

Supplemental Material S3. Full results from the Descriptive IRT Model (1-PL IRT with random item effect).

The following tables show the random and fixed effects (Table S3-1), item difficulty estimates and their standard errors (Table S3-2), and person ability estimates and their standard errors from the best-fitting descriptive IRT model (i.e., 1-PL IRT with random item effect, as described in the paper). Model fit indices are displayed in Table S3-3.

Given that we previously reported IRT item and person parameter estimates for the VNT (see Fergadiotis et al., 2023) using the traditional fixed effect for items and with a different estimation method (weighted least squares mean- and variance-adjusted estimator), we additionally calculated and plotted correlations between item difficulty estimates (Figure S3-1) and person ability estimates (Figure S3-2) between the two studies to illustrate their comparability.

Table S3-1

Random and Fixed Effects of the Descriptive IRT Model

Fixed Effects	Estimate	Estimate	SE ^a	z-statistic	p-value
	(Logit)	(Odds Ratio)			
Intercept	-0.184	0.832	0.260	-0.71	0.478
Random Effects		Variance			
Person	2.141				
Item	0.978				

Note. Transformation of parameter estimates from the logit scale to an odds ratio was calculated using the following formula: exp(logit).

^aSE=standard error

Table S3-2

Item Difficulty Estimates and Their Standard Errors

VNT Item			
No. ^a	Target Verb	Estimate	SE ^b
1	cut	-0.518	0.247
2	bark	-1.119	0.256

3	put	2.220	0.316
4	send	0.392	0.249
5	drive	-0.862	0.251
6	wash	-0.713	0.249
7	read	0.197	0.247
8	laugh	-1.624	0.271
9	watch	0.798	0.251
10	give	0.798	0.256
11	swim	-1.811	0.278
12	stir	0.439	0.250
13	pinch	-0.232	0.246
14	crawl	0.442	0.250
15	deliver	1.025	0.263
16	pour	0.539	0.251
17	howl	0.392	0.249
18	throw	0.798	0.256
19	bite	-0.279	0.246
20	shove	-0.137	0.246
21	tickle	0.343	0.249
22	shave	-0.924	0.253

Note. As with all IRT models specified using a logit distribution, higher values indicate greater item difficulty on the logit scale. As with item covariate effect estimates (see Table 4 in main text), item difficulty estimates are expressed on an “easiness” scale when specified using the *ranef* function from the *lme4* package in R (Bates et al., 2015), as opposed to the traditional “difficulty” scale of IRT models; as such, value signs were flipped to re-express estimates on the “difficulty” scale for ease of interpretation. Standard errors were obtained using the *se.ranef* function in the *arm* package of R (Gelman et al., 2022).

^aNo.=number

^bSE=standard error

Table S3-3

Person Ability Estimates and Their Standard Errors

Participant ID ^a	Estimate	SE ^b
ACWT01a	-0.032	0.457
ACWT02a	1.178	0.486
ACWT08a	-2.897	0.779
ACWT09a	1.178	0.486
ACWT10a	-0.865	0.491
ACWT11a	-0.432	0.468
ACWT12a	0.554	0.459
adler01a	0.358	0.455
adler02a	-0.865	0.491
adler10a	-0.432	0.468
adler20a	-0.432	0.468
BU01a	1.944	0.558
BU07a	-1.102	0.509
cmu03a	1.410	0.503
elman02a	-1.36	0.533
elman06a	-1.897	0.617
elman08a	-2.897	0.779
elman10a	0.754	0.464
elman11a	0.961	0.473
elman12a	0.754	0.464
elman14a	-0.865	0.491
fridriksson02a	1.663	0.527
fridriksson04a	1.944	0.558
fridriksson05a	1.944	0.558
fridriksson06a	-0.643	0.477
fridriksson07a	2.269	0.602
fridriksson09a	0.163	0.455
fridriksson12a	0.163	0.455
fridriksson13a	-0.432	0.468
kansas09a	-0.865	0.491
kansas11a	1.663	0.527
kansas13a	0.358	0.455
kansas15a	0.358	0.455
kansas16a	-2.897	0.779
kansas17a	-0.032	0.457
kansas23a	-1.649	0.565

kempler02a	1.178	0.486
kempler03a	-0.229	0.461
kempler04a	-0.432	0.468
scale01a	-1.102	0.509
scale04a	0.358	0.455
scale06a	0.358	0.455
scale08a	0.554	0.459
scale13a	-1.36	0.533
scale20a	1.410	0.503
scale23a	0.754	0.464
scale24a	-2.897	0.779
scale28a	-1.102	0.509
scale30a	-1.102	0.509
scale31a	-1.36	0.533
scale33a	0.754	0.464
scale38a	-0.865	0.491
STAR03a	-1.36	0.533
TAP04a	1.410	0.503
TAP06a	-2.382	0.676
TAP07a	-0.032	0.457
TAP09a	-2.337	0.683
TAP11a	-0.865	0.491
TAP12a	-0.229	0.461
TAP13a	-0.432	0.468
TAP14a	-1.102	0.509
TAP17a	-2.382	0.676
TAP18a	0.163	0.455
TAP19a	-0.432	0.468
TCU03a	-0.865	0.491
TCU05a	2.571	0.673
TCU07a	-1.360	0.533
TCU08a	-0.032	0.457
thompson02a	1.944	0.558
thompson04a	0.163	0.455
thompson05a	0.163	0.455
thompson07a	2.658	0.666
thompson08a	2.269	0.602
thompson10a	1.944	0.558
thompson11a	-1.102	0.509
thompson14a	1.663	0.527

