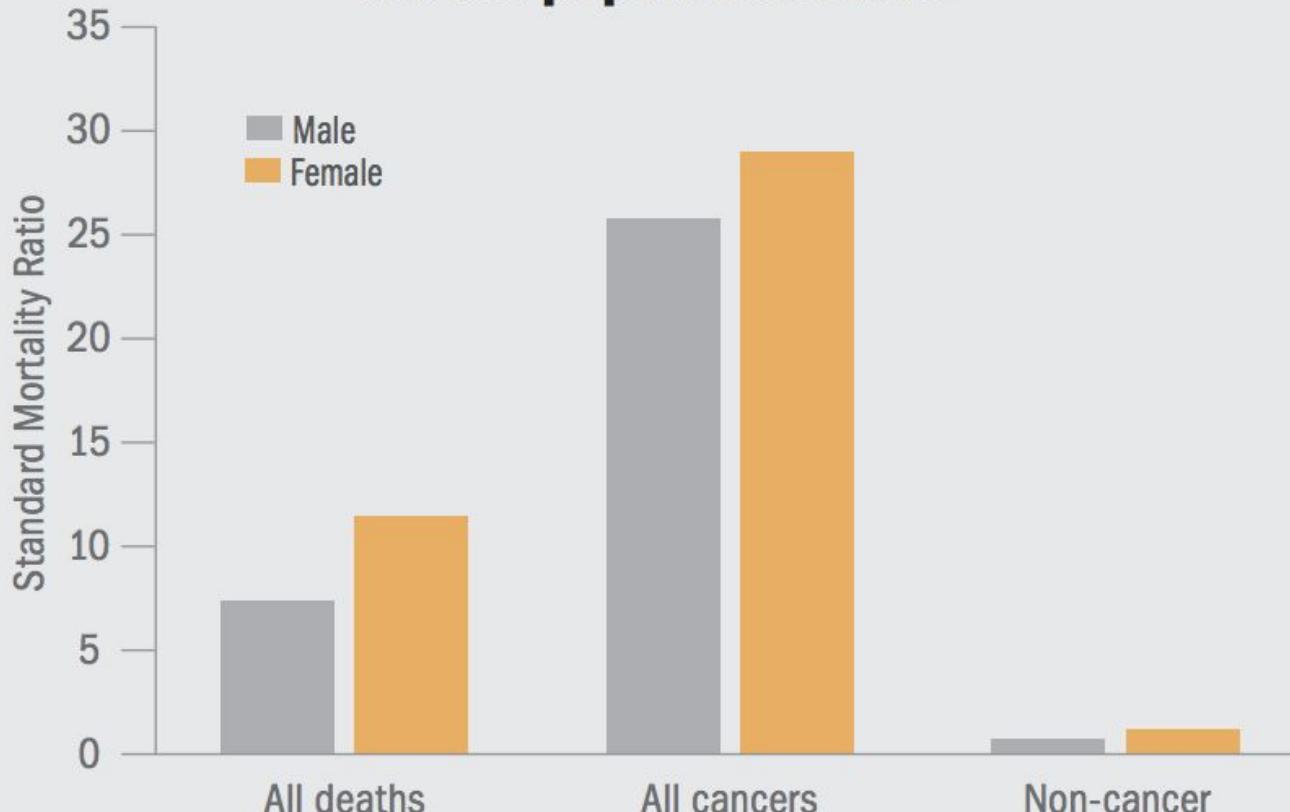
Does indicate temperature and O-ring damage for 24  
successful launches prior to Challenger. Curve shows  
increasing damage is related to cooler temperatures.



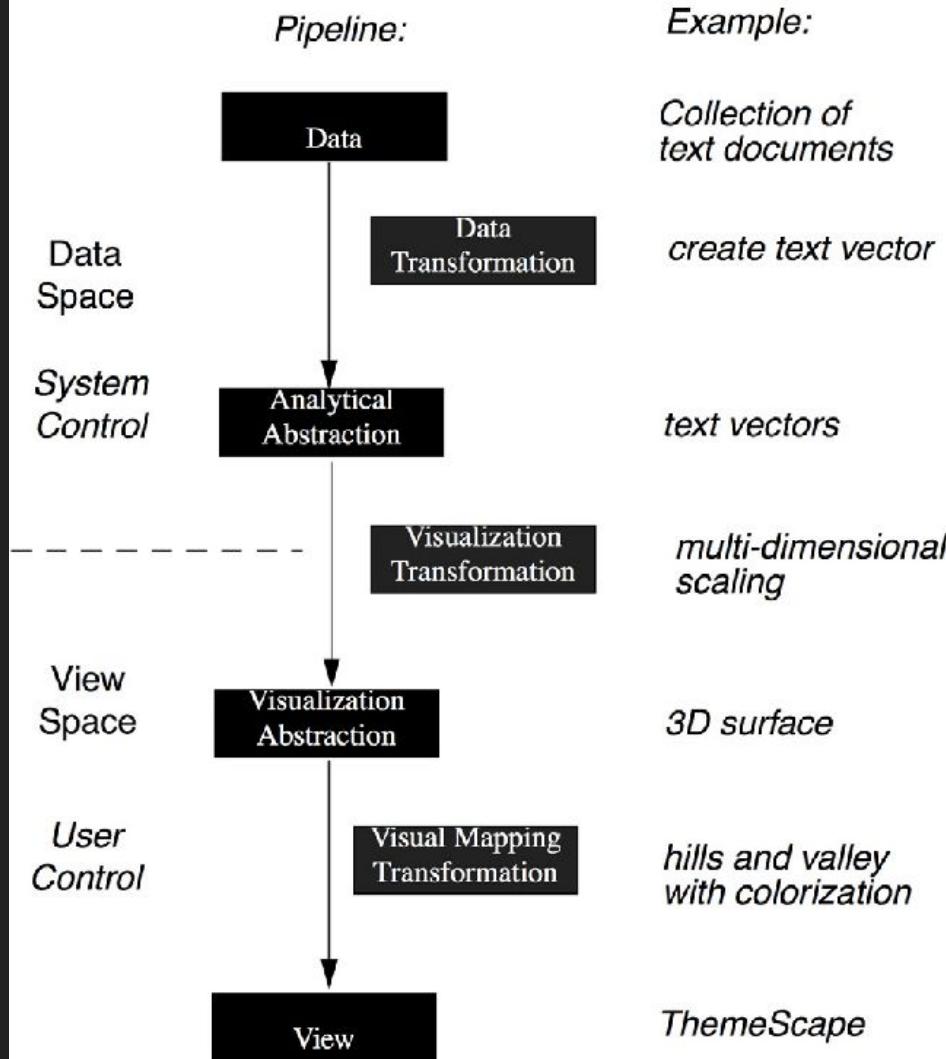


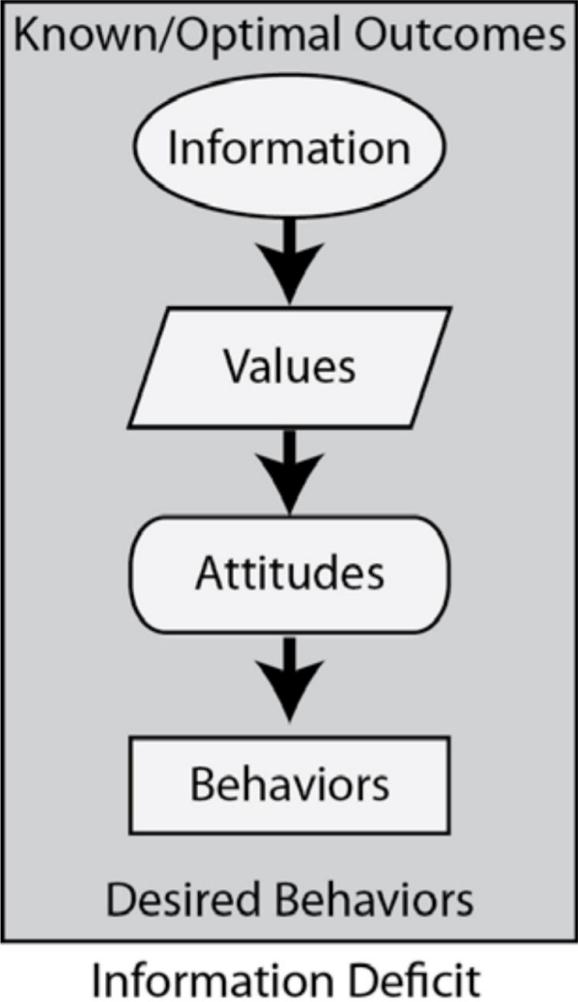
	pH after 2 h <7.25		pH after 2 h 7.25–7.29		pH after 2 h ≥7.30		
	RR	APACHE ≥29	APACHE <29	APACHE ≥29	APACHE <29	APACHE ≥29	APACHE <29
GCS 15	<30	72	35	27	7	11	3
	30–34	88	59	49	17	25	7
	≥35	93	73	64	27	38	11
GCS 12–14	<30	84	51	41	13	19	5
	30–34	93	74	65	28	39	12
	≥35	96	84	78	42	54	20
GCS ≤11	<30	93	74	65	28	39	12
	30–34	97	88	83	51	63	26
	≥35	99	93	90	66	76	40

## Relative risk of death compared to the US population rates



(Chart courtesy of Ruth Kleinerman, PhD)

