Personality Research for NLP

Prof. Yair Neuman

Ben-Gurion University of the Negev

co-Director, BIRL, Univ. Toronto

Visiting Prof. Weizmann Institute of Science & Oxford University

yneuman@bgu.ac.il

https://bgu.academia.edu/YairNeuman

A tutorial presented at the 2015 Conference on Empirical Methods on Natural Language Processing, September, Lisbon, Portugal

What is Personality and why is it Important for the NLP Community?

A psychological study once asked an interesting question:

Who divorce more?

Men who try to understand their wives?
or
Men who don't try to understand their wives?

Those of you who are married can guess the answer…

Men who try to understand their wives divorce more than men who don't try to understand their wives

The question is Why?

The answer that I gave elsewhere* is that

Understanding other people is a tricky issue

* Neuman, Y. (2014). *Introduction to computational cultural psychology.* Cambridge: Cambridge University Press.

- Understanding involves conscious theorization
- Human beings are better in applying unconscious heuristics

Gigerenzer, G., & Todd, P. M. (1999). *Simple heuristics that make us smart.* Oxford: Oxford University Press.

In sum, we want to understand other people but this is not an easy task

The lesson: Don't try to understand your spouse, just adapt …

However …

Understanding other people is important than ever in our technological and consumer oriented society

In the past, and until quite recently in historical terms, it was more important to know WHAT you are (e.g. a Noblemen or a peasant) than WHO you are

Today the WHO you are is a central issue

Consumers' Research

In consumers' research "granular analytics" is an attempt to profile the client for high resolution tasks (e.g. marketing, advertising, priorization)

Similarly to "Personalized Medicine", we would like to find the best "match" for a specific individual

e-Health

In e-Health it is important to screen the mental state of patients for diagnosis, prevention and treatment

Think for example about the importance of automatically screening for Depression

The murderous pilot of German Wings

Forensic Analytics

Can we screen for potential offenders such as pedophiles, school shooters or school bullies?

The Conclusion

Understanding other people is a must

Understanding other people is understanding their PERSONALITY
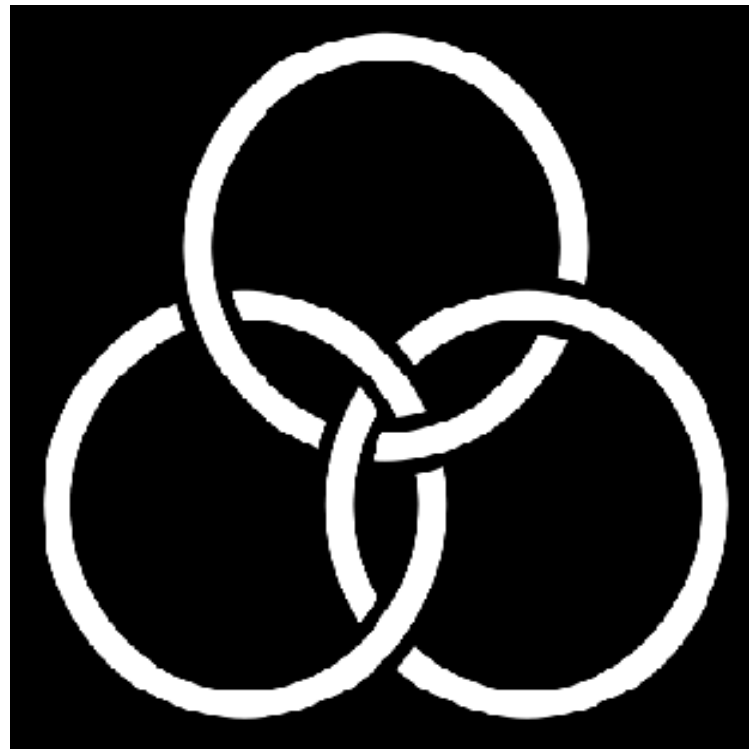
What is Personality?

Personality refers to the subject's consistent patterns of

- Thought
- Emotion
- Behavior

Consistent = Stable across time and contexts

The Borromean Rings of Personality

THOUGHTS

EMOTION

BEHAVIOR

Thoughts

Thoughts concern the cognitive aspect of personality

Mainly the schemes through which we represent our inner and outer world

Beliefs about self and others (I am .., They are …)

Emotions

No need to explain but … a recent interesting neuro-imaging study suggests that all of our emotions can be mapped into four dimensions

Kassam, K. S. et al. (2013). Identifying emotions on the basis of neural activation. *PloS one*, *8*(6), e66032.

1. Valence (whether the stimuli is positive or negative)
2. Arousal (the strength of the affect)
3. Social aspect (e.g. jealousy)
4. Sexual desire (e.g. lust)

Behavior

Behavior concerns the actions taken by the individual

Not necessarily actual actions but fantasies and intentions too

Let's illustrate these dimensions of personality through the

"understanding" husbands

vs.

"non-understanding" husbands

Thoughts

The "understanding" husband: "I don't understand my wife"

The "non-understanding husband": "I think that my wife needs me"

Emotions

The "understanding" husband: "I'm frustrated"

The "non-understanding husband": "I'm OK"

Behavior

The "understanding" husband: "I must get divorce"

The "non-understanding husband": "I'm going to have a pint of beer"

or a bottle of Port Wine produced in Portugal …

In sum

Personality involves consistent patterns of thought, emotion and behavior

Personality can be described in terms of

Types: Discrete categories of personality

or

Traits: Continuous dimensions of personality

How to scientifically identify a personality trait?

