

Crafting with Data

Reality, Illusions, Truth & the Future

Instructor: Rob Faludi

Plan for Today

- Designing Attraction: Judgement in Decision-making
- Review

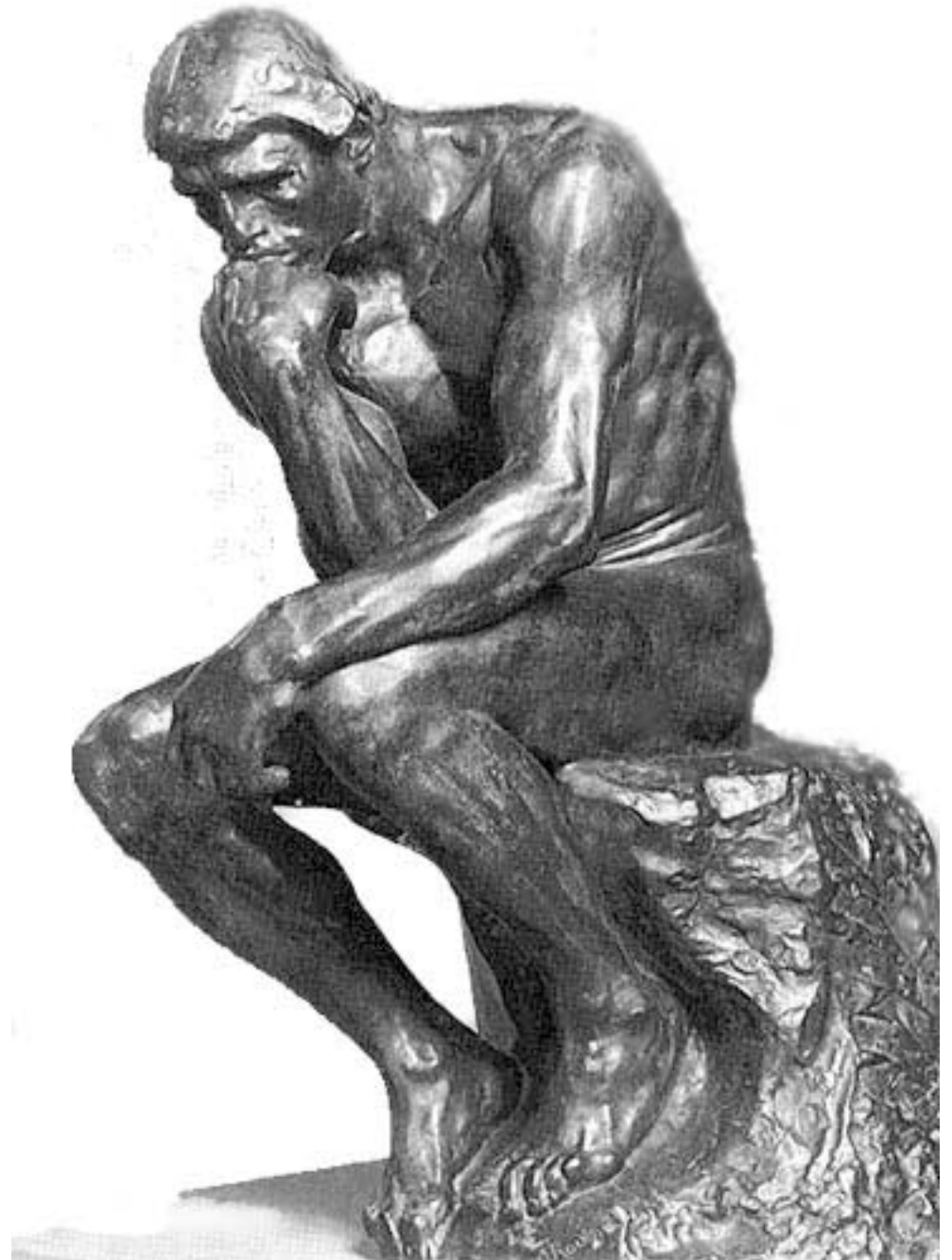
Designing Attraction

human decision-making

Rob Faludi

Thinking

is not for thinking



Thinking is for doing

– Susan T. Fiske



Designing Attraction



Designing Attraction



- If you want to attract people to your project...
- If you want to design a persuasive interaction...
- If you want to influence people's actions...

**You must look into
people's minds**



...hardware isn't enough,
you need to know the
software

How don't people work?

- people are not logical
- not even-handed, not objective
- not slow and thoughtful



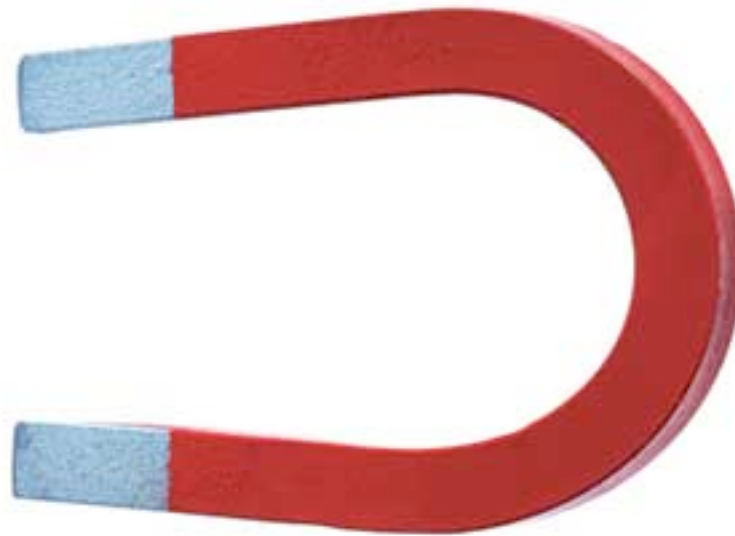


People are a problem

Decision-making

- How to predict people
- How to influence people
- Ways to guide users to the goal

**Attractions must be
designed**





The Human Brain

- A tangle of quickie rules, biased processes, evolutionary flotsam, attentional diversions
- The major influence shaping our planet
- Better understood now than ever before

Humans are predictable

- but we have some surprising behaviors

Click, whirr



Automation

- Fixed action patterns
- Doing what you did before
- Chains of events

Biases



Biases

- leanings or predisposition
- favoring some outcomes over others
- sources of predictable errors

Heuristics



Heuristics

- A rule of thumb, simplification, or educated guess that reduces or limits the search for solutions in domains that are difficult and poorly understood. Unlike algorithms, heuristics do not guarantee optimal, or even feasible, solutions and are often used with no theoretical guarantee.

— Free Online Dictionary of Computing



Plenty of heuristics

- Anchoring and adjustment
- Availability heuristic
- Representativeness heuristic
- Affect heuristic
- Contagion heuristic
- Effort heuristic
- Familiarity heuristic
- Fluency heuristic
- Gaze heuristic
- Peak-end rule
- Recognition heuristic
- Scarcity heuristic
- Similarity heuristic



Scads of biases

- Bandwagon effect
- Base rate fallacy
- Bias blind spot
- Choice-supportive bias
- Confirmation bias
- Congruence bias
- Contrast effect
- Déformation professionnelle
- Distinction bias
- Endowment effect
- Extreme aversion
- Focusing effect
- Framing
- Hyperbolic discounting
- Illusion of control
- Impact bias
- Information bias
- Irrational escalation
- Loss aversion
- Mere exposure effect
- Moral credential effect
- Need for closure
- Neglect of probability
- Omission bias
- Outcome bias
- Planning fallacy
- Post-purchase rationalization
- Pseudocertainty effect
- Reactance
- Selective perception
- Status quo bias
- Unit bias
- Von Restorff effect
- Zero-risk bias
- Ambiguity effect
- Anchoring
- Attentional bias
- Availability heuristic
- Availability cascade
- Clustering illusion
- Conjunction fallacy
- Gambler's fallacy
- Hawthorne effect
- Hindsight bias
- Illusory correlation
- Ludic fallacy
- Neglect of prior base rates effect
- Observer-expectancy effect
- Optimism bias
- Overconfidence effect
- Positive outcome bias
- Primacy effect
- Recency effect
- Regression toward the mean disregarded
- Reminiscence bump
- Rosy retrospection
- Selection bias
- Stereotyping
- Subadditivity effect
- Subjective validation
- Telescoping effect
- Texas sharpshooter fallacy
- Actor-observer bias
- Dunning-Kruger effect
- Egocentric bias
- Forer effect (aka Barnum Effect)
- False consensus effect
- Fundamental attribution error
- Halo effect
- Herd instinct
- Illusion of asymmetric insight
- Illusion of transparency
- Ingroup bias
- Just-world phenomenon
- Lake Wobegon effect
- Notational bias
- Outgroup homogeneity bias
- Projection bias
- Self-serving bias
- Self-fulfilling prophecy
- System justification
- Trait ascription bias
- Beneffectance
- Consistency bias
- Cryptomnesia
- Egocentric bias
- False memory
- Hindsight bias
- Suggestibility

Four Interesting Biases

- positive outcome bias
- confirmation bias
- illusion of control
- framing: presentation affects choice

Four Interesting Biases



- positive outcome bias
- confirmation bias
- illusion of control
- framing: presentation affects choice

Four Interesting Biases






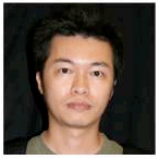



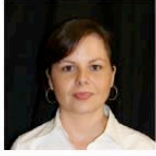


- positive outcome bias
- confirmation bias
- illusion of control
- framing: presentation affects choice

Four Interesting Biases



- positive outcome bias
- confirmation bias
- illusion of control
- framing: presentation affects choice

Four Interesting Biases

Katherine		Yasmin		Justin
	Kaki		Jung-Eun	
Bryan		Sandra		Adam
	Matthew		Yonatan	

- positive outcome bias
- confirmation bias
- illusion of control
- framing: presentation affects choice

Four Interesting Biases

Social Genius

Click to Begin

- positive outcome bias
- confirmation bias
- illusion of control
- framing: presentation affects choice

Four Interesting Biases



- positive outcome bias
- confirmation bias
- illusion of control
- framing: presentation affects choice

Some Effects and Fallacies

- Contrast effect — the enhancement or diminishment of a weight or other measurement when compared with recently observed contrasting object.
- Endowment effect — "the fact that people often demand much more to give up an object than they would be willing to pay to acquire it"
- Moral credential effect — the tendency of a track record of non-prejudice to increase subsequent prejudice.
- Planning fallacy — the tendency to underestimate task-completion times.
- Ludic fallacy — the analysis of chance related problems with the narrow frame of games. Ignoring the complexity of reality, and the non-gaussian distribution of many things.
- Texas sharpshooter fallacy — the fallacy of selecting or adjusting a hypothesis after the data is collected, making it impossible to test the hypothesis fairly.



