



Data-driven leadership – The fight between intuition and facts

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Case 1



MONEYBALL

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Data-Driven Football Managers



FACULTY & RESEARCH

🏠 FACULTY RESEARCH FEATURED TOPICS ACADEMIC UNITS

CASE | HBS CASE COLLECTION | AUGUST 2015

TSG Hoffenheim: Football in the Age of Analytics



theguardian

home > football live scores tables competitions results fixtures clubs U all

Midtjylland

How Midtjylland took the analytical route towards the Champions League

“There are inefficiencies in the transfer market. Lots of clubs pay too much money for players that are low quality. [...] We think we’ve got some tools that will make us evaluate teams and players much more accurately with data than human eye is able to.” (Mirror, 18 Feb 2016)

Case 2

John Doe

Art Director



My name is John Doe and I am an 26 years old Art Director. Orestrunt, il iur re vereprae conemolor malo volor asinvenis abor-por ernatem dolorum ipitatur? Andsciunt molor auta posam.

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JOB EXPERIENCE

ART DIRECTOR: COMPANY IN LOS ANGELES, 2013

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JUNIOR ART DIRECTOR: COMPANY IN NEW YORK, 2012

Ut quia acea sitiis mi, officaectem ipsanih illaborporit eniat et la-borerchic tem evelis alitatibus autem quam, cum quist quoditaspit magnat. Nem esequis apit volor aut que nam, nost harum

EDUCATION

HARVARD UNIVERSITY: MASTER OF DESIGN IN 2012

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STANFORD UNIVERSITY: BACHELOR OF ARTS IN 2010

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AWARDS

RED DOT AWARD: COMMUNICATION DESIGN 2013

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CSS DESIGN AWARDS: WINNER 2012

Perspiti liciae nist ab ipsam quid quibusc lentur ab inulpa vidicient assit, se si dolorum, tem eat dolut ipictiu ritatum quis alit, verem-po ritaquid eior, quiam facia voluptaquis moluptatis volecat



