

Personality is more than you think: Abilities, Temperament, Interests, and Character

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Beyond Correlation in the Study of Personality:
Associations, Investments and Interventions
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Outline

1 Descriptive models

- A selective history of 20th century personality research
- Predictive power of personality traits
- Behavior genetics

2 Biologically inspired causal theories

3 A new organization

- Integrating temperament, ability and interests
- Prior demonstrations of the power of temperament, abilities and interest
- A need for integrative studies
- SAPA: A new methodology
- A tentative model
- Temperament, Ability and Interests



100

- Distinguishing between descriptive and causal models
 - American descriptive taxonomic models
 - European biologically based models
- American taxonomic models
 - Taxonomic confusion and challenge
 - Consensus model of the “Big 5”
- European models of biological causes of temperament
 - Giant 3 models of Hans Eysenck
 - 2 reinforcement models developed by Jeffrey Gray



The conventional US taxonomic model – the Big 5 – 1950—1980

1950 – 1980

Traits

Taxonomic analyses of items and scales from most personality tests showed confusing structures.

Neuroticism

However analyses of structure of lexical items yielded a similar structure of peer and self report.

Agreeableness

Conscientiousness

This led to the consensual structure known as the the “Big 5”

Extraversion

Openness



The Big 5, dimensions of people or delusions of observers?

1968-1980

Traits

The “dark ages” of personality
Traits are shared delusions.

Neuroticism

Agreeableness

Traits are in the
eye of the beholder.

Conscientiousness

Traits do not predict anything
“Personality coefficient” = .3.

Extraversion

Openness



The Big 5, dimensions of people or delusions of observers?

Traits

Neuroticism

Are traits shared delusions?

Agreeableness

Are traits in the
eye of the beholder?

Conscientiousness

Do traits add anything
to understanding behavior?

Extraversion

Openness



The conventional US model: with some behavioral correlates

Traits

Behaviors

Neuroticism

Traits are stable and have predictive power over the lifespan

Agreeableness

Getting along

Conscientiousness

Roberts and DelVecchio (2000)

Extraversion

Getting ahead

Caspi, Roberts and Shiner (2005)

Openness

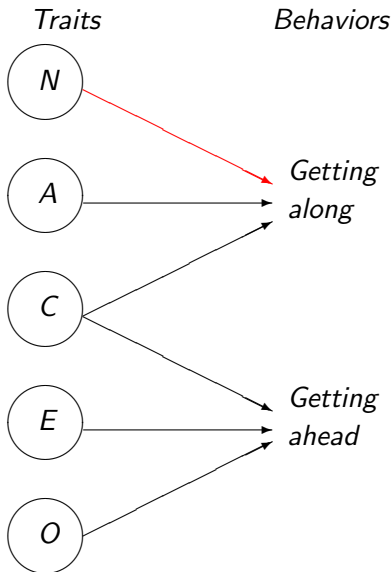


The conventional model: with some predictive powers

Traits are stable and have predictive power over lifespan

Mortality
Divorce
Employment

Roberts, Kuncel, Shiner,
Caspi and Goldberg, (2007)



The beginning of causal thinking: all traits have heritabilities $\approx .5 \pm .2$

Genes

Behavior genetic studies

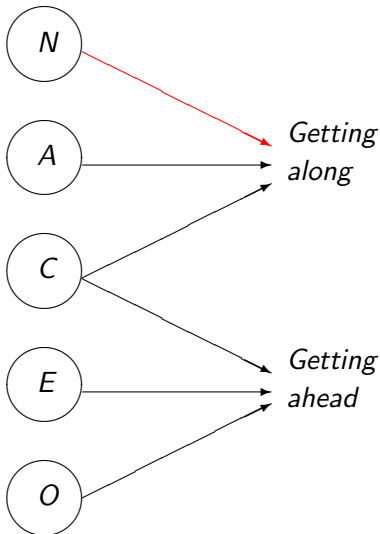
$$r_{MZa} = r_{MZt} \approx 2r_{DZt}$$

Big 5 traits have $h^2 \approx .5$

No evidence for shared
(family) environment.

Traits

Behaviors



The beginning of causal thinking: all traits have heritabilities $\approx .5 \pm .2$

Genes

Behavior genetic studies

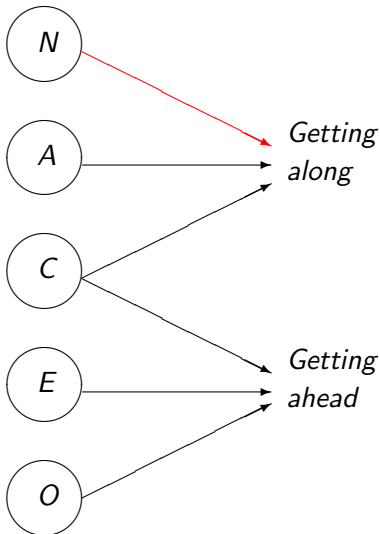
$$r_{MZa} = r_{MZt} \approx 2r_{DZt}$$

Big 5 traits have $h^2 \approx .5$

But so do divorce,
religiousness and watching TV

Traits

Behaviors



The beginning of causal thinking: all traits have heritabilities $\approx .5 \pm .2$

Genes

Traits

Behaviors

Behavior genetic studies

$$r_{MZa} = r_{MZt} \approx 2r_{DZt}$$

Big 5 traits have $h^2 \approx .5$

No evidence for shared
(family) environment.