- Human languages use numerous words and phrases to describe people: Nerd, liberal, open-minded etc.
- Which of these tags can be used to describe a personality 'trait'?

- Not every descriptive term should be used as a personality tag (e.g. Liberal, Nerd, Funny)
- However, it is difficult to decide …

The Lexical Approach to Personality

- The naïve use of language is informative
- Through subjects' self-reports examine whether certain linguistic tags cluster together
- If you identify clusters conclude that there are underlying personality factors explaining these clusters

Theories of Personality

The Five Factor Model of Personality (FFM) - The "Big Five"

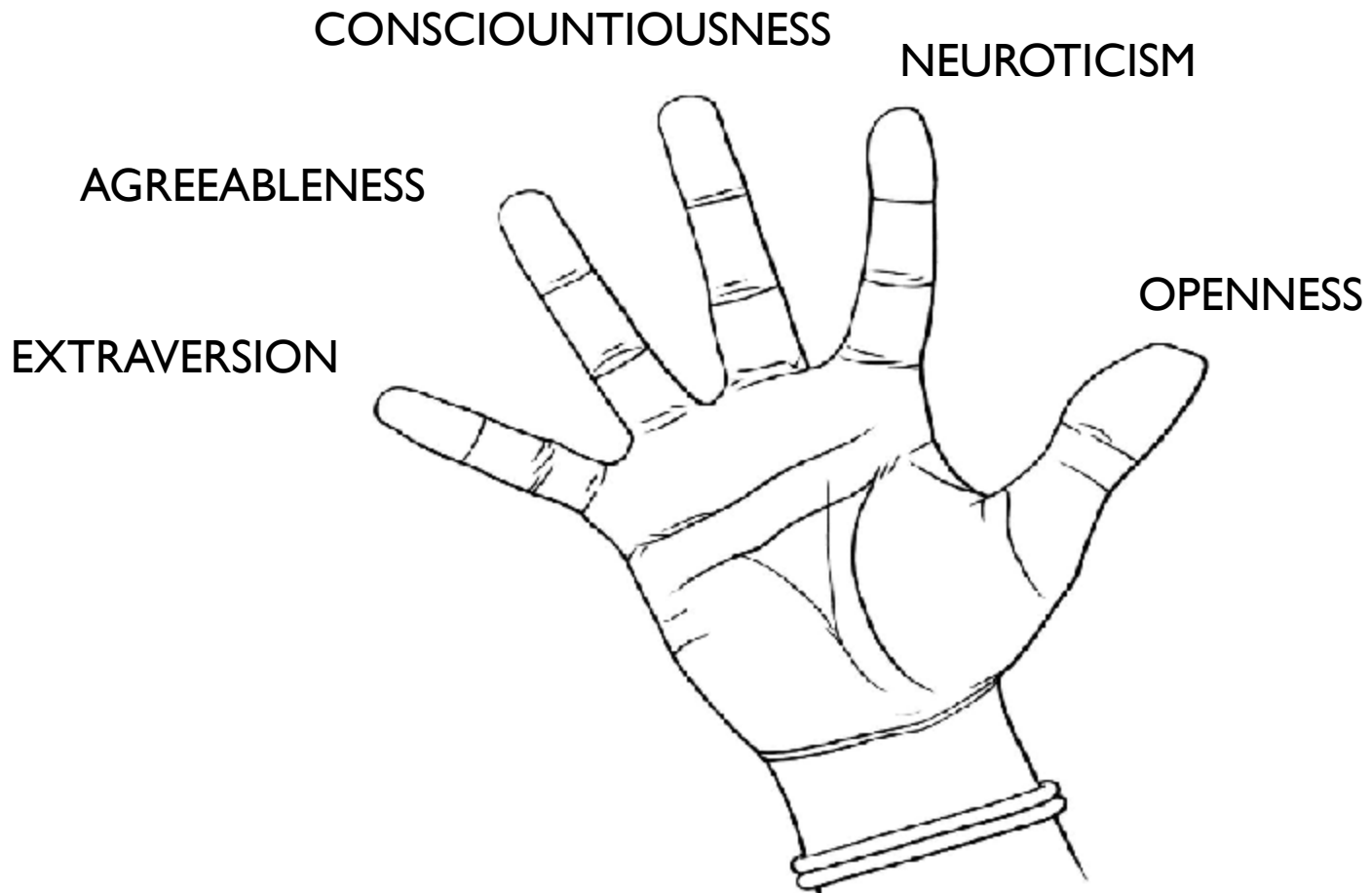- ## The dominant model in the current personality research

John, O. P. & Srivastava, S. (1999). The Big Five trait taxonomy: History, measurement, and theoretical perspectives. In L. A. Pervin & O. P. John (Eds.), *Handbook of Personality: Theory and Research* (pp. 102–138). New York: Guilford Press.

McCrae, R. R. & John, O.P. (1992). An introduction to the five-factor model and its applications. *Journal of Personality, 60*(2), 175-215.

- "The default model of personality structure"
- "anyone's personality can be characterized in terms of the five dimensions of the FFM"

McCrae, R. R & Costa, P. T. (2013). Introduction to the empirical and theoretical status of the five-factor model of personality traits. In T. A. Widiger and P. T. Jr, Costa (Eds.), Personality disorders and the five-factor model of personality. Washington, DC: American Psychology Association.