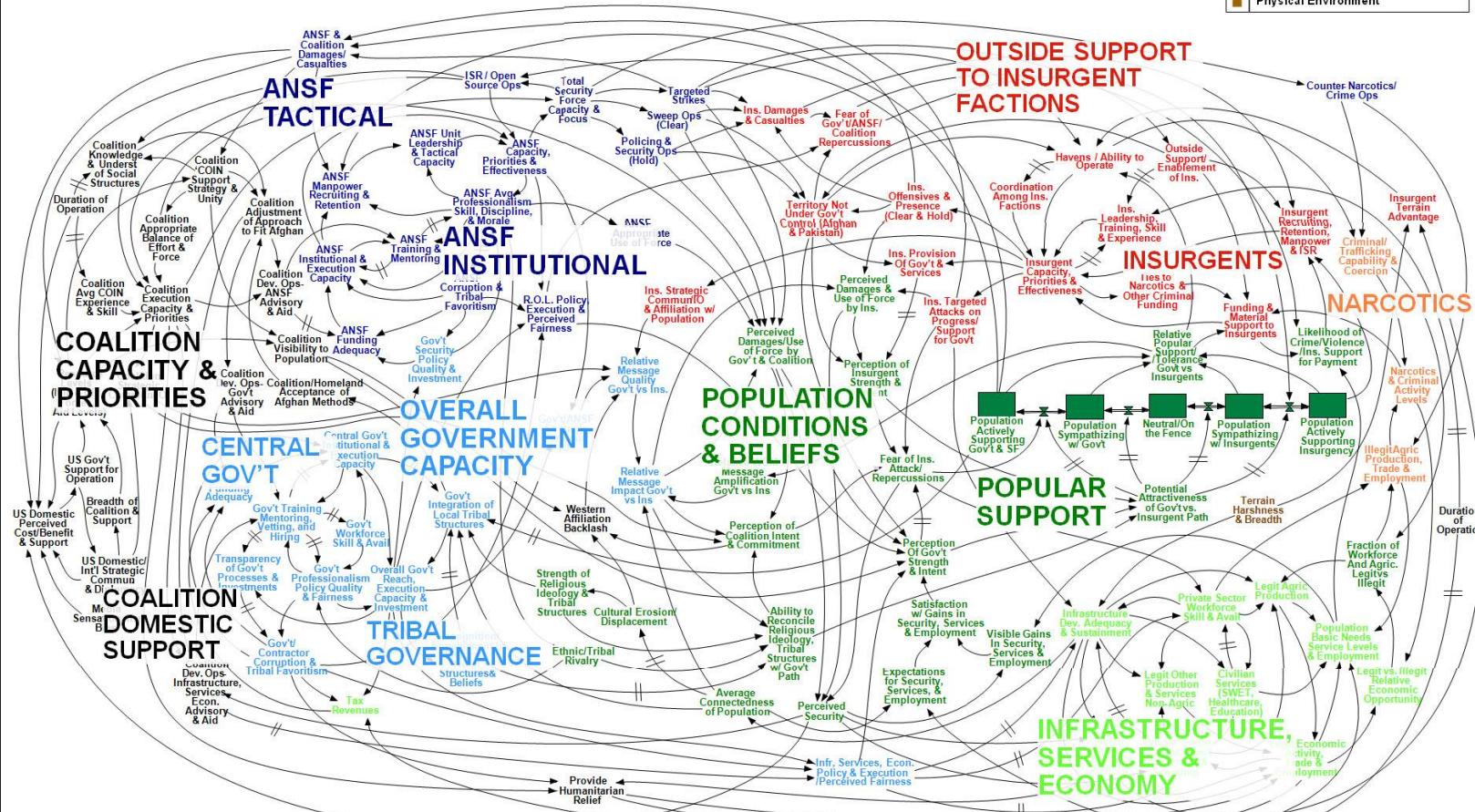




# Afghanistan Stability / COIN Dynamics

 = Significant Delay

 Population/Popular Support
 Infrastructure, Economy, & Services
 Government
 Afghanistan Security Forces
 Insurgents
 Crime and Narcotics
 Coalition Forces & Actions
 Physical Environment



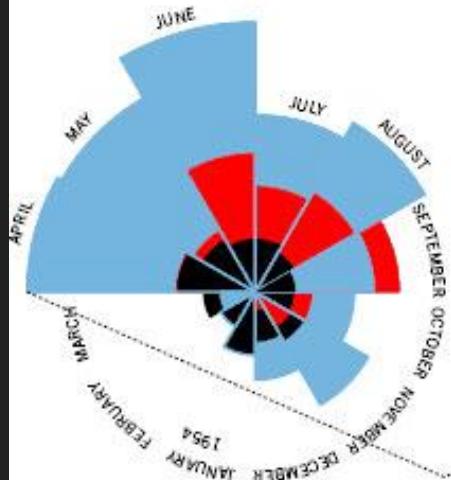


# data comm wins

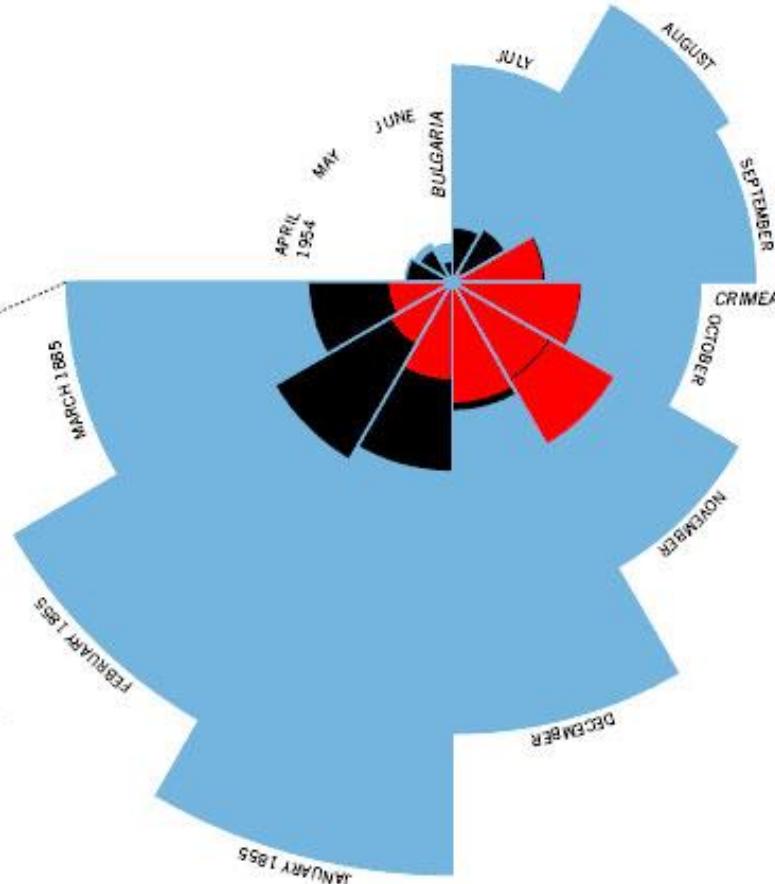
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# DIAGRAM OF THE CAUSES OF MORTALITY IN THE ARMY IN THE EAST

2.  
APRIL 1855 to MARCH 1856



1.  
APRIL 1854 to MARCH 1855

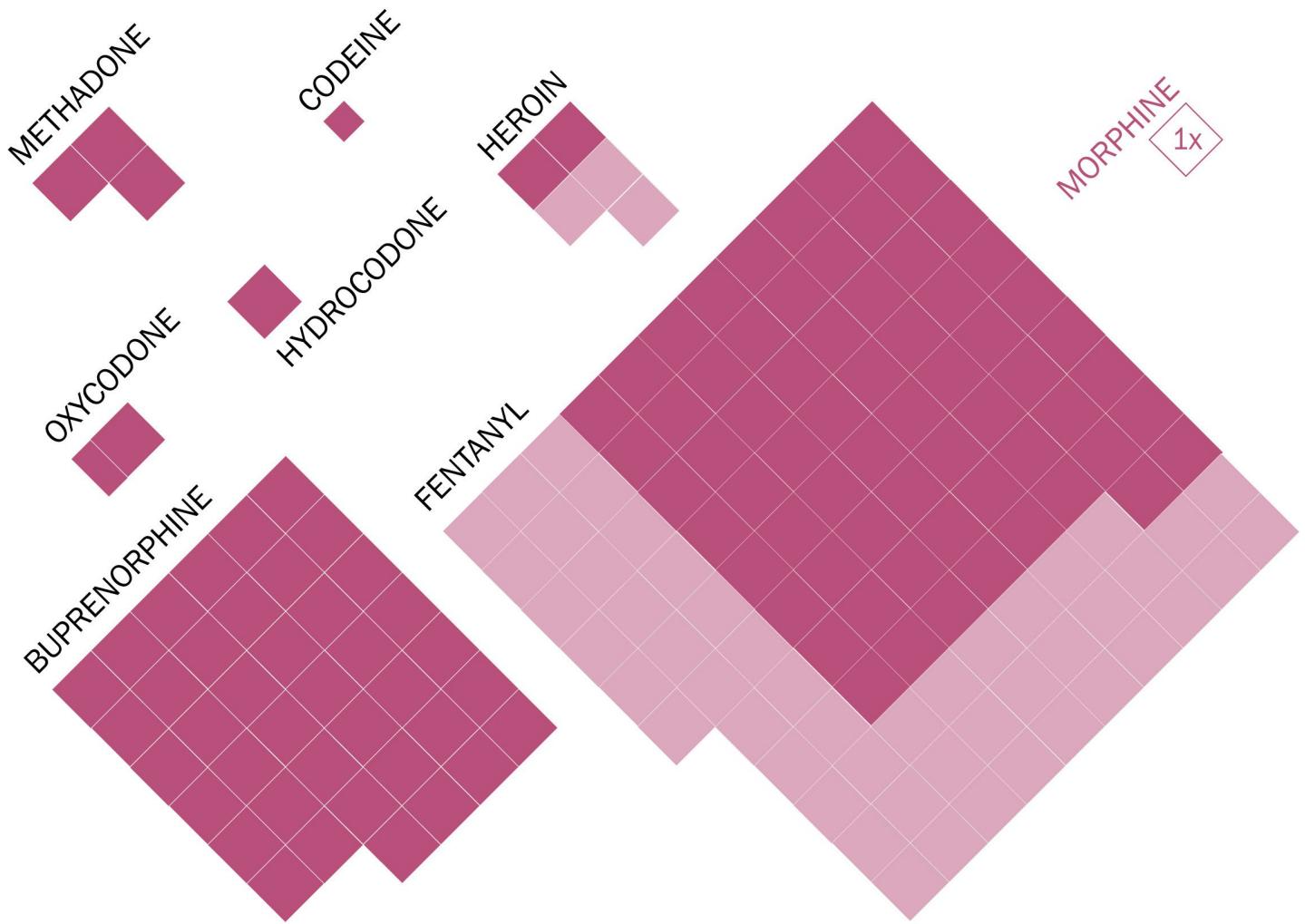


*The Areas of the blue, red, & black wedges are each measured from the centre as the common vertex*

*The blue wedges measured from the centre of the circle represent area for area the deaths from Preventible or Mitigable Zymotic Diseases, the red wedges measured from the centre the deaths from wounds, & the black wedges measured from the centre the deaths from all other causes*  
*The black line across the red triangle in Nov' 1854 marks the boundary of the deaths from all other causes during the month*

*In October 1854, & April 1855, the black area coincides with the red, in January & February 1856, the blue coincides with the black*

*The entire areas may be compared by following the blue, the red & the black lines enclosing them.*



Help this map take flight.



