# “Yeah Boy!”





**General Flow of talk**

- Play 10-20 second intro from Public Enemy’s Bring The Noise...
- If you love rap, you’re probably confident with high self esteem and extremely out going.
- and that’s really what this talk is all about....

**References:**

**News article:**

http://www.independent.co.uk/arts-entertainment/music/news/classical-to-rap-music-lovers-have-much-more-in-common-than-you-would-think-919553.html

**Books:**

Snoop - Sam Gosling

**Research paper links (non-exhaustive):**

“Music Preference and the Five-Factor Model of the NEO Personality Inventory”
http://pom.sagepub.com/content/25/2/120.short

Music preference correlates of Jungian types
http://www.sciencedirect.com/science/article/pii/S0191886903001685

# Weaponizing Cyberpsychology & Subverting Cybervetting

## For Fun, Profit & Subterfuge



Chris Sumner
Ali B
alien

OnlinePrivacyFoundation.org



**General Flow of talk**

- My compardres and I, whom I'll introduce as we go along, are going to talk to you about some research we conducted to see to what extent you can determine peoples personality traits through their Facebook activity and what fun things you could do, armed with that knowledge. and because this is DEF CON, how you might EXPLOIT the knowledge of someones personality traits from social networking activity.

- We'll also look at how you might fly under the radar or even subvert the attempts of others to gain an insight into your personality through these means

- you'll see that this is still a pretty untapped area, so our hope is to get some of you suitably inspired to take a look in this area too, before it's abused

**References:**

# chris sumner

**O**nline**P**rivacy**F**oundation.org





**General Flow of talk**

- Quick introduction I'm Chris Sumner, some of you know me by my twitter handle @TheSuggmeister

- Together with a friend, I co-founded the fledgling volunteer organizations, The Online Privacy Foundation. We deliver talks about security to the non-geeks in our local communities and also conduct research projects to raise awareness.

**References:**


- http://www.onlineprivacyfoundation.org

- OnlinePrivacyFoundation - who are we - https://www.onlineprivacyfoundation.org/?page_id=27

- http://www.facebook.com/onlineprivacyfoundation/

















**General Flow of talk**

- I will start us off with a brief introduction to Personality Traits. This should put us in a good position for understanding the rest of the talk.
- Then we'll discuss the research experiment we conducted called "The Big 5 Experiment", which looked at peoples Facebook activity in relation to their personality types.
- we'll then look at how we analysed the data and what the results told us.
- in "Weaponizing" we'll look at how knowledge of someones personality can be used and abused
- and final, in "Subverting" we'll look at techniques you could use to thwart the attempts of others to make decisions based on personality derived through Facebook activity.






**General Flow of talk:**

- So, Personality 101...let me first tell you how I got interested in Psychology.
- You see, I went to university and studied computing. Computing students look a bit like this...





**General Flow of talk**

- ....yeah, that's right, I mean a lot like me.  I learned an important lesson at uni...
- if you want to meet girls, don't study computing... So with this in mind, after graduating, I enrolled on an adult education psychology course, hopefully to meet ladies like this....





**General Flow of talk**

- wait, wait.  Not quite the perfect match...





**General Flow of talk**

- **there** that's better, a cheerleader WITH and pizza
- ... actually this was what most of the people on the class looked like...





**General Flow of talk**

- this

- I digress....anyway, a curious thing happened, I really enjoyed it.  and **personality** was perhaps the most interesting area and it's important that we start with a brief overview on personality



# Theophrastus c. 371 - c. 287 BC



**General Flow of talk**

- As with many things, you can trace the origins of Personality back to Greece
- This dude, Theophrastus is widely credited with observing differences in the behaviour of people at...





**General Flow of talk**

- ...parties like this.  At least this is how I image they did it in ancient greece.

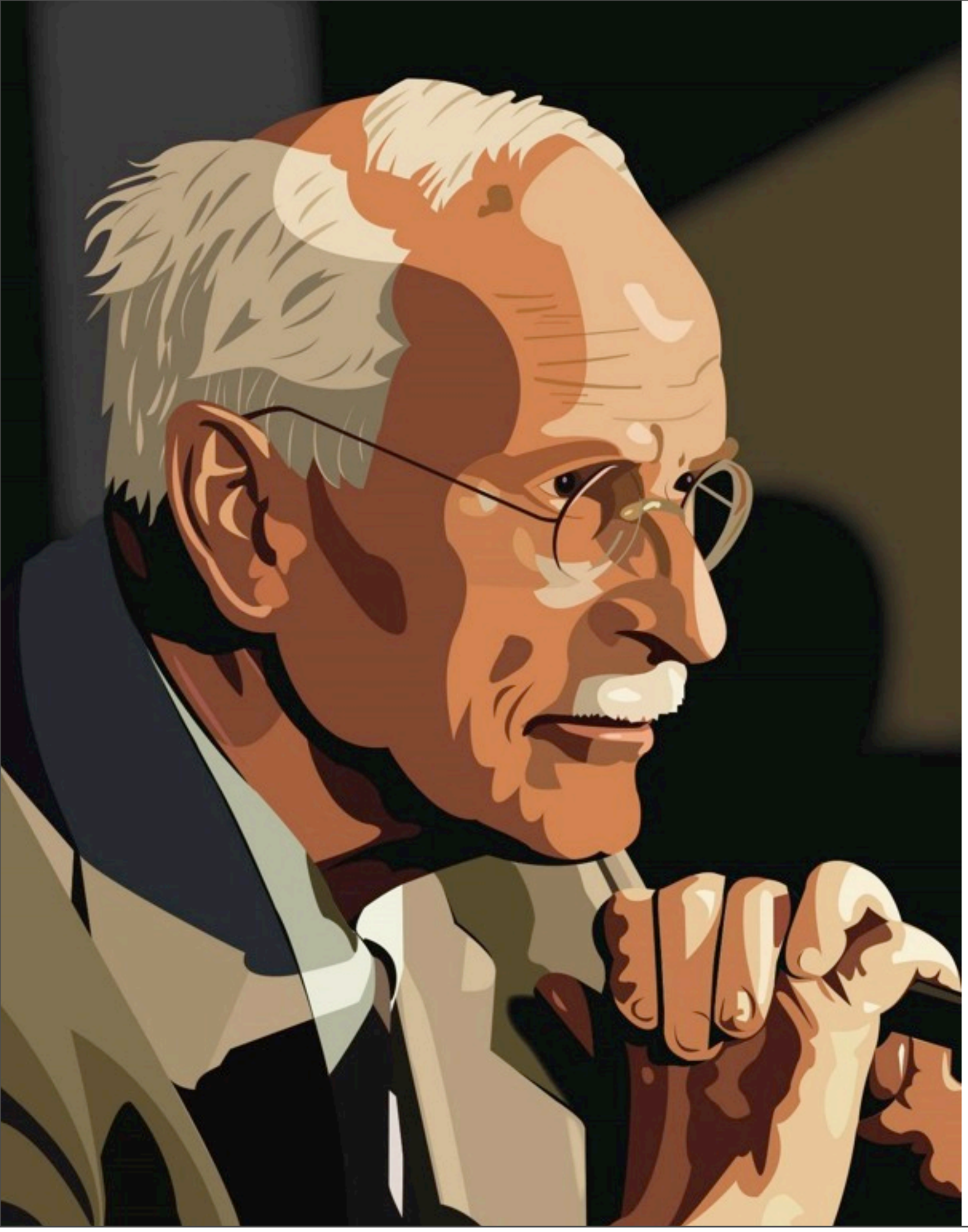
- He wrote a book titled “The Characters”. He covers a number of types, including the flatterer, the dissembler, the mean, the tactless, the garrulous, and the avaricious (see reference for more)

- Fast forward a few years...

**References**

http://www.netplaces.com/career-tests/personality-and-your-career/a-short-history-of-the-study-of-personality.htm

Book: Snoop, What your stuff says about you, Sam Gosling



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# Psychological Types

A REVISION BY R. F. C. HULL

OF THE TRANSLATION BY H. G. BAYNES

CG JUNG

1921



**General Flow of talk**

- ...and we meet Carl Jung, who some might consider the godfather of personality types.

- “It was Jung who suggested that human behavior could be classified by how people go about such basic functions as gathering information and making decisions based on that information. He realized that some people orient themselves to the world outside themselves (extroverts) and some people orient themselves to their inner world (introverts). He then named the cognitive processes that all people engage in — thinking, feeling, sensing, and intuiting — to come up with eight types.” (See first reference below)

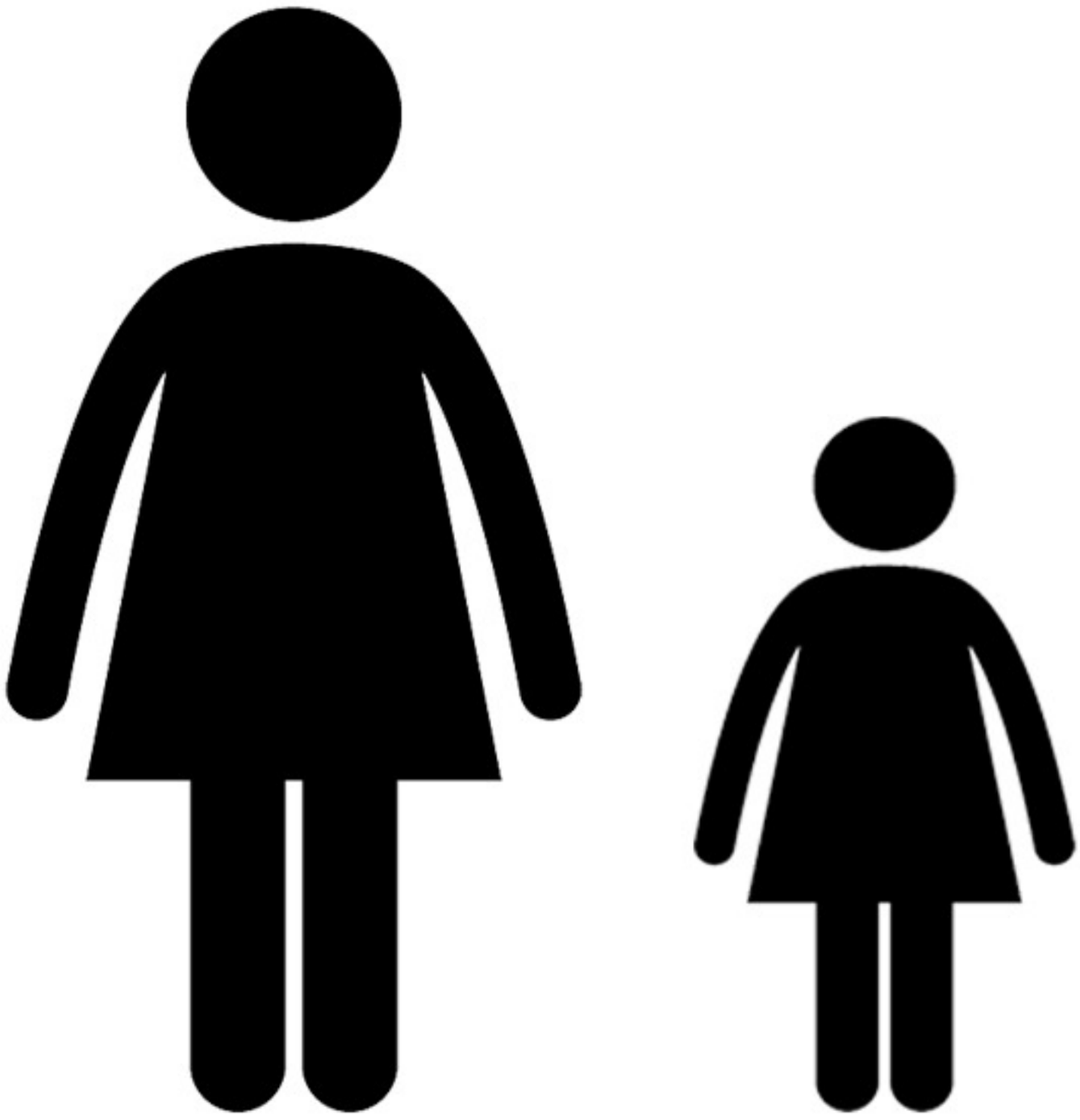
- We’ll talk more about these traits later. While he proposed these traits, he didn’t provide a test, in the way many of us are used to seeing these days...

**References**

Highly readable - http://www.netplaces.com/career-tests/personality-and-your-career/types-traits-and-temperaments.htm

Book - Psychological Types (Collected Works of C.G. Jung Vol.6)

# Myers Briggs





**General Flow of talk**

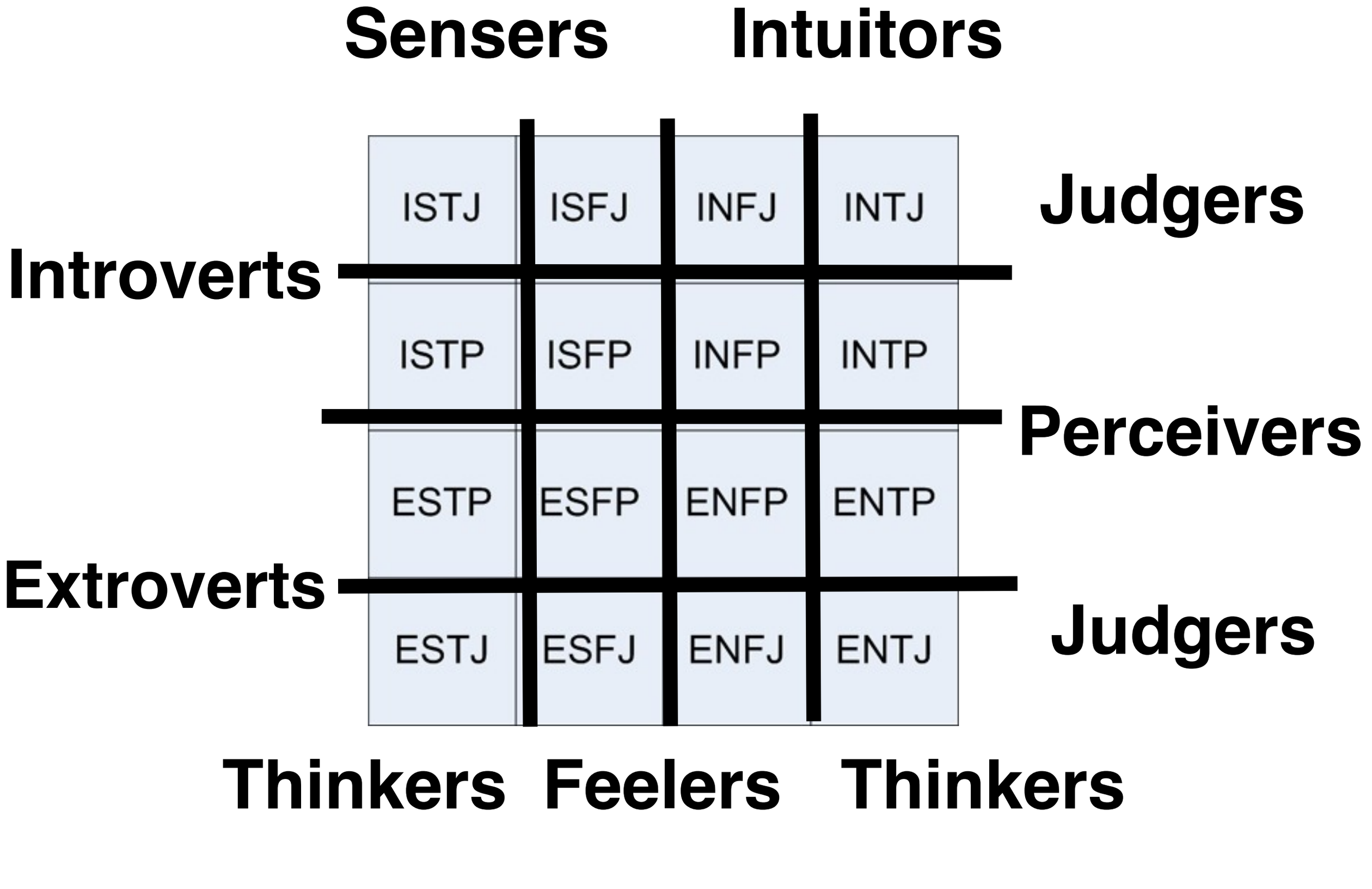
- ...enter the mother daughter team of Myers and Myers Briggs, who were fascinated with Carl Jung's work. Katherine Briggs and her daughter Isobel Briggs Myers
- I’m going to skirt over the reasons they got interested in Personality, but essentially Briggs was intrigued by the differences in her daughter and her son in law.
- ”Spurred on by a desire to find a way to help people find jobs that suited them, Isabel Myers Briggs conducted independent research and tried a series of questions out on friends, family, and students at her children's school until she came up with sixteen distinct personality types. ”....

**References**

Highly readable - http://www.netplaces.com/career-tests/personality-and-your-career/types-traits-and-temperaments.htm

Highly readable - http://en.wikipedia.org/wiki/Myers-Briggs_Type_Indicator

Book - Gifts Differing: Understanding Personality Type (By Isabel Briggs-Myers)






**General Flow of talk**

- ...without going into detail, the sliced people into
- Extroverts and Introverts
- Sensers and Intuitors
- Thinkers and Feeler
- and Judgers and Perceivers.

• I'm going to skirt over the reasons they got interested in Personality, but essentially Briggs was intrigued by the differences in her daughter and her son in law.

• "Spurred on by a desire to find a way to help people find jobs that suited them, Isabel Myers Briggs conducted independent research and tried a series of questions out on friends, family, and students at her children's school until she came up with sixteen distinct personality types. "....

