Personality Structure After the Big Five

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Abstract

This document is a verbatim copy of a guest blog post I wrote for the *European Journal of Personality*. This document includes formal citations but informal writing. Please visit the *European Journal of Personality* [blog](#) for this post and other great personality content.

Cheers

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Guest post by Alexander P. Christensen

The Big Five has been around for a long time (Tupes & Christal, 1961/1992). Since its inception, the Big Five has seen alternative models come and go. At present, several contemporary alternatives exist, but they tend to be slight variations or extensions on the “basic five” (Costa & McCrae, 1992). Is this it? Is the Big Five the definitive structure of personality? Accumulating evidence suggests that it’s not. In this guest post, I discuss some problems of the Big Five model as well as emerging evidence for how we can move beyond it.

If you ask any psychologist “What is personality?” more often than not their answer will include “traits” or “the Big Five.” Although “traits” are by no means equivalent to the Big Five trait domains (Openness to Experience, Conscientiousness, Extraversion, Agreeableness, and Neuroticism), they are often implied. The Big Five is pervasive in our thinking about personality.

If you ask personality researchers the same question, you’ll get many different answers (Mõttus, 2021). Their answers often depend on a researcher’s level of interest: idiographic (individuals’ unique personality processes), within-person (individuals’ personality variability), or between-person (personality differences across people). “Trait” definitions will be nuanced depending on whether they are talking about idiographic and within-person traits (people’s unique behavioral signatures; Shoda, 1999) or between-person traits (the Big Five). Regardless of orientation, if a researcher is serious about publishing in a personality journal, then the Big Five must at least be mentioned.

Do all personality researchers agree that the Big Five is *the* model? HEXACO proponents will brandish their pitchforks and flourish their torches but the HEXACO model, which adds Honesty/Humility to the Big Five, is honestly a humble variant of it. The Dark Triad—Machiavellianism, Narcissism, and Psychopathy—is a malevolent extension of the Big Five and HEXACO but are closely related to them (Howard & Van Zandt, 2020).

Researchers who use contemporary alternatives of the Big Five don’t tend to stray very far

from it.

Earlier and more distant alternatives such as Myers-Briggs and Cattell's Sixteen Personality Factors have long since been dismissed. The Cognitive-Affective Personality System (Mischel & Shoda, 1995) is a prominent contemporary alternative; yet few researchers have tested its claims (and for good reason: it's tough to test). This state of affairs leaves most contemporary theories of personality to commit to the Big Five as a fact and not one of many possible models. So, the Big Five stands with no comparison—isn't this a problem?

The Big Five is so ubiquitous that it tends to encompass theoretical models rather than develop testable propositions that allow it to be differentiated from others (e.g., Honesty/Humility is often argued to be subsumed in Agreeableness; DeYoung, 2020). Without other models, every new model of personality is compared to the Big Five benchmark. But what if this benchmark is wrong (i.e., it doesn't accurately portray the structure of between-person personality)? If the benchmark is wrong, then anything that's more correct will seem wrong (even if it's right!). Certainly, "all models are wrong, but some are useful" (Box, 1976), but the problem is not a matter of utility (the Big Five is undeniably useful), it's a matter of validity.

Say we want to develop a new questionnaire to assess between-person personality. Without any alternatives, we start with the Big Five (or at least we use it to guide our thinking). We also decide that our questionnaire should have a facet structure—nearly every contemporary personality questionnaire does. Using some sort of theoretical rationale, we decide on characteristics that best reflect each trait. After, we write a large pool of items to capture the themes of the facets. We then distribute our items to two large samples for item selection and validation.

In the selection sample, we follow conventional scale development guidelines: keep items that have high item-facet and item-trait correlations, and remove items with weak dominant loadings (e.g., $< .30$) or large cross-loadings (e.g., $> .20$). In the validation sample, our exploratory models confirm that the refined facets correspond to their traits.