The darker the color, the more favorable the climate conditions are for survival. The outlined areas represent approximate current range for each season.  
[More on reading these maps.](#)

-  Winter
-  Summer
-  Winter Range
-  Summer Range
-  Both Seasons

 2000 2020 2050 2080

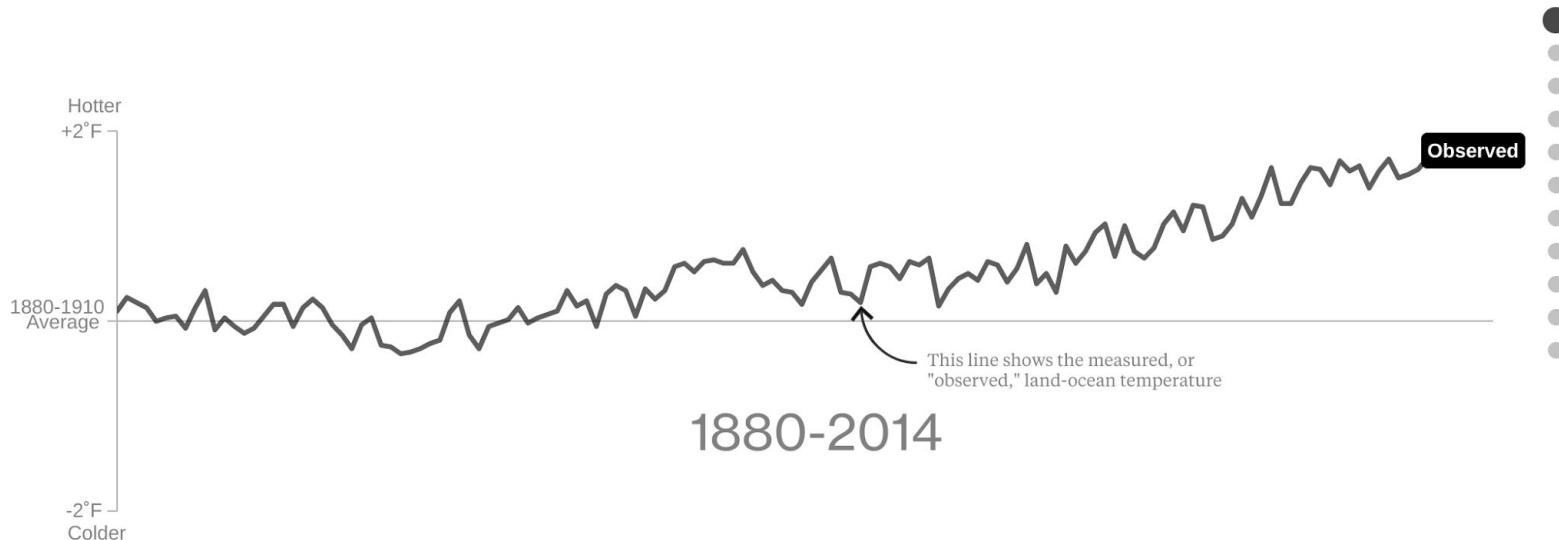
 Zoom In



# What's Really Warming the World?

By Eric Roston  and Blacki Migliozi  | June 24, 2015

Skeptics of manmade climate change offer various natural causes to explain why the Earth has warmed 1.4 degrees Fahrenheit since 1880. But can these account for the planet's rising temperature? Scroll down to see how much different factors, both natural and industrial, contribute to global warming, based on findings from NASA's Goddard Institute for Space Studies.