•However, this has also drawn some criticisms

**References**

Highly readable - http://www.netplaces.com/career-tests/personality-and-your-career/types-traits-and-temperaments.htm

Highly readable - http://en.wikipedia.org/wiki/Myers-Briggs_Type_Indicator

Book - Gifts Differing: Understanding Personality Type (By Isabel Briggs-Myers)





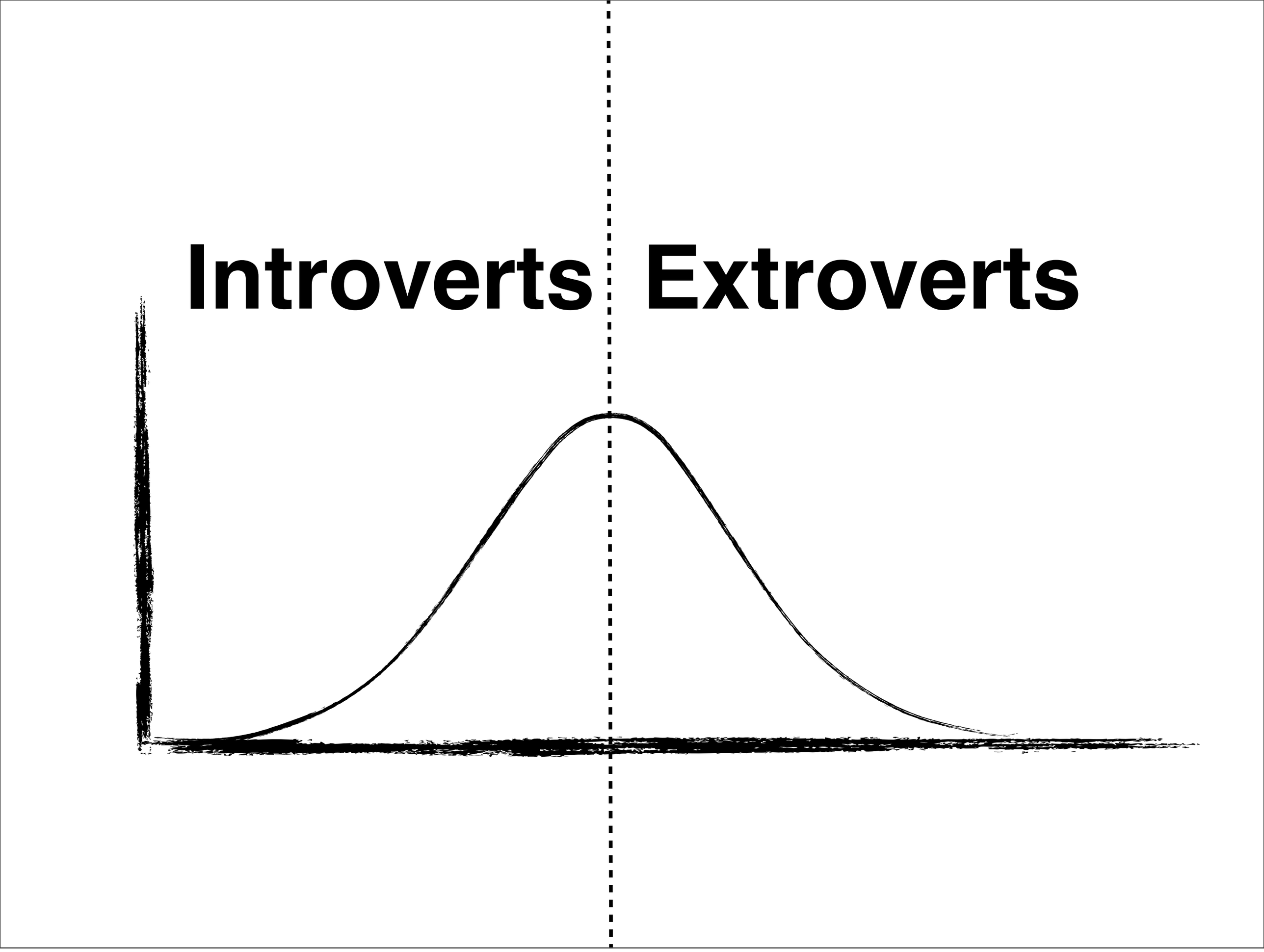
**General Flow of talk**

- ...that is, If implemented incorrectly, which it often is, people get pigeon holed.....

**References**

Highly readable - http://en.wikipedia.org/wiki/Myers-Briggs_Type_Indicator

Book - The Cult of Personality: How Personality Tests Are Leading Us to Miseducate Our Children, Mismanage Our Companies, and Misunderstand Ourselves **Annie Murphy Paul**






**General Flow of talk**

- ...here for example, we have introverts and extroverts, but nothing in the middle.
- If we assume a normal distrubution, most people are going to somewhere in that middle ground.
- Now, it doesn't mean that MBTI states this, it's the way it's often used.  it's often used by people who don't understand that there's a spectrum and that the way you answer the questions can differ depending on a variety of variables, such as your mood or amount of sleep.
- I mention this because when we conducted the experiment, we could have used MBTI, but instead we chose....

**References**

Highly readable - http://en.wikipedia.org/wiki/Myers-Briggs_Type_Indicator

Book - The Cult of Personality: How Personality Tests Are Leading Us to Miseducate Our Children, Mismanage Our Companies, and Misunderstand Ourselves  **Annie Murphy Paul**






**General Flow of talk**

- ...The Five Factor Model. Sometimes called, “The Big 5” or “OCEAN”.  OCEAN because it covers 5 high order personality dimensions
  - •Openness
  - •Conscientiousness
  - •Extroversion
  - •Agreeableness and
  - •Neuroticism  (more of this shortly).
- The Five Factor Model does score people on a spectrum
- There are a number of tests available to determine these traits, from tests with 100 or more questions to tests with 10 questions.
- •In research terms, and as far as I’m aware, the five factor model has received more scrutiny than any other personality model
- •For our, non-profit objectives there was one final important point. Free tests exist. Free to non-profits in anycase... so lets take a look at those 5 dimensions.

**References**

Highly readable - http://en.wikipedia.org/wiki/Myers-Briggs_Type_Indicator

Book: Snoop, What your stuff says about you, Sam Gosling

# Openness





**General Flow of talk**

- ..Keeping the letters in the right order, the first high order trait is Openness.
- For someone high in Openness, I chose “Doc” (Emmett Brown) from back to the future
- Now, Openness doesn’t neccesarily equate to someone sharing a lot about themselves. In fact the attributes associated with Openness include
  - Creative
  - Imaginative
  - Curious
  - Inventive
  - Deep thinking
- That’s why I chose the “Doc”.  Now, conversely...

**References**

Highly readable - http://en.wikipedia.org/wiki/Big_Five_personality_traits#Openness_to_experience

Book: Snoop, What your stuff says about you, Sam Gosling




# Low Openness



**General Flow of talk**

- ..This is one of the Stepford Wives, who, to me at least demonstrate the traits of someone low in openness

- They're
  - •conventional
  - •concrete
  - •traditional
  - •prefer known to unknown

•if they go into a resteraunt, odd are that they probably order the same thing/things on each visit, where the Doc might choose something different every time

•On to...

**References**

Highly readable - http://en.wikipedia.org/wiki/Big_Five_personality_traits#Openness_to_experience
Movie - The Stepford Wives http://en.wikipedia.org/wiki/The_Stepford_Wives
Book: Snoop, What your stuff says about you, Sam Gosling






**General Flow of talk**

- ..Conscientiousness...those over acheiving, punctual types....the bane of my life :-)

- They’re
  - •thorough,
  - •dependable,
  - •task focused

  - •Or as Sam Golsing notes in his book....

**References**

Highly readable - http://en.wikipedia.org/wiki/Big_Five_personality_traits#Conscientiousness

Book: Snoop, What your stuff says about you, Sam Gosling

# Part Man, Part Machine, All Cop





**General Flow of talk**

- ..It's the RoboCop dimension

- Part Man, Part Machine, All Cop....if you give this guy something to do, you can be pretty confident he'll get it done, **unlike**

**References**

Highly readable - http://en.wikipedia.org/wiki/Big_Five_personality_traits#Conscientiousness

Book: Snoop, What your stuff says about you, Sam Gosling





**General Flow of talk**

- ..Uncle Buck

- In a typical movie role for John Candy, Uncle Buck is a bumbling disaster of someone to look after your kids.

- (actually he comes good in the end, but initially at least he displays all the characteristics of someone low in Conscientiousness
  - disorganised
  - poor timekeeping
  - careless
  - impulsive

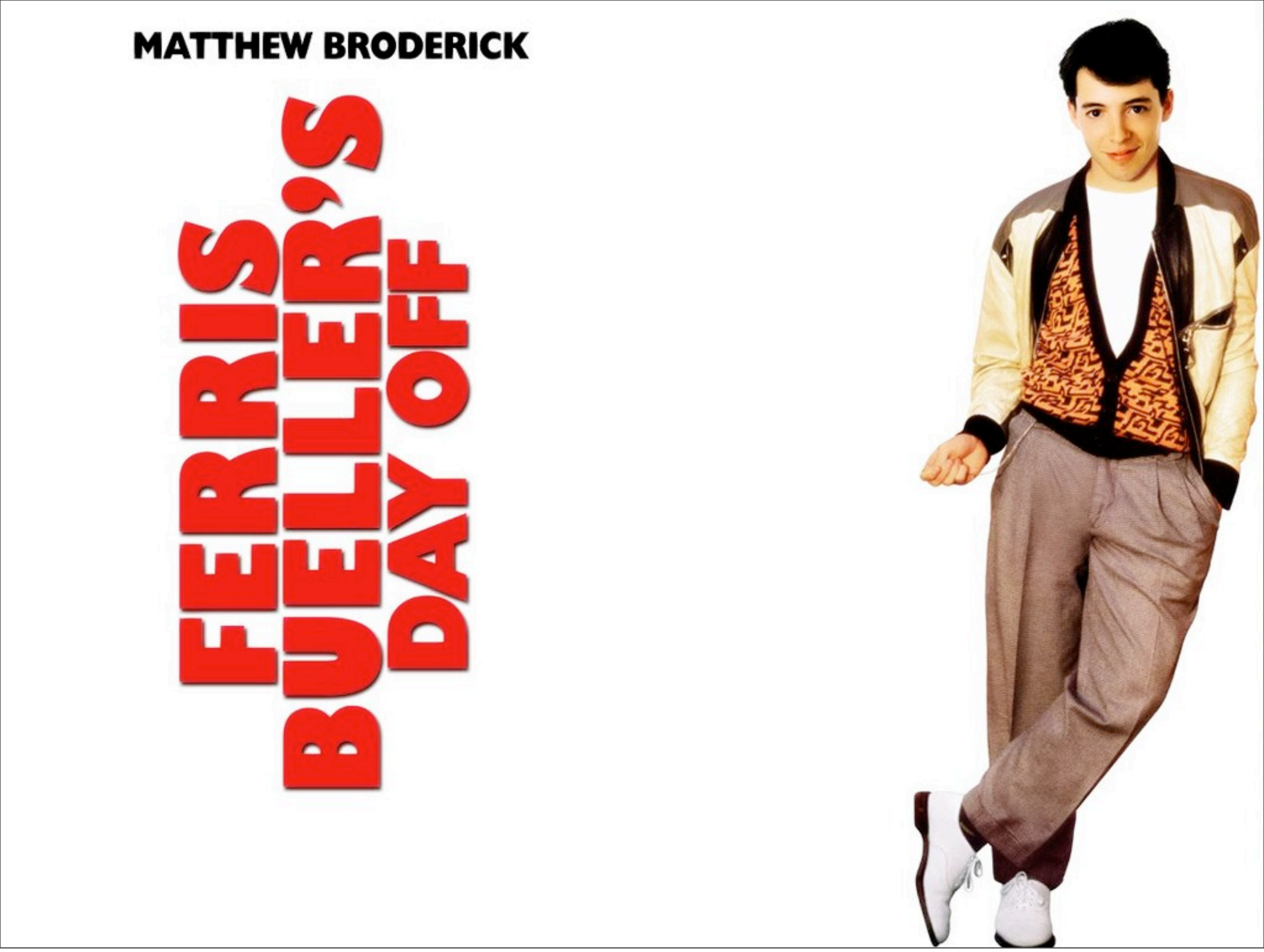
- Next up is,,,

**References**

Highly readable - http://en.wikipedia.org/wiki/Big_Five_personality_traits#Conscientiousness

Movie: http://en.wikipedia.org/wiki/Uncle_Buck

Book: Snoop, What your stuff says about you, Sam Gosling






**General Flow of talk**

- ..Extroversion and perhaps my favourite movie idol, Ferris Bueller.

- Ferris, high in extroversion is
  - talkative
  - energetic
  - enthusiastic
  - assertive
  - outgoing
  - social...highly social

- Contrast Ferris to....

**References**

Highly readable - http://en.wikipedia.org/wiki/Big_Five_personality_traits#Extraversion

Movie : http://en.wikipedia.org/wiki/Ferris_Bueller's_Day_Off

Book: Snoop, What your stuff says about you, Sam Gosling





**General Flow of talk**

- ..Milton from Office-Space.

- Milton's
  - reserved
  - shy
  - quiet
- Much happier in his office cube farm, tending to his red swingline stapler

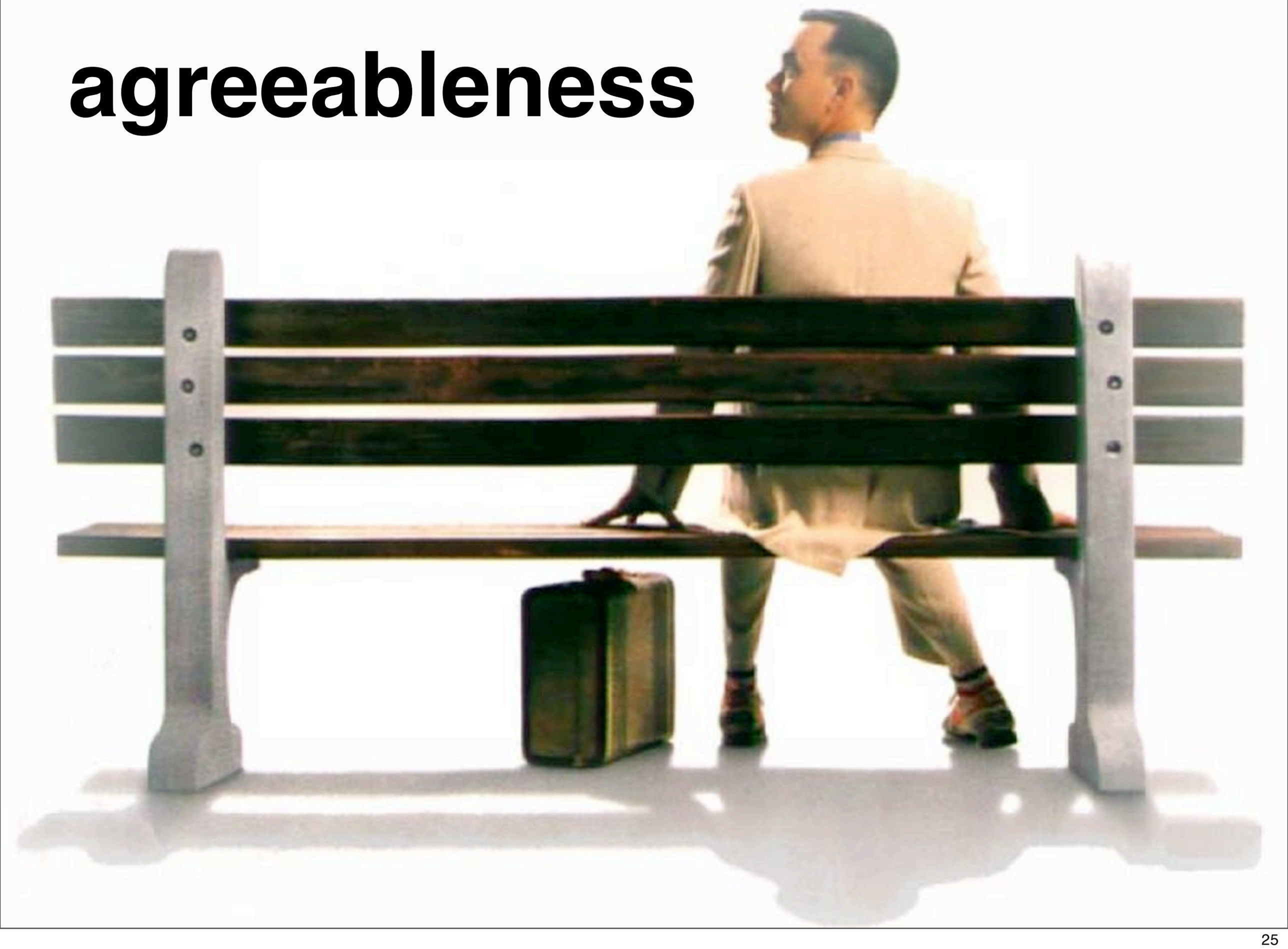
**References**

Highly readable - http://en.wikipedia.org/wiki/Big_Five_personality_traits#Extraversion

Movie: http://en.wikipedia.org/wiki/Office_Space

Book: Snoop, What your stuff says about you, Sam Gosling

# agreeableness



25

**General Flow of talk**

- ..And for agreeableness, I chose...Forrest Gump
  - •helpful
  - •selfless - “How many people would have run back into the jungle to save Bubba?”
  - •sympathetic
  - •kind
  - •forgiving
  - •trusting... “I just did what Lieutenant Dan wanted...”
  - •considerate
  - •cooperative

•Forrest Gump is one of the nicest guys you’ll ever meet. Unlike this guy...

**References**


Highly readable - http://en.wikipedia.org/wiki/Big_Five_personality_traits#Agreeableness

Movie: http://en.wikipedia.org/wiki/Forrest_Gump

Book: Snoop, What your stuff says about you, Sam Gosling

# Greed is Good





**General Flow of talk**

- ..Gordon Gecko from the movie Wall Street
  - •fault finding
  - •quarrelsome
  - •critical
  - •harsh
  - •aloof
  - •blunt

•A real nice piece of work with a tag line of “Greed is Good”

•Interestingly, a number of studies have shown a link between people at the top of organizations (e.g. CEO’s) and low agreeableness, theres a great article in Bloomberg Business Week called “The Sociopath Network”...

•Our final dimension is...

