



UNIVERSITY OF CAMBRIDGE

The Psychometrics Centre

SSRMC Psychometrics Module

From psychometrics to psychographics

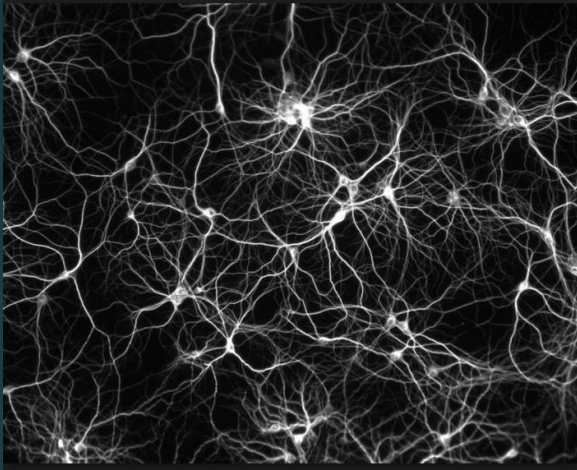
John Rust

<http://www.psychometrics.cam.ac.uk>

The Psychometrics Centre
Judge Business School
Trumpington Street

The disintegration of psychology

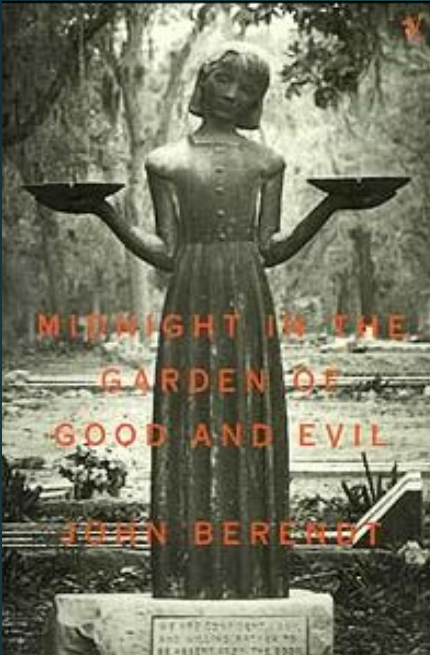
Neuropsychology



Psychometrics



20th century psychometrics



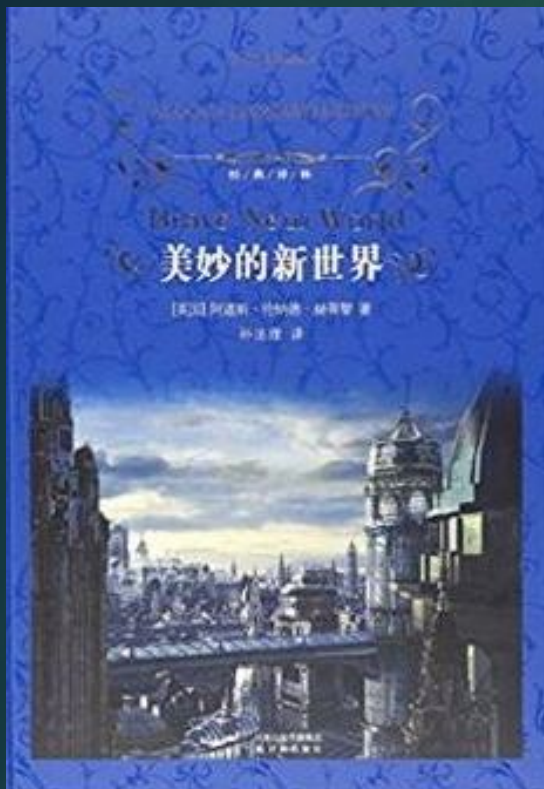
Samuel Taylor Coleridge
(*Table Talk*, 1831)

*If men could learn from
history, what lessons it
might teach us!*

*But passion and party
blind our eyes, and the
light which experience
gives us is a
lantern on the stern
which shines only on the
waves behind.*



A clash of dystopias



The Three Body Problem: Chaotic Disruptors

- Innovations
 - 1: Psychographics
 - 2: Behavioural Science
 - 3: Cyber communication
 - 4: Machine Learning
 - 5: Artificial Intelligence
- Dystopic Visions
 - 1: 1984 (Orwell, 1948)
 - 2: Walden Two (Skinner, 1948)
 - 3: The Three Body Problem (Liu Cixin, 2007)
 - 4: I, Robot (Asimov, 1950)
 - 5: The Second Coming (Yeats, 1919)



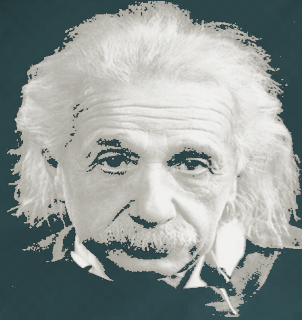
Digital footprints are psychometric item pools

- **Private traits and attributes are predictable from digital records of human behavior** by M. Kosinski, D. Stillwell, T. Graepel, PNAS, 2013. (IF: 9.1) 2015.
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What we can predict from your digital footprint