The Five Factors of Personality

EXTRAVERSION

Being assertive, sociable, out-going, energetic, effective, and ambitious

The complementary dimension is

INTROVERSION

NEUROTICISM

Negative reaction to stress, anxious, insecure

Vs.

Calm and stable

AGREEABLENESS

Friendliness and cooperative behavior

Vs.

Selfishness and arrogance

CONSCIENTIOUSNESS:
organized, ordered, responsible vs.

OPENNESS

Openness to experience, creativity and imagination

Vs.

Closeness and rigidity

Dogma under criticism

- The FFM is a dogma with many theoretical and empirical problems

Neuman, Y. (2014). Personality from a cognitive-biological perspective. *Physics of Life Reviews*, 11, 650-686.

For example

- The FFM is based on the relations between variables across individuals but personality lies within the individual

- So?

- Molennar and Campbell (2009) analyzed data of 22 subjects who were measured on 90 consecutive days with equivalent versions of the Big Five questionnaire

Molenaar, P. C & Campbell, C. G. (2009). The new person-specific paradigm in psychology. Curr. Dir. Psychol . Sci. 18(2), 112–7.

The results are surprising

- The analysis has shown that intra-individual variation doesn't explain the repeated measurement scores!

- It means that the correlation you may find at the group level of analysis is invalid at the individual level of analysis

- For example, you may find a negative correlation between being 'happy' and 'sad' at the group level of analysis but when you analyze the subject's scores, as gained through repeated measurements, the correlation vanishes …
- No consistency, no personality …

A simpler explanation?

- Neuroticism was found* to be strongly correlated with FEAR, SADNESS and ANGER

- So … Maybe Neuroticism is just a fancy name for negative emotions?

*Davis, K. L. & Panksepp, J. (2011). The brain's emotional foundations of human personality and the Affective Neuroscience Personality Scales. *Neuroscience & Biobehavioral Reviews, 35*(9), 1946-1958.
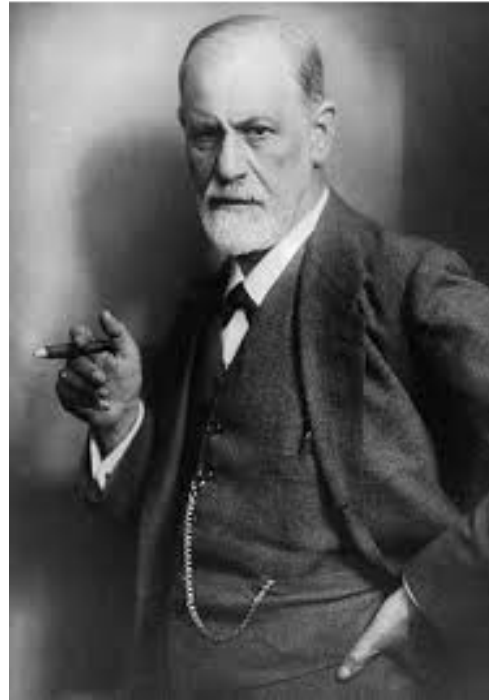
The dimensions are highly associated, for instance

- 60% of the Extraverts are Agreeable
- 62% of those who are not Neurotic are Agreeable and so on …

* Celli, F. et al., (2013). Workshop on computational personality recognition (shared task). In *Proceedings of the Workshop on Computational Personality Recognition*.

In sum …

- The FFM is the most popular model of personality, specifically in computational personality
- Theoretically simple
- Results are "guaranteed" (anything is associated with Neuroticism …)
- Extremely limited

The Psychodynamic Approach: Beyond the Straw-Man of Dr. Freud

- Personality as the adaptive ways of coping with the "exigencies of life"
- Variability of personality traits is therefore variability in mental coping strategies
- Personality types are presented in terms of the (1) cognitive (2) affective and (3) defensive functioning

Defensive Functioning

- The mechanisms we use to defend ourselves from threatening thoughts and emotions

- For example, splitting

- Positive and negative qualities of the self and others are separated

The Splitting Mind

Mom didn't give me a candy

Mom is BAD

Mom gave me a hug

Mom is GOOD

Too complex!!!

Maybe there are two different mothers!

Splitting explains why through History we Find Two Orthogonal Kind of Women!

And …

Identifying Splitting

- Highly relevant for diagnosis
- Identification of potential offenders (e.g. civilian mass murderers, political extremists etc.)

Neuman, Y. Assaf, D & Cohen, Y. (in press). Automatic identification of the splitting defense mechanism in texts. In M. Arntfield & M. Danesi (Eds.), *The Criminal Humanities: An Introduction*. Peter Lang.