Within group heritabilities are
uninformative wrt
between group differences
(Consider height: Johnson, 2010)



Getting
along

Getting
ahead

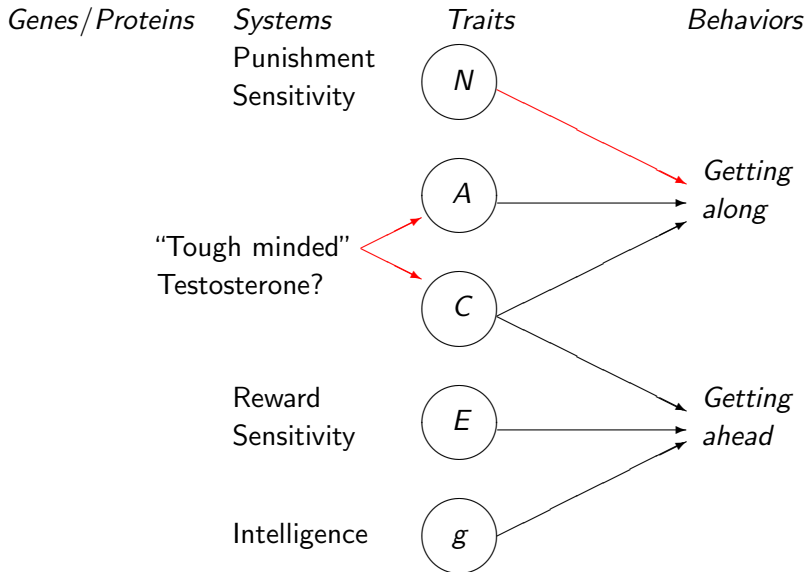


Biologically inspired causal theories

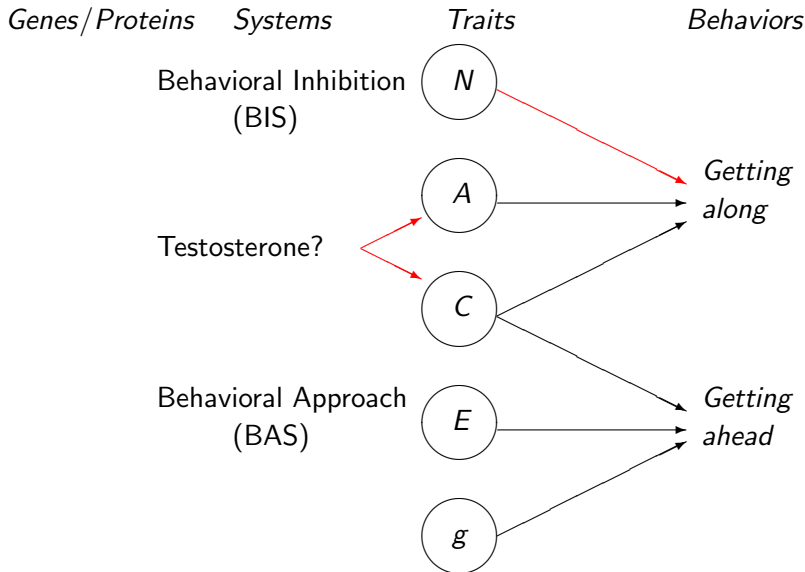
- During the 1950s - 1990s, while Americans focused on descriptive taxonomies and debated whether personality made a difference, trait theory was alive and well and living in Europe.
- The Europeans emphasized biological models of the “Giant 3”: Extraversion, Neuroticism, and “Psychoticism” (also called “tough mindedness”).
- They also included the study of intelligence as part of the study of personality and individual differences.



