

NASSCOM®

BigData & Analytics SUMMIT 2017

AI & Deep Learning Transforming Enterprise Decision Making

JUNE 22nd & 23rd 2017

HICC, HYDERABAD

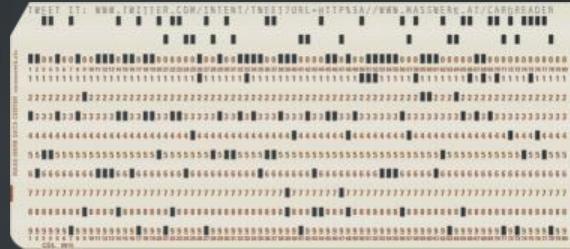
The Missing 80%



Dr. JT Kostman

Up to 60,000 Digits!

0.007MB



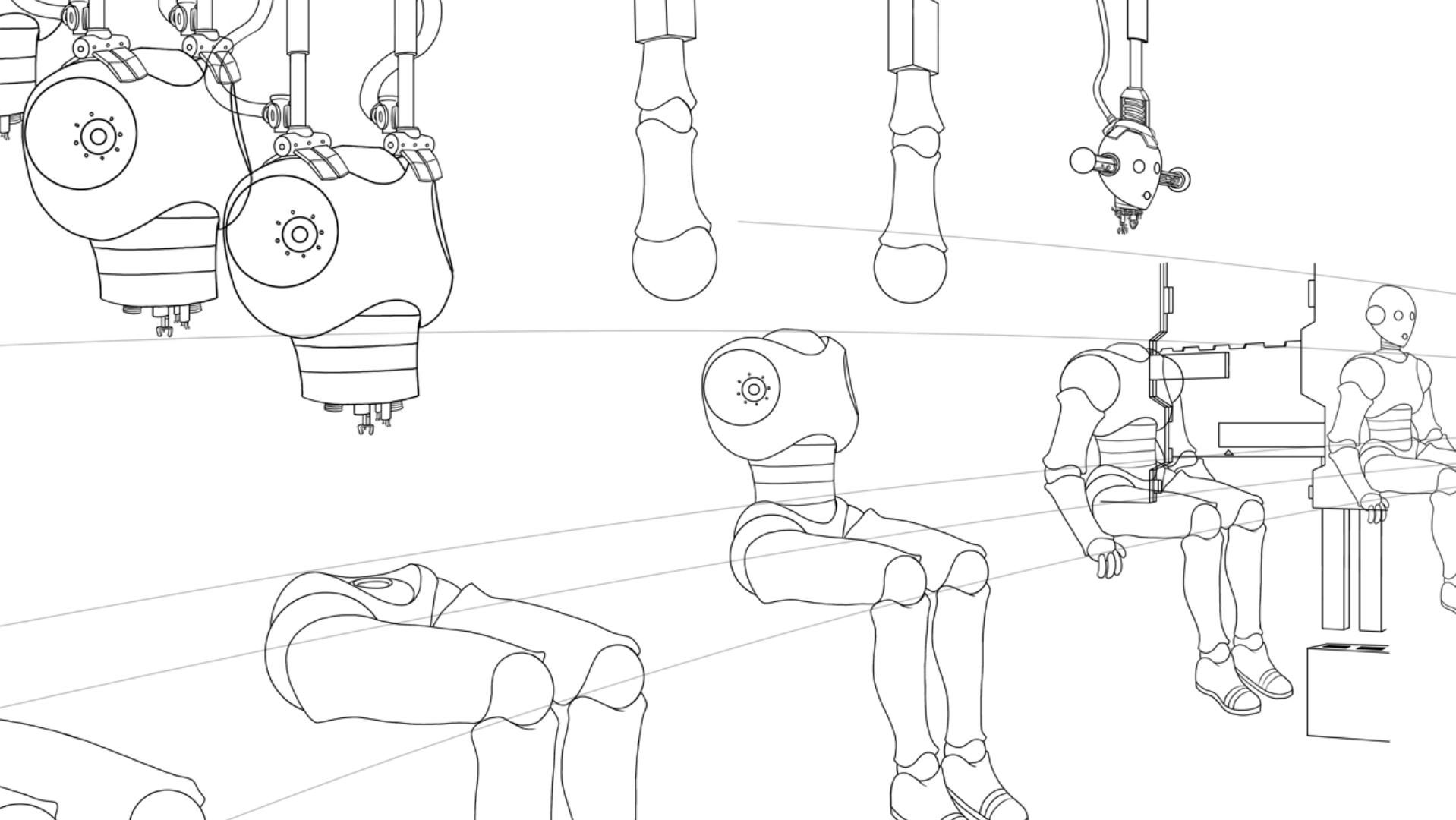


ELEVATOR



Computer







Harvard Business Review

OCTOBER 2012

46 The Big Idea

The True Measures
Of Success
Michael J. Mauboussin

84 International Business

10 Rules for Managing
Global Innovation
Keeley Wilson and Yves L. Doz

92 Leadership

What Ever Happened
To Accountability?
Thomas E. Ricks



DATA SCIENTIST: THE SEXIEST JOB OF THE 21ST CENTURY

A photograph of Shah Rukh Khan shirtless, showing his well-defined abdominal muscles. He is wearing a red headband and red wristbands. He is standing in what appears to be a gym or fitness studio, with blurred lights and equipment in the background.

Shah Rukh Khan
Data Scientist

DATA SCIENTIST

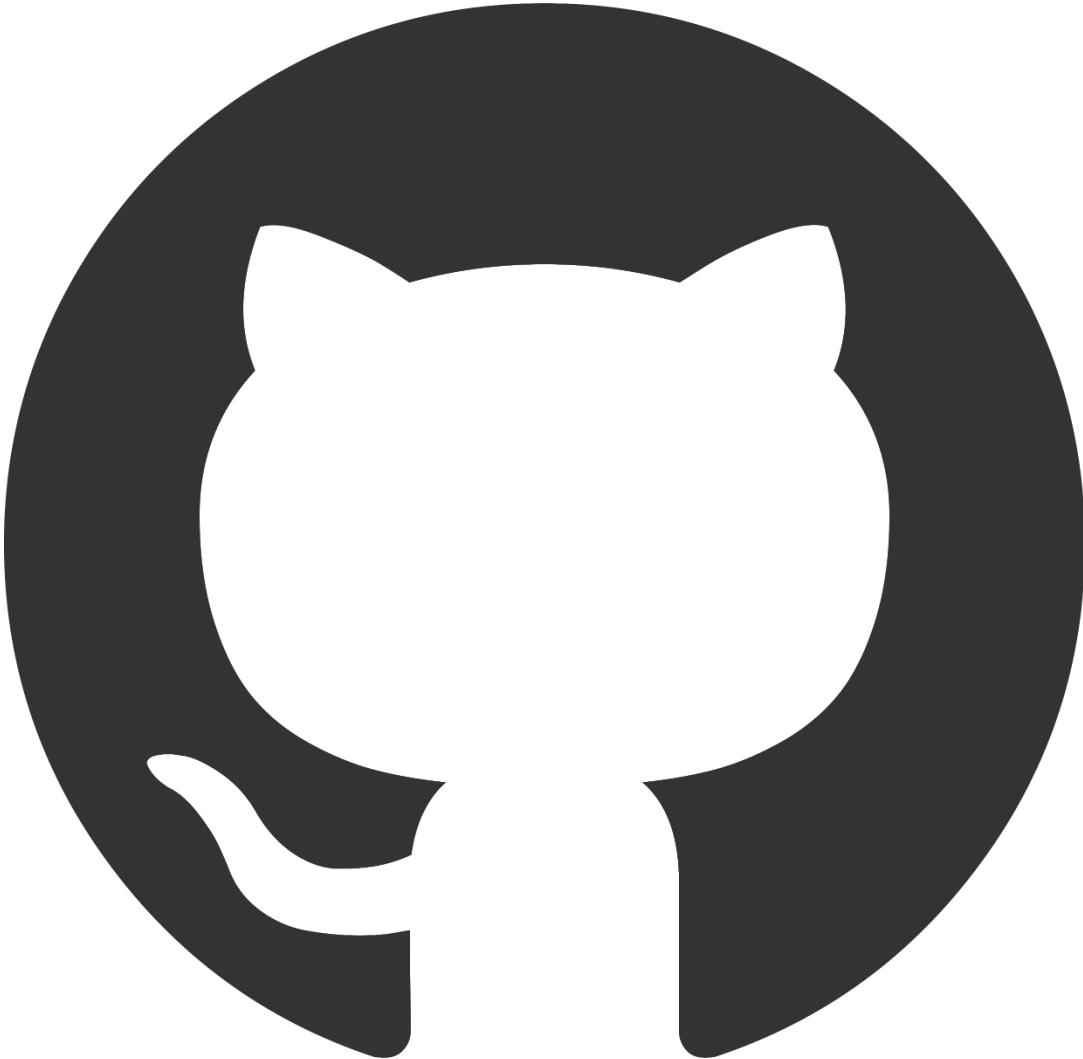






DATA TECHNICIAN





A Neural Network in 13 lines of Python

```
01. import numpy as np
02. X = np.array([[0,0,1],[0,1,1],[1,0,1],[1,1,1]])
03. y = np.array([[0,1,1,0]]).T
04. alpha,hidden_dim = (0.5,4)
05. synapse_0 = 2*np.random.random((3,hidden_dim)) - 1
06. synapse_1 = 2*np.random.random((hidden_dim,1)) - 1
07. for j in xrange(60000):
08.     layer_1 = 1/(1+np.exp(-(np.dot(X,synapse_0))))
09.     layer_2 = 1/(1+np.exp(-(np.dot(layer_1,synapse_1))))
10.     layer_2_delta = (layer_2 - y)*(layer_2*(1-layer_2))
11.     layer_1_delta = layer_2_delta.dot(synapse_1.T) * (layer_1 * (1-layer_1))
12.     synapse_1 -= (alpha * layer_1.T.dot(layer_2_delta))
13.     synapse_0 -= (alpha * X.T.dot(layer_1_delta))
```

THIS IS YOUR MACHINE LEARNING SYSTEM?

YUP! YOU POUR THE DATA INTO THIS BIG
PILE OF LINEAR ALGEBRA, THEN COLLECT
THE ANSWERS ON THE OTHER SIDE.

WHAT IF THE ANSWERS ARE WRONG?

JUST STIR THE PILE UNTIL
THEY START LOOKING RIGHT.