The Spectrum of Personality Dimensions

- Personality dimensions range from

Adaptive, flexible and normal

to

Non-adaptive, rigid and pathological patterns

The Obsessive Personality Positive Aspects

- Perfectionists, hard-workers, believe in work ethics, task-oriented and put their emotions aside when the work has to be done
- Such a prototypical personality may be a highly successful surgeon or engineer
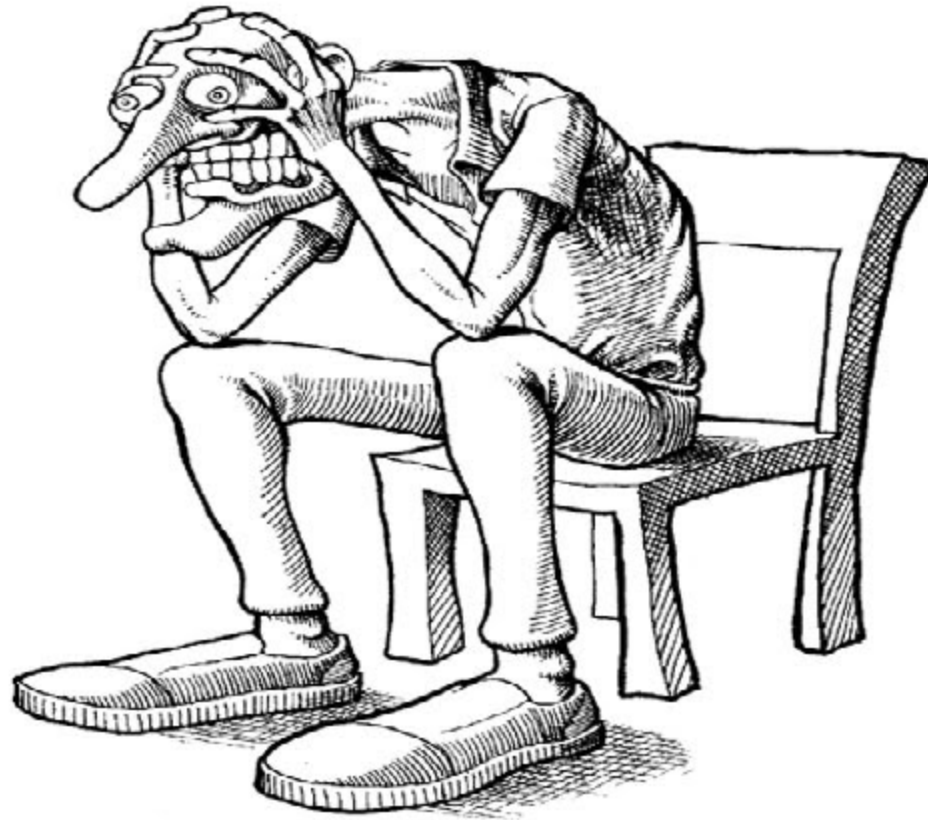
The Obsessive Personality Negative Aspects

- Nothing is ever good enough and therefore no task can be finished
- The hard-working person might be a workaholic who is "caged" in his office
- The emotional constriction might be experienced as the loss of emotions that drains the joy of life and a basic sense of living

Personality Themes

- Personality is organized around "themes" or conflicts

Psychodynamic diagnostic manual (PDM). Alliance of Psychoanalytic Organizations, 2006.

The Paranoid Personality

- Organizing theme: Attacking/Being attacked by humiliating others
- Central affect: Fear, rage
- Thoughts of others: The world is full of potential attackers and users
- Central ways of defense: Projection. The aggression that exists in his mind is attributed to others in the world

A Famous Paranoid

Suspicion

- In fact the major conflict of the paranoid is the one of trust/suspicion
- The paranoid invests energy in trust issues
- Believes no one
- On the other hand fully and uncritically trusts and adopts ungrounded Beliefs
- Conspiracy theories

For example

- Someone told me that his mother in law calls him regularly to "inform" him about "new scientific" inventions, trusting all possible rubbish in the media

My diagnosis: A conflict over trust

- I've asked him if his mother-in-law is paradoxically suspicious of well-grounded information …

- He was shocked when I explained that I don't really know his mother-in-law …

Personality Prototypes

- The Shelder-Westen Assessment Procedure (SWAP) recently identified two main personality clusters

Westen, D., Shedler, J., Bradley, B. & DeFife, J. A. (2012). An empirically derived taxonomy for personality diagnosis: bridging science and practice in conceptualizing personality. *Am. J. Psychiatry*, **169**(3), 273-284.

The Internalizing Spectrum

Depressed, anxious, emotionally inhibited and socially avoidant, blame themselves, self-critical

- Depressive
- Anxious-Avoidant
- Dependent-Victimized
- Schizoid-Schizotypal

Depressive Personality

- Prone to feelings of sadness and inadequacy
- Self-critical/self-punitive
- Concerns about abandonment and loss

A Famous Depressed Author Franz Kafka

Anxious–Avoidant Personality

- Socially anxious and avoidant
- Manage anxiety in a way that limit and constrict their lives

A Famous Avoidant Singer Michael Jackson

Dependent-Victimized Personality

- Dependent and afraid of being alone
- Insufficient concern for their well-being
- Difficulty in expressing anger

The Schizoid-Schizotypal

- Peculiarities in interpersonal relationships and thought processes
- Appear to have little need for human company
- Seem detached or indifferent
- Lack social skills and look awkward
- Odd appearance
- Feel life has no meaning

Willy Wonka from Charlie and the Chocolate Factory

- We recently found that Schizoids function as "Firewalls" for the spread of rumors on Twitter
- When receiving a rumor they are significantly less inclined to re-Tweet it

The Externalizing Spectrum

Angry and hostile, suspicious of others, conflicted about authority, prone to getting into power struggles, lack empathy, feel privileged and entitled, blame others, lack psychological insight, feel mistreated