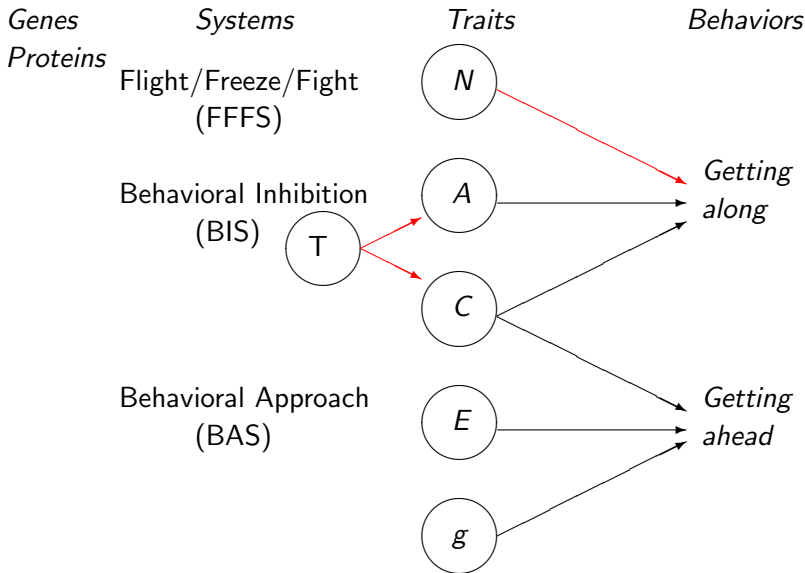
Theories of learning and reinforcement—primarily European



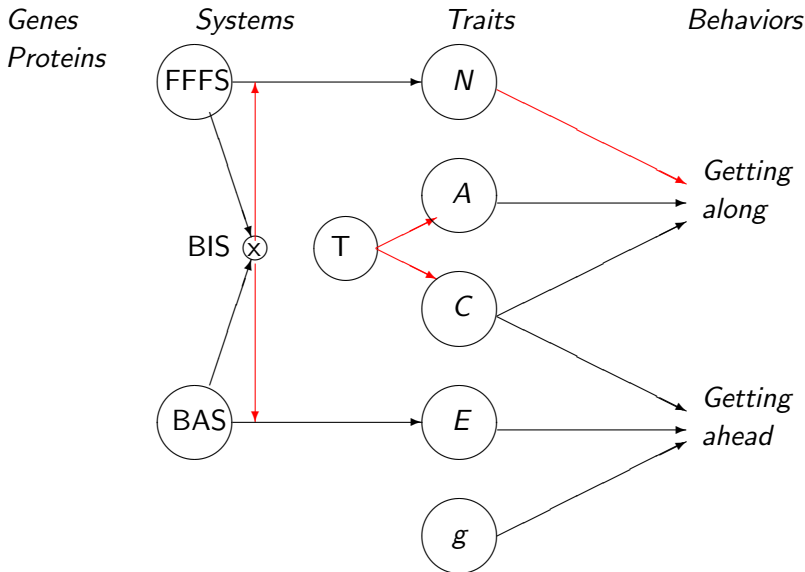
Theories of learning and reinforcement: The “Gray model”



Reinforcement Sensitivity Theory (RST) the revised “Gray model”



Reinforcement Sensitivity Theory (RST) the revised “Gray model”



Integrating temperament, ability and interests

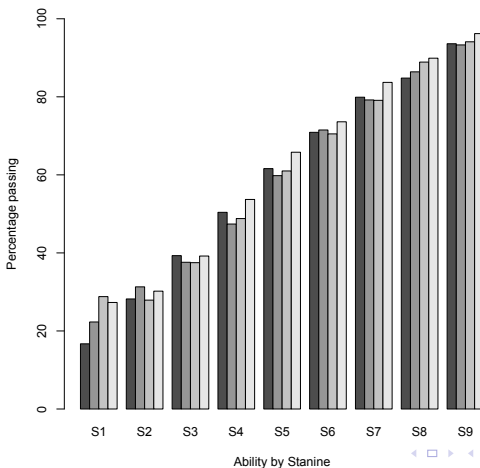
- Personality theorists from the 1920s to late 1940s included ability and interests in personality formulations (e.g., Kelly & Fiske, 1950).
- Perhaps in a desire to be theoretical rather than applied, and not to discuss the socially dangerous idea of intelligence, American personality psychologists from the 1950s until the present have avoided or ignored the study of ability and interests.
 - Exceptions include Lubinski & Benbow (2000); Lubinski, Webb, Morelock & Benbow (2001); Lubinski & Benbow (2006)
 - Ackerman (1997), Ackerman & Heggestad (1997)
 - Kuncel, Campbell & Ones (1998); Kuncel, Hezlett & Ones (2001); Kuncel, Crede & Thomas (2005)
- Ability was left to school psychologists, interests to counseling psychology. However, both were included in I/O psychology.
- It is time to rectify that oversight. What follows is a tentative proposal.



Prior demonstrations of the power of temperament, abilities and interest

The power of ability: Army Airforce Selection

Army airforce selection study: predicting passing training based upon stanine of screening battery. Multiple $R \approx .42$



Prior demonstrations of the power of temperament, abilities and interest

Temperament, ability, interests: Kelly and Fiske (1950)

- A classic study of graduate school success showed how temperament, ability, and interests all predicted performance equally well (Kelly & Fiske, 1950).
- Graduate students enrolled in 40 different clinical psychology programs in 1946 were evaluated by ≈ 75 psychologists at UM
- Criteria included ratings of clinical diagnosis, skill at individual therapy, research skills, preference for hiring
- Predictive measures that worked included
 - Ability: Millers analogy test
 - Temperament: Measures of neuroticism
 - Interests: Measures of psychological mindedness in interests
- “The most efficient clinical predictions, in terms of both validity and economy of data, are those based only on the materials contained in the credentials file and in the objective test profiles. The addition of autobiographical and projective test data appears to have contributed little or nothing to the validities of the assessment ratings.”