Texas Sharpshooter

Texas Sharpshooter

- A logical fallacy created by devising meaning after the fact. Name comes from a story about a Texan who shoots at the side of a barn.
- Post-hoc analysis

Three Important Heuristics

- anchoring and adjustment
- availability heuristic
- social proof heuristic

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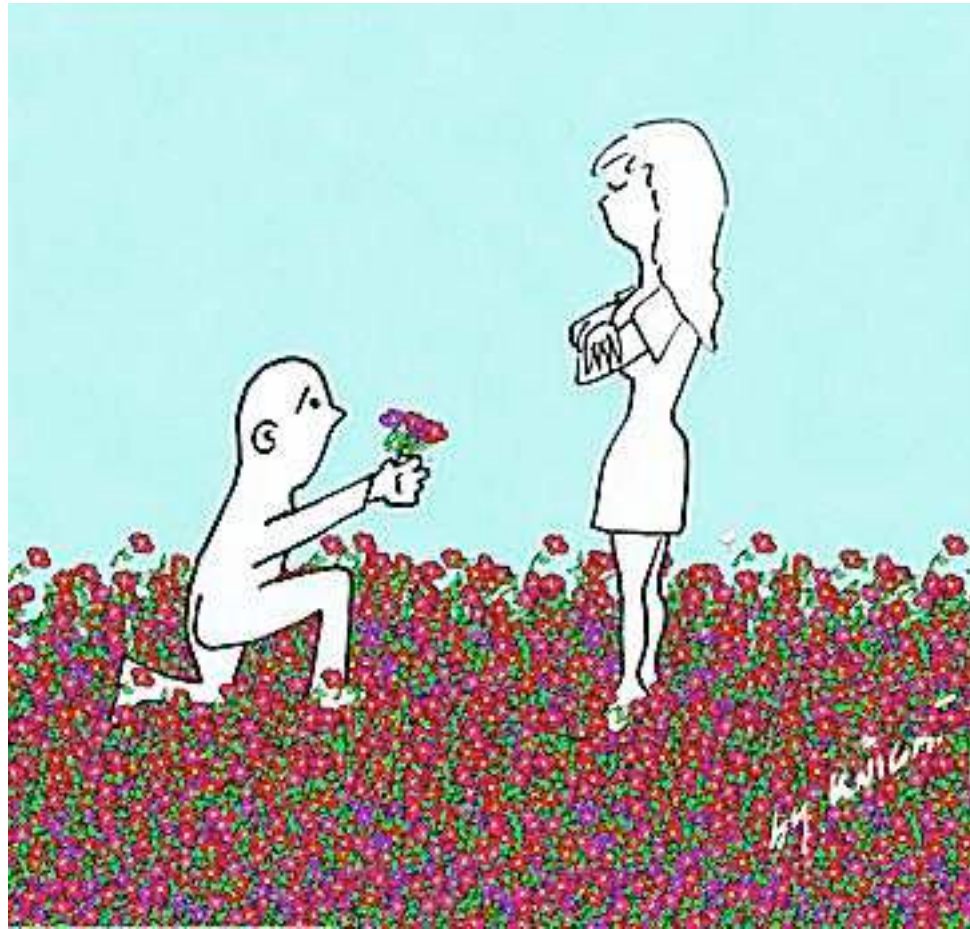
Three Important Heuristics

- anchoring and adjustment
- availability heuristic
- social proof heuristic

Heuristics Are Sensible

- Rules of thumb work because they are often correct
- Heuristics are fast
- Exhaustive analysis isn't usually possible

How to attract



...and persuade

**OVER A
QUARTER
MILLION
COPIES SOLD!**

FOURTH EDITION

INFLUENCE

Science and Practice

*"The best and best researched book ---
ever --- on this topic. Robert Cialdini would
have predicted 10 years ago the power
of 'permission marketing' on the Web!"*

---TOM PETERS, The Tom Peters Group

ROBERT B. CIALDINI

Influence



- Robert Cialdini and the *weapons* of persuasion

Influential Tools

- Reciprocity
- Commitment and consistency
- Social proof
- Liking
- Authority
- Scarcity

Reciprocity



"I'm not going to Sid's funeral.
He won't be coming to mine."

Reciprocity

- we try to repay, in kind, what another person does for us
-Alvin Gouldner (1960)
- web of indebtedness
- watch out for uninvited debts
- mailing labels, in-person solicitations, engineered concessions



Reciprocity

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- mailing labels, in-person solicitations, engineered concessions



Commitment & Consistency



Commitment & Consistency

- we like things better after we choose them
- foot-in-the-door: small to large (Freedman, Fraser 1966)
- justification of effort: boot camp, up all night



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- justification of effort: boot camp, up all night



Social Proof



Stanley Milgram

Social Proof

- if everyone else jumped off a cliff...
- Milgram conformity
- effective in ambiguous situations with social peers
- can be tragically powerful



Liking



Liking

- more likely to comply with someone we like
- ...and we like people who are
 - attractive
 - similar
 - familiar

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Authority

Authority



Authority



- Milgram
- value of authority symbols
- illusion of authority (not a doctor but play one on TV)
- heuristic value

Authority



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- heuristic value

Scarcity



Scarcity

- increases perceived value
- baseball cards, wine, mates
- time limits



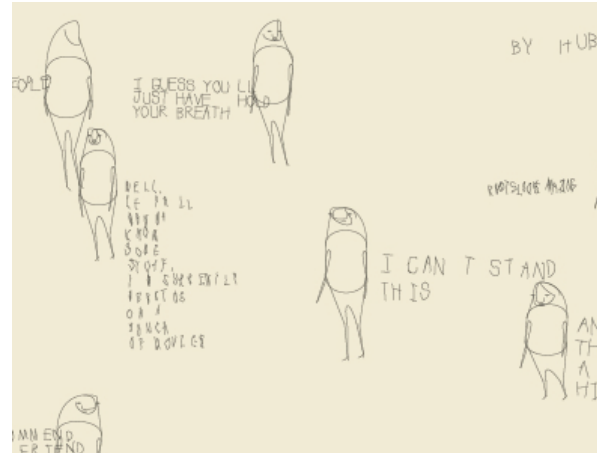
Scarcity

- increases perceived value
- baseball cards, wine, mates
- time limits



Influential tactics relevant to:

- advertising
- social networks
- art
- media
- projects
- dating
- religion



Ethics and Exemption

- Is it okay to use these tools?
- Does understanding them exempt us from their influence?