**References**

Highly readable - http://en.wikipedia.org/wiki/Big_Five_personality_traits#Agreeableness

Movie : http://en.wikipedia.org/wiki/Gordon_Gekko

Bloomberg Business Week article on CEO sociopaths - http://bx.businessweek.com/social-networking/your-boss-could-be-a-sociopath-no-really/2681781844226532535-9353e88624c9ef773d051ad787f9cb82/

Book: Snoop, What your stuff says about you, Sam Gosling

# Neuroticism





**General Flow of talk**

- ..Neuroticism, and for this, as in Sam Gosling's book, I opted for Woody Allen. He's classically
  - •anxious
  - •easily ruffled, upset
  - •worried
  - •moody
  - •In stark contrast to...

**References**

Highly readable - http://en.wikipedia.org/wiki/Big_Five_personality_traits#Neuroticism

More on Woody Allen - http://en.wikipedia.org/wiki/Woody_Allen

Book: Snoop, What your stuff says about you, Sam Gosling





**General Flow of talk**

- ..The Dude from the Big Lebowski

- As well as a penchant for White Russians, he's
  - calm
  - relaxed
  - handle stress well
  - emotionally stable

- He's so laid back, he's almost horizontal

- So there we have it. the Big 5

- **Now we've introduced, very basically, personality traits, but let's take a look at some associated issues**

**References**

Highly readable - http://en.wikipedia.org/wiki/Big_Five_personality_traits#Neuroticism

Movie - http://en.wikipedia.org/wiki/The_Big_Lebowski

Dudeism - http://dudeism.com/

Book: Snoop, What your stuff says about you, Sam Gosling

# Corporate Personality Testing





**General Flow of talk**

- Now corporate types seem to love personality testing. Infact Myers Briggs assessments are almost ubiquitous in corporations
- Anecdotally at least, many of the corporate types administering the tests on their staff really don't seem to understand it, it's real value and it's limitations
- It's important to stress that it's not worthless, but that it can be very dangerous when used in the wrong contexts without an understanding of the limitations.

**References**

A wide range of studies. For an easy read, this book Book - The Cult of Personality: How Personality Tests Are Leading Us to Miseducate Our Children, Mismanage Our Companies, and Misunderstand Ourselves **Annie Murphy Paul**

Caveat, this book comes from the angle of finding issues. The truth is likely somewhere in the middle






**General Flow of talk**

- With all that said, research tells us that personality testing is used in pre-employment screening and vetting.
- Anecdotally at least, many of the corporate types administering the tests on their staff really don't seem to understand it, it's real value and it's limitations
- It's important to stress that it's not worthless, but that it can be very dangerous when used in the wrong contexts without an understanding of the limitations.
- Theres a wide range of research papers and articles about personality testing in employment / pre-employment screening and they're worth hunting down.

**References**

A wide range of studies. For an easy read, this book Book - The Cult of Personality: How Personality Tests Are Leading Us to Miseducate Our Children, Mismanage Our Companies, and Misunderstand Ourselves **Annie Murphy Paul**

Caveat, this book comes from the angle of finding issues. The truth is likely somewhere in the middle

- Papers & articles -
  - "Reconsidersing the use of personality tests in personnel selection contexts"
  - "Personality testing in employment: useful business tool or civil rights violation"
  - "Companies use of psychometric testing and the changing demand for skills. A review of the literature"
  - "Employers relying of personality tests to screen applicants"






**General Flow of talk**

•Well, now with the advent of mass social network use, blogging etc (almost 1 in 12 people around the world are on Facebook) it's unsurprising to see these same corporates (and other organizations), turn to cyber vetting

•They look at your Online Reputation or NetRep to determine if you'd be a good choice or a bad one. Often this is something a hiring manager would do themselves, whether it's illegal or note.

•but now we're seeing companies like this spring up.

**References**

A wide range of studies. For an easy read, this book Book - The Cult of Personality: How Personality Tests Are Leading Us to Miseducate Our Children, Mismanage Our Companies, and Misunderstand Ourselves **Annie Murphy Paul**






**General Flow of talk**

- Social Intelligence. There are others around.
- Actually, and it's important to stress this. I kind of like this company for a number of reasons.
- If you're going to have someone look at your NetRep, I'd say it's better that a company like this do it in a controlled manner following strict guidelines. If you want to see what they do, there's a great Gizmodo article.
- But, the point here is. Companies can look at your online reputation today. It's not entirely clear whether there's a firm scientific basis for this, i.e. are we measuring the right variables and measuring them consistently? Given what I know about social intelligence, I suspect they're on the money of what makes someone look more or less desirable.

**References**

Gizmodo article : http://gizmodo.com/5818774/this-is-a-social-media-background-check

Social Intelligence : http://www.socialintel.com/home




KEEP AUSTIN WEIRD YOU WILL



**General Flow of talk**

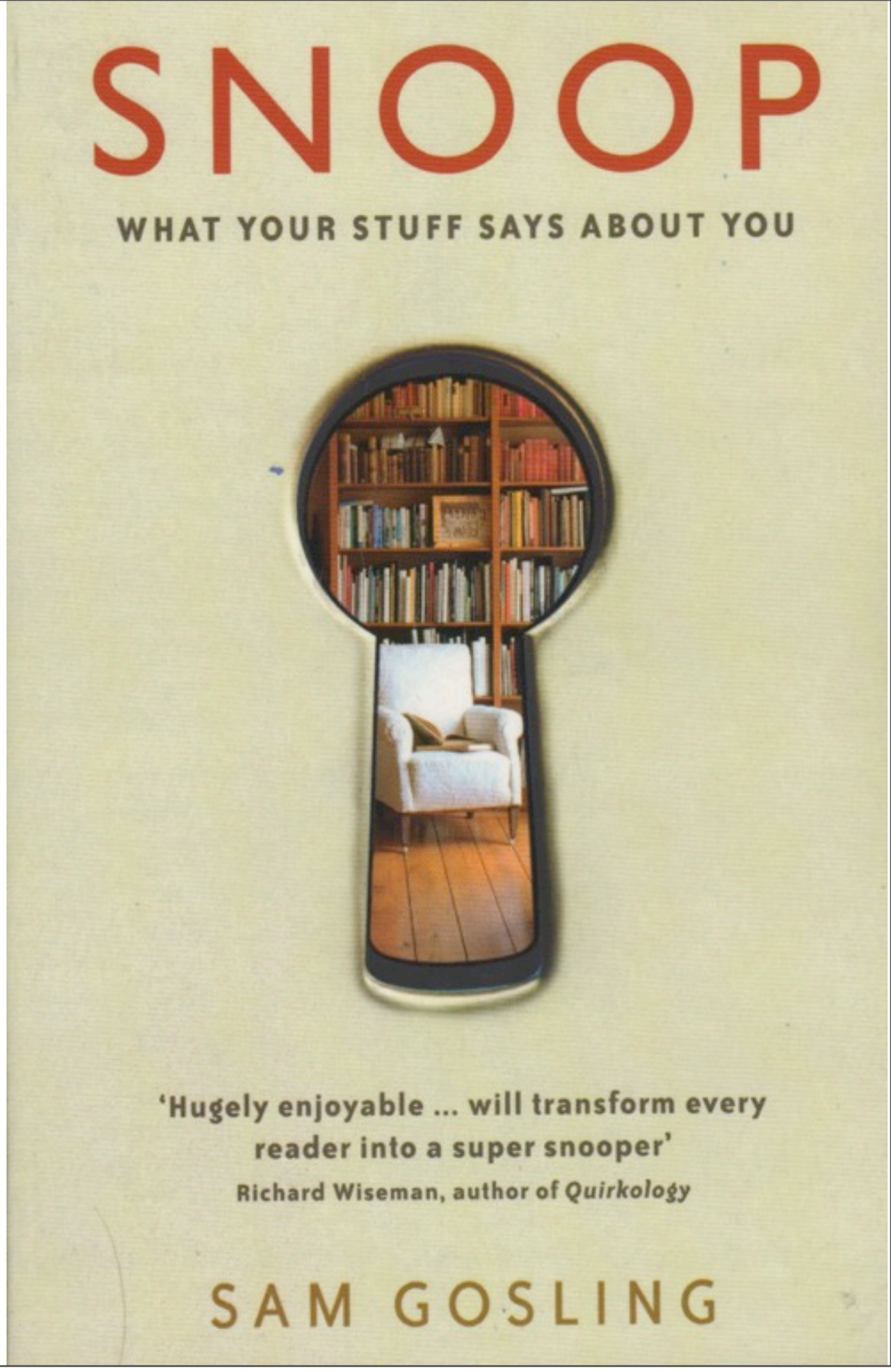
- So we've got out personality 101 and some insight into what companies do in terms of vetting.

- Well, last october I flew to Austin and was browisng the self help section in the Airport and picked up.....

**References**

Keep Austin Weird you Will - origami - http://www.bookpeople.com/yoda

# Professor Sam Gosling






**General Flow of talk**

- This book, Snoop.  by Professor Sam Gosling at the University of Texas in Austin.
- The fact I was flying to Austin was a complete coincidence.

- In this book, Professor Gosling looks at what peoples rooms/living spaces say about them. For instance
  - A messy living space can indicate a lower degree of conscientiousness.
  - Motivational posters could indicated above average levels of neuroticism.

- It's a fascinating and easy read. I really recommend that you buy it.

**References**

Book: Snoop, What your stuff says about you, Sam Gosling

Video : http://fora.tv/2008/06/16/Sam_Gosling-Snoop_The_Secret_Language_of_Stuff






**General Flow of talk**

- In his book, he touched on the relationship of personality traits and facebook activity

- This did two things.
  - Set alarm bells ringing in terms of privacy.
  - Triggers the nerd in me.  I immediately wanted to know more

**References**

Book: Snoop, What your stuff says about you, Sam Gosling

Video : http://www.youtube.com/watch?v=tVuoNAeTpUU <-- what facebook says about you.












**General Flow of talk**

- I mentioned alarm bells because
  - We've got personality tests that often put people into neat boxes...hint, people don't fit into neat boxes.
  - We've got corporate types who love, but don't necessarily understand personality
  - We've got an explosion of usage in social networks and
  - we've got companies cropping up only too happy to determine your NET REP on behalf of employers

- Now, if you're able to determine personality traits from people online activity, without asking...

**References**






**General Flow of talk**

- ...we have a problem
- Do people know what they’re revealing in terms of personality?
- Are we going to see some Minority Report style thought police? OK, I’m being sensational, but you get the idea.

•So....

**References**

Movie : http://en.wikipedia.org/wiki/Minority_Report_(film)






**General Flow of talk**

- ...together with a friend and co-founder of “The Online Privacy Foundation” we discussed this over a beer
- several beers
- and some shots

- we set about researching this to see to what extent you can predict personality from Facebook activity and of what practical use there is. You see, statistical significance is a different beast to practical significance...more on that later.
- With that, as with all good pub related ideas go, we spent the next 9 months and a tone of money on developing a... facebook application and conducting our research

**References**



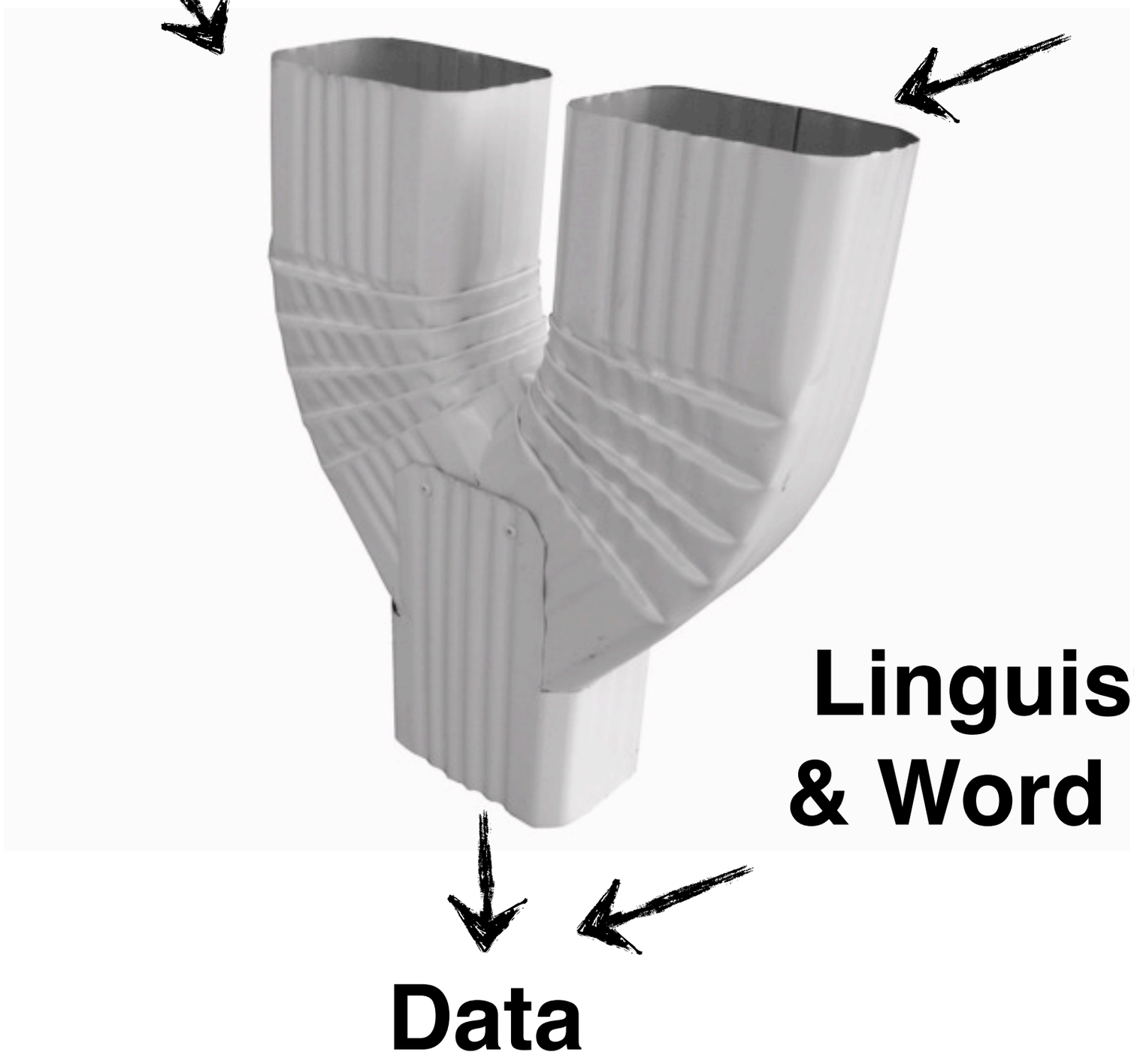



**General Flow of talk**

- ...which we called “The Big 5 Experiment”
- In a nut shell, this is what the application / experiment does....

**References**

•The Big 5 Personality Experiment https://www.onlineprivacyfoundation.org/?page_id=49






**General Flow of talk**

- ...it presents users with a 44 question personality test called “The Big Five Inventoryr” or BFI test, by Oliver John.
- We actually added a 45th question about privacy

- We requested, and where they existed pulled down 74 Facebook data points, including things with Photo’s, Descriptions on Photos, Biography, Interests, Friends etc etc. Just about everything, expect email and chats.

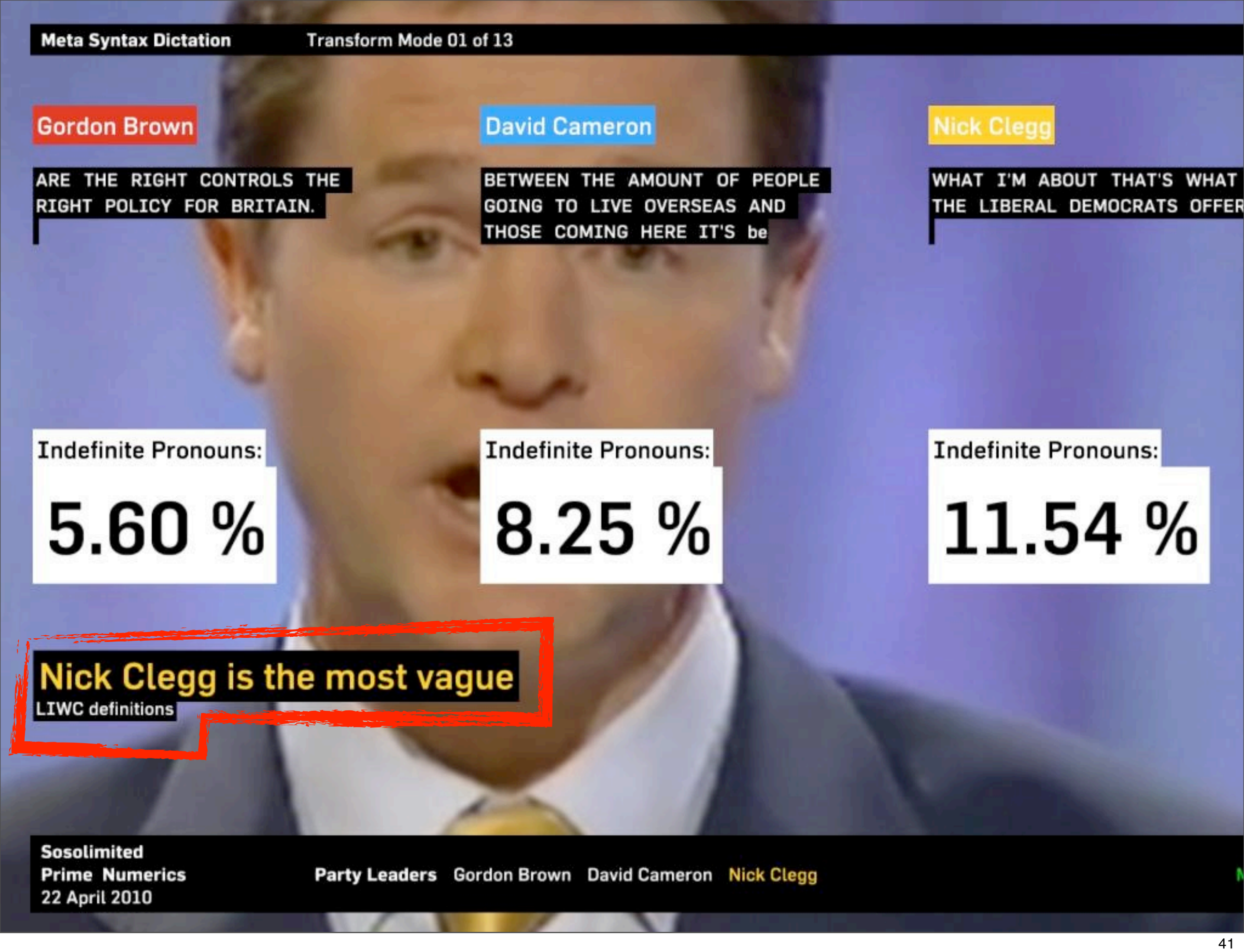
- We got a tone of data out, which we also examined for

- Linguistic Inquiry and Word Count (Or LIWC). Take a look at Professor James Pennebaker’s work on LIWC for more information. In simple terms ...

