Automatic Personality Assessment From Video Interviews

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LTP

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Personality predicts job performance

Table 1. Validity Information for Personality Predictors of Overall Performance, Task Performance, Organizational Citizenship Behavior, and Counterproductive Work Behavior

		Big Five personality factor				
Criterion domain and study	*N* range	Conscientiousness	Agreeableness	Emotional Stability	Extraversion	Openness to Experience
Overall job performance						
Barrick, Mount, and Judge (2001)[a]	23,225–48,100	.27 (.27)	.13 (.13)	.13 (.13)	.15 (.15)	.07 (.07)
Judge, Rodell, Klinger, Simon, and Crawford (2013)	14,321–41,939	.26 (.33)	.17 (.22)	.10 (.13)	.20 (.26)	.08 (.10)
Task performance criterion						
Judge et al. (2013)	16,738–47,729	.25 (.31)	.10 (.13)	.08 (.11)	.12 (.15)	.12 (.14)
Hurtz and Donovan (2000)[b]	1,176–2,197	.15 (.16)	.07 (.08)	.13 (.14)	.06 (.07)	−.01 (−.01)
Organizational citizenship behavior						
Judge et al. (2013)	3,892–24,034	.32 (.40)	.18 (.23)	.16 (.21)	.22 (.28)	.03 (.04)
Hurtz and Donovan (2000)[b]	2,514–4,301	.17 (.19)	.13 (.16)	.15 (.16)	.08 (.08)	.03 (.03)
Chiaburu, Oh, Berry, Li, and Gardner (2011)	6,700–14,355	.22 (.22)	.17 (.17)	.15 (.15)	.11 (.11)	.17 (.17)
Counterproductive work behavior						
Berry, Ones, and Sackett (2007)[c]	1,772–3,458	−.32 (−.40)	−.39 (−.51)	−.24 (−.31)	−.03 (−.04)	−.07 (−.08)
Salgado (2002)	1,299–6,276	−.26 (−.29)	−.20 (−.23)	−.06 (−.07)	.01 (.01)	.14 (.16)

(Sackett & Walmsley, 2014)