A need for integrative studies

- Prior work has shown that there is a need to integrate Temperament, Abilities and Interests.
- But how to do it?
- To integrate the areas requires large sample sizes, ease of data collection, and a diverse subject population.
- Some do this through meta analysis, some use broad based national samples.
- Is it possible for single labs to do integrative studies?



How to do integrative studies?

- Problem of small samples sizes based upon college undergraduates. Typical subject pools are neither large enough nor diverse enough.
- Expensive to get access to large and diverse populations
 - Exceptions include national and international survey samples using preselected items:
 - National Longitudinal Study of Youth (NLSY)
 - Program for International Student Assessment (PISA)
 - German Socio-Economic Panel
- Is it possible to do large based sampling with tailored items?
- Yes, use the web.

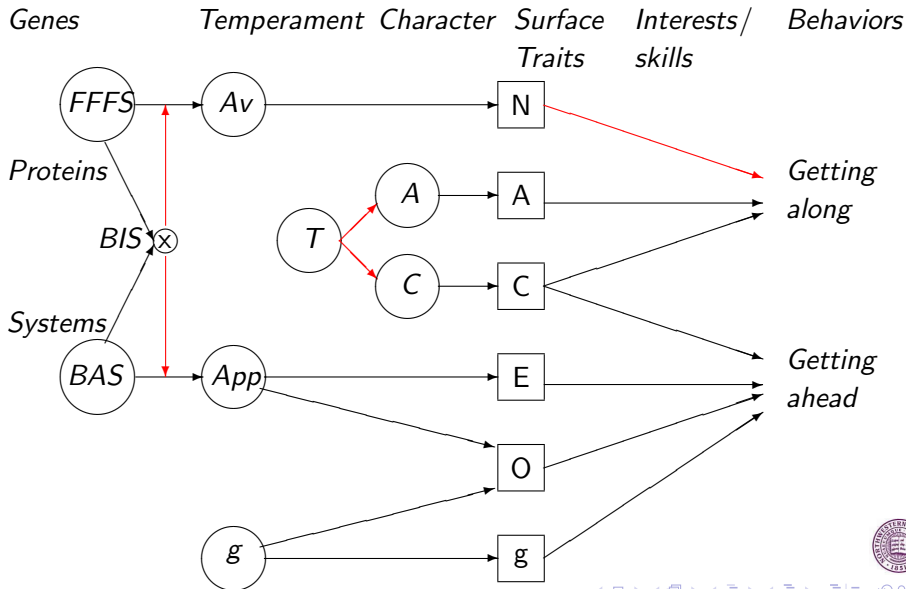


Synthetic Aperture Personality Assessment (SAPA)

- Using the web to collect data on temperament, ability and interests
 - Synthetically form large covariance matrices from smaller subsets of items
 - Each subject given ≈ 50 personality, 10 interest, and 14 ability items sampled from the larger pool.
 - Total pool of items > 500
 - ≈ 400 personality items primarily from International Personality Item Pool Goldberg (1999)
 - 92 interest items for Oregon Vocational Interest Scales (Pozzebon, Visser, Ashton, Lee & Goldberg, 2010)
 - 56 ability items (home brewed at NU)
 - Demographic items include age, sex, education, race, country, college major, occupation (if appropriate)
 - Resulting sample sizes $> 50,000 - 100,000$
- College major, occupational status and interest items added in 9/10
- Data to be summarized include $\approx 12,000$ participants



Temperament, abilities, interest, character



Standard use of SAPA is to analyze covariance structures

- 100-200 subjects/day are recruited to `test.personality-project.org`
- web site uses PHP, MySQL to collect data and give feedback to users
- Covariance matrix formed from pairwise covariances.
 - Items are missing at random and thus the resulting covariance structure is unbiased.
- Scales are synthetically formed from covariance matrix
 - Scale reliability and scale intercorrelations can be found from the covariance matrix
 - Standard errors of correlations between scales are function of number of items per scale and vary by total sample size rather than pairwise average sample size.
- All code is written in R and is included in the `psych` package.