**References**


- The Big Five Inventory (BFI) - http://www.ocf.berkeley.edu/~johnlab/bfi.htm

- Personality Experiment https://www.onlineprivacyfoundation.org/?page_id=49
- LIWC tools - http://www.liwc.net/



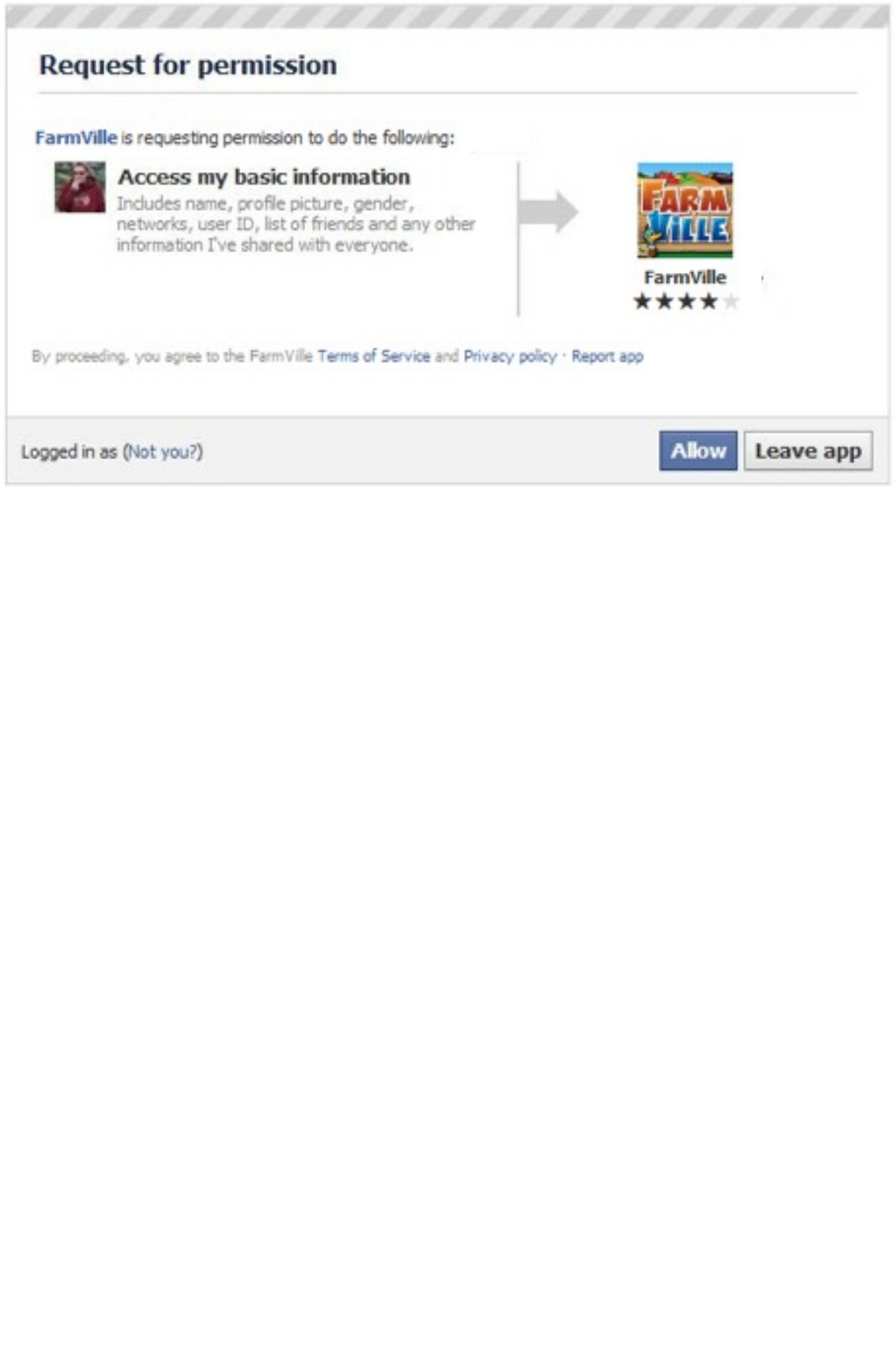


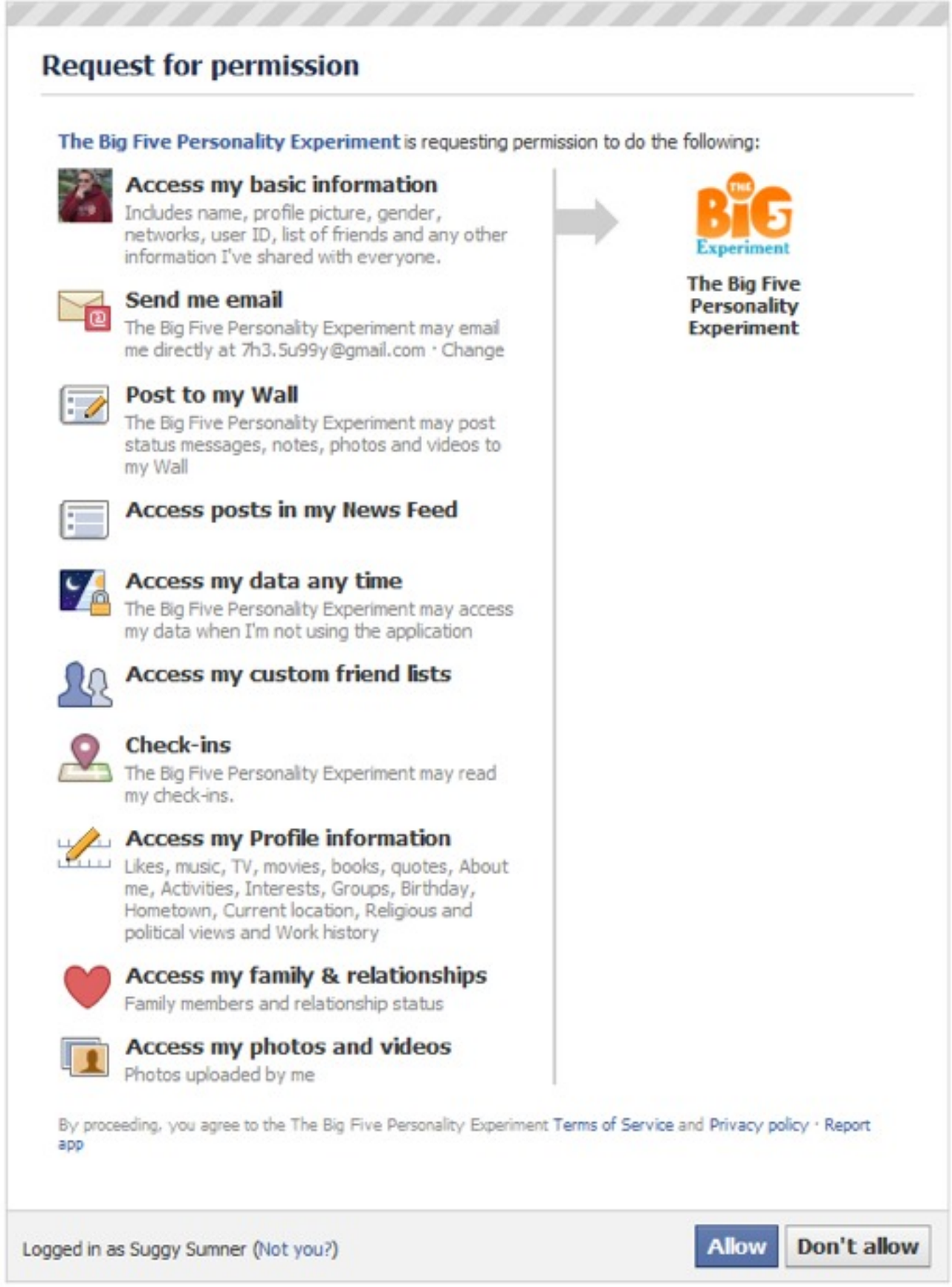

**General Flow of talk**

- LIWC examines the different types of words and punctuation used by people.
- In this graphic we see how linguistic analysis was used during the last UK elections. This is Nick Clegg, our deputy prime minister and the analysis is telling us he's "The most vague"
- This is a fascinating area of study in its own right....However, back to our study. We had a problem...

**References**


- The Big 5 Personality Experiment https://www.onlineprivacyfoundation.org/?page_id=49
- "THE UK ELECTION TELEVISED DEBATES - CAN PSYCHOLOGY UNRAVEL THE GAME PLAN?" http://knol.google.com/k/raj-persaud/the-uk-election-televised-debates-can/4kby5muufrzo/25#






**General Flow of talk**

- You see,  our handy app asks for A LOT of information.

- This, for example, is Farmville. People complain about apps like this and yet it asks little (compared to us) .

- By the way. other online personality studies also grab the same data as Farmville, that's what differentiates our work from theirs. We look at more, although thats not to discredit their work (as we'll show).

- As a side note, the more access you request, the less likely it is for people to install your app.

**References**

- The Big 5 Personality Experiment https://www.onlineprivacyfoundation.org/?page_id=49






**General Flow of talk**

- In the end, we targeted people through
  - Asking friends/family to take the test
  - Advertising on Facebook
  - Tweeting and re-tweeting.
  - Adding information on our project to Digg and Reddit and finally, the most successful approach
  - Flyer distribution and talking to people....Over 5,000 flyers. We really targets Chineham in the UK and Boise, Idaho in the USA.

- And with that, we ended up with a lot of data. Data from 537 participants.  but we had a problem. While we know a bit about statistics, we're not experts...so we quickly recruited one, gave her our data set and asked her to "figure it out" :-)

- Please welcome Ali B to the podium

**References**


- The Big 5 Personality Experiment https://www.onlineprivacyfoundation.org/?page_id=49

# ali b

OnlinePrivacyFoundation.org





**General Flow of talk**

- Please welcome Ali B to the podium

**References**

- OnlinePrivacyFoundation - who are we - https://www.onlineprivacyfoundation.org/?page_id=27





**General Flow of talk**

•Tell a little bit about what I did with the data, the decisions we made along the way, let you know some of our results and then talk a little bit about what this actually means in the real world.

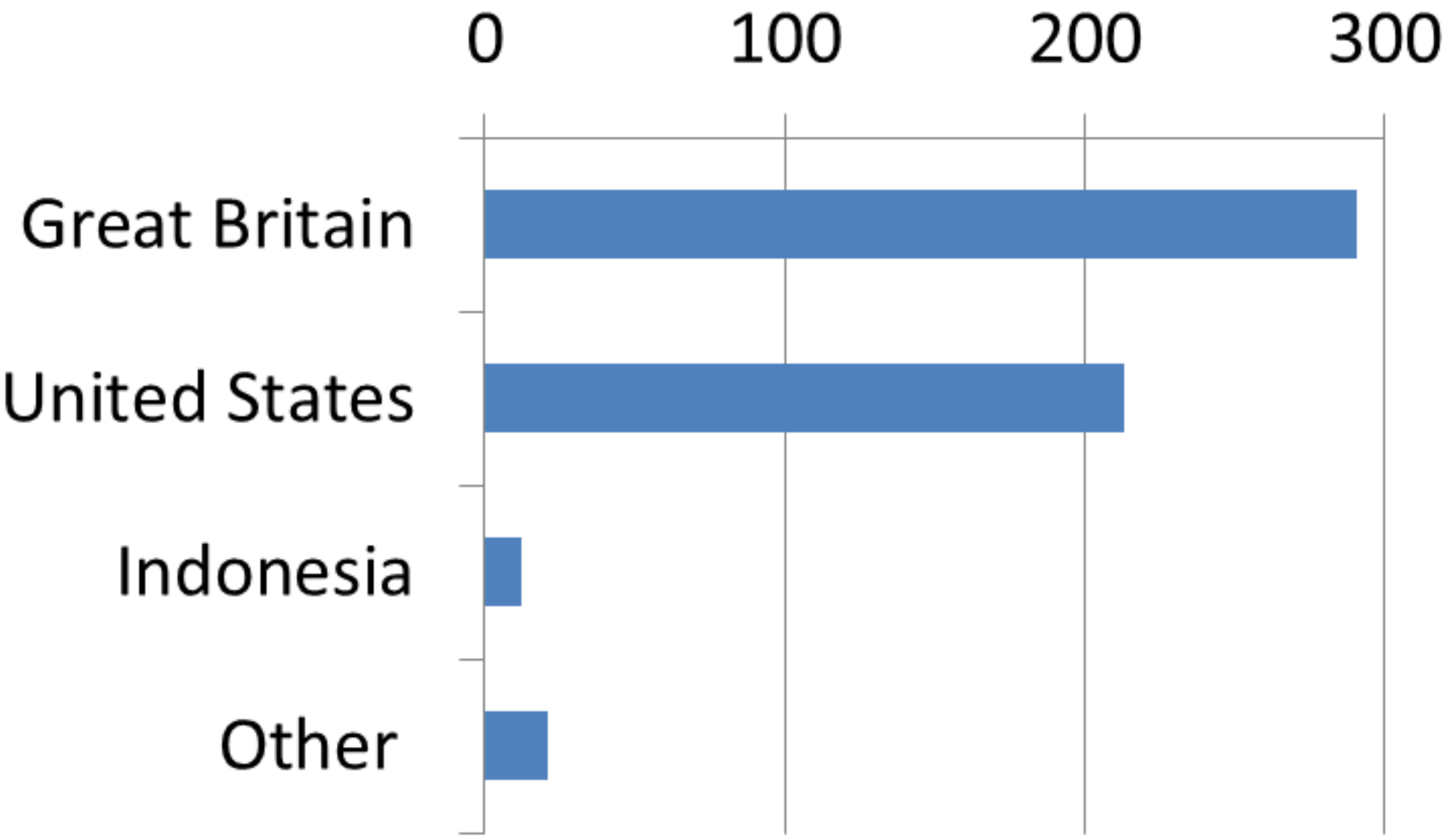
•In performing this study, the first thing we had to do was come up with some hypotheses about what we thought the data might show us. Our null hypothesis was that there was no relationship between a person's personality type, their concerns over privacy issues and their Facebook activity. Our alternative hypothesis was that there was a relationship between these variables.

•The first thing I had to do is familiarise myself with the data – if you don't know your data, you can't hope to analyse it properly. The first thing I did was to look at the demographics of the data and take a look at the age, sex and location of our participants.

**References**

•Facebook demographics - http://www.insidefacebook.com/2010/06/08/whos-using-facebook-around-the-world-the-demographics-of-facebooks-top-15-country-markets/
•Facebook demographics - http://www.ignitesocialmedia.com/social-media-stats/2011-social-network-analysis-report/#Facebook

# Country of Registration



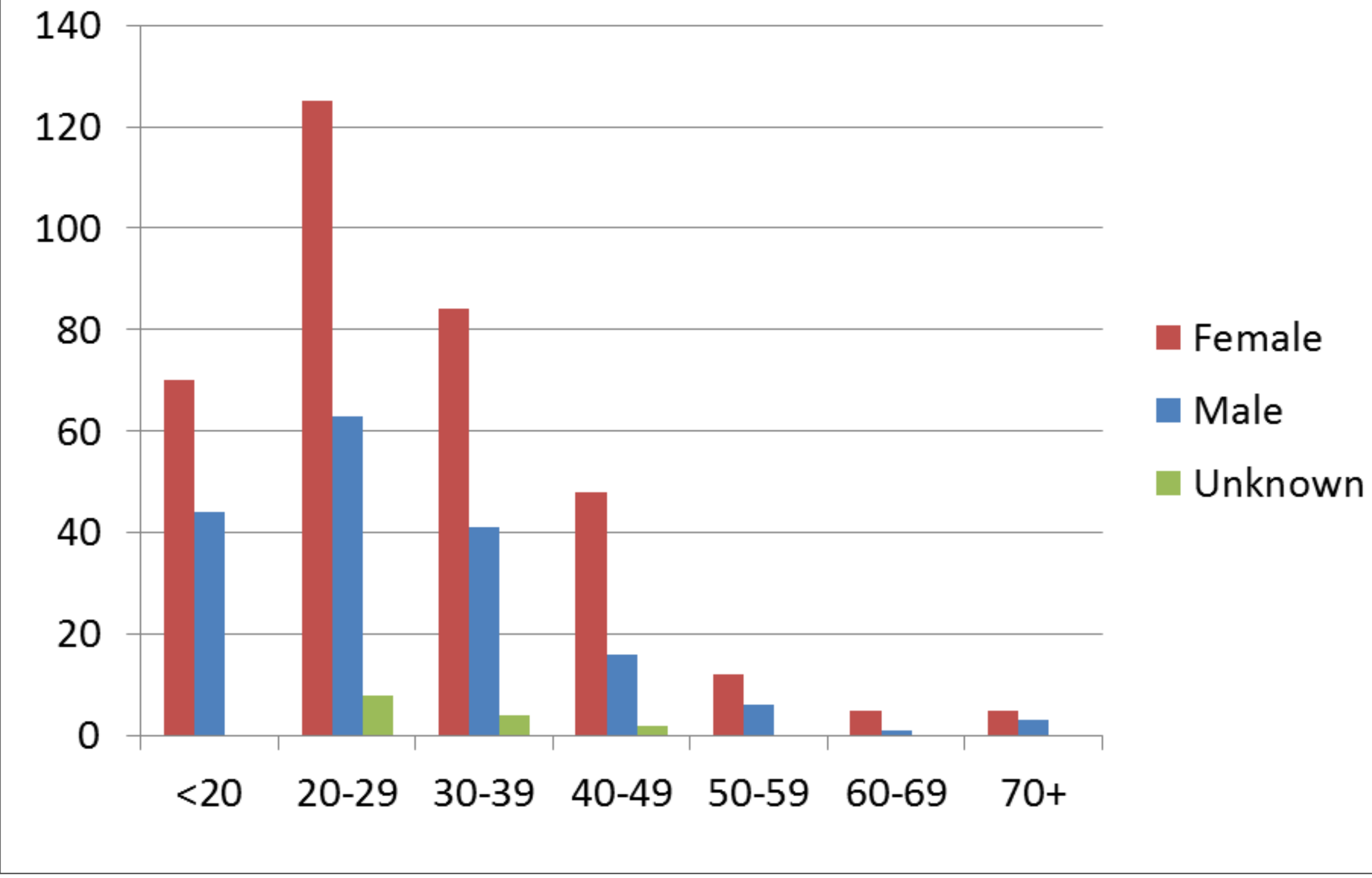



**General Flow of talk**

- The vast majority of our respondents were from the US and Great Britain, most likely reflecting the exposure we had in each of these countries in terms of advertising and word of mouth. However this isn't truly reflective of the overall distribution of Facebook users, as there are more users in Indonesia and India than there are in Great Britain.

