SSRMC Psychometrics Module

Introduction

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The Psychometrics Centre

- Educational and diagnostic tests e.g. BAS-III, WISC, CELF
- Organisational e.g. Watson-Glaser, Orpheus/OBPI, Giotto
- Statistical, IRT, machine learning and AI techniques
- Software products e.g. Concerto, Apply Magic Sauce
- Web based assessment, 'Discover My Profile'
- BPS Professional training courses
- Short courses, seminars and events (SEM in R, Mplus, ML)
- PhDs in psychometrics
- Tutorial materials on website - www.psychometrics.cam.ac.uk
The programme

• 1: Introduction to psychometrics (John Rust)
  • Psychometrics yesterday, today and tomorrow
  • How to design and build your own psychometric test
• 2: Testing in the online environment (David Stillwell)
  • Testing via the internet. How to, plus do's and don'ts
  • Putting your test online
• 3. Modern Psychometrics (David Stillwell and Aiden Loe)
  • Item Response Theory (IRT) models and their assumptions
  • Assessment and development of item parameters
• 4: Online Computer Adaptive Tests (John Rust and Luning Sun)
  • How to build your own CAT using Concerto
  • Practical

Introduction to psychometrics

• Definition: The science of psychological assessment
• From IQ to AI: Past, present and future
• Intended and unintended consequences
• Behavioural Economics
• Online digital footprints
• ‘Psychology’ in Cyberspace
Psychometric Prediction

... with the best of intentions

MERITOCRACY
... and also the worst

**DISCRIMINATION**

What is 'fair' to individuals can be unfair to groups.

Immigration (Ellis Island), sterilization of the 'unfit', euthanasia

To sum up 20\textsuperscript{th} 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.
Assessment revolutions

Innovation

• Examinations
• Mental Tests
• Digital Footprints
• Adaptive Testing

Intended consequences

• Meritocracy
• Diagnosis
• Marketing
• Automation

Assessment revolutions

Innovation

• Examinations
• Mental Tests
• Digital Footprints
• Adaptive Testing

Unintended consequences

• Discrimination
• Eugenics
• Big Brother
• Artificial Intelligence
The disintegration of psychology

Neuropsychology

Psychometrics

Personality testing – early days (1950-1975)

Questionnaire

Scoring

Store results
Questionnaire  Score  Store results

1975-1995

Openness  Conventionalism

Openness-to-Experience
I am always on the lookout for new ideas to explore

Conventionalism
Stick with tried and tested ways of doing things
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

Introversion

I have my best ideas when I am left alone.
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
The future (or one of them)

Digital footprint

Real-time analysis

Real-time response

Towards 2048: Utopias and Dystopias

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”

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?”

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’
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
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.
  –Online, the 21st most discussed paper of 2013 (Altmetric)


• Computer-based personality judgments are more accurate than those made by humans by W. Youyou, M. Kosinski, D. Stillwell, Proceedings of the National Academy of Sciences (PNAS), 2015,1
  –Online, the 22nd most discussed paper of 2015 (Altmetric).

Extraversion
Introversion

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 your 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?