


Do Self-Reported Traits and Aggregated States Capture the Same Thing? A Nomological Perspective on Trait-State Homomorphy

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Abstract

Convergent correlations between traits and state aggregates from experience sampling cannot fully establish trait-state homomorphy (the extent to which the same constructs are measured). With a nomological vector correlation and lens model approach, we test how similar nomological networks of traits and state aggregates are to each other: A trait and state-aggregate capture the same construct when both show highly similar nomological associations to a common set of correlates. In large experience sampling ($N = 209$) and life-logging studies ($N = 298$), Extraversion, Conscientiousness, and Agreeableness tended to show more and Openness, Honesty/Humility, and Neuroticism/Emotionality tended to show less trait-state homomorphy. However, these general findings differed somewhat at the aspect level, with Neuroticism and Extraversion aspects tending to show more versus Openness and Honesty/Humility aspects tending to show less homomorphy. The proposed nomological approaches can be flexibly applied to other traits, states, and correlates.

Keywords

nomological network, lens model, trait, state, HEXACO, Big Five, DIAMONDS

In experience sampling studies, personality states (e.g., behaving extraverted at a given moment)—momentary manifestations or expressions of personality traits—are repeatedly assessed. In principle, the mean aggregate of these states across all measurements—the regularity in one’s thoughts, feelings, desires, and behaviors—should approximate a trait (e.g., being generally an extraverted person). Indeed, research has shown that the mean of a density distribution of states (a state aggregate) is associated with self-reported trait measures ($r_s \sim .20-.60$; Augustine & Larsen, 2012; Finnigan & Vazire, 2017; Fleeson, 2001; Fleeson & Gallagher, 2009; Heller, Komar, & Lee, 2007; Horstmann & Rauthmann, in preparation). However, do assessments of traits and state aggregates really capture the same constructs? To answer this, we employ a nomological vector correlation (NoVeCA) and lens model approach (NoLeMA) to examine *nomological trait-state homomorphy*.

Rauthmann, Jones, & Sherman, 2016; Sherman, Rauthmann, Brown, Serfass, & Jones, 2015) defined as “having the same affective, behavioral, and cognitive content as a corresponding trait (. . .), but as applying for a shorter duration” (Fleeson & Jayawickreme, 2015, p. 84). Per Whole Trait Theory (Fleeson, 2012), states are momentary instantiations of traits and form distributions within persons. Thus, averaged state aggregates should approximate traits if trait and state measures were chosen diligently and enough situations were sampled representatively within participants’ daily lives.

However, a crucial question is to what extent traits and state aggregates are homomorphous (Fleeson, 2001). Psychometrically, demonstrating substantial correlations between traits and state aggregates represents convergent validity. As construct validation is an open, ongoing, and iterative process (Campbell

Background

Traits and States

Personality traits are conceptualized as stable interindividual differences in thoughts, feelings, desires, and behaviors (Funder, 2001). However, people also regularly exhibit a range of momentary states across situations (Fleeson, 2001, 2007;

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& Fiske, 1959; Cronbach & Meehl, 1955; Loevinger, 1957), it is prudent to examine also other forms of validity. Thus, we propose an additional focus on *nomological validity*—the extent to which two constructs, or their measures, show similar associations with a set of correlates (Cronbach & Meehl, 1955; Hough, Oswald, & Ock, 2015; Rauthmann & Sherman, 2016a, 2016b).

Nomological Networks

Cronbach and Meehl (1955, p. 290) argued that “scientifically speaking, to ‘make clear what something is’ means to set forth the laws in which it occurs [and] (...) the interlocking system of laws which constitute a theory [shall be referred to] as a nomological network.” This means that we can learn something about a construct by examining how it is associated with a set of other variables. It follows that we can *define* and *compare* scales in terms of their nomological networks. If two scales share a highly similar nomological network (nomological homomorphy), then we may pragmatically conclude that they both tap a highly similar construct—even if they are not highly correlated with each other.

This principle has already been used in developmental research, where it is important to establish that scales administered in early ages capture the same constructs as those administered in later ages. For example, Big Five scales in children show similar nomological networks to those of Big Five scales in adults (e.g., Asendorpf & van Aken, 2003; Measelle, John, Ablow, Cowan, & Cowan, 2005), with the conclusion that “the same” Big Five are measured across time—*despite* mean-level and rank-order differences (Roberts & DelVecchio, 2000; Roberts, Walton, & Viechtbauer, 2006).¹ Further, in organizational research, Hough et al. (2015) highlighted how nomological web clustering can identify constructs with similar correlates so as to taxonomize them. Together, we may utilize a nomological perspective to understand to what extent traits and state aggregates are “the same thing” (trait-state homomorphy).

A nomological perspective. Nomological homomorphy can be examined with vector correlations or lens models. NoVeCA may represent the usual or traditional approach, although it has not been used to examine trait-state homomorphy yet. ANoLeMA is novel and has, to our knowledge, not yet been used to examine any questions at all.

NoVeCA. To examine their nomological similarity, traits and state aggregates can be correlated *each separately* with a set of correlates, and then the resulting two profiles of *r*-to-*z* transformed correlation coefficients are correlated. The resulting vector correlation indexes how similar nomological correlations were between traits and state aggregates. This piecemeal procedure is straightforward, easy to implement, and has already been utilized in literature (e.g., Miller et al., 2017; Rauthmann & Sherman, 2016a, 2016b). It works especially well when many correlates are used. However, a drawback is

that the NoVeCA does not consider intercorrelations among correlates. The NoLeMA addresses this issue by adopting multiple regressions instead of bivariate correlations.

NoLeMA. When nomological correlates are regressed on *both* the trait and the state aggregate, shared variance among correlates is considered. Such modeling is consistent with the mathematical formulation of a Brunswikian lens model (Brunswik, 1934, 1943, 1952; Hammond, 1980; Hogarth & Karelaia, 2007; Karelaia & Hogarth, 2008). Lens models are commonly used in personality/social psychology to study interpersonal perception (Nestler & Back, 2013). Briefly, a trait is associated with several observable cues that may be used for trait judgments. The correlation between trait scores and judgments is termed achievement. Correlations between traits and cues denote cue validity and those between cues and judgments denote cue utilization. Here, we modify this terminology and say, correlations between traits and state aggregates denote trait-state manifestations, those between traits and correlates denote trait saturation, and those between correlates and state aggregates denote state saturation.

A schematic lens model (Hogarth & Karelaia, 2007) is presented in Figure 1. The left side concerns *trait saturation* R_{trait} which is high when trait data are strongly predictable from nomological correlates. It is modeled within a multiple regression framework as:

$$Y_{trait} = \sum_{i=1}^n b_{trait_i} \cdot X_i + \epsilon_{trait} \quad (1)$$

$$R_{trait} = \rho_{Y_{trait} \hat{Y}_{trait}} \quad (1.1)$$

where Y_{trait} = trait data to be predicted, b_{trait} = regression weights, X_i , $i = 1, \dots, n$ = nomological correlates 1 to n , and ϵ_{trait} = residual error term. Such a regression yields a multiple R that is the correlation between Y_{trait} (actual values) and \hat{Y}_{trait} (predicted values).

The right side of Figure 1 concerns *state saturation* R_{state} , which is high when state data are strongly predictable from correlates. It is modeled as:

$$Y_{state} = \sum_{i=1}^n b_{state_i} \cdot X_i + \epsilon_{state} \quad (2)$$

$$R_{state} = \rho_{Y_{state} \hat{Y}_{state}} \quad (2.1)$$

where Y_{state} = state data to be predicted, b_{state} = regression weights, X_i , $i = 1, \dots, n$ = nomological correlates 1 to n , and ϵ_{state} = residual error term. Such a regression yields a multiple R that is the correlation between Y_{state} (actual values) and \hat{Y}_{state} (predicted values).