**References**

# Age and Sex



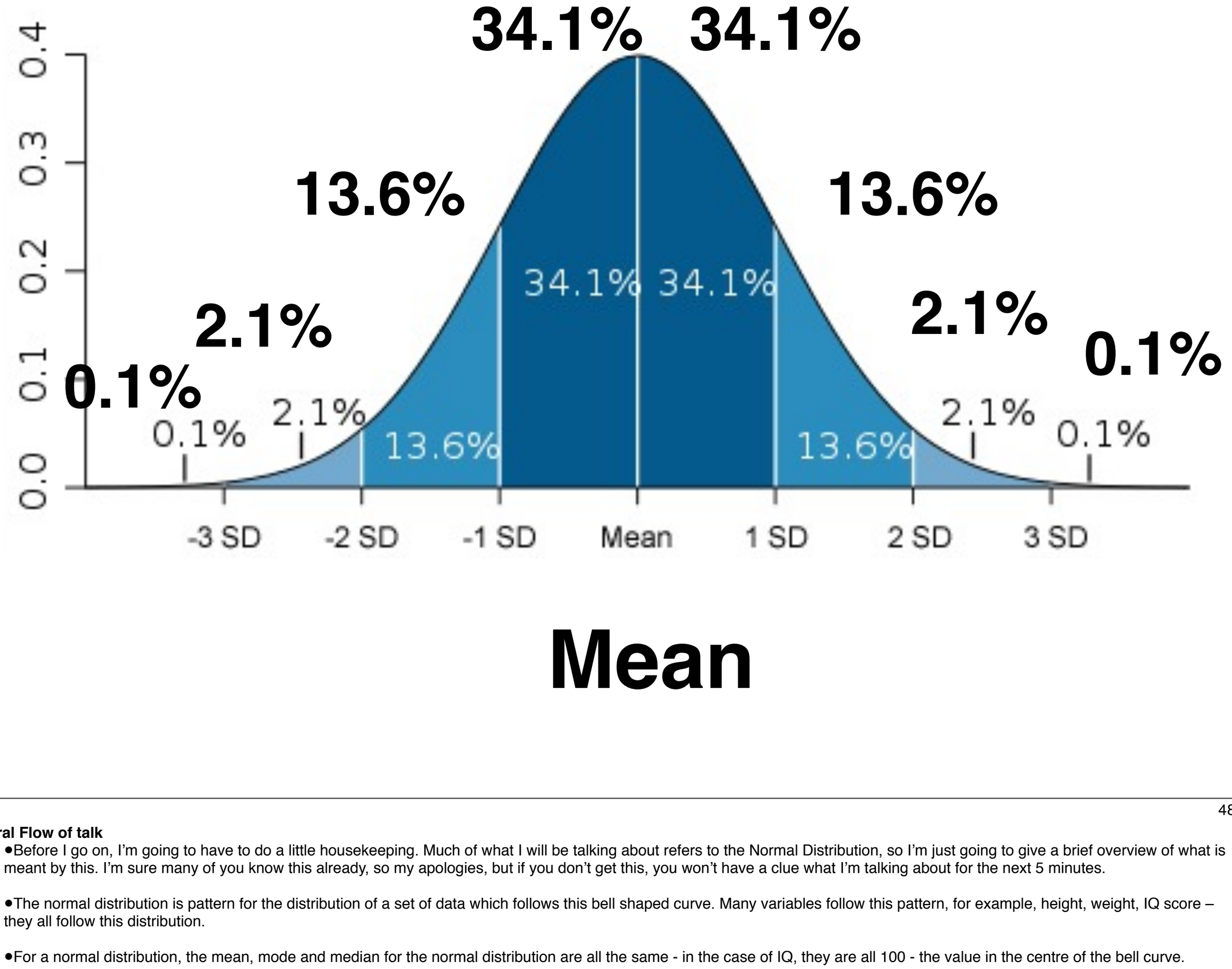



**General Flow of talk**

•Over 2/3 of our participants were female, which differs from the sex split of the Facebook population, however, this **may** reflect higher tendencies in females to volunteer their time in studies such as these. This 2:1 ratio has also been noted in other studies of personality and online media.

•The greatest proportion were in the 20 – 29 age group, and the overall age distribution of our sample is pretty representative of the underlying age distribution of all Facebook users.

**References**






**General Flow of talk**

- Before I go on, I'm going to have to do a little housekeeping. Much of what I will be talking about refers to the Normal Distribution, so I'm just going to give a brief overview of what is meant by this. I'm sure many of you know this already, so my apologies, but if you don't get this, you won't have a clue what I'm talking about for the next 5 minutes.

- The normal distribution is pattern for the distribution of a set of data which follows this bell shaped curve. Many variables follow this pattern, for example, height, weight, IQ score – they all follow this distribution.

- For a normal distribution, the mean, mode and median for the normal distribution are all the same - in the case of IQ, they are all 100 - the value in the centre of the bell curve.

- A measure called the standard deviation is used to measure the spread of values across the bell curve. So, in terms of IQ, for example, about 68% of people will have an IQ level within 1 standard deviation above or below the mean, 95% of people will have an IQ that is within 2 standard deviations above or below the mean and 99% of people will have an IQ that falls within 3 standard deviations of the mean.

- So that's a whistle stop tour of the normal distribution, so hopefully the rest of this will make sense now.

**References**



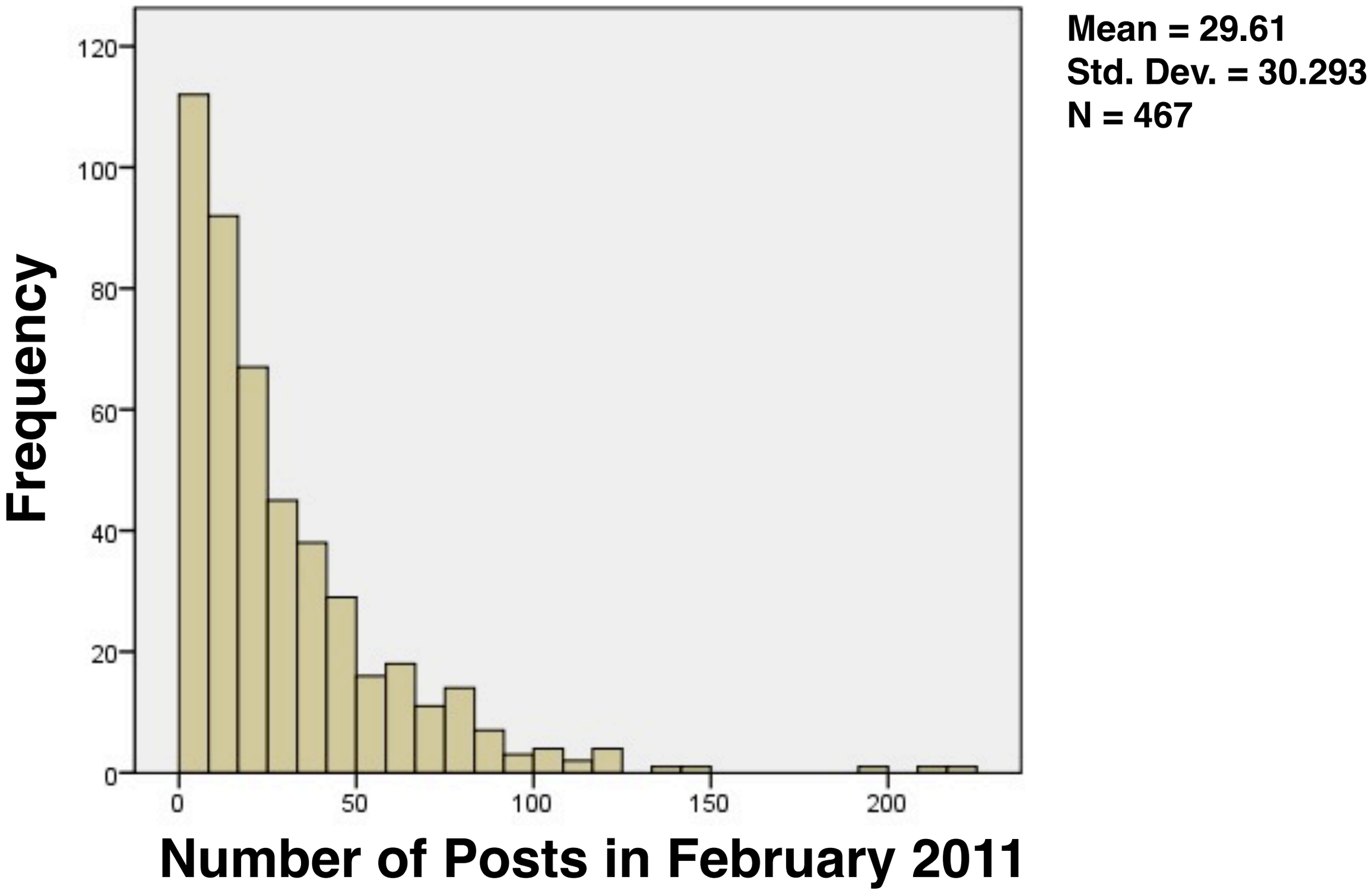



**General Flow of talk**

- So after figuring out who was in our sample, my next step was to look at the responses to the questions themselves to decide how to analyse these variables.
- Just in case you were interested, for almost all the analysis for this study, I used the Statistical package SPSS.
- Firstly, I used SPSS to produce descriptive statistics of mean, median, stdev, minimum and maximum values and also skewness and kurtosis, which are indications of the shape of the distribution. I also created histograms of the data to be able to see the distributions.

**References**


- SPSS Software - http://www-01.ibm.com/software/uk/analytics/spss/



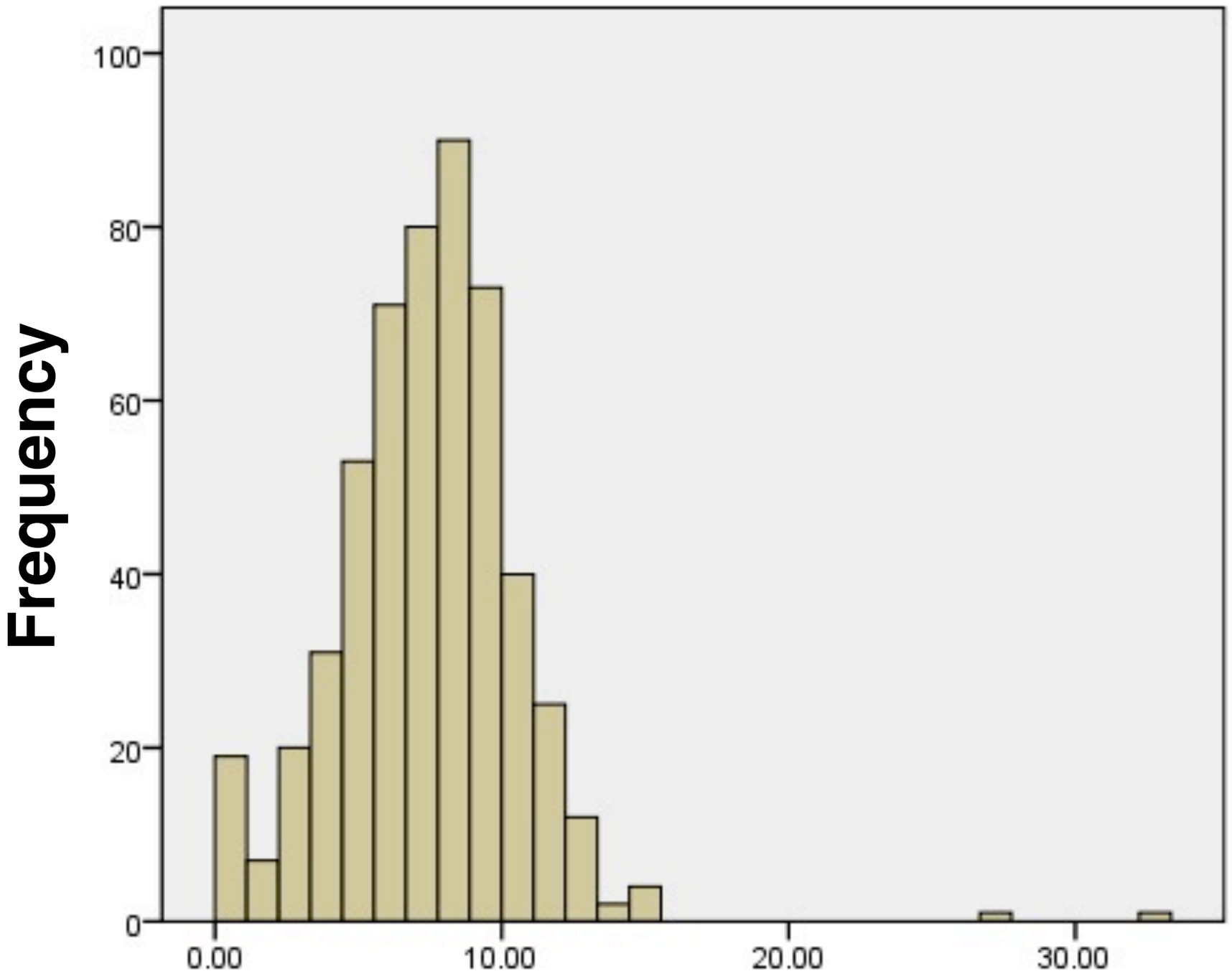



**General Flow of talk**

- For example, a distribution like this has a very high positive skew and it is quite clear that it is not normally distributed.

**References**

# Histogram




Mean = 7.40
Std. Dev. = 3.196
N = 529



**General Flow of talk**

•A distribution like this, however, looks like it has potential to satisfy a normal approximation, so further tests need to be performed to see whether we can actually use a normal approximation or not.

•I used SPSS to perform Kolmogorov-Smirnov tests for normality, which tests the data to see if it can be reasonably assumed that it fits the normal distribution. The results showed that actually none of the variables in our study could be considered normally distributed.

**References**

# Pearson



# Spearman





**General Flow of talk**

•But why is this important?

•When analysing data, there are two types of analysis – parametric and non-parametric, or in the case of correlational analysis like ours, Pearson's Analysis or Spearman's Analysis.

•Pearson's is better and much more preferable, as it looks at the magnitudinal differences between datapoints. But it can only be used on continuous data whose underlying population approximates the normal distribution and on variables whose relationship is linear.

•Spearman's, on the other hand, can be performed on rank order data, or on continuous data that does not satisfy the needs of Pearson's test. However, if you use Spearman's on continuous data, it converts all nominal values into ranks, therefore you lose the magnitude of difference between the variables, so Spearman's can be less sensitive and less powerful than Pearson's.

•So in deciding what analysis to perform, we need to look at the data and decide if we can reasonably say that the samples come from a normally distributed population and that any two variables will have a linear relationship. If we can – Pearson's, if not, Spearman's.

•BUT there is an exception to this rule called the Central Limit Theorem, which states that with sufficiently large sample sizes, all samples of a given population approach the normal distribution. Under this rule, our sample of 537 is 'sufficiently large' therefore, if we wanted to, we COULD, under the central limit theorem, sate that all variables were normally distributed and therefore use the preferred Pearson's test.