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JohnDoe@domain.com

www.johndoe-design.com

www.twitter.com/username

username.deviantart.com

SKILLS

PROFESSIONAL SKILLS

Adobe Creative Cloud

Cinema 4D

HTML5/CSS3

Javascript

Flash/Animation

PERSONAL SKILLS

Communication

Teamwork

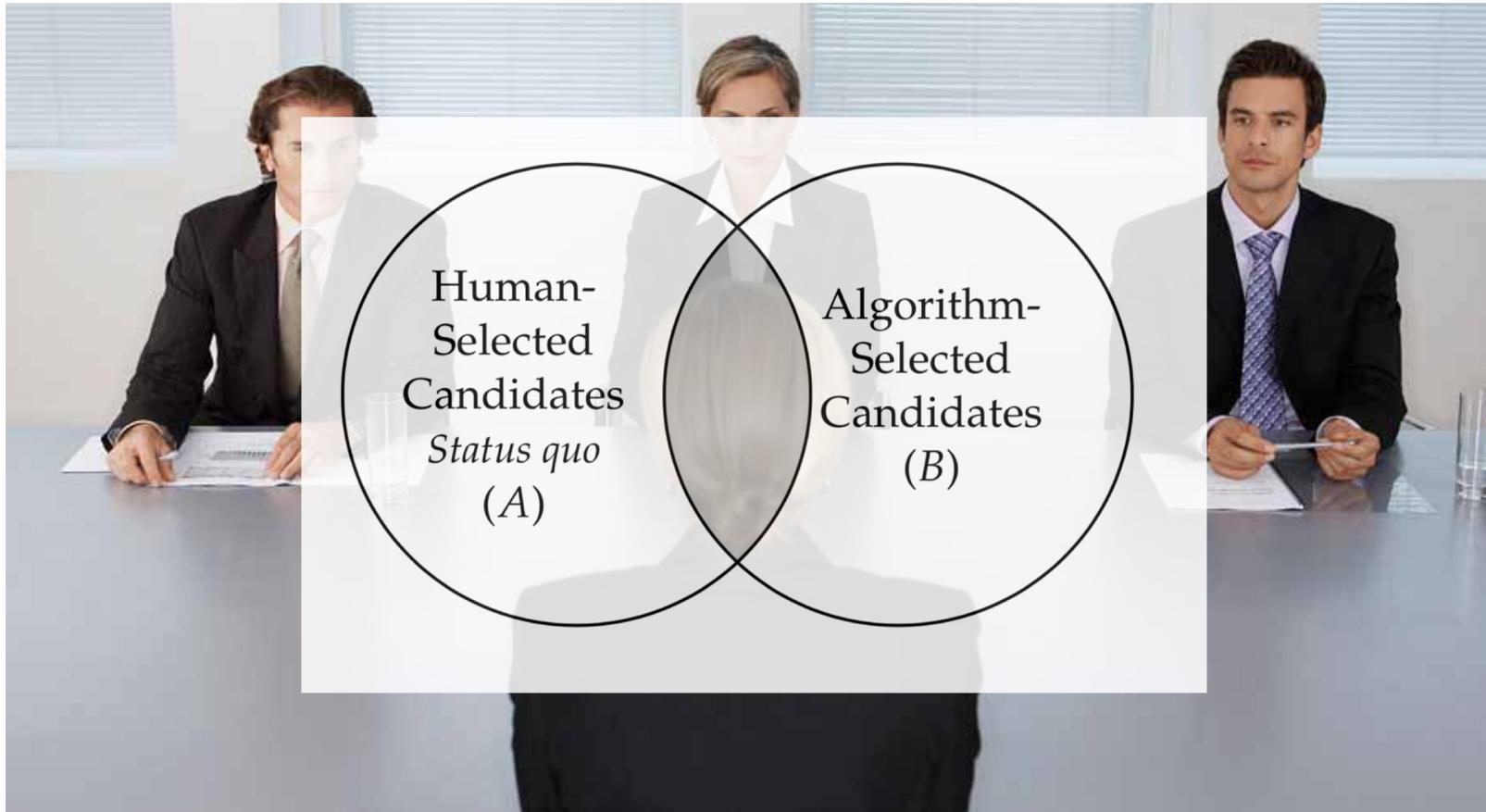
Creativity

Leadership

Management

Human versus Algorithm

Résumé screening experiments by Cowgill (2017)



Human versus Algorithm

Algorithm learned from "watching" humans screen CVs

The image shows a CV for Lisa Hanssen from Universiteit Utrecht. The CV includes personal information, a photo, and a list of responsibilities. Below the CV is a table with columns for various skills and an 'Interview?' column. A magnifying glass is positioned over the table, highlighting the data.

	Harvard	Creativity	Big Data	Analytics	English	...	Interview?
CV1	0	0	3.291	0	0	...	NO
CV2	1.398	1.398	2.194	...	...	...	YES
CV3	0	0	2.194	...	...	...	NO
CV4	0	0	0	...	...	...	YES
CV5	1.398	1.398	1.097	...	...	...	YES
...

CV Lisa Hanssen

PERSONAL INFORMATION

Name: Lisa Hanssen
Date of Birth: 31-10-1993
Address: Herenstraat 4, 3512 KC Utrecht

11/2011 – 10/2015
Team leader
Albert Heijn, Utrecht
Responsible for the entire product-handling process
• Managed a team of 10 stockers
• Spoke to customers when handling errors occurred

Participated in the Information Management advisory group
• Wrote (parts of) tender bids and advisory reports.