Correlating the actual scores Y_{trait} and Y_{state} yields a *trait-state manifestation index* $r_{trait.state}$ (achievement r_a in lens model literature):

$$r_{trait.state} = \rho_{Y_{trait} Y_{state}} \quad (3)$$

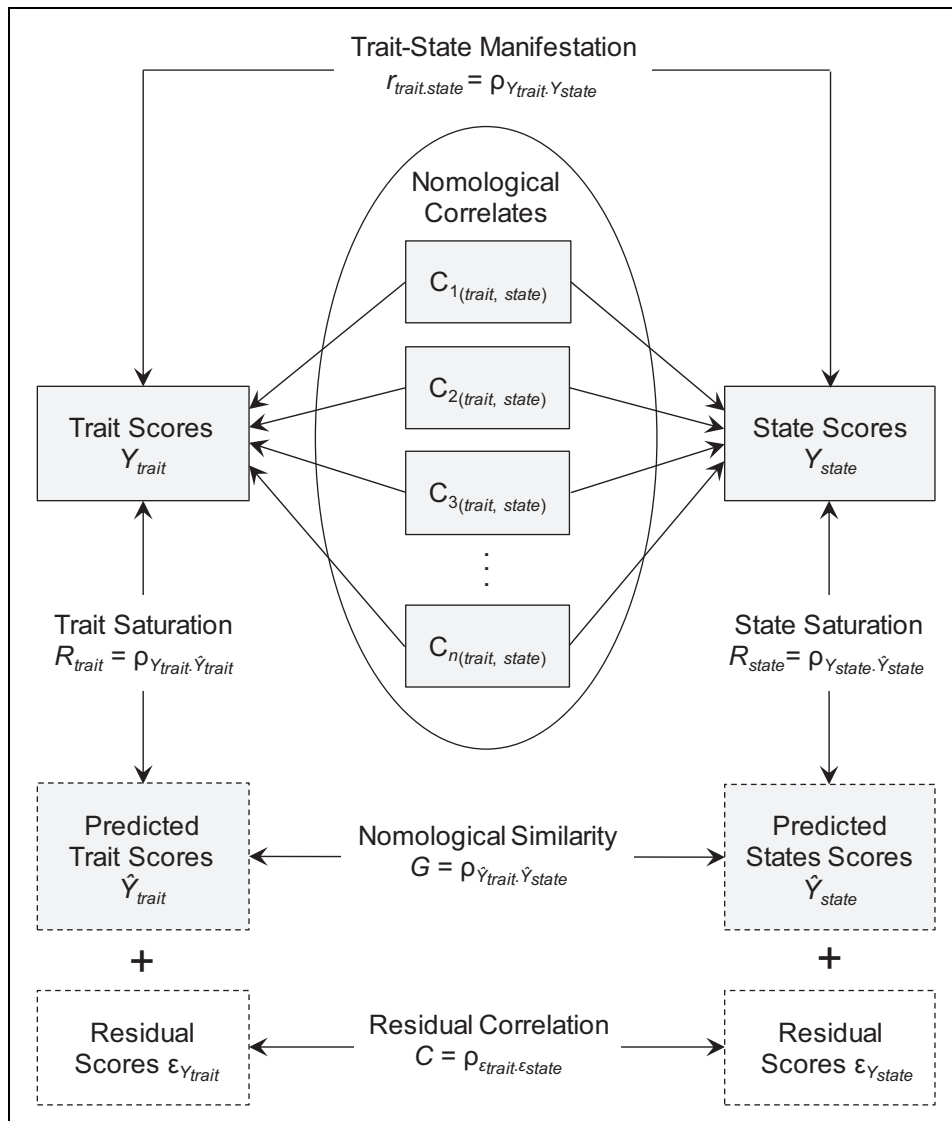


Figure 1. Representation of a nomological lens model.

The convergent correlation between a trait and state aggregate can be diminished for several reasons (e.g., lack of reliability, not enough states aggregated, different measures, or items used). Thus, a small correlation alone is not necessarily indicative of a lack of trait-state homomorphy. Moreover, $r_{trait.state}$ is itself a function of other lens model indices as explained in Equation 6.

The predicted scores \hat{Y}_{trait} and \hat{Y}_{state} can be correlated to obtain a *nomological similarity index*, referred to as the matching index G in lens model literature:

$$G = \rho_{\hat{Y}_{trait}, \hat{Y}_{state}} \quad (4)$$

G represents how well the linear trait saturation model matches that of state saturation: The more the weights and function forms of trait and state saturation correspond, the stronger the correspondence between traits and state aggregates. Put differently, the more similarly traits and state

aggregates are associated with a set of common correlates, the higher G —and thus nomological homomorphy—will be. However, G may be large even if weights do not correspond if there are high intercorrelations among correlates (Castellan, 1992; Dawes & Corrigan, 1974; Einhorn & Hogarth, 1975).²

The error scores $\epsilon_{Y_{trait}}$ and $\epsilon_{Y_{state}}$ can be correlated to obtain a *residual correlation index*, referred to as C in the lens model literature:

$$C = \rho_{\epsilon_{Y_{trait}}, \epsilon_{Y_{state}}} \quad (5)$$

C captures the part of $r_{trait.state}$ that is *not* linearly accounted for due to (a) omitted correlates (i.e., not all might have been available/sampled), (b) configularity (i.e., interactions among correlates), (c) nonlinear relations between correlates and traits or state aggregates, or (d) some combination of these reasons (Gorman, Clover, & Doherty, 1978). C is

equal to the partial correlation between Y_{trait} and Y_{state} controlled for all n correlates X_i .

The indices $r_{trait.state}$, G , and C are related such that $r_{trait.state}$ can be expressed within following lens model equation (Tucker, 1964, p. 528):

$$r_{trait.state} = G \cdot R_{trait} \cdot R_{state} + C \cdot \sqrt{(1 - R_{trait}^2) \cdot (1 - R_{state}^2)} \quad (6)$$

This relation alerts us that the simple correlation $r_{trait.state}$ is composed of different aspects. Indeed, if C was low or zero, Equation 6 would simplify to $r_{trait.state}$ being the product of R_{trait} , R_{state} , and G . Thus, we suggest computing all lens model indices to obtain a fuller picture of the commonly computed $r_{trait.state}$.

The Current Work

Trait-state manifestation concerns the extent to which a trait is expressed in an aggregate of states sampled across a limited range of situations and time.³ In statistical terms, we examine to what extent people's rank orders on a trait are preserved on a state aggregate. For various reasons, we may not expect a perfect rank ordering, and previous literature shows modest trait-state manifestations (Horstmann & Rauthmann, in preparation). However, the extent to which the trait and state aggregate capture the same construct in their respective measurements is a different, though related, question. To address this question of trait-state homomorphy, we contend that the similarity of the nomological networks of a trait and a state aggregate is revealing. If a state aggregate shows a highly similar nomological network as the trait does, then both are relatively nomologically homomorphous.

We examined trait-state homomorphy in two studies with different sets of domains, aspects, and correlates. As traits and states of interest, we used two frameworks containing the widely used Big Five plus additional dimensions: HEXACO (Ashton & Lee, 2007) in Study 1 and Big Five Aspects (BFAS: DeYoung, Quilty, & Peterson, 2007) in Study 2. As nomological correlates, we selected a broad range of person and situation characteristics in both studies.

For person characteristics correlates, we used a measure that assesses a broad variety of enduring traits. Toward this end, we deemed the California Adult Q-Sort (CAQ; Bem & Funder, 1978; Block, 1961, 2008) ideal with its 100 diverse person descriptors, devised to comprehensively measure important person characteristics. Using the CAQ items as correlates is especially fruitful in the NoVeCA that works best with many correlates.

For situation characteristics correlates, we considered theory and research linking persons, situations, and behaviors (Funder, 2006, 2008). Because states are manifested in situations (Fleeson & Jayawickreme, 2015), it makes sense to use situation characteristics as important correlates. We used the Situational Eight DIAMONDS taxonomy that (a) affords a reasonably comprehensive assessment of situation characteristics (Rauthmann et al., 2014; Rauthmann & Sherman, 2016a, 2016b), (b) is

conceptually linked to person variables (Rauthmann, 2016), and (c) shows replicable and meaningful empirical relations to traits and states (Horstmann & Ziegler, in press; Rauthmann, Sherman, Nave, & Funder, 2015; Rauthmann et al., 2014, 2016). Using the DIAMONDS as correlates is especially fruitful in the NoLeMA that works best with few predictors.