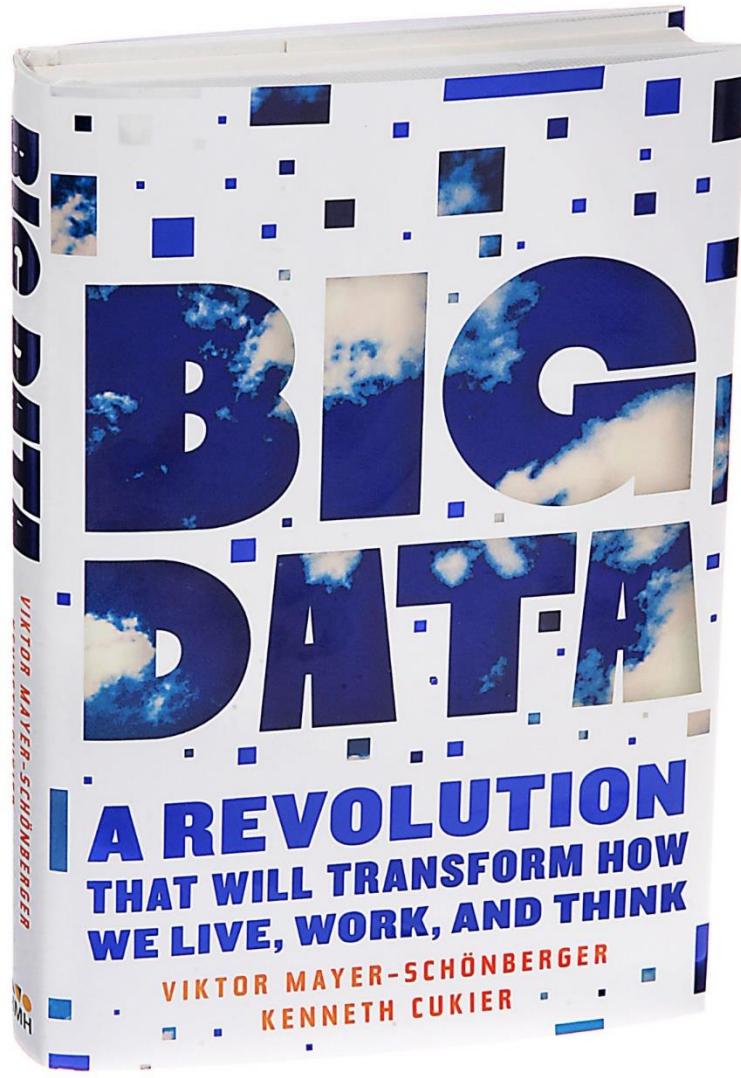


The End of Theory: The Data Deluge Makes the Scientific Method Obsolete

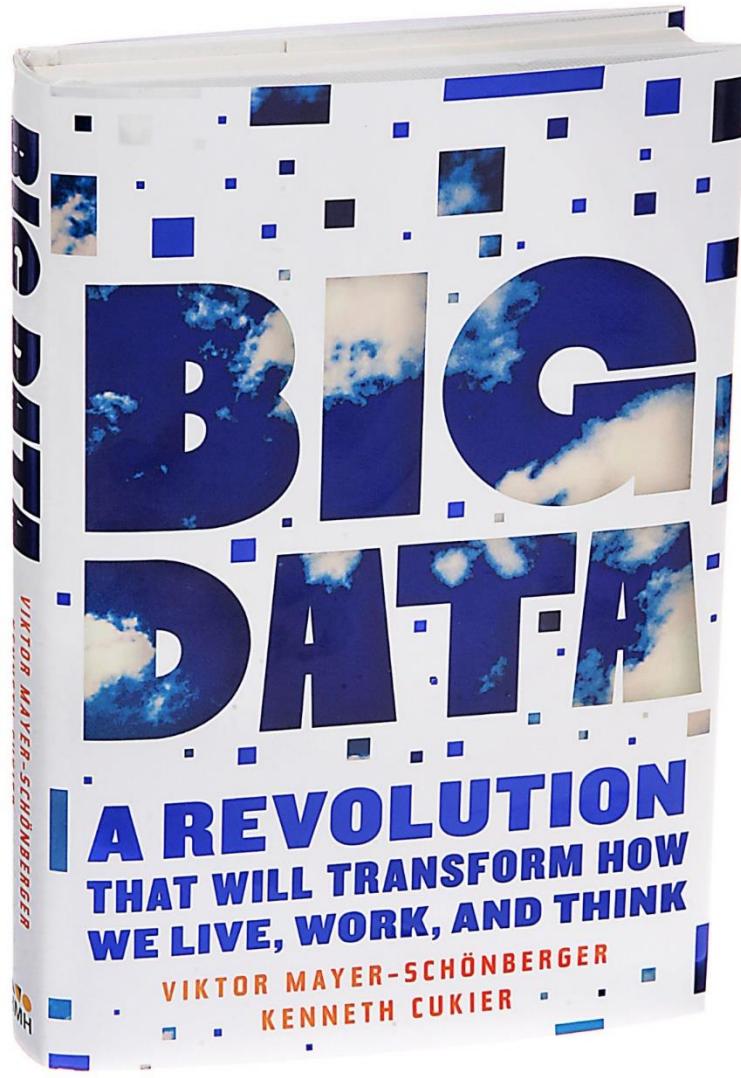
By Chris Anderson  06.23.08



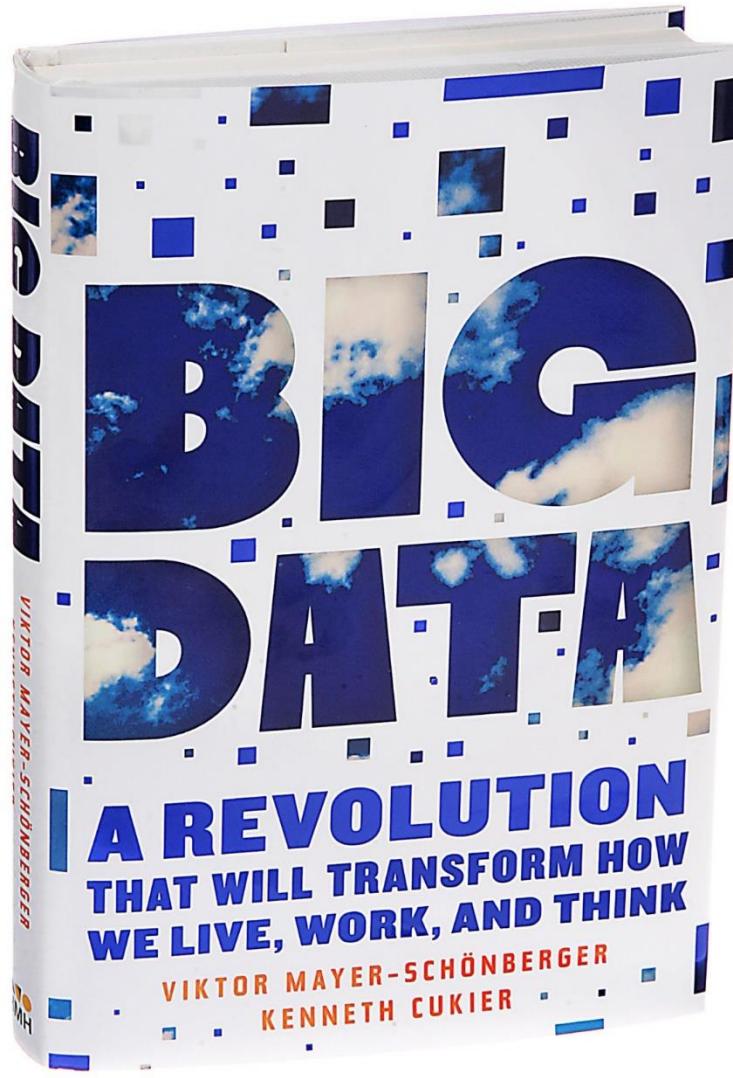
Illustration: Marian Bantjes



“...society will need to shed some of its obsession for causality in exchange for simple correlations: not knowing *why* but only *what*.”

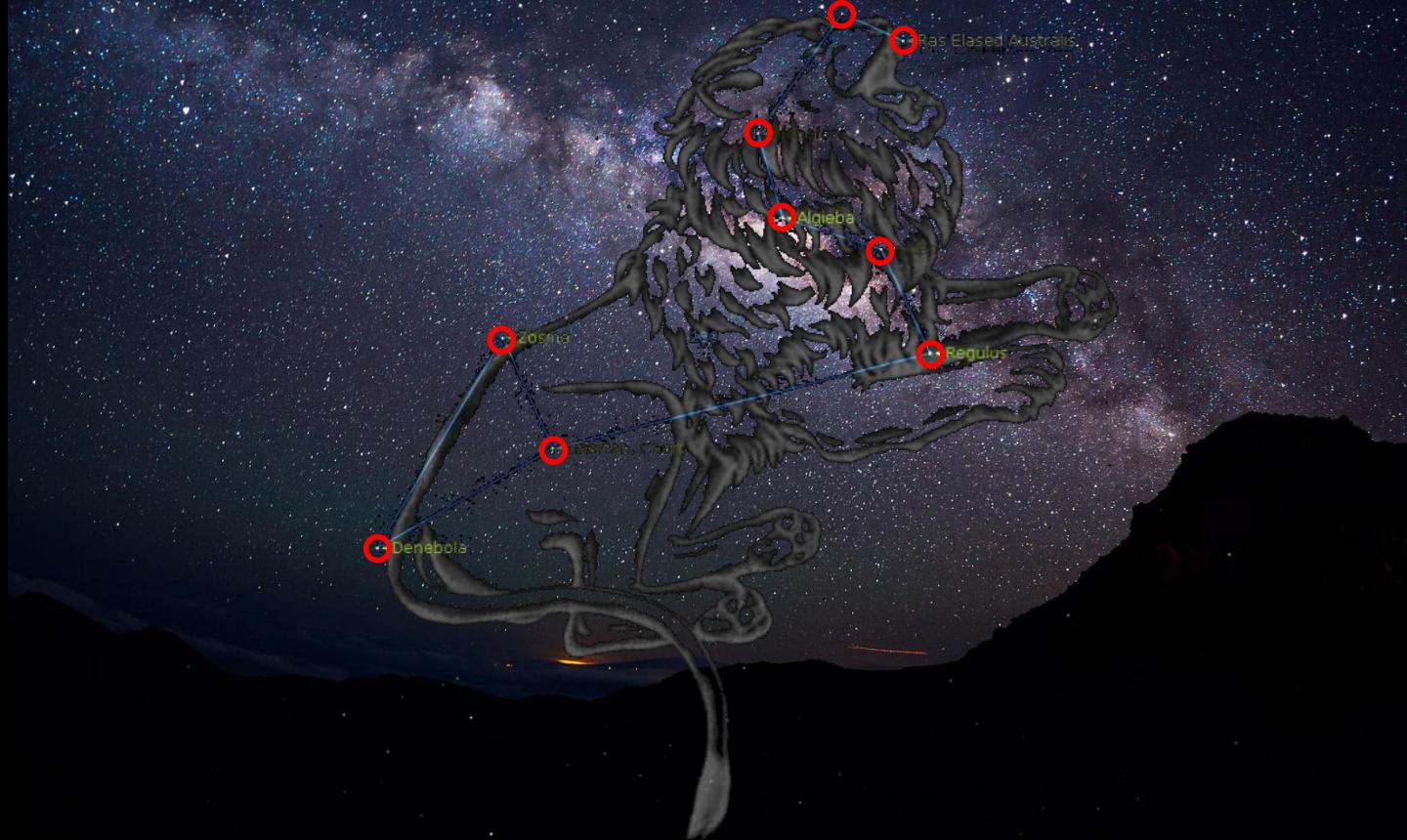


“This overturns centuries of established practice and challenges our basic understanding of how to make decisions and comprehend reality.”