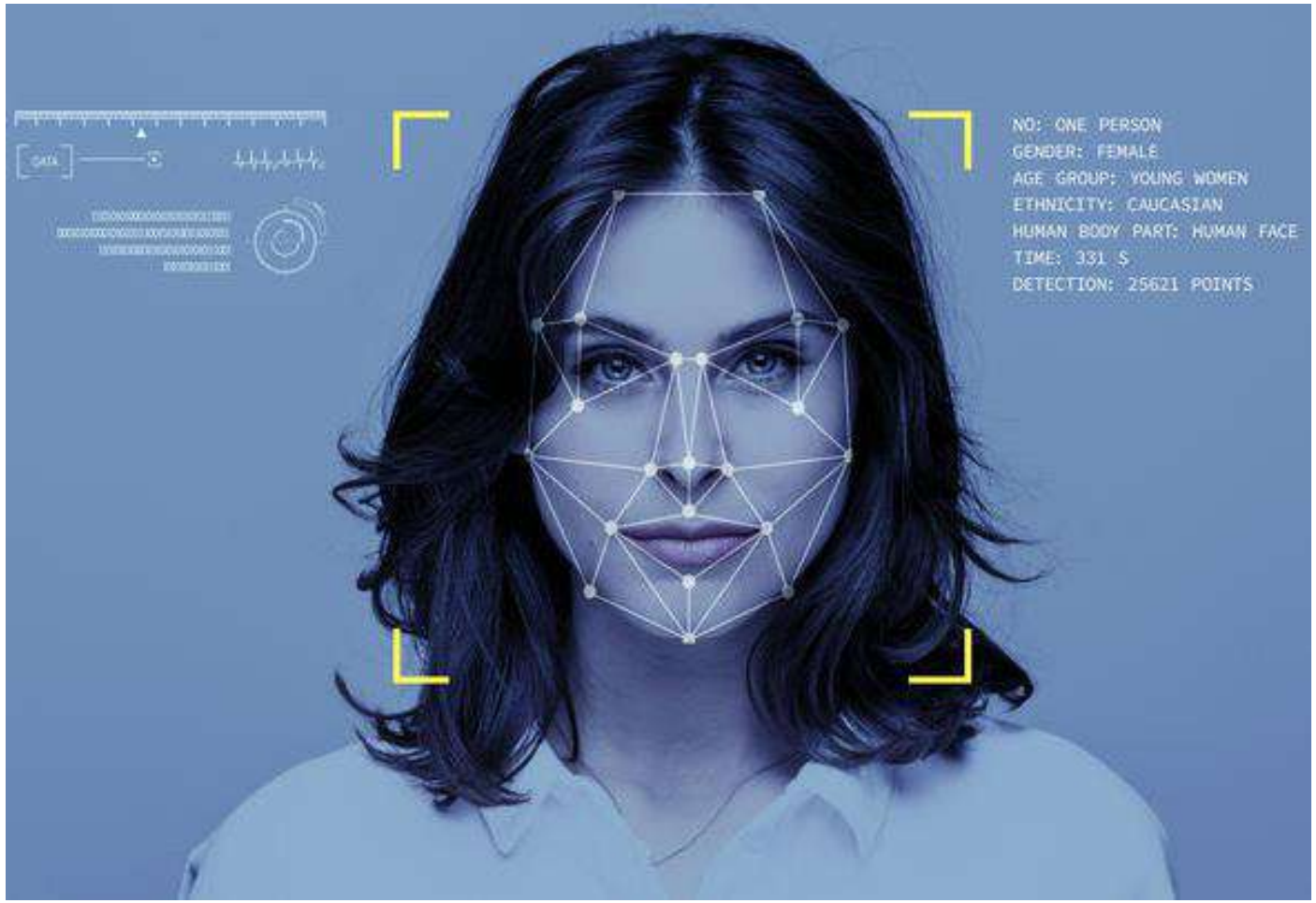
Personality self-reports in personnel selection: Limitations

Self-reported questionnaires

The most commonly used option, but

- Time consuming
- Costly
- Rely on the ability and motivation to introspect accurately (De Cuyper et al., 2017)
- Susceptible to faking (Birkeland, Manson, Kisamore, Brannick, & Smith, 2006)
- Can be influenced by a variety of biases and response sets (e.g., consistency motivation; Paulhus & Vazire, 2007)
- Alternative way of assessment?[click me]

Automatic coding of verbal, non-verbal, para-verbal information



Verbal

- Depression
- Deception
- Emotions
- Age, gender differences
- Personality

Non-verbal

- Facial expressions
- Emotions
- Deception
- Psychopathology
- Personality

Para-verbal:

- Dominance
- Attractiveness
- Emotions
- Communication styles
- Personality

Back to basics: Three channels of communication

Verbal

Non-verbal

Para-verbal

Personality

This project





Create a real-time, non-invasive, efficient, and cost-effective assessment instrument to automatically assess personality from video interviews

Test accuracy, validity, reliability and incremental validity

Empirical studies - Method

Design: 2 x 2 x 2 between subjects [past-future; trait-behavior; self-metaperception]

Study 1

- 2-part study
- HEXACO
- TurkPrime
- N = 650
- General population
- English
- 25 questions
- 1'-2' per question
- ~45'
- $ 7.5
- ~500 video interviews

Study 2

- 2-part study
- Big 5 PLUS
- LTP
- N = ?
- Real job candidates
- Dutch
- 10 questions
- 1'-2' per question
- ~20'
- Performance feedback

Sigmund [click me]

Personality interview questions – Item development

- Work related
- Follow HEXACO structure
- Open-ended (can be answered in 1'-2')
- Broad enough, allowing participants to express their unique disposition; specific enough to focus on the desired trait
- Trait Activation Theory
- Structured

81 items initial pool
25 personality questions ($ICC_{2,3}$ = .77 – 1.00)
One question per HEXACO facet, plus one item for Proactivity

E.g., *"Remember a time when you took part in a group discussion. Could you describe aspects of your personality that affected whether you assumed a leading or listening role?"* [Extraversion; Social boldness]

What is the optimal question format?