Method

Participants and Procedures

Study 1. These data have already been used by Sherman et al. (2015), Rauthmann et al. (2016), and Jones, Brown, Serfass, and Sherman (2017). From 218 ethnically diverse undergraduates at the Florida Atlantic University participating for partial course credit, data from 209 were usable for the current analyses (67.94% women; age: $M = 18.64$, $SD = 1.86$). In the first part of the study, participants provided informed consent, were interviewed, and completed different measures. From this part, we used personality traits and life situations. In the second part, participants received a text message 8 times per day (9 a.m.–11 p.m.) for seven consecutive days, prompting them to fill out an online survey on their *current* states and characteristics of the situation they were in. On average, participants completed about 39 reports. More information on exact experience sampling procedures and preprocessing of data can be found in Sherman et al. (2015, pp.877–878).

Study 2. Of 298 participants, the majority were undergraduate students (58.72% women, 0.67% no indication; age: $M = 21.11$, $SD = 6.21$). In the first part of the study, participants provided informed consent, were interviewed, and completed a variety of personality measures. From this part, we used personality traits. In the second part, participants wore a small photographic camera on their outermost layer of clothing for the duration of their next waking day. The camera automatically took a photograph at 30-s intervals while worn. The following day, participants returned to the laboratory with the camera and were shown their photos. After first being allowed to privately delete any photos they did not want to share, participants divided their photos into situation segments, effectively marking where one situation ended and another began. Participants then rated situation characteristics and states in each situation segment. More information can be found in Brown, Blake, and Sherman (2017).

Measures

Table 1 summarizes all measures for traits, states, and correlates in Studies 1 and 2. Study 1 used HEXACO scales and Study 2 Big Face Aspect Scales plus Honesty and Humility as additional aspects. Further, both studies used as nomological correlates CAQ items (measuring enduring person characteristics) and aggregated daily situations, while Study 1 additionally used life situations (i.e., enduring characteristics of one's typical situations in current life). It is desirable to use nomological correlates that are gathered before, during, or after experience

Table 1. Overview of Measures Used.

Constructs	Study	Scale	Citation	Response Format	Number of Items	Comments
Traits						
HEXACO Domains	1	HEXACO-60	Ashton and Lee (2009)	1 = <i>Strongly disagree</i> 5 = <i>Strongly agree</i>	60 (10 per domain)	Items were mean-aggregated to scale scores ^a
Big Five (and Honesty/Humility) Domains and Aspects States	2	BFAS+H	DeYoung et al. (2007); Lee and Ashton (in press)	1 = <i>Strongly disagree</i> 5 = <i>Strongly agree</i>	120 (20 per domain, 10 per aspect)	Items were mean-aggregated to scale scores ^b
HEXACO Domains	1	HEXACO-60	Sherman et al. (2015), inspired by Fleenon (2007) and Denissen, Geenen, Selfhout, and van Aken (2008)	1 = <i>Left adjective pair</i> 7 = <i>Right adjective pair</i>	6 (one bipolar scale with two adjectives on each extreme pole)	States were mean-aggregated across all measurement occasions within each person.
Big Five (and Honesty/Humility) Domains and Aspects	2	BFAS + H	Sherman et al. (2015), inspired by Fleenon (2007) and Denissen, Geenen, Selfhout, and van Aken (2008)	1 = <i>Left adjective pair</i> 7 = <i>Right adjective pair</i>	12 (one bipolar scale with two adjectives on each extreme pole)	States were mean-aggregated across all measurement occasions within each person.
Situation perceptions: Life situations ^c DIAMONDS	1	Modified RSQ-8	(Rauthmann et al., 2014)	1 = <i>Not at all</i> 3 = <i>Sometimes</i> 5 = <i>All of the time</i>	32 (four per domain)	Participants were asked to rate the typical characteristics of situations in their current life.
Situation perceptions: Daily situations ^d DIAMONDS	1, 2	S8-I	Rauthmann and Sherman (2016a)	1 = <i>Extremely uncharacteristic</i> 7 = <i>Extremely characteristic</i>	Eight (one per domain)	Situation perceptions were mean-aggregated across all measurement occasions within each person.
Person characteristics ^c Single enduring characteristics that describe persons	1, 2	CAQ	Block (1961); Bem and Funder (1978)	1 = <i>Extremely uncharacteristic</i> 9 = <i>Extremely characteristic</i>	100	Items were q-sorted using a forced-choice, quasi-normal distribution.

Note. H = Honesty/Humility, E = Emotionality (Neuroticism), X = eXtraversion (Extraversion), A = Agreeableness, C = Conscientiousness, O = Openness, D = Duty, I = Intellect, A = Adversity, M = Mating, O = pOsitivity, N = Negativity, D = Deception, S = Sociality. ^aAcross all 60 items and 209 participants, seven data points were missing and were imputed by using the mean of the remaining items of that scale. ^bParticipants not completing at least 80% of the items on a scale were not included in analyses. ^cUsed as nomological correlates in Study 1 only. ^dUsed as nomological correlates in Studies 1 and 2.

sampling. Thus, we considered both aggregated daily situation characteristics (assessed during experience sampling along with behavioral states) and midterm stable life situation characteristics and CAQ person characteristics (assessed before experience sampling along with the traits).

Data Analysis

All data and reproducible R code (also customizable to other data sets) can be found openly accessible at <https://osf.io/3x9r5>. Data were analyzed in R (R Core Team, 2016) and RStudio (RStudio Team, 2015) with the following packages: multicon (Sherman, 2015; Sherman & Serfass, 2015), psych (Revelle, 2014), purrr (Wickham, 2016), broom (Robinson, 2016), lme4 (Bates, Maechler, Bolker, & Walker, 2014), xlsx (Dragulescu, 2014), and knitr (Xie, 2016). We performed lens model analyses for three sets of nomological correlates: eight aggregated daily situation characteristics (Studies 1 and 2), eight life situation characteristics (Study 1), and 100 CAQ items (Studies 1 and 2). Because we were interested in nomological homomorphies between traits and state aggregates, we mean aggregated daily situation characteristics within participants.

For a NoVeCA, we first correlated traits and state aggregates each with all nomological correlates. This resulted in vectors of correlations, which were r -to- z transformed and then correlated with each other. For a NoLeMA, we performed lens model analyses using the lensModel function from the multicon package, computing trait, and state saturations as well as r , G , and C indices. The NoVeCA approach works best with many correlates (i.e., 100 CAQ items) as a smaller number of correlates (e.g., Eight DIAMONDS) means a lower reliability of the resulting vector correlations (Sherman & Wood, 2014). In contrast, the NoLeMA works best with fewer predictors (i.e., Eight DIAMONDS) as too many predictors (e.g., 100 CAQ items) may introduce problems of power (larger sample sizes are needed for more predictors), multicollinearity, suppression, and misspecification. These caveats should be taken into account when interpreting findings.

Results

Descriptive statistics of all variables can be found in Table 2. Table 3 presents, at the domain and aspect level, trait-state manifestations and a summary of all findings from the NoVeCA (Online Supplemental Tables A, B, and C) and NoLeMA (Online Supplemental Tables A, D, and E) for Studies 1 and 2. Figure 2 contains a graphical overview of focal findings. Readers interested in the details are referred to the supplemental tables and <https://osf.io/3x9r5>.

Trait-State Manifestations

As seen in Table 3 under r , most trait-state manifestations (correlations between measures of traits and state aggregates) were

small to moderate in both studies for domains (average $r = .27$, range: $-.03$ for Study 2 Honesty/Humility to $.41$ for Study 2 Extraversion) and aspects (average $r = .26$, range: $.03$ – $.43$). As explained previously, this is only one part of a larger picture; indeed, the indices r , G , and r_v were, on average, substantially correlated when correlating the r -to- z transformed vectors of coefficients from Table 3 ($r_s = .73$ – $.81$, $p_s < .001$). Nomological analyses, however, reveal more about to what extent traits and state aggregates were homomorphous.

Nomological Vector Correlations

Domains. Domain-level correlations of traits and state aggregates, respectively, with nomological correlates (DIAMONDS, CAQ) can be found in Online Supplemental Table B for both studies. These correlations served, after r -to- z transformation, as input for vector correlations, found in Table 3 under r_v . Most r_v s were substantial (average = $.84$) and statistically significant. Of the 30 r_v coefficients, six had p values $>.05$ (see light-gray coefficients); these pertained to Honesty/Humility, Emotionality, and Openness. In contrast, eXtraversion, Agreeableness, and Conscientiousness showed the highest r_v s and thus higher nomological trait-state homomorphy.