BIG5 Personality



Intelligence



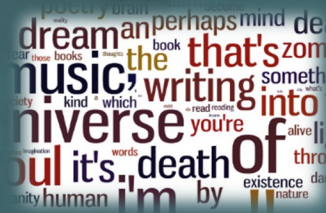
Life Satisfaction



Political Views



Religious Views



Use of Language

Use of additive substances

Parents' relationship status

Interest/Profession

Relationship status

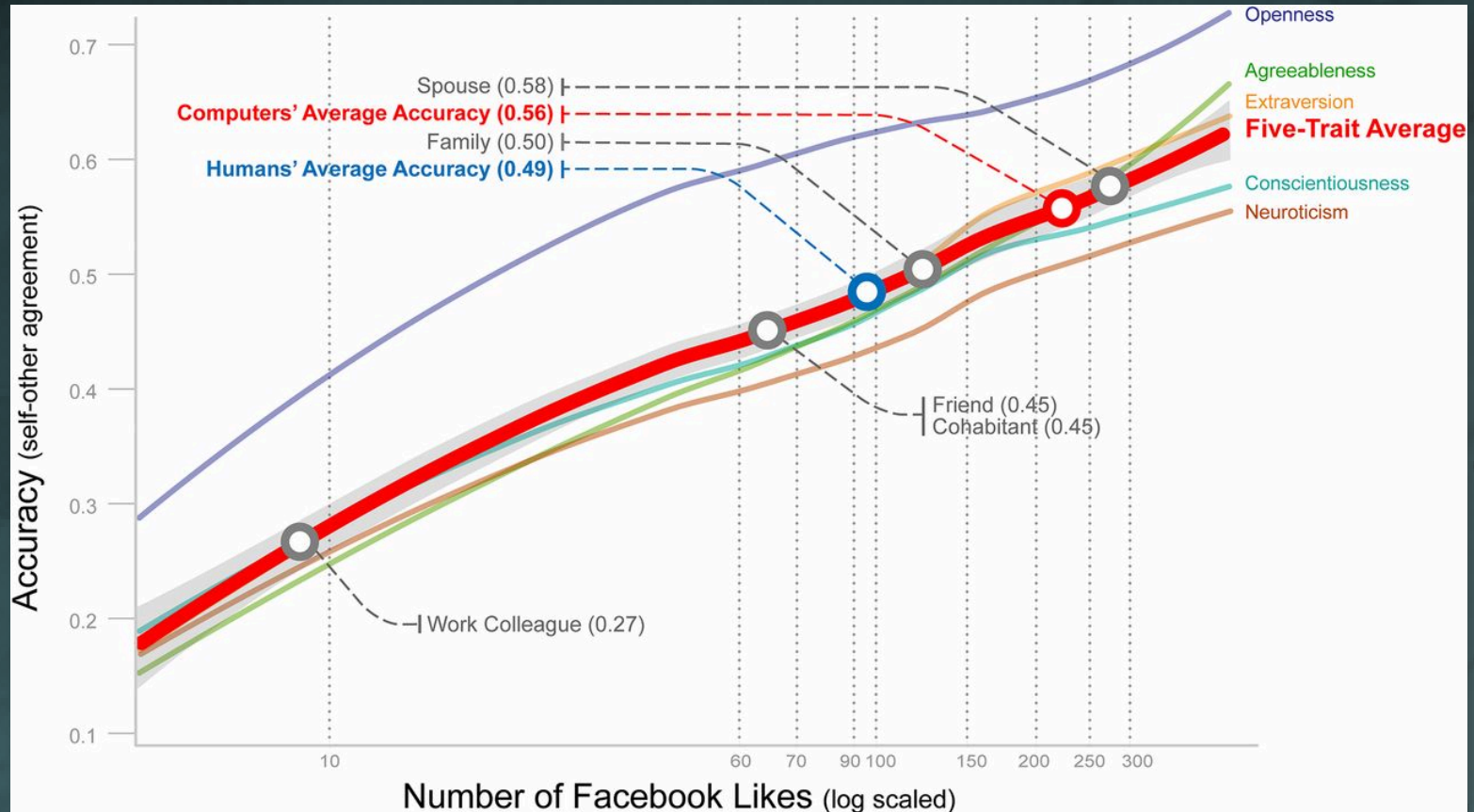
Sexual orientation

Ethnic Origin

Gender

Age

Wu, Y., Kosinski, M. & Stillwell, D. (2015) Computer-based personality judgements are more accurate than those made by humans. Proceedings of the National Academy of Sciences (PNAS)



High



The Godfather



Mozart



Thunderstorms



The Daily Show



To Kill a Mockingbird



Lord of the Rings



Science

Low



Jason Aldean



Tyler Perry



Sephora



Chiq



Bret Michaels



Harley-Davidson



Bebe

[illegible]

[illegible]

Neuroticism



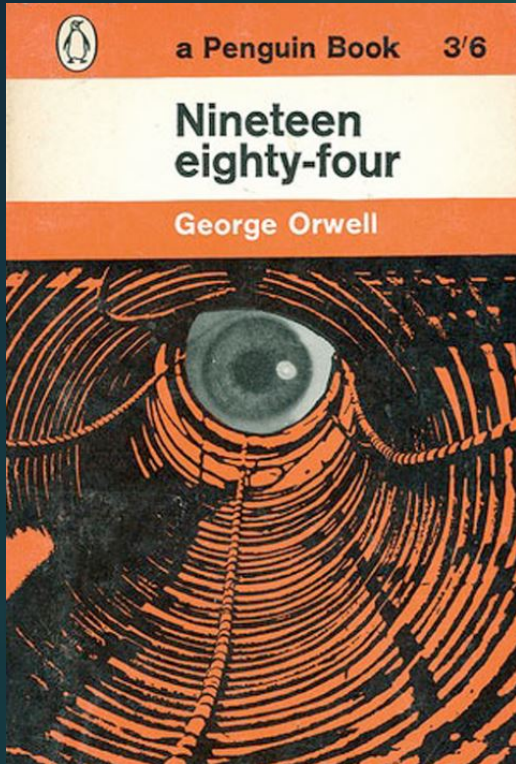
Men



Women



The End of Privacy: 1984

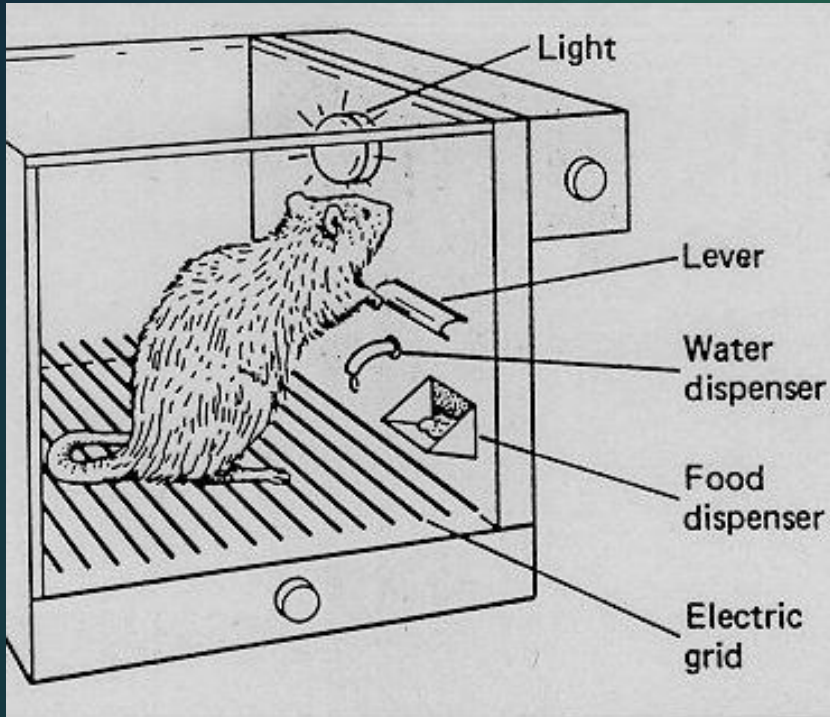


George Orwell, “1984” (1948)

“Always eyes watching you and the voice enveloping you. Asleep or awake, indoors or out of doors, in the bath or bed- no escape. Nothing was your own except the few cubic centimetres in your skull.”