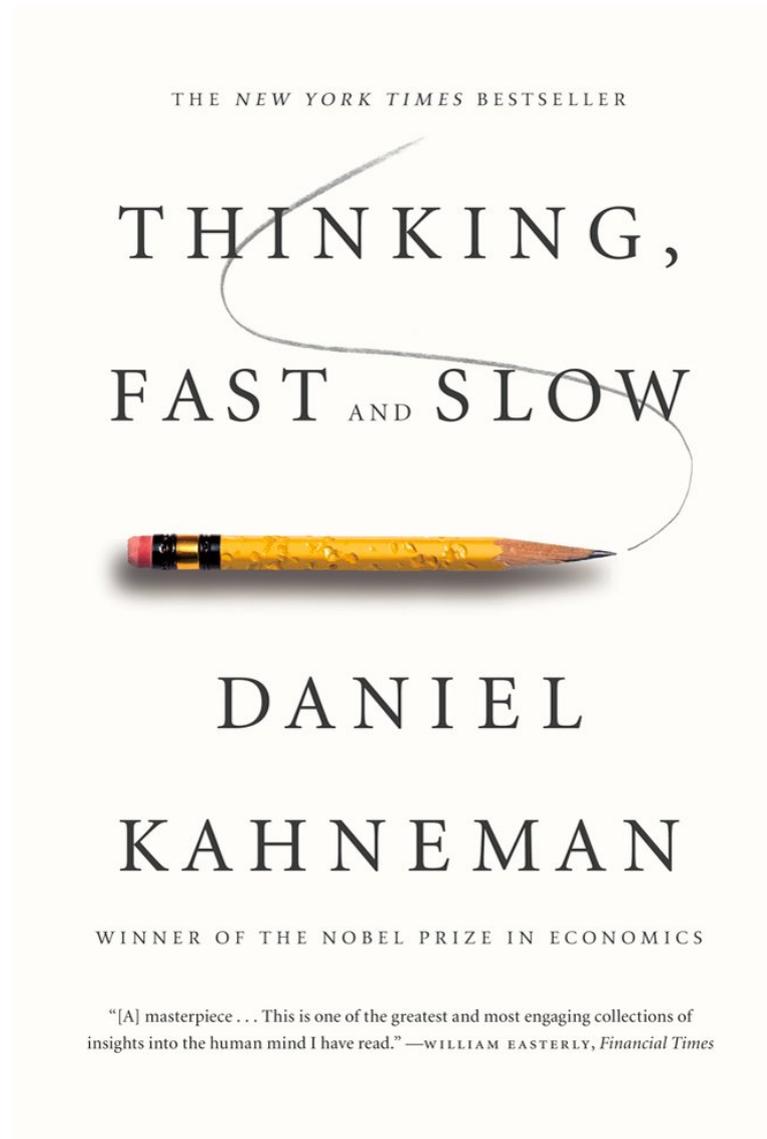
CV Lisa Hanssen Page 1 of 2 Page 2 of 2

Findings

- The marginal candidate picked by the machine, but not by human screeners, was
 - 17% more likely to pass a face-to-face interview and receive a job offer offer
 - 15% more likely to accept job offers when extended by the employer
 - more productive (lines of code) once hired as employees
- In addition, candidates picked by the machine
 - had better soft skills, e.g., leadership and cultural fit
 - were more diverse in terms of gender, race, education, qualifications, and experience

Theory

Cognitive Heuristics and Biases





Angry!

17 x 24 is 408

Cognitive Heuristics and Biases

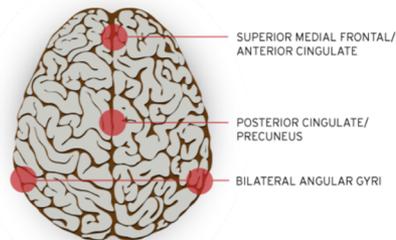
System 1

- Intuitive thinking
 - Fast
 - Automatic
 - Effortless
 - Implicit
 - Emotional

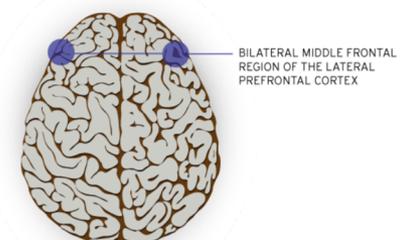
System 2

- Rational thinking
 - Slow
 - Conscious
 - Effortful
 - Explicit
 - Logical

Areas of the Brain Affiliated with System 1 Processing



Areas of the Brain Affiliated with System 2 Processing



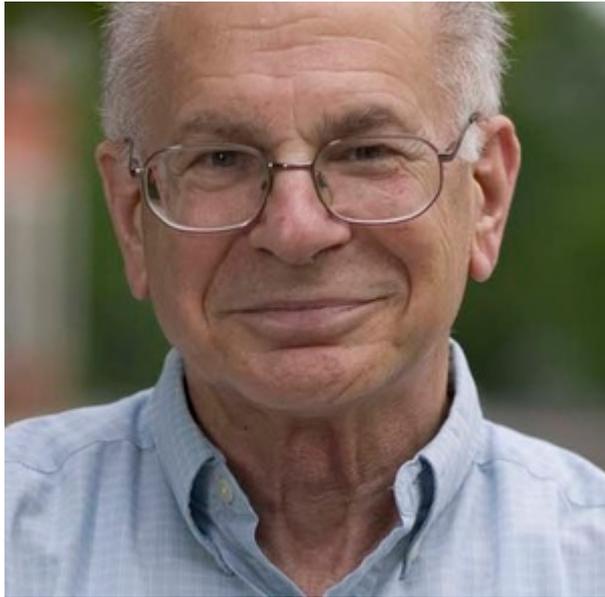
Cognitive Heuristics and Biases

Do System 1 and System 2 always work well together?

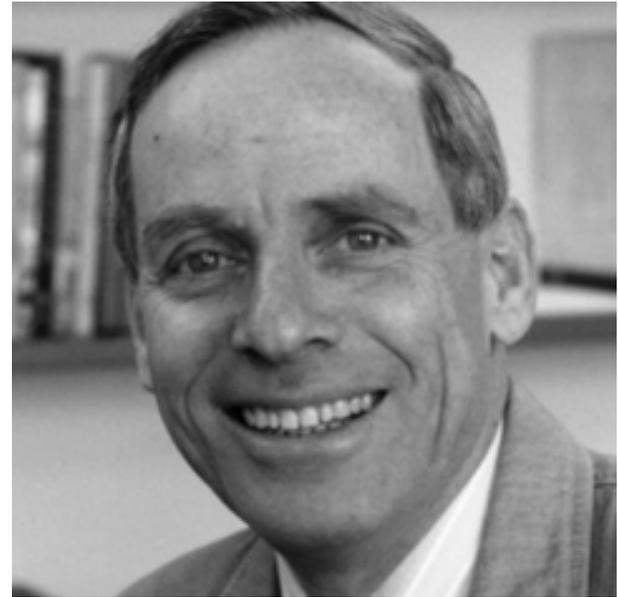
- ❖ **A bat and a ball together cost \$1.10**
- ❖ **The bat costs a dollar more than the ball**
- ❖ **How much does the ball cost?**