Extending personality: temperament, ability and interests over time

- Using SAPA to find group means rather than covariances.
- Temperament variables: The Big 5 (10 item scales sampled from 20)
 - Agreeableness
 - Conscientiousness
 - Stability (-Neuroticism)
 - Extraversion
 - Openness
- Ability items:
 - self reported SAT V, Q, W, ACT
 - 14 (from 56) home brewed IQ items (including number and letter series, vocabulary, "Raven like" spatial items).
- 8 ORVIS scales (Based upon 1-3 items/scale sampled from 10-12 items/scale)
 - Productivity, Adventure, Analytical, Organized, Leadership, Altruism, Erudition, Artistic (aka creativity)
- Age Trends
 - Big 5, ability measures, Interests (grouped for clarity)



Example interest items by domain

- ① Production: Would like to construct new buildings.
- ② Adventure: Like to face physical danger.
- ③ Analysis: Would like to be a physicist.
- ④ Organization: Like to monitor business expenses.
- ⑤ Leadership: Would like to be a state governor or senator.
- ⑥ Altruism: Would like to be a social worker.
- ⑦ Erudition: Would like to be a foreign correspondent.
- ⑧ Creativity: Create works of art.



Full scale intercorrelations – Temperament and Interests

Full scale intercorrelations corrected for attenuation.

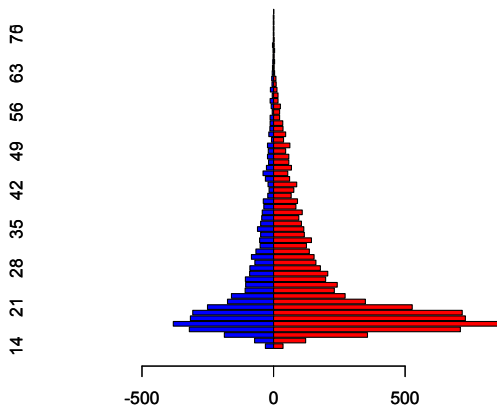
Raw correlations below the diagonal, α on the diagonal
correlations corrected for attenuation above the diagonal:

	A	C	E	S	O	Prod	Adv	Ana	Org	Lead	Alt	Erud	Crea
A	0.90	0.31	0.45	0.21	0.22	-0.02	-0.10	-0.14	0.04	0.10	0.72	0.02	0.14
C	0.28	0.92	0.21	0.23	0.16	0.02	-0.09	0.02	0.52	0.13	0.22	-0.02	-0.12
E	0.42	0.19	0.93	0.31	0.28	0.00	0.22	-0.05	0.16	0.55	0.35	0.00	0.12
S	0.19	0.21	0.29	0.93	0.19	0.16	0.23	0.17	0.08	0.16	0.07	0.05	-0.03
O	0.20	0.14	0.25	0.17	0.88	0.31	0.18	0.41	0.14	0.42	0.22	0.64	0.47
Prod	-0.01	0.02	0.00	0.14	0.26	0.82	0.68	0.55	0.31	0.29	0.22	0.46	0.53
Adv	-0.09	-0.07	0.19	0.19	0.15	0.55	0.79	0.50	0.24	0.54	0.23	0.17	0.24
Ana	-0.12	0.02	-0.05	0.15	0.36	0.46	0.41	0.86	0.44	0.40	0.18	0.59	0.41
Org	0.04	0.46	0.14	0.07	0.12	0.25	0.19	0.37	0.84	0.64	0.32	0.23	0.07
Lead	0.08	0.11	0.49	0.15	0.36	0.24	0.44	0.34	0.54	0.85	0.33	0.44	0.38
Alt	0.62	0.19	0.30	0.06	0.18	0.18	0.18	0.15	0.26	0.27	0.80	0.38	0.47
Erud	0.01	-0.02	0.00	0.04	0.52	0.36	0.13	0.48	0.19	0.35	0.29	0.75	0.76
Crea	0.12	-0.10	0.10	-0.03	0.40	0.44	0.20	0.35	0.06	0.32	0.38	0.60	0.83