“Just as the telescope enabled us to comprehend the universe and the microscope allowed us to understand germs, the new techniques for collecting and analyzing huge bodies of data will help us make sense of our world in ways we are just starting to appreciate.”







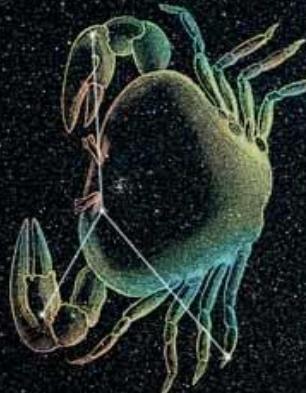
GEMINI



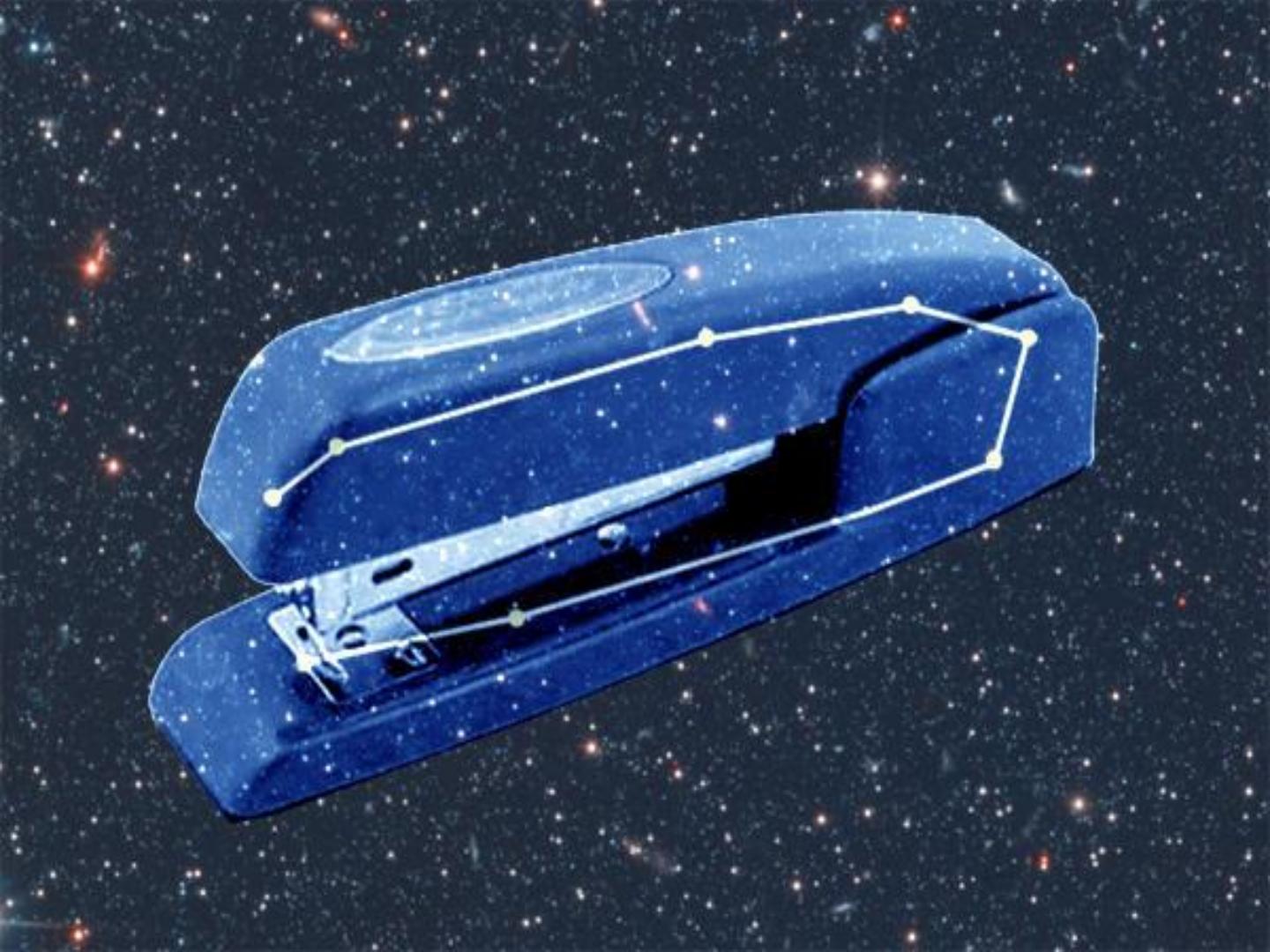
ARIES



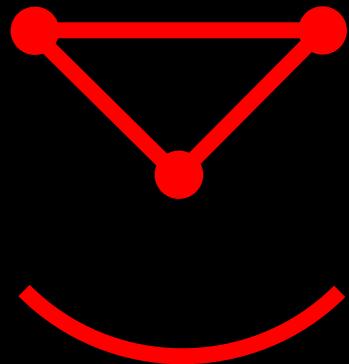
TAURUS



CANCER

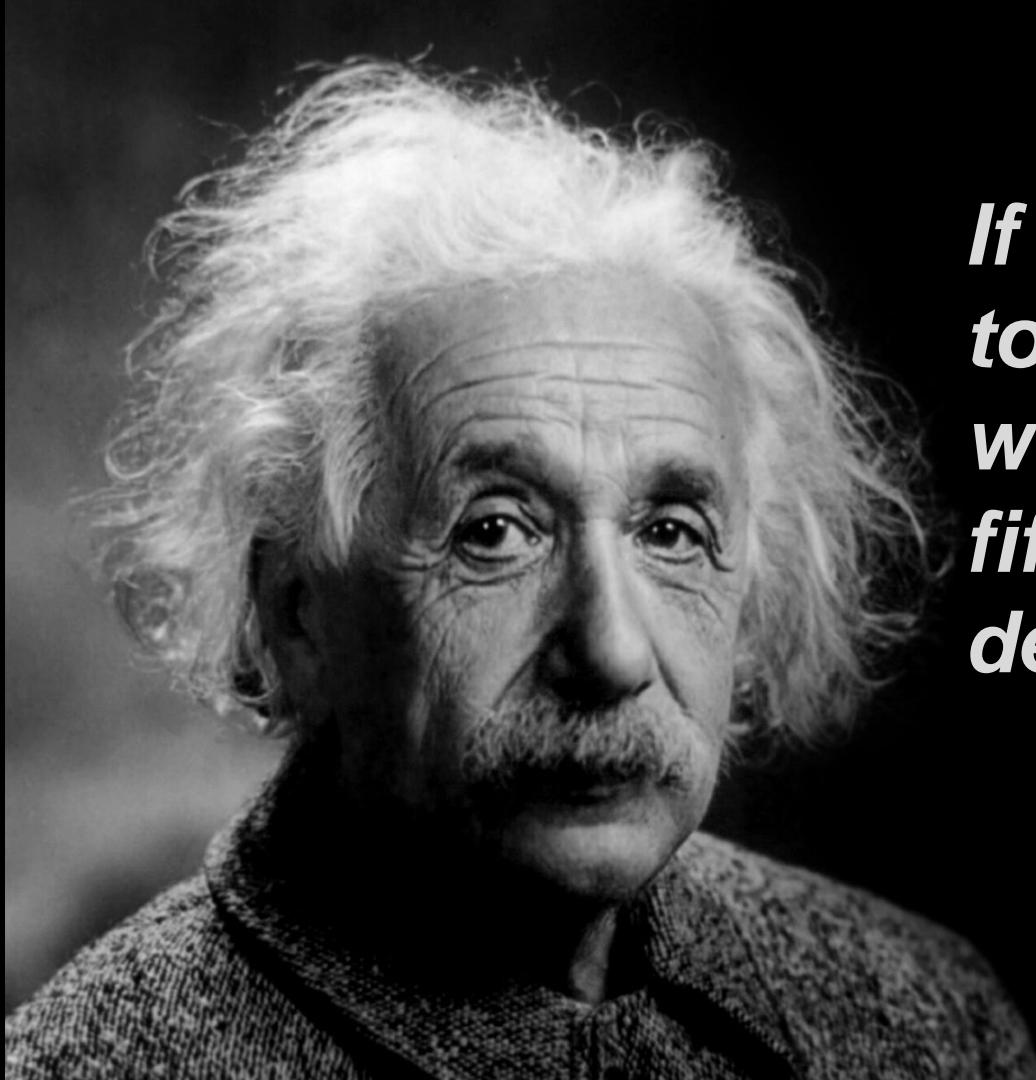


Pareidolia



THE SCIENTIFIC METHOD

- *Ask a Question*
- *Do Background Research*
- *Construct a Hypothesis*
- *Test Your Hypothesis by Doing an Experiment*
- *Analyze Your Data and Draw a Conclusion*
- *Communicate Your Results*

A black and white close-up portrait of Albert Einstein. He has his characteristic wild, curly hair and a well-groomed, bushy beard and mustache. His eyes are looking slightly off-camera to the right with a thoughtful expression. The lighting is dramatic, casting deep shadows on one side of his face.