tucson15a	-0.865	0.491
tucson20a	-0.229	0.461
tucson22a	-0.032	0.457
whiteside01a	0.961	0.473
whiteside02a	-1.102	0.509
whiteside06a	0.358	0.455
whiteside07a	1.663	0.527
whiteside09a	1.663	0.527
whiteside10a	-0.643	0.477
whiteside12a	-1.102	0.509
whiteside14a	0.163	0.455
whiteside15a	0.163	0.455
whiteside17a	1.663	0.527
williamson02a	1.944	0.558
williamson03a	-1.360	0.533
williamson04a	0.358	0.455
williamson12a	-0.032	0.457
williamson14a	0.358	0.455
williamson15a	0.358	0.455
williamson18a	1.178	0.486
williamson19a	-0.032	0.457
williamson21a	-2.382	0.676
wozniak02a	1.590	0.533
wozniak03a	-0.229	0.461
wozniak05a	0.163	0.455
wozniak07a	-0.432	0.468
wright201a	0.163	0.455
wright202a	1.663	0.527
wright203a	0.754	0.464
wright204a	0.554	0.459
wright206a	-0.865	0.491

Note. As with all IRT models specified using a logit distribution, higher values indicate amount of the latent ability (verb naming) on the logit scale. Item ability estimates were obtained using the *ranef* function from the *lme4* package in R (Bates et al., 2015), and standard errors were obtained using the *se.ranef* function in the *arm* package of R (Gelman & Su, 2022).

^aID=identifier

^bSE=standard error

Figure S3-1

Correlation between VNT Item Difficulty Estimates from Fergadiotis et al. (2023) and the Present Study