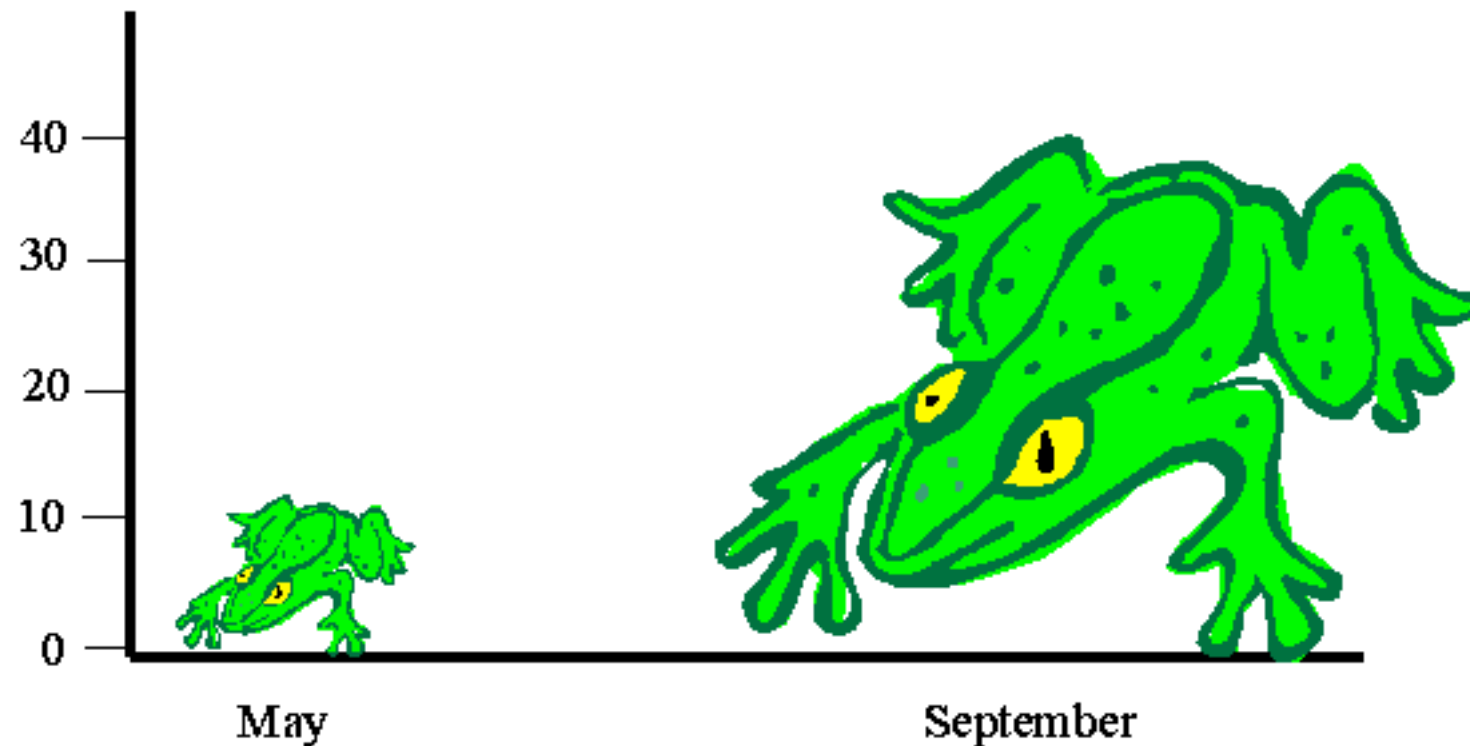
Designing Attraction

Class Review

Ethics and understanding

- how to lie with statistics

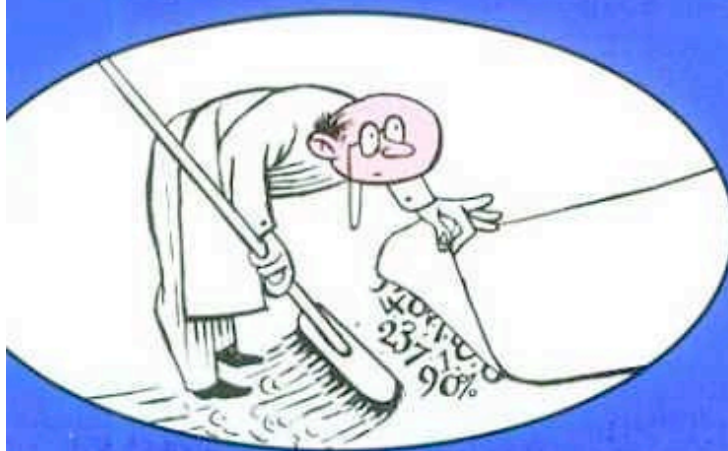
**Number of Adult
Frogs in South Pond**



HOW TO LIE WITH STATISTICS

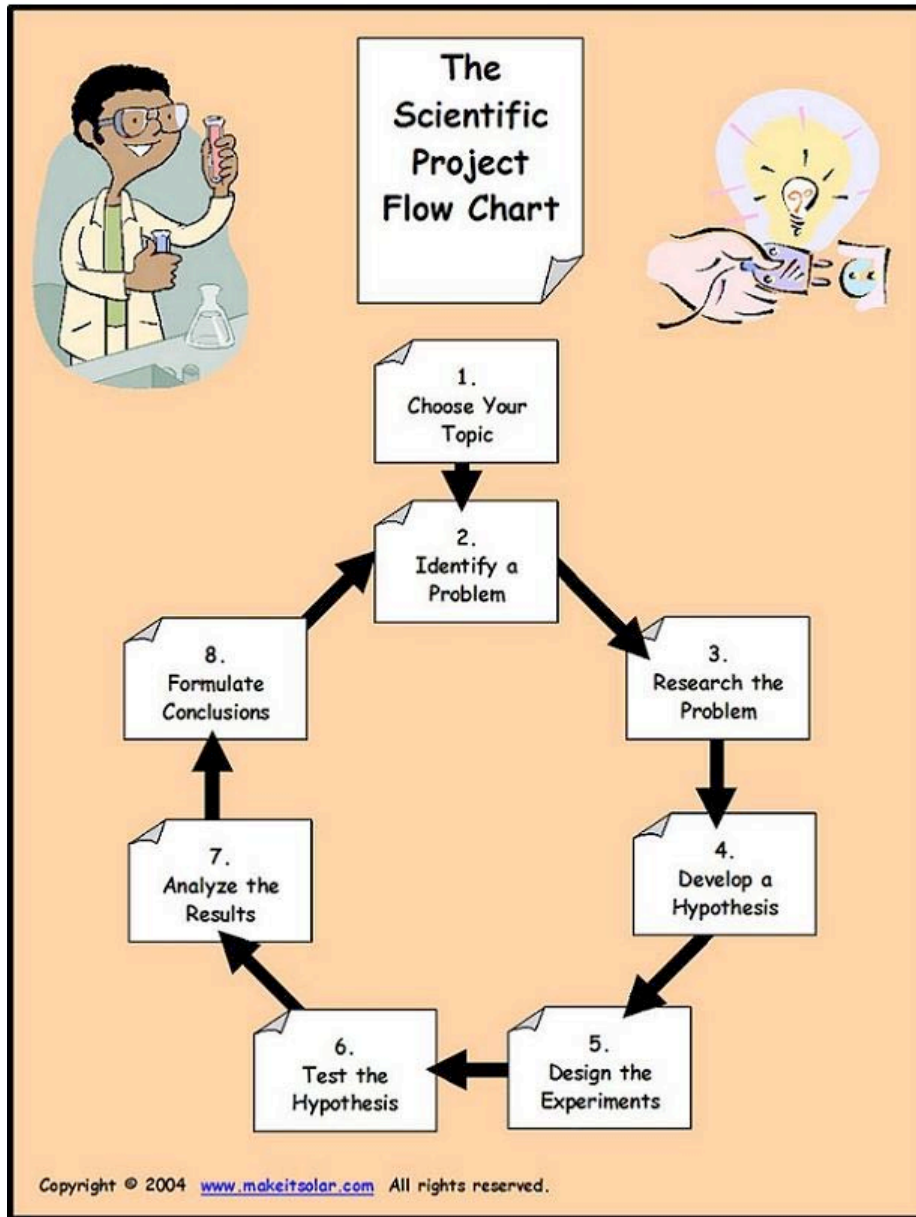
Darrell Huff

Illustrated by Irving Geis



**Over Half a Million Copies Sold—
An Honest-to-Goodness Bestseller**

Thinking Scientifically



Thinking Scientifically



MADE IN ITALY

PH-2

AREF GND 3 2 1 0 9 8 7 6 5 4 3 2 1 0
DIGITAL TX RX

Arduino™
Diecimila

DWR_SEL

USB
EXT

X3

506V

Prototype
Limited
Edition

ATMEGA168-20PU
0101
ATMEL

S1

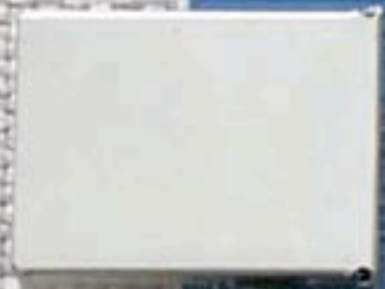
TCSP



2424L
47
25V

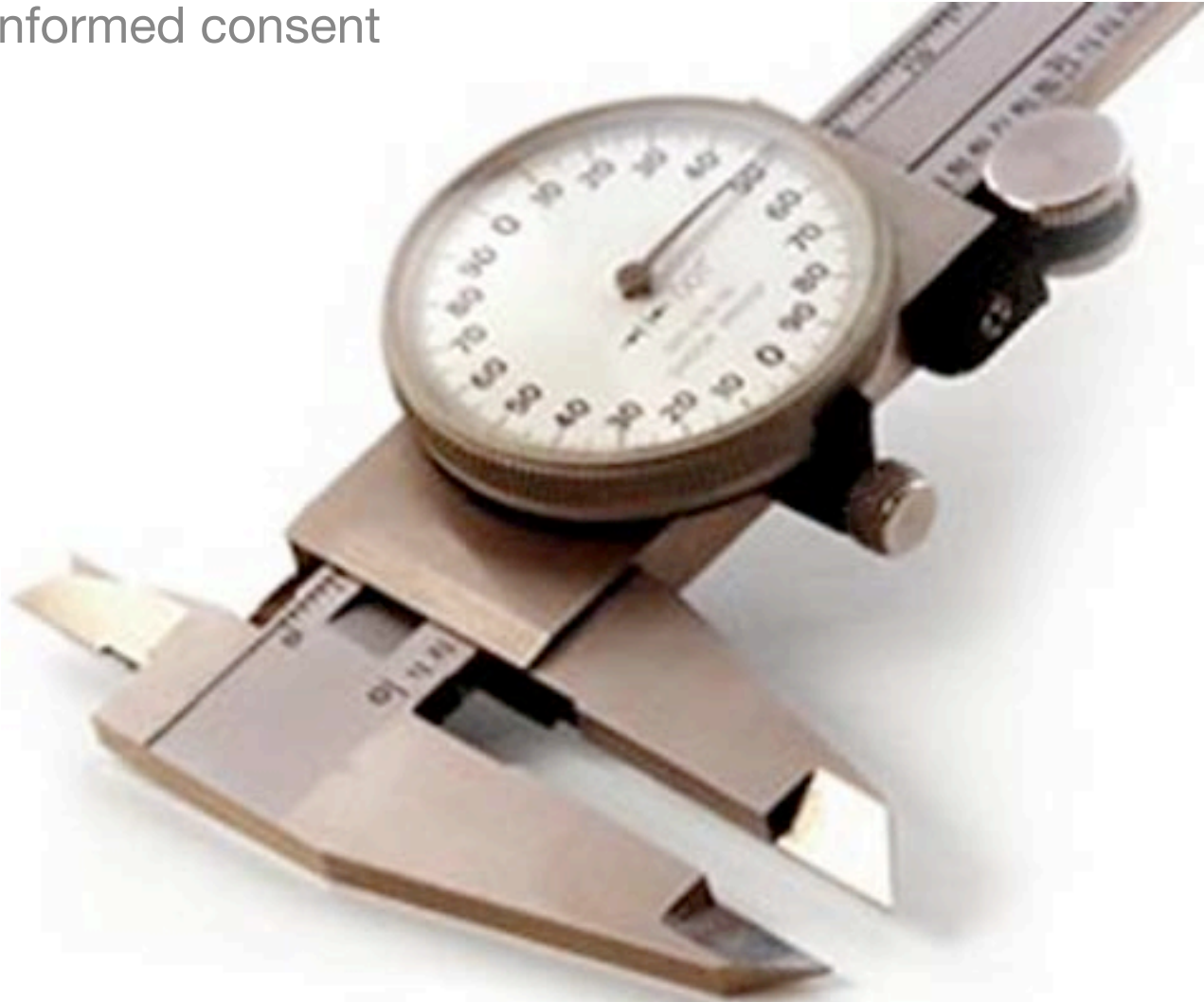
RESET
GND
VCC
POWER
ANALOG IN

www.arduino.cc

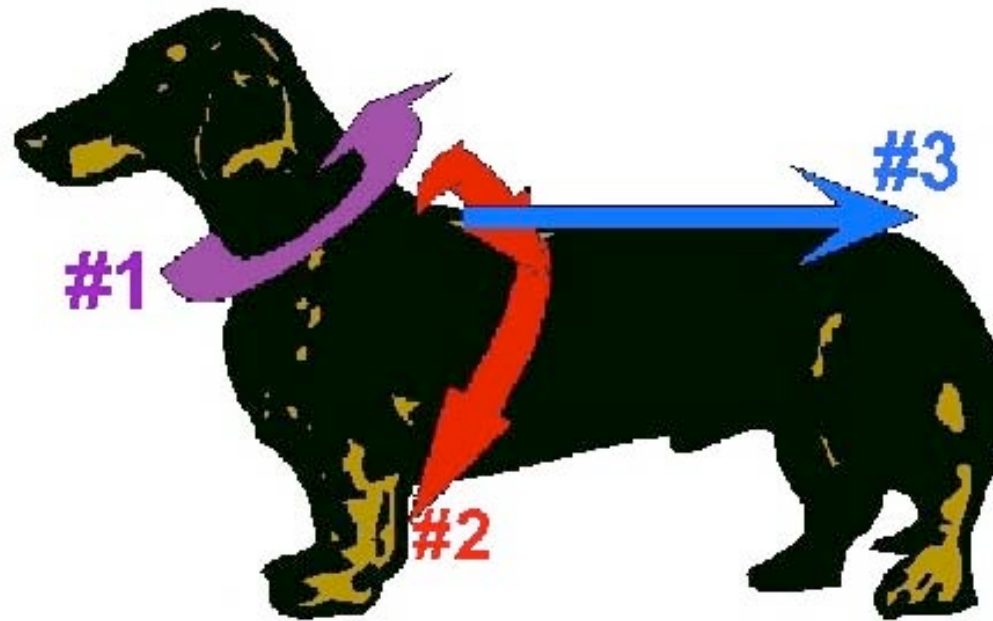


The Modern Science of Measuring

- a world of parameters. Scientific method, gathering data, ethics and IRB, informed consent



The Modern Science of Measuring



The Modern Science of Measuring



Diagram A: Place thumb or finger beneath tape measure when taking bust measurement.