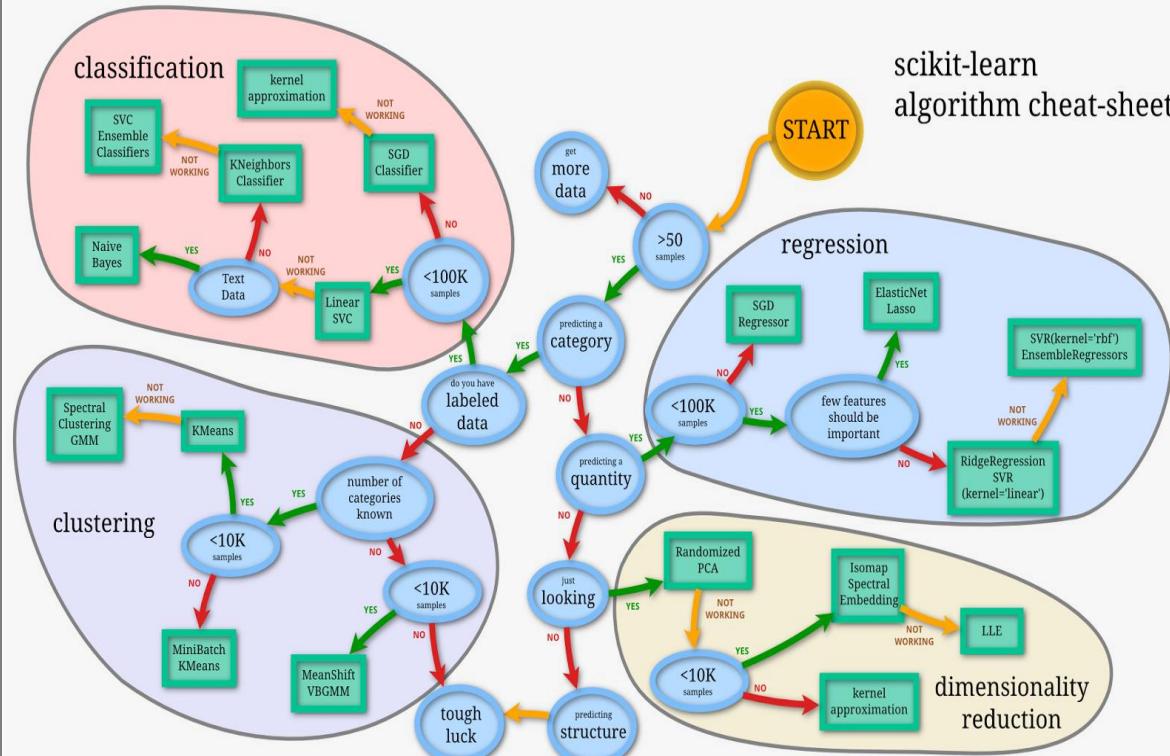
*If I had only one hour
to save the world, I
would spend the first
fifty-five minutes
defining the problem.*

Albert Einstein

Preparation

Analysis

Presentation



Preparation

- The Right Question
- The Right Data
- The Right Methodology

DEFINING THE PROBLEM

JT's Rule: The question the client is asking is almost never the question that really needs to be answered

- Ask yourself:
 - *What is the situation or condition?*
 - *What are the consequences and/or costs?*
 - *Can we do something with the results?*
 - *Descriptive, Predictive, Prescriptive*

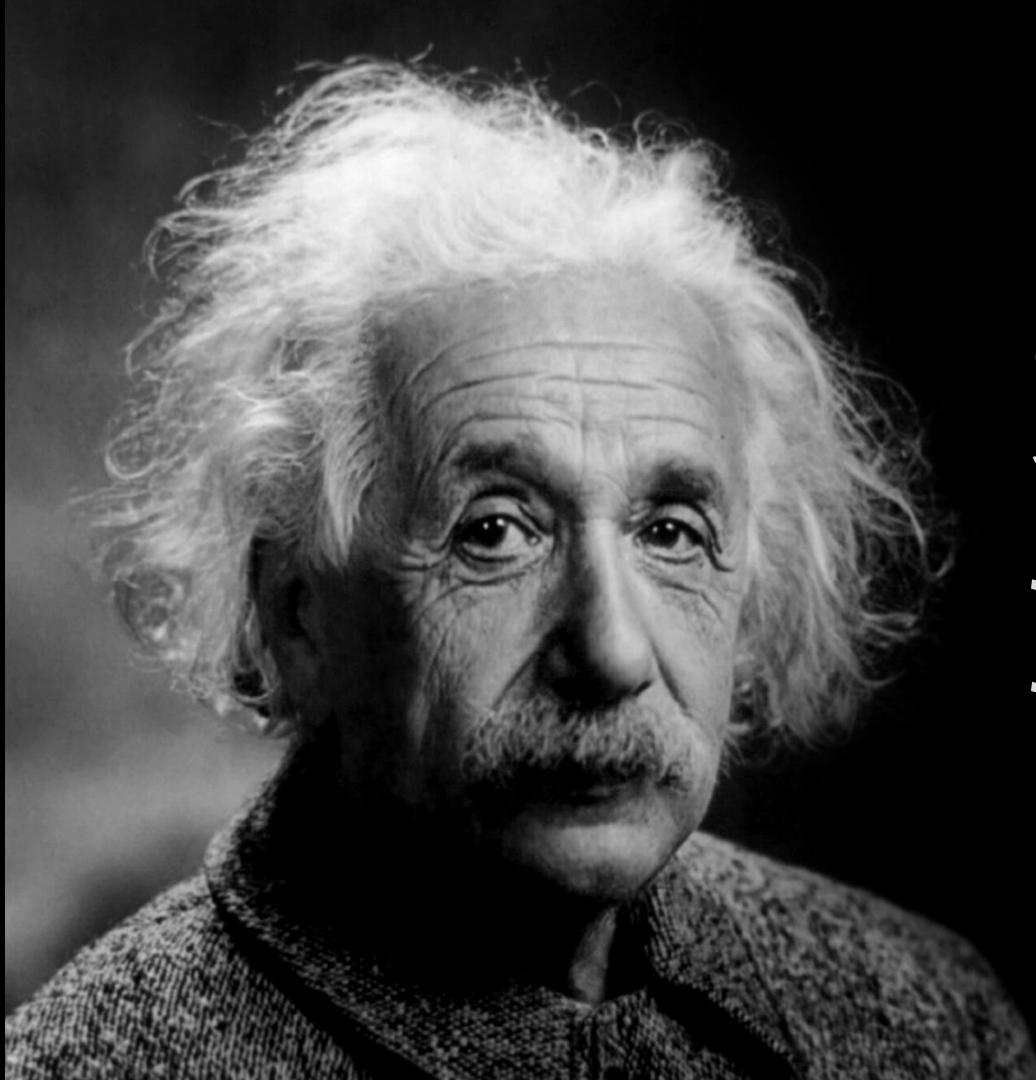
Preparation

- Research Question (DV ID)
- Variable Identification (IV ID)
- Preprocessing (Cleaning)
 - Missing Data
 - Normalization/Standardization
 - Outlier Identification
 - Central Tendency / Distribution / Variance / Range / Skewness / Heteroscedasticity
- Transformation (e.g., Logarithmic)
- Data Dictionary (Explication)
- Metadata
- Data Appends
- Data Intimacy
- Hypothesis Formation
- Experimental Design
- Analytic Approach (Boxes, Circles, Lines)

QUID TUM
SO WHAT?

QUID TUM

1. What you are researching
 - *I am investigating the topic of....*
2. What your client doesn't know
 - *Because it will be important to know...*
3. Why it is important they know
 - *So that we can....*

A black and white close-up photograph of Albert Einstein's face. He has his characteristic wild, white hair and a well-groomed, light-colored beard and mustache. His eyes are looking slightly to the right of the camera with a thoughtful expression. The lighting is dramatic, casting deep shadows on one side of his face.

*You do not really
understand
something unless
you can explain it to
your grandmother.*

