

Of Traits and Machines

When Computers Meet Personality

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Individual Differences



“I applied my thoughts to the puzzling question [...] why it is that, while all Greece lies under the same sky and all the Greeks are educated alike, it has befallen us to have characters so variously constituted.”

Theophrastus, *“The Characters”*, 4th Century BC.

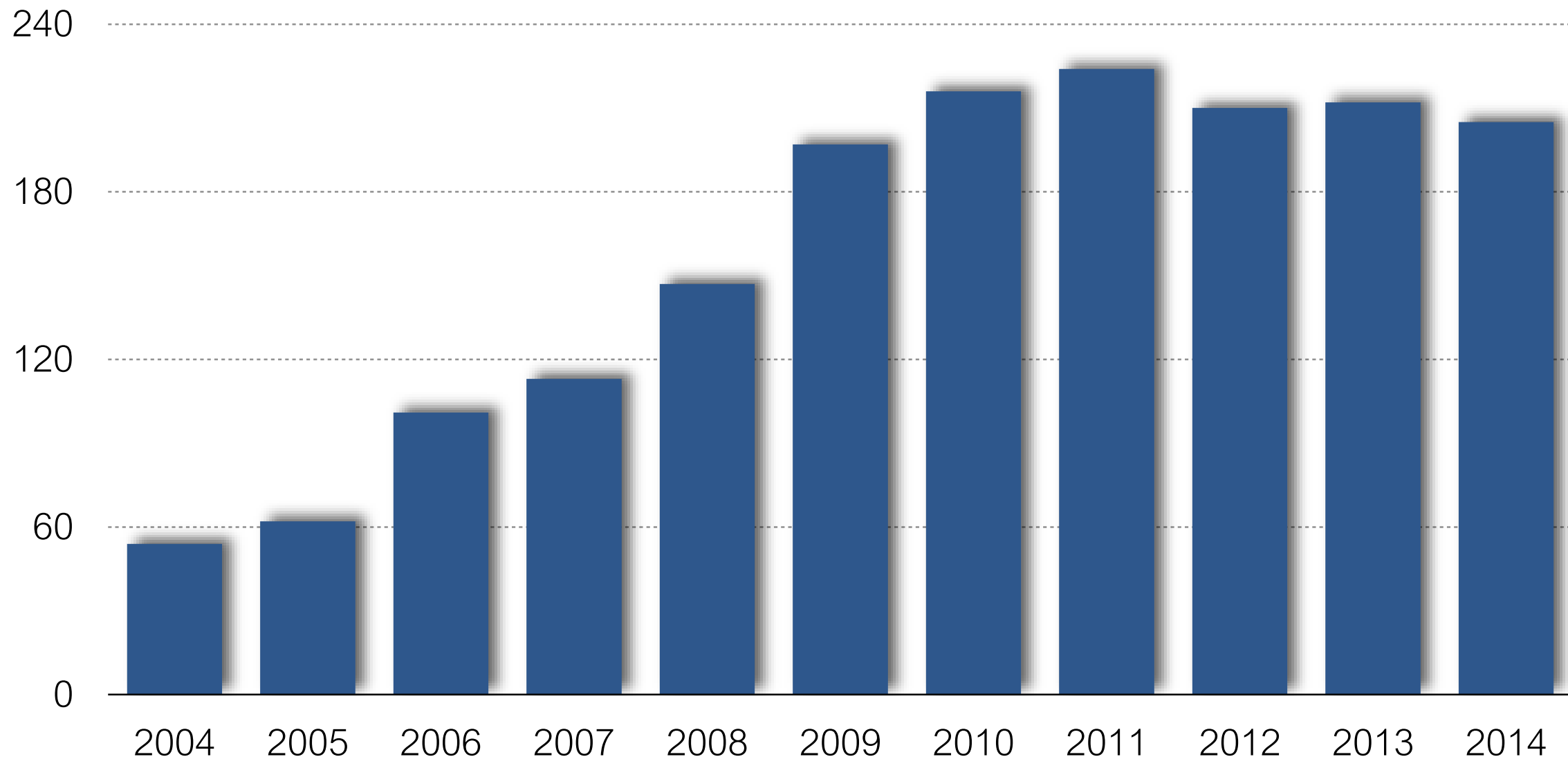
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Personality in Computing



Number of papers with the word “*personality*” in their title in *IEEEXplore* and *ACM Digital Library*.

Personality and Computing



“[Personality is] a strong predictor of life outcomes in relational, occupational, and social functioning [...] modern computer science has a real potential for advancing that endeavor.”

A.Wright, “Current Directions in Personality Science and the Potential for Advances Through Computing”, IEEE Trans. on Affective Computing, 3(5):292-296, 2014.

Outline



- Personality and its Measurement
- Personality and Computing
- Voice and Personality
- Face and Personality
- Conclusions

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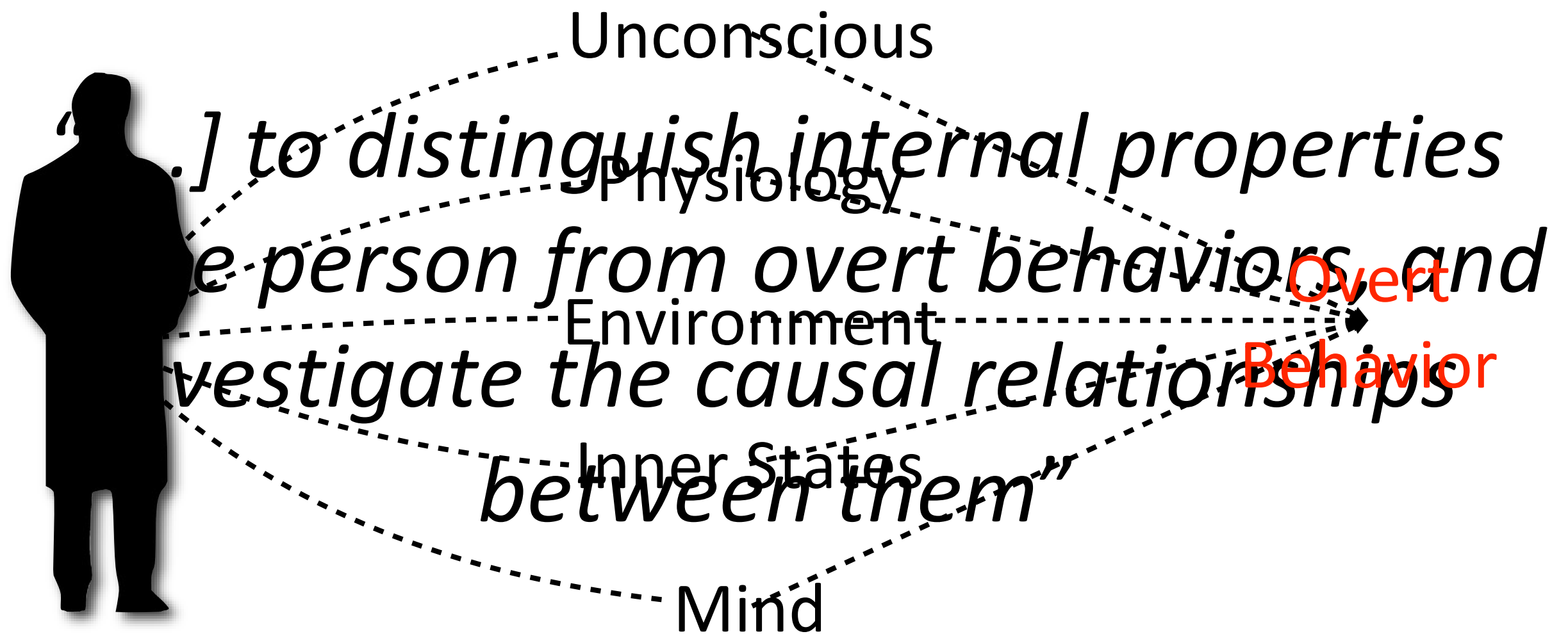
Personality Psychology



“[The goal of personality psychology is] to distinguish internal properties of the person from overt behaviors, and investigate the causal relationships between them”

Matthews, Deary & Whiteman, *“Personality Traits”*,
Cambridge University Press, 2009

Personality Psychology



Matthews, Deary & Whiteman, *“Personality Traits”*,
Cambridge University Press, 2009

The Big Five



“The Big Five Personality Factors appear to provide a set of highly replicable dimensions that parsimoniously and comprehensively describe most phenotypic individual differences”