The Modern Science of Measuring





SCHOOL BUS

SCHOOL BUS

SCHOOL BUS

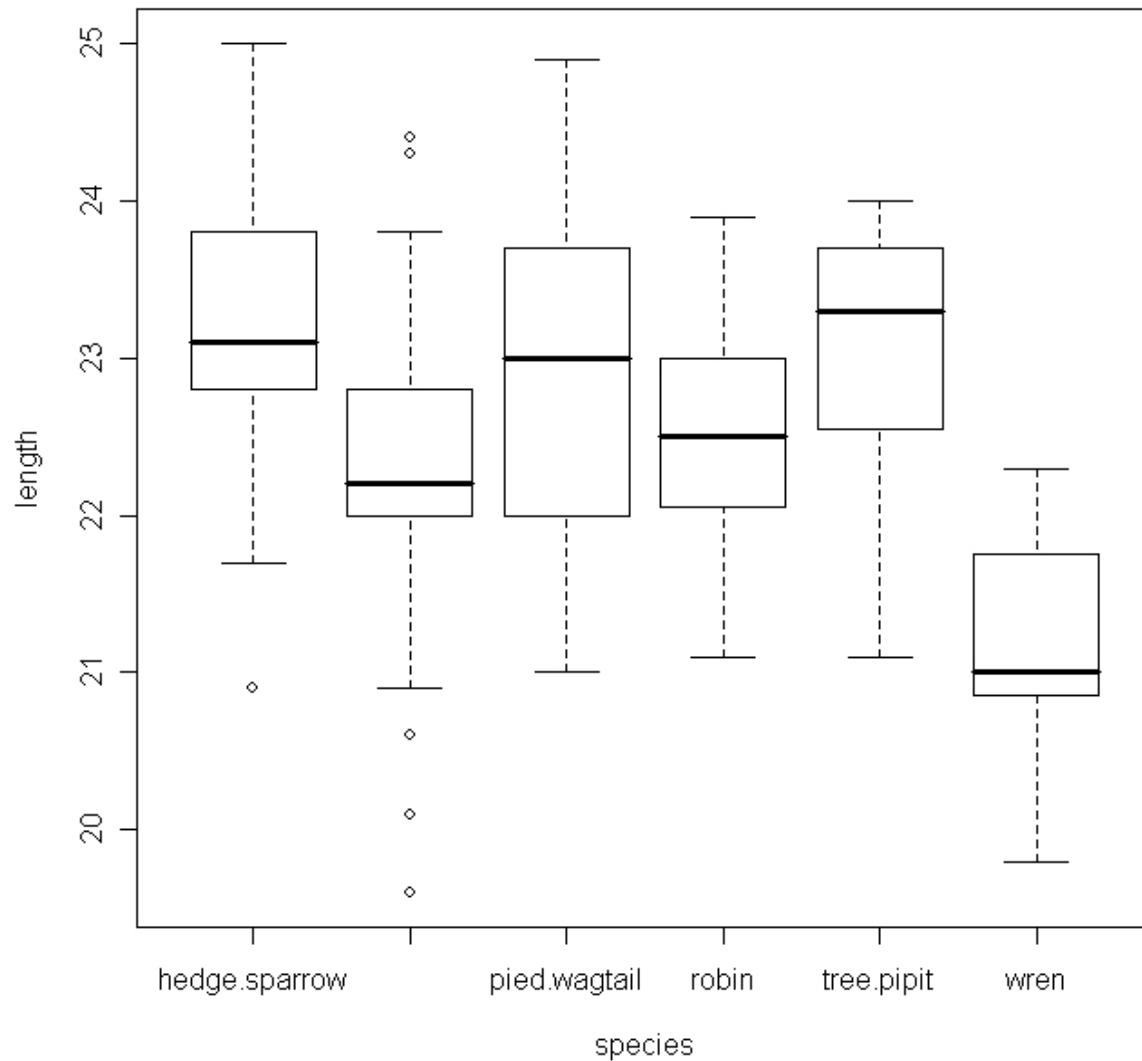
EMERGENCY DOOR

Looking at Data

- exploratory data analysis and descriptive statistics

	A	B	C	D	E	F	G	H	I	J	K	L
1	Site	Longitude	Latitude	Elevation	Annual Me	Mean Diur	Isothermali	Temperatu	Max Temp	Min Tempe	Temperatu	Mean T
2	O0002258	149.3833	-19.9167	0	23.8	4.5	0.39	0.9	29.4	17.8	11.6	2
3	O0000469	144.2483	-17.4283	10	25.8	14	0.61	0.98	36.2	13.1	23.1	2
4	O0000181	144.85	-15.5167	600	21	8.3	0.53	0.91	28.7	13	15.7	2
5	O0000409	152.9833	-14.5667	260	24.2	-2.8	-3.97	0.35	25.5	24.9	0.7	2
6	O0001066	152.9833	-14.5667	260	24.2	-2.8	-3.97	0.35	25.5	24.9	0.7	2
7	O0001064	152.9833	-14.5667	260	24.2	-2.8	-3.97	0.35	25.5	24.9	0.7	2
8	O0000387	153.9	-14.6	165	24.8	-3.3	-41.25	0.33	25.7	25.7	0.1	2
9	O0000405	152.9833	-14.5667	260	24.2	-2.8	-3.97	0.35	25.5	24.9	0.7	2
10	O0001065	152.9833	-14.5667	260	24.2	-2.8	-3.97	0.35	25.5	24.9	0.7	2
11	O0001092	153.9	-14.6	150	24.9	-3.2	-38.27	0.33	25.8	25.7	0.1	2
12	O0000368	152.9667	-14.5	1200	19	-4.1	-4.28	0.4	20.8	19.8	1	2
13	O0000382	153.9	-14.6	165	24.8	-3.3	-41.25	0.33	25.7	25.7	0.1	2
14	O0000392	152.95	-14.45	1800	15.7	-4.9	-4.05	0.44	17.8	16.6	1.2	1
15	O0001048	152.9833	-14.5667	260	24.2	-2.8	-3.97	0.35	25.5	24.9	0.7	2
16	O0001081	152.9833	-14.5667	260	24.2	-2.8	-3.97	0.35	25.5	24.9	0.7	2
17	O0000369	152.9667	-14.5	1200	19	-4.1	-4.28	0.4	20.8	19.8	1	2
18	O0000399	152.9833	-14.5667	260	24.2	-2.8	-3.97	0.35	25.5	24.9	0.7	2
19	O0001054	152.9833	-14.5667	260	24.2	-2.8	-3.97	0.35	25.5	24.9	0.7	2
20	O0001055	152.9833	-14.5667	260	24.2	-2.8	-3.97	0.35	25.5	24.9	0.7	2
21	O0000400	152.9833	-14.5667	260	24.2	-2.8	-3.97	0.35	25.5	24.9	0.7	2
22	O0001056	152.9833	-14.5667	260	24.2	-2.8	-3.97	0.35	25.5	24.9	0.7	2
23	O0000371	152.9667	-14.5	1200	19	-4.1	-4.28	0.4	20.8	19.8	1	2

Looking at Data

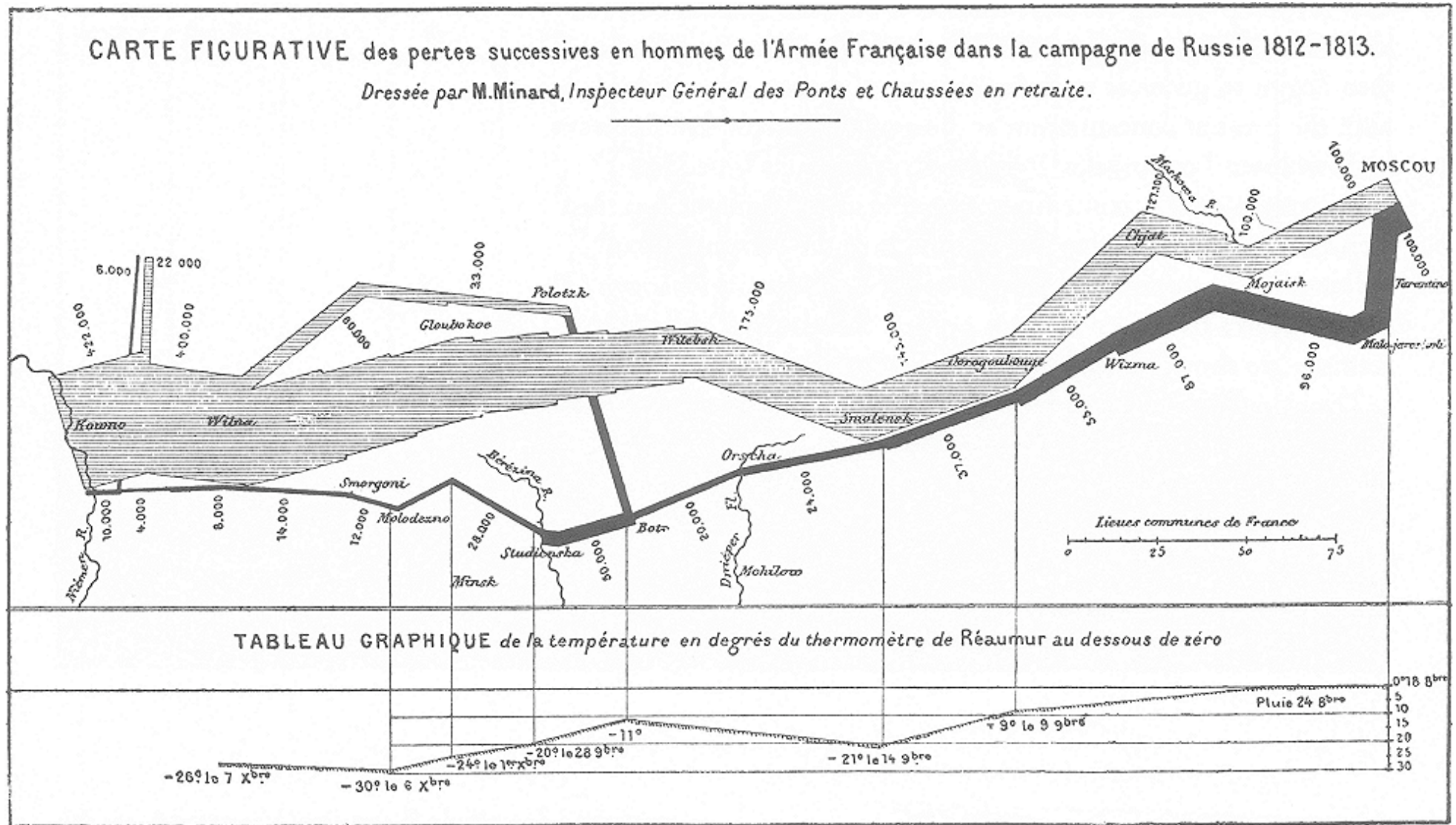


Stem-and-leaf of Weight N = 92
Leaf Unit = 1.0

```

1     9 5
2    10 2
4    10 88
7    11 002
13   11 556688
19   12 000123
24   12 55555
31   13 0000013
37   13 555688
42   14 00002
(6)  14 555558
44   15 00000000003
33   15 55555555557
22   16 00004
17   16 5
16   17 0000
12   17 55
10   18 000
7    18 5
6    19 0000
2    19 5
1    20
1    20
1    21
1    21 5
    
```

