Quest for general principles
The **most fundamental units** of personality variance?
Traits as units of variance:

- Stable
- Converges across assessment methods
- Distinct developmental patterns
- Correlations with criteria
- Heritable
Every item is a unique trait – nuance
Unique variance in hundreds of nuances

- Not error, temporary fluctuations (stable over 10+ years)
- Not rating idiosyncrasies (agreed on by different raters)
- Not less “biological” than aggregate traits (heritable)
- Have distinct etiology (distinct age and gender differences)
- Have causal potency (links with tens of criteria)

Mõttus, Kandler et al., 2017 JPSP, Mõttus, Sinick et al., 2018 JPSP
Mõttus Realo et al., 2015 PlosONE
Vainik et al., 2015 EJP, Seeboth & Mõttus, 2018 EJP
Nuances are real

Not only error, biases
Nuances are real

The basic units of personality variance

Not only error, biases
Single items as markers for nuances

Items out-predict aggregate traits, more reliable than often thought
• Clonelanders are identical in their Big Five, facet scores

• But differ in acting, thinking, feeling, motivation patterns
  - Stable
  - Visible
  - Develop
  - Linked with life outcomes
Just characteristic adaptations?

But the patterns are heritable
The Big Five and facet clones have nearly as much personality as anyone
The Big Five and facet clones have nearly as much personality as anyone.

Because they differ in nuances.
Nuances as nuisance? A rabbit hole?

Often safe to ignore nuances: any trait is as good as any other

Most robust findings do not depend on how personality happens to be measured.
But we cannot wish nuances away

• They do contain much of personality variance

• Ignoring this is choosing to throw away information
Nuances can be seen pragmatically as assets
Nuances can be seen pragmatically as assets:

- There are many of them
- They contain “free” info
Default operationalization of personality: “the traits”
A universe of characteristics: “persome”

- Measured traits samples of persome
- Markers of personality

Mõttus, Bates et al., in preparation
Personality markers as interchangeable "participants", sampled broadly

Nuances sample persome broadly
SNPs are markers of genome

Nuances are markers of persome

Individual markers not very interesting
We can assign nuances numerical properties, study patterns among these
Why?

• Reveal **general principles** about personality
• **Not waste** information in personality measurements
• Leverage our research by **recycling previous findings**
Examples
Personality maturation and adult social roles

- Correlate Big Five traits (changes) and being in social roles
- Expect positive correlations with A, C, Em Stability

Control form multiple testing, avoid over-fitting!
• Take a sample of nuances (items)
• Quantify in the degree of maturity
  – Correlations with age, expert ratings
• Correlate with being in adult social roles
<table>
<thead>
<tr>
<th>Nuance 1</th>
<th>Maturity</th>
<th>Social roles</th>
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<tr>
<td>Nuance k</td>
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</tbody>
</table>
Every dot is a nuance

Being adult in social roles
Or create “polynuance scores” for maturity

Maturity-related info in nuances in one score

Seeboth & Mõttus, 2018 EJP; Mõttus, Bates et al., in preparation, osf.io/preprints/psyarxiv/4q9gv
Circumscribed hypotheses?

- Social roles drive maturation for socially relevant traits?
- Quantify nuances in social relevancy, use as a moderator
Being adult in social roles
• Hypotheses testable in single models
• Hypotheses testable quantitatively
  – Less cherry-picking from among multiple findings
More power:

- All personality-information can be used
- Analysis aggregates across the persome
  - Improves estimate reliability
• Leverage from previous findings
  – Boost statistical power
  – Avoid over-fitting, inherent cross-validation
• Results more generalizable
  – Less dependent on measurement choices
  – Straightforward to meta-analyze
Antisocial behaviour and personality immaturity?

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<th>Nuance</th>
<th>Maturity</th>
<th>Antisociality</th>
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<td>Nuance k</td>
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</table>

Combine all previous findings
White matter integrity → Cognitive impairment → Personality change

<table>
<thead>
<tr>
<th>Changes in nuances</th>
<th>Cognitive impairment (proximal cause)</th>
<th>WM integrity (distal cause)</th>
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<tbody>
<tr>
<td>Nuance 1</td>
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<td>Nuance k</td>
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## Systematic genetic overlap?

<table>
<thead>
<tr>
<th>Nuance</th>
<th>BMI (meta-analysis)</th>
<th>Polygenic risk for BMI</th>
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<tbody>
<tr>
<td>Nuance 1</td>
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</table>
Personality and education genetically entangled

Mõttus et al., 2017, Psych Science
More prediction for free?

- Why throw away the predictive information?
- Examine what drives personality-criteria associations

Mõttus, 2016, Seeboth & Mõttus, 2018 EJP
Can we already do this?

Yes, if we accept existing items as markers of nuances
All item-level associations published

• For *meta-analyzing*, *leveraging* specific projects
  - Has been a *big boost* in genetic research

• Open Science Framework or *dedicated repository*
  - Similarly to LD Hub for sharing GWAS findings

 Doesn’t cost anything
Public domain pool of personality markers

(Human Persome Project)
• Representative coverage of persome
• Little redundancy
• Attention to single item properties
• Published **basic properties**
  - Reliability
  - Desirability
  - Stability
  - Culture specificity / universality
  - Developmental trajectories
  - Gender differences
  - Socioeconomic differences
  ...

Useful as co-variates in specific projects
Known co-variance (network) structure

• “Imputation” (predict unmeasures nuances)
• Draw most informative samples of nuances
Off-shelf statistical software

- Data preparation
- Model building, cross-validation
- Extracting, plotting key findings
- Imputing markers
Not doing away with personality, not a rabbit-hole

- Traits as random factors
- Explore new questions
- Harness more information
- Leverage existing findings
- General principles → not even more complexity

Slides and text: René Mõttus @ Researchgate