Albert Einstein



Presentation



Upanishads







Upanishads

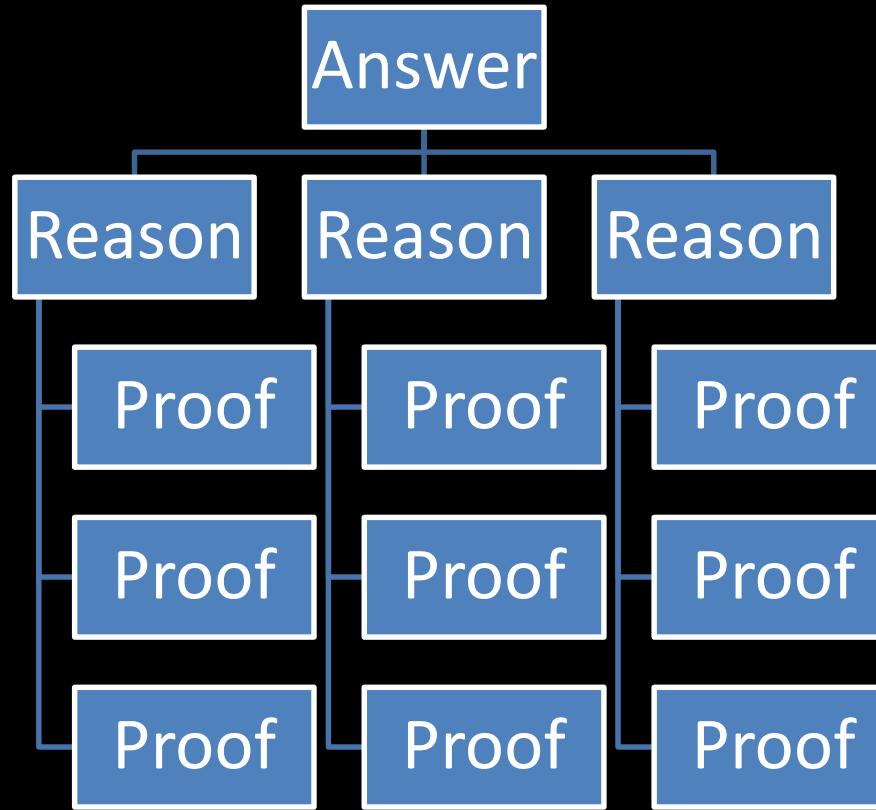
Sita Doss Nair

QUID TUM

Making a Cogent Argument

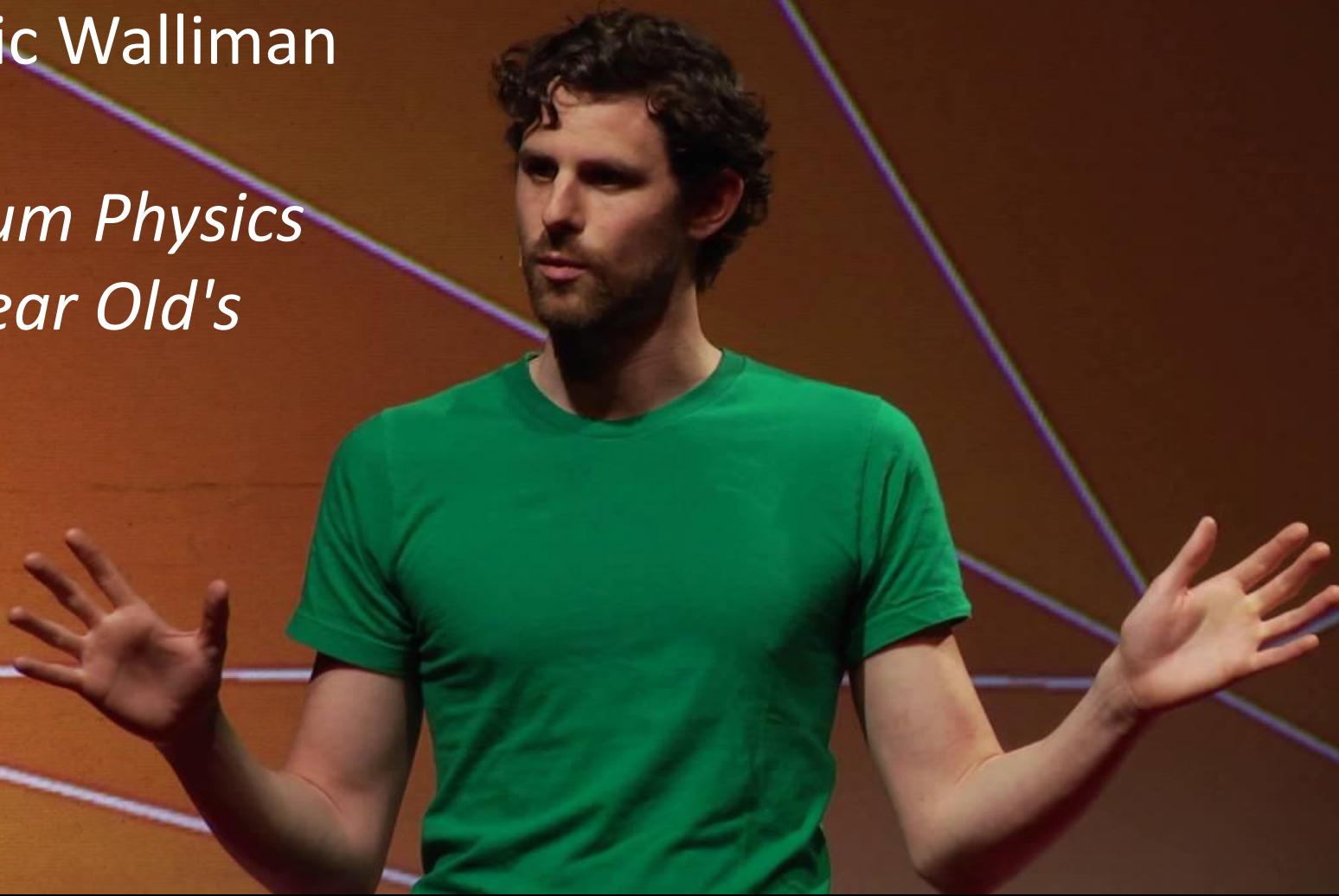
- *Conversation, Not Presentation*
- *Support Your Claims*
- *Anticipate Questions and Objections*
- *Build a Pyramid (Minto)*

The Minto Pyramid



Dominic Walliman

*Quantum Physics
for 7 Year Old's*



FOUNDATIONS

FUNDAMENTAL RULES

THEORY OF COMPUTATION

CONSISTENT SET OF AXIOMS?

GÖDEL INCOMPLETENESS THEOREMS

P ≠ NP?

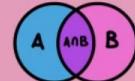
COMPLEXITY THEORY



MATHEMATICAL LOGIC

$P \Rightarrow Q$

SET THEORY



90°
f
g
y
z

CATEGORY THEORY

PARTITION THEORY

TREE

GROUP THEORY

PERMUTATION GROUP

GRAPH THEORY

LINEAR ALGEBRA

MATRICES

VECTORS

EQUATION

STRUCTURES

SPACES

CHANGES

ORIGINS

APPLIED MATHEMATICS

ENGINEERING

SYSTEM

CONTROLLER

SENSOR

CARDINAL NUMBERS
 \aleph_0 ALEPH NULL

OCTONION
 $[e_0, e_1, e_2, e_3, e_4, e_5, e_6, e_7]$

QUATERNION
 $a+bi+cj+d\mathbf{k}$

CRYPTOGRAPHY

COMPUTER SCIENCE

MACHINE LEARNING



THEORY OF COMPUTATION

0 0 0 1 1 B 0:
1

PI
 π

EXPONENTIAL
 e

COMPLEX NUMBERS

3, i, 4+3i, -4i

REAL NUMBERS

RATIONAL NUMBERS

INTEGERS

NATURAL NUMBERS

ARITHMETIC

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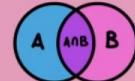
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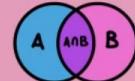
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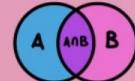
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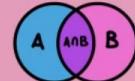
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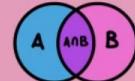
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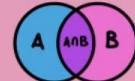
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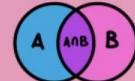
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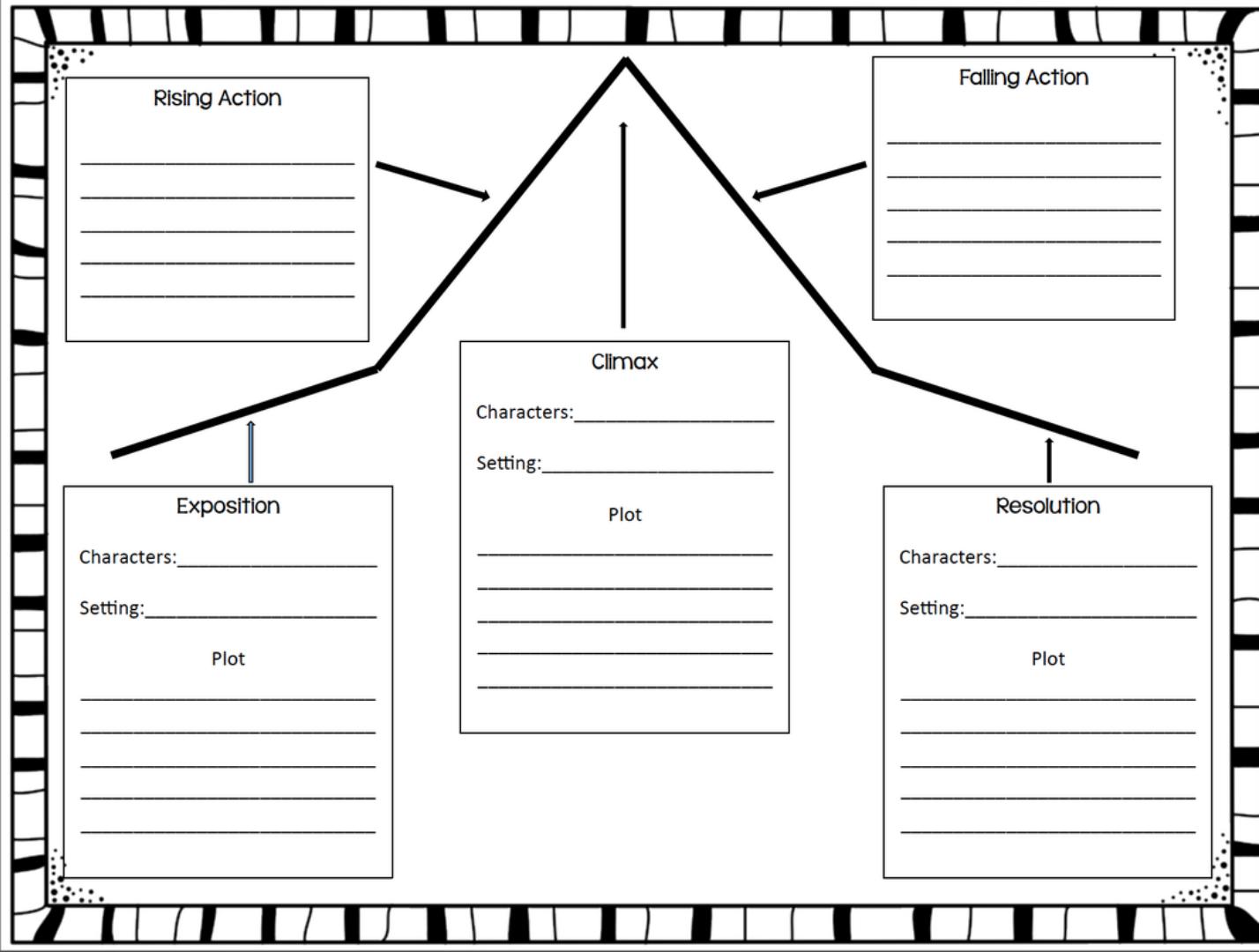
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Dominic Walliman

Rules for Explaining Science / Technology



The Shapes of Stories

by Kurt Vonnegut

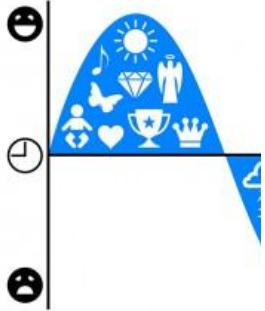
Kurt Vonnegut gained worldwide fame and adoration through the publication of his novels, including *Slaughterhouse-Five*, *Cat's Cradle*, *Breakfast of Champions*, and more.

But it was his rejected master's thesis that he called his prettiest contribution to his culture.

The basic idea of his thesis was that a story's main character has ups and downs that can be graphed to reveal the story's shape.

The shape of a society's stories, he said, is at least as interesting as the shape of its pots or spearheads. Let's have a look.

Designer: Maya Elam, www.mayaelam.com
Sources: *A Man without a Country* and
Palm Sunday by Kurt Vonnegut



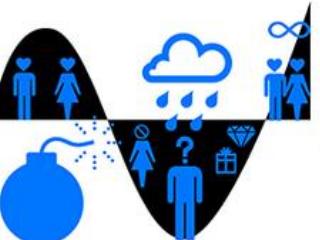
Man in Hole



The main character gets into trouble then gets out of it again and ends up better off for the experience.

- Arsenic and Old Lace*
- Harold & Kumar Go To White Castle*

Boy Meets Girl



The main character comes across something wonderful, gets it, loses it, then gets it back forever.

- Jane Eyre*
- Eternal Sunshine of the Spotless Mind*

From Bad to Worse



The main character starts off poorly then gets continually worse with no hope for improvement.

- The Metamorphosis*
- The Twilight Zone*

Which Way Is Up?



The story has a lifelike ambiguity that keeps us from knowing if new developments are good or bad.

- Hamlet*
- The Sopranos*

Man in Hole



The main character gets into trouble then gets out of it again and ends up better off for the experience.

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Creation Story



In many cultures' creation stories, humankind receives incremental gifts from a deity. First major staples like the earth and sky, then smaller things like sparrows and cell phones. Not a common shape for Western stories, however.

Creation Story



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- Great Expectations*

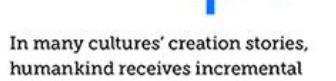
Old Testament



Humankind receives incremental gifts from a deity, but is suddenly ousted from good standing in a fall of enormous proportions.

- Great Expectations*

New Testament



Humankind receives incremental gifts from a deity, is suddenly ousted from good standing, but then receives off-the-charts bliss.