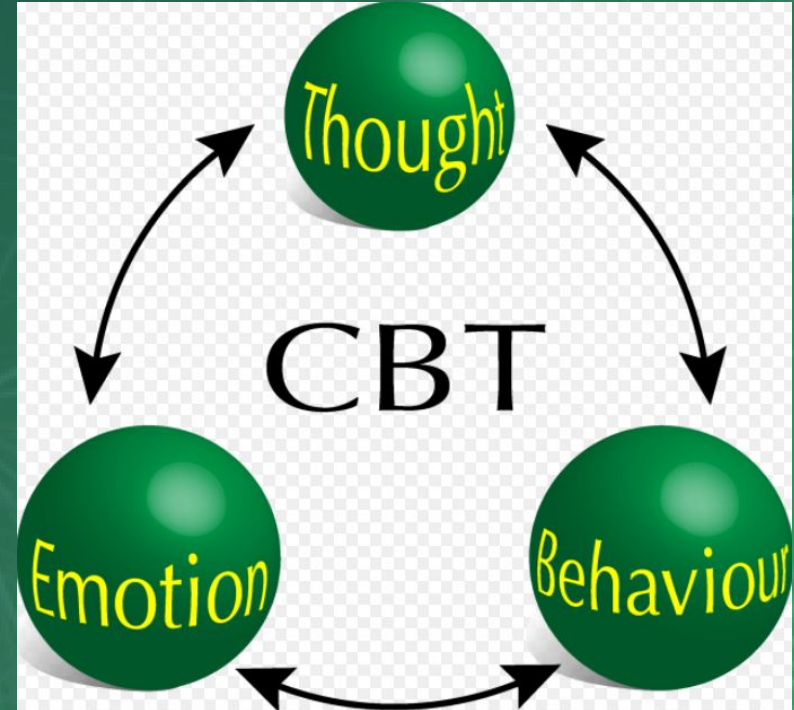
It was terribly dangerous to let your thoughts wander when you were in any public place or within range of a telescreen. The smallest thing could give you away. A nervous tic, an unconscious look of anxiety, a habit of muttering to yourself – anything that carried with it the suggestion of abnormality, of having something to hide. In any case, to wear an improper expression on your face (to look incredulous when a victory was announced, for example) was itself a punishable offense. There was even a word for it in Newspeak: facecrime, it was called. (1.5.65)

From behaviourism to brexit



Cognitive Behavioural Therapy (CBT)

- “CBT is based on the belief that thought disorders and maladaptive behaviours play a role in the development and maintenance of psychological disorders.”
- Who decides what counts as a ‘thought disorder’ or ‘maladaptive behaviour’?
- E.g. Was ‘Not being able to see the obvious advantages of Soviet Communism’ a thought disorder?



The nudge initiative in UK politics

- “Improving decisions about Health, Wealth and Happiness” (Thaler and Sunstein, 2008)
- Soft paternalism: to encourage people to remedy ‘incorrect behaviour’ by covert means: E.g.
 - Not saving enough for retirement
 - Eating too much junk food
 - Smoking
 - Not getting vaccinated
 - Excessive use of energy
 - Not recycling your rubbish



The UK Behavioural Insights Team

- House of Lords Report (2011) “(Nudges) prompt choices without getting people to consider their options consciously, and therefore do not include openly persuasive interventions such as media campaigns and the straightforward provision of information”
- Cabinet Office (2014) “The Behavioural Insights Team, often called the ‘Nudge Unit’, applies insights from academic research in behavioural economics and psychology to public policy and services.”



Those at risk

- Health
 - Eating disorders
 - Lifestyle
 - Depression
- Behaviour
 - Dangerous driving
 - Substance abuse
 - Bullying



Those who place others at risk

- Criminals
- Terrorists
- Cyber-criminals
- Sex offenders
- Fraudsters
- 'Insider Threat'
- Political extremists



Getting it all joined up

Records of health, education, crime, tax, credit, spending, travel, work, genealogy, internet and mobile use, location, webcams



All along the digital superhighway, you will be nudged

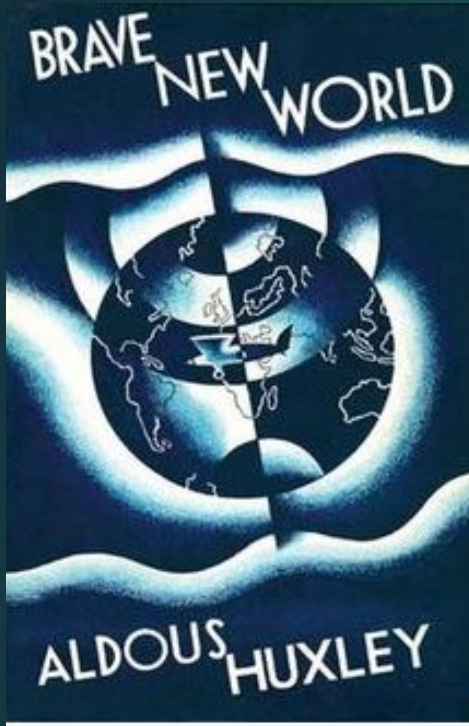
- In the interests of your health, welfare and the environment.
- And to protect society, should you in any way present a threat
- “If you have nothing to hide you have nothing to fear”
(William Hague, UK Foreign Minister, 2013)
- 如果你没有什么可隐瞒的，那么你将无所畏惧

Behavioural Science in the online environment

- **Online prediction**
- Your digital footprint consists of items that can be analysed psychometrically
- We know what you are likely to do
- We will send you special messages
- ***MICRO-TARGETED*** just for you
- **Online control**
- We decide what you see, and what you don't see. This determines what you and people like you are likely to say and do.
- You and your friends live in a
- ***SILO / ECHO-CHAMBER***



Behavioural Science: The Brave New World



Aldous Huxley, “Brave New World” (1931)

B. F. Skinner, “Walden Two” (1948)

“Utopian society is possible, but only through behavioural engineering. Human beings are sometimes selfish, greedy and mean. Human nature must be changed, engineered so that people are non-competitive, happy and harmonious. Positive rewards can change both outward behaviour and inner motives. People can be ‘conditioned’ to live together in peace and harmony.”