# Out of Sight, Out of Mind.

ATTACKS VICTIMS NEWS INFO SHARE



ESTIMATED TOTAL FATALITIES

3341

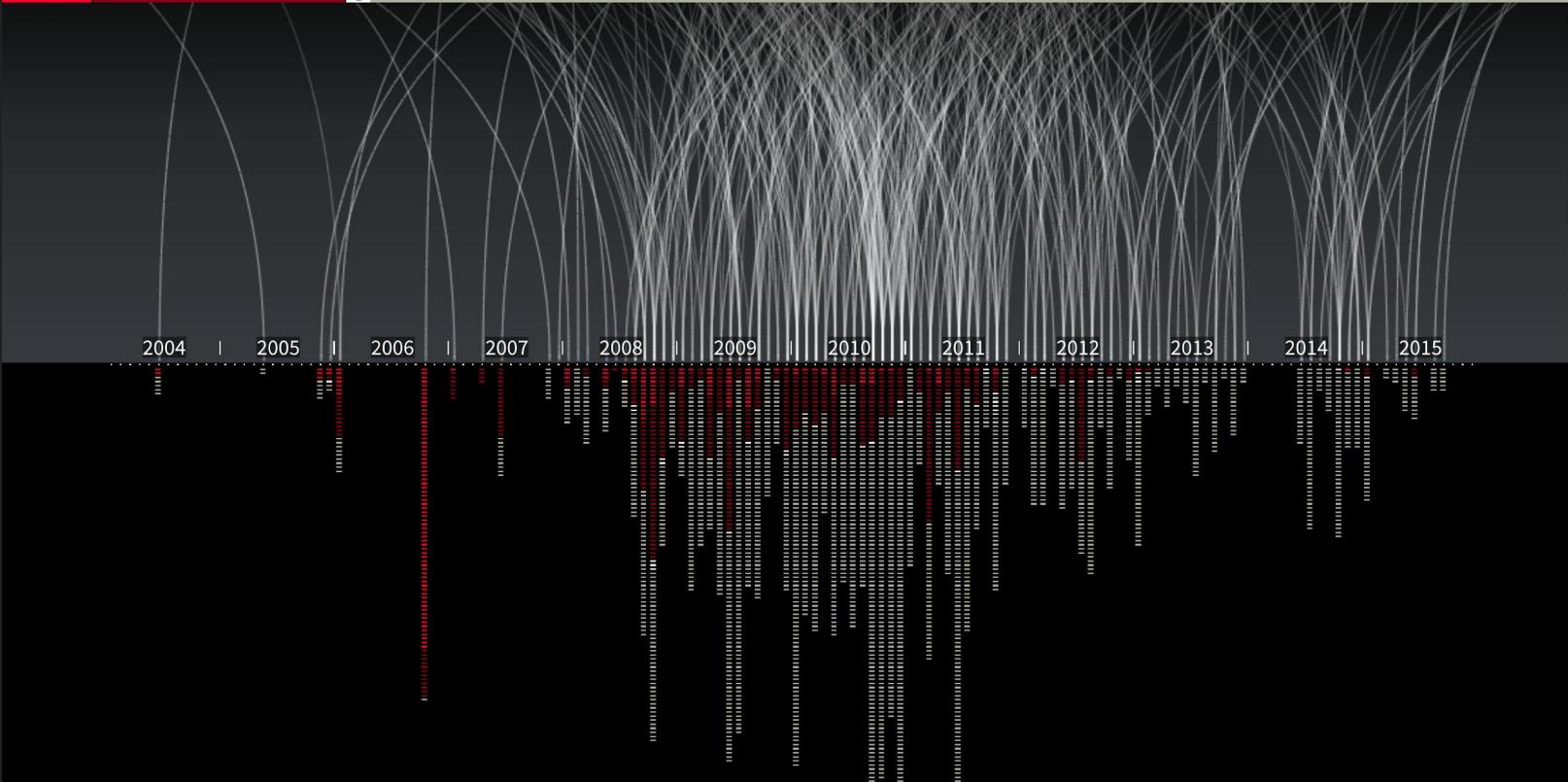
EN FR

CHILDREN  
**190** 5.7%

CIVILIAN  
**534** 16%

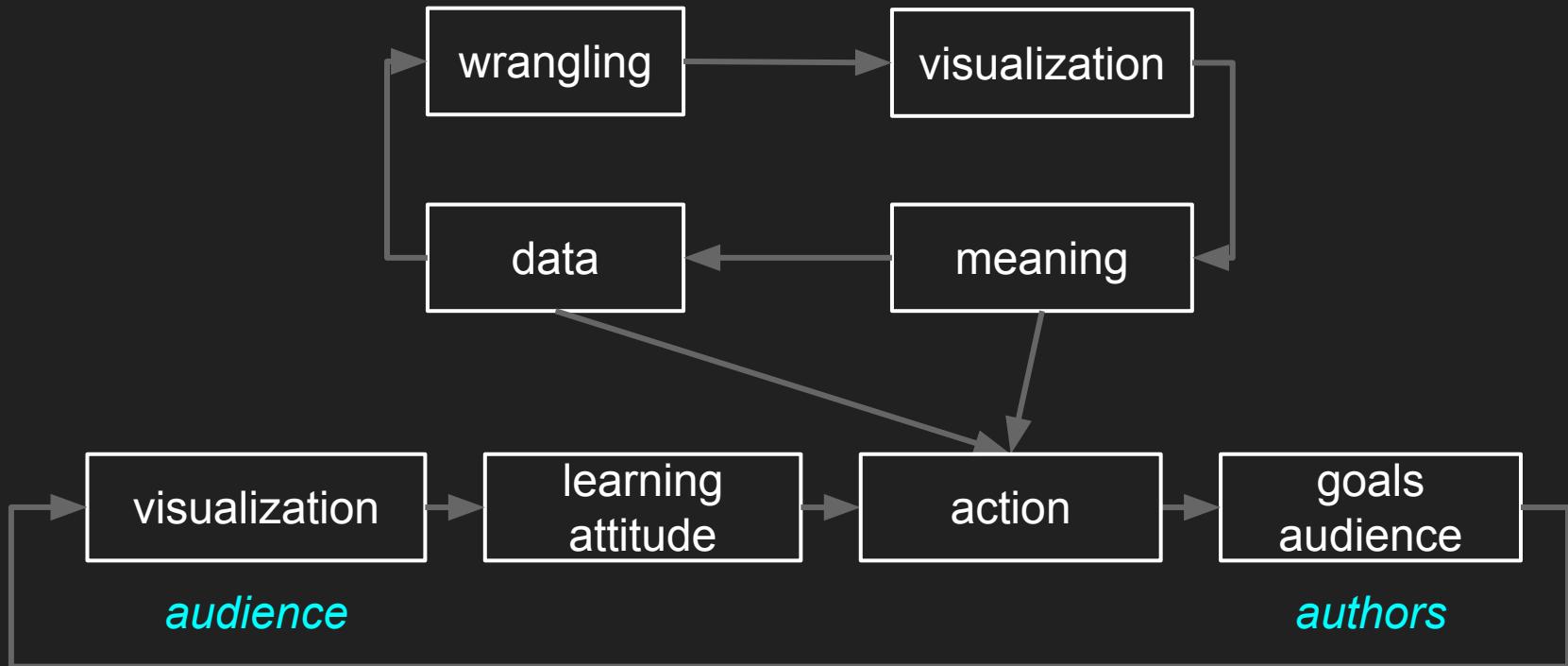
HIGH PROFILE  
**52** 1.6%

OTHER  
76.8%  
**2565**



RECENT NEWS ABOUT DRONES

*analysts*

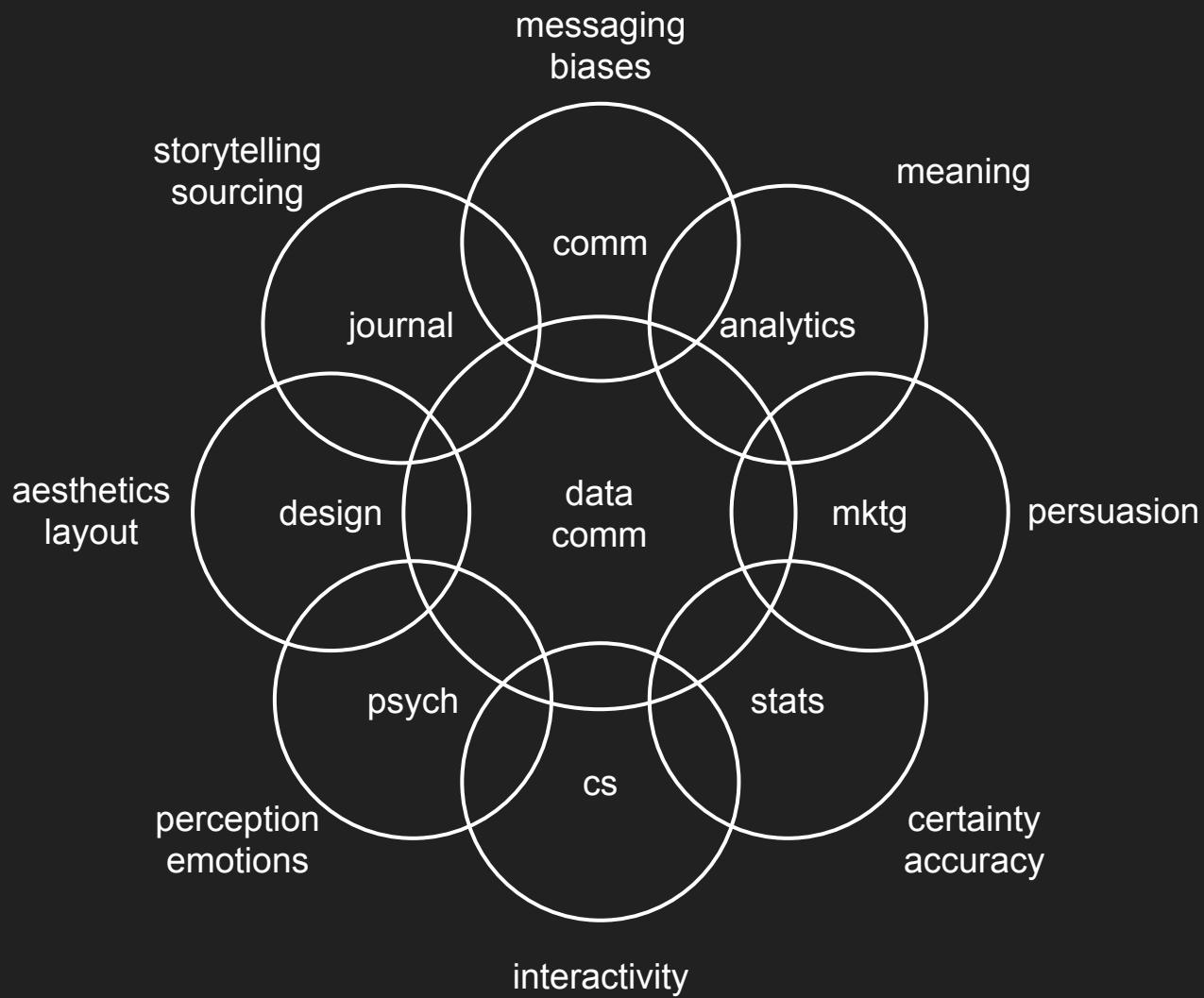


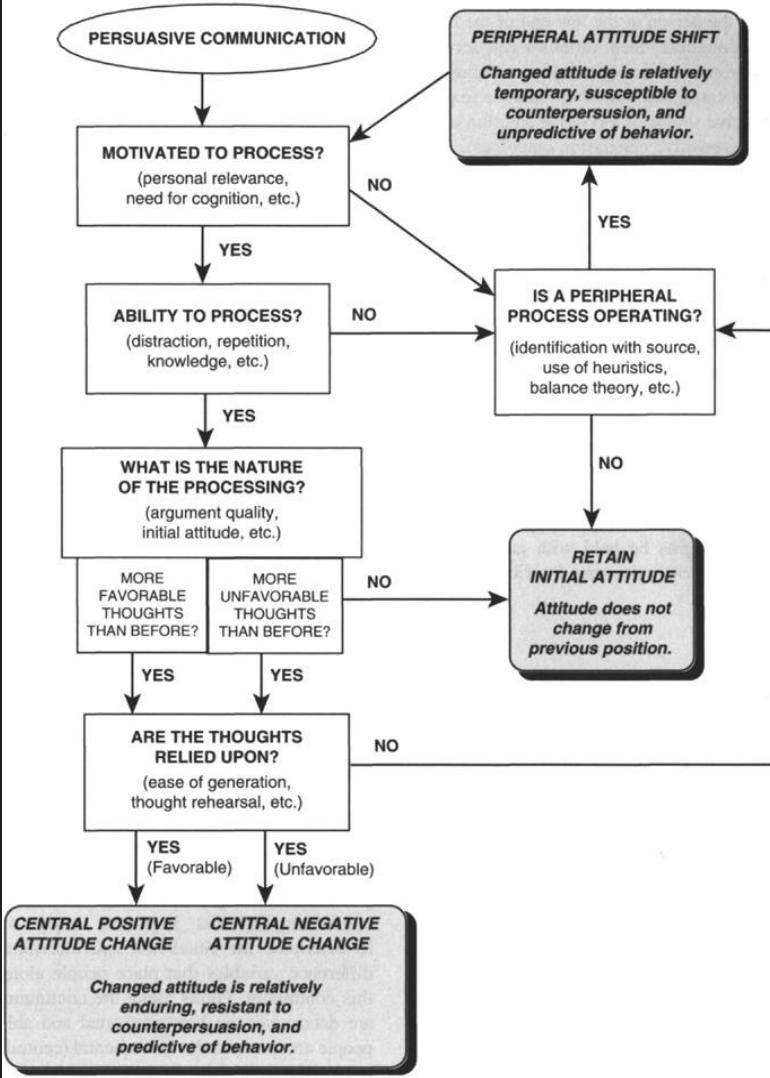
*audience*

*authors*

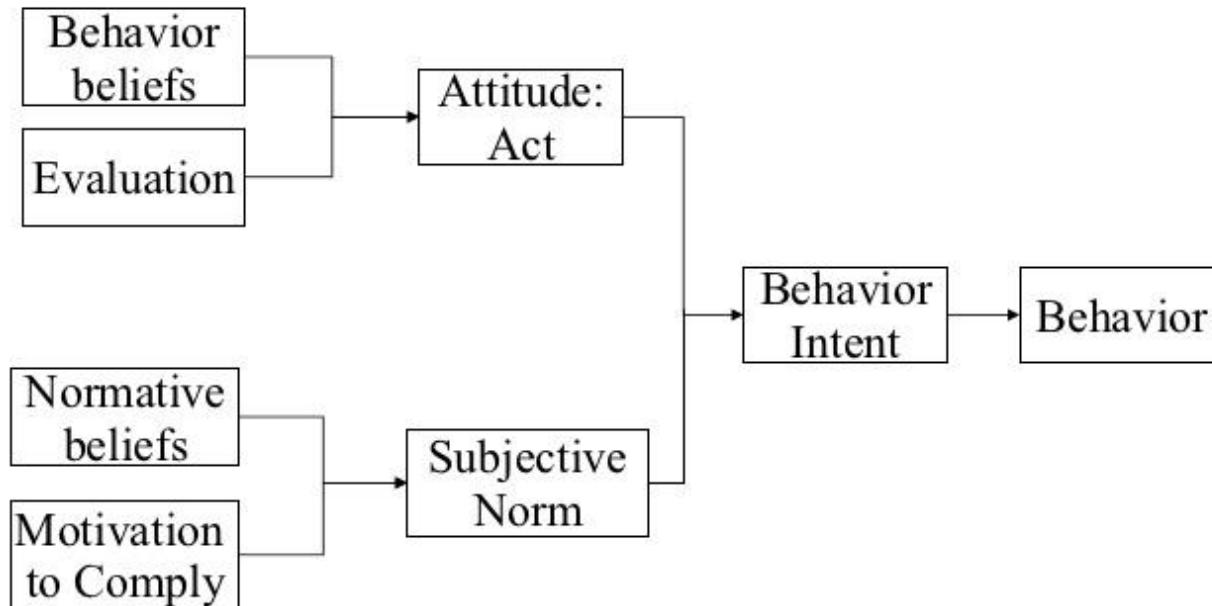