Saucier, Goldberg, *“The Language of Personality: Lexical Perspectives on the Five-Factor Model”*, in *“The Five-Factor Model of Personality”*, Wiggins (ed.), 21-50, 1996

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The Big Five Traits



- *Extraversion*: Active, Assertive, Energetic, Outgoing
- *Agreeableness*: Appreciative, Forgiving, Generous, Kind, Sympathetic, Trusting
- *Conscientiousness*: Efficient, Organized, Planful, Reliable, Responsible, Thorough
- *Neuroticism*: Anxious, Self-pitying, Tense, Touchy, Unstable, Worrying
- *Openness*: Artistic, Curious, Imaginative, Insightful

Saucier, Goldberg, "The Language of Personality: Lexical Perspectives on the Five-Factor Model", in "The Five-Factor Model of Personality", Wiggins (ed.), 21-50, 1996

Measuring Traits: the “BFI-10”

This person is reserved	E	-
This person is generally trusting	A	+
This person tends to be lazy	C	-
This person is relaxed, handles stress well	N	-
This person has few artistic interests	O	-
This person is outgoing, sociable	E	+
This person tends to find faults with others	N	+
This person does a thorough job	C	+
This person gets nervous easily	A	-
This person has an active imagination	O	+

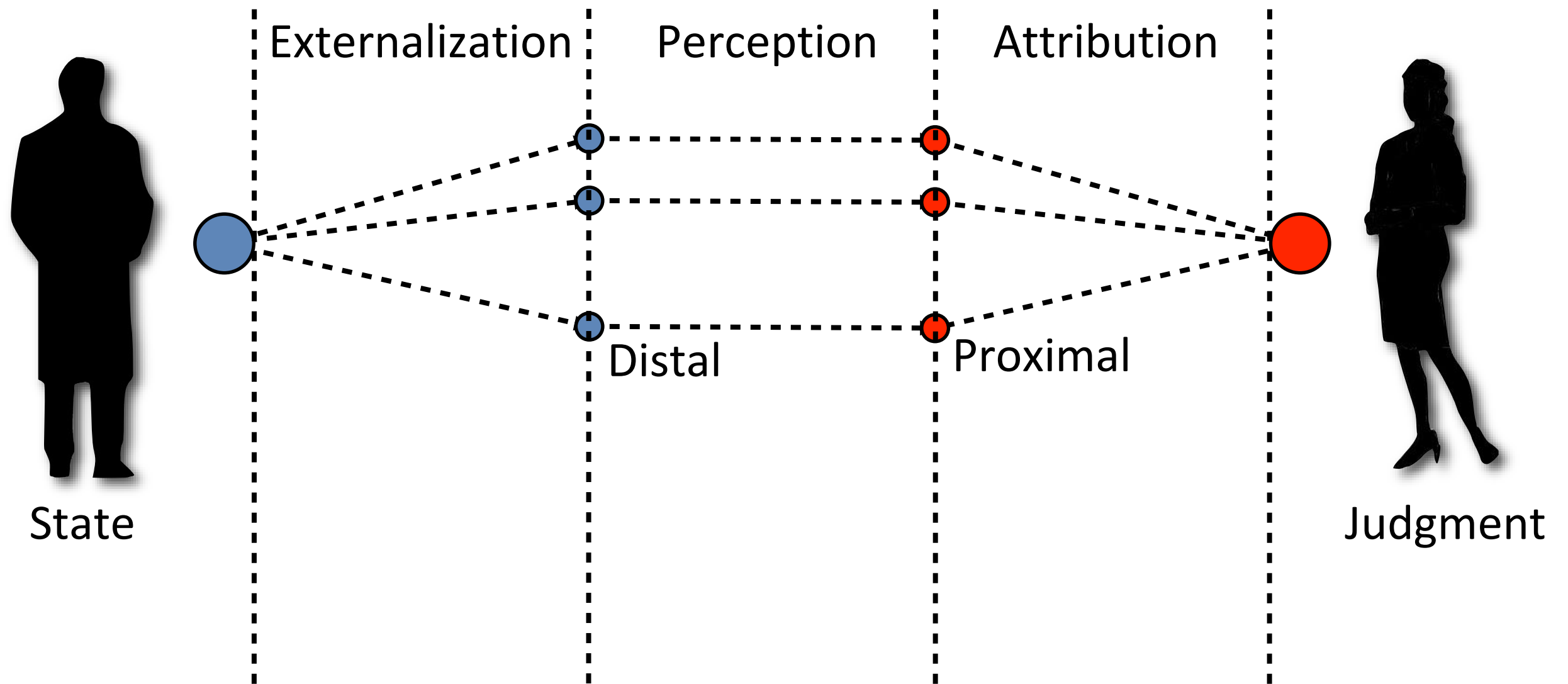
Rammstedt and John, “*Measuring Personality in One Minute or Less: A 10-item short version of the BFI*”, *Journal of Research in Personality*, 41(1):203-212, 2007

Outline



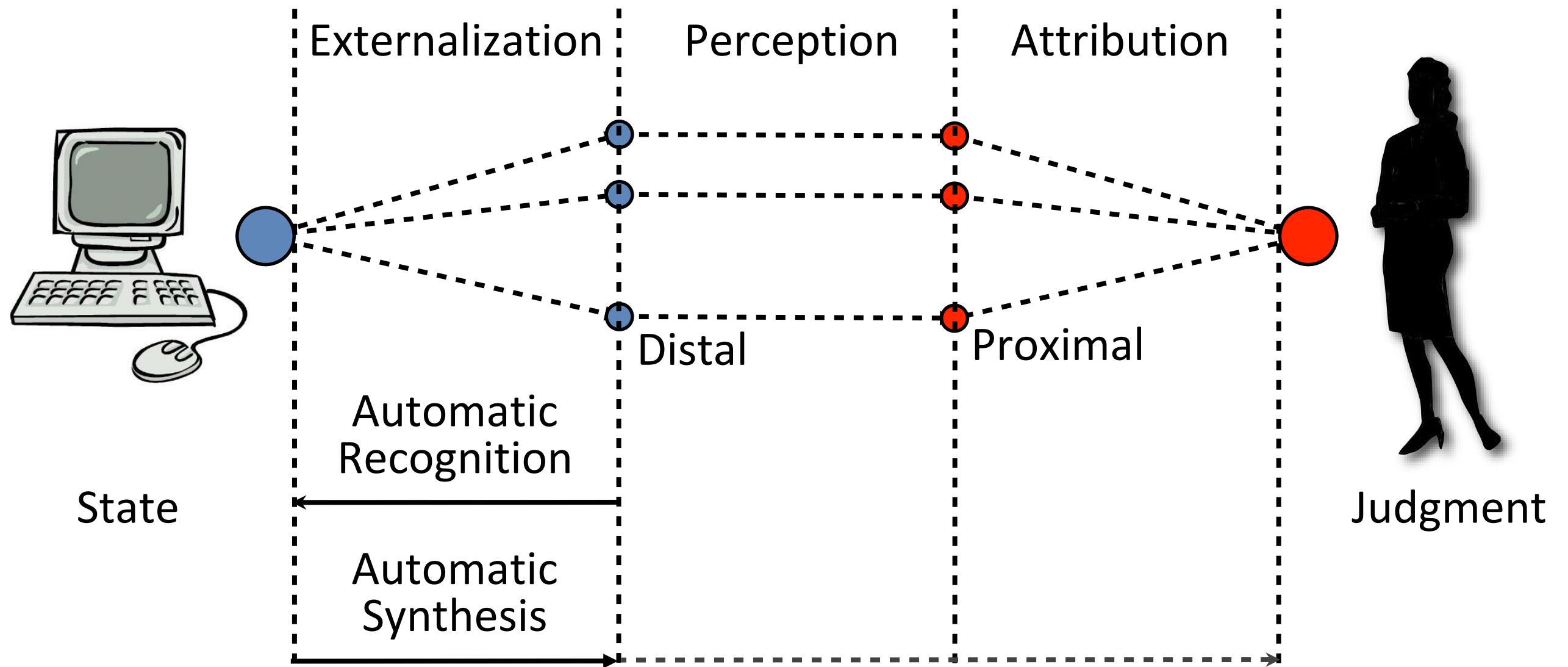
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Brunswik Lens