Cognitive Heuristics and Biases



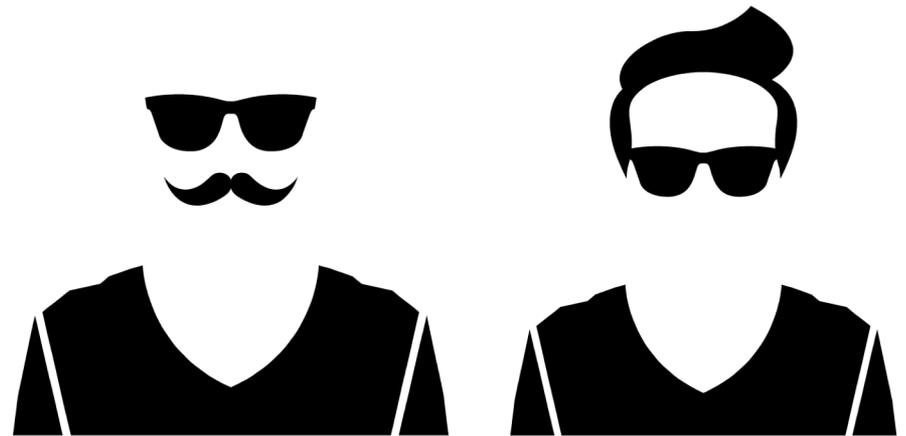
Daniel Kahneman



Amos Tversky

The Representativeness Heuristic

- When making a judgment about an individual (or object or event), people tend to look for traits an individual may have that correspond to previously formed stereotypes.



The Representativeness Heuristic

- Illustration:
 - “Steve is a very shy and withdrawn, invariably helpful, but with little interest in people, or in the world of reality. A meek and tidy soul, he has a need for order and structure, and a passion for detail.”
- What is the probability that Steve is a...
 - Salesman
 - Librarian

The Representativeness Heuristic

- Insensitivity to base rates
 - The fact that there are many more salesmen than librarians in the population should be considered in your judgment.

%

The Availability Heuristic

- People assesses frequency, probability, or likely causes of an event by the degree to which instances or occurrences of that event are readily available in their memory.



Cognitive Heuristics and Biases

The Availability Heuristic

- Ease of recall based on vividness

World Fire Statistics

N	Country	Number of fires ...											
	structure fires	in %	vehicles	in %	forests	in %	grass, brush	in %	rubbish	in %	other	in %	
	в зданиях	в %	не транспорте	в %	в лесах	в %	травы, кустов	в %	мусора, свалок	в %	другие	в %	
	Staat	Anzahl der Brände ...											
	in Gebäuden	in %	Transport	in %	im Wald	in %	Gras usw.	in %	Abfall, Müll	in %	Sonstige	in %	
1	Armenia	-	-	233	3,8	-	-	1 634	26,3	723	11,7	3 612	58,2
2	Austria	14162	79,8	1 393	7,8	449	2,5	1742	9,8	-	-	-	-
3	Belarus	5 936	79,3	448	6,0	687	9,2	-	-	-	-	418	5,8
4	Bulgaria	163	0,7	2 111	9,1	39	0,2	6 572	28,3	4 868	21,0	9 446	40,7
5	Croatia	2 920	40,0	545	7,5	111	1,5	1 574	21,5	1 454	19,9	703	9,0
6	Czech Republic	5 075	29,2	1 970	11,3	866	5,0	580	3,3	2 656	15,3	6 244	32,3
7	Estonia	1 833	26,7	403	5,9	100	1,5	2 318	33,7	1 819	26,5	398	5,5
8	Finland	5 958	42,5	2 142	15,3	-	-	3 511	25,0	-	-	2 418	14,9
9	Great Britain	61 300	28,8	23 100	10,9	-	-	-	-	-	-	128 130	60,3
10	Hungary	7 992	40,9	640	3,3	5 783	29,6	-	-	1 014	5,2	4 107	21,0
11	Japan	23 641	54,2	4 467	10,2	-	-	1 494	3,4	-	-	14 052	35,9
12	Latvia	3 947	40,2	566	5,8	-	-	-	-	2 316	23,8	2 992	30,5
13	Liechtenstein	10	41,7	2	10,0	0	0,0	3	12,5	1	4,2	6	33,3
14	Lithuania	847	8,4	1 182	18,7	263	4,2	4 086	30,7	2920	21,9	4024	30,2
15	New Zealand	5 294	35,6	4 627	31,1	-	-	4 951	33,3	-	-	-	-
16	Norway	3 714	48,4	821	10,7	-	-	1 144	14,9	-	-	1 994	26,0
17	Poland	27 564	19,0	8 246	7,0	4 685	4,0	24 647	17,9	3 100	2,1	76 995	53,0
18	Russia	104 146	69,2	22 847	15,2	16 865	11,2	-	-	-	-	6 579	4,4
19	Serbia	7 530	44,8	1 527	9,1	165	1,0	2 138	12,7	2 717	16,2	2 728	16,8
20	Singapore	2 888	61,1	-	-	-	-	-	-	-	-	1 836	38,9
21	Slovenia	3 570	60,3	660	11,2	1 279	21,6	-	-	-	-	408	6,9
22	Ukraine	36 775	51,9	4 276	6,0	2 003	2,8	-	-	24 723	34,9	3 125	4,4
23	USA	494 000	38,1	193 500	14,9	-	-	290 500	25,5	157 500	-	162 500	12,5
	Total/Worto/Gesamt:	819 265	38,8	275 706	13,0	33 295	1,6	346 896	16,4	205 811	9,7	432 715	20,5