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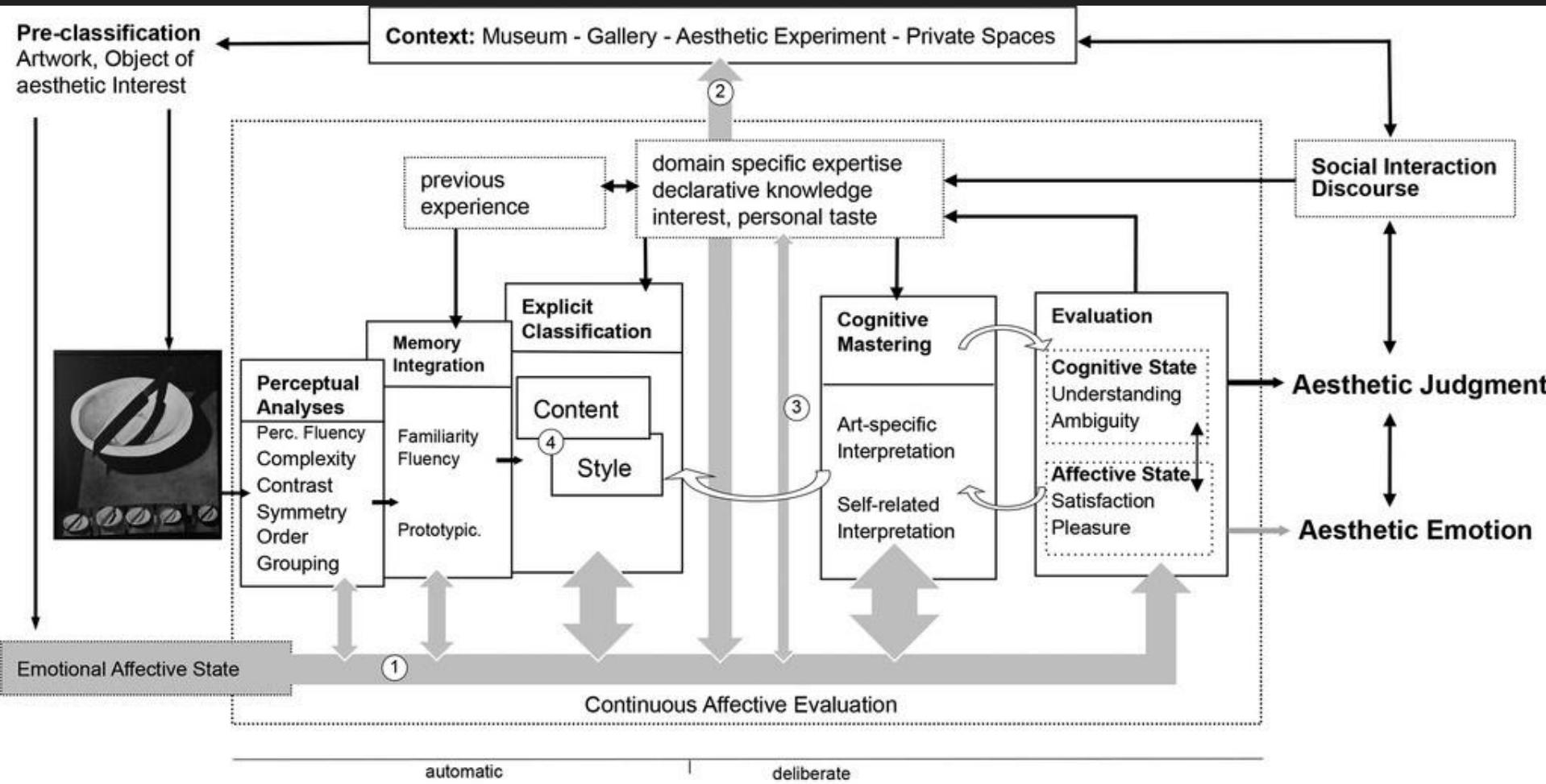




# Attitudes and Behavior



Theory of Reasoned Action (Fishbein & Ajzen)



# research

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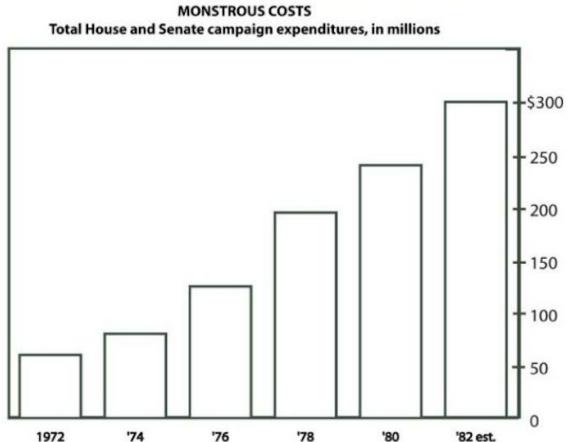
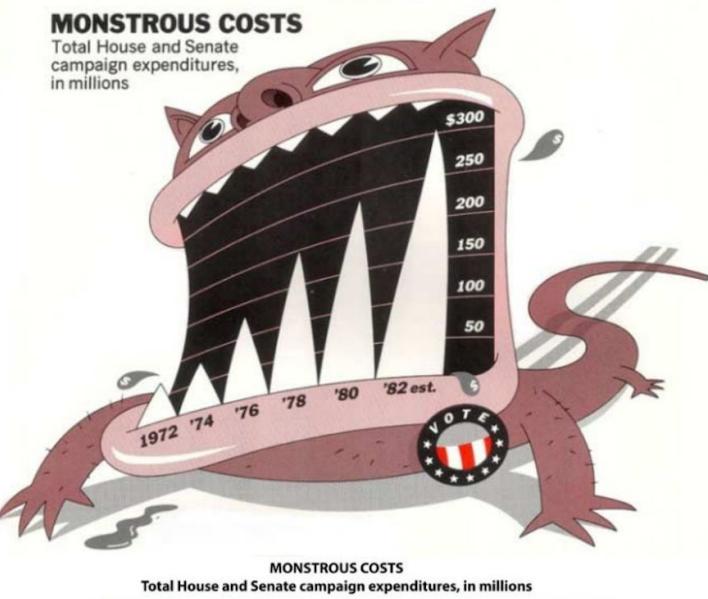
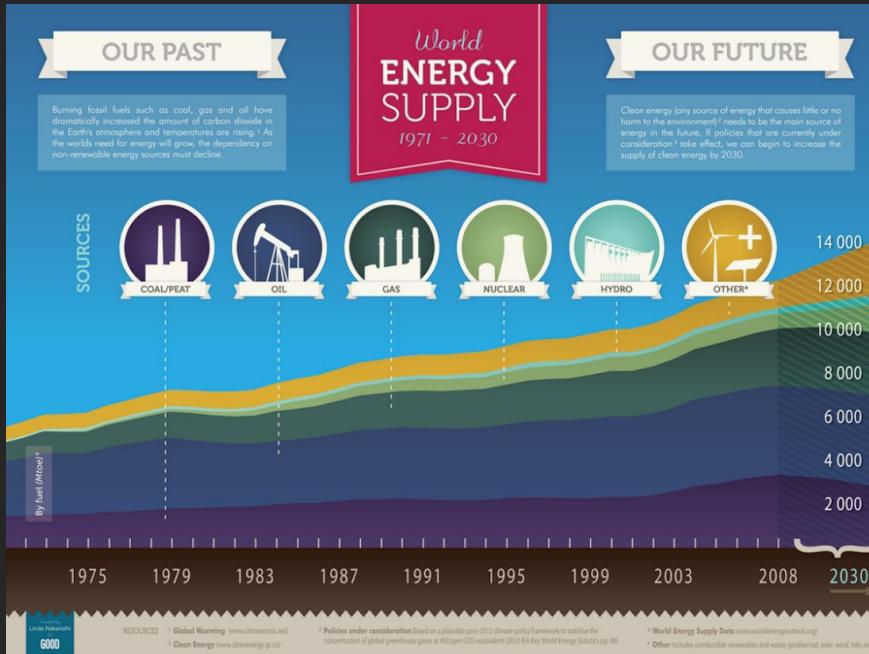
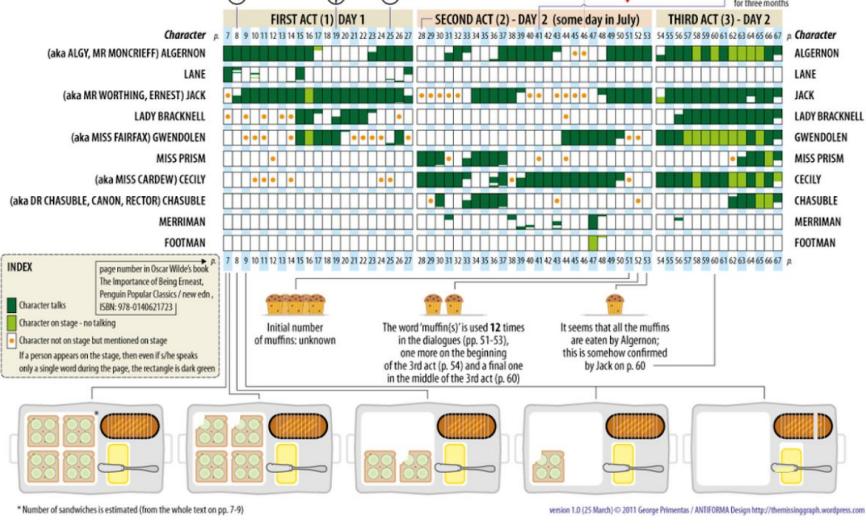


Figure 1. A chart by Holmes [7] (above), and a ‘plain’ version.