Design – 3 question formats

- Past vs Future (situational)
  - *"Remember a time when* you took part in a group discussion…" [Past]
  - "*Imagine that* you take part in a group discussion…" [Future]

- Trait vs Behavior
  - "… Could you describe aspects of your personality that affected whether you assumed a leading or listening role?" [Trait]
  - "… Could you describe the way you behaved and whether you *assumed a leading or listening role?*" [Behavior]

- Self vs Meta-perception (how you think others see you)
  - "… Could you describe aspects of your personality that affected whether you assumed a leading or listening role?" [Self-perception]
  - "… How would someone who knows you well describe aspects of your personality that affected whether you assumed a leading or listening role?" [Meta-perception]

Empirical studies – Data analysis

Research hypothesis: Explorative

500 video interviews
375 hours

Verbal

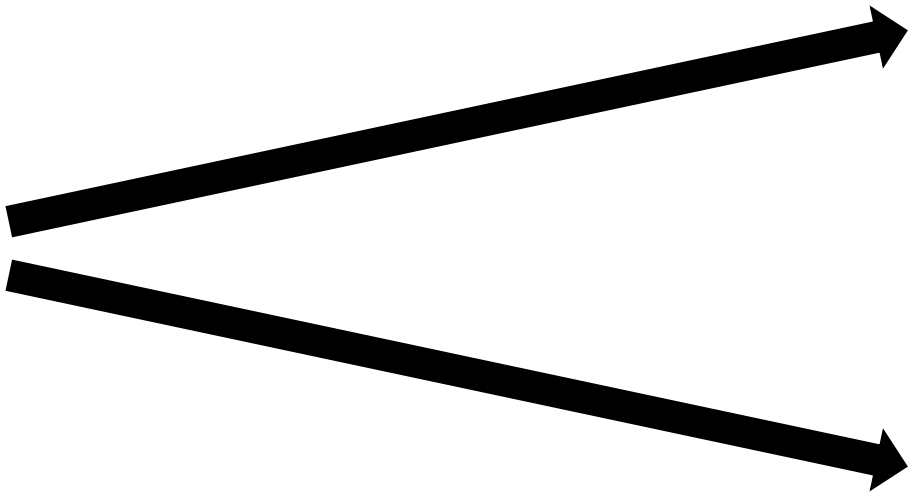
Non-verbal

Para-verbal

Personality

Data analysis – Verbal features

Verbal



Closed vocabulary
- LIWC
- Sentimentics
  - HEXACO dictionary

Open vocabulary
- Word clouds
- N-grams
- Topic analysis

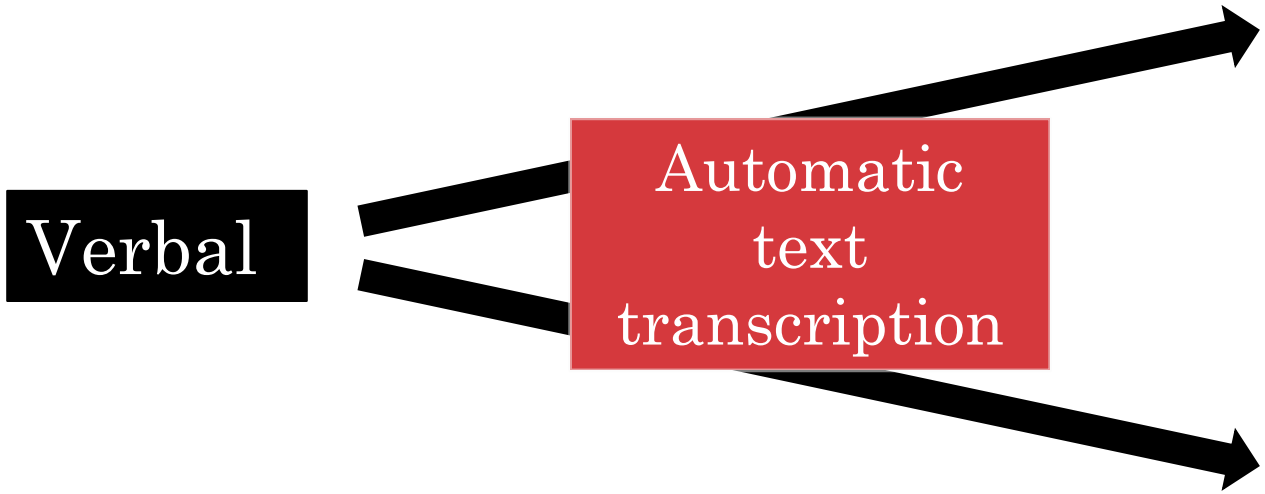
Open vs Closed vocabulary approach

Closed vocabulary	**Open vocabulary**
Theory Driven	No-theory Driven