The Availability Heuristic

- Ease of recall based recency
- Illustration
 - People are more likely to purchase insurance to protect themselves from a natural disaster (e.g. earthquake) that they have just experienced than they are to purchase such an insurance before this type of disaster occurs.
 - In fact, the risk for a second earthquake in the same location diminishes after an earthquake (excluding aftershocks)

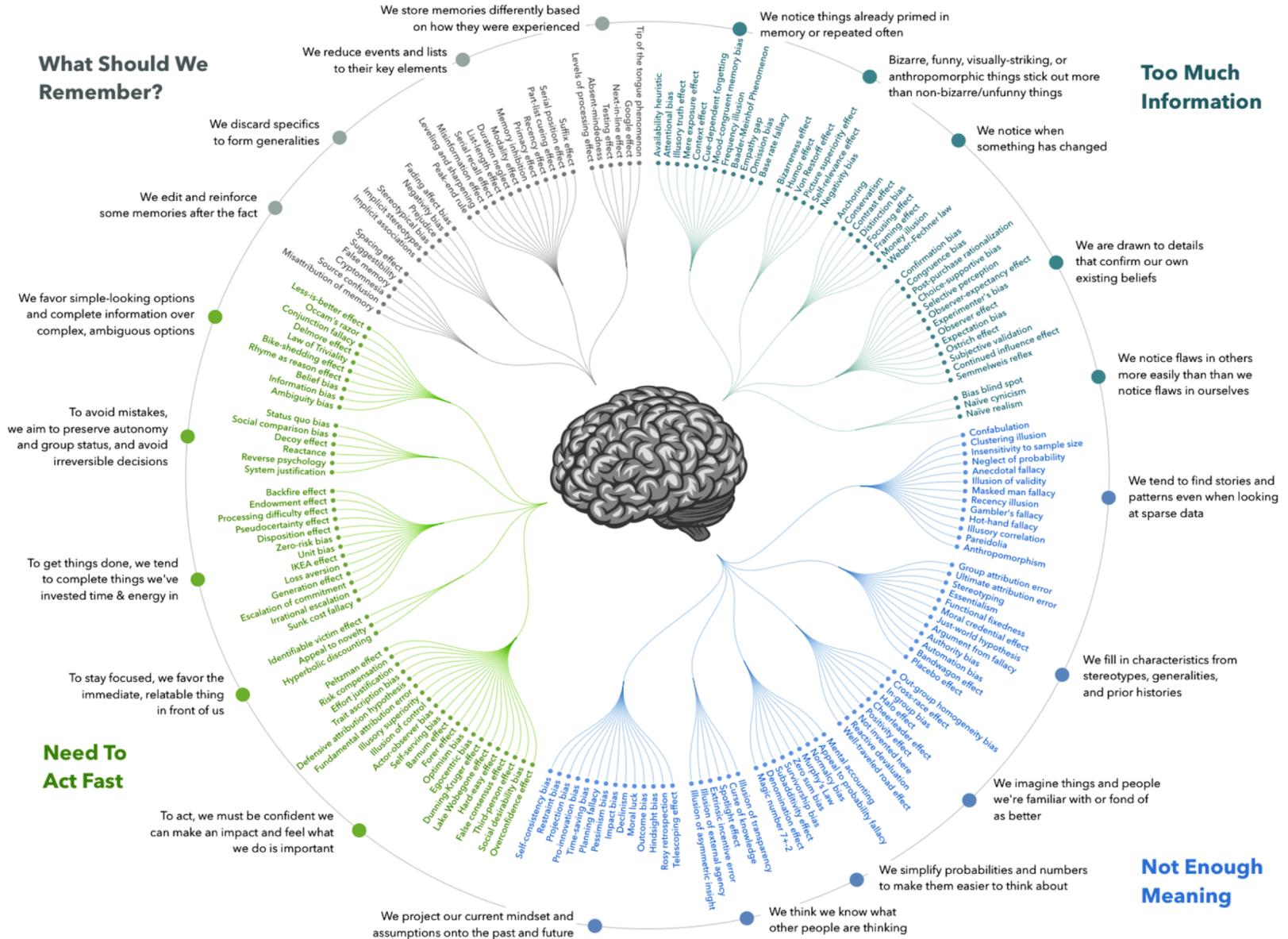


