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Exploring and measuring differences in person–thing orientations

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ABSTRACT

Individuals differ in their orientation toward aspects of the environment. Previous work suggests that some individuals orient primarily toward people, whereas others orient toward things. Women generally orient towards people more than men, and men orient towards things more than women. Person–thing orientation is related to occupational choices. This research examined the structure of person–thing orientation using a combination of exploratory and confirmatory factor analyses and structural equation modeling. Analyses suggested that thing orientation and person orientation can be measured (1) with a few items; (2) separately from each other; and (3) person orientation and thing orientation are not necessarily bipolar opposites.

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1. Introduction

More than 40 years ago, Little (1968, 1972, 1974) began a series of theoretical papers about the fit between individuals and the environment. Most scientists grant that the environment has powerful influences on behavior and that living organisms continually adapt to environmental changes. Of special interest to Little was selective orientations towards people and things. Individuals differ in attending and responding to the people in the environment (Person Orientation), but also in how much they attend and respond to the objects in the environment (Thing Orientation). These orientations are related to person–environment fit, to individual adaptation, and ultimately, the capacity of organisms to exploit any environmental niche.

Little developed a 24-item self-report scale to measure person–thing orientation. From the structure of the instrument, 12 items of which measured Person Orientation (PO) and another 12 measured Thing Orientation (TO), we infer that Little kept open the possibility that TO and PO might not be bipolar aspects of a single dimension. Little left open as an empirical question the possibility that PO and TO could even be orthogonal. The relative independence of PO and TO could be falsified empirically. Little and Kane (1974) showed that their PO scale predicted concerns for privacy, but the TO scale did not. This suggests that PO and TO are not bipolar opposites and may not even be aspects of a single dimension.

The person–thing orientation distinction was first framed by Cattell and Drevdahl (1955), who examined characteristics of 294

research scientists in biological sciences, physics and psychology. They found that research scientists within each field differed from administrators and teachers within the same field. Researchers showed “schizothymic preoccupation with things and ideas, rather than people” (p. 259). Cattell and Drevdahl implied that being thing-oriented was negatively related to being people oriented. They may even be bipolar ends of a single dimension. Cattell and Drevdahl's (1955) study was published before modern computer technology was available to aid statistical analyses. Given serious computational errors found in some of Cattell's other 16PF work (e.g., Digman & Takemoto-Chock, 1981), conclusions by Cattell and Drevdahl require corroboration. Further empirical research is needed on dimensional structures of PO and TO.

In their comprehensive review of the literature on sex differences in dispositional vocational interests Su, Rounds, and Armstrong (2009) observed that person–thing orientations was first noted by Thorndike (1911) in his book, *Individuality*. Thorndike regarded person- and thing orientation similarly to Cattell: part of a single continuum. Su et al. organized their analyses around Prediger's (1982) two-dimensional conceptualization of occupational interests, namely Things–People and Data–Ideas. Procedurally, they examined technical manuals for 47 interest inventories, yielding 503,188 respondents. Men preferred working with things and women prefer working with people. The effect size was large ($d = 0.93$) on the People–Thing dimension. Sex differences on the Data–Ideas dimension were negligible.

To summarize, several researchers observed a difference in individual orientation toward people and things. These are related empirically to sex differences with women reporting greater orientation toward people than do men. Men report greater orientation

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toward things than do women. Meta-analytic work confirms that the orientations are also related to occupational preferences. Still unclear is the dimensional structure of PTO. PO and TO may be part of a one-dimensional continuum. Alternatively, PO and TO both reflect a common underlying variable of engagement with the environment, as part of a positive omnibus interest manifold. A third possibility is that PO and TO are separate dimensions that are largely independent. If this is correct, an individual could possess configurations, such as being high on both PO and TO, or, high on PO but low on TO.