Age and gender distribution

Age distribution by gender

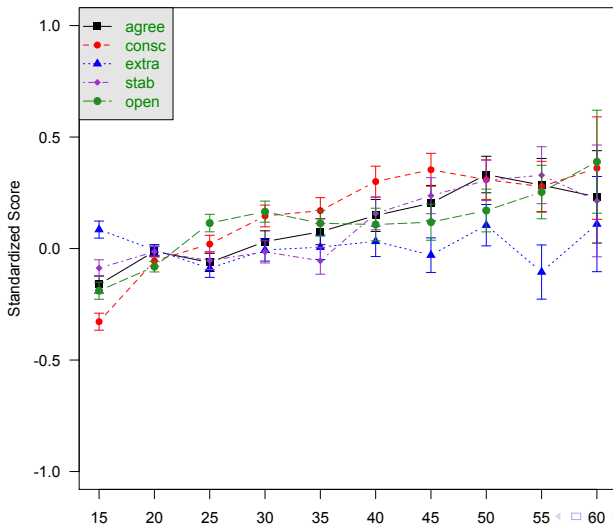


- $N \approx 12,000$
- 68% female
- median age = 22
- trimmed mean = 24



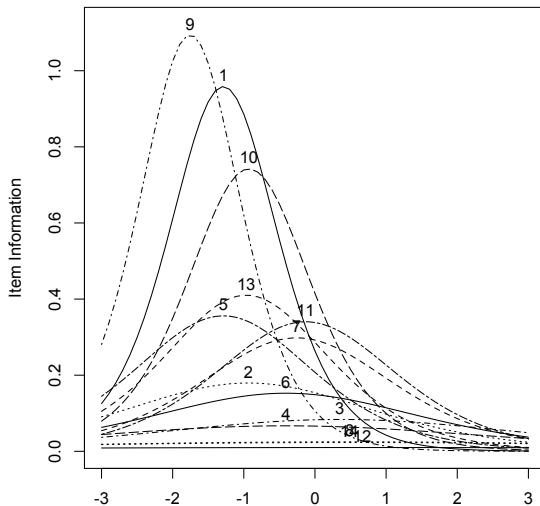
Big 5 over 6 decades (cross sectional data)

Temperament Scores by Age



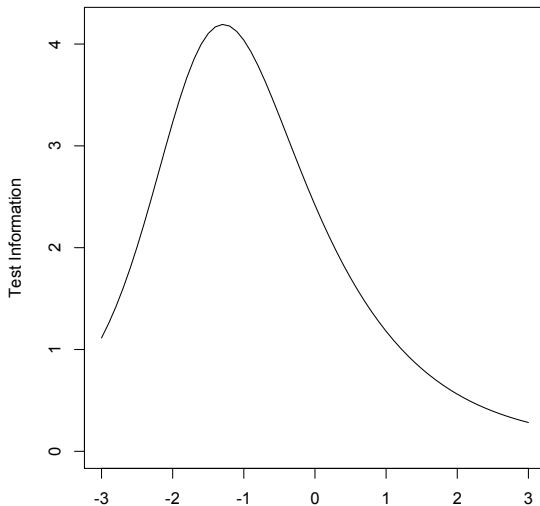
Sample item information for 14 ability items

Item information from factor analysis



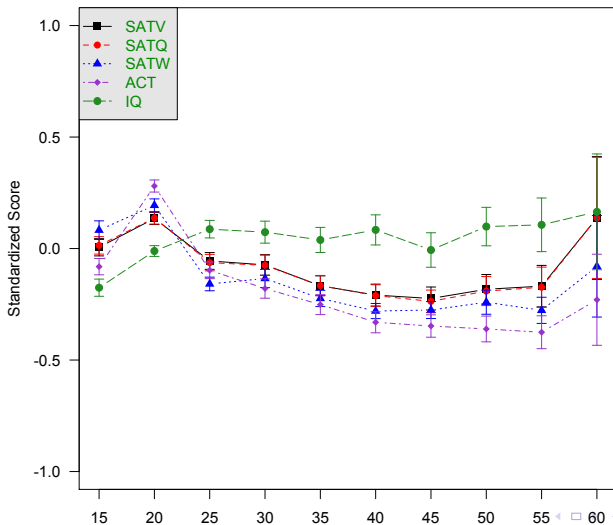
Sample test information for 14 item test – better at low end

Test information -- item parameters from factor analysis



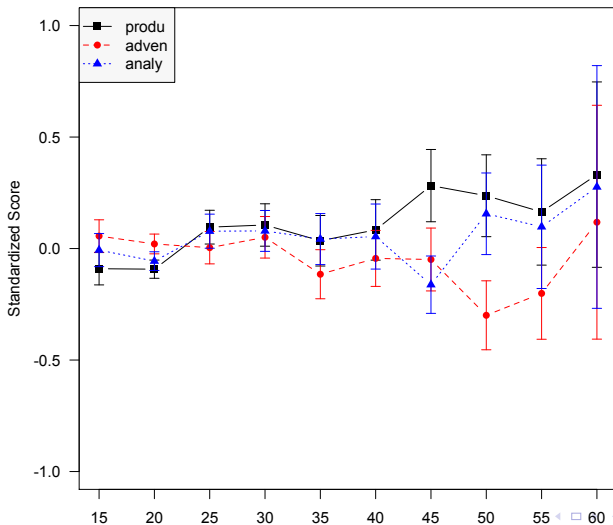
Ability over 6 decades (cross sectional data)