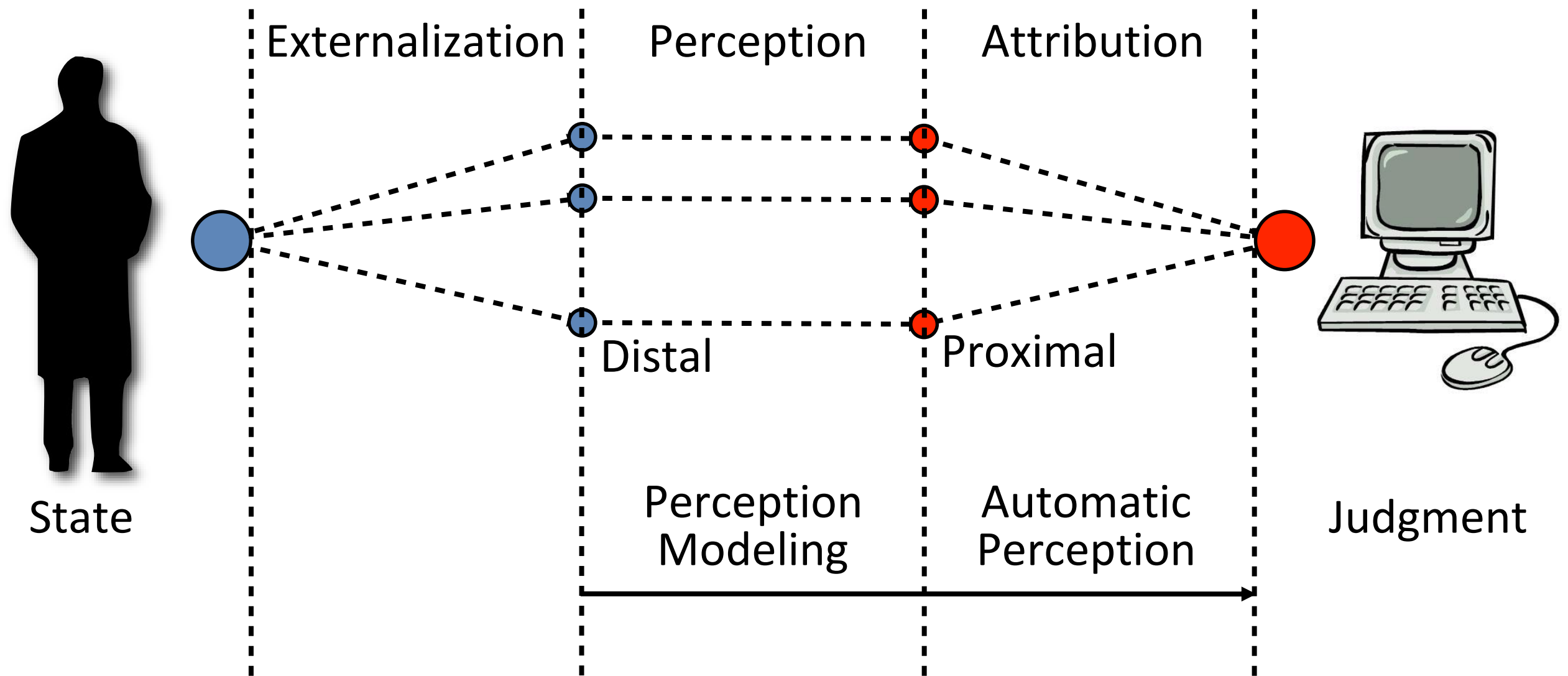
Vinciarelli & Mohammadi, "A Survey of Personality Computing",
IEEE Transactions on Affective Computing, 5(3):273-291, 2014

Personality Computing



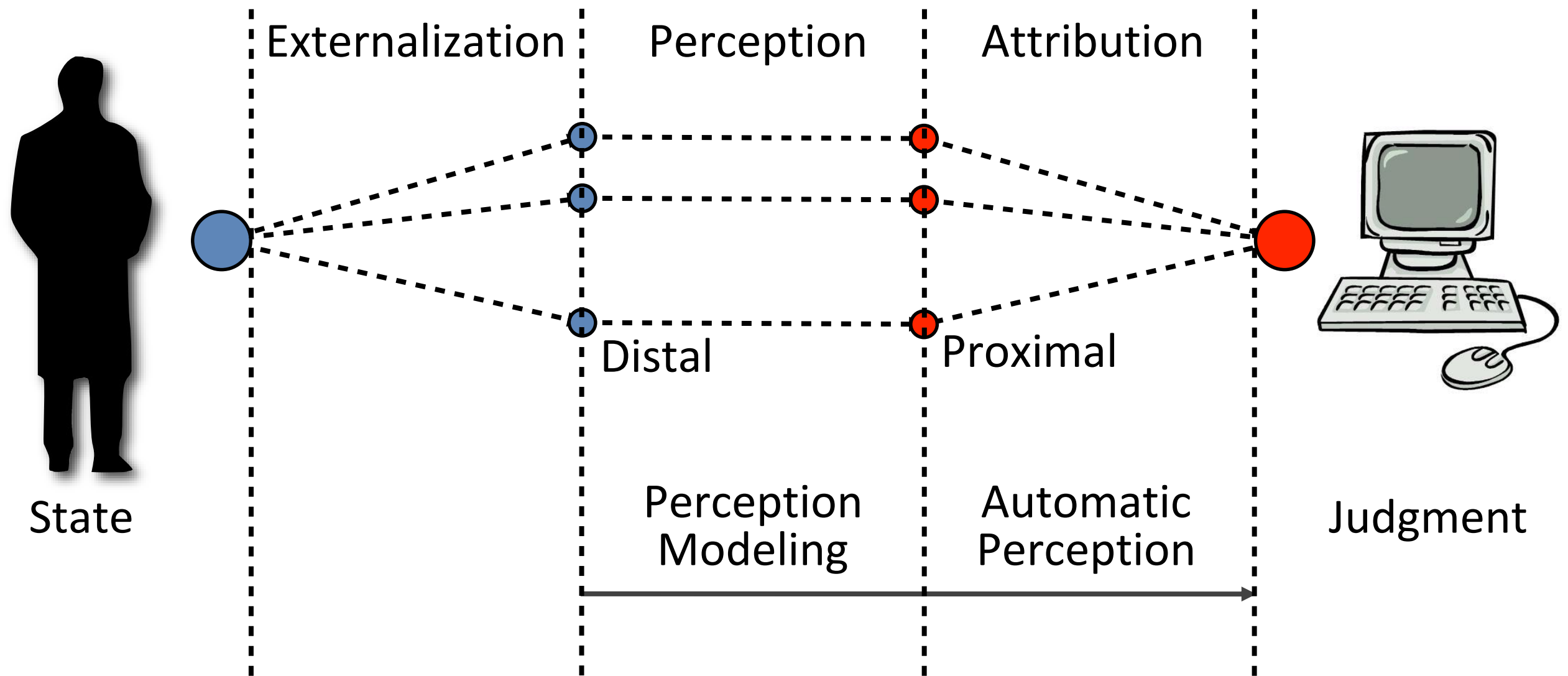
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Personality Computing



- **Automatic Personality Recognition (APR)**: inference of self-assessed personality traits from machine detectable distal cues.
- **Automatic Personality Perception (APP)**: inference of attributed traits from machine detectable proximal cues.
- **Automatic Personality Synthesis (APS)**: generation of artificial cues aimed at stimulating the attribution of predefined personality traits.

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Perception and Identity



*“We need to recognise that identification is often **most consequential as the categorisation of others, rather than as self-identification.**”*

Jenkins, *“Social Identity”*, Routledge, Fourth Edition, 2014

Perception



*“Mirror, mirror on the wall,
who in this land is **fairest of all?**”*

*“You, my queen, are fair; it is true.
But Snow-White is **thousand
times fairer than you**”*

Jacob and Wilhelm Grimm, *“Sneewittchen”* (*“Snow-white”*), *Children’s and Household Tales*, final edition, Berlin 1857

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Data Collection



322 Subjects

640 Speech Clips

10 seconds per clip



All individuals speaking in the news of Radio Suisse Romande during February 2005

The “*Speaker Personality Corpus*”