**References**

# Spearman





**General Flow of talk**

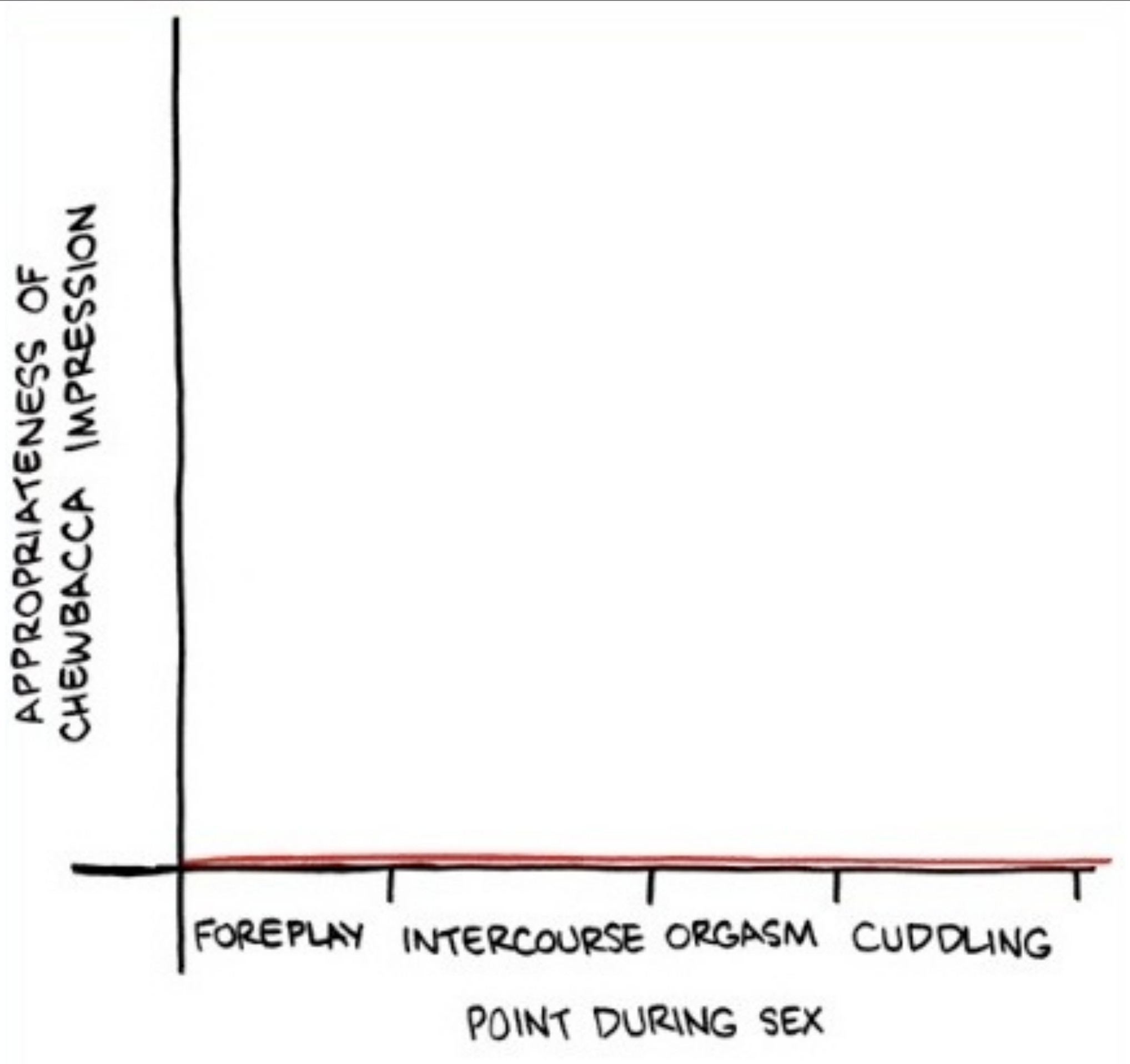
•But despite all this, I still chose the Spearman's test. There are 3 main reasons for this:

1. As I said before, the Kolmogorov-Smirnov tests for normality showed that none of the variables satisfied tests for normality
2. As far as I know, we know nothing of the underling population distributions, for example, what is the distribution of all 750 million Facebook users' levels of neuroticism? So I wasn't happy to state that the underlying populations were normal, therefore the samples should be.
3. And finally, with sufficiently large sample sizes (as ours is), the Spearman's test is only slightly less powerful than Pearson's.

•Taking all this into account, I thought we should err on the side of caution and use the Spearman's test and be confident in our conclusions, rather than use Pearson's and risk statistical errors.

•Spearman's has been used in other studies of online use and personality

**References**






**General Flow of talk**

- Our study was primarily a correlational study between the Big 5 personality aspects, self reported privacy concerns and Facebook activity.
- It is important to remember that a correlation between two variables does not indicate a causal relationship between those two variables. For example....

## References







**General Flow of talk**

- ... there is a very strong correlation between ice cream sales and shark attacks. This does not mean that ice cream causes shark attacks, but that there is a related factor – the weather  the warmer it is, the more people will buy ice creams and go swimming in the sea. Any correlational relationship we find must be regarded carefully, as there may well be a related factor that influences both variables.

## References

# Openness

## +ve correlations



money
religion
death
longer bio
more interests



**General Flow of talk**

- The analysis we performed on the data showed statistically significant findings that suggests that people with higher openness scores will use more words to do with negative emotions and anger and be more open to talking about things like money, religion and death. They will also write more about themselves and give more information about their hobbies and interests.

**References**

# Openness
## -ve correlations



family

words per sentence



**General Flow of talk**

- Conversely, they would use shorter sentences and be less likely to talk about their family.

**References**

# Conscientiousness

## +ve correlations

dictionary words
positive emotion
family
age





**General Flow of talk**

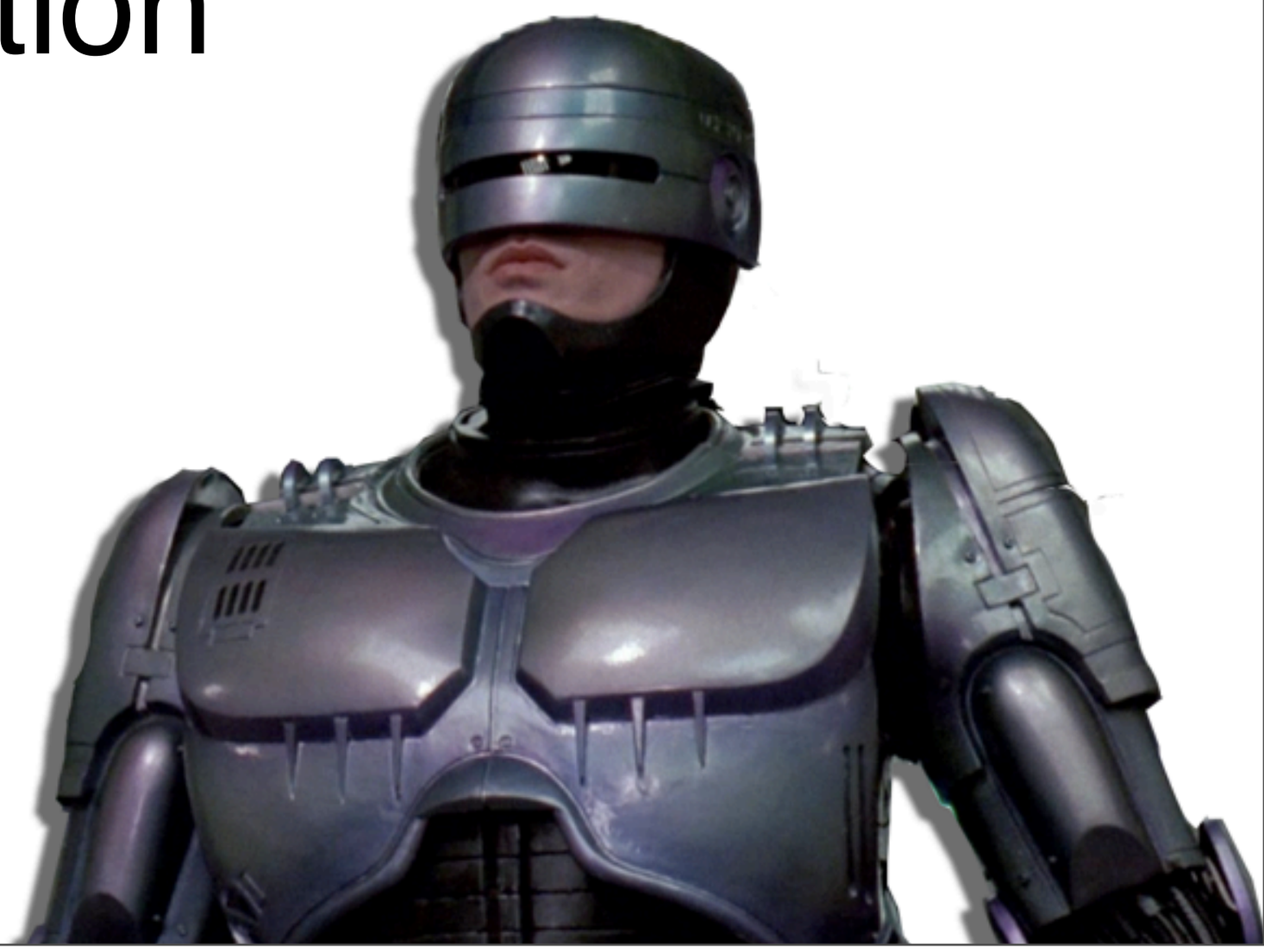
- Our study suggested that a person with high levels of conscientiousness will be older, use proper words and talk about their family, and use words to do with positive emotion and inclusion.

**References**

# Conscientiousness

## -ve correlations

negative emotion
swearing
anger
death





**General Flow of talk**

- Conversely, they are less likely to talk about death, to swear and use angry words or words to do with negative emotion.

**References**

# Extraversion

## +ve correlations

friends
photos
comments
positive emotion
biological processes





**General Flow of talk**

- In terms of extroversion, our results indicated that people with high levels of extroversion will have more more Facebook friends, post more photos and comments and use words to do with friends, positive emotion and assent.

**References**

# Extraversion

## -ve correlations

books





**General Flow of talk**

- On the other hand they would have fewer books listed on their Facebook page.

**References**

# Agreeableness

## +ve correlations

longer sentences
positive emotion
comments
friends
photos
age





**General Flow of talk**

•Our study suggested that a person with higher levels of agreeableness will be older, have more friends on Facebook,  and post more photos and comments. They will also use longer sentences, but perhaps fill spaces with words like er or um, and use words to do with positive emotion.

**References**

# Agreeableness

## -ve correlations





**General Flow of talk**

- We found no statistically significant negative associations with agreeableness

**References**

# Neuroticism

## +ve correlations

negative emotions
longer posts
swearing
sadness
albums
anxiety
anger





**General Flow of talk**

•And finally, our study showed that people with higher levels of neuroticism tend to post more photo albums, have longer posts and swear more, as well as using words to do with negative emotion, anxiety, anger and sadness.

**References**

# Neuroticism

## -ve correlations

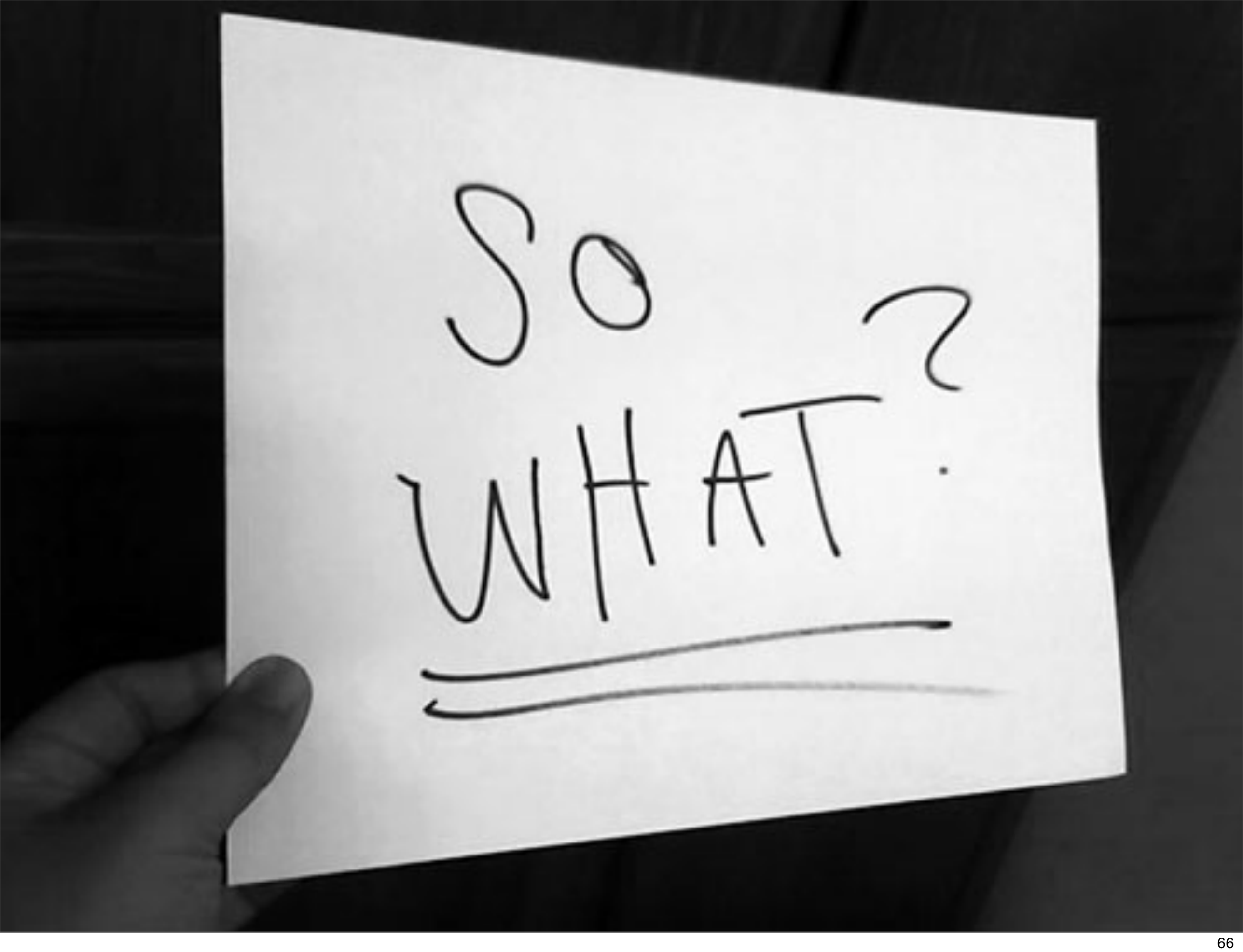




**General Flow of talk**

- Again, we found no statistically significant negative associations with neuroticism.

**References**






**General Flow of talk**

- So what? I've said a lot about statistical significance, but what does all this mean in the real world? To explain this, I'm afraid I need to go back to the stats.

- When performing a correlational analysis using SPSS, this is what the output looks like.

**References**

# Nonparametric Correlations

[DataSet1]

**Correlations**

| | | | EXTROVERSION | Number of Friends |
|---|---|---|---|---|
| Spearman's rho | EXTROVERSION | Correlation Coefficient | 1.000 | .240** |
| | | Sig. (2-tailed) | . | .000 |
| | | N | 537 | 534 |
| | Number of Friends | Correlation Coefficient | .240** | 1.000 |
| | | Sig. (2-tailed) | .000 | . |
| | | N | 534 | 534 |

**. Correlation is significant at the 0.01 level (2-tailed).

$H_0$ = There is no relationship

$H_1$ = There is a relationship



**General Flow of talk**

•This value is called the p value and it lets me know whether a correlation is statistically significant or not. But again, what does that mean? If we go back to our hypotheses: our Null Hypothesis stated that there was no relationship between personality and Facebook activity. Our alternative hypothesis stated that there is a relationship between personality and Facebook activity.

•The p value is the probability of, if the null hypothesis is true, it's the probability that we could find a result at least as extreme as the one we observed in our study. So basically, the smaller the p value is, the more evidence we have to reject the null hypothesis and accept that there is a relationship between our variables.

•So in translating this correlation to having meaning in the real world, we're not concerned with the p value, as all this tells us is the probability that we've made the right conclusion. To find out the strength of the relationship between these two variables, we need to look at this value, which is the r value, or the coefficient of correlation.

•In correlational analysis, what you really want is a value as close to 1 or -1 as you can get, as this indicates a very strong relationship. So intuitively, we can see that in this case, it may be a statistically significant relationship but it doesn't appear to be a very strong one.

•To find out exactly how strong, we need to square the r value to get what is called the coefficient of determination, and this will tell us the percentage of variance, or fluctuation, in one variable that can be predicted or explained by the other variable. In this case, if we square our r value of 0.24, we get roughly 0.05, which translates to 5%. So even thought this correlation is statistically significant, it illustrates that only 5% of the variance of one variable can be explained by the other.

•In a nutshell, you have to look beyond the fact that something is statistically significant and start to look at the strength of the relationship.

**References**

**stats are strong**

**interpretation is key**

**gives a competitive edge**



**General Flow of talk**

- A statistically significant result indicates that we are valid in stating that there is a relationship.
- It does not indicate the strength of that relationship.
- A result can be statistically significant, but only explain a small amount of variance in the data.

**References**






**General Flow of talk**

- The key thing to bear in, and since we're in vegas is that results give you an **edge**.

- so if we take 100 people, it may mean that you'll predict correctly 53% of the time.  This isn't great for basing critical decisions on, but it means you're going to be right more often than not.

- want to read more, check our fortunes formula and the eudeamonic pie.  two great books

**References**


- Book - Fortune's Formula: The Untold Story of the Scientific Betting System That Beat the Casinos and Wall Street [Paperback] - William Poundstone

- Book - The Eudaemonic Pie [Paperback] - Thomas Bass

“if you want to make an educated **bet**, you would be crazy to bet against the odds.”



**General Flow of talk**

- In other words
- “if you want to make an educated bet, you would be crazy to bet against the odds”

**References**






**General Flow of talk**

- let's take a look at "weaponizing"
- We're really looking at practical uses (good and bad)...and things this information should be used for, but probably will.
- We could have called this section a number of things, but since this is DEF CON, we opted for "Weaponizing"

**References**






**General Flow of talk**

- Well, one of the most obvious and possibly benin uses is **advertising / marketing**.

- we know there's link between online advertising and people high in openness

- We also know that people low in Conscientiousness are more **impulsive**, so perhaps we can **hike the prices** for impulsive people.

- it's not like this hasn't happened in other contexts right?

- As an advertiser, the odds are very appealing to us, **we don't need to worry so much about incorrect predictions**....

- So you could get different ads, based on personality and recent sentiment.

- Maybe as a automobile manufacturer, you target your SUV's at Extroverts?

**References**

Five Factor model and impulsivity - http://www.subjectpool.com/ed_teach/y4person/2_facets/refs/Lynam_2001_impulsivity_as_NEO_facets.pdf

URL's to images and some rough thoughts/Notes
==========
But how can this be used for bad?
It may be possible to tell something about somes personality from the ads they're getting

kenton B's lockdown presentation - i.e. you might be able to ascertain something about someone simply by the ads they recieve

http://www.istockphoto.com/stock-photo-249661-billboard.php?st=789ced5






**General Flow of talk**

- If you want to see a really cool use of sentiment analysis, take a look at “we feel fine”.org Sentiment Analysis
- In future, you might be able to “guess” someone’s personality through the ads they receive
- Well advertising is perhaps a practical use, but what about something a little more interesting.