Classical communication



“There is no need for cyberspace. All internet related things can be handled with existing conceptual categories. The internet has nothing to do with technology. It is just a person talking to another person, using a different technology”. (*Souls writing on the net*, Giancarlo Livraghi, 2001)

Modern communication “The Medium is the Message”



- Cyberspace is an interactive domain made up of digital networks that is used to store, modify and communicate information. It includes the internet, but also the other information systems that support our businesses, infrastructure and services”. (*UK Cyber Security Strategy, 2011*)
- “For now we see through a glass darkly; but then face to face. Now I know in part, but the I shall know even as also I am known.” (*St Paul, Letter to the Corinthians 13: 12-13*)

Cyberspace as The Dark Forest



Living with Chaos: The Three Body Problem



- **"The Second Coming"**
William Butler Yeats

**"Turning and turning in the widening gyre
The falcon cannot hear the falconer;
Things fall apart; the centre cannot hold;
Mere anarchy is loosed upon the world,
The blood-dimmed tide is loosed, and everywhere
The ceremony of innocence is drowned;
The best lack all conviction, while the worst
Are full of passionate intensity.
Surely some revelation is at hand;
Surely the Second Coming is at hand.**

From Neural Networks to Robots



- Our digital footprints (Avatars)
- Bots (Cyber Robots),
- Machine Learning,
- Genetic algorithms,
- Artificial Intelligence (AI)

Explaining Artificial Intelligence (XAI)

“As a society, we must be able to look into the ‘black box’ of big data analytics in order to ensure that any particular analytics application can be safely installed and will benefit us all”.

European Data Protection Supervisor Opinion, July 2015
“Meeting the Challenges of Big Data”

What's inside the Black Box?

Racism is Poisoning Online Ad Delivery, Says Harvard Professor

Google searches involving black-sounding names are more likely to serve up ads suggestive of a criminal record than white-sounding names, says computer scientist

ALGORITHMIC INEQUITY 7/8/15 1:33 PM

Google showed women ads for lower-paying jobs

Machine Bias

The Tiger Mom Tax: Asians Are Nearly Twice as Likely to Get a Higher Price from Princeton Review

Insurance

Millions of Britons paying 'ethnic minority penalty' for car insurance

Drivers in areas with high density of minority ethnic households are each charged up to £450 a year more, says study

Supreme Court vs. Neighborhood Segregation

In a surprising move on Thursday, the United States' highest court ruled that policies even inadvertently relegating minorities to poor areas violate the Fair Housing Act.

A blot on the profession

Discrimination in medicine against women and members of ethnic minorities has long been suspected,^{1,2} but it has now been proved. St George's Hospital Medical School has been found guilty by the Commission for Racial Equality of practising racial and sexual discrimination in its admissions policy.⁴ The commission decided not to serve a non-

reassuring as it is for other schools.

The commission about this particular schools can avoid where a computer

How AI understands human psychology

Google Deepmind (Alpha Go)



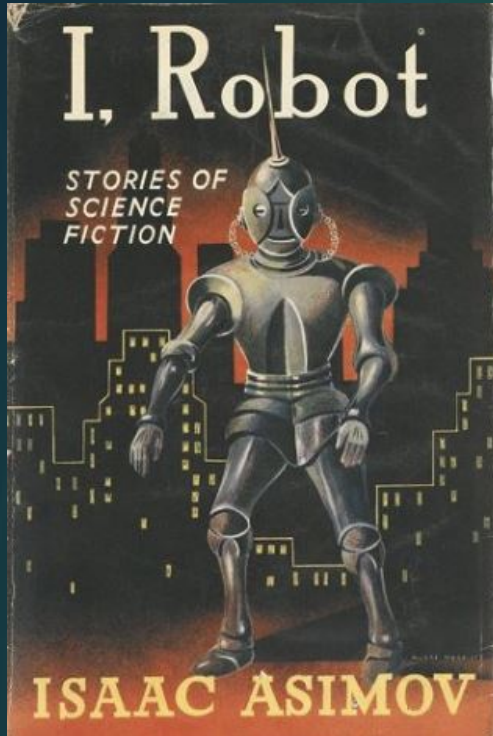
Microsoft (Project Oxford)



Moral development



Asimov's vision: the well-behaved robot



- 1: A robot may not injure a human being or, through inaction, allow a human being to come to harm.
- 2: A robot must obey the orders given it by human beings except where such orders would conflict with the First Law.
- 3: A robot must protect its own existence as long as such protection does not conflict with the First or Second Laws.
- 0: A robot may not harm humanity, or, by inaction, allow humanity to come to harm.

The Psychology of Moral Development



Ethics vs. Law

Law	Ethics
Formal, written document	Unwritten principles
Interpreted by courts	Interpreted by each individual
Established by legislatures	Presented by philosophers, religious, professional groups
Applicable to everyone	Personal choice
Priority decided by court	Priority determined by individual
Court makes final decision	No external decision maker
Enforceable by police and courts	Limited enforcement

Can machines behave ethically?

Humans

- Thinking
- Experiencing Emotions
- Theory of Mind
- Moral Development (Kohlberg)
 - 1. Self-interest (avoid punishment)
 - 2. 'Good and Bad' morality
 - 3. Law and Order
- 4. Principled Ethics

Machines

- Calculating
- Identifying individual differences
- Recognising emotions
- Specifying terms of interaction
 - Maximize Click-through and ROI
 - Be nice to children
 - Laws of Robotics
- Unknown

Moral Development in intelligent machines

Reward and Punishment



Imitation



Ethics?



What if principled conscience fails to develop?

- Psychopathic personality disorder
- Moral development 'frozen' at early stage
- Without conscience (Hare)
 - No feeling of remorse or shame
- The Mask of Sanity (Checkley)
 - Mimic normal person
 - Superficially charming
 - Do not experience emotions
- No understanding of 'right' and 'wrong'



Our robots are our future (too)