Ability Scores by Age



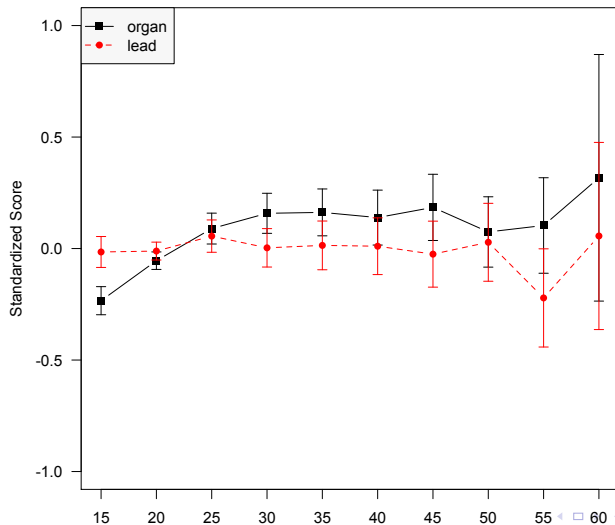
Production/Analysis interests over 5 decades (cross sectional data)

Interest Scores by Age



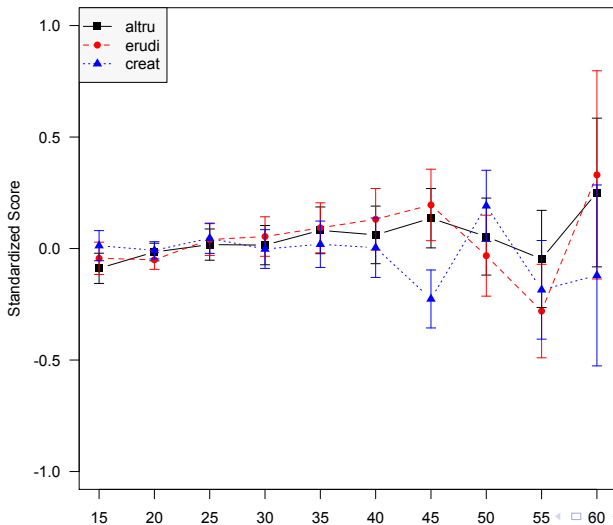
Organization/Leadership interests over 5 decades (cross sectional)

Interest Scores by Age



Artistic/erudite Interests over 5 decades (cross sectional data)

Interest Scores by Age

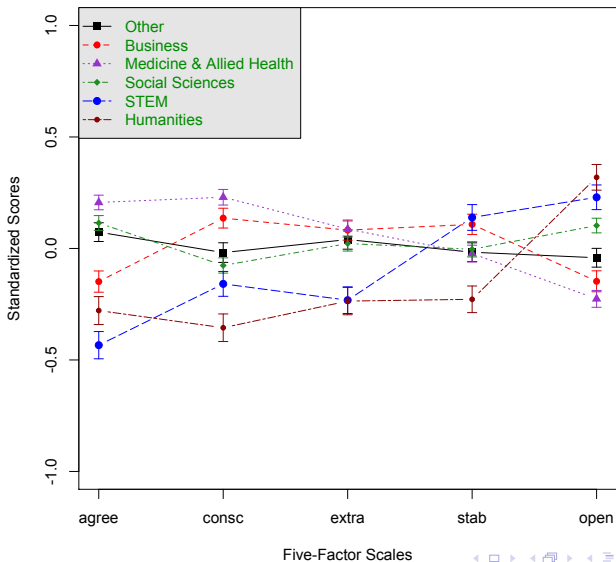


Extending personality: temperament, ability and interests

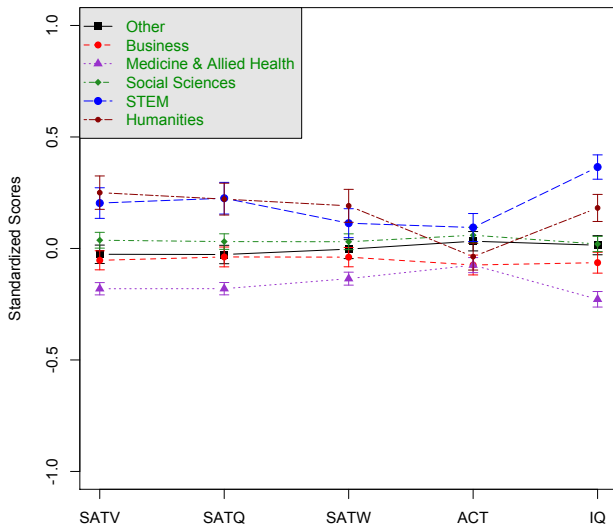
- Using SAPA to find group means rather than covariances.
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- 8 ORVIS scales (Based upon 2-3 items/scale)
 - Productivity, Adventure, Analytical, Organized, Leadership, Altruism, Erudition, Artistic (aka creativity)
- Predicting college major
 - STEM, Humanities, Social Sciences, Medicine and Allied Health, Business, Other