Unfortunately, even despite these steps, confirmatory models rarely provide adequate fit of the Big Five (McCrae, Zonderman, Costa, Bond, & Paunonen, 1996). Rather than taking this as evidence that the Big Five doesn't fit the data, some researchers have suggested that we alter our conventions of the statistical model to fit the Big Five (Hopwood & Donnellan, 2010). This *is* a problem. Either we need to change the conventions of a statistical model, switch to a different model, or move on from the Big Five.

The first path, changing the conventions of a statistical model, doesn't seem sensible. Lowering conventions of model fit is like increasing statistical significance to $p < .10$. Moving the goalposts is not the way forward. The second path, switching to a different statistical model, needs some unpacking to understand the problem of why the Big Five doesn't fit. Traditional psychometric models are based on local independence or variables (e.g., items) being independent after they are conditioned on latent ones (e.g., the Big Five). Even despite careful curation of the item pool, items and facets still often have correlated residuals (i.e., correlated variance not explained by the latent variables). Alternative latent variable models, such as unrestricted factor models (Lorenzo-Seva & Ferrando, 2020) or exploratory structural equation models (Booth & Hughes, 2014), might mitigate some issues of model fit (e.g., simple structure) but the problem of correlated residuals will still remain.

This observation suggests that the problem is not with the conventions of the model, it's a problem with the model itself (Borsboom, 2006). Either we force personality structure to be defined without correlated residuals or we change the model to match the data. Personality structure without correlated residuals is untenable, making models with the assumption of local independence untenable too. So, it seems we have no choice but to consider the second path of switching to a different statistical model.

Enter network models. Networks in psychology represent variables as nodes (circles) and their relations (e.g., partial correlations) as edges (lines). Although conceptually simple, networks are capable of modeling considerable complexity. Indeed, networks are the preferred model for mapping the interactions of complex systems (Barabási, 2011).

Personality (even at the between-person level) is a complex system: it's a system meaning that it's composed of many components which interact with one another (e.g., feeling comfortable around people tends to be positively associated with being sociable and kind but negatively associated with being anxious; Wood, Gardner, & Harms, 2015), and it's complex meaning that it's interactions with other systems are difficult to derive because of their properties and dependencies (e.g., interactions between situation features and personality components; Bedford-Petersen & Saucier, 2021).

Notably, network models do not assume local independence, allowing variables to covary freely. Network models thus appear to be appropriate for personality data. Considering that network models have different statistical assumptions than traditional psychometric models, should they follow the same conventions?

The intention of Hudson Golino, Paul Silvia, and I's article, "A Psychometric Network Perspective on the Validity and Validation of Personality Trait Questionnaires," was to provide a framework to advance psychometrics that are based on network models (Christensen, Golino, & Silvia, 2020). The network perspective suggests that traits are a summary statistic for how personality components—defined as "every feeling, thought, or act" that is associated with a "unique causal system"—are influenced by one another (Cramer, 2012; Cramer et al., 2012).

We psychometrically defined these components as "an item or set of items that share a unique common cause." This definition aligns with recent suggestions that items themselves are traits, and is a drastic departure from conventional psychometrics where most contemporary scales are developed with notions of exchangeability (items are interchangeable) and high internal consistency (items may be redundant; McCrae & Möttus, 2019).

The first step in network psychometrics then is to reduce redundant variables to their unique components. In the article, we provide the conceptual foundation for a statistical approach, which we call, "Unique Variable Analysis," to reduce redundant variables to

unique personality components (recently, we validated this approach via simulation; Christensen, Garrido, & Golino, 2020).

When focusing on these components within a Big Five framework, we reason that the content of each personality trait’s domain needs validation. We suggest that each trait domain consists of a finite set of unique attributes where the attributes need not be unique to a single domain. Instead, an attribute’s representation of a domain is a matter of degree because of its potential overlap with other domains—that is, the boundaries of domains are fuzzy (Schmittmann et al., 2013). This fact is evidenced by the correlated residuals discussed earlier.

One approach to evaluate the degree that attributes are representative of trait domains has been to examine multiple Big Five inventories at different levels using network models. At the domain level (i.e., single trait), items from multiple inventories have been used to discover coherent sub-organizations of a domain (e.g., facets; Christensen, Cotter, & Silvia, 2019). At the multi-domain level (i.e., Big Five), facets from multiple inventories have been used to uncover the extent to which they represent one or more domains (Schwaba, Rhemtulla, Hopwood, & Bleidorn, 2020).

