A Case for Multilevel Models in Fit and Some Burning Questions

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Introduction

This short paper is a result of my exploration into the domain of multilevel models. It is intended to raise awareness in the fit community to the potential contributions these statistical techniques could make to the field. Theoretically, multilevel models (MLM) open appealing new areas of research to the field; their actual application however can be more daunting than anticipated. For example, shedding some light into how to apply this technique of analysis to my research question meant that I had to significantly adjust my tolerance threshold for frustration. Therefore, I attempt to help other interested researchers who are unfamiliar with the topic by sharing what I have managed to untangle and I hope to receive some feedback and suggestions on questions that I have not yet been able to answer.

Potential contributions to Fit

Person-Environment Fit research (PE fit) appears to be at a crossroads. Harrison's incisive critique (2007) argued that current conceptualisations and definitions of fit need to be tightened, and Edwards (2008) suggested that the theoretical foundations should be further developed. An additional area that merits further attention is the related aspect about the outcomes of fit and the effects thereof on the individual and its environment. The outcomes of fit are inherently intertwined with how PE fit is defined and what kind of theoretical lens is applied. However, they are also distinct in that they demonstrate to researchers unrelated to the field and practitioners alike that PE fit research is relevant and that it upholds one of the central tenets in industrial and organisational psychology. That is, the support of the scientist-practitioner model (Cascio & Aguinis, 2008).

Looking at recent meta-analyses of PE fit and Person-Organisation fit (PO fit) in particular, I start to wonder. The most common individual-level outcomes are related to attitudes - among which job satisfaction is prominent -, job performance and turnover with its related concept of tenure (Kristof-Brown, Zimmerman, & Johnson, 2005; Arthur, Bell, Villado, & Doverspike, 2006). The meta-analysis by Arthur and colleagues (2006) established a criterion related validity of .15 for PO fit as a predictor of job performance, .24 for turnover and .31 for work attitudes. In addition, it should be noted that the confidence intervals included zero. Person-Job fit (PJ fit) fared better in the analysis by Kristof-Brown and colleagues (2005). It had a strong relationship with work attitudes (e.g. ρ=. 56 for job satisfaction), only a modest one with job performance (.20) and a low correlation with turnover (-.08). Thus, the strongest relationships for fit can be found for work attitudes.

However, Bowling (2007) demonstrated that job performance and job satisfaction are virtually unrelated after controlling for personality traits, work locus of control and organisation-based self-esteem, thus diminishing the hopes of fit being relevant for practitioners. Equally, it is debatable to what degree employee turnover may have negative consequences from an organisational point of view. Theories maintain that turnover might also have beneficial effects rather than only negative consequences for the organisation as a whole (e.g. Siebert & Zubanov, 2009). Taking these conflicting views into account, I propose

that investigating the effects of fit on higher levels of analysis might address possible questions about its relevance.

The prospects of fit research being a contribution to group- and organisational-level outcomes are promising. An example for the potentials of fit on higher levels of analysis is the study by Ostroff (1993) that suggested that the congruence between personal orientation and organisational climate contributes to organisational effectiveness in schools. However, similarity or congruence as higher level equivalents of supplementary fit may not be the only fruitful area of research. A higher level equivalent for complementary fit could be important if the diversity of fit perceptions or actual fit is the predictor for group- and organisation-level outcomes.

The avenues mentioned above have in common that they are inherently multilevel by nature and therefore might necessitate the application of MLM.

Multilevel models

Multilevel models, also known as Hierarchical Level Models or Random Coefficient Models, are a particular form of regression in which the regression coefficients of parameters are allowed to vary in intercepts and slopes along a given probability model (Gelman & Hill, 2007). To clarify, it means that for example individual level predictors (e.g. student scores) show a correlation on an outcome, which can vary among groups (e.g. schools). This group variation is then the foundation for correlations with specific outcomes (e.g. influence of region specific policies). The simplest multilevel model comprises two levels (e.g. individual and group) and has linear regression coefficients and hyper-parameters. MLM have the advantage that non-independence, sphericity and missing data are more effectively handled.

Here the question arises for me how the assumption of linearity can be tested. In ordinary regressions violations of linearity can be tested by looking at residuals versus predicted values. How can I do this for multilevel models?

In addition, power and sample size seem to be estimated in MLM via simulations (Gelman & Hill, 2007). However, these simulations require an educated guess on effect sizes, group sizes and the degree of within group agreement that I cannot make without a prior look at the data. Are there any suggestions on how to achieve this?

The more I think about fixed effects (fixed slopes and intercepts) and random effects (varying slopes and intercepts), the more I find it difficult to imagine that fixed effects might play a role in organisation studies because data for the whole population is virtually not available. Does anybody have further thoughts on this?

Compilation and Composition

Important is the distinction between compilation process models and composition process models. Both processes share the assumption that lower level phenomena can be pooled to represent higher level aspects (Kozlowski & Klein, 2000). In contrast to compilation processes, composition processes assume that lower-level phenomena are identical with higher level phenomena (isomorphism). The assumption of isomorphism requires the researcher to demonstrate that within-group agreement exists. Compilation models however, are more interested in the notion of dissimilarity and therefore do not require demonstration of within-group agreement (Bliese, 2000). Within-group agreement is commonly established

with an MANOVA (Ployhart, Weekley, & Baughman, 2006) to obtain the intra-class coefficient (ICC(1)). However, while Ployhart and colleagues (2006) used a cut-off of .12 for ICC(1), Bliese (2000) argues that a cut-off point of .12 is too high because it fails to take into account that eta-squared values become inflated when group sizes are small. Should we rather employ the cut-off point of .05 as Bliese (2000) suggests?

Conclusion

Investigating the relationships of PE fit dimensions with higher units of analysis may provide new avenues for fit research and could increase its relevance for related academic fields and practitioners. However, translating theory into academic practice requires a thorough understanding of MLM. I hope that this paper will contribute to a debate during the e-conference on how the assumptions of MLM can be tested properly.

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