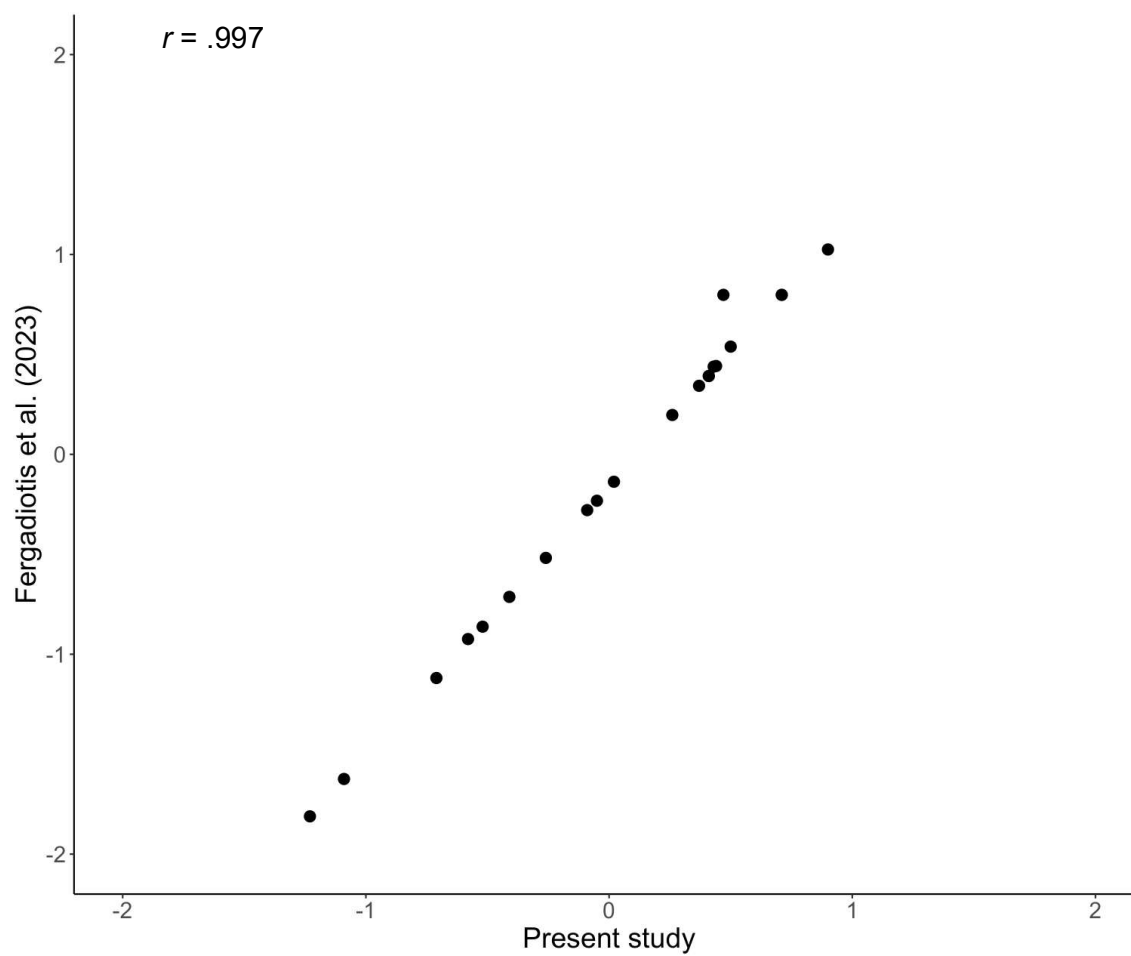
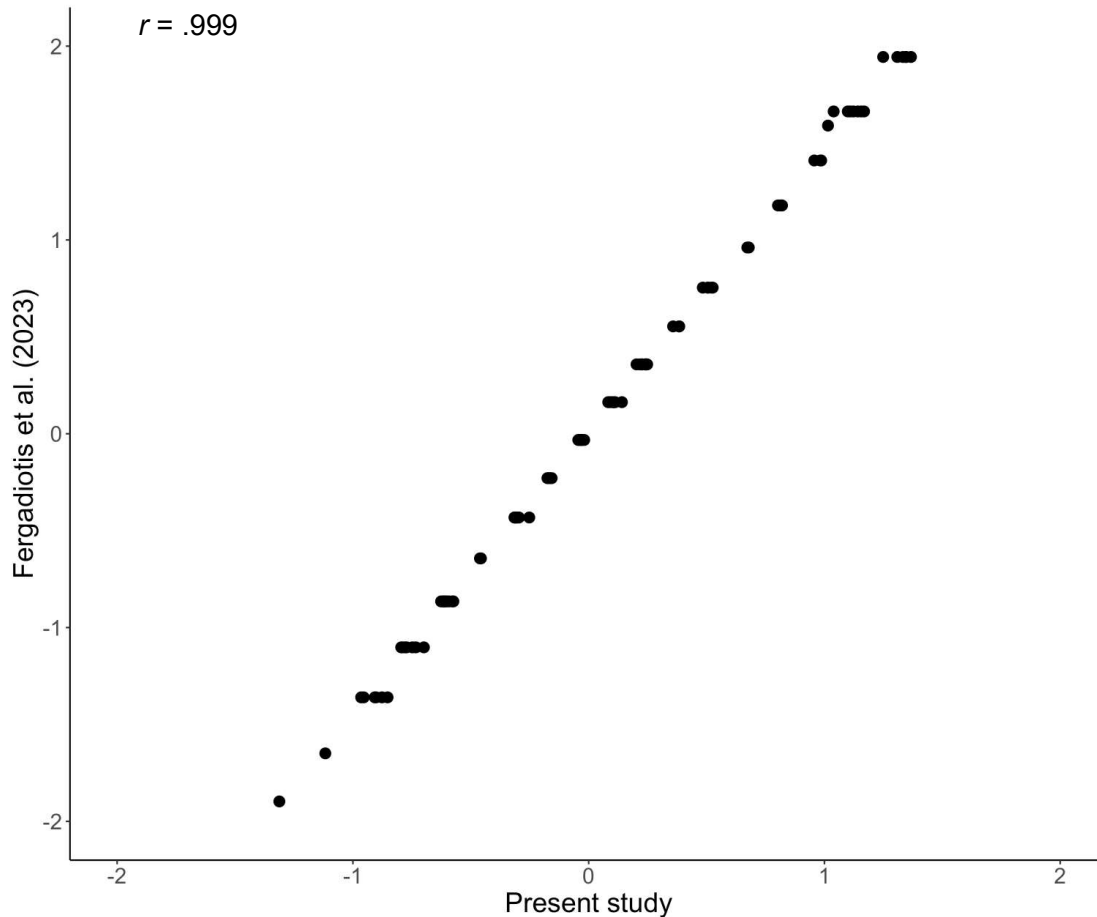


Figure S3-2

Correlation between VNT Person Ability Estimates from Fergadiotis et al. (2023) and the Present Study



References

- Bates, D., Mächler, M., Bolker, B., & Walker, S. (2015). Fitting linear mixed-effects models using lme4. *Journal of Statistical Software*, 67, 1–48.
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- Gelman, A., Su, Y.-S., Yajima, M., Hill, J., Pittau, M. G., Kerman, J., Zheng, T., Dorie, V., & Su, M. Y.-S. (2022). *Package 'arm.'* <http://cran.stat.unipd.it/web/packages/arm/arm.pdf>