**References**

http://www.wefeelfine.org/






**General Flow of talk**

**•dating!**

•Imagine being able to tell if he/she's going to be high maintenance?

•So if we look at their Facebook posts/activity and it suggests they might be high maintenance, then perhaps we'll be forewarned and forearmed....and on the look out for other clues.

•PROMISCUITY. can he can't keep it in his trousers?  If he's high in openness, maybe his desire to experience new things also extends to other people

•PLAYERS -  'The Rachel Papers' by Martin Amiss.  The main character,Charles Highway, deftly adapts his personality/approach based on his pray.

• You could write your dating profiles/email and running it through a personality filter to suggest tweaks and make you look more attractive to your target market. This would make a particularly interesting research project, perhaps for someone's who's currently single.

•For some people, sizing up other people is a a skill already poses..

•Again, the odds work for us here. We don't mind being wrong, but we should be right, more often...slightly

**References**

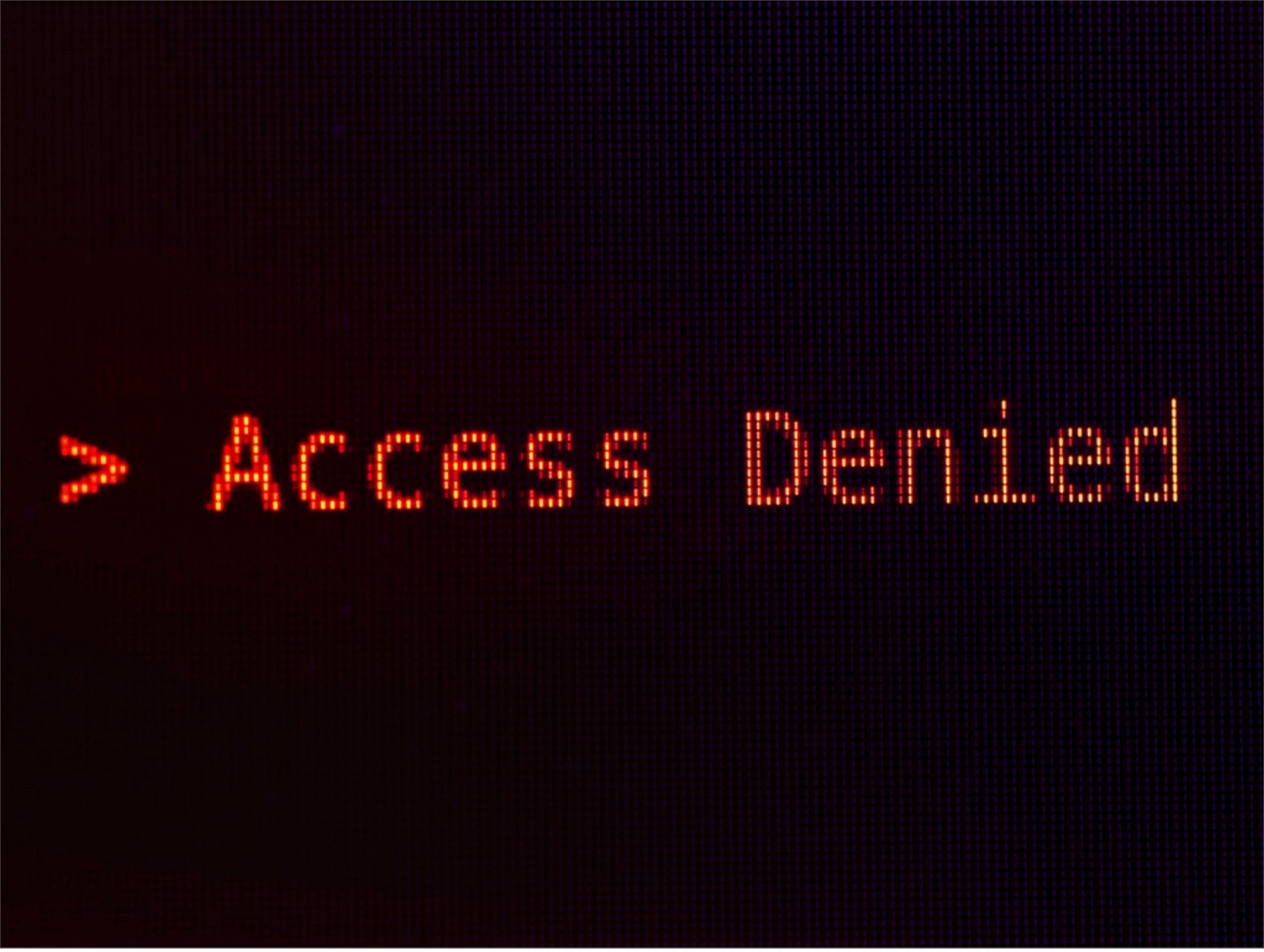





**General Flow of talk**

- however, there's a caveat here.
- Generally speaking, you can only date a +/- 2 for your potential mate (looks wise), unless you have something else to offer/trade. Money, humour, status.
- So in this case....

**References**






**General Flow of talk**

- It's "Access Denied" I'm afraid
- But, if you're conducting a "**romance scam**", you're not using your own pictures anyway, in which case, you've got yourself a new tool.
- Now, thinking about scams...

**References**

# Agreeableness & gullibility



77

**General Flow of talk**

- we know that agreeableness is positively correlated with gullibility .
- Further,  a recent Cisco report talks about increase in spear phishing..
- So, imagine sifting through the (public) social media profiles of a group of peope with the help of Maltego by Paterva
- So what if we could find people who may be more gullible than others, OR to put it another way, in rank order, who are the post pwnable people in a group.
- If you’re looking for the weakest point in a group, this should give you a headstart. <click to next slide>

**References**


Maltego - http://www.paterva.com/


URL’s to images and some rough thoughts/Notes
==========

http://www.istockphoto.com/stock-photo-9610849-target-locked.php?st=10c6eb2






**General Flow of talk**

- It can probably help social engineers and scammers. This too would make for an interesting study

## References



# Sock Puppets

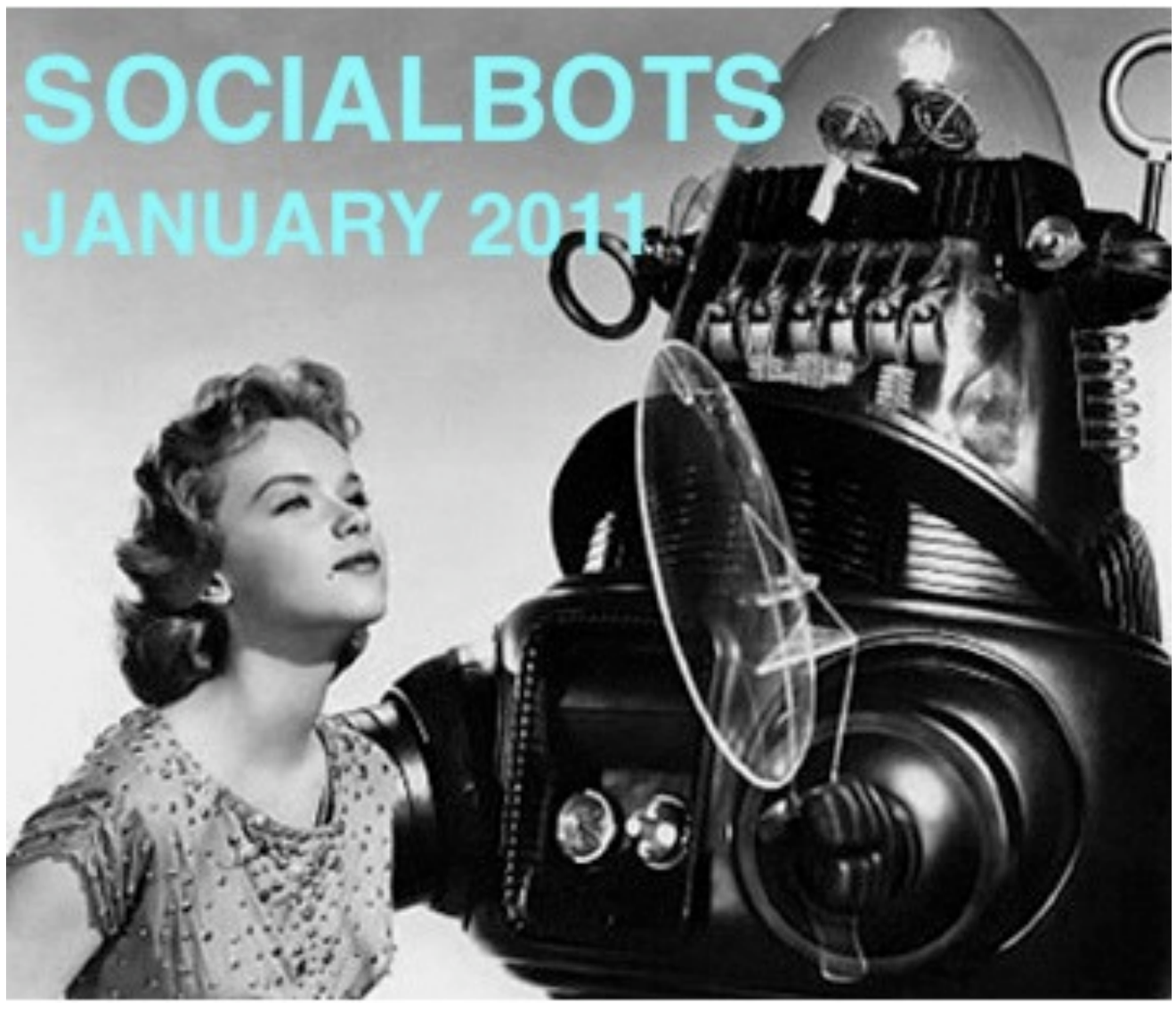


**General Flow of talk**

- Following on from Personality enhanced spear-fishing, you may have seen some of the hacking events in the news earlier this year?
- well, allegedly, it turns out you have “organisations” using fake personas, called, Sock Puppets. These sock puppets are used to feed misinformation and sway public opinion.
- Rather than explain SockPuppets...

**References**

# Tim Hwang




# “Help robots take over the internet...”



**General Flow of talk**

•...Tim Hwang has a really nice video out on youtube that talks about a twitter competition using fake personas. it’s called “"Exterminate, Exterminate: On the Robotic Subjugation of Twitter"”

•Our untested hypothesis is that you can give your sock puppets personality traits and target them accordingly. either, you fire them at people who are more likely to be gullible or you know more about the pray and alter your approach accordingly.

•so far, the edge, assuming we’re on the right end of it, is arguably useful to us....

**References**

Tim Hwang’s video http://videos.ignitesanfrancisco.com/HjQ/tim-hwang/






**General Flow of talk**

- 
- ...but we have to be careful...this is how the media have already interrupted the research prior to ours.

**References**




# "Facebook profiles reveal personality traits to researchers"



**General Flow of talk**

- On May 9th this year we saw this article.
- Their message is clear "Facebook can be used to predict personality", which will be interpreted as "by only using facebook, employers can determine personality..."
- The research makes no such claim, but the media do and they're wrong, In this case, the odds of being wrong matter a lot
- Now what happens if organizations start adding personality to cybervetting? We know personality has been misused in the past, there's some well documented cases, so it's not unreasonable to suggest it'll get added to cybervetting and it'll be misused...

**References**

abcNEWS / Technology

HOT TOPICS:
Casey Anthony · Dow Jones · Virginia Tech

SEARCH

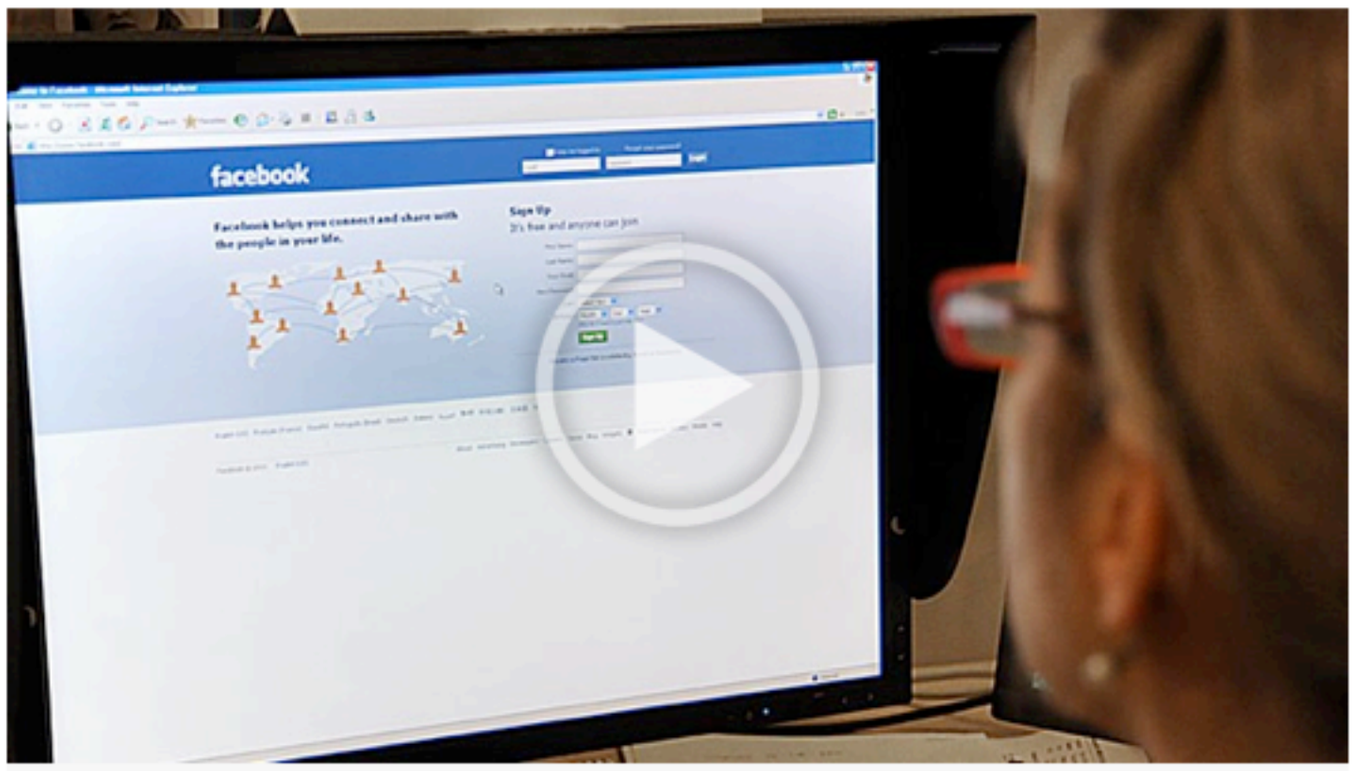
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MORE SCI/TECH: TechBytes | Tech This Out! | Water on Mars? | Hobbyists' Truck Saves Soldiers' Lives in Afghanistan | How

Breaking News: U.S. Expecting Standard & Poor's Downgrade, Governme

HOME > TECHNOLOGY

# Facebook Can Serve as Personality Test




The homepage for social media website Facebook is shown in this Jan. 26, 2010 photo in Washington. Companies who want to know more about prospective employees can learn a lot by checking their Facebook profiles. (Karen Bleier/AFP/Getty Images)

DiscoveryNews. By ERIC NILLER
May 13, 2011

**"Facebook can serve as a personality test"**



**General Flow of talk**

- Here's another report...same topic.  No mention of it only being so accurate....
- Worring isn't it

**References**



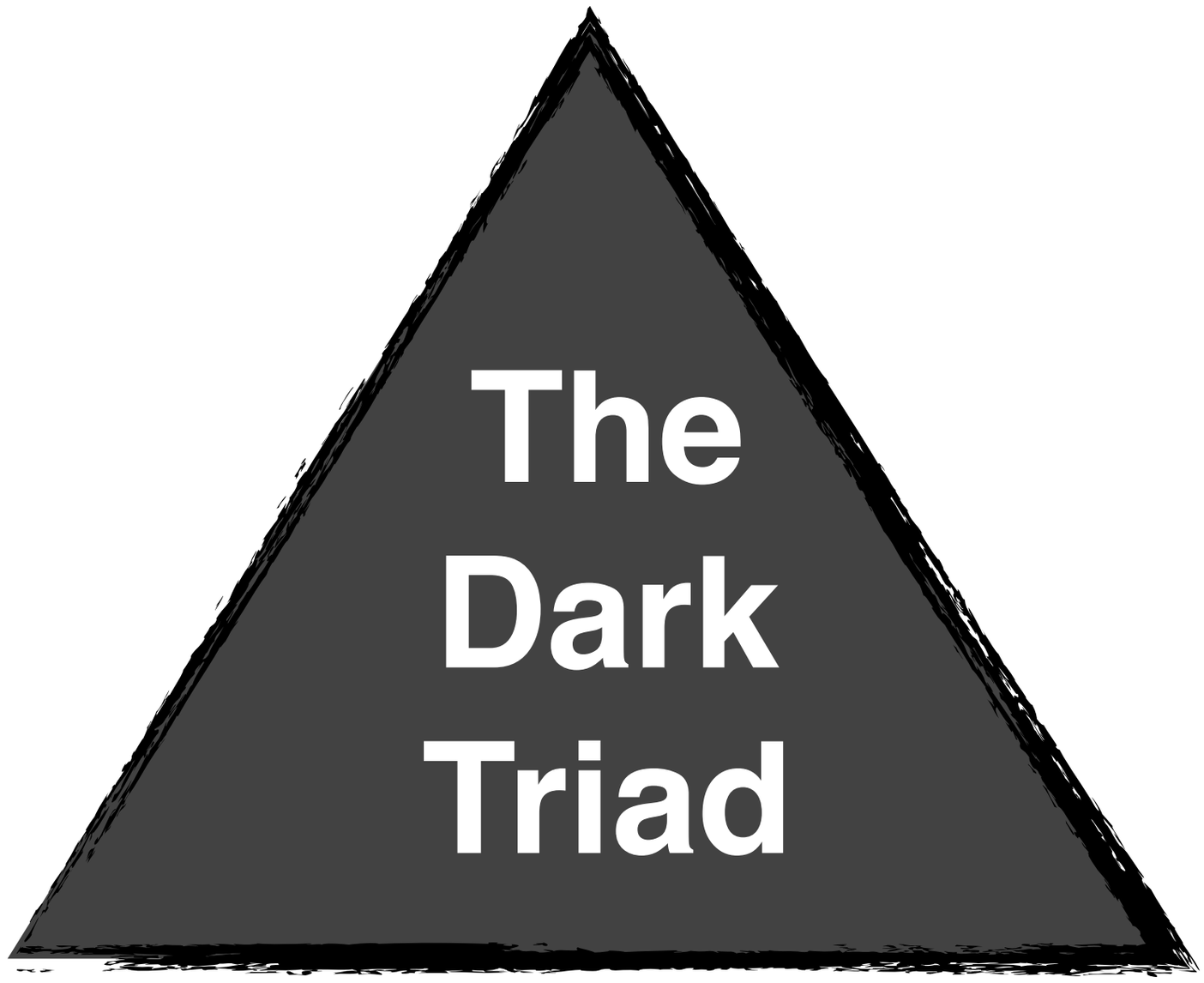


**General Flow of talk**

- So is it out of the question to assume that some smart ‘so and so’ is going to draw this conclusion?
- People who are higher in OPENNESS are more likely to try drugs.
- but it’s not 100% by far - same caveat as our research.
- Some an employers gets 5000 resumes, maybe graduate intake for a highly sensitive company. Are they going to take a chance on people with the highest levels of openness is they equate that to the chance their employees might experiment with drugs?  it’s not toooo far fetched is it?