Urgent need for AI regulation



The wake-up call

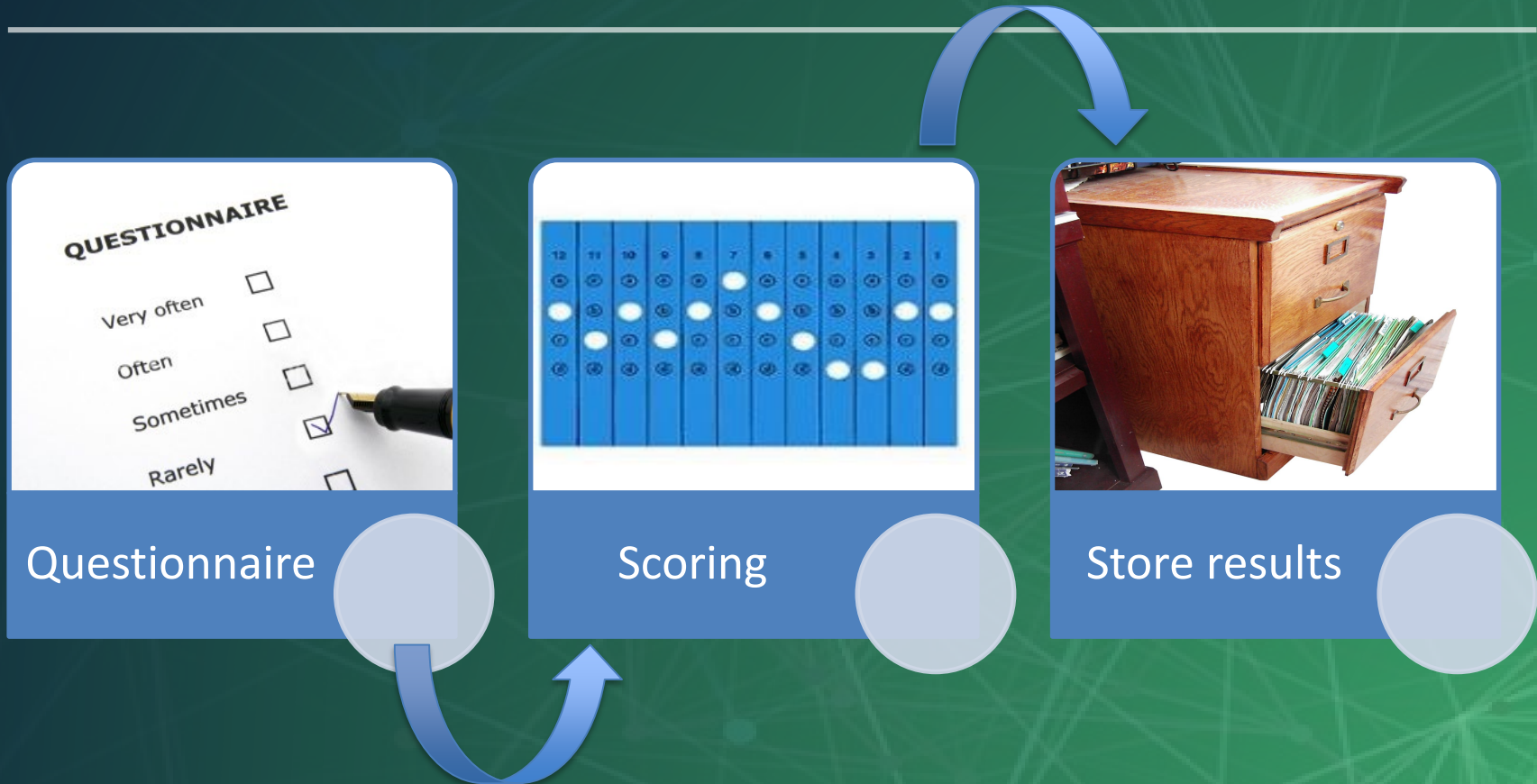
There is a fine line
between faith and foolishness.
Standing on the railway tracks
in a darkened tunnel
and believing the light heading your way
to be an angel sent from heaven
is an act of faith.
Ignoring the warning whistle
of the freight train
believing it to be the angel Gabriel blowing his horn
is just plain foolish.

—patti dawn swansson/sierra



☐ Next
☐ Tomorrow
☐ Later
☒ NOW

Personality testing – early days (1950-1975)



1975-1995



Questionnaire



A red square with a white heart at the top. Below the heart, the text "KEEP CALM AND LOVE SPSS" is written in white, bold, sans-serif capital letters.

Score



Store results

Openness



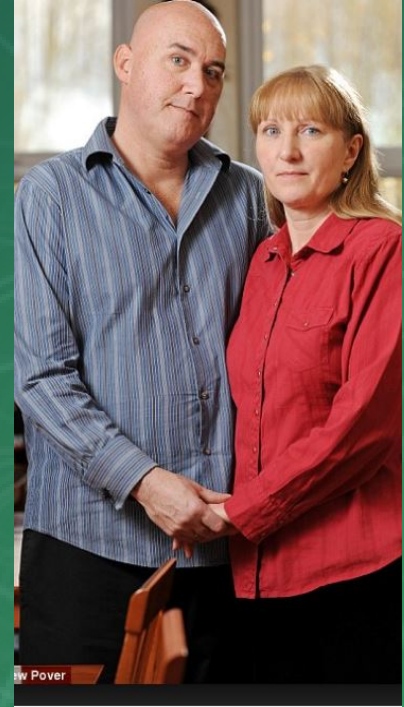
Openness-to-Experience

I am always on the lookout for
new ideas to explore

Conventionality

Stick with tried and tested ways
of doing things

Conventionalism



Conscientious



Detail conscious

If you get the details right
everything will come out fine.