Aspects. Aspect-level correlations of traits and state aggregates, respectively, with nomological correlates (DIAMONDS, CAQ) can be found in Online Supplemental Table C for both studies. These correlations served, after r -to- z transformation, as input for vector correlations, found in Table 3 under “ r_v .” Most r_v s were substantial (average = $.81$) and statistically significant. Of the 24 r_v coefficients, two had p values $>.05$ (see light-gray coefficients); these pertained to Honesty and Intellect. In contrast, Enthusiasm, Withdrawal, Volatility, and Assertiveness (aspects of Extraversion and Neuroticism, respectively) showed the highest r_v s and thus higher nomological trait-state homomorphy.

Notably, Humility showed markedly different r_v s as a function of correlates used. For aggregated daily DIAMONDS, r_v was $.82$, while it was $-.32$ for CAQ items. This may highlight how the careful selection of nomological correlates is important but also that a vector correlation across only eight coefficients may be less reliable than one across 100 coefficients.

Nomological Lens Models

Domains. Domain-level regressions predicting traits and state aggregates from nomological correlates (DIAMONDS, CAQ) can be found in Online Supplemental Table D for both studies. Notably, Online Supplemental Table D contains regression coefficients that control for the shared overlap between predictors (as opposed to Online Supplemental Table B). Across all domains, studies, and nomological correlates, grand averages were $G = .60$ (range: $.00$ for Study 2 Honesty/Humility using CAQ items to $.95$ for Study 2 Extraversion using aggregated daily situations) and $C = .16$ (range: $-.04$ for Study 2 Honesty/Humility using CAQ items to $.31$ for Study 2 Extraversion

Table 2. Descriptive Statistics and Reliabilities for Variables in Studies 1 and 2.

Variable	Study 1			Study 2		
	M	SD	Rel.	M	SD	Rel.
Traits						
Honesty/Humility	3.33	0.55	.63	3.50	0.33	.77
Honesty	—	—	—	4.08	0.72	.60
Humility	—	—	—	3.88	0.72	.76
Emotionality (Neuroticism)	3.27	0.67	.76	3.02	0.69	.88
Volatility	—	—	—	2.91	0.80	.85
Withdrawal	—	—	—	3.12	0.75	.80
eXtraversion (Extraversion)	3.57	0.62	.79	4.14	0.59	.86
Enthusiasm	—	—	—	4.29	0.69	.82
Assertiveness	—	—	—	3.98	0.68	.80
Agreeableness	3.31	0.63	.75	4.52	0.49	.80
Compassion	—	—	—	4.59	0.60	.81
Politeness	—	—	—	4.44	0.57	.65
Conscientiousness	3.59	0.57	.75	3.99	0.57	.83
Industriousness	—	—	—	4.02	0.68	.80
Orderliness	—	—	—	3.95	0.67	.76
Openness	3.20	0.66	.74	4.22	0.50	.78
Openness	—	—	—	4.14	0.64	.78
Intellect	—	—	—	4.30	0.60	.68
Aggregated States						
Honesty/Humility	5.67	1.06	.46	5.30	1.00	.57
Honesty	—	—	—	5.36	0.98	.49
Humility	—	—	—	5.23	1.08	.56
Emotionality (Neuroticism)	3.50	1.15	.32	2.13	0.85	.35
Volatility	—	—	—	2.05	0.83	.29
Withdrawal	—	—	—	2.20	0.94	.35
eXtraversion (Extraversion)	4.70	1.13	.29	4.80	0.92	.42
Enthusiasm	—	—	—	5.00	1.11	.31
Assertiveness	—	—	—	4.60	1.00	.46
Agreeableness	5.40	1.04	.37	5.30	0.98	.50
Compassion	—	—	—	5.15	1.06	.46
Politeness	—	—	—	5.45	0.98	.45
Conscientiousness	4.86	1.05	.30	5.21	0.99	.44
Industriousness	—	—	—	5.27	1.03	.34
Orderliness	—	—	—	5.15	1.02	.44
Openness	5.12	1.04	.38	4.71	0.94	.48
Openness	—	—	—	4.82	0.96	.39
Intellect	—	—	—	4.60	1.02	.47
Life situations						
Duty	5.62	0.81	.56	—	—	—
Intellect	5.09	0.90	.63	—	—	—
Adversity	2.82	1.08	.70	—	—	—
Mating	3.51	1.08	.60	—	—	—
pOsitivity	5.21	0.82	.64	—	—	—
Negativity	4.30	1.24	.84	—	—	—
Deception	3.07	1.07	.66	—	—	—
Sociality	5.21	0.84	.46	—	—	—
Aggregated daily situations						
Duty	4.19	1.16	.23	3.98	1.26	.23
Intellect	3.35	1.08	.21	3.15	1.09	.21
Adversity	1.69	0.84	.36	1.44	0.75	.34
Mating	2.53	1.21	.29	1.95	1.32	.44
pOsitivity	4.44	1.01	.22	4.63	1.12	.25
Negativity	2.46	1.02	.28	2.06	0.97	.27
Deception	1.68	0.82	.36	1.32	0.75	.52
Sociality	4.04	1.04	.17	4.33	1.27	.21

(continued)

Table 2. (continued)

Variable	Study 1			Study 2		
	M	SD	Rel.	M	SD	Rel.
California Adult-Q-Sort Items						
CAQ01—Critical, skeptical, not easily impressed	4.63	2.14	—	5.20	2.37	—
CAQ02—Genuinely dependable person	7.81	1.23	—	7.90	1.33	—
CAQ03—Has a wide range of interests	7.57	1.65	—	7.73	1.61	—
CAQ04—Is a talkative individual	6.88	1.92	—	6.66	2.20	—
CAQ05—Behaves in a giving way to others	7.51	1.60	—	7.52	1.45	—
CAQ06—Is fastidious	6.16	2.16	—	5.96	2.26	—
CAQ07—Favors conservative values	5.15	2.40	—	4.70	2.63	—
CAQ08—High degree of intellectual capacity	6.89	1.43	—	7.28	1.39	—
CAQ09—Uncomfortable w/uncertainty and complexities	5.20	2.42	—	5.05	2.52	—
CAQ10—Anxiety/Tension find outlet in bodily symptoms	4.46	2.61	—	5.04	2.62	—
CAQ11—Protective of those close to him or her	8.10	1.34	—	8.20	1.27	—
CAQ12—Self-defensive	6.21	2.07	—	5.38	2.12	—
CAQ13—Thin-skinned; Sensitive to criticism	4.44	2.63	—	4.34	2.45	—
CAQ14—Genuinely submissive	3.66	2.25	—	3.97	2.39	—
CAQ15—Skilled in imaginative play, pretending, and humor	7.07	1.74	—	7.23	1.80	—
CAQ16—Introspective	4.87	2.31	—	5.79	2.48	—
CAQ17—Sympathetic/considerate	7.72	1.37	—	7.85	1.34	—
CAQ18—Initiates humor	7.56	1.47	—	7.52	1.61	—
CAQ19—Seeks reassurance from others	5.67	2.47	—	5.79	2.28	—
CAQ20—Rapid personal tempo	6.04	2.18	—	5.95	2.18	—
CAQ21—Arouses nurturant feelings in others	5.75	2.04	—	6.30	1.99	—
CAQ22—Feels lack of personal meaning in life	3.14	2.46	—	3.42	2.50	—
CAQ23—Transfers/projects blame	2.85	2.06	—	3.34	2.07	—
CAQ24—Prides self on being objective/rational	5.55	2.26	—	6.57	1.98	—
CAQ25—Delays gratification unnecessarily	4.60	2.26	—	5.01	2.33	—
CAQ26—Productive; gets things done	7.14	1.72	—	7.16	1.69	—
CAQ27—Condescending to others	4.11	2.43	—	3.94	2.30	—
CAQ28—Arouses liking and acceptance	6.60	1.79	—	6.81	1.59	—
CAQ29—Turned to for advice/reassurance	7.28	1.86	—	7.26	1.58	—
CAQ30—Gives up in face of frustration/adversity	3.57	2.37	—	3.50	2.34	—
CAQ31—Regard self as physically attractive	5.93	1.99	—	6.31	2.11	—
CAQ32—Aware of impression made on others	6.40	1.96	—	6.89	1.65	—
CAQ33—Calm; relaxed in manner	6.86	1.83	—	6.82	1.94	—
CAQ34—Overreactive to minor frustrations	4.19	2.35	—	4.35	2.44	—
CAQ35—Warmth; capacity for close relationships	7.99	1.30	—	7.89	1.43	—
CAQ36—Negativistic; tends to undermine/sabotage	2.65	1.84	—	3.59	2.27	—
CAQ37—Guileful, deceitful, and manipulative	2.64	2.13	—	3.31	2.34	—
CAQ38—Hostile toward others	2.39	1.76	—	3.00	2.01	—
CAQ39—Unconventional thought process	5.03	2.46	—	6.40	2.17	—
CAQ40—Generally fearful	2.80	2.05	—	3.81	2.29	—
CAQ41—Moralistic	7.04	1.88	—	7.46	1.53	—
CAQ42—Reluctant to commit to course of action	4.23	2.34	—	4.13	2.34	—
CAQ43—Facially/gesturally expressive	6.82	1.90	—	7.28	1.80	—
CAQ44—Evaluates motivations of others	6.74	1.67	—	7.15	1.53	—
CAQ45—Brittle ego-defense system	3.79	2.26	—	4.15	2.38	—
CAQ46—Fantasizes/daydreams	5.91	2.51	—	6.53	2.25	—
CAQ47—Readiness to feel guilt	5.17	2.50	—	5.67	2.42	—
CAQ48—Keeps people at a distance	3.31	2.37	—	3.75	2.38	—
CAQ49—Basically distrustful of others	3.47	2.52	—	4.19	2.47	—
CAQ50—Unpredictable in behavior/attitudes	3.68	2.51	—	4.25	2.50	—
CAQ51—Values intellectual/cognitive matters	7.13	1.54	—	7.84	1.34	—
CAQ52—Behaves in an assertive fashion	5.78	2.21	—	5.85	2.02	—
CAQ53—Unable to delay gratification	4.56	2.14	—	4.71	2.26	—
CAQ54—Emphasizes being w/others	6.02	2.05	—	6.21	2.09	—
CAQ55—Self-defeating	4.17	2.36	—	4.13	2.42	—
CAQ56—Responds to humor	8.17	1.06	—	8.30	1.05	—