Top-down	Bottom up
Uni-grams	N-grams, topic-analysis
Needs few data (e.g., <250 words)	Needs a lot of data (e.g., >3500 words)
Un-intelligent system	Un-intelligent system

Misclassification example:
"*On our day off, our last choice would be to go to Miami and have drinks in several bars*"

([1]Muralidhar, Nguyen, & Gatica-Perez, 2018; [2]Schwartz et al., 2013; Park et al., 2014)

Speech-to-text transcription



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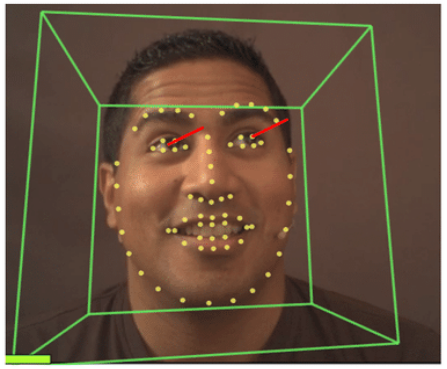
	Transcription accuracy	
2013:	41.5%	(Biel, 2013)
2018:	62.5%	(Muralidhar, 2018)
2019:	73%	(me, a week ago; Amberscript)

Predictive validity is significantly decreased with automatic transcription (vs. manual transcription) (Biel & al., 2013; Muralidhar, Nguyen, Gatica-Perez, 2018)

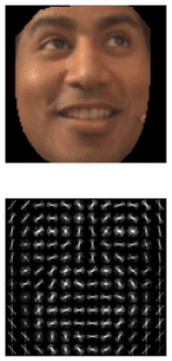
Data analysis – Non-verbal features

Non-verbal

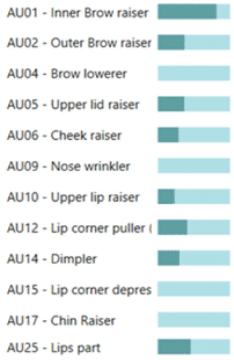
OpenFace 2.0 [click me]



Facial Landmarks, head pose, and eye gaze



Facial Appearance



Facial Action Units

Real time:

- facial landmark position
- head pose
- 18 action units
- Eye gaze

Demands programming skills

IMOTIONS
BIOMETRIC RESEARCH PLATFORM

- 20 action units
- 7 core emotions (joy, anger, fear, disgust, contempt, sadness, surprise)
- facial landmarks
- head orientation
- attention.