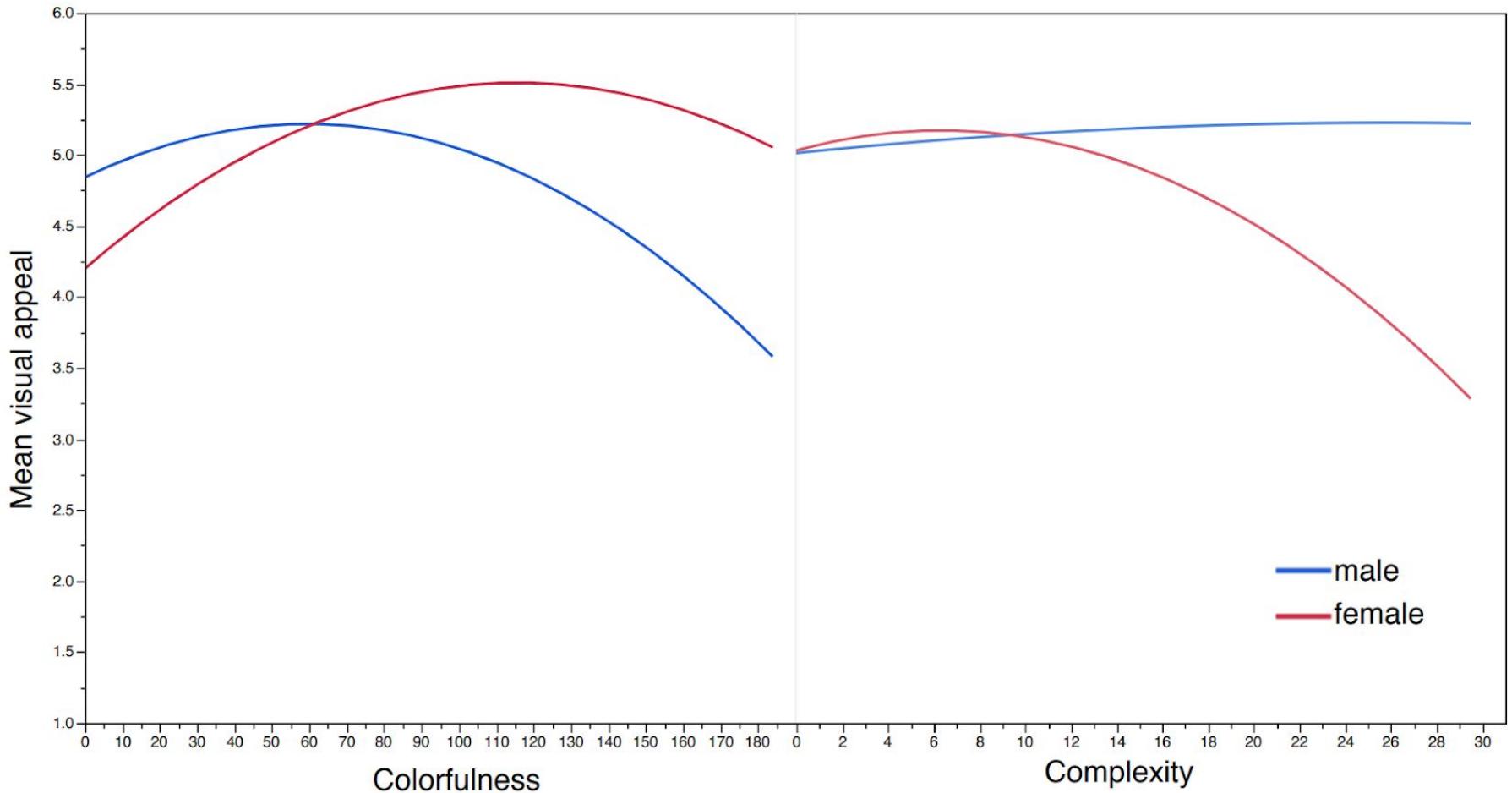
source

## Oscar Wilde The Importance of Being Earnest

14th of February  
day that according to Cecily (p. 41),  
she got engaged to Algernon

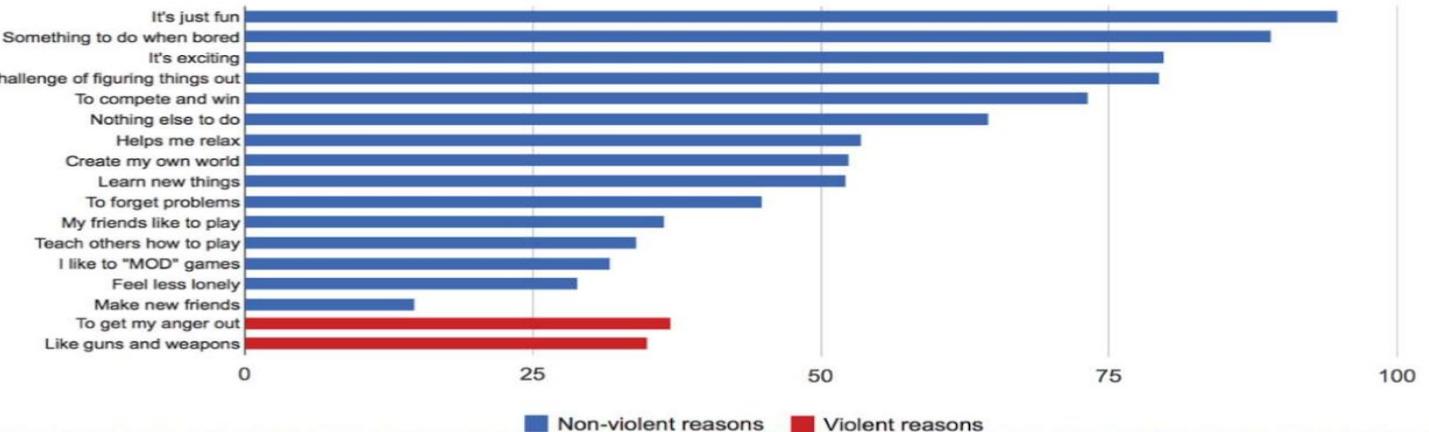


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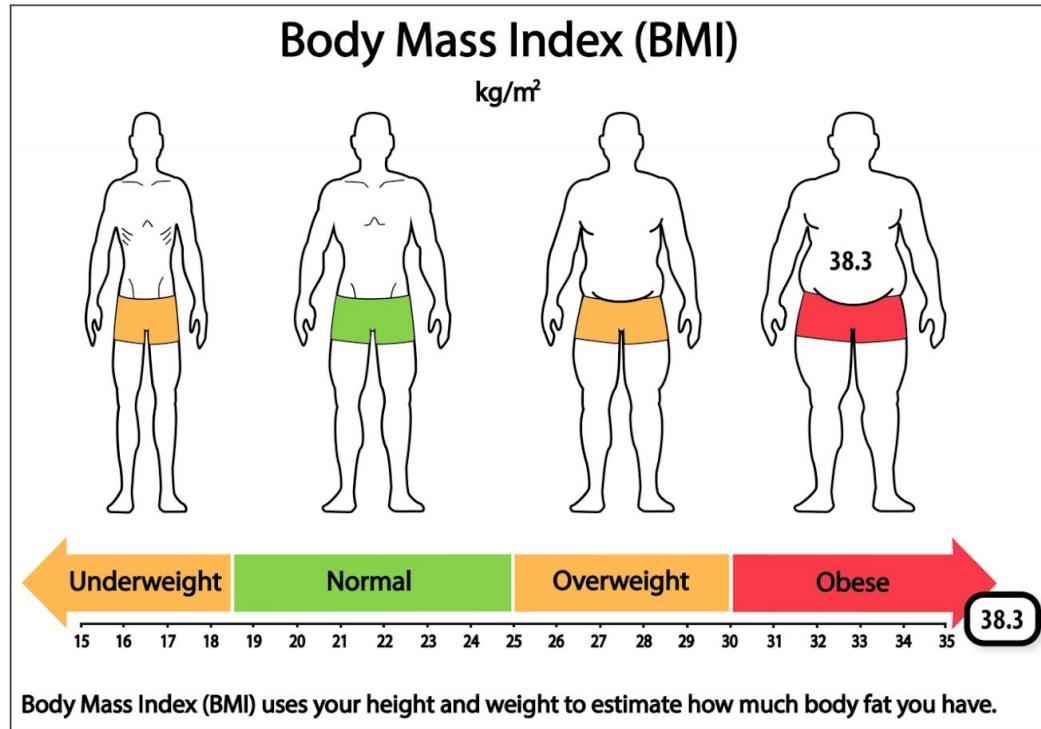


source

### Recorded response of children for playing computer games (in %).



Reasons for playing video games	Agree percentage	Reason type
It's just fun	94.85	Non-violent
Something to do when bored	89.05	Non-violent
It's exciting	79.8	Non-violent
Challenge of figuring things out	79.35	Non-violent
To compete and win	73.2	Non-violent
Nothing else to do	64.65	Non-violent
Helps me relax	53.5	Non-violent
Create my own world	52.5	Non-violent
Learn new things	52.25	Non-violent
To forget problems	45	Non-violent
My friends like to play	36.5	Non-violent
Teach others how to play	34	Non-violent
I like to "MOD" games	31.75	Non-violent
Feel less lonely	29	Non-violent
Make new friends	14.75	Non-violent
To get my anger out	37	Violent
Like guns and weapons	35	Violent



**Figure 2:** Body Mass Index (BMI) infographic from WICER showing an out-of-range value (38.3). Initially, we presented the body silhouettes (top portion) and the reference range number line (bottom portion) in participatory design sessions as separate graphical formats. We combined them into a single infographic at the suggestion of design session participants. The attributes of the data drove numerous design decisions.