- Antisocial-Psychopathic
- Paranoid
- Narcissist

The Antisocial-Psychopathic

- Exploit others
- Experience little remorse and empathy
- Manipulative
- Lack fear
- Enjoy playing the role of the predator
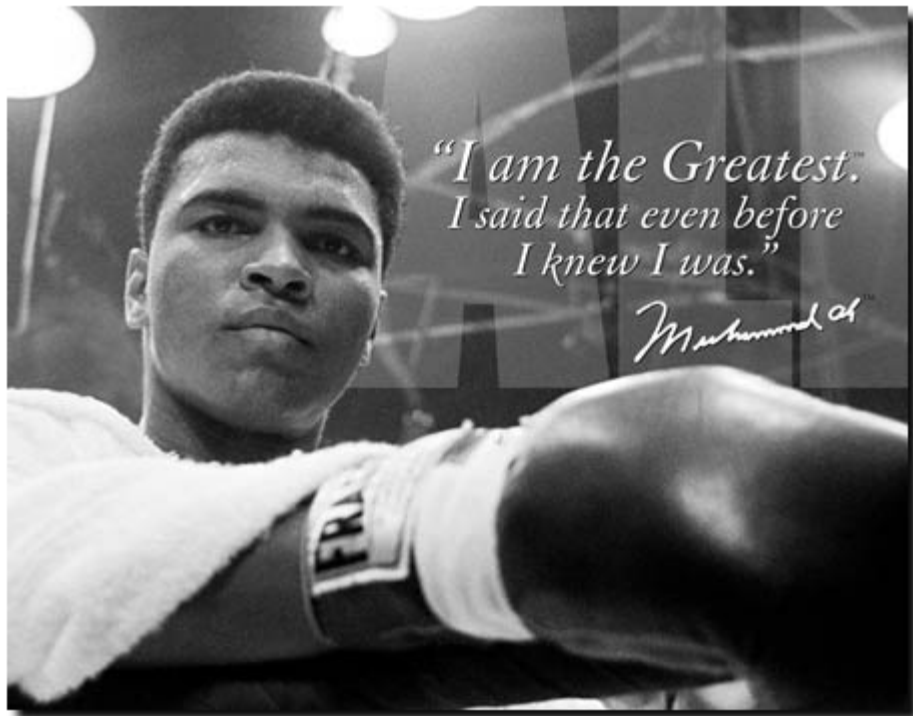
Personality Analysis and Deterrence
Khaled Mashal – The Leader of Hamas

Narcissistic Personality

- Grandiose self
- Dismissive of others
- Vulnerability beneath a grandiose facade

Muhammad Ali – The Boxer

Borderline-Dysregulated Spectrum

- Impaired ability to regulate emotions
- Unstable perceptions of self and others
- Intense and chaotic relationships
- Impulsive to include self-destructive impulses

Neurotic Styles

- Obsessional personality

Overly rational, emotionally constricted and rigid, critical of themselves and others

- Hysteric-Histrionic personality

Emotionally dramatic and theatrical, sexually provocative, idealizing others, paradoxically both intensely and superficially attached

Personality	Tension	Affect	Belief Self	Belief Others	Defense
Schizoid	Fear of/ longing for closeness	Pain	Dependency and love are dangerous	Social interactions are painful	withdrawal
Paranoid	Attacking/ being attacked	Fear/ rage	Aggression is dangerous	World is full of offenders	projection
Psychopathic /Antisocial	Manipulating /being manipulated	Rage/ envy	I can make anything happened	Everyone is manipulative	Omnipotent control

In sum

- The psychodynamic approach is theoretically grounded and rich in insights
- Mostly applied to clinical cases
- Difficult to apply in practice specifically in the context of NLP

The Cognitive Behavioral Approach

We have genetically determined strategies, or more accurately schemes, that aim to support our survival and reproduction

Personality is about our schemes

Beck, A. T. et al. (1990). *Cognitive therapy of personality disorders*. N.Y.: The Guilford Press.

Beliefs about self, others, future

- Thoughts results from interpretation/ information processing
- Thoughts lead to emotions & behavior
- Overdeveloped vs. underdeveloped schemes of interpretation

Over vs. Under Developed Schemes

Personality	Overdeveloped	Underdeveloped
Obsessive	Control	Spontaneity
Dependent	Help seeking	Self sufficiency
Paranoid	Mistrust	Trust
Schizoid	Withdraw al	Intimacy
Narcissistic	Self-aggrandizement	Empathy

Beliefs → Behavior

Personality	Self	Others	Assumption	Behavior
Paranoid	Vulnerable	Vicious	If I trust then I may be attacked	Don't trust
Obsessive	My world can get out of control	Irresponsible	If I'm out of control the world will fall into chaos	Control as much as possible, rigidity
Narcissistic	Inferior	Superior	If others conceive me as non-superior than I'm inferior	Show your superiority

- If you want to understand others analyze their beliefs, assumptions and behavior

How to identify a Narcissist?

- If someone is saying:

"I am a brilliant person who graduated from Harvard university not like my brothers who studied in a community college"

Dependency Parsing

nsubj(person-5, I-1)

cop(person-5, am-2)

det(person-5, a-3)

amod(person-5, brilliant-4)

The association between the "I" and "Brilliant" is indicative of the subject's belief about the self

A Practical Application

Personality sensitive advertisements

- For a narcissistic personality paraphrase the advertisement so that it includes words involving high status:

Harvard, Manhattan, Cartier, Ferrari, Remy Martin Cognac, etc.