Number of Samples

640

Total Length

1h:46m

Number of Subjects

322

Gender Balance

78.5% M / 21.5% F

Category Balance

48% J / 52% G

Speaker Distribution

80% < 3

Assessors

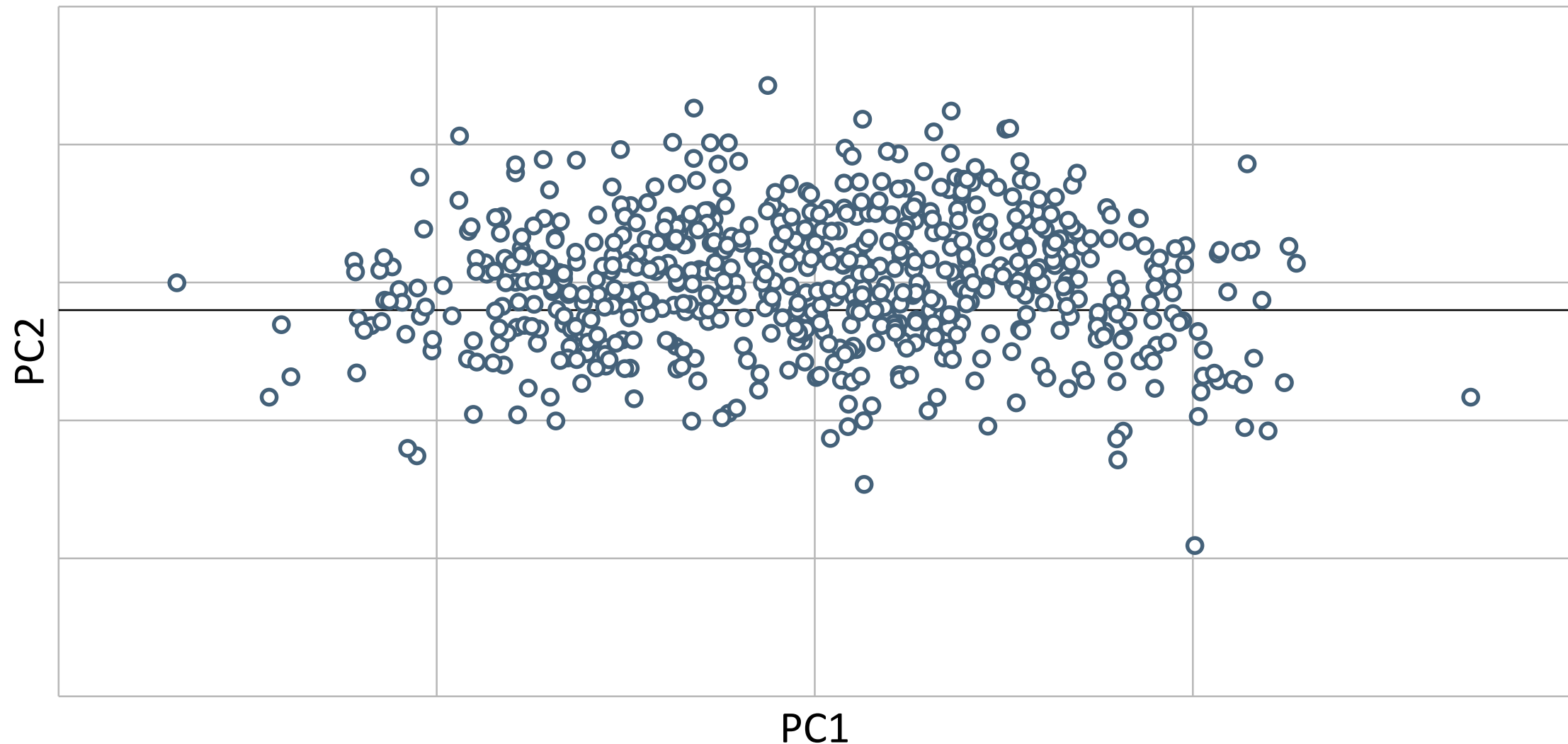
11 (British)

Total Items

70400

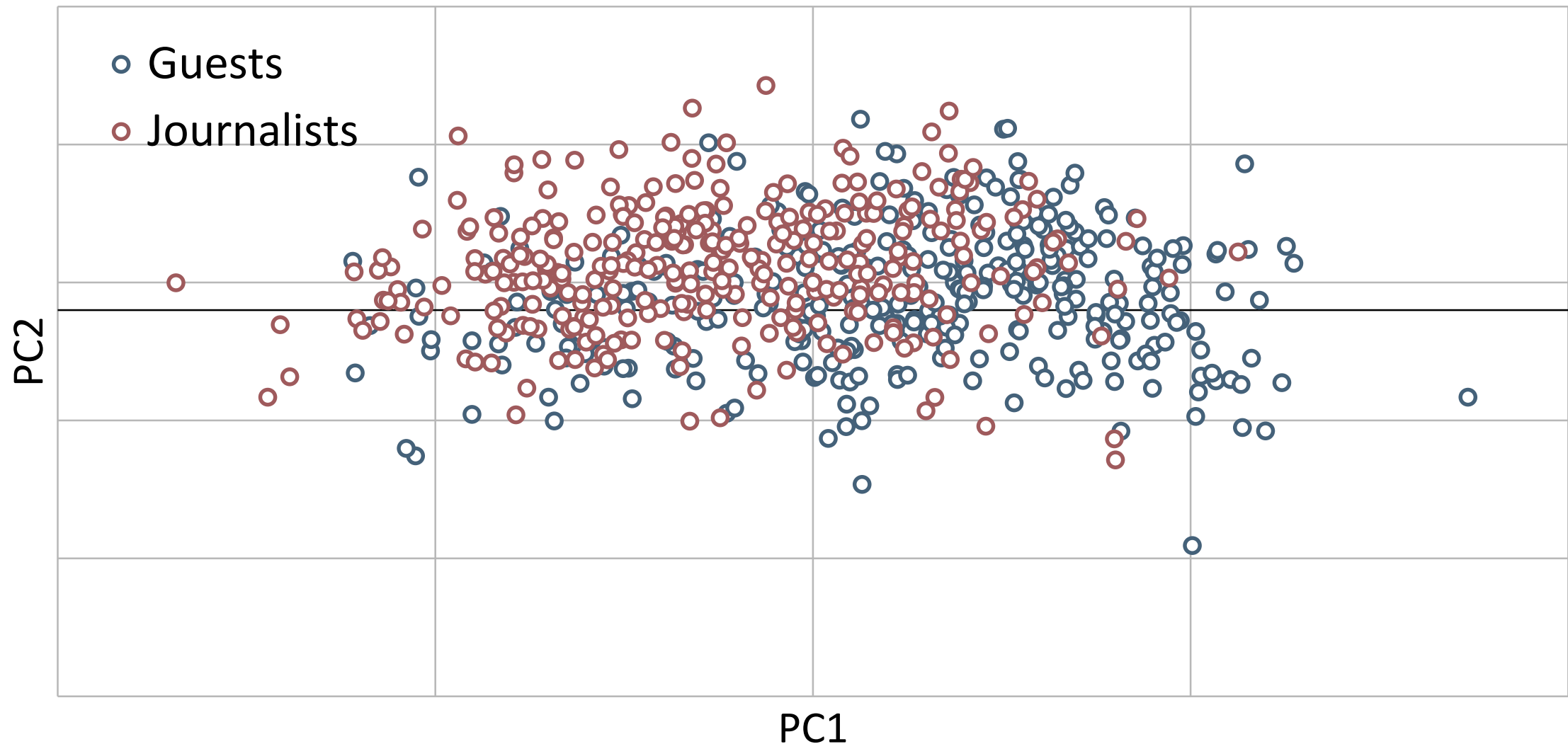
Mohammadi et al., “*The Voice of Personality: Mapping Nonverbal Vocal Behavior into Trait Attributions*”, Social Signal Processing Workshop, pp. 17-20, 2010