One obstacle to empirical investigation for PO and TO involves measures. To conduct their comprehensive review, Su et al. (2009) conducted archival analyses of 47 technical manuals for interest inventories. Their classifications required a staggering commitment (pp. 864–865). Few researchers have the resources or expertise required to duplicate these procedures to study person–thing orientation. What is needed is a research friendly tool. Ideally, it would be a brief measure collected by persons without first-line expert knowledge of technical manuals or theories of occupational counseling. Concise measures bring advantages to research beyond reducing the measurement load. A concise tool allows its inclusion in time-constrained research (e.g., laboratory experiments) and multimethod research like diary studies and experience sampling. Underscoring the importance of concise, public domain interest measurement instruments, Armstrong, Allison, and Rounds (2008) validated short-forms based on Holland's (1997) RIASEC (realistic, investigative, artistic, social, enterprising, and conventional) vocational types for use in basic research. The social and realistic subscales of the shortened RIASEC assess interests that are generally related to person-oriented and thing-oriented occupational activities. However, the orientations conceived by Little are more global responses to the environment.

Our research set four converging goals, each accomplished with the use of a separate data set. First, we explored the dimensional structure of Little's original 24-item scale using modern statistical techniques. We used exploratory factor analysis (EFA) to uncover factors underlying Little's measure, and interrelations among the items. We also located PO and TO in "Big Five space" (i.e., in relation to the dimensions of the Big Five; Ozer & Benet-Martínez, 2006). Second, we used confirmatory factor analyses (CFAs) to test hypotheses about the factor structure of the person–thing orientation measure. Specifically, is it more plausible that PO and TO are two ends of a common continuum or that PO and TO are two separate dimensions? Third, we used structural equation modeling (SEM) to explore factor equivalence across sex. The fourth goal was pragmatic. Can the core aspects of Little's conceptualization be captured with a reduced set of items?

2. Study one: exploring factorial structure

2.1. Method

2.1.1. Participants

Introductory psychology students from Purdue University ($N = 804$ from a potential pool of 2119) completed the 24-item Person–Thing Orientation scale during an online mass-testing session. The median age was 19 (range: 18–44). Most were in their freshman (55%) or sophomore (26%) year of college. Fifty-six percent of the sample was female and 75% were White.

2.1.2. Instrument and study variables

2.1.2.1. Person–Thing Orientation scale. Little's original PTO items were updated to reflect contemporary terminology (see Table 1). The term "beggar" was changed to "homeless person", and "record

player" was changed to "stereo sound system." Participants completed the revised 24-item PTO scale with these instructions: "Please rate how much you would enjoy being in the situations listed below. Rate each one even if you have never done it", using a 5-point rating scale where 1 = "not at all", 2 = "slightly", 3 = "moderately", 4 = "quite a lot", and 5 = "extremely".

2.1.2.2. Big Five measure of personality. The 44-items of the Big Five Inventory (BFI, John & Srivastava, 1999) measured agreeableness, conscientiousness, extraversion, openness to experience, and neuroticism. Items for both PTO and Big Five measures were randomized.

2.2. Procedures

The online mass-testing survey was offered to introductory psychology students during the first two weeks of the semester and was open to the first 800 volunteers.

2.3. Results and conclusions

2.3.1. Factor structure

Exploratory factor analysis using Maximum Likelihood estimation was conducted (Muthén & Muthén, 2010). First, we compared factor models that included one to seven factors. To determine the optimal number of factors for the current data, we set three criteria (Fabrigar & Wegener, in press) for selecting the final model. First, the model should fit the data well. Second, a model with one fewer factor should fit substantially worse. Finally, a model with one additional factor should not fit appreciably better. The Comparative Fit Index (CFI; Bentler, 1990), the Tucker-Lewis Index (TLI; Tucker & Lewis, 1973), and the Root Mean Square Error of Approximation (RMSEA; Browne & Cudeck, 1993) for each model are reported. For CFI and TLI values of .90 or greater reflect adequate model fit. MacCallum, Browne, and Sugawara (1996) noted that RMSEA values of .05 or less indicate good fit, values ranging from .05 to .08 indicate reasonable fit, values ranging from .08 to .10 indicate mediocre fit, and values greater than .10 indicate poor fit.