(continued)

Table 2. (continued)

Variable	Study 1			Study 2		
	M	SD	Rel.	M	SD	Rel.
CAQ57—Interesting, arresting person	6.84	1.61	—	7.03	1.53	—
CAQ58—Enjoys sensuous experiences	7.71	1.51	—	7.84	1.60	—
CAQ59—Concerned with own body	6.43	2.29	—	6.86	1.98	—
CAQ60—Insight into own motives/behaviors	7.25	1.51	—	7.46	1.48	—
CAQ61—Creates/exploits dependency in others	3.95	2.31	—	3.65	2.40	—
CAQ62—Rebellious/nonconforming	3.77	2.49	—	5.20	2.30	—
CAQ63—Judges self and others in conventional terms	4.33	2.24	—	5.65	2.12	—
CAQ64—Is socially perceptive	5.68	1.84	—	6.90	1.83	—
CAQ65—Pushes/tries to stretch limits	5.74	2.24	—	6.75	1.92	—
CAQ66—Enjoys esthetic impressions	5.52	1.78	—	6.65	1.92	—
CAQ67—Is self-indulgent	5.04	2.09	—	5.48	2.16	—
CAQ68—Is basically anxious	4.27	2.46	—	5.07	2.51	—
CAQ69—Sensitive to anything that could be a demand	4.28	2.30	—	5.03	2.21	—
CAQ70—Behaves in ethically consistent manner	6.58	1.83	—	7.31	1.62	—
CAQ71—High aspiration level for self	7.17	1.85	—	7.54	1.73	—
CAQ72—Concerned w/own adequacy as a person	6.61	1.95	—	6.71	2.06	—
CAQ73—Perceives contexts in sexual terms	4.74	2.29	—	4.92	2.43	—
CAQ74—Subjectively unaware of self; satisfied w/self	5.58	2.12	—	5.64	2.26	—
CAQ75—Clear-cut internal personality	6.22	2.12	—	6.68	1.97	—
CAQ76—Projects own feelings onto others	6.19	2.19	—	6.53	1.98	—
CAQ77—Straightforward, forthright, and candid	6.94	1.82	—	7.18	1.69	—
CAQ78—Feels cheated/victimized by life	2.56	1.95	—	2.87	2.15	—
CAQ79—Tends to ruminate	4.95	2.31	—	6.42	2.05	—
CAQ80—Interested in members of opposite sex	8.06	1.74	—	7.97	1.96	—
CAQ81—Is physically attractive	6.26	2.00	—	6.49	2.01	—
CAQ82—Has fluctuating moods	4.87	2.39	—	4.96	2.48	—
CAQ83—Sees heart of important problems	7.41	1.43	—	7.54	1.41	—
CAQ84—Is cheerful	7.23	1.68	—	7.30	1.60	—
CAQ85—Emphasizes communication non-verbally	6.56	1.98	—	6.49	2.07	—
CAQ86—Suppresses anxiety/conflicts	4.69	2.25	—	4.43	2.47	—
CAQ87—Interprets simple situations in complex ways	5.37	2.27	—	5.69	2.46	—
CAQ88—Is personally charming	6.78	1.63	—	6.93	1.73	—
CAQ89—Compares self to others	5.55	2.46	—	5.83	2.28	—
CAQ90—Concerned w/philosophical problems	5.16	2.18	—	5.92	2.43	—
CAQ91—Is power oriented	6.04	2.04	—	6.54	2.05	—
CAQ92—Has social poise/presence	6.75	1.86	—	6.67	1.97	—
CAQ93—Behaves in gender consistent manner	7.17	1.90	—	6.41	2.34	—
CAQ94—Expresses hostile feelings directly	3.67	2.39	—	3.96	2.34	—
CAQ95—Tends to proffer advice	7.56	1.71	—	7.62	1.45	—
CAQ96—Values own independence	7.50	1.51	—	7.79	1.38	—
CAQ97—Emotionally bland; flattened affect	3.13	2.21	—	2.84	2.07	—
CAQ98—Verbally fluent	6.55	1.94	—	6.83	2.05	—
CAQ99—Self-dramatizing; Histrionic	4.15	2.04	—	4.42	2.36	—
CAQ100—Does not vary roles	4.56	2.46	—	5.20	2.60	—

Note. Study 1: $N = 209$. Study 2: $N = 298$. Reliabilities for traits and life situations are indexed by Cronbach's α s, while those for state aggregates and situations are indexed by ICCs. The Situational Eight DIAMONDS (as life situations as well as aggregated daily situations) and the CAQ items were used as nomological correlates. The exact CAQ items can be found at <http://rap.ucr.edu/qsorter/CAQadapted.htm> and <http://rap.ucr.edu/qsorter/CAQ-Revised.pdf>. Rel. = reliability.

using aggregated daily situations). Typically, as summarized in the upper panel of Figure 2 under "Domains," the nomological trait-state homomorphy as indexed by G was larger for eXtraversion, Conscientiousness, and Agreeableness while lower for Emotionality/Neuroticism, Honesty/Humility, and Openness.

Aspects. Aspect-level regressions predicting traits and state aggregates from nomological correlates (DIAMONDS, CAQ)

can be found in Online Supplemental Table E for both studies, containing regression coefficients that control for the shared overlap between predictors (as opposed to Online Supplemental Table C). Across all aspects and nomological correlates, grand averages were $G = .55$ (range: $-.15$ for Humility to $.88$ for both Withdrawal and Enthusiasm, using aggregated daily situations) and $C = .16$ (range: $.00$ for Assertiveness using CAQ items to $.34$ for Enthusiasm using aggregated daily

Table 3. Lens Model and Vector Correlation Statistics.