Old Testament



Humankind receives incremental gifts from a deity, but is suddenly ousted from good standing in a fall of enormous proportions.

- Great Expectations*

New Testament



Humankind receives incremental gifts from a deity, is suddenly ousted from good standing, but then receives off-the-charts bliss.

- Great Expectations*

Cinderella



It was the similarity between the shapes of Cinderella and the New Testament that thrilled Vonnegut for the first time in 1947 and then over the course of his life as he continued to write essays and give lectures on the shapes of stories.

The Classic Data Story

Challenge

Complication

Consequence

Call to Action



THIRD
EDITION

THE Craft OF Research

WAYNE C. BOOTH

GREGORY G. COLOMB

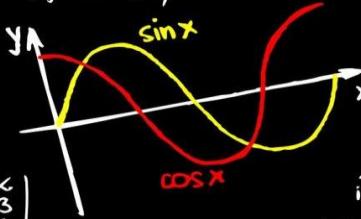
JOSEPH M. WILLIAMS

JOSEPH CAMPBELL THE POWER OF MYTH



with Bill Moyers

$$x^3+x^2+y^3+z^3+xyz-6=0$$



$$g \cdot \operatorname{ad} f = \left(\frac{\partial f}{\partial x}, \frac{\partial f}{\partial y} \right)$$

$$Y_{i+1} = Y_i + b_i \cdot K_2$$

$$B = \begin{pmatrix} 2 & 1 & -1 & 0 \\ 3 & 0 & 1 & 2 \end{pmatrix}$$

$$\operatorname{tg} x \cdot \operatorname{cotg} x = 1$$

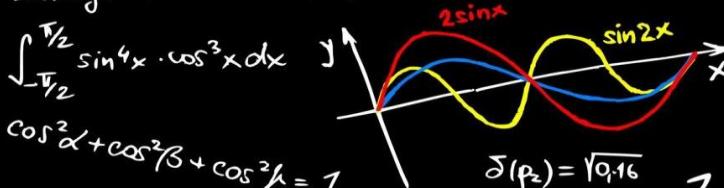
$$2x^2yy' + y^2 = 2$$

$$x_1 = -11p, x_2 = -p, x_3 = 7p, p \in \mathbb{R}$$

$$X_2 = \begin{pmatrix} -\alpha \\ -\beta \\ -\delta \end{pmatrix}$$

$$\iiint_M z dx dy dz = \int_0^{2\pi} \left(\int_0^2 \left(\int_{\frac{1}{2}\pi}^1 r r dr d\sigma \right) dr \right) d\varphi$$

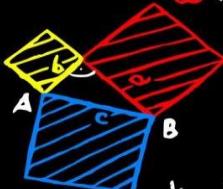
$$2 \arctan x - x = 0, I = (1, 10)$$



$$\cos^2 \alpha + \cos^2 \beta + \cos^2 \gamma = 1$$

$$\frac{\partial z}{\partial x} = 2, \frac{\partial z}{\partial y} = 0 \quad \vec{n} = (F_x, F_y, F_z)$$

$$\frac{x^2}{a^2} + \frac{y^2}{b^2} + \frac{z^2}{c^2} = 0$$



$$f(x) = 2^{-x} + 1, \epsilon = 0.005$$

$$e^z - xyz = e, A[0, e, 1]$$

$$|x| + |\beta| \neq 0, \mu \neq 0$$

$$\frac{2x}{x^2 + 2y^2} = 2 \quad z = \frac{1}{x} \arcsin \frac{\sqrt{2}}{2}$$

$$\sin(x+y) = \sin x \cos y + \cos x \sin y$$

$$|z| = \sqrt{a^2 + b^2}$$

$$y' - \frac{\sqrt{y}}{x+2} = 0; y(0) = 1$$

$$D\left(\frac{\partial f}{\partial x}\right) = 16 - x^2 + 16y^2 - 4z > 0$$

$$A = \begin{pmatrix} x, 1+x^2, 1 \\ y, 1+y^2, 1 \\ z, 1+z^2, 1 \end{pmatrix}; x=0, y=1, z=2$$

$$A = [1, 0; 3]$$

$$\cos \varphi = \frac{(1, 0) \cdot (\frac{1}{2\sqrt{3}}, \frac{1}{4\sqrt{3}})}{\sqrt{\frac{1}{12} + \frac{1}{48}}}$$

$$\oint 3x^2 + 1,66x^{-0,17} dx \underset{n \rightarrow +\infty}{\lim} \left(1 + \frac{3}{n}\right)^n$$

$$\operatorname{tg} \frac{x}{2} = \frac{1 - \cos x}{\sin x} = \frac{\sin x}{1 + \cos x}$$

$$F_2 = 2 \times y^2 - 1 = 1$$

$$X_1 = \begin{pmatrix} 2p \\ -p \\ 0 \end{pmatrix}$$



$$(1+e^x) y' = e^x \quad y(1) = 1$$

$$\cos 2x = \cos^2 x - \sin^2 x$$

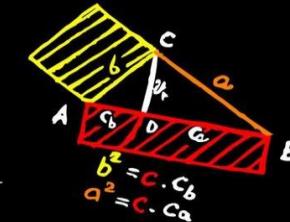
$$\begin{aligned} A+B+C &= 8 \\ -3A-7B+2C &= -10,3 \\ -18A+6B-3C &= 15 \end{aligned}$$

$$\lambda_2 = i\sqrt{14}$$

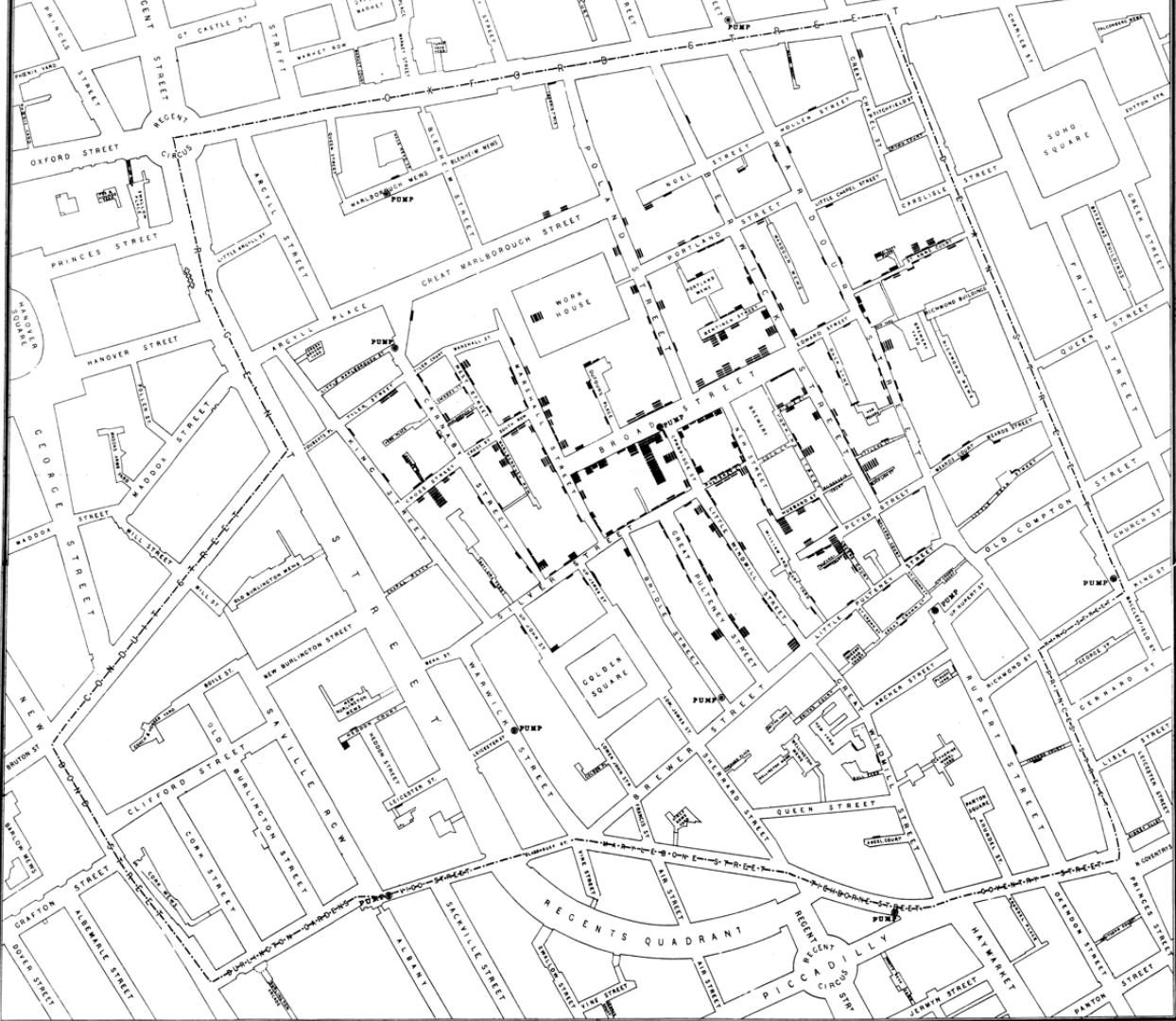
$$\int_P(t, y) \frac{\partial w}{\partial x} dt$$

$$\frac{\sin x}{x} \leq \frac{x}{x} = 1$$

$$\eta_1 = \lambda_1^2 - 3\lambda_1 + 1 \neq 0$$







Carte Figurative des pertes successives en hommes de l'Armée Française dans la campagne de Russie 1812-1813.

Dessinée par M. Minard, Inspecteur Général des Ponts et Chaussées en retraite.

Paris, le 20 Novembre 1869.

Les nombres d'hommes présents sont représentés par les largeurs des zones colorées à raison d'un millimètre pour dix mille hommes; ils sont de plus écrits en tracés des zones. Le rouge désigne les hommes qui entrent en Russie; le noir ceux qui en sortent. — Les renseignements qui ont servi à dresser la carte ont été puisés dans les ouvrages de M. M. Thiers, de Léger, de Fezensac, de Chambray et le journal médical de Jacob, pharmacien de l'Armée depuis le 28 Octobre.

Pour mieux faire juger à l'œil la diminution de l'armée, j'ai supposé que les corps du Prince Jérôme et du Maréchal Davout, qui avaient été détachés sur Minsk et Mohilow et qui rejoignirent vers Orscha et Witebsk, avaient toujours marché avec l'armée.