Exploratory factor analysis of all 24 items indicated that a six factor model fit the data best, $\chi^2(147, N = 804) = 101.98, p < .001$, CFI = .95, TLI = .90, RMSEA = .057 (CI 90 interval = .052–.062). Two factors accounted for 13/24 items and also had the largest Eigenvalue, 5.10 and 4.03 (all other Eigenvalue <1.70). The first factor consisted of statements like "Listen in on a conversation between two people in a crowd" and "Attempt to comfort a total stranger who has had a disaster happen." This factor appears to represent the core of what Little called Person Orientation ($\alpha = .80$). The second factor consisted of statements like "Redesign and install a stereo sound system yourself" and "Take apart and try to reassemble a desktop computer." This factor appears to represent the core of what Little called Thing Orientation ($\alpha = .90$). The third factor consisted of items with statements such as "Breed rare forms of tropical fish" and "Learn to be good at the art of glass blowing." This factor appears to represent a smaller factor dealing with a focus on mastery ($\alpha = .66$). The fourth factor consisted of items with statements such as "Explore the ocean floor in a one-person submarine" and "Go sky-diving." This factor represents an additional smaller factor dealing with exploration ($\alpha = .68$). The fifth factor consisted of items with statements such as "Interview people for jobs in a large hospital" and "Interview people for a newspaper column." This represents a smaller factor dealing with talking with people and information exchange ($\alpha = .63$). The final factor consisted of items with statements like "Join in and help organize a children's field trip at school" and "Help a group of children plan a Halloween party." This represents a smaller factor dealing with children and prosocial

Table 1
Items and factor loadings for the Person–Thing Orientation scale from Study 1.

Item	F1	F2	F3	F4	F5	F6
Listen in on a conversation between two people in a crowd	.447	–.060	.085	–.191	.120	–.113
Strike up a conversation with a homeless person on a street	.419	.087	.048	.087	.171	–.049
Listen with caring interest to an old person who sits next to you on a bus	.538	.042	–.002	.003	–.005	.227
Notice the habits and quirks of people around you	.622	–.023	.062	–.124	–.022	.002
Make the first attempt to meet a new neighbor	.501	–.040	–.067	.050	.193	.167
Attend a speech given by a person you admire without knowing the topic of the speech	.422	.034	.077	.016	.064	.126
Attempt to comfort a total stranger who has had a disaster happen	.566	.007	–.083	.050	.019	.205
Gain a reputation for giving good advice for personal problems	.491	.018	–.036	.028	.091	.091
Redesign and install a stereo sound system yourself	–.186	.733	–.058	.112	.060	.040
Take apart and try to reassemble a desktop computer	–.180	.767	–.010	.065	.049	.019
Stop to watch a machine working on the street	.131	.713	.102	–.093	–.062	–.055
Remove the back of a mechanical toy to see how it works	.033	.867	.074	–.048	–.004	–.085
Try to fix your own watch, toaster, etc.	.008	.864	–.049	.009	–.051	.026
Breed rare forms of tropical fish	–.128	.034	.452	.275	.214	–.010
Learn to be good at the art of glass blowing	.067	.005	.668	–.021	.007	.046
Watch the path of a comet through a telescope	.223	.038	.345	.256	–.122	.049
Make a hobby of photographing nature scenes and putting them into multimedia presentations	–.088	–.045	.550	.056	.031	.216
Explore the ocean floor in a one-person submarine	–.007	.013	.164	.689	.020	–.038
Climb a mountain on your own	.152	.017	.088	.609	.009	–.071
Go sky-diving	.261	–.073	–.040	.530	–.034	.020
Interview people for jobs in a large hospital	.026	.023	–.040	.023	.590	.175
Interview people for a newspaper column	.103	–.018	.111	–.130	.639	.006
Join in and help organize a children's field trip at school	–.003	.015	.041	–.016	.023	.823
Help a group of children plan a Halloween party	.041	–.046	.161	–.064	–.009	.820

Note: All factor loadings reported are rotated. All factor loadings in bold represent the highest loadings.

actions ($\alpha = .85$). Neither the one factor model, $\chi^2(252, N = 804) = 4554.43, p < .001, CFI = .38, TLI = .32, RMSEA = .146$ (CI 90 interval = .142–.149), nor the two factor model, $\chi^2(229, N = 804) = 1945.18, p < .001, CFI = .75, TLI = .70, RMSEA = .097$ (CI 90 interval = .093–.101) provided adequate fit for the data. Little's (1974) 24-item PTO measure probably contained more than one or two factors.