Domains and Aspects	Lens Model Findings							Vector Correlation Findings			
	Trait Saturation		State Saturation		Correlations			r_v	95% CI	t	p
	R_{trait}	Abs. \bar{b}_{trait}	R_{state}	Abs. \bar{b}_{state}	r	G	C				
Study 1: Aggregated daily situations											
Honesty/Humility	.36	.10	.57	.20	.27	.74	.15	.94	[.68, .99]	6.52	.001
Emotionality	.42	.13	.48	.18	.18	.30	.15	.10	[-.65, .75]	0.24	.822
eXtraversion	.34	.08	.48	.26	.37	.77	.29	.92	[.59, .98]	5.56	.001
Agreeableness	.33	.05	.67	.25	.29	.83	.16	.99	[.95, 1.00]	17.50	.000
Conscientiousness	.29	.05	.46	.25	.33	.76	.27	.89	[.48, .98]	4.69	.003
Openness	.20	.06	.48	.23	.18	.11	.20	.61	[-.17, .92]	1.88	.109
Study 1: Life situations											
Honesty/Humility	.39	.07	.44	.15	.27	.44	.24	.68	[-.05, .94]	2.25	.065
Emotionality	.48	.10	.17	.06	.18	.53	.16	.67	[-.06, .93]	2.24	.066
eXtraversion	.57	.09	.34	.12	.37	.91	.24	.96	[.79, .99]	8.49	.000
Agreeableness	.34	.06	.50	.16	.29	.82	.19	.93	[.65, .99]	6.19	.001
Conscientiousness	.46	.09	.38	.12	.33	.84	.22	.93	[.64, .99]	6.05	.001
Openness	.30	.07	.43	.13	.18	.33	.16	.11	[-.65, .76]	0.27	.797
Study 1: CAQ items											
Honesty/Humility	.77	.02	.80	.05	.27	.36	.14	.72	[.61, .81]	10.37	.000
Emotionality	.89	.03	.78	.06	.18	.21	.12	.34	[.15, .50]	3.55	.001
eXtraversion	.92	.02	.78	.06	.37	.50	.06	.90	[.86, .93]	20.52	.000
Agreeableness	.84	.03	.81	.05	.29	.42	.02	.80	[.71, .86]	13.08	.000
Conscientiousness	.88	.02	.81	.05	.33	.45	.05	.84	[.77, .89]	15.27	.000
Openness	.84	.03	.80	.06	.18	.21	.14	.53	[.38, .66]	6.26	.000
Study 2: Aggregated daily situations											
Honesty/Humility	.09	.01	.42	.08	-.03	.12	-.03	-.05	[-.73, .68]	-0.12	.910
Honesty	.22	.06	.45	.09	.12	.24	.11	.58	[-.21, .91]	1.75	.131
Humility	.15	.03	.36	.09	.03	-.15	.05	.82	[.26, .97]	3.45	.014
Neuroticism	.33	.08	.57	.12	.40	.89	.30	.95	[.73, .99]	7.26	.000
Volatility	.25	.08	.55	.11	.30	.84	.23	.96	[.80, .99]	8.63	.000
Withdrawal	.35	.10	.55	.14	.43	.88	.33	.92	[.63, .99]	5.96	.001
Extraversion	.33	.06	.51	.13	.41	.95	.31	.99	[.92, 1.00]	14.51	.000
Enthusiasm	.31	.07	.56	.16	.42	.88	.34	.95	[.76, .99]	7.75	.000
Assertiveness	.26	.06	.39	.12	.32	.86	.26	.91	[.59, .98]	5.54	.001
Agreeableness	.26	.03	.45	.10	.27	.44	.25	.87	[.43, .98]	4.32	.005
Compassion	.25	.04	.41	.09	.28	.56	.25	.88	[.48, .98]	4.65	.003
Politeness	.21	.02	.44	.12	.19	.22	.19	.79	[.20, .96]	3.20	.019
Conscientiousness	.30	.06	.39	.11	.36	.85	.30	.93	[.67, .99]	6.35	.001
Industriousness	.34	.08	.39	.12	.33	.78	.26	.87	[.44, .98]	4.40	.005
Orderliness	.18	.03	.37	.11	.30	.78	.27	.80	[.23, .96]	3.31	.016
Openness	.17	.03	.43	.11	.22	.68	.19	.76	[.11, .95]	2.84	.029
Openness	.17	.04	.44	.10	.25	.85	.21	.86	[.38, .97]	4.05	.007
Intellect	.18	.04	.40	.14	.15	.19	.15	.16	[-.61, .78]	0.41	.699
Study 2: CAQ items											
Honesty/Humility	.62	.01	.67	.04	-.03	.00	-.04	.18	[-.02, .36]	1.81	.073
Honesty	.75	.03	.66	.04	.12	.15	.10	.53	[.37, .66]	6.17	.000
Humility	.78	.02	.68	.04	.03	-.04	.12	-.32	[-.49, -.13]	-3.34	.001
Neuroticism	.91	.02	.71	.03	.40	.57	.11	.93	[.89, .95]	24.42	.000
Volatility	.86	.02	.69	.03	.30	.46	.07	.87	[.81, .91]	17.55	.000
Withdrawal	.90	.02	.72	.03	.43	.62	.10	.94	[.92, .96]	27.92	.000
Extraversion	.90	.01	.72	.04	.41	.62	.03	.95	[.92, .96]	29.24	.000
Enthusiasm	.88	.02	.72	.04	.42	.62	.09	.92	[.89, .95]	23.77	.000
Assertiveness	.86	.02	.71	.04	.32	.51	.00	.91	[.87, .94]	21.66	.000
Agreeableness	.85	.02	.67	.04	.27	.37	.14	.73	[.62, .81]	10.58	.000
Compassion	.82	.02	.68	.04	.28	.44	.09	.79	[.70, .85]	12.81	.000
Politeness	.80	.02	.66	.04	.19	.20	.17	.56	[.41, .68]	6.75	.000
Conscientiousness	.86	.02	.70	.03	.36	.49	.18	.91	[.87, .94]	22.16	.000
Industriousness	.88	.02	.68	.03	.33	.52	.04	.92	[.89, .95]	23.45	.000
Orderliness	.80	.02	.70	.04	.30	.36	.23	.79	[.70, .85]	12.78	.000

(continued)

Table 3. (continued)

Domains and Aspects	Lens Model Findings							Vector Correlation Findings			
	Trait Saturation		State Saturation		Correlations			r_v	95% CI	t	p
	R_{trait}	Abs. \bar{b}_{trait}	R_{state}	Abs. \bar{b}_{state}	r	G	C				
Openness	.83	.02	.68	.04	.22	.36	.03	.66	[.54, .76]	8.80	.000
Openness	.84	.02	.65	.03	.25	.42	.06	.79	[.71, .86]	12.86	.000
Intellect	.78	.02	.69	.04	.15	.22	.07	.27	[.08, .44]	2.76	.007

Note. Study 1: $N = 209$. Study 2: $N = 298$. The Situational Eight DIAMONDS ($k = 8$) and the California Adult Q-Sort (CAQ) items ($k = 100$) were treated as nomological correlates. Bold-faced indices and values are “preferred” ones: DIAMONDS with eight predictors is preferred over CAQ with 100 items for the nomological lens model approach; and CAQ with 100 correlates is preferred over DIAMONDS with 8 predictors for the nomological vector-correlation approach. R_{trait} = trait saturation (multiple correlation); Abs. \bar{b}_{trait} = average of absolute regression coefficients for trait saturations in Table B (left side); R_{state} = state saturation (multiple correlation); Abs. \bar{b}_{state} = average of absolute regression coefficients for aggregated state saturations in Table B (right side); r = regular correlation between a trait and a corresponding aggregated state (trait-state manifestation, achievement); G = nomological similarity or matching index; C = residual correlation index; r_v = vector (profile) correlation (across eight correlates: $df = 6$; across 100 correlates: $df = 98$), with those not statistically significant at $p < .05$ appearing in light gray.