(a)

*Treated individuals*



*Nontreated individuals*



(b)

*Treated individuals*



*Nontreated individuals*

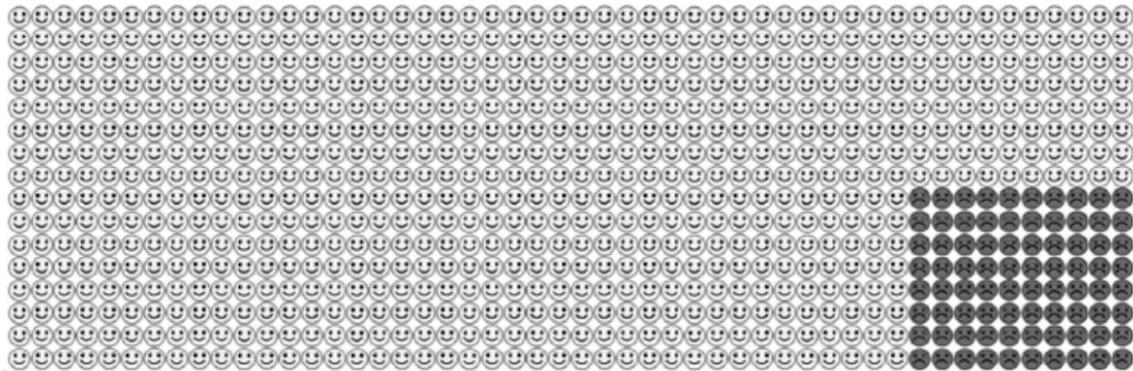
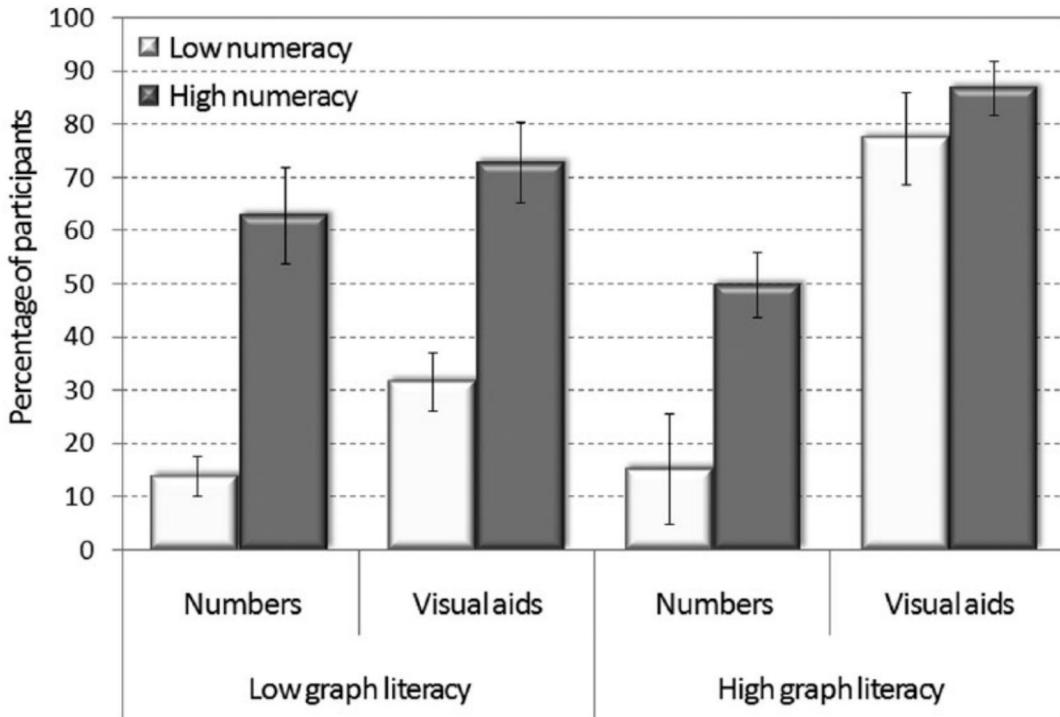
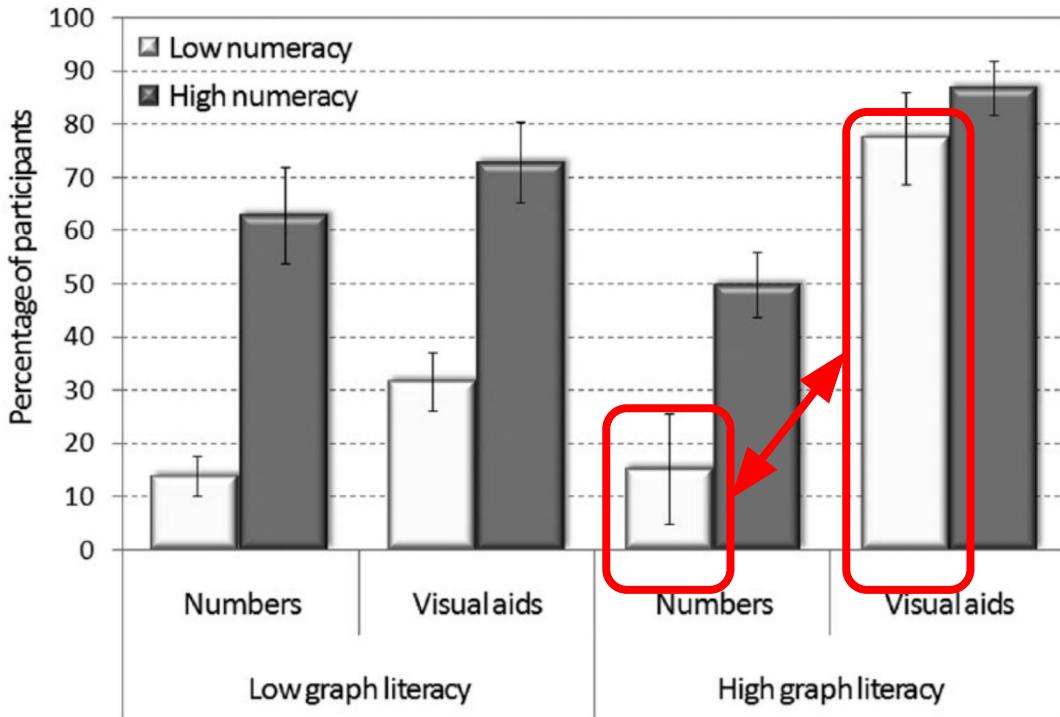


Figure 5. Icon arrays representing a treatment risk reduction of 50% with (a) equal and (b) different samples of treated and nontreated individuals. Affected individuals are represented in dark gray. Healthy individuals are represented in light gray.



*Figure 4.* Percentage of participants with low and high numeracy and low and high graph literacy who correctly inferred treatment risk reduction, as a function of condition (numbers vs. visual aids). In the visual-aids condition, icon arrays and bars reported the entire population at risk. Error bars represent one standard error. Adapted from "Who Profits From Visual Aids: Overcoming Challenges in People's Understanding of Risks," by R. Garcia-Retamero and M. Galesic, 2010, *Social Science & Medicine*, 70, 1019–1025. Copyright 2010 by Elsevier Ltd. Adapted with permission.



*Figure 4.* Percentage of participants with low and high numeracy and low and high graph literacy who correctly inferred treatment risk reduction, as a function of condition (numbers vs. visual aids). In the visual-aids condition, icon arrays and bars reported the entire population at risk. Error bars represent one standard error. Adapted from “Who Profits From Visual Aids: Overcoming Challenges in People’s Understanding of Risks,” by R. Garcia-Retamero and M. Galesic, 2010, *Social Science & Medicine*, 70, 1019–1025. Copyright 2010 by Elsevier Ltd. Adapted with permission.

# The New York Times

Tuesday, March 27, 2018 | [Today's Paper](#) | [Video](#) | 50°F | FTSE 100 +1.76% ↑

World U.S. Politics N.Y. Business Opinion Tech Science Health Sports Arts Books Style Food Travel Magazine T Magazine ALL

## Expelling 60 Russians, U.S. Joins Allies in a Harsh Rebuke

By KATIE ROGERS and PETER BAKER

- President Trump ordered 60 Russian officials to leave the country, joining a coordinated campaign by two dozen countries to retaliate for the poisoning of a former Russian spy in Britain.

- The joint action intensified the conflict between Russia and the West, yet Mr. Trump avoided any public condemnation of Russia's role in the attack.



Chip Somodevilla/Getty Images North America

## She Was Shot in Parkland. Can She Turn Trauma Into Change?

Onstage, Samantha Fuentes, 18, is helping to lead a national conversation about gun control. Behind the scenes, she's reeling from mental and physical trauma.

By NEETI UPADHYE, YOUSUR AL-HLOU and NATALIE RENEAU  
Following Citigroup, New Ways Banks Can Limit Gun Sales

## How an Outraged Europe Agreed to a Hard Line on Putin

By STEVEN ERLANGER 2:30 AM ET

Faced with new aggressiveness from the newly re-elected President Vladimir V. Putin, the European Union backed Britain and sent a strong message to Moscow.

### Listen to 'The Daily': Violence as Daily Threat

Students on the South Side of Chicago joined protests spurred by the Florida school shooting, but they also felt frustration. Why hadn't gun violence in their community earned the same outrage?



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## Opinion

### New Leadership Has Not Changed Uber

By STEVEN HILL

Its business model has always been the same, and it's always been destructive.

#### EDITORIAL

### Editorial: Tough Action on Russia, at Last, but More Is Needed

Freeze oligarchs' assets and bar them from Western banks, then start to protect the American electoral system.

- Scott Pruitt's Attack on Science Would Paralyze the E.P.A.
- Editorial: All the President's Thugs

### Hello, Generation Putin

By IVAN KRASTEV

Vladimir Putin is installing a cohort of young, loyal technocrats in a bid to assure that his regime will endure without him.

- Editorial: New York City Subways Are Still Looking for a Savior
- Brooks: In Praise of Privilege
- Krugman: Putting the Ex-Con in Conservatism
- Yes, You Can Indict the President
- Beware of A.I. in Social Media Advertising
- What Was the Vietnam War About?
- Goldberg: Stormy Daniels Spanks Trump Again

#### READER CENTER »

Humans of Quebec: Portraits of Those I Met on My Road Trip

#### THE CROSSWORD »

Play Today's Puzzle

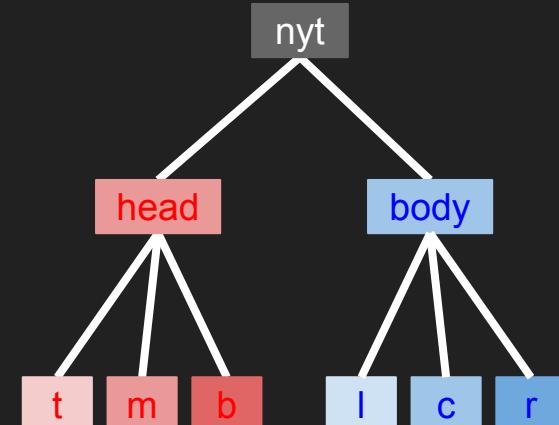
6h

An admission of cheating by the Australian cricket captain has stunned a sport that prides itself on fair play.