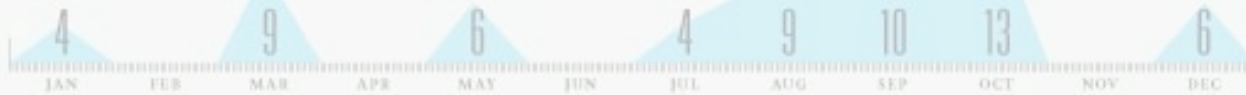
Looking at Data



Two Thousand and Seven

THE YEAR BY DAY:

38 VACATION DAYS



61 OFFICE-FREE DAYS



Nicholas Feltron

feltron.com

266 OFFICE DAYS



LOWEST TEMPERATURE (°F):

8°

FEBRUARY 5, NYC

HIGHEST TEMPERATURE (°F):

92°

JULY 10 & AUGUST 2, NYC

POSTCARDS RECEIVED:

13

WEIGHT GAINED:

2.6

POUNDS

BURGLARS CONFRONTED:

ONE

LONGEST DAY OF THE YEAR:

MARCH
CENTU

TEETH LOST BY CAT:

1

MUSEUM VISITS:

EIGHT

An Average



CHANCE OF OLIVE'S LUNCH:

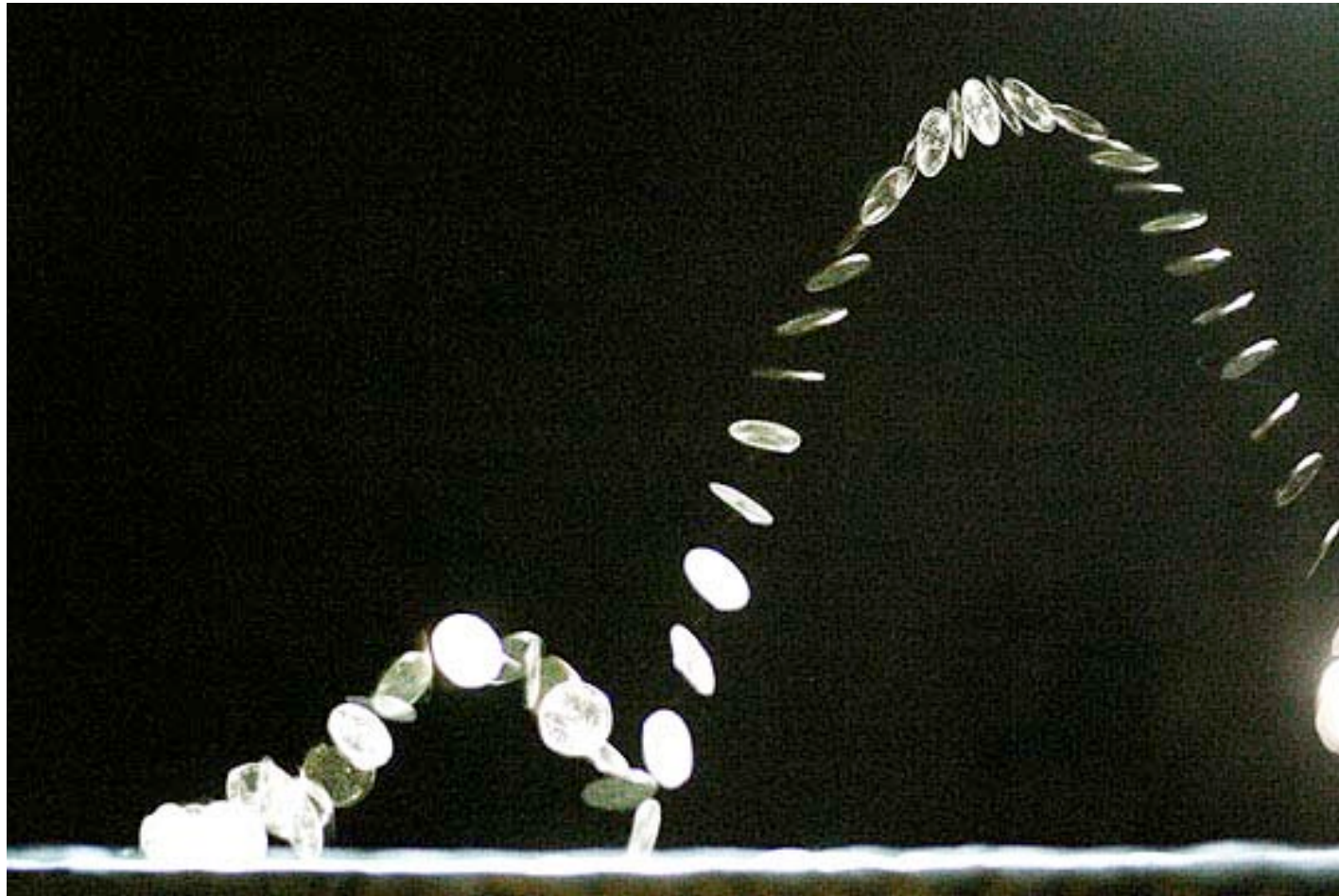
44%

CHANCE OF DINNER AT HOME:

39%



Knowing Uncertainty



Knowing Uncertainty



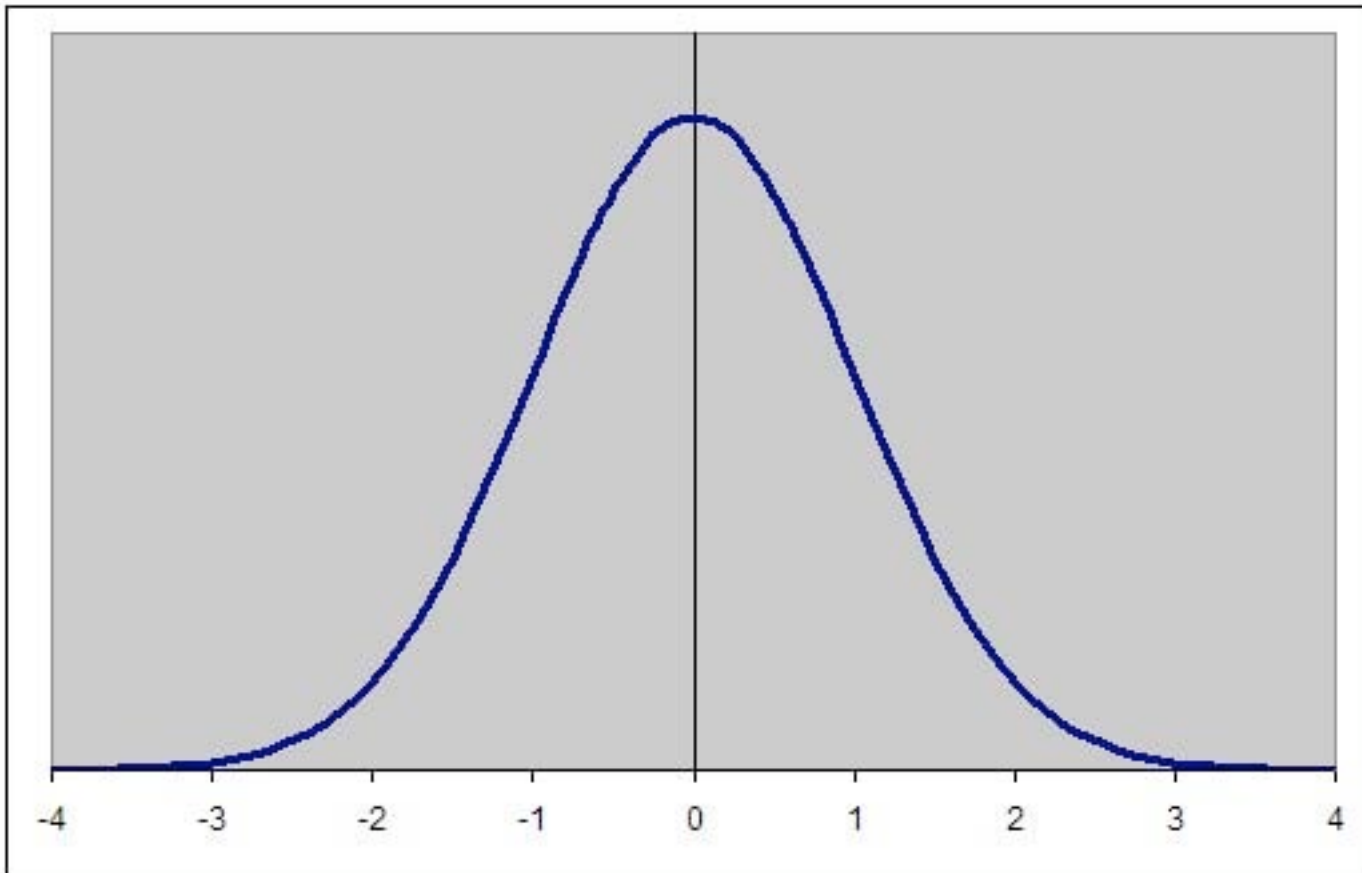
American Human Experimentation



“Tuskegee Study of Untreated Syphilis in the Negro Male”