Cognitive Heuristics and Biases

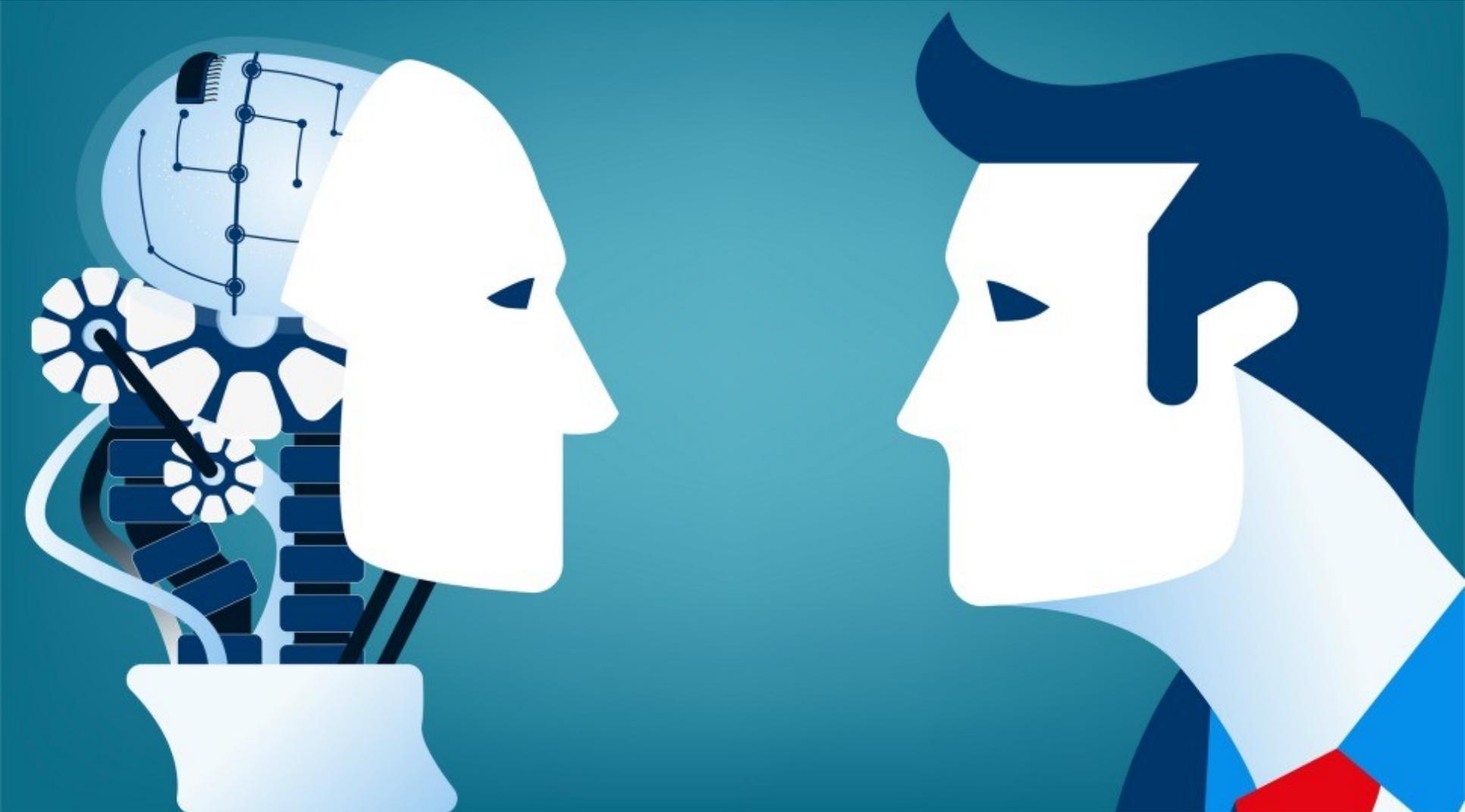
The Halo Effect



COGNITIVE BIAS CODEX



Evidence



Human versus Algorithm

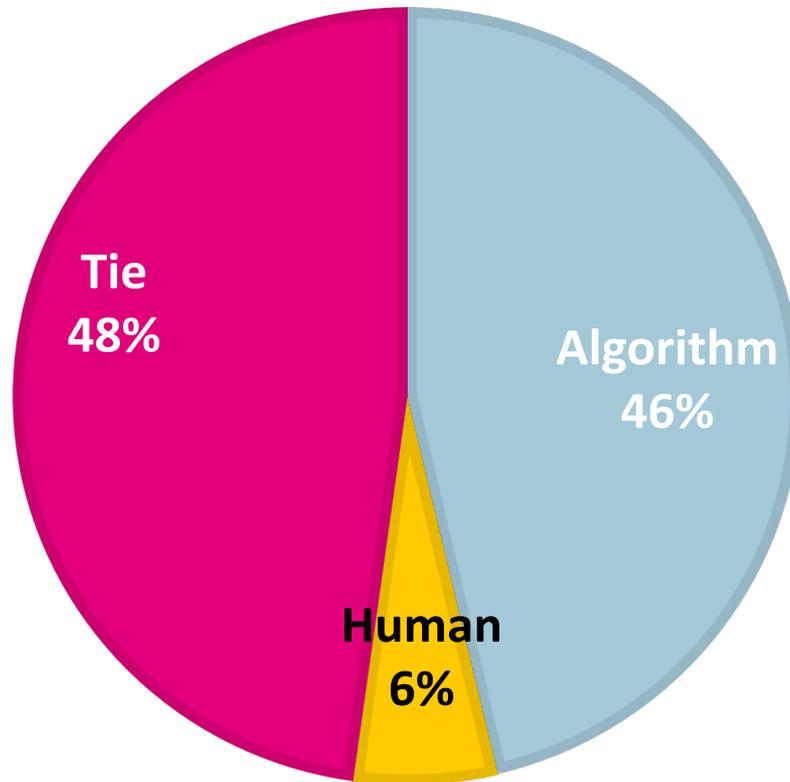
Meta Analysis by Grove et al. (2010)

- Extension of Meehl's (1954) work
- Grove analyzed **136 studies** comparing the accuracy of **human and algorithmic decisions**, e.g.,
 - Medical and psychiatric diagnosis
 - Human resources
 - Student performance