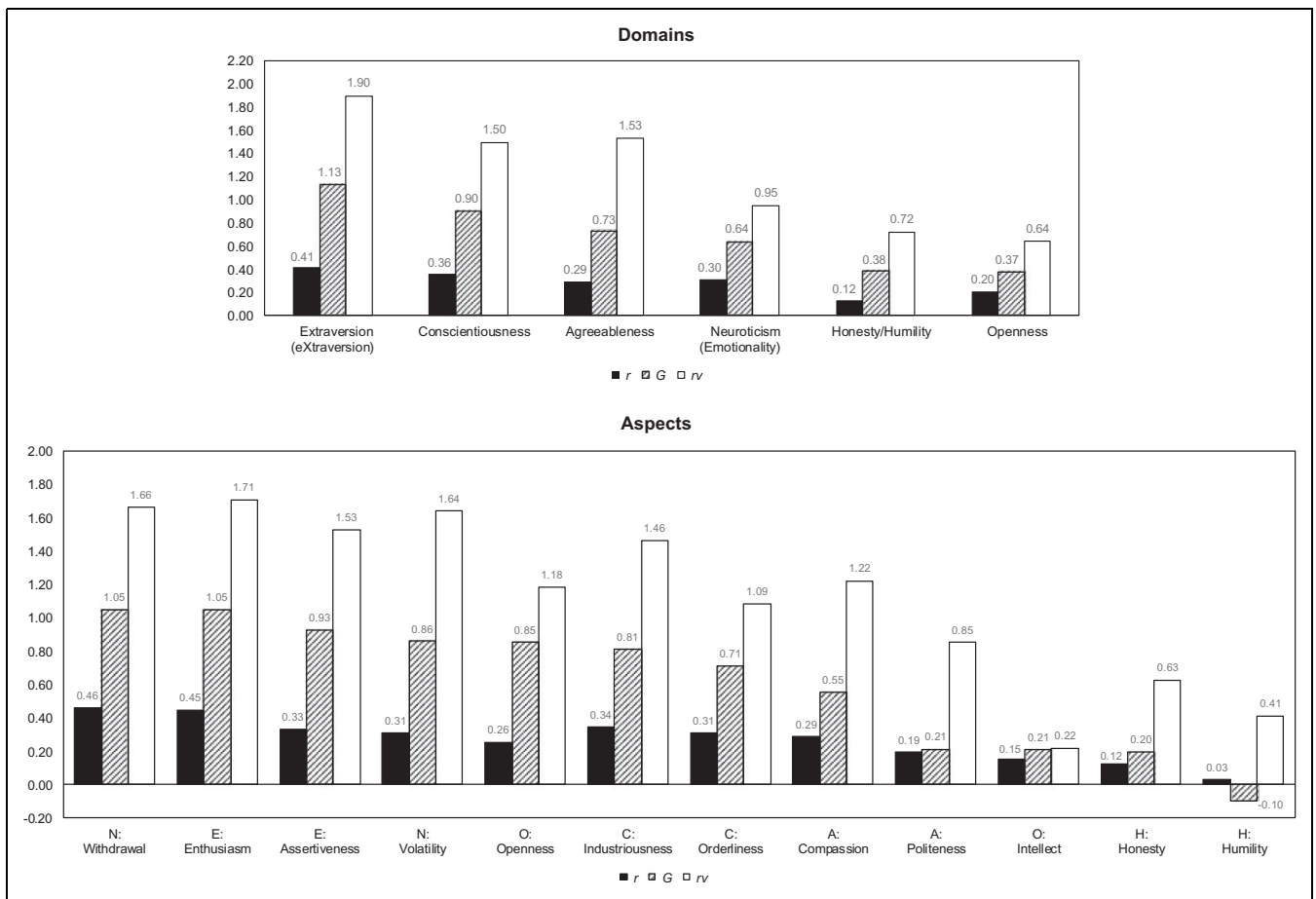


Figure 2. Averaged trait-state homomorphy indices per domain and aspects. y-axis = r -to- z transformed correlation coefficients. x-axis: Domains or aspects sorted according to descending G . Domains or aspects on the left show more nomological trait-state homomorphy, domains, or aspects on the right less. Domain and aspect scores from Table 3 were used. Domain labels of aspects (lower panel): H = Honesty/Humility, N = Neuroticism, E = Extraversion, A = Agreeableness, C = Conscientiousness, O = Openness. Average findings per domain were computed across Studies 1 and 2 and those per aspect only in Study 2. r (black bars) = zero-order correlation between a trait and an aggregated state (trait-state manifestation), G (striped bars) = nomological similarity index, r_v (white bars) = vector correlations. As all coefficients are essentially correlations, they are depicted in r -to- z transformed units.

Table 4. Replication of Rank-Orderings Among Domains and Aspects.

Scales	Trait-State Manifestations <i>r</i>		Eight Aggregated Daily Situation Characteristics				Eight Characteristics of Life Situations				100 CAQ Person Descriptors			
	Study 1	Study 2	Study 1		Study 2		Study 1		Study 2		Study 1		Study 2	
			<i>G</i>	<i>r_v</i>	<i>G</i>	<i>r_v</i>	<i>G</i>	<i>r_v</i>	<i>G</i>	<i>r_v</i>	<i>G</i>	<i>r_v</i>	<i>G</i>	<i>r_v</i>
Domains														
Honesty/Humility	4	6	4	2	6	6	5	4	—	—	4	4	6	6
Emotionality/Neuroticism ^a	5	2	5	6	2	2	4	5	—	—	5	6	2	2
eXtraversion/Extraversion ^b	1	1	2	3	1	1	1	1	—	—	1	1	1	1
Agreeableness	3	4	1	1	5	4	3	3	—	—	3	3	4	4
Conscientiousness	2	3	3	4	3	3	2	2	—	—	2	2	3	3
Openness	6	5	6	5	4	5	6	6	—	—	6	5	5	5
Aspects^c														
Honesty/Humility														
Honesty	—	10	—	—	7	11	—	—	—	—	—	—	10	7
Humility	—	11	—	—	10	8	—	—	—	—	—	—	11	9
Neuroticism														
Volatility	—	5	—	—	4	1	—	—	—	—	—	—	4	4
Withdrawal	—	1	—	—	1	3	—	—	—	—	—	—	1	1
Extraversion														
Enthusiasm	—	2	—	—	1	2	—	—	—	—	—	—	1	2
Assertiveness	—	4	—	—	2	4	—	—	—	—	—	—	3	3
Agreeableness														
Compassion	—	6	—	—	6	5	—	—	—	—	—	—	5	5
Politeness	—	8	—	—	8	10	—	—	—	—	—	—	9	6
Conscientiousness														
Industriousness	—	3	—	—	5	6	—	—	—	—	—	—	2	2
Orderliness	—	5	—	—	5	9	—	—	—	—	—	—	7	5
Openness														
Openness	—	7	—	—	3	7	—	—	—	—	—	—	6	5
Intellect	—	9	—	—	9	12	—	—	—	—	—	—	8	8

Note. Rank-orders are given such that *smaller* numbers indicate *more* trait-state homomorphy (e.g., 1 is the highest possible value) and larger numbers decreasingly lower homomorphy. Ties got the same rank. Ties were possible if correlations were identical when rounded to two decimals. Bold-faced ranks mean that the respective index (*G* or *r_v*) may be favored in that instance. The nomological vector-correlation approach, with the index *r_v*, should be favored when using many correlations (100 CAQ items) as opposed to few (Eight DIAMONDS). The Nomological Lens Model Approach, with the index *G*, should be favored when using few predictors (Eight DIAMONDS) as opposed to many (100 CAQ items).

^aEmotionality (within the HEXACO model) was used for Study 1, and Neuroticism (within the Big Five Aspects model) in Study 2. ^beXtraversion (within the HEXACO model) was used for Study 1, and Extraversion (within the Big Five Aspects model) in Study 2. ^cThe aspects showed multiple rank ties. Thus, the last possible ranks ranged from 9 to 12.

situations). Typically, as summarized in the lower panel of Figure 2 under “Aspects,” the nomological trait-state homomorphy as indexed by *G* was larger for Withdrawal, Enthusiasm, Assertiveness, and Volatility (aspects of Extraversion and Neuroticism, respectively) while lower for Intellect, Honesty, and Humility.

Replication

To gauge levels of replicability across both studies and/or across sets of nomological correlates (life situations vs. aggregated daily situations vs. CAQ), Table 4 summarizes findings from Table 3 in terms of *rank ordering* domains and aspects. While there was no perfect replication, the *general pattern* of findings replicated fairly well with only few exceptions.

Discussion

Summary and Interpretation

Using a nomological perspective, we proposed a way of estimating the extent to which traits and state aggregates actually tap the same construct—in *addition to* looking at the raw convergent correlation (trait-state manifestation *r*). If a trait and a corresponding state aggregate show the same associations with a set of correlates, then both likely tap the same construct as defined per a common nomological network. Across both studies, convergent correlations indexing trait-state manifestations in daily life were rather modest, while the typical nomological trait-state homomorphy was quite sizable although differed substantially by domain and aspect (Figure 2). Specifically, trait and state aggregate assessments of eXtraversion, Agreeableness, and Conscientiousness were particularly nomologically homomorphous, while those for Honesty/Humility,

emotionality, and Openness were less so. This general picture notwithstanding, there are some specific observations to make when looking at Table 4.