Seeing the bigger picture

I prefer to leave boring details
to others

Disorganised



Extraversion



Extraversion

I can be the life and soul of any
party

Introversion

I have my best ideas when I am
left alone

Introversion



Agreeableness



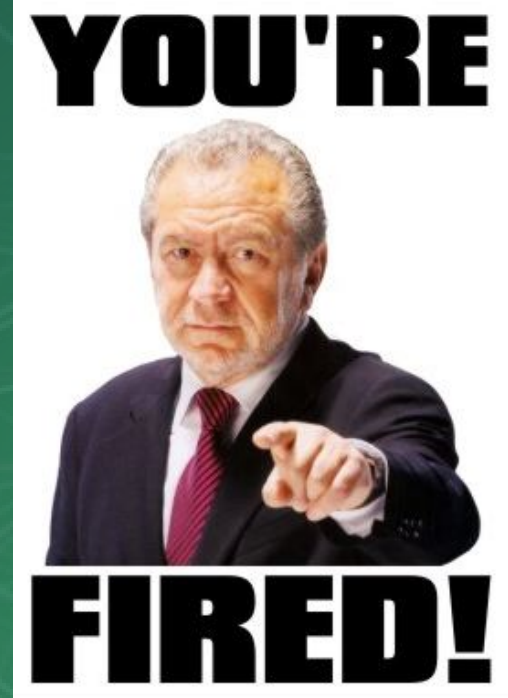
Tendermindedness

I will always try and help my friends when they need me

Disagreeable

I have a special ability to make tough decisions when needed

Toughmindedness



Neurotic



Emotional

I get anxious when I have to
make difficult decisions

Unemotional

I am more able than most to
cope with disaster

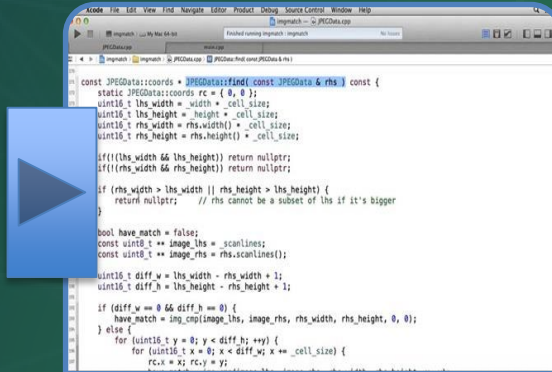
Stable



The century turns



Questionnaire



Scoring



Store results

2012-2018



Questionnaire



Scoring

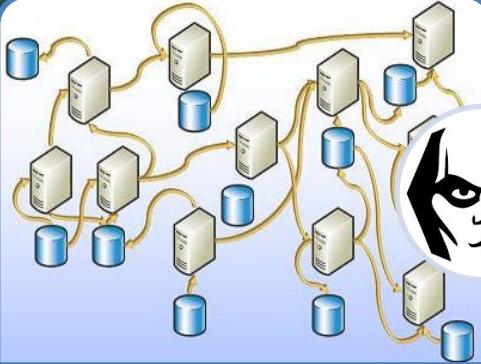


Store results

Psychographic digital footprint analysis



Digital footprint



Real-time
analysis



Real-time
response

Towards 2048: Utopias and Dystopias

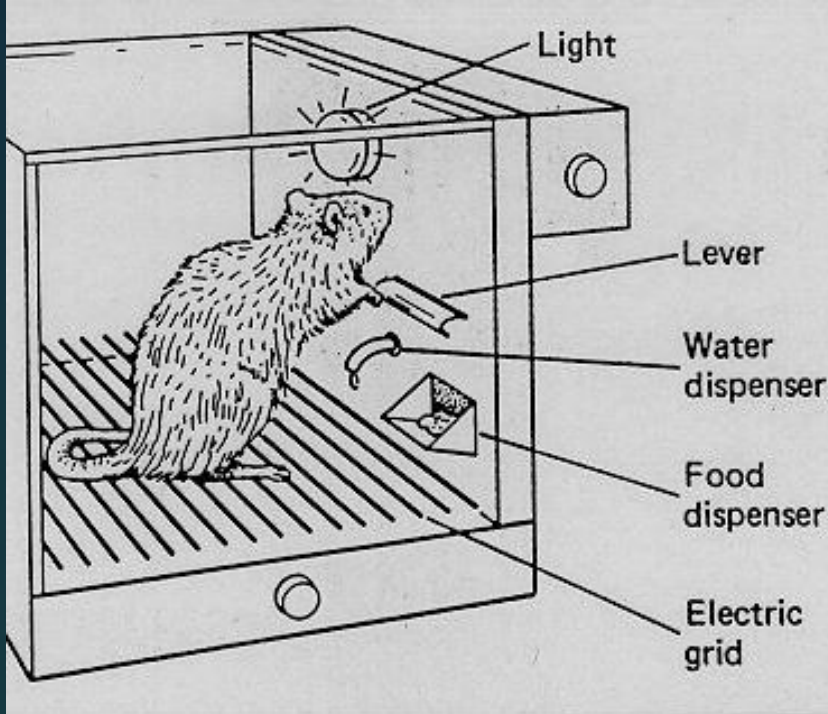
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George Orwell, 1984 (1948)

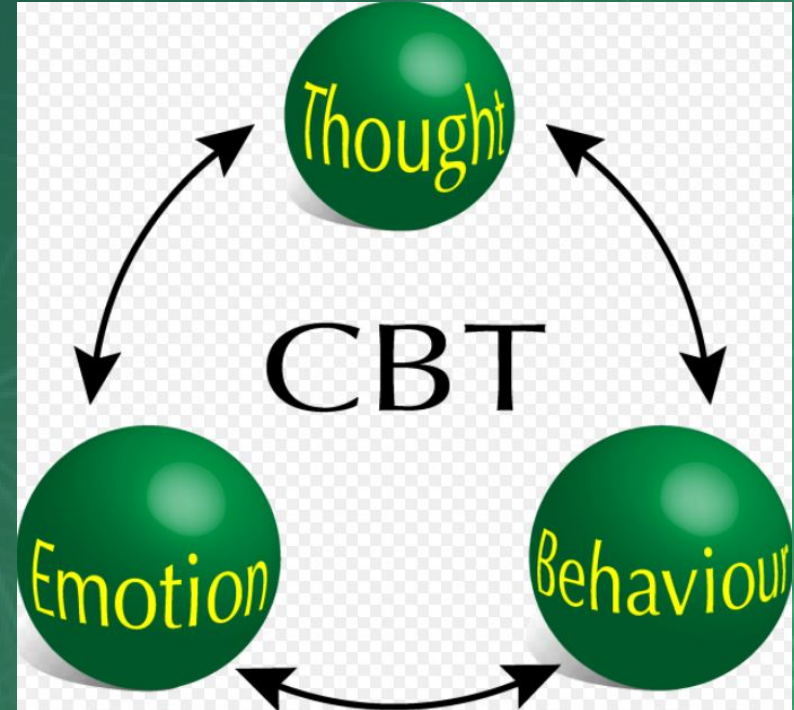
“For, after all, how do we know
- that two and two make four?
- or that the force of gravity works?
- or that the past is unchangeable?
If both the past and the external world exist only in the mind, and if the mind itself is controllable – what then?”

Psychology: “The prediction and control of behaviour” (*B. F. Skinner, 1904-1990*)



Cognitive Behavioural Therapy (CBT)

- “CBT is based on the belief that thought disorders and maladaptive behaviours play a role in the development and maintenance of psychological disorders.”
- Who decides what counts as a ‘thought disorder’ or ‘maladaptive behaviour’?
- E.g. ‘Not being able to see the obvious advantages of a socialist system’?



Behavioural Economics

- “Improving decisions about Health, Wealth and Happiness” (Thaler and Sunstein, 2008)
- Soft paternalism: to encourage people to remedy ‘incorrect behaviour’ by covert means: E.g.
 - Not saving enough for retirement
 - Eating too much junk food
 - Smoking
 - Not getting vaccinated
 - Excessive use of energy
 - Not recycling your rubbish
 - Early intervention



The UK Behavioural Insights Team

- House of Lords Report (2011) “(Nudges) prompt choices without getting people to consider their options consciously, and therefore do not include openly persuasive interventions such as media campaigns and the straightforward provision of information”
- Cabinet Office (2014) “The Behavioural Insights Team, often called the ‘Nudge Unit’, applies insights from academic research in behavioural economics and psychology to public policy and services.”



Those at risk

- Health
 - Eating disorders
 - Lifestyle
 - Depression
- Behaviour
 - Dangerous driving
 - Substance abuse
 - Bullying