Personality as a Predictor



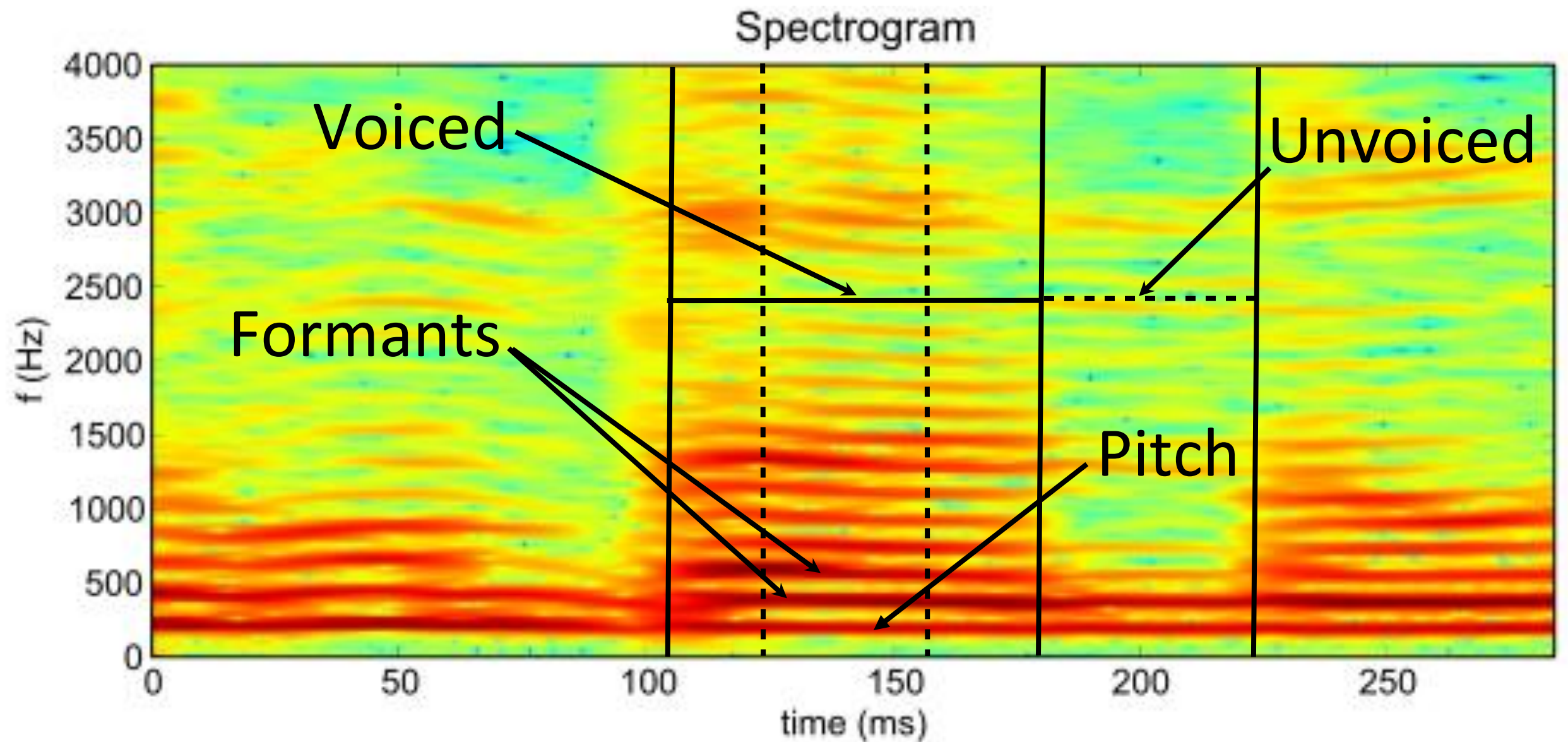
Mohammadi & Vinciarelli, *“Humans as Feature Extractors: Combining Prosody and Personality Perception for Improved Speaking Style Recognition”*, Proc. of IEEE Intl. Conf. on Systems, Man and Cybernetics, pp. 363-366, 2011

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Prosody



Low level measurements are represented with clip statistics (mean, minimum, maximum, entropy)

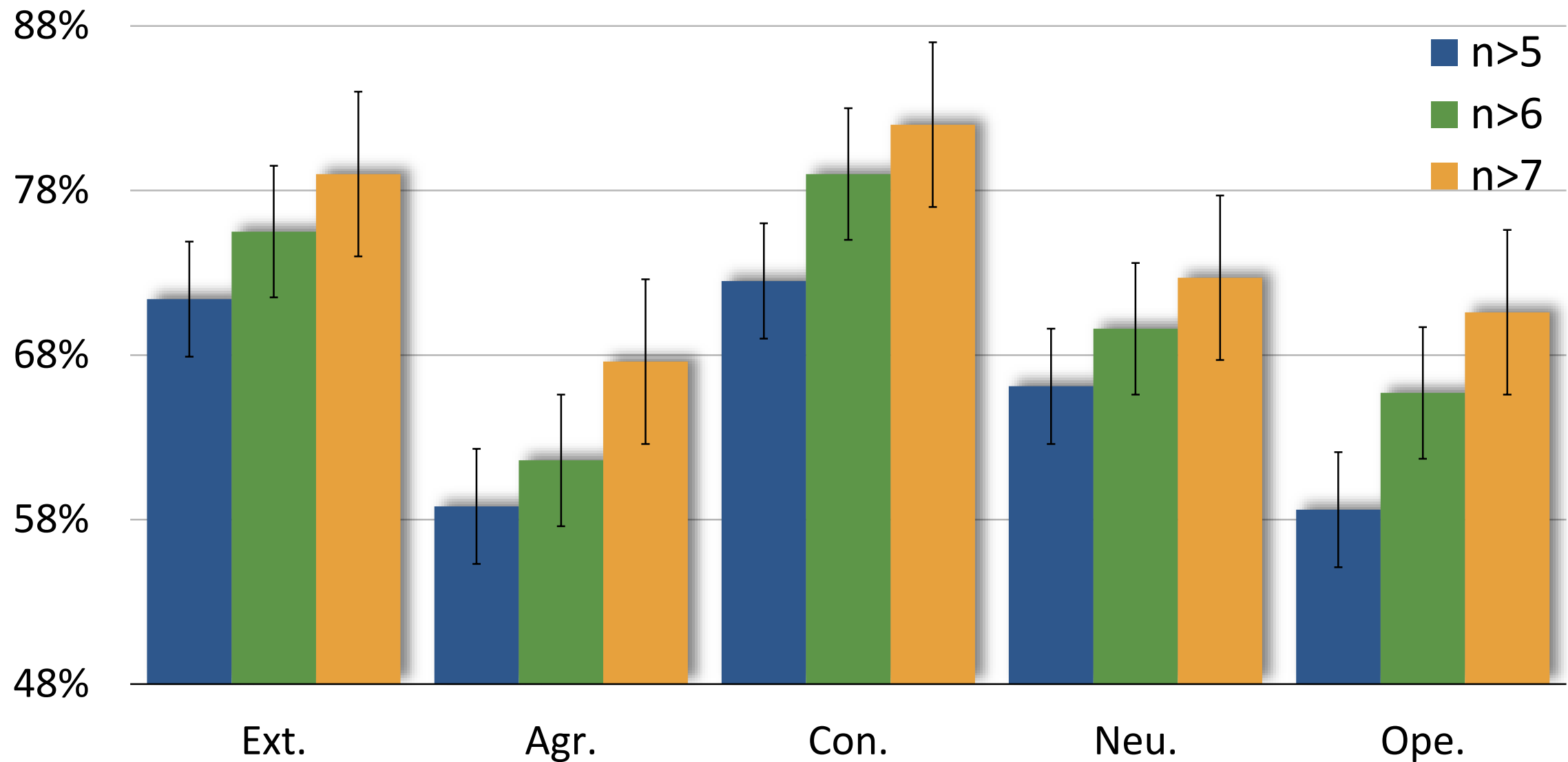
The Task



- Each subject is perceived to be above (“*High*”) or below (“*Low*”) median with respect to each trait
- The task is to predict automatically whether a subject is perceived to be “*High*” or “*Low*” along each trait

Mohammadi & Vinciarelli, “*Automatic Personality Perception: Prediction of Trait Attribution Based on Prosodic Features*”, IEEE Transactions on Affective Computing, 3(3):273-284, 2012