2.2.2. Convergent and discriminant validity

Two factors measuring PO and TO were larger, accounted for more variance, and were more reliable than the four remaining factors, so subsequent analyses were conducted with only the two large factors, labeled Person Orientation and Thing Orientation. First, we compared the reliabilities of Little's (1974) original 12-item PO and TO factors with our more concise factors. The original 12-item measure of PO had reliability ($\alpha = .84$) comparable to our new more concise eight-item measure of PO ($\alpha = .80$). The original 12-item measure of TO had a lower reliability ($\alpha = .80$), than our new five-item measure of TO ($\alpha = .90$). Next, we examined covariation between the original factors and our concise factors. The correlation between the 12-item measure of PO correlated with the new concise measure $r = .93, p < .001$. The correlation between the 12-item measure of TO correlated with the new concise measure $r = .78, p < .001$. Most importantly, the correlation between the PO and TO factors using the new measures were closer to zero, but slightly negatively correlated, $r = -.09, p < .02$. In contrast, the original 12-item measures of PO and TO were positively correlated, $r = .15, p < .001$. These results suggest that both PO and TO can be reliably and accurately measured using the smaller more concise versions without losing fidelity to Little's conceptualization. The shorter scales provide a more focused assessment. The two constructs may not be bipolar opposites, or on the other hand, different manifestations of a single underlying construct (e.g., "interest in the environment").

Table 2 presents correlations among each of the Big Five dimensions and the two new concise measures of PO and TO. Person Orientation was positively related to Extraversion, ($r = .36$), and Agreeableness ($r = .26$), whereas Thing Orientation was negatively related to these dimensions, $r = -.16, r = -.08$, respectively.

2.2.3. Sex differences

Women scored higher in PO ($M = 3.49, SD = .67$) than men ($M = 3.12, SD = .69$), $F(1, 802) = 25.55, p < .001, \eta^2 = .07$. Men however, scored higher in TO ($M = 3.19, SD = 1.00$) than women ($M = 1.92, SD = .90$), $F(1, 802) = 318.38, p < .001, \eta^2 = .31$. Sex differences were much larger for TO than PO.

3. Study 2: confirmatory analyses

3.1. Method

3.1.1. Participants

University of Michigan introductory psychology students ($N = 203$ from a potential pool of ~ 1200) completed the survey for partial course credit. Participants' median age was 18 (range 18–22), 64% were female, and 77% were White. The majority was in their freshman year (78%) and had declared majors across many departments.

3.1.1.1. Instrument and study variables. The 24-item PTO scale was administered as part of an online survey containing demographic questions, psychology and personality scales, and single item measures.

3.2. Results and conclusions

3.2.1. Confirmatory factor analysis

Confirmatory factor analysis used Structural Equation Modeling, with multiple indices to determine fit of the current model. The condensed 13-item two-factor measure of PO/TO found in Study 1 provided adequate fit for the data, $\chi^2(64, N = 203) = 117.92, p < .001, CFI = .95, TLI = .92, RMSEA = .065$ (CI 90 interval = .046–.083). The same eight items loaded on the first factor, Person Orientation, whereas the same five items loaded highly on the second factor, Thing Orientation (see Table 3). All factor loadings were significant (all p values $\leq .002$).

Study 2 found that internal consistency reliability of the five-item measure of Thing Orientation ($\alpha = .92$) was higher than the

Table 2
Intercorrelations between 12-item measure, concise measure, and Big Five Personality dimensions in Study 1.

	1	2	3	4	5	6	7	8	9
1. Original 12-item PO	.84								
2. New 8-item PO	.93**	.80							
3. Original 12-item TO	.15**	.16**	.80						
4. New 5-item TO	-.12*	-.09*	.78**	.90					
5. Extraversion	.37**	.36**	-.05	-.16*	.88				
6. Agreeableness	.28**	.26**	.01	-.08*	.19**	.80			
7. Conscientiousness	.21*	.21**	-.03	-.11*	.12**	.37**	.80		
8. Neuroticism	.04	.02	-.17**	-.19**	-.22**	-.30**	-.17**	.83	
9. Openness	.27**	.29**	.36**	.22**	.21*	.13**	.07*	-.13**	.77

Note: Number across the diagonal represent internal consistency for each scale.