The Affective-Neuroscience Approach

- Basically seeks to ground the human affective system in the context of mammalian brains

Panksepp, J. (1998). *Affective neuroscience: The foundations of human and animal emotions*. Oxford university press.

Core Emotions

- SEEKING, FEAR, RAGE, LUST, CARE, PANIC, and PLAY

Panksepp, J. (2005). Affective consciousness: Core emotional feelings in animals and humans. *Consciousness and Cognition, 14*(1), 30-80.

Adapted to Personality

- ## ANPS – The Affective Neuroscience Personality Scales

Davis, K. L., Panksepp, J., & Normansell, L. (2003). The affective neuroscience personality scales: Normative data and implications. *Neuropsychoanalysis: An Interdisciplinary Journal for Psychoanalysis and the Neurosciences*, 5(1), 57-69.

Davis, K. L., & Panksepp, J. (2011). The brain's emotional foundations of human personality and the Affective Neuroscience Personality Scales.*Neuroscience & Biobehavioral Reviews*, 35(9), 1946-1958.

The Positive Emotions

Playfulness

- Joy, social gaming, laugher, humor

Having fun vs. being serious, playing games with physical contact, humor, and laughter, and being generally happy and joyful.

"I am known as one who keeps work fun"

Seeking

- Appetitive motivation system that involves a goal-directed behavior

Feeling curious, feeling like exploring, striving for solutions to problems and puzzles, positively anticipating new experiences, and a sense of being able to accomplish almost anything

"Almost any little problem or puzzle stimulates my interest"

Caring

Nurturing, being drawn to young children and pets, feeling softhearted toward animals and people in need, feeling empathy, liking to care for the sick, feeling affection for and liking to care for others, as well as liking to be needed by others

"I often feel a strong need to take care of others"

The Negative Emotions

Fear

- Flight, escape, avoiding harm

Feelings of anxiety, feeling tense, worrying, struggling with decisions, ruminating about past decisions and statements, losing sleep, and not typically being courageous

"I often cannot fall right to sleep because something is troubling me"

Anger (Rage)

- Anger, aroused by thwarting and frustration, affective attack

Feeling hotheaded, being easily irritated and frustrated, experiencing frustration leading to anger, expressing anger verbally or physically, and remaining angry for long periods

"When I get angry, I often feel like swearing"

Sadness (Panic)

- A separation distress system, attachment to significant others

Feeling lonely, crying frequently, thinking about loved ones and past relationships, and feeling distress when not with loved ones

"I often have the feeling that I am going to cry"

Significant correlations between the ANPS and the Big Five

	E	A	C	-N	O
PLAY	**.46**	.29			
SEEK					.47
CARE	.25	**.50**			
FEAR	-.19	-.17	-.24	**-.75**	
ANGER		**-.48**	-.30	**-.65**	
SADNESS	.15	.26			.17

In sum

- Grounds personality in basic emotion systems
- Can it represent the complexity of HUMAN personality?
- What does it mean to be a Narcissist according to the Affective Neuroscience Approach?

The requisite variety of personality theories: Why should we have more ideas in our tool kit

- Higher level features may be highly relevant for sensitive and complex tasks

- Bogdanova, Rosso and Solorio (2014) found that high-level feature were much more effective than lower-level features (e.g. n-grams) in differentiating between pedophilia chats and normative cybersex chats

- Bogdanova, D., Rosso, P., & Solorio, T. (2014). Exploring high-level features for detecting cyberpedophilia. *Computer Speech & Language, 28*(1), 108-120.

- Enriching our personality dimensions means enriching the high-level features that we may use for automatic personality analysis

NLP and Computational Personality

- Automatic analysis of the subject's personality based on his texts
- You can use non-textual features for the analysis (e.g. voice) but I focus on texts only
- Texts, whether written or spoken, are the richest source of information

Workshop on Computational Personality Recognition: Shard Task (2013)

- The data: A corpus of 2468 stream-of-consciousness essays that was labeled with personality classes of the FFM
- Each student got a categorical score on each of the FFM. For instance you can be a Neurotic or non-Neurotic

Percentage of Subjects in each of the Personality Dimensions

	N	E	O	A	C
0	50	48	49	47	49
1	50	52	51	53	51

A Straightforward ML approach

- Get a tagged corpus
- Identify relevant features
- Classify

- The bread and butter of NLP researchers

Features

- N-grams
- LIWC
- Sentiwordnet
- Emotions

"top-down approaches, based on lexical resources (including the ones for sentiment analysis) and social info, in general seem to help personality recognition more than bottom-up approaches" (Celli et al. 2013)

Fine emotions even work better than general coarse categories

E	N	A	C	O
possessive	guilt	happy	excited	anxious
apart	eager	anger	apprehensive	delighted
happy	interested	homesick	homesick	blah

Important emotions "loaded" on each of the personality dimensions

Mohammad, S. M & Kiritchenko, S. (2013). Using nuances of emotion to identify personality. *arXiv preprint arXiv:1309.6352*

- There are limits in gaining access to a tagged corpus
- How representative is the corpus used for the First Comp. Pers. Workshop?
- A corpus of students …
- A sample of students is a non-representative sample

A Vectorial Semantics Approach to Personality Analysis

1. Identify words that are the best representatives of a certain personality trait
2. Represent them as a vector
3. Measure the distance between your personality vector and the target text

Neuman, Y & Cohen, Y. (2014). A vectorial semantics approach to personality assessment. *Scientific Reports, 4.* doi:10.1038/srep04761

For instance

Extraversion: dominant, assertive, authoritarian, forceful, assured, confident, firm, persistent

Depressive: sad, depressed, hopeless, gloomy, fatalistic

A Top-Down Approach

- Pros: Works extremely well, currently the state of the art results

F1 scores of Neuman and Cohen (NC) vs. Mohammad and Kiritchenko (MK)

	EXT	NEU	AGR	OPN	CON
MK	56.28	58.25	54.20	60.57	56.56
NC	66.30	64.60	68.91	61.55	60.74

Cons

As a Top-Down approach it demands the expert's knowledge for identifying the relevant words/vectors

Can we exhaust the complexity of human personality by focusing only on "words" as units of analysis?