Results



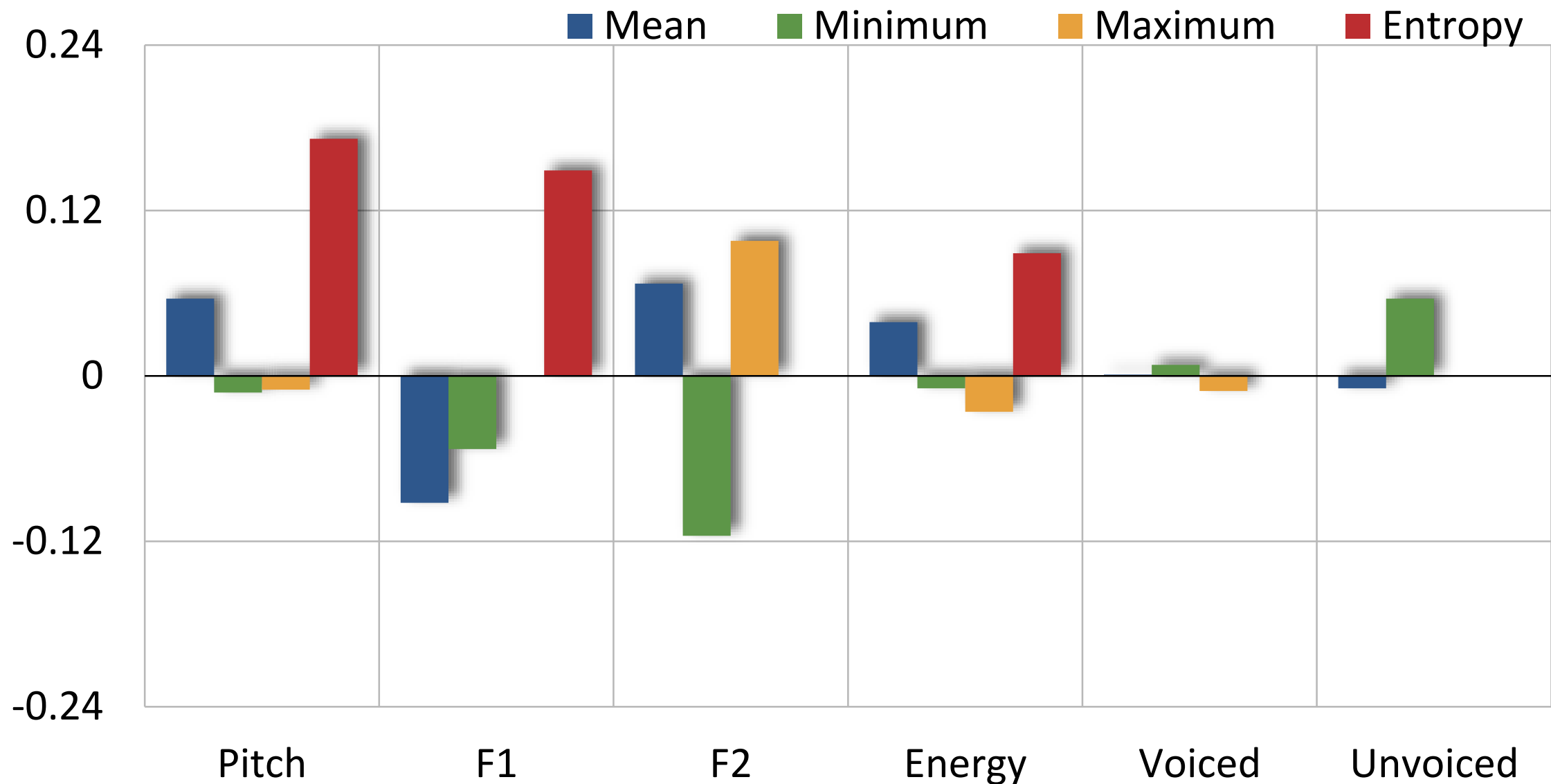
Mohammadi & Vinciarelli, "Automatic Personality Perception: Prediction of Trait Attribution Based on Prosodic Features", IEEE Transactions on Affective Computing, 3(3):273-284, 2012

Extraversion and Conscientiousness

“[...] there are two dimensions that underlie most judgments of traits, people, groups, and cultures [...] the first makes reference to attributes such as competence, agency, and individualism, and the second to warmth, communality, and collectivism.”

Judd et al., “*Fundamental Dimensions of Social Judgment: Understanding the Relations Between Judgments of Competence and Warmth*”, *Journal of Personality and Social Psychology*, 89(6):899-913, 2005

Conscientiousness



Mohammadi & Vinciarelli, "Automatic Personality Perception: Prediction of Trait Attribution Based on Prosodic Features", IEEE Transactions on Affective Computing, 3(3):273-284, 2012

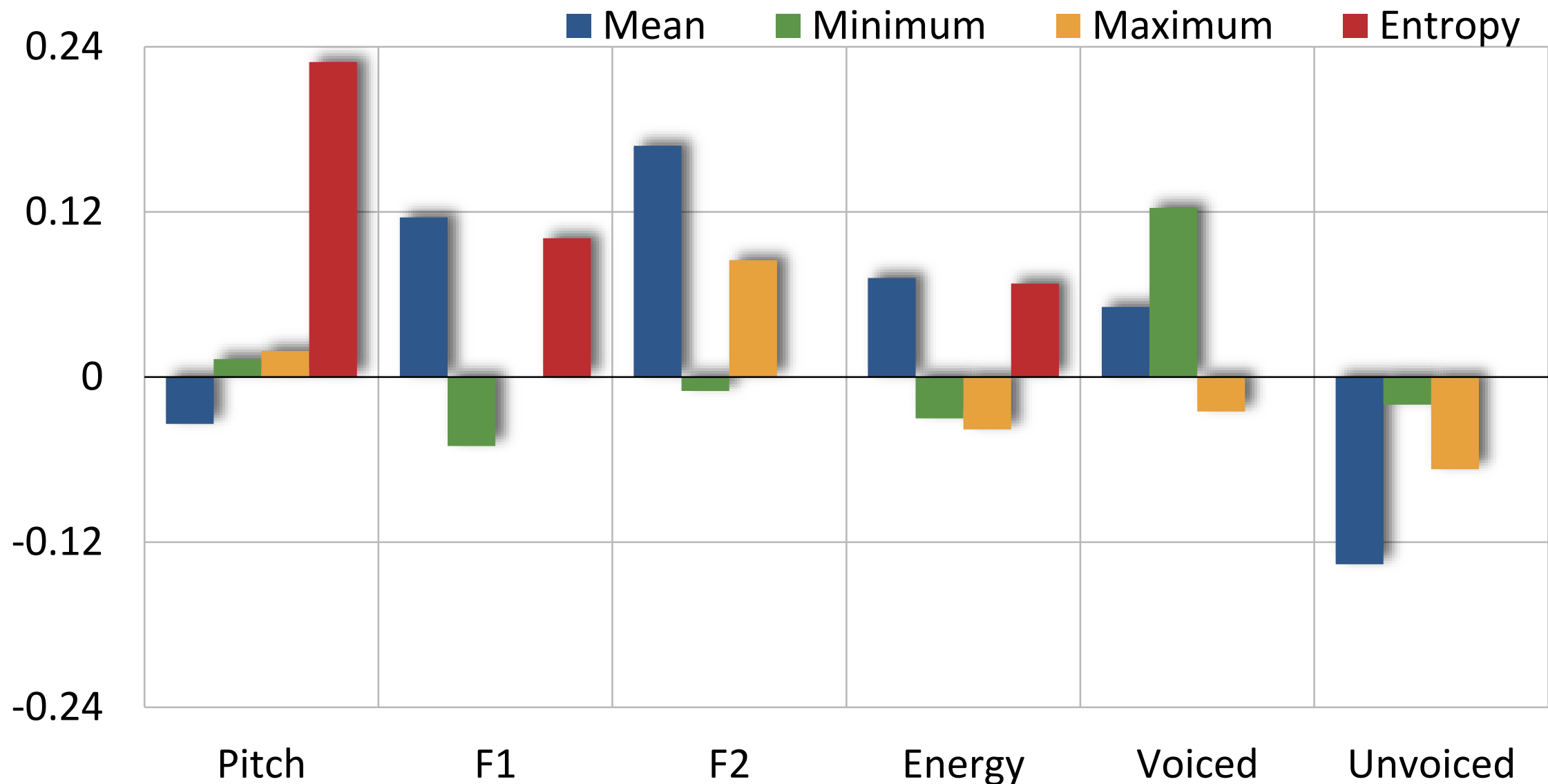
Conscientiousness in Psychology



“Rate and pitch variation were the most influential for competence and benevolence, respectively. For competence, one interaction effect (rate by pitch variation) was significant”

Ray, “Vocally cued personality prototypes: An implicit personality theory approach”, *Journal of Communication Monographs*, 53(3):266-276, 1986

Extraversion



Mohammadi & Vinciarelli, "Automatic Personality Perception: Prediction of Trait Attribution Based on Prosodic Features", IEEE Transactions on Affective Computing, 3(3):273-284, 2012


Extraversion in Psychology



“Rate and pitch variation were the most influential for competence and benevolence [...] For benevolence, two interaction effects were significant (pitch variation by loudness, and pitch variation by rate)”

Ray, “Vocally cued personality prototypes: An implicit personality theory approach”, *Journal of Communication Monographs*, 53(3):266-276, 1986