Hands-on Statistics

- central tendency and variance



Variation and Measures of Spread

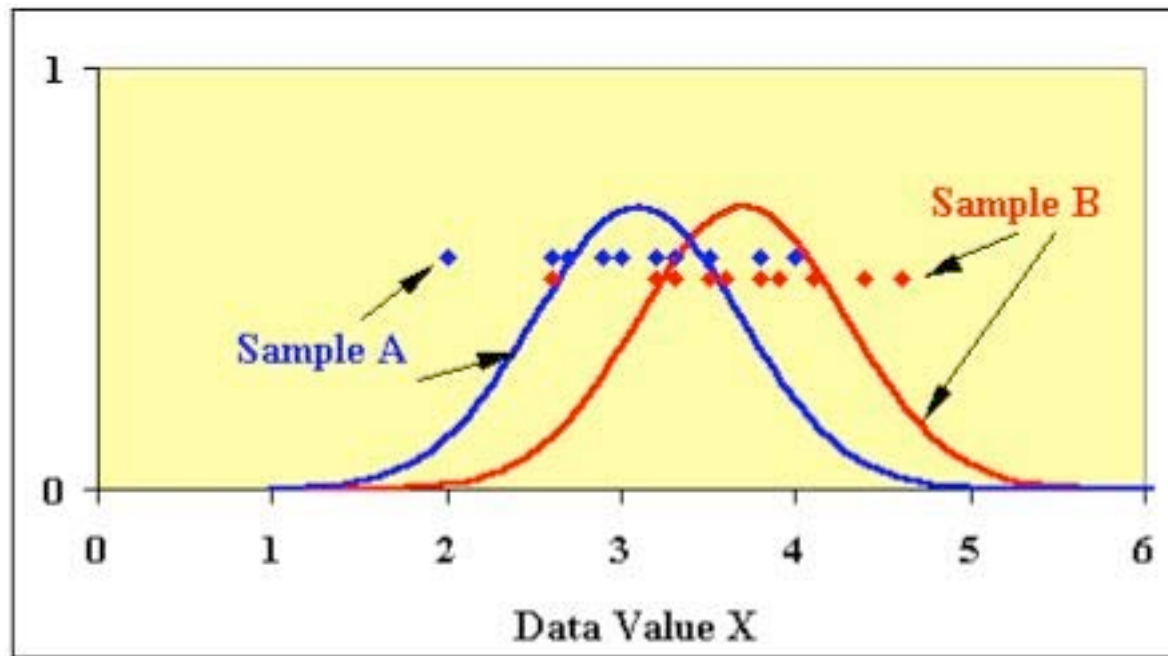


Testing for Truth

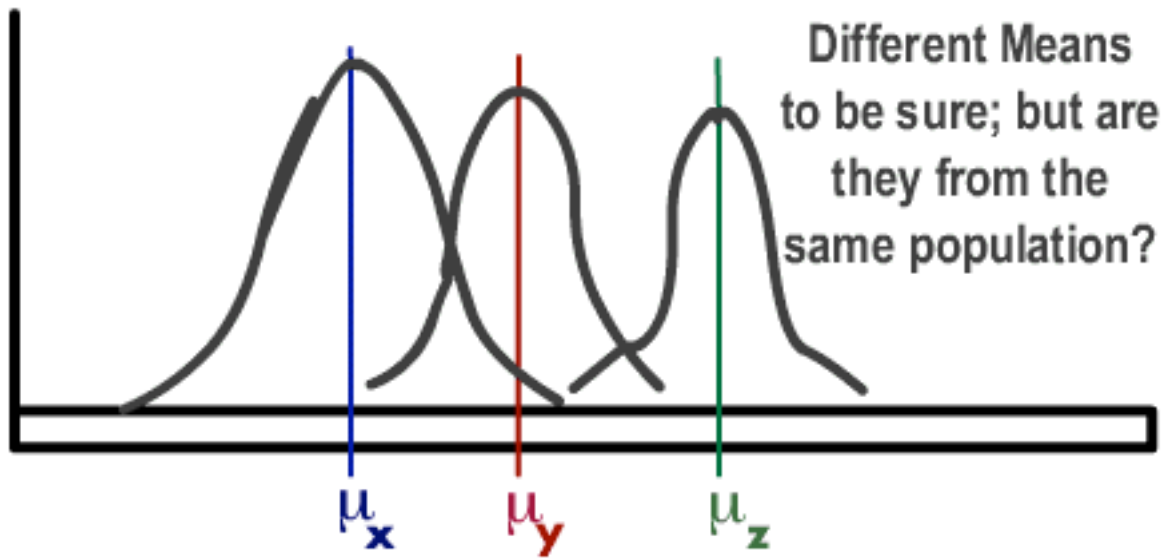
- confirmatory stats and your favorite spreadsheet