Personality is probably expressed better as a discursive dynamics that involves the pragmatics of human communication

From Words to Discourse
From Semantics to Pragmatics

- The discursive level: Propositions, rather than words, as the target of analysis

- Pragmatics: The use of language in human communication as determined by the conditions of society*

*Mey, J. L. (1993). *Pragmatics: an introduction*. Wiley-Blackwell.

- Understanding the "Pragmatics of Personality" is a must
- Specifically if we would like to understand personalities beyond their limited Anglo-Saxon cultural context

This is Probably the Next Phase in Automatic Personality Analysis

Beyond Classification

In psychology, there has been an intensive work in developing valid psychological questionnaires for measuring psychological dimensions

We can use an NLP approach in which the quest/inventory is allegedly administrated to the subject or more accurately to his written text

"I am often nervous, fearful, and anxious, and I worry that something might go wrong"

We can use a TE engine and measure the degree in which the hypothesis, or several hypotheses derived from the personality items, is entailed from the subject's written essay

text: *I am very sad.*

hypothesis: I am often nervous, fearful, and anxious, and I worry that something might go wrong

There are three possible answers to this text-hypothesis pair:

1. text entails hypothesis
2. text contradicts hypothesis
3. text does not entail or contradict

Given a text written by subject X, let each **s**entence in the text be Xi. For each Xi, construct a text-hypothesis pair:

text: *Xi*

hypothesis: *Hi,*

where each Hi is an item taken from the psychological questionnaire

Doesn't work well…

- But maybe a simpler method

Convert personality items into lexico-semantic patterns

Item: "I am often nervous, fearful, and anxious''

has been converted into the pattern:

nsubj(nervous, I)
nsubj(fearful, I)
nsubj(anxious, I)

- Parse the essay and find sentences with first person pronoun
- Identify matching patterns for those that have been extracted from the psychological questionnaire
- Measure the similarity between the essay and the predefined patterns

For example

- Target sentence: I am sad

- Personality item for measuring Neuroticism:

"I am often nervous, fearful, and anxious"

I AM SAD

IF nsubj (X, I) AND IF X = JJ

THEN SIM(X, nervous/fearful/anxious)

IF advmod (X, RB = 'seldom' or 'rarely' or 'barely' or 'hardly' or 'infrequently' or 'never' or 'scarcely' or 'almost never' or 'not often')

OR

IF neg(X)

THEN SIM = SIM*(-1)

- We tested this methodology on the identification of the FFM
- Few pre-defined patterns based on the "Short Five" (S5) questionnaire (Muck et al., 2007) (e.g. only 8 patterns for NEU)

Muck, P. M. et al. (2007). Construct validation of a short five-factor model instrument: A self-peer study on the German adaptation of the Ten-Item Personality Inventory (TIPI-G). *European Journal of Psychological Assessment, 23*(3), 166-175.

Results

On average, the F1 score gained in this study (63.58) isn't significantly different from the one gained by Neuman and Cohen (2014) (i.e., 64.42), but is higher that the average F1 score gained by Mohammad and Kiritchenko (2013) (i.e., 57.17)

Practical Applications

Homeland Security: How to Identify a Murderer in a Haystack

Neuman, Y. et al. (2015). Profiling school shooters: Automatic text-based analysis. *Frontiers in Psychiatry* [http://journal.frontiersin.org/article/129117/abstract]

School Shooters

Seung-Hui Cho murdered 23 students and faculty members at Virginia Tech on April 16, 2007

- School shooters receive extensive media coverage and create social anxiety
- There is no consistent diagnosis of school shooters
- Can we profile school shooters?
- Can we use the profile for future screening?

- We selected six texts written by school shooters
- For gaining comparative insights, we used the Blogs Authorship Corpus (Schler et al., 2006) and selected blogs written by *males* from the age of 15 to 25, ages approximately overlapping those of the school shooters
- Overall, we analyzed the blogs written by 6056 subjects

- We have analyzed only three parts of speech categories: nouns, verbs, and adjective
- From each text, we selected the ten most frequent nouns, the ten most frequent verbs, and the ten most frequent adjectives
- Overall, we used 30 words to represent each text as a vector

We measured the semantic similarity between each of the texts and word vectors representing four personality disorder traits:

1. Paranoid Personality Disorder (PPD),
2. Narcissistic Personality Disorder (NPD)
3. Schizotypal Personality Disorder (ScPD) and
4. Depressivity (DEP)

In addition, factors of REVENGE

1. Hopeless: hopeless, desperate
2. Lonely: lonely, lonesome
3. Helpless: helpless, defenseless
4. Pain: pain, misery, agony
5. Revengeful: revengeful, vengeful, vindictive
6. Chaotic: chaotic, disordered
7. Unsafe: unsafe, insecure
8. Abandoned: abandoned, deserted
9. Humiliated: humiliated, shamed

For measuring similarity, we used Peter Turney's matrix

Turney, P., Neuman, Y., Assaf, D., Cohen, Y. (2011). Literal and metaphorical sense identification through concrete and abstract context. In *Proceedings of the 2011 Conference on Empirical Methods in Natural Language Processing*, Edinburgh, Scotland, UK, July 27–31. pp. 680–690.