* $p < .05$.

** $p < .01$.

Table 3
Items and factor loadings for confirmatory factor analysis of the Person–Thing Orientation scale (Study 2).

Item	PO	TO	Structure coefficients
Listen in on a conversation between two people in a crowd	.280		.130
Strike up a conversation with a homeless person on a street	.518		.152
Listen with caring interest to an old person who sits next to you on a bus	.665		.140
Notice the habits and quirks of people around you	.584		.160
Make the first attempt to meet a new neighbor	.636		.149
Attend a speech given by a person you admire without knowing the topic of the speech	.521		.351
Attempt to comfort a total stranger who has had a disaster happen	.569		-.001
Gain a reputation for giving good advice for personal problems	.467		-.047
Redesign and install a stereo sound system yourself		.814	.133
Take apart and try to reassemble a desktop computer		.793	.052
Stop to watch a machine working on the street		.882	.152
Remove the back of a mechanical toy to see how it works		.838	.090
Try to fix your own watch, toaster, etc.		.835	.356

Note: All factor loadings in columns 1 and 2 are significant at $p \leq .002$; PO, Person Orientation; TO, Thing Orientation.

reliability of the eight-item measure of Person Orientation ($\alpha = .74$). Across two studies, results suggested that the condensed new 13-item version of the PO/TO scales had internal consistency reliabilities at least as good as the original 24 item scale, using fewer items. The new measures correlate well with the original scale, suggesting the new measures retained fidelity with Little's original conceptualization of PO and TO.

3.2.2. Sex differences

Women in Study 2 reported higher levels of PO ($M = 2.52$, $SD = .59$) than did men ($M = 2.24$, $SD = .62$), $F(1, 179) = 3.34$, $p < .01$, $\eta^2 = .05$. Men however, reported higher levels of Thing Orientation ($M = 1.79$, $SD = 1.02$) than did women ($M = .92$, $SD = .97$), $F(1, 179) = 32.53$, $p < .01$, $\eta^2 = .15$. Sex differences were larger in TO than PO.

4. Study 3: structural modeling of item invariance

Sex differences in Thing-Orientation could appear for at least two reasons. First, men and women might interpret some items differently. Some items may be more closely tied to the way one sex thinks about people or things than it does for the other sex (e.g., Graziano, Bruce, Sheese, & Tobin, 2007). Rather than being a simple artifact of assessment, such differences could be an opportunity for construct elaboration and improved prediction. That is, when measuring Thing Orientation, different items may be more accurate predictors of this orientation in men and women. A second reason may be actual substantive differences in orientation (e.g., Su et al., 2009).

4.1. Method

4.1.1. Participants

Introductory psychology students from Purdue University ($N = 512$ from a potential pool of 4222) completed the survey for partial course credit. Participants' median age was 19 (range 18–31), 45% were female, and 76% were White. Sixty-one percent were in their freshman year and had declared majors across many departments.

4.1.1.1. Instrument and procedure. The survey instrument and administration were identical to Study 2.

4.2. Results and conclusions

We separated data into two groups based on participants' sex. First, a model with all factor loadings allowed to vary freely across both groups can be compared to a model with all factor loadings constrained to be equal. Then the RMSEA fit index and its confidence interval can be compared across both models. This technique provides an omnibus test of all factor loadings, but does not pinpoint exactly which factor loadings are different across groups. A more directed test of variation in factor loadings across men and women compared several models. The first referent model consisted of the fully constrained model (i.e., all factor loadings constrained to be equal across groups). This model was then compared to 13 other models, in which each model permitted only one factor loading to vary across groups.

None of the models allowing the factor loadings for Person Orientation items to vary across groups were significantly different

from the fully constrained model. Based on the larger sex differences found in Study 1 and 2 in Thing Orientation, however, we expected factor loadings to vary across men and women. Two of these models were significantly different from the fully constrained model.