 - Job performance
 - Criminal behavior
 - Lie detection
 - Business failure

Human versus Algorithm

Meta Analysis by Grove et al. (2010)

WHO IS THE BETTER DECISION MAKER?



On average, **algorithmic decision making was about 10% more accurate** than human judgment.

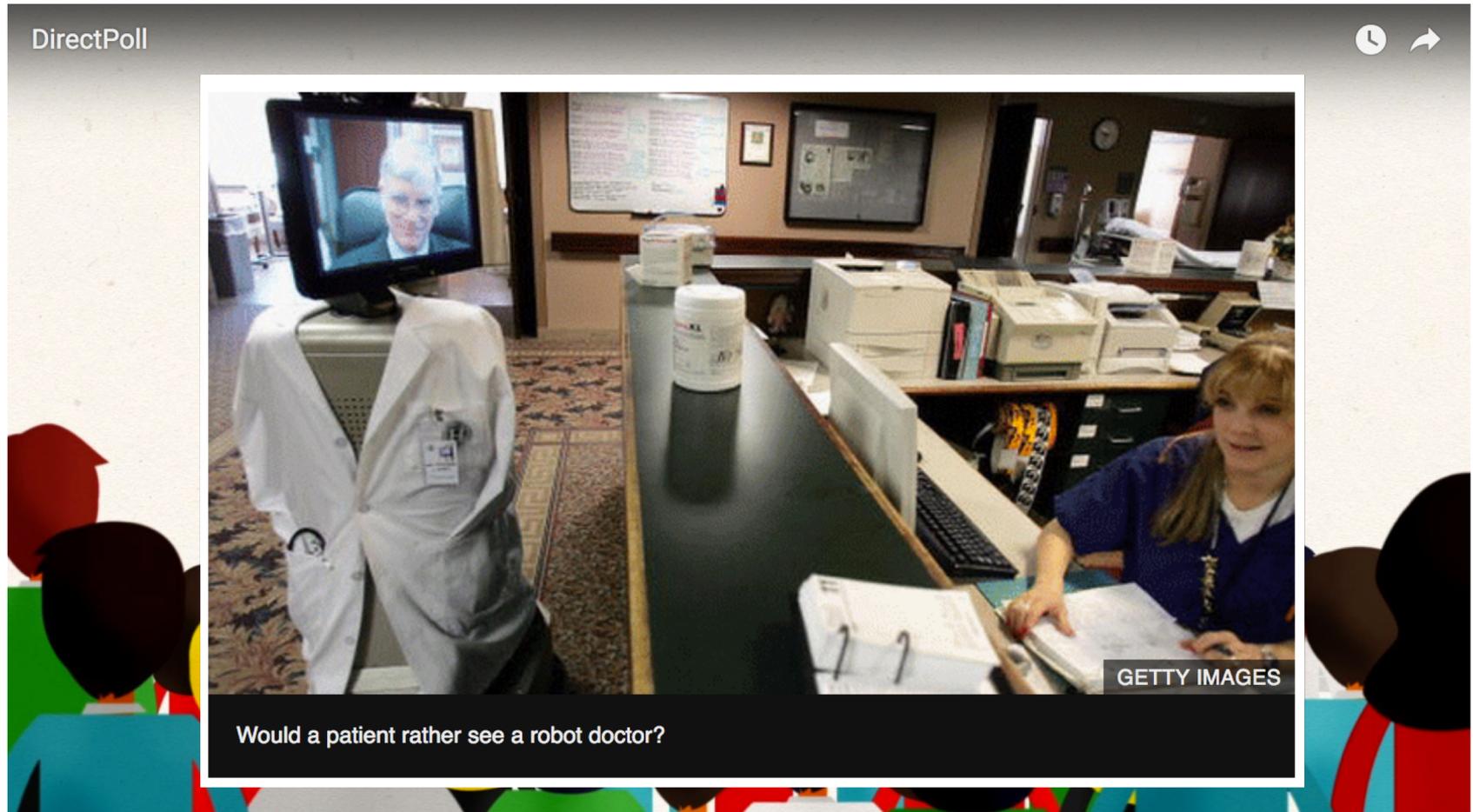
Superiority of the algorithm was consistent regardless of task, type of humans, amounts of experience, or types of data being combined