6h

The bullet that killed a gunman in a Maryland school last week came from his own weapon, not from the gun of a school resource



none



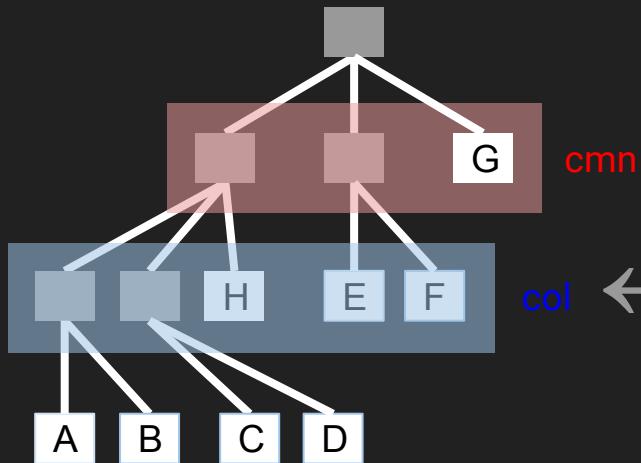
col



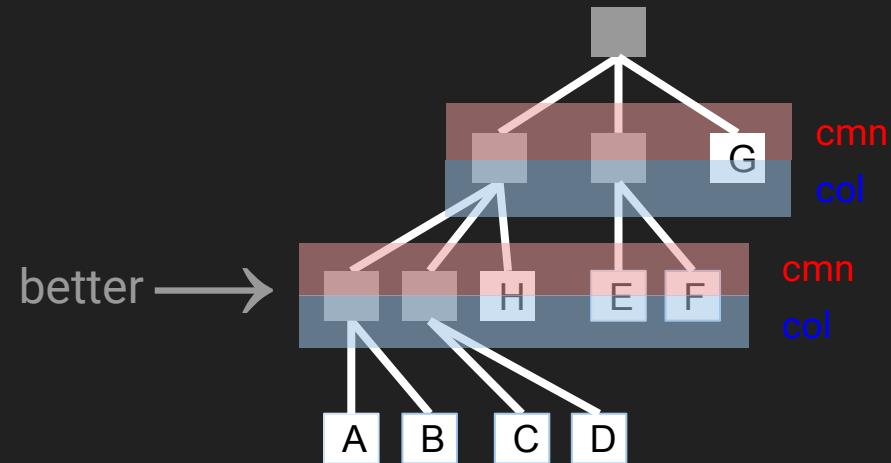
cnn



disjoint grouping

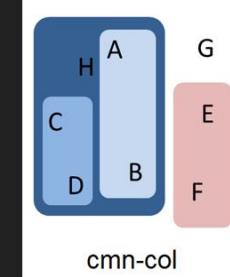
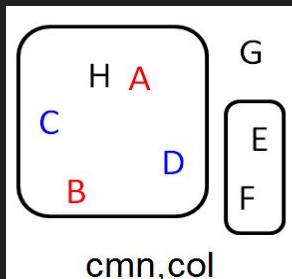


reinforced grouping



worse

better



source

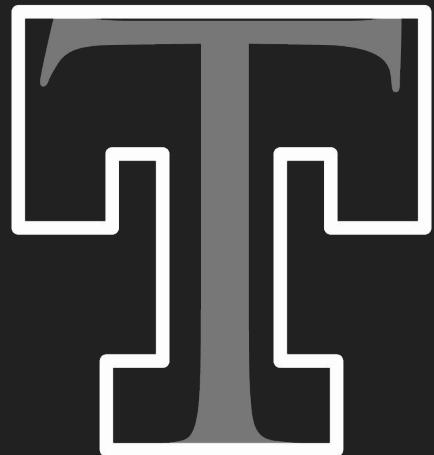
# instruction?

a bit about me/us  
the vis we know  
the vis that is emerging  
bottom line  
why now?  
trad vis fails  
data comm wins  
data comm breadth  
research  
instruction?  
sources

the old individual domain

T

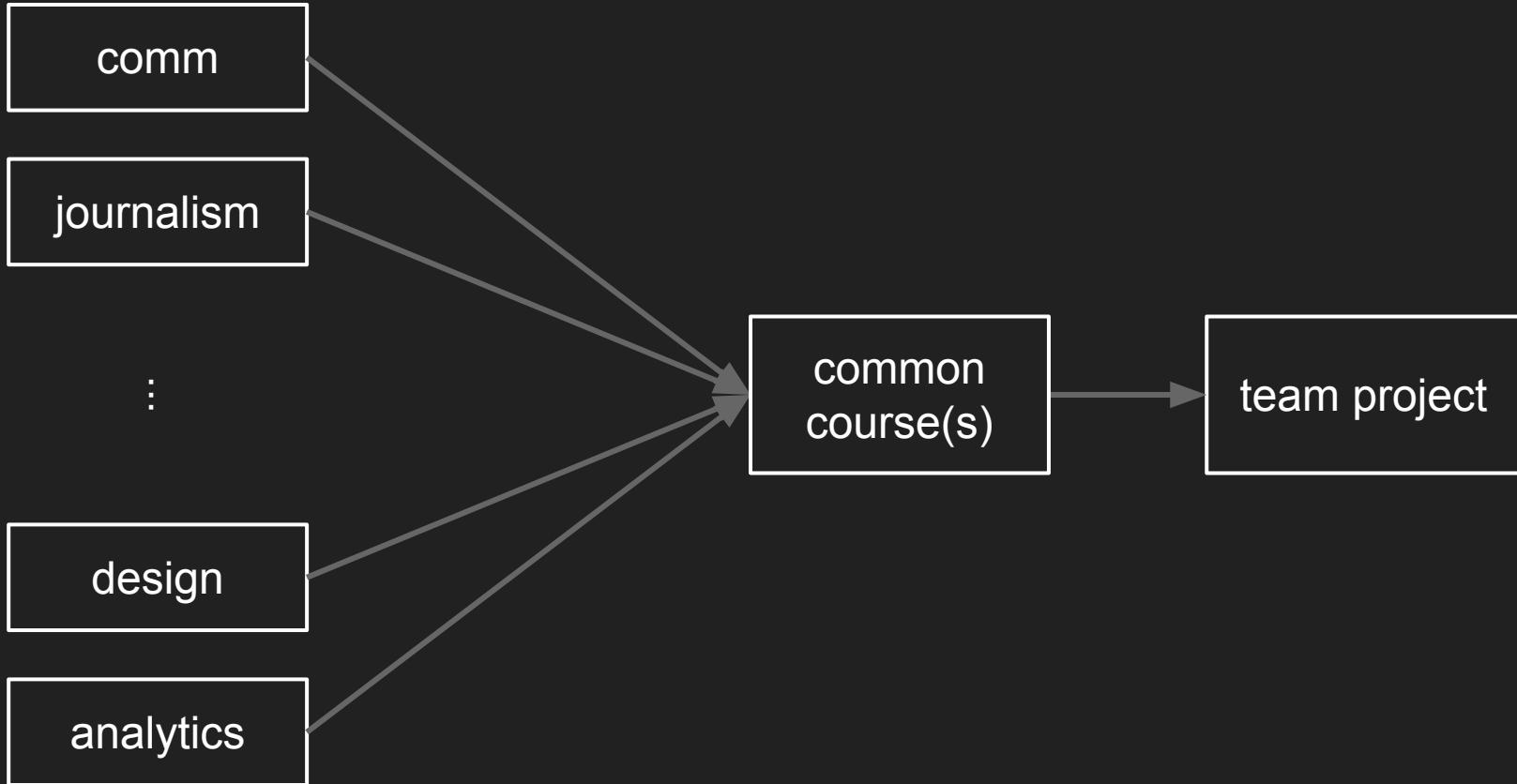
a data comm graduate...





...spans many disciplines





# sources

a bit about me/us  
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trad vis fails  
data comm wins  
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sources

A K Peters Visualization Series

# Data-Driven Storytelling

Edited by

Nathalie Henry Riche  
Christophe Hurter  
Nicholas Diakopoulos  
Sheelagh Carpendale



# Visualization for Communication (VisComm)

October 20<sup>th</sup>      9am - 12:20pm      Room 15

## WORKSHOP SUMMARY

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**Date and Location:** The workshop will be held on Sunday, October 20, 9am to 12:20pm at [IEEE VIS](#) in the Vancouver Convention Centre East Building.

While visualization research is still largely focused on data analysis, most people experience visualization as communication and presentation. The New York Times and other publications regularly release interactive visuals depicting complex datasets including political topics, budgets, and sports. An independent community of visualization practitioners and bloggers has also sprung up, producing and deconstructing visualizations of data of broad interest. Free visualization tools such as D3, Data Wrapper, Tableau Public, and others are available and widely used.

The VisComm workshop brings together practitioners and researchers from a broad range of disciplines to address questions raised by visualization's new communicative role. We encourage participation from journalists, designers and others that do not typically attend [IEEE Vis](#).

## PROGRAM

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### VisComm Session 1: Visualization for Specific Audiences (9:00am - 10:30am)



*Visualization Onboarding: Learning how to Read and Use Visualizations*

Christina Stoiber, Florian-Gregor Grassinger, Margit Pohl, Holger Stitz, Marc Streit, and

thanks.

questions?

Benjamin Watson

*[bwatson@ncsu.edu](mailto:bwatson@ncsu.edu)*

*[vxlab.csc.ncsu.edu](http://vxlab.csc.ncsu.edu)*

*[go-vxlab.csc.ncsu.edu/viscommtalk](http://go-vxlab.csc.ncsu.edu/viscommtalk)*