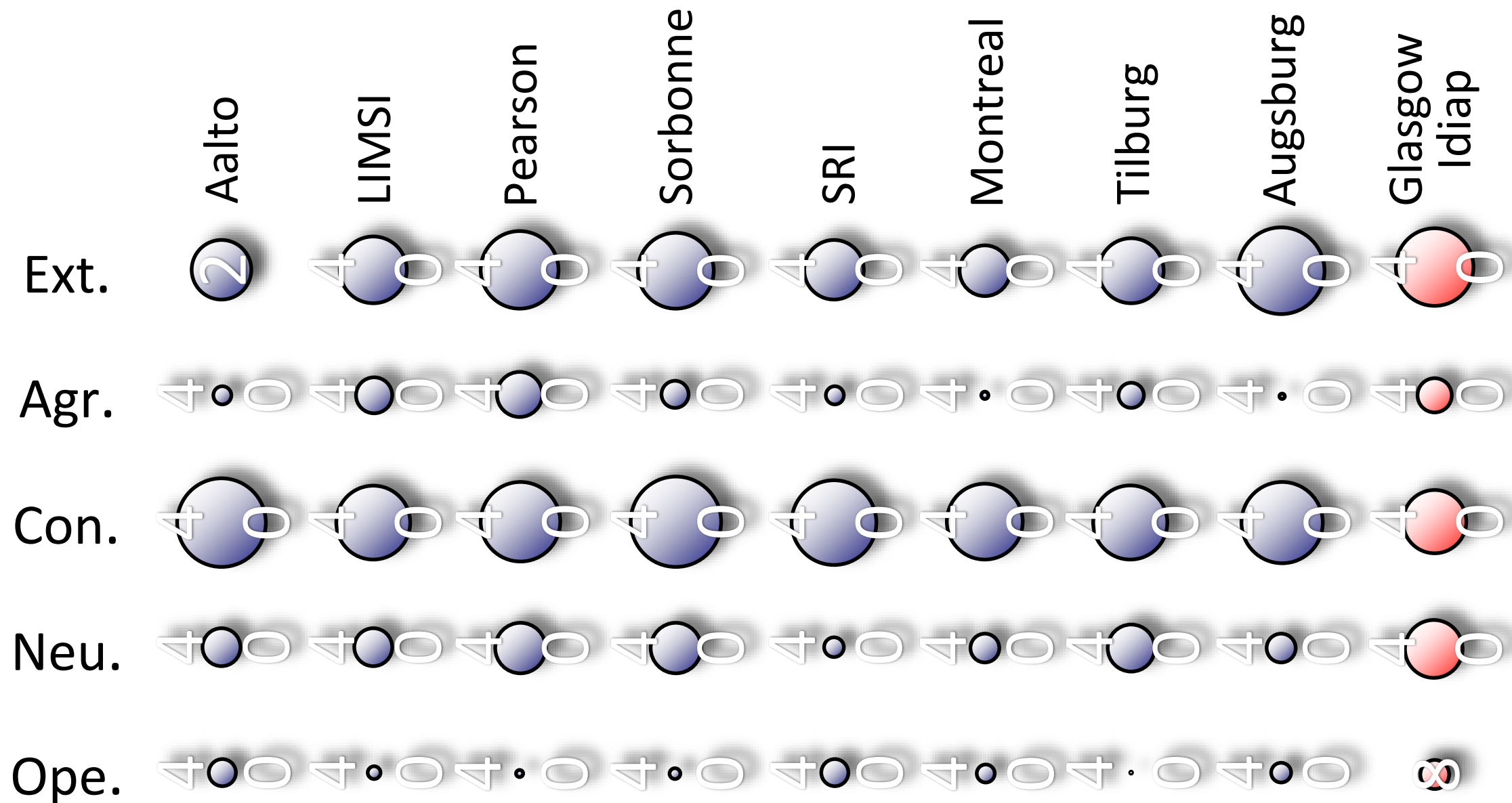
The Speaker Trait Challenge



Participants	No.
Total	54
Personality Sub-Challenge	21
Selected	9

Schuller, Steidl, Batliner, Noeth, Vinciarelli, Burkhardt, van Son, Wenginger, Eyben, Bocklet, Mohammadi, Weiss "*The Interspeech 2012 Speaker Trait Challenge*", Proc. of Interspeech, 2012

Speaker Trait Challenge



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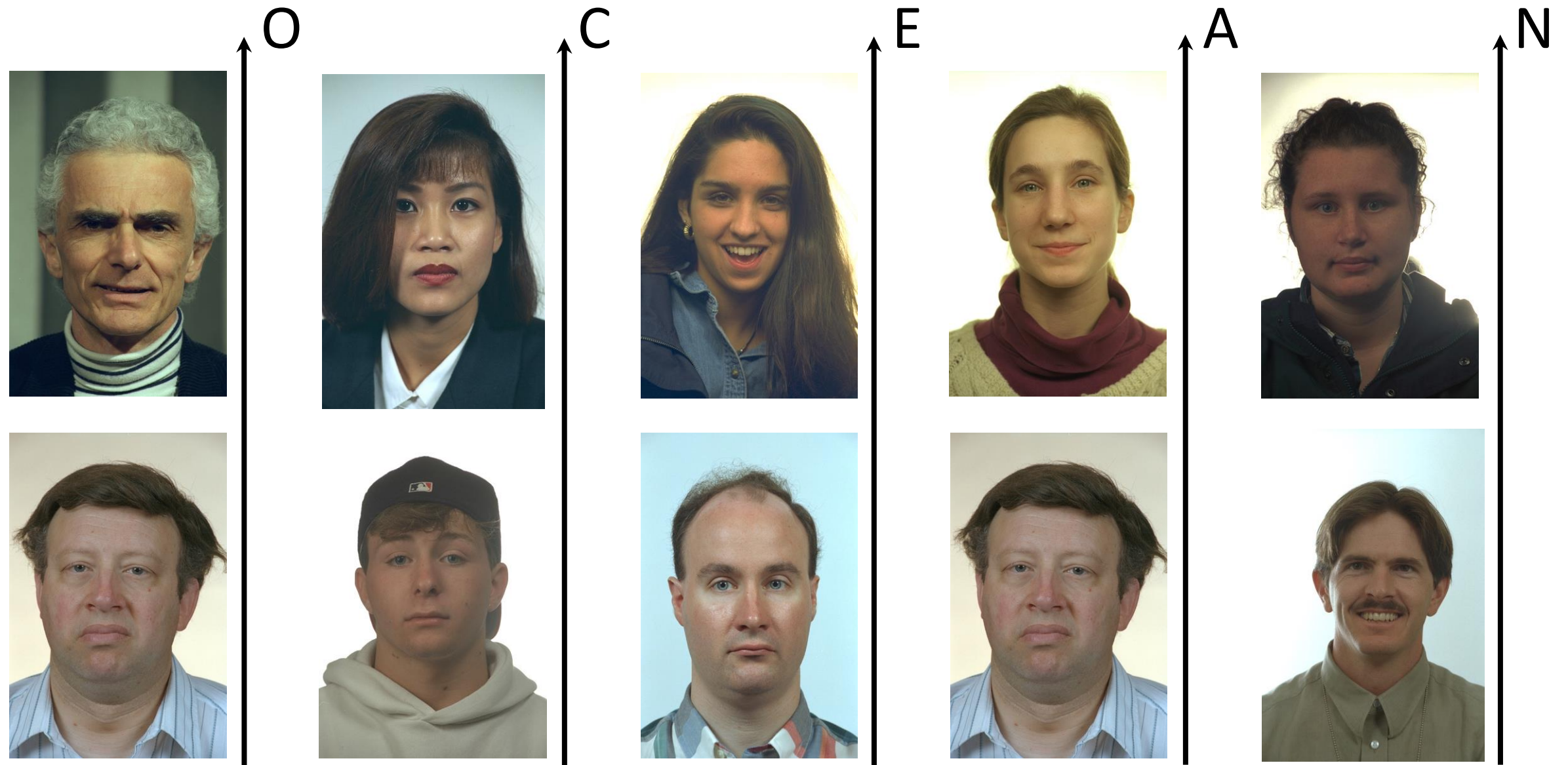
The “*Face Personality Corpus*”



Number of Samples	829
Number of Subjects	829
Gender Balance	57.0% M / 43.0% F
Ethnicity Balance	63.9% C / 36.1% O
Subjects Distribution	100% = 1
Assessors	11 (British)
Total Items	91190

Al Moubayed, Vazquez-Alvarez, Mc Kay & Vinciarelli, “*Face-Based Automatic Personality Perception*”, Proceedings of ACM Multimedia, 2014

The Data



All frontal images in the FERET Color Corpus (829 pictures for 829 subjects), aimed at biometrics.