So why are people not always using algorithmic decision making instead of human judgment?

Human versus Algorithm

<http://etc.ch/rU2t>

DirectPoll



Human versus Algorithm

Experiments by Dietvorst et al. (2014) – MBA Admissions

Undergraduate Degree	Business
GMAT - Verbal	41/60
GMAT - Quantitative	47/60
Essay Score	Good
Interview Score	Good
Work Experience (years)	5
Average Salary	\$55,333
Average of Parents' Education	Undergraduate degree(s)



Percentile	Letter Grade
95-100	A
94	A
93	A
92	A
91	A
90	A
89	B
88	B
87	B
86	B
85	B
84	B
83	B
82	B
81	B
80	B
79	C
78	C
77	C
76	C
75	C

Human versus Algorithm

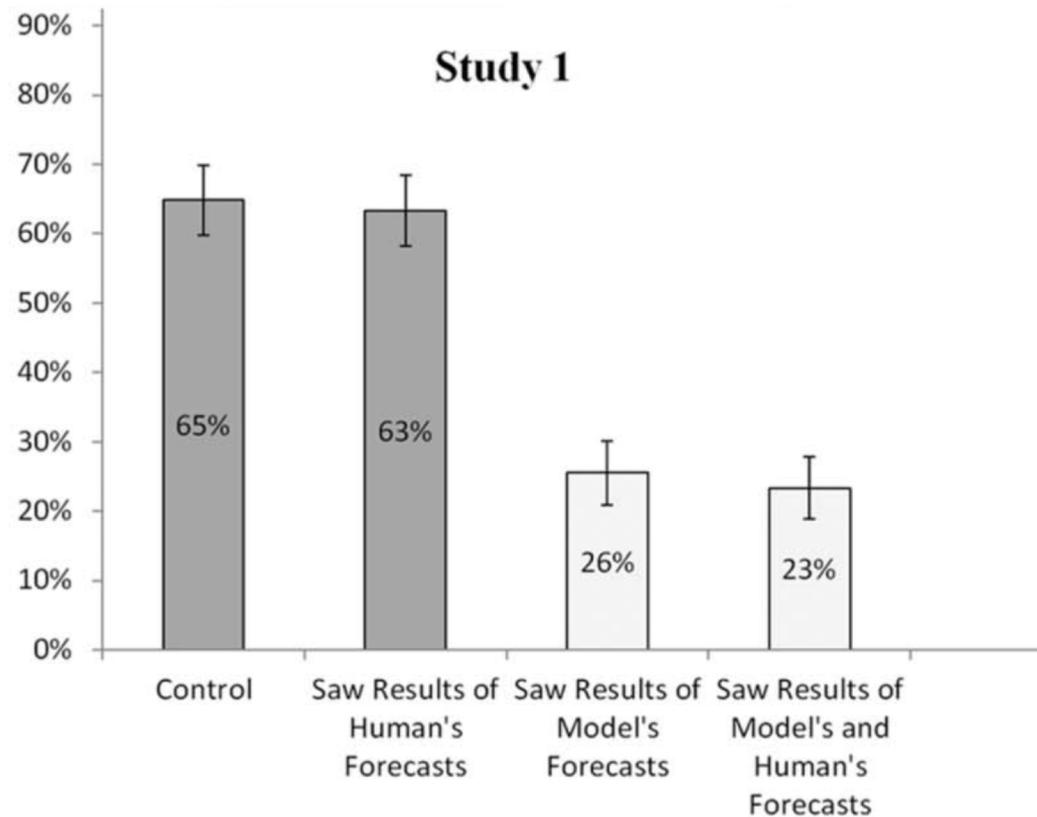
Experiments by Dietvorst et al. (2014) – MBA Admissions

The algorithm was 15-29% more accurate than the human judges



Experiments by Dietvorst et al. (2014) – MBA Admissions

Percent choosing algorithm
to predict MBA student's performance



Effect of seeing model: $\chi^2(1, N = 361) = 57.48, p < .001$

Effect of seeing human: $\chi^2(1, N = 361) = 0.14, p = .706$

Implications

Will a robot take your job?

🕒 11 September 2015

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