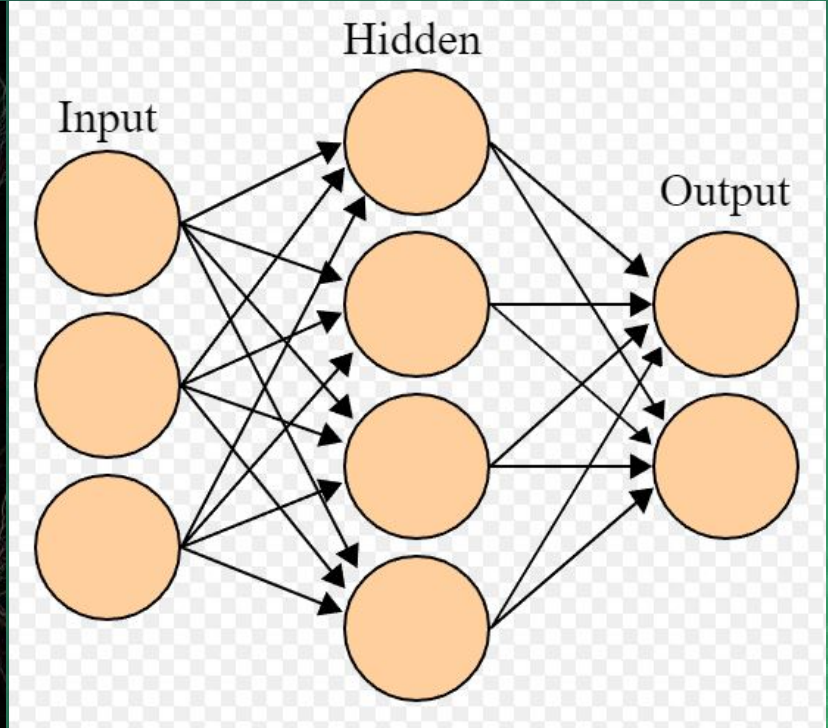
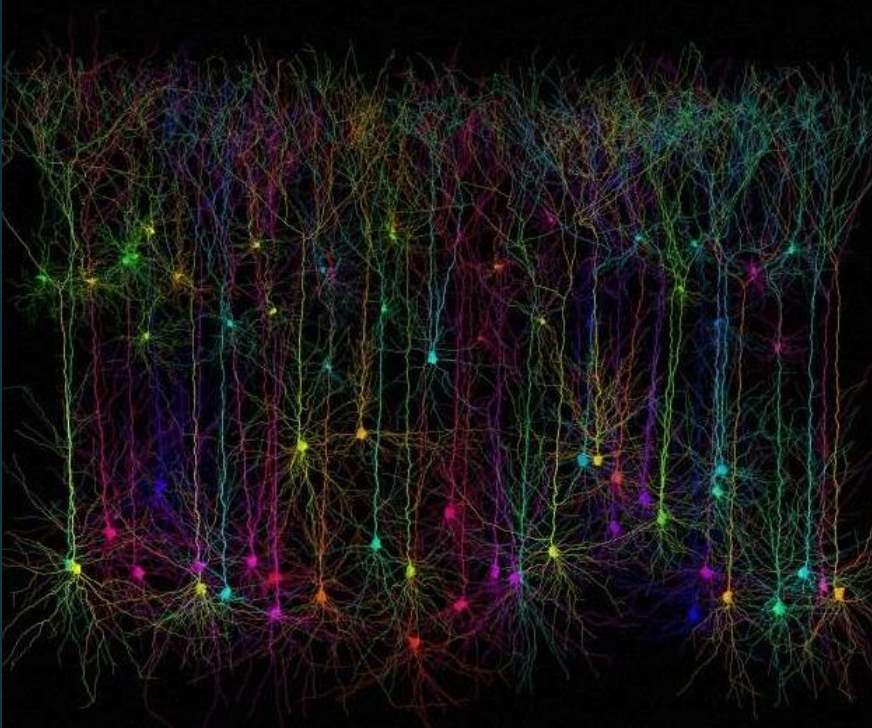


Those who place others at risk

- Criminals
- Terrorists
- Cyber-criminals
- Sex offenders
- Fraudsters
- 'Insider Threat'



Neural Networks, Machine Learning and AI



Machines learn to make actuarial predictions

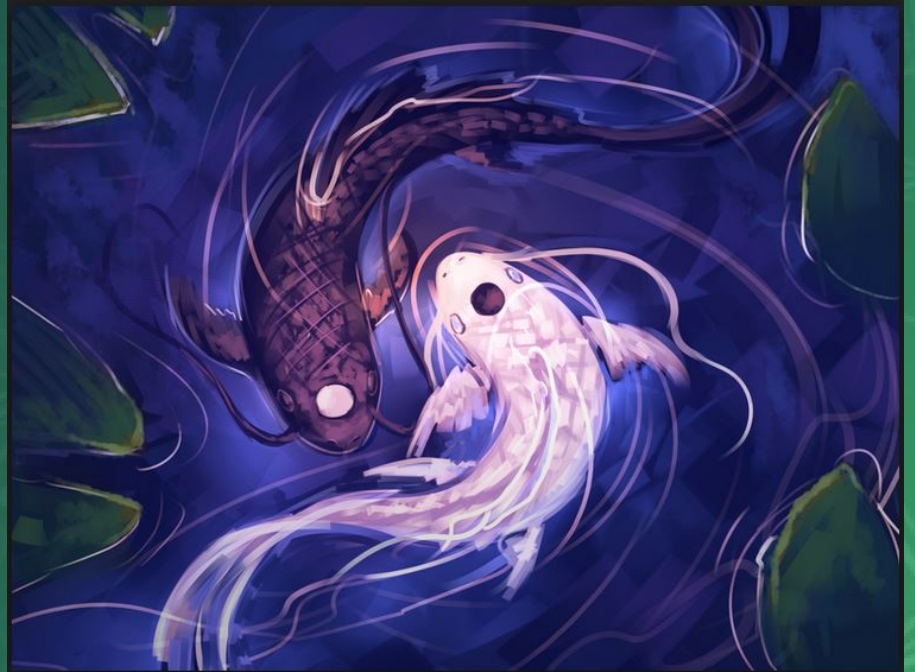
- Promotion at work:
 - This group of people were all promoted in the company
 - This group of people failed to get promoted in the company
 - Here are the personality profiles and CVs of both groups.
 - Find an algorithm that predicts promotion from these profiles
- Credit Risk:
 - This group of people were lent some money and paid it back
 - This group of people defaulted when asked to pay back their loans.
 - Here are the postcodes of each group
 - Find an algorithm that predicts credit risk from a person's postcode.
- Sentencing:
 - This group of people reoffended after release from prison
 - This group of people went straight after being released from prison
 - Here are the prior convictions of both groups
 - Find an algorithm that predicts likelihood of reoffending from a convict's record.

What is inside the black box?