Testing for Truth

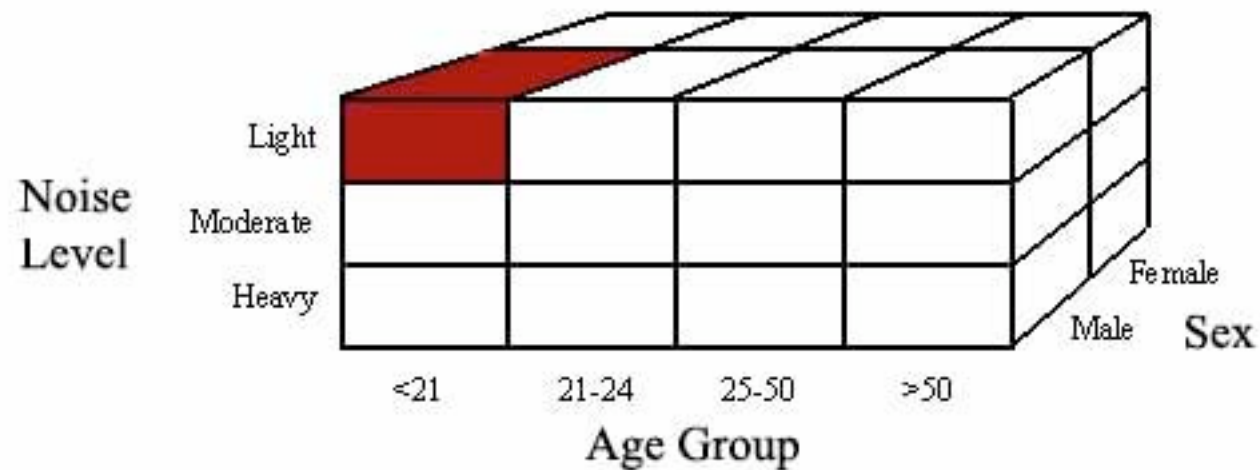


Testing for Truth



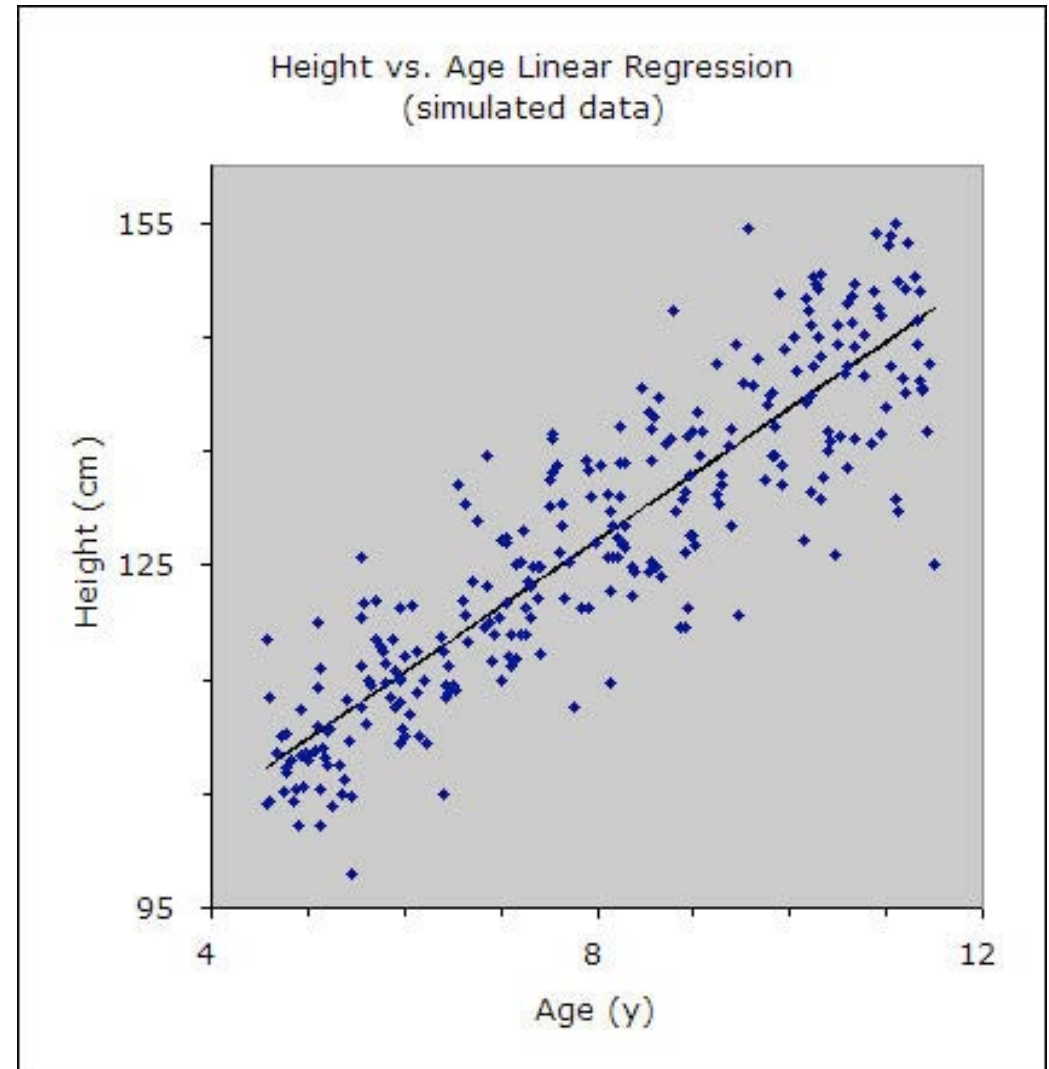
Testing for Truth

Between-Groups Design



Seeing the Future

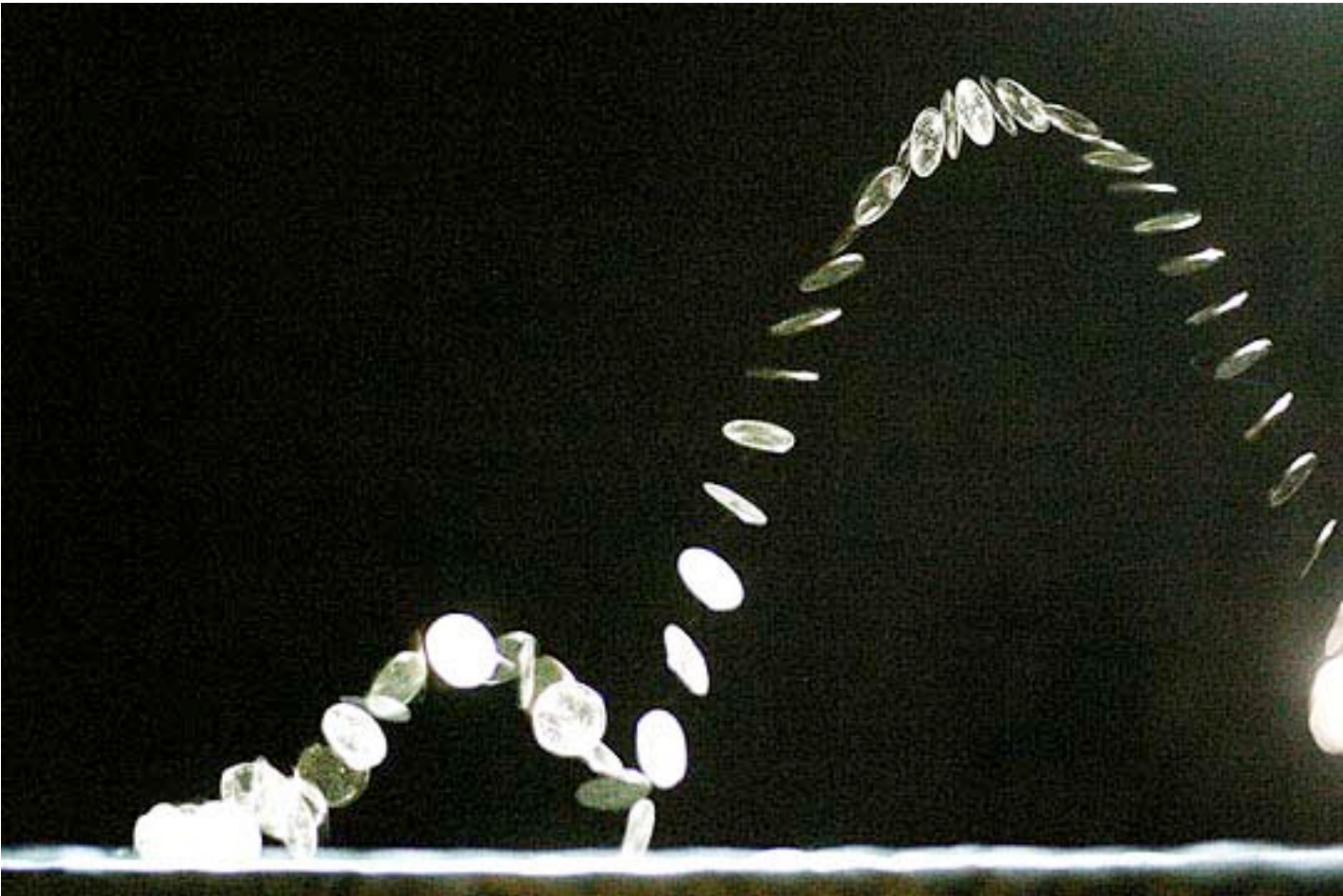
- predictive statistics



Testing for Truth



Virtual Statistics



One-in-a-million



Getting it Right

- sample size, effect size and power



Getting it Right



New York Data



Chi-square



Graphical Persuasion

- how to lie with maps



Graphical Persuasion

- how to lie with maps

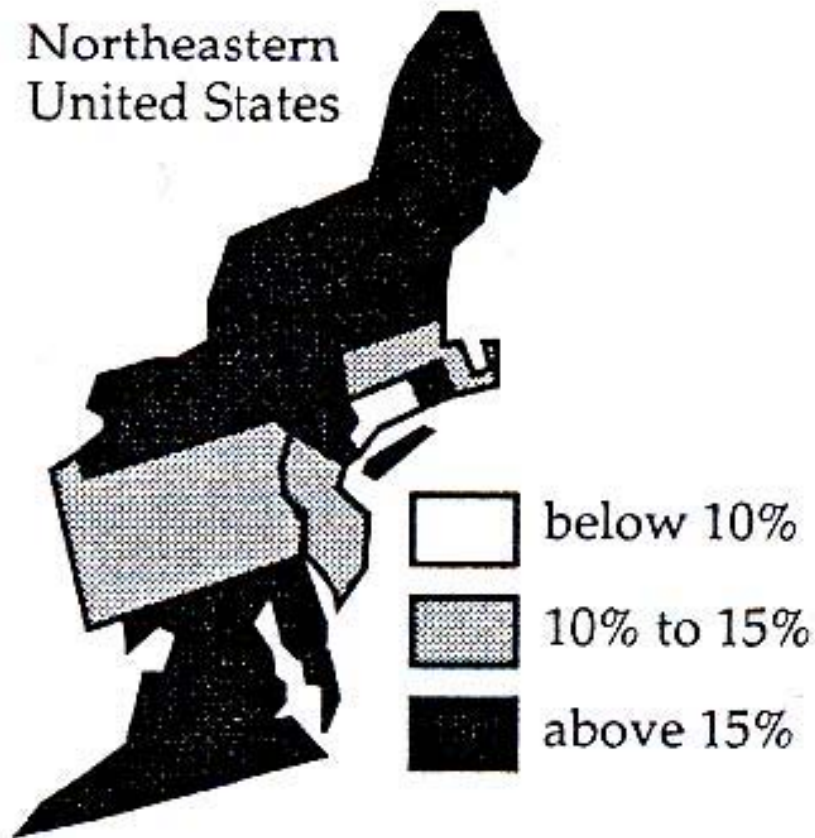
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Graphical Persuasion

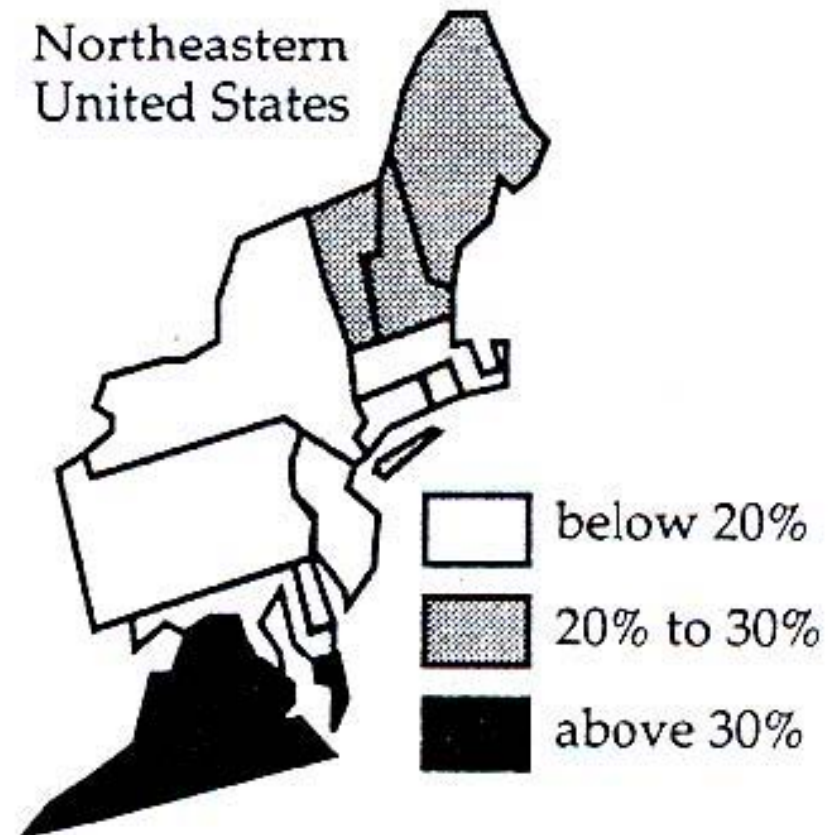
**Occupied Housing Units
Lacking a Telephone, 1960**

Northeastern
United States

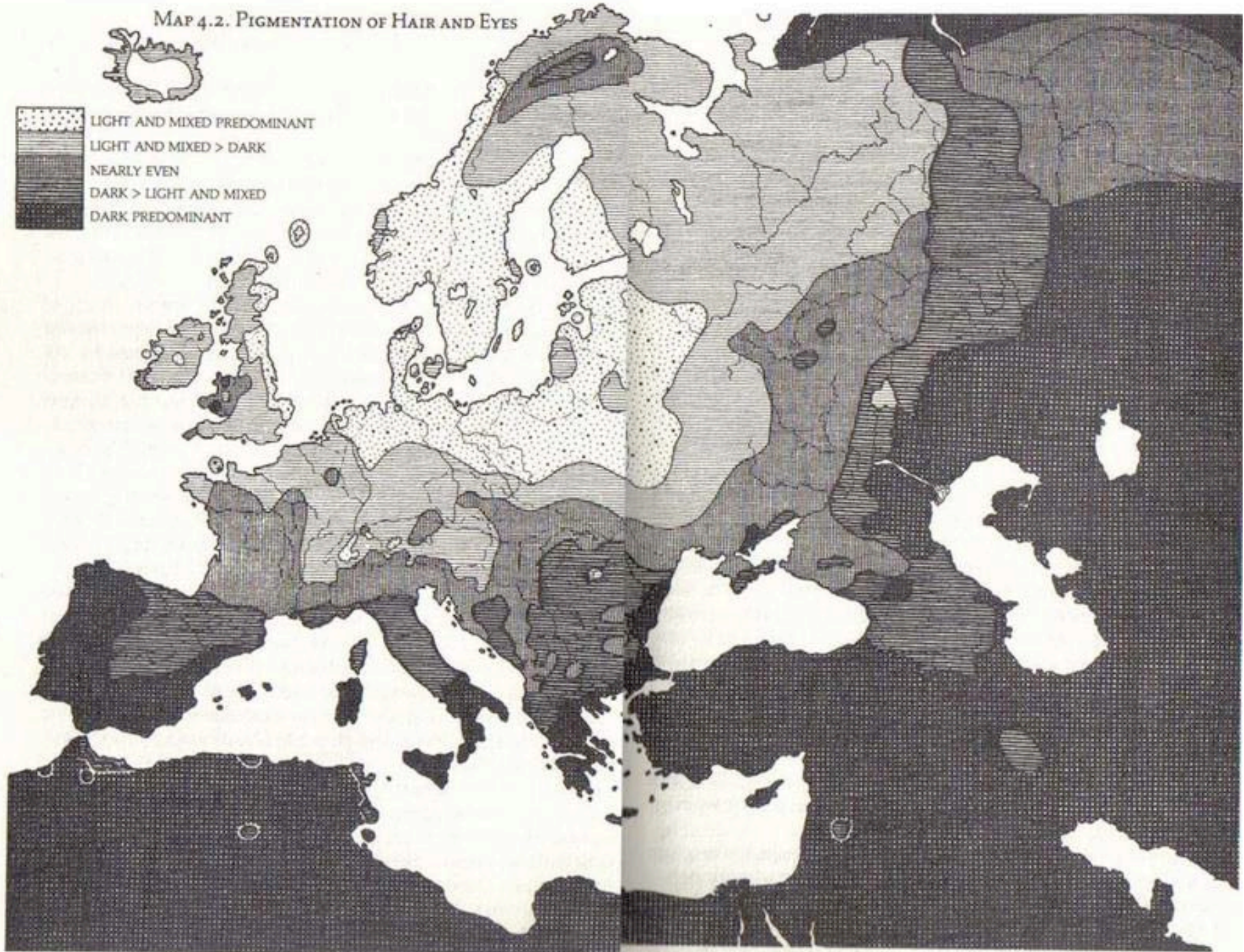
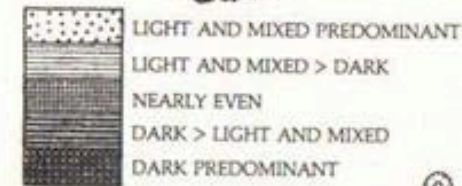