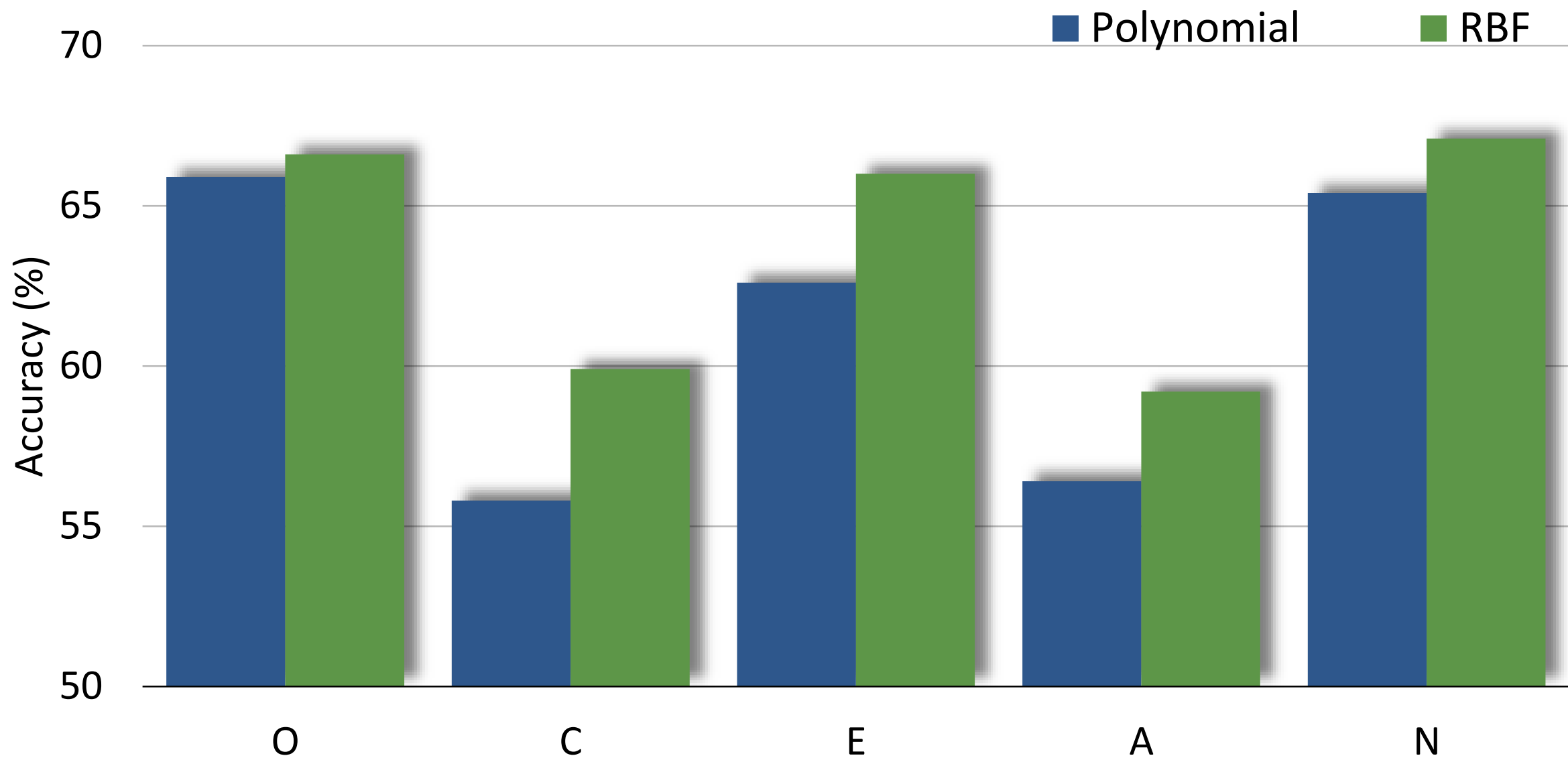
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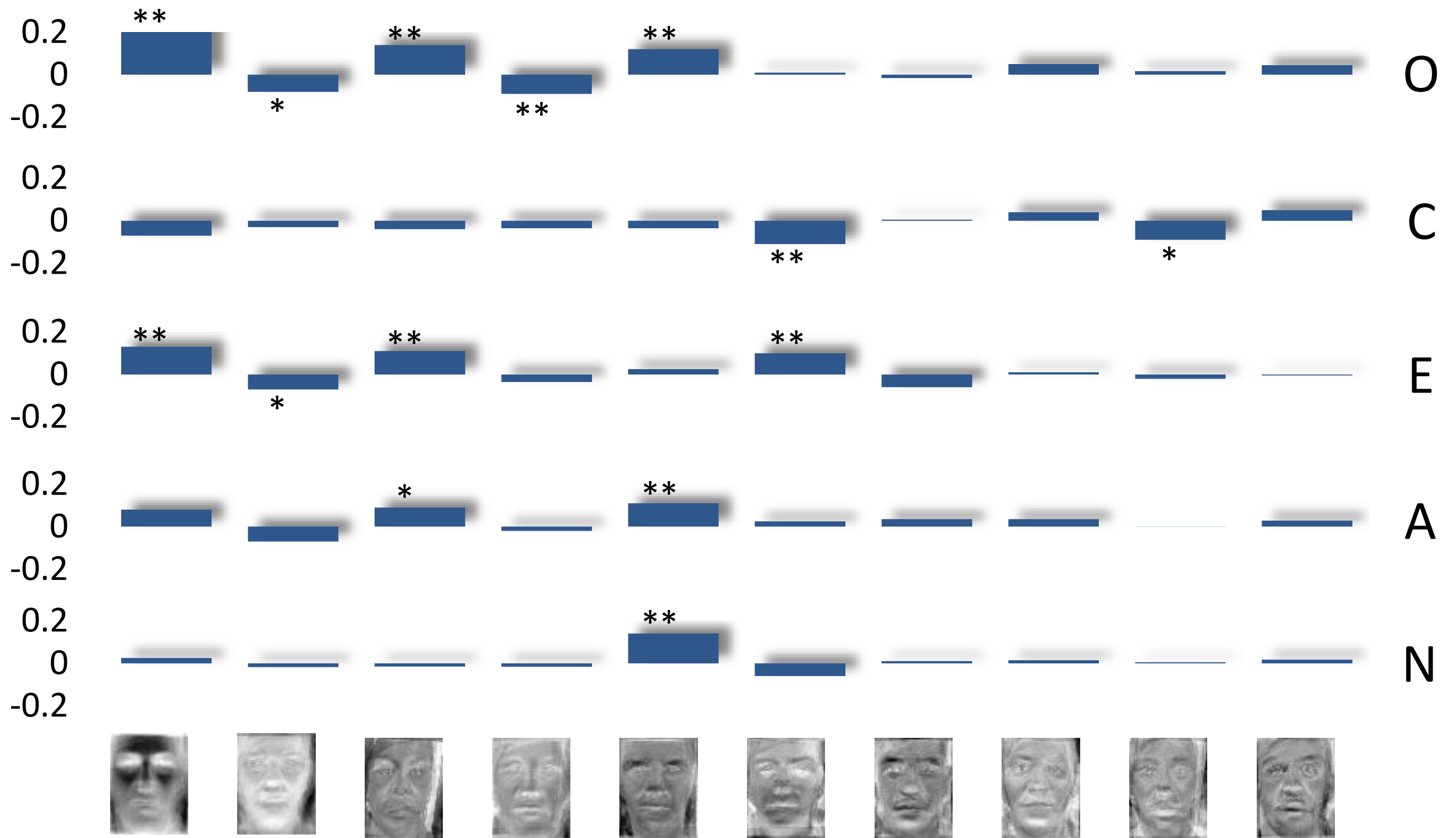
Al Moubayed, Vazquez-Alvarez, Mc-Kay & Vinciarelli, “*Face-Based Automatic Personality Perception*”, Proceedings of ACM Multimedia, 2014

Eigenfaces and SVM Results



Al Moubayed, Vazquez-Alvarez, Mc Kay & Vinciarelli, *“Face-Based Automatic Personality Perception”*, Proceedings of ACM Multimedia, 2014

Correlational Analysis



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Conclusions



- Personality Computing is important for any technology dealing with people
- Personality Computing should move from the prediction of traits to the prediction of consequential outcomes
- Tighter integration with Personality Science is needed to improve both Computing and Psychology

Thank you!



- Noura Al Moubayed (University of Glasgow)
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- Antonio Origlia (University of Napoli Federico II)
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- Cristina Segalin (University of Verona)
- Yolanda Vazquez Alvarez (University of Glasgow)
- Bjoern Schuller (Imperial College / TU Munich)