**References**

# Machiavellianism




# Narcissism

# Psychopathy



**General Flow of talk**

- And here's arguably "undesirable characteristics.
- OK, pot's one thing, but we've also seen studies where traits are mapped to something called, "The Dark Triad", that is.
  - Narcissism
  - machiavellianism and
  - psychopathy.
- all of a sudden, the potential for misuse seems a lot darker doesn't it. **You're not a number.....you're a label**
- Perhaps its amusing that your see these traits most evident is people at the top of organizations...again..not always

**References**






**General Flow of talk**

- So let's say you have some potentially interesting personality traits...
- ...and you use certain words in your posts...and/or
- you're connected to known criminals..
- Is it too far a stretch that you might end up on a "Watch List"? After all, you could present a threat to national security.

**References**






**General Flow of talk**

- In a digital age, you **can't leave your past behind**
- You probably will do things that others will disagree with
- you'll make mistakes
- you'll be judged
- forever.
- So what might you be able to do to sail under the radar? Adrian is going to lead us through this discussion.  Please welcome Adrian to the podium.

**References**

adrian

OnlinePrivacyFoundation.org





**General Flow of talk**

**References**






**General Flow of talk**

- I’m going to take a look at evading/subverting anyone who’s trying to make decisions based on your online personality
- So assuming this information is ever used in the wrong context.....how might you Subvert and or evade?
- So, how might you subvert cybervetting?  Well, perhaps the first question is why would you? you’ve got nothing to hide right?
- what you’re hiding and who you’re hiding it from will influence what you’re doing
- the problem you have is that you don’t really know what people are looking for,
- Fortunately, today, you’re best approach is...

**References**

# Invisible man?

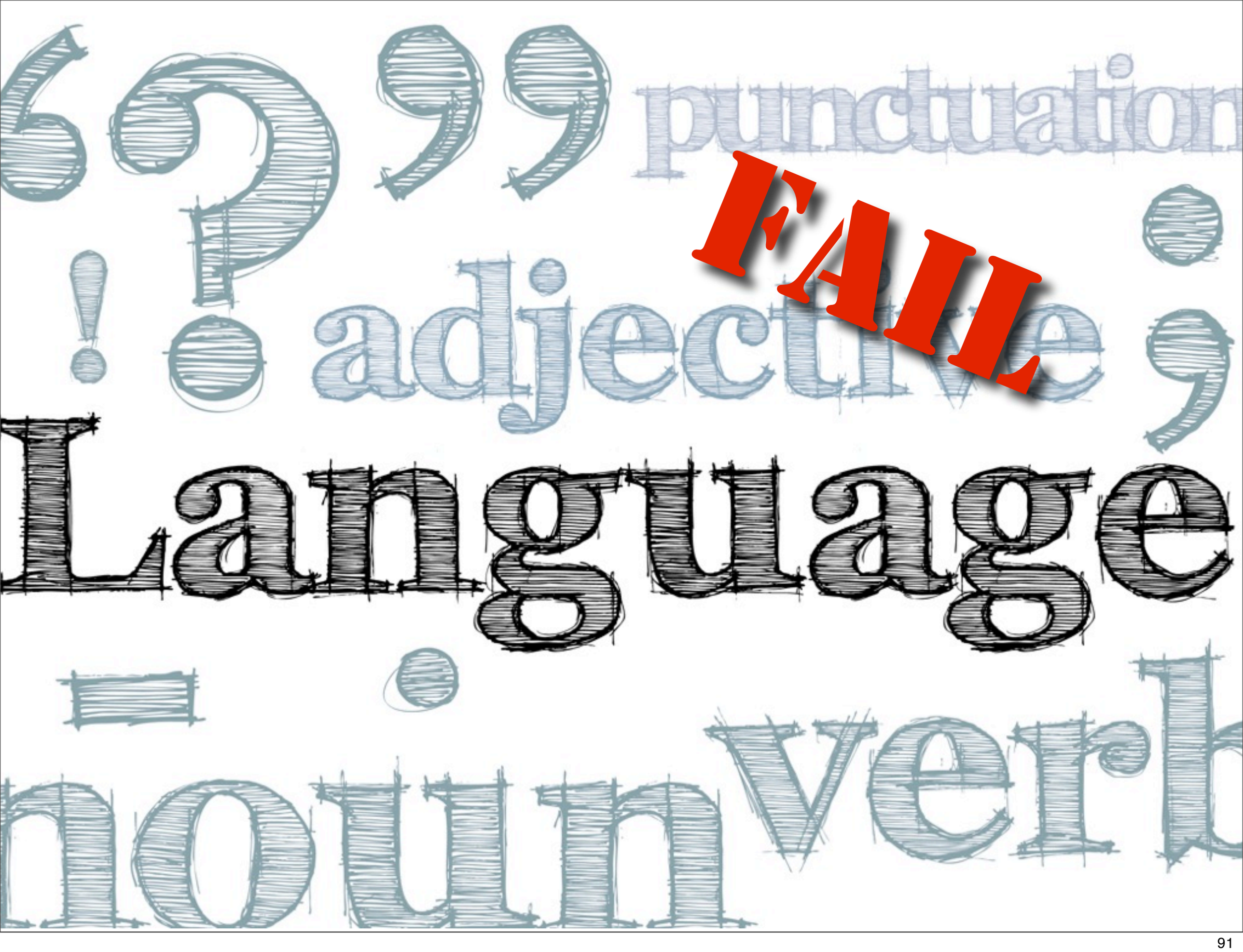




**General Flow of talk**

- ...to not use social media or
- really lock down your privacy settings and/or
- different accounts/pseudonymns?
- ..but we shouldn't forget that someone can easily pretend to be you. ALSO...
- There's not been much research into what not being on a social networks says about you. Further, it's not just whats out there in research papers, it's what prospective employers rightly or wrongly think. If I meet a 20 year old today, I'll be curious of why they don't use a social network.

**References**






**General Flow of talk**

- BTW...you're probably on to a loser if you focus on language (e.g. translating to Russian), even if kids are using lyrics to communicate. You see, **much of our work didn't care about language, but the activity on social networks.**

**References**

# tweak your personality





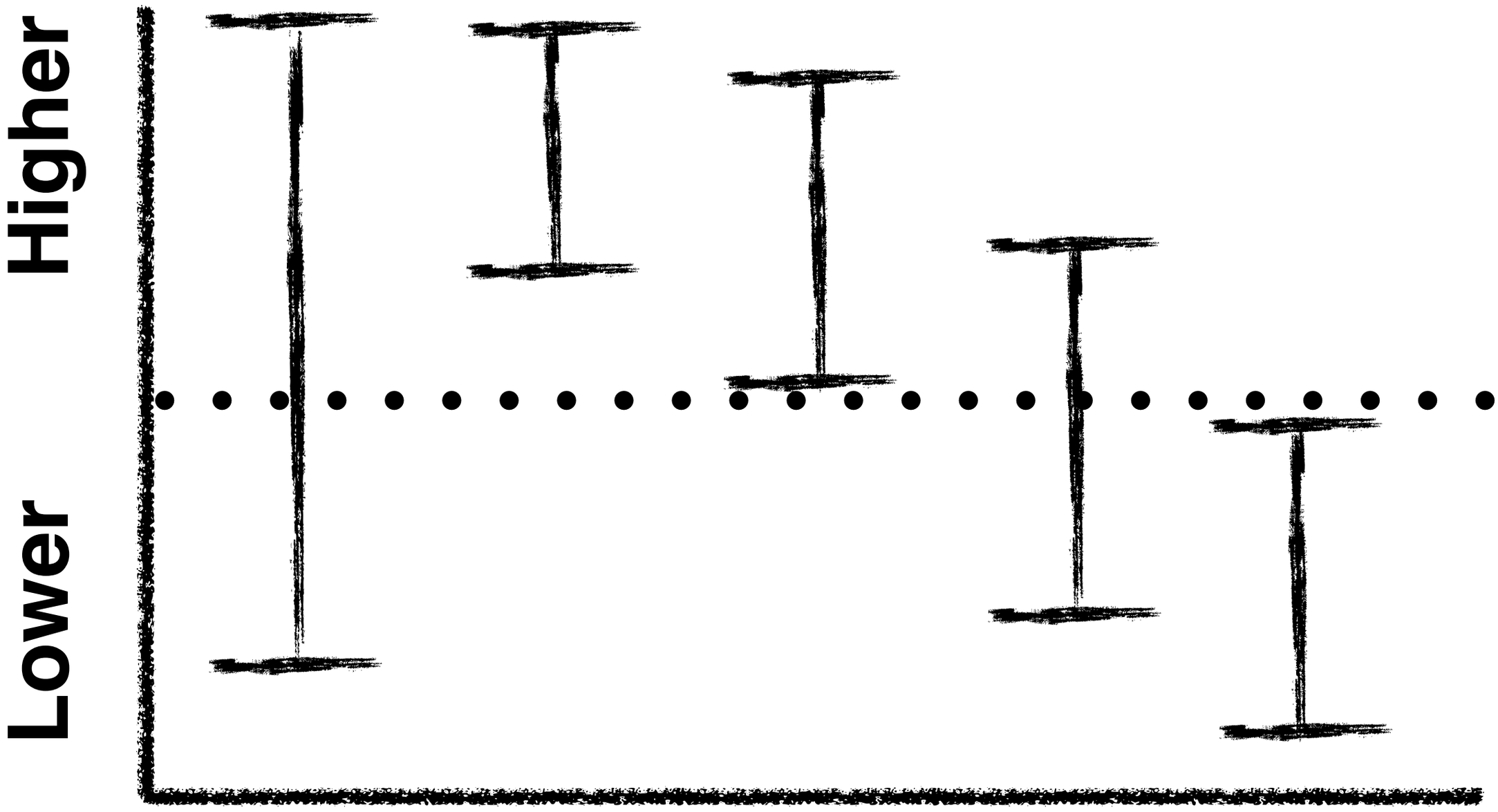
**General Flow of talk**

- you could try tweak your personality?
- what are you going to do, to WHO, and WHY.
- very difficult to pull off....CONSISTENTLY
- ...and what would you change your personality to anyway?

**References**

URL's to images and some rough thoughts/Notes
==========
http://www.istockphoto.com/stock-photo-4186791-funny-disguise.php?st=ff6e666

# Desirable personality traits



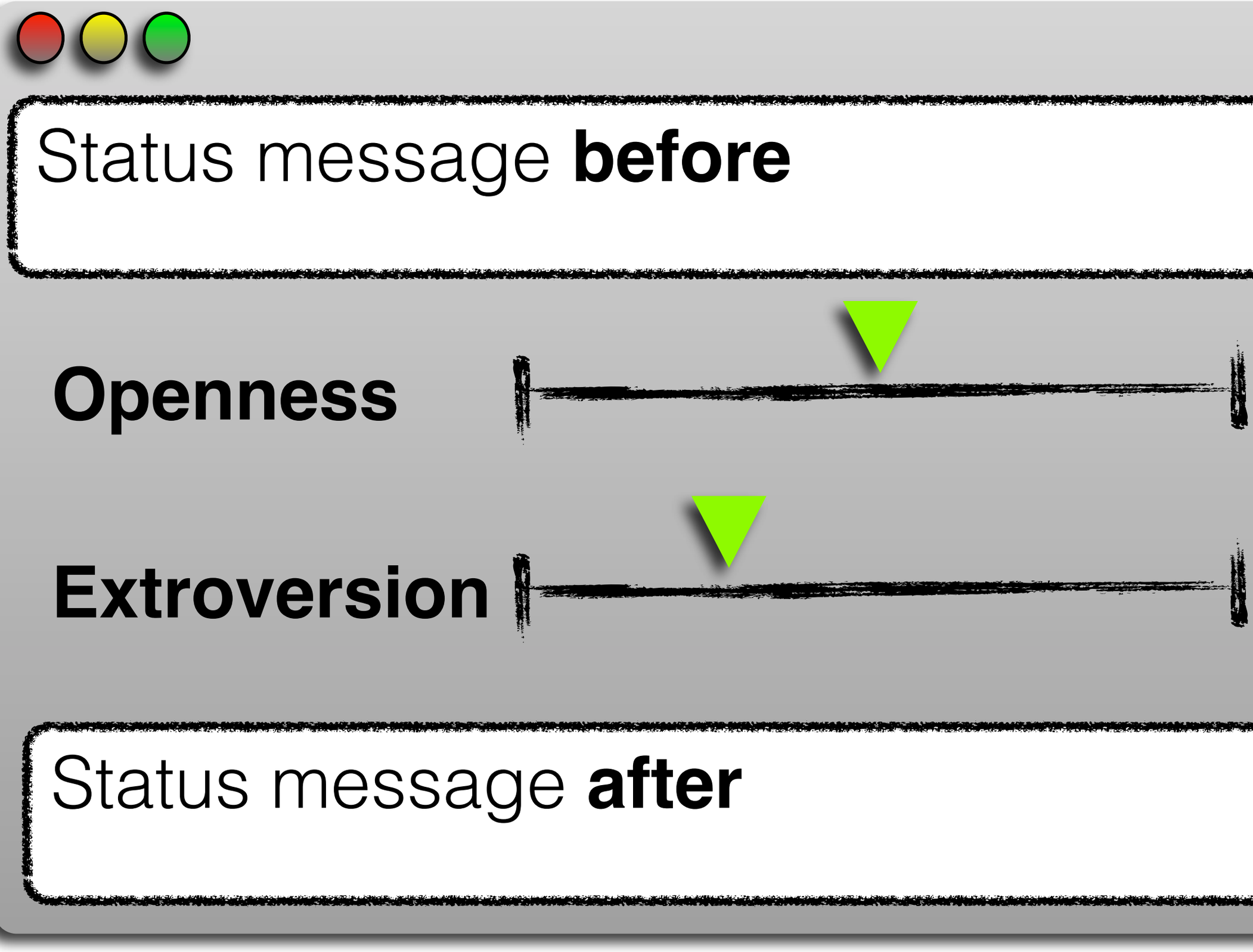



**General Flow of talk**

- I looked at some published research on personality and career success, and this seemed to be the ball park you should aim for....
- ....but it'll depend on the career your going for.
- ...also, lets say you really are a high end extrovert...are you really going to be happy doing data entry?

**References**

# personality filter






**General Flow of talk**

- Here's another idea. It's a bit tongue in cheek, but it should make a point.
- We are working on an app to "guess" your personality based on your facebook activity.
- We've also been discussing implementing a filter to suggest how you might alter how you're perceived.
- This is what it could look like.

**References**





**General Flow of talk**

•Drugs might do it too...although we've been unable to find any studies looking at how personality changes after people have taken drugs, say like anti-depressants. Maybe you look less neurotic. it'd be an interesting research project.  We don't recommend doing this for fun though.

•Do we really want to suggest people take drugs to ensure they meet some societal norm?

•Are the edges of society really going to be smoked out?

•So....

**References**






**General Flow of talk**

- Assuming organizations do start using Cyber Personality Profiling...and currently it's a big, but not far fetched assumption....
- where does this leave us...society

**References**




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**General Flow of talk**

- In my opinion, shouldn't the best approach be that we embrace each others differences?
- It's unlikely though...

**References**






**General Flow of talk**

- Maybe tight controls on how personality derived from social media is used.
- Companies like Social Intelligence might indeed be the place places to add this dimension.  They're then able to communicate the context in which the results should be used and more importantly.
- this organizations can be highly regulated.
- I'd sooner have a small number of experts doing this in a regulated manner, than a free for all.

**References**






**General Flow of talk**

- When people talk about determining personality from Facebook or blogs.  Point them at this research. Make sure they're not drawing conclusions on facebook / OSNs  alone....there's a caveat of course..

- ...perhaps one day, the accuracy of personality prediction from Online Social Networks will be much better.

## References

# question & challenge



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**General Flow of talk**

- Finally, where ever you see statistics in the press question their numbers
- Challenge the science behind it.
- Check out Bad Science by Ben Goldacre. A great read about the abuse of statistics in the media

**References**

Book - Bad Science, Ben Goldacre

# “Don’t Believe the Hype”





**General Flow of talk**

- Since we started with Public Enemy, it’s only fitting to end with the,,,
- “Don’t believe the hype”...well, unless you’ve looked at the numbers.

**References**






**General Flow of talk**

- That concludes our talk. We will be taking questions.
  - chris@onlineprivacyfoundation.org
  - alison@onlineprivacyfoundation.org
  - adrian@onlineprivacyfoundation.org
- We hope we've left you with an insight into personality traits,
- what your Facebook activity might say about you and how you might conduct your own research (hint, get a statistician)
- and with our final two sections, why you should care. We have to ensure this isn't used in the wrong contexts.

**References**