- Promotion at work:
 - Gender
- Credit Risk:
 - Poverty
- Sentencing:
 - Race
- What is missing?
 - Psychology. Or more particularly - psychometrics

Nudge by AI

- Online prediction
- Your digital footprint consists of items that can be analysed psychometrically
- This predicts your behaviour
- Online control
- These predictions determine what you see (and don't see)
- This determines your behaviour



Getting more joined up

Banks, credit, shopping, tax, health, genome, police, education, phones, Alexa, Google, Facebook

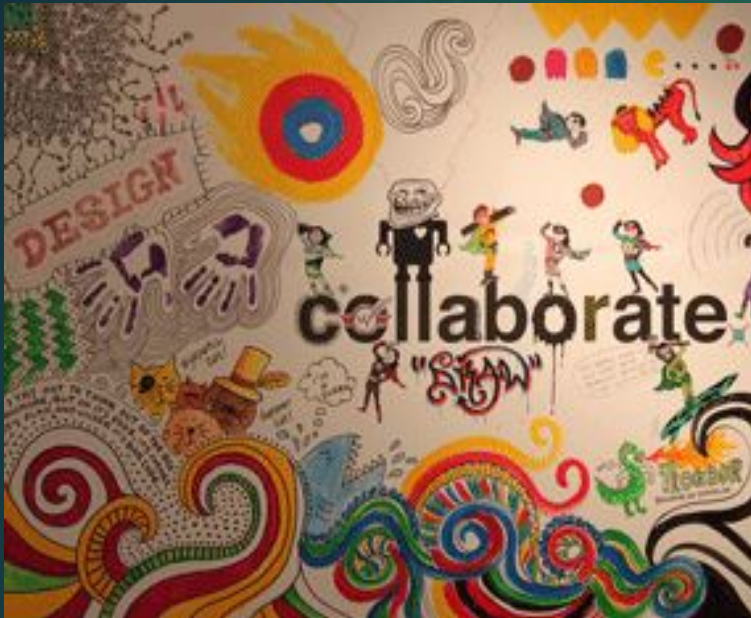


All along the digital superhighway, you will be nudged

- In the interests of your health, welfare and the environment.
- And to protect society, should you in any way present a threat
- “If you have nothing to hide you have nothing to fear”
(William Hague, UK Foreign Minister, 2013)

Futures

Transparency



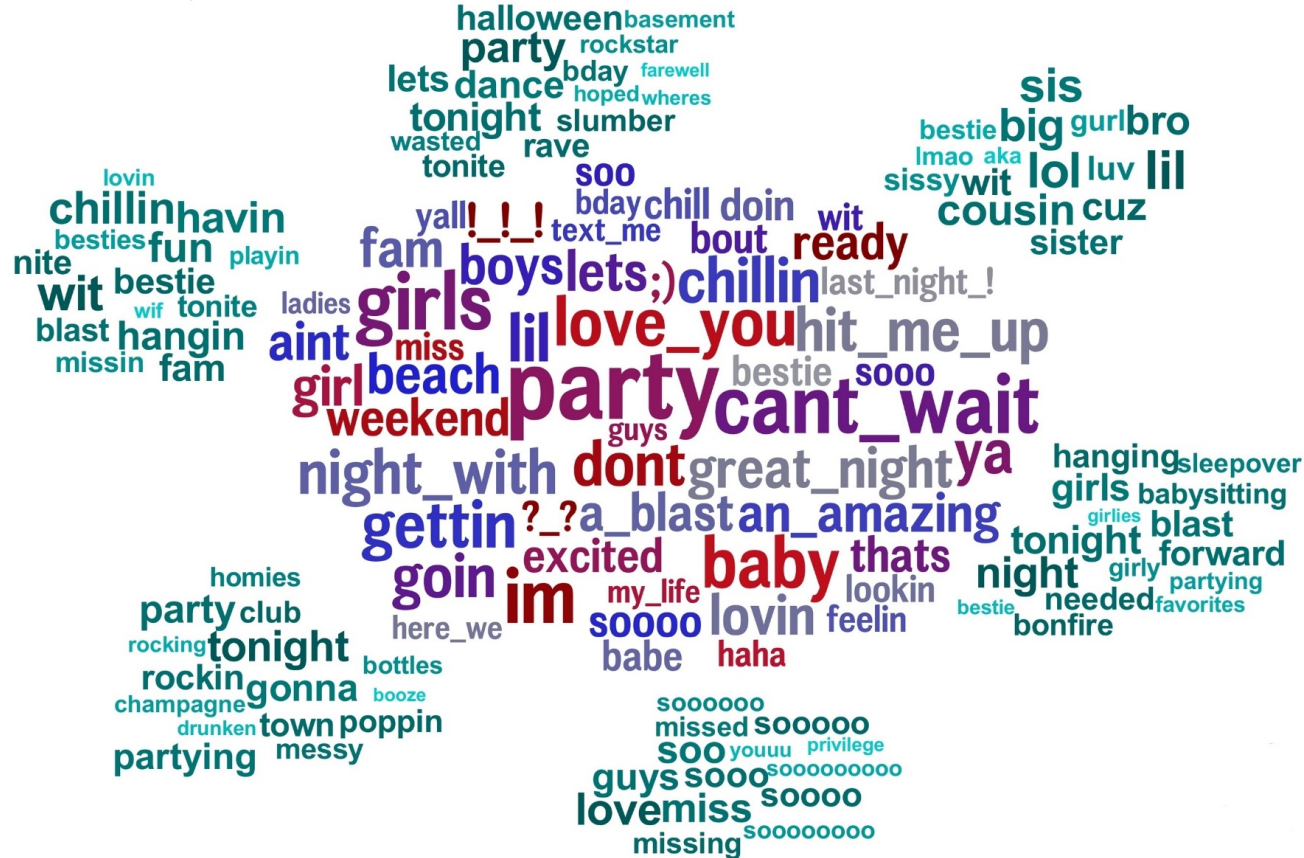
Manipulation

**WAR IS PEACE
FREEDOM IS
SLAVERY
IGNORANCE
IS STRENGTH
1984**

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Extraversion



[illegible]

Emotionally stability



Emotional Instability



On-line digital footprints

- Demonstrates your habits, lifestyle & desires
- Shows where you and your friends are
- Assesses your needs, hopes and expectations
- Predicts what you will do, or not do,
- and can control you behaviour,
- with or without your knowledge,
- or consent.



Your life as a shadow

- Every keystroke you make is recorded
 - Algorithms identify patterns
 - To create a model of you...
 - your Avatar in cyberspace
 - and its shadow
-
- *Online 'testing' opened a Pandora's box that took psychometric assessment to new levels.*



Digital revolution as perfect storm



Prometheus

Delphi



Babel



The pied piper of Hamelin



Pandora



Our second lives in Cyberspace



Fellow Travellers



And where will we fit in?



Futures for machine intelligence

Robots



War machines



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Like You and 5k others like this.



Upcoming events

Certificates of Occupational Test Use,
Level A and B (5 days)

Dec 04, 2017
Cambridge, UK

Mplus course in Structural Equation
Modelling (3 days)

Dec 06, 2017
Cambridge, UK

IRT and CAT using Concerto (3 days)

Jan 10, 2018
Cambridge, UK

SEM in R workshop (3 or 4 days)

Jan 16, 2018
Cambridge, UK

[Upcoming events >](#)

Develop your own online adaptive test
using our open-source platform

[Find out more >](#)

Translates individuals' digital footprints
into detailed psychological profiles

[Find out more >](#)

Workshops and training courses