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We can do more with already existing existing tricks

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To increase predictive accuracy at no extra cost, life outcomes including job performance can be predicted from individual questionnaire items in addition to even instead of composite trait scores. Items can be conceived of as markers of persome (the universe of behavioral, affective, cognitive and motivational differences among people), like single nucleotide polymorphisms (SNPs) are markers of genomic variance. Ideally, comprehensive items pools are used to capture persomic variance, but items of existing questionnaires can also provide incremental predictive accuracy. Item-level associations may reveal that outcomes are highly polycasual.

Individuals—focally, job applicants—differ in how well they can perform at a given job, and this is consequential for employers. Those involved in personnel selection therefore have a goal of working out the best possible methods for predicting these performance differences from other, potentially observable behavioral, cognitive, affective or motivational characteristics. This partly overlaps with what many personality researchers are interested in. They see that individuals differ in *all* sorts of life-course aspects (outcomes) and they, too, want to work out how to best predict these differences from a multitude of potentially observable behavioral, cognitive, affective or motivational characteristics. With this, they hope to learn about the extent to which and how personality plays out in everyday life.

But we cannot measure everything. Personality researchers have therefore invested substantial efforts in systematizing these potentially observable characteristics, reducing them to increasingly fewer, broader, more abstract traits such as the Big Five. Ostensibly, these broad traits underlie the multitude observable characteristics and are thereby also the causal forces partly driving the outcomes. The Big Five, measured using item composites, has been correlated with hundreds of outcomes, including those that are of interest in personnel selection.

My reading of the target article is that personnel selection researchers say: the broad traits such as the Big Five are fine, but we think that we could actually be doing even better. In part, this is due to the limitations of the self-report method. But in part, personnel selection could do better by capturing individual differences in more nuanced and context-sensitive ways. And guess what, I think personality researchers may have reasons for thinking alike. Broad trait constructs have served us well, but by now we may have learned most of what they allowed us to learn.

Drawing a loose parallel with genome, let's call all the possible behavioral, affective, cognitive and motivational differences among people the *persome*. In both personality research and personnel selection, we need as good a coverage of the persome as possible. Broad dispositional traits capture some of the persomic variance, but they also miss out on a lot because they do not encompass all potentially relevant ways of how individuals differ. Furthermore, they may misrepresent *how* personality is linked with outcomes because it may not be whichever underlying structures of the persome the broad traits ought to reflect that drives the associations with outcomes but the constituents of the aggregates themselves (Mõttus, 2016).

Genomic variance is captured by placing markers—SNPs—throughout the genome. Perhaps personality research and personnel selection could do something similar, by placing the markers of persomic variance as thoroughly throughout the persome as possible. The markers can be operationalized as individual questionnaire items, reflective of the specific and more context-

sensitive personality characteristics that have been called nuances (McCrae, 2015, Mõttus, Kandler, Bleidorn, Riemann & McCrae, 2017). This would enable capturing as much persomic variance as possible. It would mean sampling from the persome, as we sample from populations. Thereby, when relating these markers (individual items) with whatever is being predicted—job performance, antisocial behavior or longevity—possibly more accurate predictions can be made than based on the composites of only selected markers (those that allegedly best measure the broad traits such as the Big Five).

Yes, the proportions of measurement error are likely larger in single items than in their aggregates, and the more parameters in models the more prone to over-fitting they are. For this reason, prediction models should be created (or trained, using machine learning language) using large samples. This is another parallel with genetic research: as the training samples (i.e., genome-wide association studies; GWAS) are getting bigger and bigger (from a few to hundreds of thousands), an increasing amount of phenotypic variance is being predicted from genomic data in independent samples (Cesarini & Visscher, 2017).

And yes, we may worry about an apparent loss of parsimony: isn't it nice to see a few familiar composite traits being correlated with whatever we are trying to predict from personality? One may feel less comfortable with the idea that a predictive model of an outcome contains hundreds of predictors with commensurately small effect sizes. But, again, if lessons from genetic research are anything to go by, this may be how reality is: like complex traits are highly polygenic (Chabris, Lee, Cesarini, Benjamin, & Laibson, 2015), they may also be highly polycausal inasmuch as personality is concerned.

Quite likely, training item-based prediction models of outcomes, including those relevant in personnel selection, would be an atheoretical enterprise, quite similarly to how GWAS atheoretically link genetic variants and phenotypes. Scary? Maybe, but there are arguments for empiricism over framing research with *a priori* hypotheses (Yarkoni & Westfall, in press). For example, many hypothesis—unless they are trivial—just tend to be wrong (for a parallel, think of candidate gene research).

In order to address the possibility that outcomes are linked with a large number of very specific characteristics, we need comprehensive item pools rather than item-sets of questionnaires that have been designed to measure particular traits such as the Big Five. However, even already existing data collected with these less-than-ideally comprehensive item pools are consistent with the above-described hypothesis. For example, we observed that item-based predictive models almost always outperformed those based on the Big Five or their facets in the prediction of a range of life outcomes in independent samples of people (Mõttus, Bates, Condon, Mroczek, & Revelle, 2017). Although job performance was not among these outcomes, it is very likely that predicting it from individual questionnaire items rather than the Big Five or its facets would entail more accurate predictions. Importantly, this leverage comes at no extra cost as one needs to have item-data to calculate trait scores anyway.

Therefore, in addition to, or perhaps even before, developing new methods for predicting job performance or any other life outcome from personality, it may make sense to make the best possible use of already existing tricks and already existing data. In personality psychology and personnel selection alike.

References

Cesarini, D., & Visscher, P. M. (2017). Genetics and educational attainment. *Npj Science of Learning*, 2, 4. <https://doi.org/10.1038/s41539-017-0005-6>

Chabris, C. F., Lee, J. J., Cesarini, D., Benjamin, D. J., & Laibson, D. I. (2015). The Fourth Law of Behavior Genetics. *Current Directions in Psychological Science*, *24*, 304–312. <https://doi.org/10.1177/0963721415580430>

McCrae, R. R. (2015). A More Nuanced View of Reliability: Specificity in the Trait Hierarchy. *Personality and Social Psychology Review*, *19*, 97–112. <https://doi.org/10.1177/1088868314541857>

Möttus, R. (2016). Towards more rigorous personality trait–outcome research. *European Journal of Personality*, *30*, 292–303. <https://doi.org/10.1002/per.2041>

Möttus, R., Kandler, C., Bleidorn, W., Riemann, R., & McCrae, R. R. (2017). Personality traits below facets: The consensual validity, longitudinal stability, heritability, and utility of personality nuances. *Journal of Personality and Social Psychology*, *112*, 474–490. <https://doi.org/10.1037/pspp0000100>

Möttus, R., Bates, T. C., Condon, D. M., Mroczek, D. K., & Revelle, W. (2017, June 23). Your personality data can do more: Items provide leverage for explaining the variance and co-variance of life outcomes. Retrieved from osf.io/preprints/psyarxiv/4q9gv

Yarkoni, T., & Westfall, J. (2017). Choosing prediction over explanation in psychology: Lessons from machine learning. *Perspectives on Psychological Science*