(Baltrusaitis, 2018)

Data analysis – Para-verbal features

Para-verbal

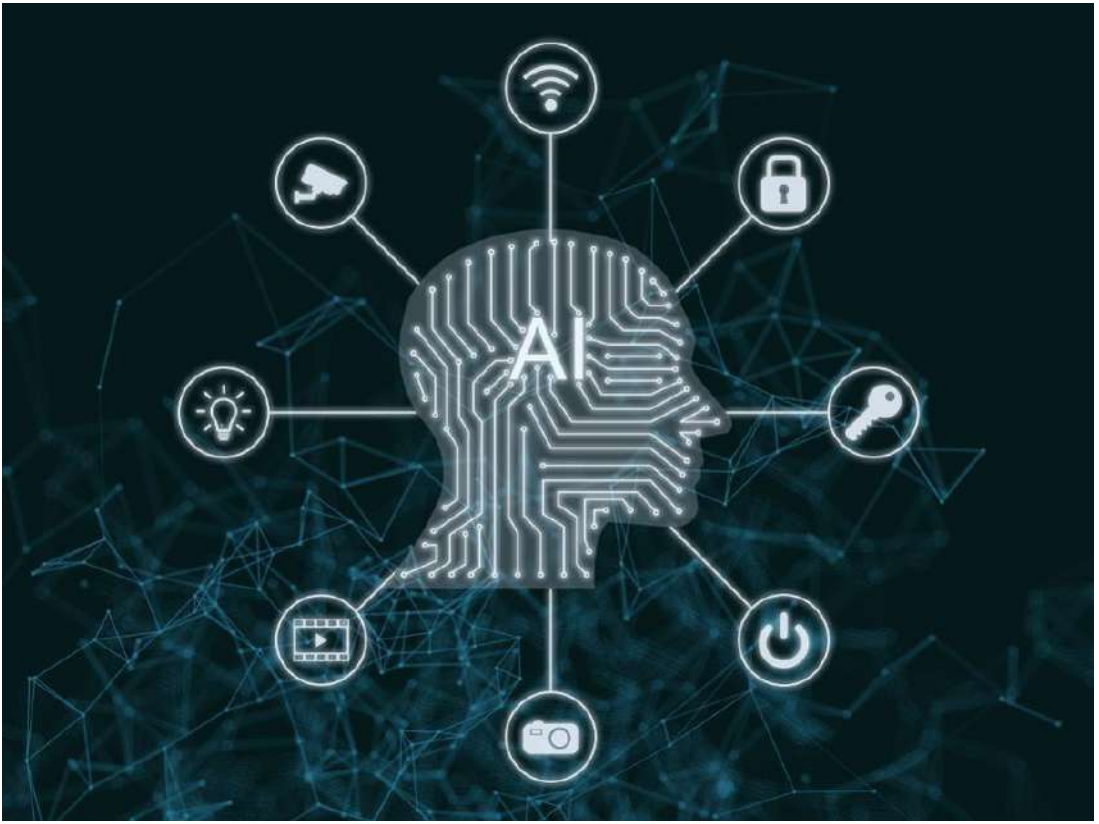
Praat →

21 voice characteristics

- Intensity (min, max, mean, sd)
- Pitch (min, max, mean, sd)
- Speech rate
- Jitter
- Shimmer
- Harmonicity
- Formants
- VTL

(Boersma & Weenink, 2019)

Empirical studies – Data analysis



Verbal

Non-verbal

Para-verbal

Personality

Machine learning approach

- Logistic regression
- Naive Bayes
- Support vector machines
- Tree based ensemble methods
- Neural networks
- Specifically feed-forward neural networks
- Recurrent neural networks