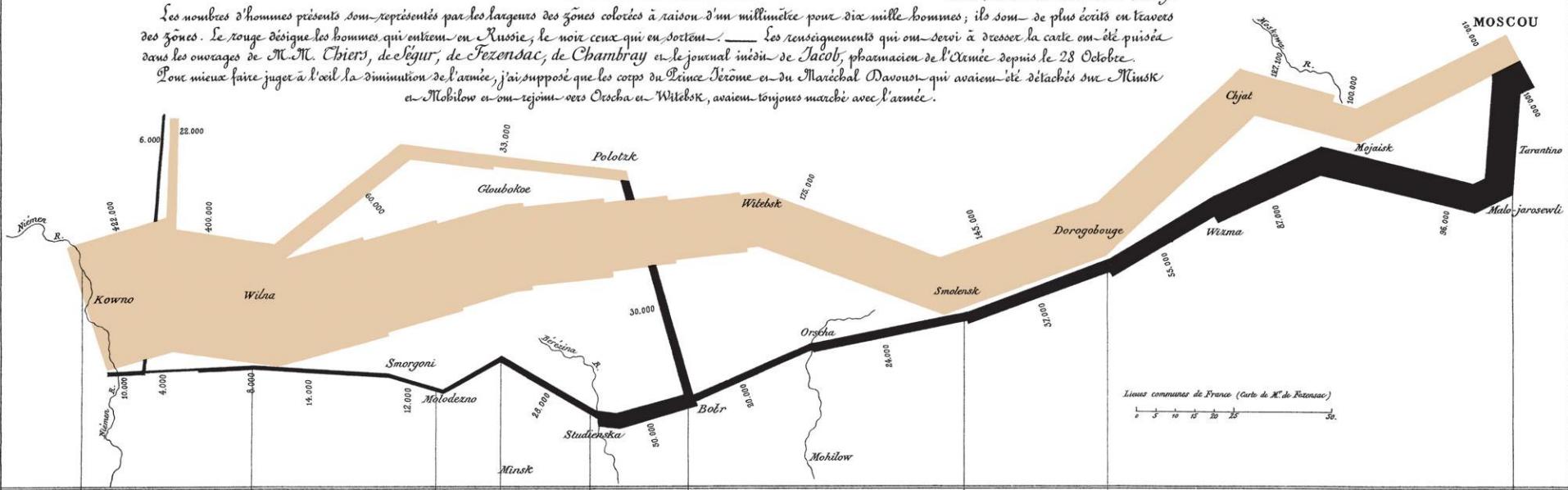
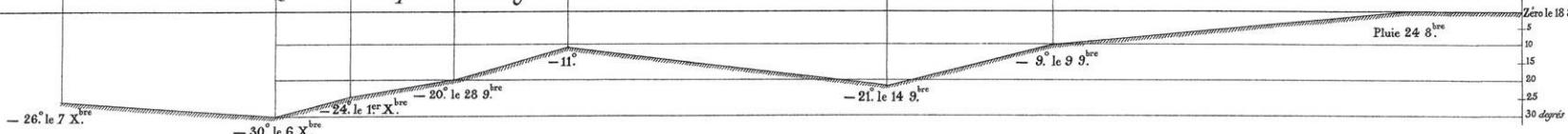


TABLEAU CRAPHIQUE de la température en degrés du thermomètre de Réaumur au dessous de zéro.

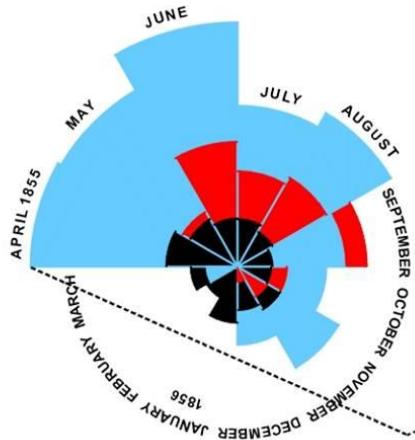
Les Cosaques passent au galop
le Niemen gelé.



**DIAGRAM OF THE CAUSES OF MORTALITY
IN THE ARMY IN THE EAST.**

2.

APRIL 1855 TO MARCH 1856.



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

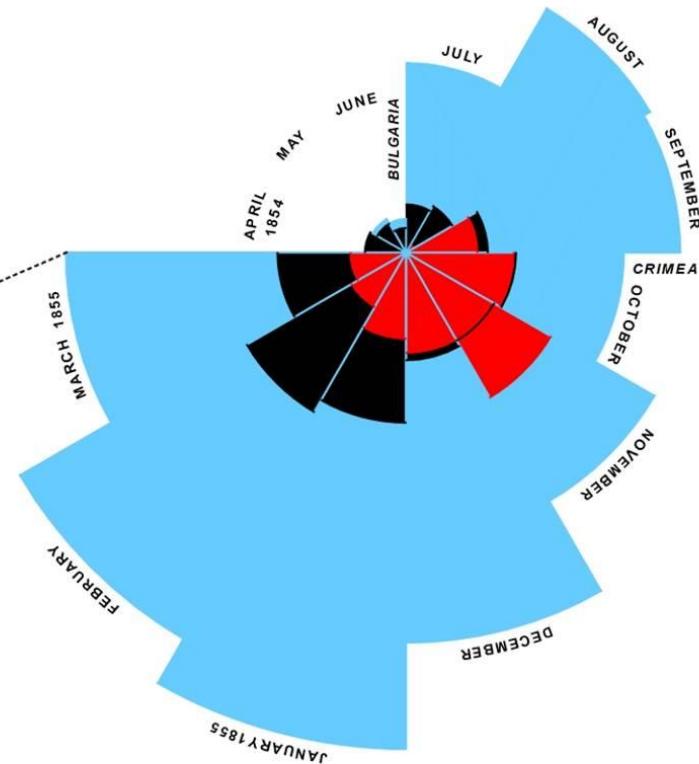
The black line across the red triangle in Nov 1854 marks the boundary of the deaths from all other causes during the month

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

1

APRIL 1854 TO MARCH 1855.





GEORGE LUCAS



\$122,700

GEORGE LUCAS' FEE TO WRITE AND DIRECT STAR WARS AND TO KEEP SEQUEL RIGHTS AND CONTROL OF MERCHANDISING

TOTAL NUMBER OF STAR WARS FILMS
GEORGE LUCAS TALKED ABOUT MAKING
IN AN INTERNAL INTERVIEW IN 1977

42

YEARS AGO GEORGE LUCAS
FIRST OUTLINED A STORY
THAT BECAME STAR WARS

THE CHARACTERS



17,000

STAR WARS CHARACTERS IN THE MOVIES AND EXPANDED UNIVERSE
THAT THE WALT DISNEY COMPANY ACQUIRED IN OCTOBER 2012

8

NUMBER OF TIMES A CHARACTER SAYS
"I'VE GOT A BAD FEELING ABOUT THIS"
ON SCREEN IN THE SIX FILMS

MERCHANDISE



42,322,500

STAR WARS TOYS AND GAMES
KENNER PRODUCTS SOLD IN 1978.
THE FIRST FULL YEAR OF PRODUCTION

109

VIDEO GAMES FOR
COMPUTERS, CONSOLES,
AND MOBILE APPLICATIONS
RELEASED SINCE 1982

\$30B

TOTAL RETAIL SALES WORLDWIDE OF
STAR WARS MERCHANDISE TO DATE

THE IMPACT OF STAR WARS

\$4.3B

WORLDWIDE UNADJUSTED
TICKET SALES FOR THE SIX
STAR WARS LIVE-ACTION FILMS

- I - \$1B
- II - \$649.4M
- III - \$848.8M
- IV - \$775.4M
- V - \$538.4M
- VI - \$475.1M

10

OSCAR® AWARDED FOR
THE STAR WARS SAGA

25

ACADEMY AWARD®
NOMINATIONS
FOR THE SIX FILMS



OFFICIAL STAR WARS CELEBRATION
FAN CONVENTIONS SINCE 1999



54
DIFFERENT SCENARIOS
POSSIBLE ON STAR TOURS:
THE ADVENTURE CONTINUES

MAKING THE FILMS



2,000

TOTAL SHOTS IN EPISODE I:
THE PHANTOM MENACE



1,900

VISUAL EFFECTS SHOTS



49.3

PERCENTAGE OF COMPUTER
ANIMATION IN EPISODE II:
ATTACK OF THE CLONES
(70 OUT OF 142 MINUTES)