Following the automatic identification of sexual predators (Inches & Crestani, 2012) can we produce *a ranked list of suspects to prioritize the investigation?*

Inches, G., Crestani, F. (2012). Overview of the international sexual predator identification competition at pan-2012. In *CLEF 2012 Evaluation Labs and Workshop - Working Notes Papers*, eds. P. Forner, J. Karlgren, C. Womser-Hacker (Rome, Italy).

Three Statistical Models

Binary Logistic Regression Analysis

Tree Classification with CHAID and ten-fold cross-validation procedure and

K Nearest Neighbors Analysis with ten-fold cross-validation

Averaging the ranks produced by the three classifiers, we gain the best results, which are identifying all the shooters' texts among the top 210 ranked texts: approximately *3% of our corpus*

Enormous reduction in work load for the human agent

Screening for Potential Offenders

- Ethical considerations due to the high rate of false positives
- Results can be improved by the fusion of several information sources:

1. Medical records: Psychiatry illness
2. Purchases: Weapons? Chemicals?
3. Criminal records: Previous convictions?

Military Intelligence: Profiling Political Leaders

Neuman, Y., Cohen, Y., & Shahar, G. (in press). A novel computer assisted methodology for leaders' profiling. *American Intelligence Journal* [Special issue: New Paradigms in [Military] Intelligence Analysis

- Personality profiling

- The "impressionist" and "informal" approach used by Jerry Post (CIA)

- The "formal" approach uses informants' reports of others through the use of standard inventories (The profiling of Kim Jong-il)

Personality and Text-in-Context

The challenge:

- Identify themes that emerge from the text in a given socio-political context as well as personality features

- The way in which these themes, that may have been <u>preformed</u> by the leader and probably by his close circle, intermingle with the leader's personality to produce a synergetic output

Morsi's Case

- The speech given by the new elected Egyptian President Mohammed Morsi
- A leader of the Islamic Brothers
- September 26, 2012, the General Assembly of the UN

Surface Themes

Three Major Themes

1. The Palestinian – Israeli conflict and Egypt's support of the Palestinian side
2. Establishing Egypt as an Arabic – African leader of the developing world
3. Egypt's efforts on helping to end the violence in Syria

Motifs Analysis - Results

- We applied MOTIFS ANALYSIS to the semantic network of the speech

- By identifying the words populating most the motifs' edges three words emerge: Rights, Principles and Vision

- The hypothesis: Morsi's speech is indicative of Obsessive Compulsive Personality features

Obsessive Compulsive Personality

This type of personality seeks opportunity to prove himself as <u>selflessly committed to the "greater cause"</u>

Rigid and dogmatic personality, occupied with details, and presents an over conscientious attitude toward matters of morality and values

Testing the Hypothesis

- The Obsessive vector: Rigid, stubborn, over-conscientious, inflexible, organized, perfectionist …

- The Narcissistic vector: special, unique, selfish, envious, arrogant, contemptuous, brilliant …

Results

The speech was much closer to the Obsessive vector (0.09) than to the Narcissistic vector (0.02)

It was found that the speech was mostly similar to the Bureaucratic and the Purtian subtypes

Conclusions

- President Morsi was a Bureaucratic-Puritan leader

- Don't expect him to lead a change …

- The American enthusiasm was too early …
- In retrospective we know that we were right

Customers' Service: Who is the Unhappy Customer

- Can we better understand who is a non-satisfied customer?
- The **** dataset
- 335,022 Reviews
- 70,817 users
- We categorized the reviews into satisfied (3/4 stars) and non satisfied customers (1/2 starts)

- Most reviews were very positive (70% vs. 30%)
- We profiled the customers by analyzing the reviews of each customer

Correlations between Rating and Personality Dimensions

- Neuroticism = -0.215
- Angry = -0.185
- Etc.

- We built an index from these scores
- The sum of the z-scores
- Titled "Neurotic"

Neurotic?			
		NO	YES
A satisfied customer?	**NO**	**34%**	**66%**
	YES	58%	42%

- The probability of being an unsatisfied costumer is 0.32
- The probability of being an unsatisfied costumer given that one is Neurotic is 0.43

Implications for Customers' Service Priorization

- Some customers are not satisfied as a result of the service/purchase
- Some customers are not satisfied because their PERSONALITY cannot be satisfied
- We found two types of unsatisfied customers: The NEUROTICS and the PERFECTIONISTS (i.e. Obsessive)

The Rorschach Test

It Looks Like Darth Vader from Star Wars!

BUT DON'T POINT TO THIS SIMILARITY

The diagnosis of those who see monsters in the ink spots isn't positive …

Human Personality is like a Rorschach Ink Spot

Sometimes we see our own projections rather than a real structure …

- Automatic personality analysis
- The challenge of understanding other people
- From naïve impressions to scientific analysis
- A pragmatic motivation – real world applications

Thank you for Attending this Tutorial