Network models facilitate this approach by representing the inventories as an interconnected map of the Big Five’s conceptual space. A limitation of using multiple Big Five inventories is that the Big Five still structures the findings from the top-down. As with our hypothetical questionnaire, the Big Five constrains our ability to identify anything beyond it—that is, we get out what we put in. So, to move past the Big Five, we must free ourselves of its constraints.

This brings us to our third and final path: moving on from the Big Five. Three recent articles, all published in the *European Journal of Personality* and *European Journal of Personality Assessment*’s open-access joint special issue on “New Approaches Towards Conceptualizing and Assessing Personality,” report encouraging results for what we can expect for personality structure after the Big Five. Castro, Ferreira, and Ferreira (2020) used

a network approach to evaluate the hierarchical structure of the IPIP-NEO-120 in an enormous sample ($N = 345,780$). To do so, they used a network dimension reduction method called ModuLand (Kovács, Palotai, Szalay, & Csermely, 2010), which (in very basic terms) estimates dimensions from the network's nodes and then further estimates dimensions from those dimensions, repeating this process until there is a single dimension. After applying ModuLand, they found three levels in their network: 120 items, 35 second-level dimensions, and 9 third-level dimensions. Notably, the ModuLand method not only estimates dimensions hierarchically but it also allows dimensions to overlap (i.e., nodes can belong to multiple dimensions). Such an approach is consistent with the hierarchical yet fuzzy nature of personality structure.

Whereas Castro and colleagues (2020) break free of the Big Five by changing the statistical model, Condon et al. (2021) encourage us to break free by moving on (or rather up). Condon and colleagues provide a framework to construct a personality taxonomy from the bottom-up. They suggest six steps for how to proceed: (1) identify a highly inclusive item pool, (2) programmatically evaluate item characteristics, (3) test-retest analyses of items for qualitative and quantitative properties, (4) analyze ratings from multiple raters, (5) aggregate ratings across diverse samples, and (6) evaluate predictive utility. The focus of their approach is the exact opposite of our hypothetical questionnaire developed above and avoids forcing personality structure to fit in the neat Big Five box.

Saucier, Iurino, and Thalmayer (2020) put some of Condon and colleagues' suggestions into practice. Saucier and colleagues, using an old dataset but new methods, compared the predictive capacity of conventional facets and a high-dimensional structure of natural language adjectives. Using parallel analysis, they identified 23 and 30 dimensions in the adjectives. Their next step, and main study, was to compare the predictive power of the adjective dimensions against the facet structures of commonly used inventories such as the NEO-PI-R, HEXACO, and Big Five Aspects Scale. Importantly, across these inventories, there were different scale construction philosophies—some top-down and others bottom-up.

In the end, the high-dimensional bottom-up adjective approach provided the greatest predictive capacity, consistent with recent item-focused trends (Seeboth & Möttus, 2018).

The lexical approach presented by Saucier and colleagues is not new. In fact, it is the historical foundation on which modern personality structure is built. There is a lot, however, that is new: network modeling (Costantini et al., 2015), experience sampling (Beck & Jackson, 2020a), [machine learning and big data](#), and a greater awareness of diversity (from race to [age](#); Syed, 2021). Old ideas, such as the lexical approach (Saucier & Iurino, 2020) and Allportian perspectives (Beck & Jackson, 2020b), are worth revisiting because we have the methods and technologies to obtain observations that previous personality psychologists could not. Data-driven methods offer a fresh perspective on old data as well as new prospects for the structure of personality.

Over the last several decades, personality has been synonymous with the Big Five. Like every influential model, it's served the field well. There comes a point, however, when the model no longer moves the field forward (Wiernik, Yarkoni, Giordano, & Raghavan, 2020). Just as the heliocentric model fit the planets' movements in solar system better than the geocentric model, so too will data-driven models fit the structure of personality better than the Big Five model. It's time to move on from the Big Five. I look forward to where we end up.

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