**Occupied Housing Units
Lacking a Telephone, 1960**

Northeastern
United States



MAP 4.2. PIGMENTATION OF HAIR AND EYES



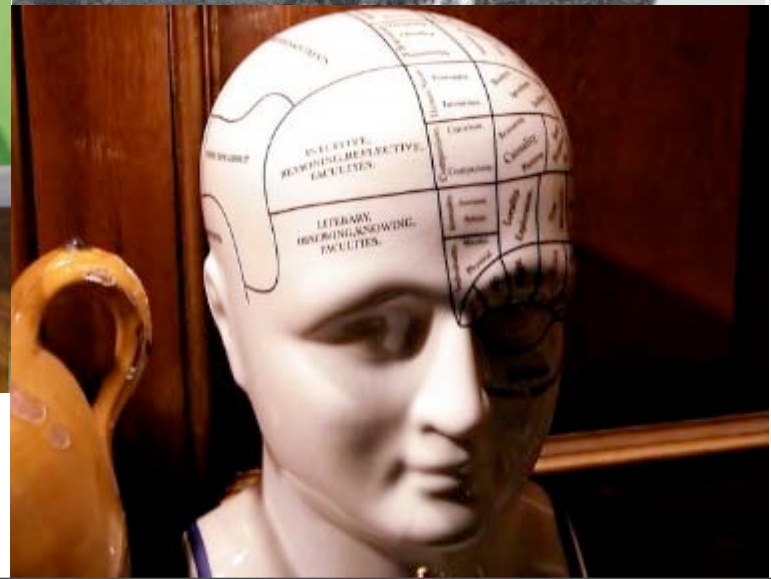
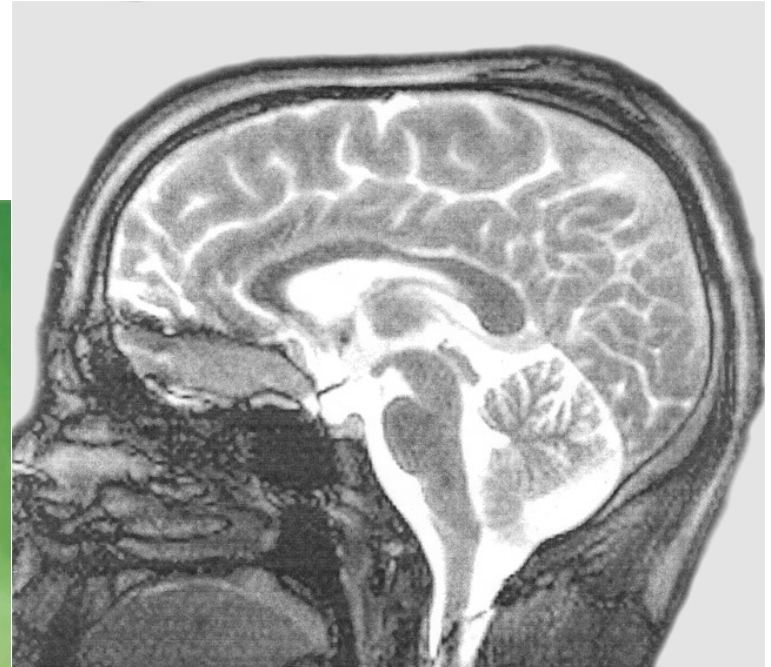
SOURCE: Drawn by Elmer Rising, ca. 1939.

THIS map combines data on the pigmentation of hair and eyes in modern Europe. Light hues cluster around the North Sea and the Baltic in the lands most recently deglaciated. Hair is darkest to the west in Wales, Ireland, the Faroes, Iceland, and

parts of western Norway. There, browns and reds are frequent, and the local blonds are mostly golden, while farther east in Baltic and Slavic lands the combination of brown eyes and ashen hair is common. Although not shown here, in the west exposed skin may be red and raw; in the east it is smoother and shinier and tans more easily.

Judgment

- designing attraction

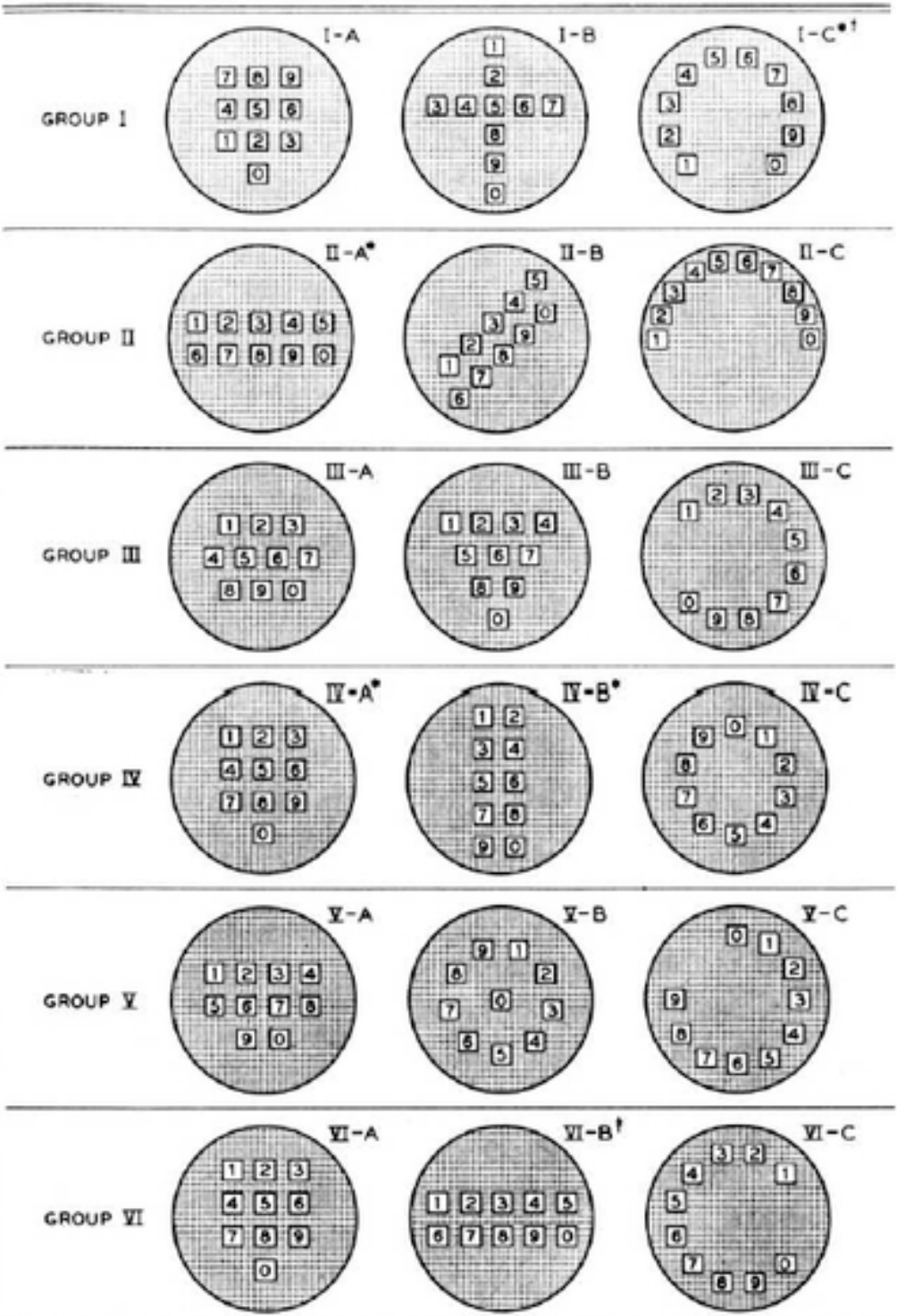


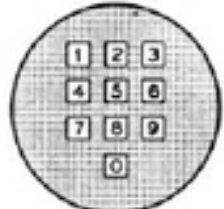
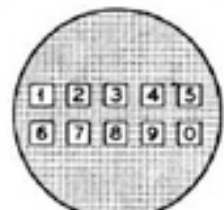
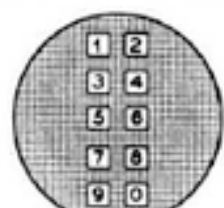
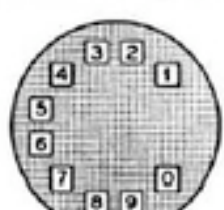
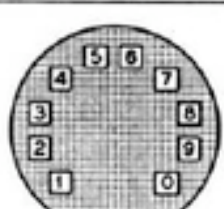
Questions

- What's worse than too few samples?
- What are subjects properly called?
- Correlation is not _____.
- When you see regression, think _____.
- Where does the normal curve come from?
- How do you talk back to a statistic?
- What statistic can you use to test if a jury is fair?

Assignments

- Critical thinking
- Iterative design
- Ethical rigor, ethics aren't obvious
- Look at your data
- Show all your data
- Find the data's story



ARRANGEMENT	KEYING TIME (SECONDS)	PER CENT ERRORS	RANKING FOR	RANKING AGAINST
 THREE-BY-THREE PLUS ONE	6.01	2.5	3RD	2ND
 TWO HORIZONTAL ROWS	6.17	2.3	1ST (MOST)	4TH
 TWO VERTICAL COLUMNS	6.12	1.3	5TH (LEAST)	1ST (MOST)
 TELEPHONE	5.90	2.0	2ND	5TH (LEAST)
 SPEEDOMETER	5.97	3.0	4TH	3RD

* SIGNIFICANTLY SHORTER KEYING TIME
 † SIGNIFICANTLY LOWER ERROR RATE

‡ SIGNIFICANTLY MORE PREFERRED