365

SPECIAL EFFECTS SHOTS IN
EPISODE IV: STAR WARS



100:20

HOURS : MINUTES
TOTAL AMOUNT OF FILM
SHOT FOR EPISODE V:
THE EMPIRE STRIKES BACK



300

SEPARATE ELEMENTS
COMPOSED TOGETHER FOR
ONE SPACE BATTLE SCENE IN
EPISODE VI: RETURN OF THE JEDI



8

MONTHS FOR ILM
TO SHOOT THE MINIATURE
SET OF MUSTAFAR, THE LAVA
PLANET IN EPISODE III:
REVENGE OF THE SITH



4.9

HOURS SPENT FOR EACH SCRIPT-
MINUTE FILMED DURING PRINCIPAL
PHOTOGRAPHY ON EPISODE III:
REVENGE OF THE SITH



109,775

ARTICLES ON THE FAN-WRITTEN
WOOKIEEPEDIA, THE STAR WARS WIKI,
AS OF MARCH 28, 2014



47

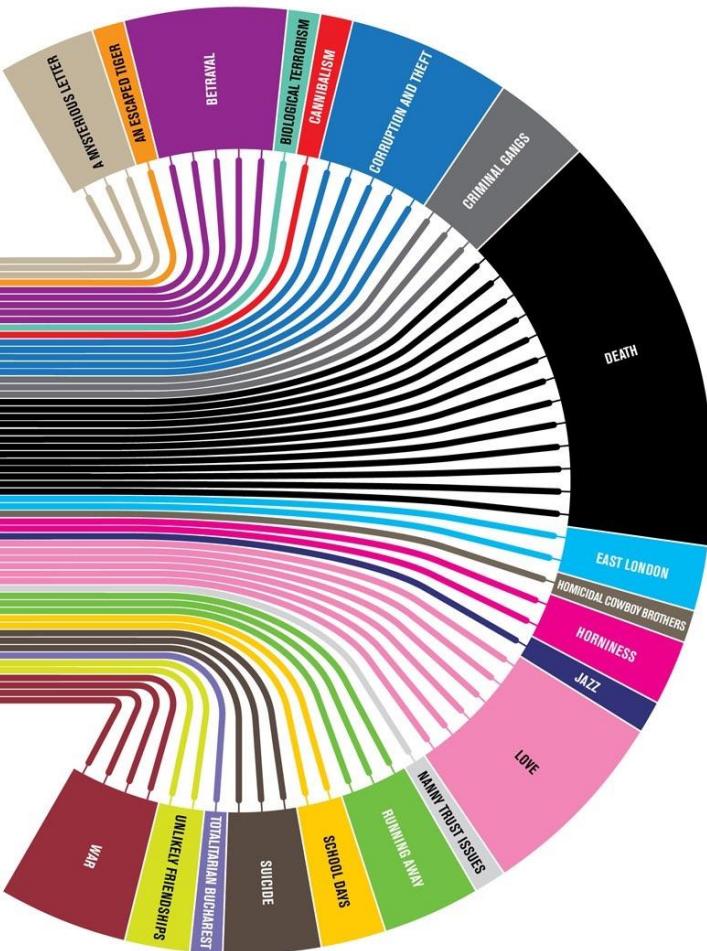
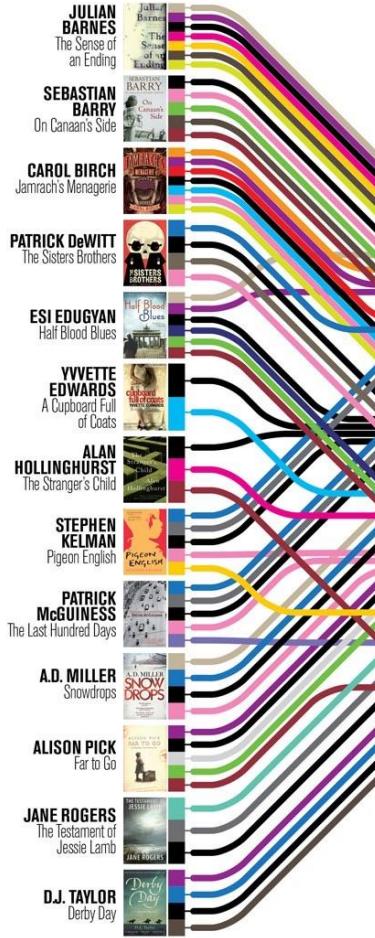
COUNTRIES THAT HAVE
UNOFFICIAL STAR WARS LEGIONS;
A COSTUMING AND SERVICE
ORGANIZATION BY AND FOR FANS

Plot lines

What makes a prize-winning novel?
As Julian Barnes wins the Booker Prize,
Johanna Kamradt charts the
themes of this year's longlisters.

Illustration: Christian Tate

Tue 18th

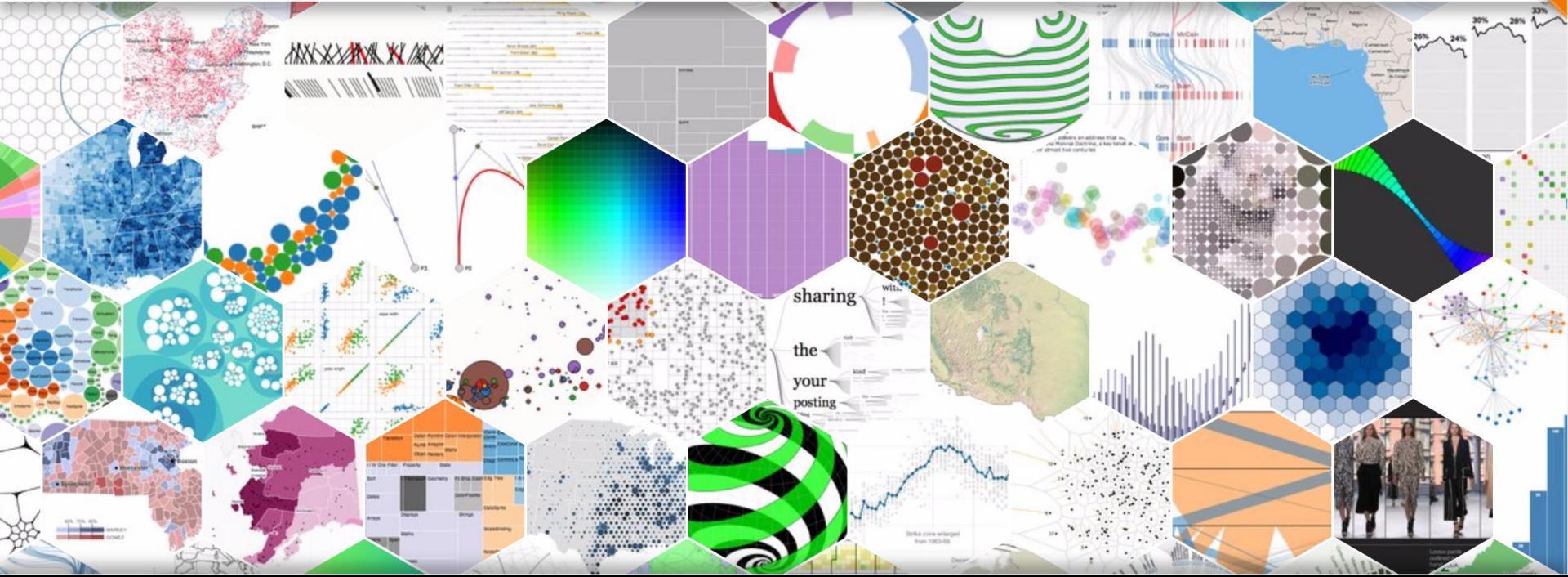


d3js.org

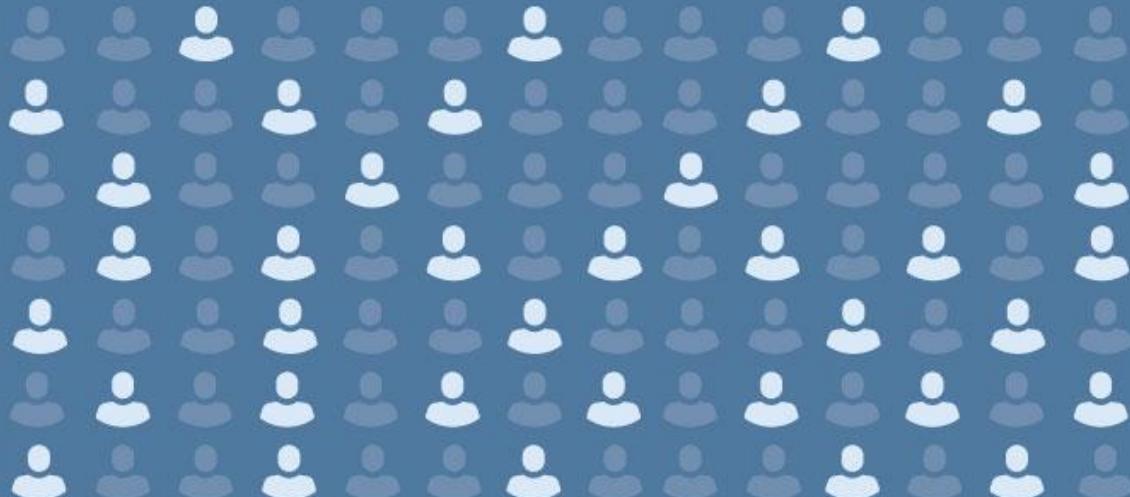


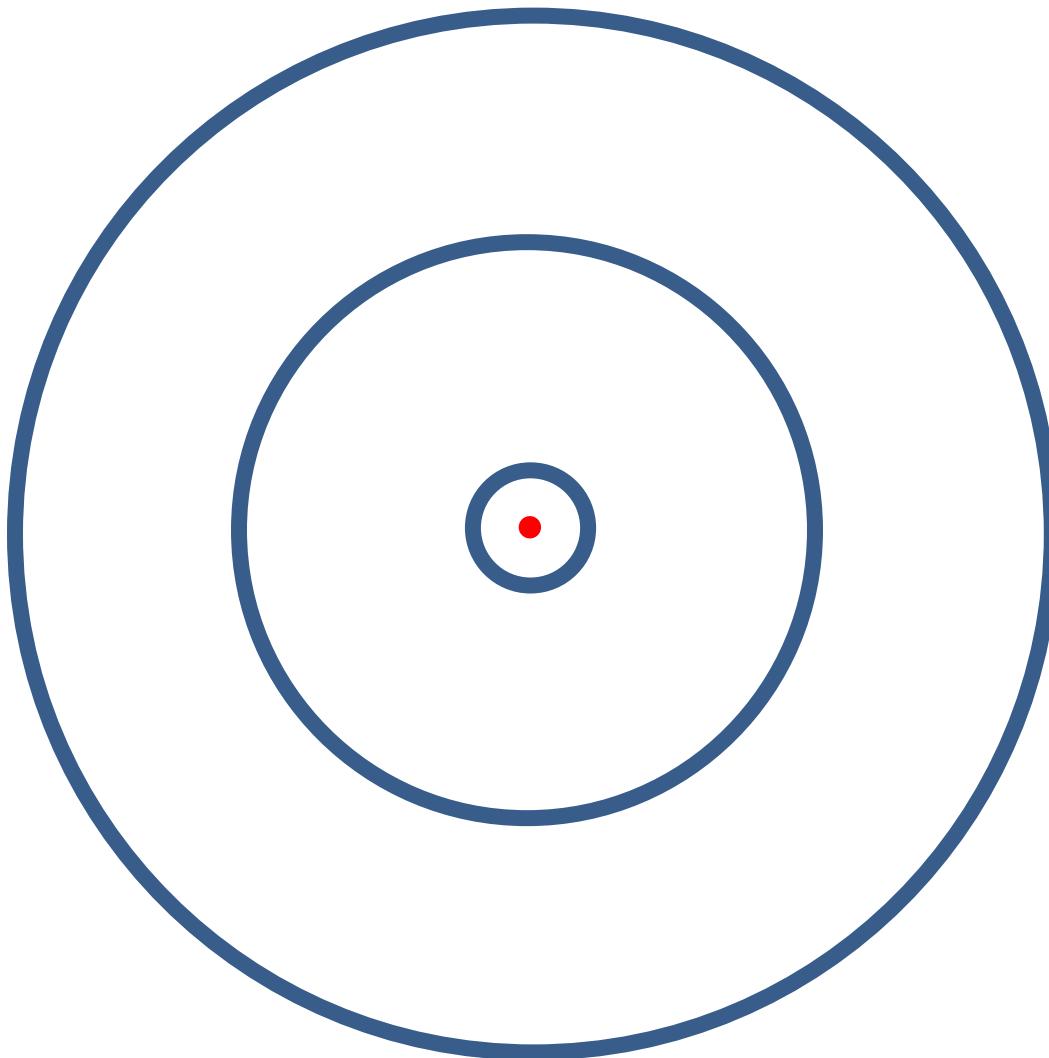
Data-Driven Documents

A small orange rectangular button with white text that reads "Fork me on GitHub".



BY 2015 THERE WILL BE
400,000
DATA SCIENCE JOBS
— BUT ONLY —
140,000
PROFESSIONALS
THAT ARE QUALIFIED TO
— FILL THEM —







Preparation

Analysis

THANK YOU

धन्यवाद

DR. JT KOSTMAN

Presentation

1729