Expected results

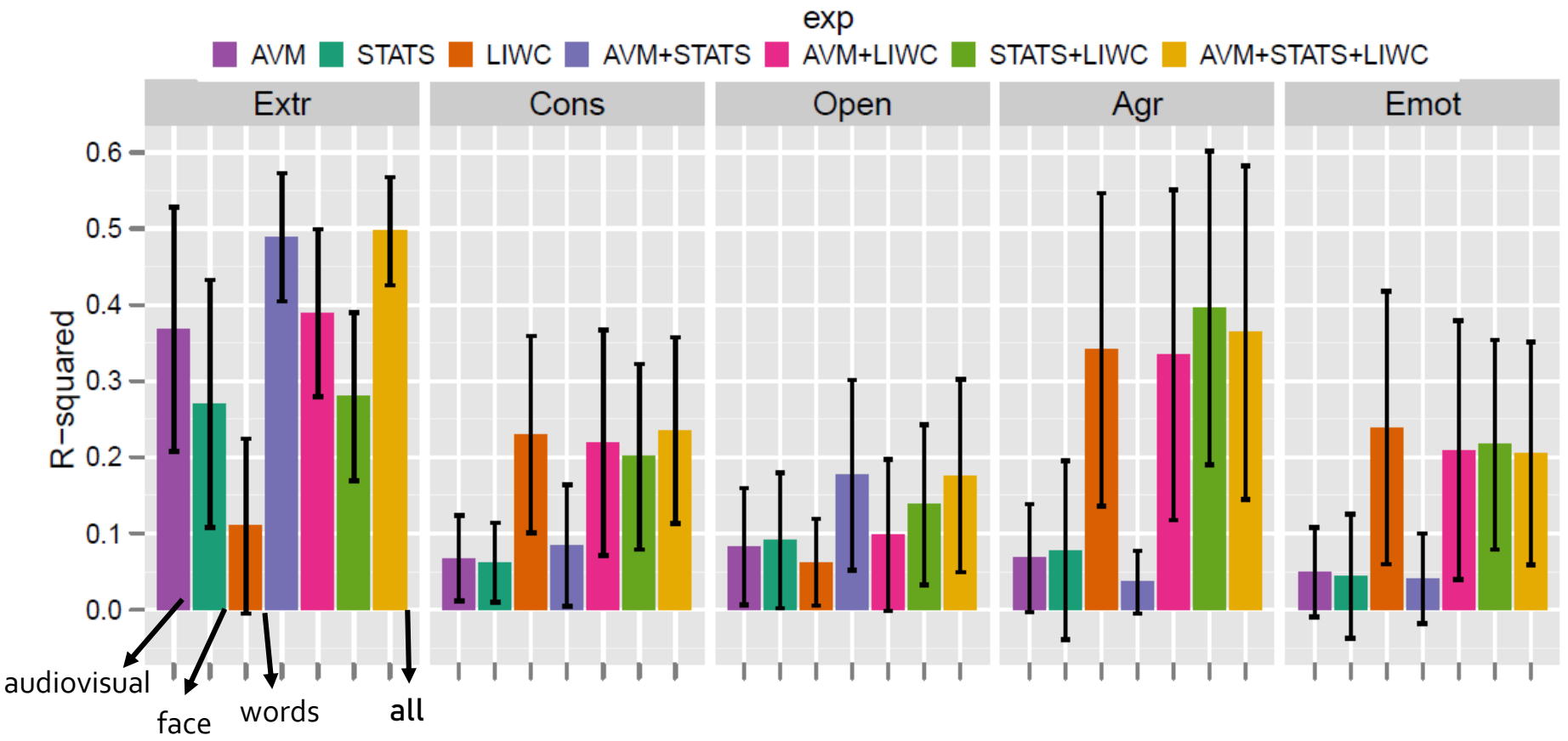


Figure 2: R-squared results on predicting personality impressions using RFs, best models for each modality (AVM for audiovisual, STATS for facial cues, and LIWC for verbal content), and combinations of them.

(Biel, Tsiminaki, Dines, Gatica-Perez, 2013)

Practical and scientific contributions

- Create a real-time, non-invasive, efficient, and cost-effective assessment measure of personality from asynchronous video interviews
- What questions/how should be asked in interview settings
- Trait Activation Theory
- Explore verbal, non-verbal, and paraverbal features per HEXACO trait in formal job interviews

Thank you!

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