The first model that was different from the fully constrained model allowed the item “Redesign and install a stereo sound system yourself” to vary across men and women. The unconstrained model provided a significantly better fit for the data, $\chi^2(138, N = 512) = 296.91$, RMSEA = .048 (CI 90 interval = .040–.055), than the constrained model, $\chi^2(139, N = 512) = 301.93$, RMSEA = .048 (CI 90 interval = .041–.055), χ^2 difference(1) = 5.02, $p < .05$. This item loaded more highly on Thing Orientation for women, $b = 1.068$, $p < .001$, than for men, $b = .862$, $p < .001$. That is, this item was more closely related to Thing Orientation for women than it was for men.

The second model that was different from the fully constrained model allowed the item “Take apart and try to reassemble a desktop computer” to vary across men and women. The unconstrained model provided a significantly better fit for the data, $\chi^2(138, N = 512) = 296.37$, RMSEA = .047 (CI 90 interval = .040–.055), than the constrained model, $\chi^2(139, N = 512) = 301.93$, RMSEA = .048 (CI 90 interval = .041–.055), χ^2 difference(1) = 5.57, $p < .05$. This item loaded more highly on Thing Orientation for men, $b = 1.15$, $p < .001$, than for women, $b = .935$, $p < .001$. That is, this item was more closely related to Thing Orientation for men than it was for women. There was no evidence that Thing Orientation items had factor loadings that were significantly different for men and women on any of the other items.

Exploratory factor analyses suggested that Little's original 24-item scale was probably not captured by a one- or even two dimensional structures. Two large factors emerged, along with four smaller factors. The two largest factors corresponded to Little's conceptualization, whereas the four smaller factors contain content related plausibly to PO and TO, but as secondary properties. Results suggest Little's 24-item scale measures more than PTO. Assessment of PO and TO might be accomplished with a smaller, more focused set of items.

Confirmatory factor analyses tested hypotheses about the factor structure of the PO–TO measures. Using an independent sample, we explored replicability of factor structure we derived tentatively from the exploratory factor analyses. Structures uncovered using EFA in the Purdue sample could be confirmed with CFA in a Michigan sample. The reduced set produced more focused PO–TO scales that correlated highly with the original scales. The new scales retained fidelity to Little's conceptualization. Furthermore, they correlated with dimensions of the Big Five in ways that made intuitive sense. One tentative conclusion is that within Little's PTO conceptualization, PO and TO are probably not bipolar opposites, and can be measured relatively independently of each other. This is tentative because both exploratory and confirmatory analyses were based only on Little's 24-item scale, not on more comprehensive occupational test manuals of the sort used by Su et al., 2009.

Outcomes suggest that PO–TO can be measured with fidelity in scales that are approximately half the size of the original instrument. Briefer scales are more efficient and require less focal expertise to collect. They are more likely to be used in basic research, and can be incorporated into time-limited laboratory studies. Reduced scales may not capture the full range of the constructs, purchasing fidelity at the price of bandwidth. Inferences about relations with other variables (e.g., sex and occupations) may be distorted.

Structural modeling explored factor equivalence across sex. Sex differences might emerge due to differential item endorsement, or by structural differences. Our analyses suggest that the new PO and TO scales contain item content that is related differentially to men

and women's responses toward TO, but not to PO. Overall, however, the new TO and PO scales operate in similar ways across sexes.

5. Conclusion

The fit between individuals and their environment generally, and their interest in people and things specifically, have been important and recurring themes in personality and social psychology. The relation between person and thing orientation was unclear, and no user-friendly, psychometrically validated, public-domain measure of person–thing orientation existed. Following Little's theorizing and measurement, we evaluated psychometrically his 24-item person–thing orientation measure using contemporary statistical techniques. A series of EFAs and CFAs conducted on independent samples indicated 13 items could measure person orientation (PO) and thing orientation (TO). This concise PTO measure appears to have measurement invariance across the sexes. In addition, we have preliminary evidence that person and thing orientation are not bipolar opposites, but unrelated dimensions of orientation to the environment. We offer this revised PTO measure as a research-friendly tool that maintains reliability and validity without creating a prohibitive measurement load.

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