First, the central indices r_v for the NoVeCA and G for the NoLeMA did not show perfect convergence but still converged quite often when rank ordering domains and aspects. Thus, more often than not, we would reach the same conclusions. However, a NoVeCA will be strongest for many and a NoLeMA for few correlates. We opted to show findings for both approaches to facilitate vis-à-vis comparisons, but NoVeCA findings with the CAQ items as correlates and NoLeMA findings with the DIAMONDS as predictors may be deemed more appropriate, respectively (see bold-faced values in Tables 3 and 4).

Second, as evident from Table 4 and Figure 2, eXtraversion/Extraversion, in terms of a domain and its aspects (especially Enthusiasm), was the most nomologically homomorphous. In contrast, Openness (especially the Intellect aspect) and Honesty/Humility uniformly showed low nomological homomorphy—in other words, state aggregates were picking up something else than trait scales. The matter was more complex for emotionality/Neuroticism and Agreeableness. Emotionality within the HEXACO model (Study 1) was less and Neuroticism within the Big Five Aspects model (Study 2) more nomologically homomorphous; this was reversed for Agreeableness which was more homomorphous in Study 1 than in Study 2 (see Table 4). These findings alert us to the pragmatic truth that constructs are operationalized in both conceptual and measurement terms. In our case, not only did the measures differ between Studies 1 and 2 but also their conceptual foundations. Specifically, HEXACO emotionality and Agreeableness represent rotated variants of more “traditional” Big Five scales (e.g., Ashton & Lee, 2007, p. 152). Thus, HEXACO Emotionality and Agreeableness scales may behave differently than BFAS scales.

As we formed no a priori hypotheses which domains or aspects would show more or less nomological trait-state homomorphy, we can only speculate on the observed differences in Table 4 and Figure 2. However, it seems that, for some reason, rather observable and social dimensions (e.g., being extraverted, enthusiastic, assertive, withdrawn, volatile, and conscientious) tended toward more while those less observable, requiring more introspection, and pertaining more to internal mental processes (e.g., being anxious, intellectual, honest, and humble) tended toward less homomorphy. Interestingly, these findings stand in line with other research demonstrating that less observable and behaviorally manifest traits, such as Neuroticism and Openness, coincide with lesser self-other agreement (Funder & Dobroth, 1987; John & Robins, 1993; Vazire, 2010) and less true trait variance in single other ratings (Rauthmann, 2017).

Future Directions, Recommendations, and Caveats

The raw correlation between a trait and a state aggregate (trait-state manifestation) is already important and meaningful

information. However, in psychometric terms, this is only evidence for convergent validity. We suggest that researchers additionally make use of nomological validity by attending to the similarity of nomological networks of trait and state aggregate measures. We anticipate that our nomological perspective would be especially useful when trait- and state measures are not entirely commensurate, for example, when (a) different items (in nature and number) were used, (b) response scale units are not the same, or (c) the constructs are similar yet still different (e.g., the trait is measured as a domain vs. the state as an aspect, facet, or nuance; DeYoung et al., 2007; Möttus, Kandler, Bleidorn, Riemann, & McCrae, 2017). More generally, however, our approach can help *empirically* address jingle (different constructs/scales are erroneously presumed to be identical because they share the same label) and jangle problems (identical constructs/scales are erroneously presumed to be different because they each have a different label).

Our findings harbor implications for (short) scale development: More care could be devoted to constructing nomologically homomorphous trait- and state measures for certain domains or aspects. Researchers may, for example, examine the “ABCD” (affect, behavior, cognition, and desire) content of items and scales (Wilt & Revelle, 2015). Those scales with more affective, cognitive, and/or motivational or less behavioral content could show less trait-state homomorphy although this remains a hypothesis to be tested specifically in further research.

The NoVeCA and NoLeMA presented here are flexible and can be extended to other person characteristics (e.g., self-esteem and happiness) that may be assessed as traits and states. Moreover, because nomological networks are defined by the sample of correlates used, the networks of focal constructs need to be selected with great care. Theory or previous empirical work may guide which correlates to select and how they are associated with the focal scales. In some cases, there may be no prior theory to rely on, or existing theories provide no clear recommendations for nomological networks. Then, prior empirical evidence is more informative, but this could entail a too narrow sampling of correlates. While a representative set of correlates would be desirable, key questions are which variables such a “representative” set would encompass and whether measurement tools are available. As trait-state homomorphy is quantified in relation to a common set of nomological correlates, findings may change somewhat depending on which correlates are chosen (see Table 4). Ideally, a chosen set would *balance* correlates (of similar or identical reliability) that should be positively, negatively, and barely associated with the focal construct. Thus, we recommend that future research replicates and extends our findings (specifically the rank orderings in Table 4 and Figure 2) using different nomological correlates, trait- and state measures, and samples (e.g., community samples and other countries).

We advise researchers to carefully select a NoVeCA and NoLeMA. The NoVeCA works best with many correlates, but the theoretical relevance, reliability, intercorrelations, and labeling of the correlates need to be considered. Further, the

NoVeCA may be improved by using modified correlational indices ($r_{alerting-CV}$ and $r_{contrast-CV}$) proposed in the quantification of construct validity approach by Westen and Rosenthal (2003), although their interpretation and computation has so far not been easy. The NoLeMA works best with few correlates, but the same issues as in the NoVeCA need to be considered plus the fact that each predictor is being controlled for all other ones, and such partialling may create issues of interpretability (What is the single predictor residually capturing when everything else is being held constant?).

We have left open what constitutes a high (or low) G or r_v . This question may only be explored once more data come in and empirically derived cutoffs can be defined. For now, we endorse comparing domains, aspects, or facets *relatively* to each other (see Figure 2). However, perfect comparability is only given with identical amounts of items and reliabilities of trait and state aggregate scales and when the same sets of correlates were used.

It is also important to think about conceptual and methodological forms of asymmetries between traits and states. Conceptually, traits are something different than states (Baumert et al., 2017). Although the complete observation of all states (within a long enough period) should approximate a trait reasonably well, short “bursts” of measurement (such as in experience sampling) may not be sufficient to fully get at the trait. Methodologically, traits and states are often operationalized via self-reports (as done here) and not via actual behavior, although states are actually tied more closely to concrete behavior. Further, traits are usually measured with several items, while states in experience sampling often with single or very few items. Thus, there are asymmetries between trait- and state measures in breadth and reliability. These issues can impact findings in Table 3.

Conclusion

Convergent correlations between self-reported traits and aggregated states from repeated measurements are not sufficient alone to establish trait-state homomorphy (i.e., whether the same construct is being measured). While high trait-state manifestation correlations are desirable, it is more stringent to test to what extent the nomological networks of traits and state aggregates are similar to each other. Within a nomological perspective manifesting in a NoVeCA and NoLeMA, we introduced the concept of nomological trait-state homomorphy: Measures of a trait and state aggregate capture the same construct when both show relatively similar nomological associations to a common set of correlates. We found that trait and state aggregate measures of some domains (e.g., eXtraversion/Extraversion) showed stronger nomological homomorphy than others (e.g., Openness and Honesty/Humility). Although we framed our nomological perspective in terms of the question to what extent traits and state aggregates capture the same constructs, it is more general and can be used whenever two scales should be examined for homomorphy. Our approaches can thus be flexibly applied to other traits, states, and correlates.

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Supplemental Material

The supplemental material is available in the online version of the article.

Notes

1. Sometimes stability of the nomological network across time points also needs to be examined because measurements of scales are far apart (e.g., childhood–adulthood). This is not the case in experience sampling studies where trait, state, and correlate reports are usually provided in proximity to each other (Fleeson & Gallagher, 2009).
2. In the case of too many single correlates and/or them being too highly intercorrelated, it is possible to run a principal component analysis over all correlates and then use the resulting dimensions as correlates. If the correlates cannot or should not be reduced, then the nomological vector correlation approach is advisable.
3. It may *vice versa* also concern how a state aggregate approximates a trait.

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