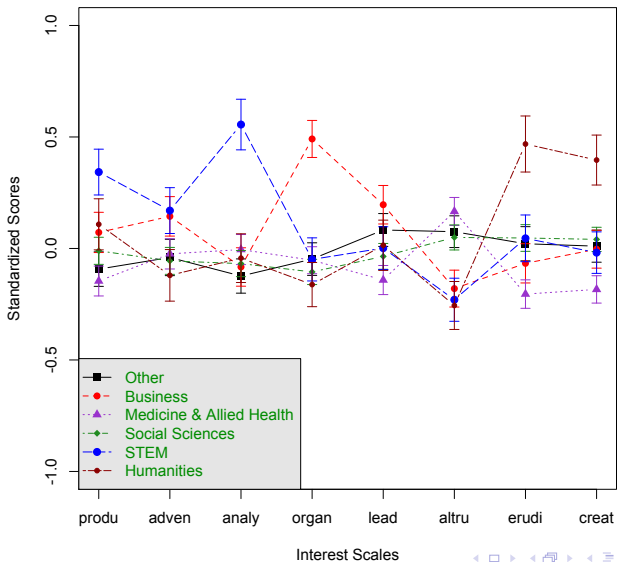
Temperament Scores by Discipline



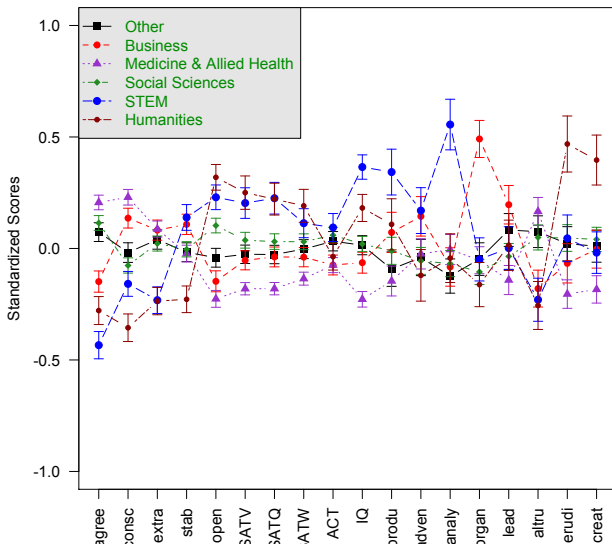
Ability Scores by Discipline



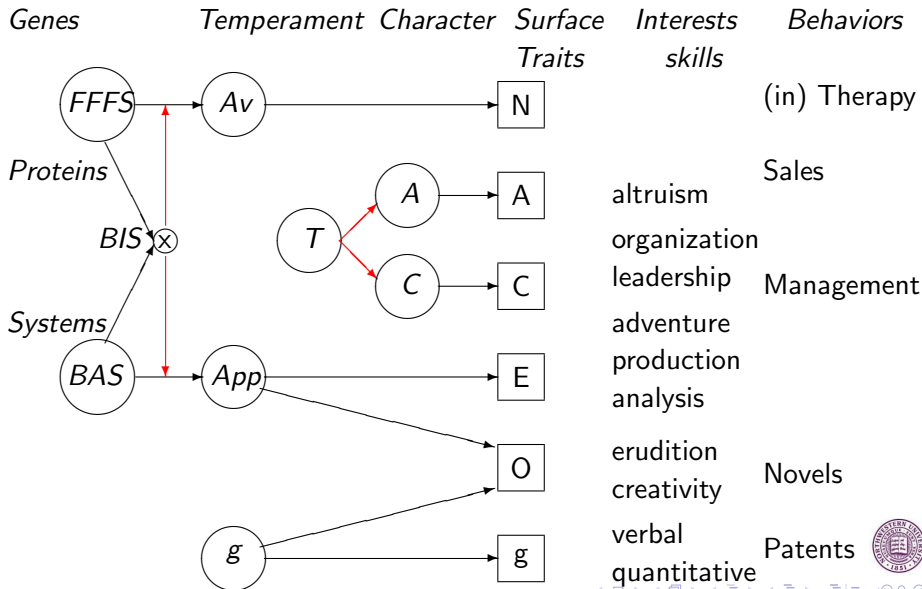
Interest Scores by Discipline



Temperament, Ability and Interest Scores by Discipline



Temperament, abilities, interest, character



Conclusion

- 1 Personality is more than just the big 5
- 2 Personality includes Temperament, Abilities, Interest and Character
- 3 Temperament, Abilities, Interest and Character predict real world criteria with substantial effect sizes.
- 4 The effect sizes of ability and interests exceed those of traditional trait measures and these variables are partially independent of traditional trait measures.
- 5 Modeling and predicting real world outcomes requires going beyond just the standard set of traits.
- 6 Theories of behavior need to integrate all of these into causal models of how people think, feel, want, and do.



The Personality, Motivation and Cognition lab and the Telemetrics group

- For more information: <http://personality-project.org>
- For the personality, interests and ability test see <http://test.personality-project.org>
- With thanks to the Personality, Motivation and Cognition Lab:
 - Joshua Wilt
 - David Conden
 - Katie Funkhouser
 - Jillian Cavanaugh



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