"Life Doesn't Happen at the Between-Person Level,"

or a Cautionary Note on Generating Scientific Inferences through Meta-analyses

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Life Doesn't Happen at the Between-Person Level

The implicit philosophy for how research and practice in I/O psychology has pursued inferences about our field's core phenomena has largely been based on a nomothetic, variable-based, and aggregate/"large-sample" ideal. As Tett et al. (2017) expertly highlight, there are more insightful means for drawing inferences about the nature of such aggregate relationships based on meta-analytic techniques than the current practice in the organizational sciences. However, the motivating force behind our commentary has less to do with the issues raised by Tett et al. (2017) concerning the practice of using meta-analysis for purposes of *validity generalization* and more to do with the practice of using meta-analysis for purposes of *scientific inference*. Between-person philosophies in which the end-goal is to identify general conclusions that apply to the aggregate (cf., Hanges & Wang, 2012) have historically guided our scientific inferences and have supported the proliferation of meta-analytic techniques (including what Tett et al. (2017) describe as tertiary analyses based on such findings). These philosophies have led to a dearth of understanding at the *within-person* and *social system* levels—the levels at which most of our meaningful phenomena exist (e.g., Hamaker, 2012; Von Bertalanffy, 1950). Learning, performing, decision-making, communicating, sensemaking, feeling/expressing emotion; these are the concepts which drive the lived experiences of individuals both inside and outside of the workplace, and all are vulnerable to being misunderstood or misinterpreted by focusing only on aggregate evidence at the between-person level. Consequently, we wish to first supplement Tett et al.'s (2017) recommendations for drawing generalizability inferences in meta-analysis and suggest a "preemptive" question (i.e., Question 0) to the list of four they advance in their focal article.

Question 0: "How appropriate is meta-analysis for the generalization we want to make?"

It is not our intention to suggest that meta-analyses should be abandoned by I/O psychologists or that the technique has no place in our field. Meta-analysis is an undeniably useful tool for detecting a signal among background noise attributable to artifacts and error which could stall practical and theoretical advancement. However, we believe that the applications and interpretations of meta-analysis can deviate too far from the tool's original intention to examine validity generalization (i.e., establishing degree of context invariance for practically important predictor-criterion relationships; Hunter & Schmidt, 2004) and into making claims of scientific inference (i.e., understanding and explaining psychological and social phenomena). Overextending meta-analyses into domains where the core phenomena are inherently within-person and/or socially dynamic risks overgeneralization or "freezing" of a field of inquiry when the detected signal is interpreted as "proof" of a theoretical explanation.

So under what conditions are meta-analyses likely to be most appropriate? We posit that when the relations of interest are *unidirectional*, *linear*, and *generally stable over time* (or the time window for generalization is narrowly specified, e.g., first six months on the job), then the inferences drawn from meta-analyses are likely to be highly informative. For example, Schmidt and Hunter's (1998) meta-analysis on selection methods for personnel psychology examined the validity of different selection procedures in predicting subsequent job and training performance. In that case, the evaluated relationships are likely to be unidirectional (e.g., job/training performance cannot precede selection), adequately linear (though perhaps not perfectly for all predictors examined), and generally stable over a defined period of time. Note that Tett et al.'s (2017) recommendations for evaluating the degree of situational specificity and the potential for identifying moderators of these relationships remains relevant even under these conditions. The broader point, however, is that the phenomena/relations of interest and the interpretative affordances granted by the meta-analytic engine are appropriately aligned. In sum, meta-analysis serves a valuable and practically important purpose for summarizing generalizable cumulative knowledge under the conditions outlined above, and can provide evidence-based guidance for evaluating procedures/relations that help the field avoid reinventing the wheel.

We believe this point is also relevant to Tett et al.'s (2017) sentiment that meta-analysis should serve a less terminal role in in the scientific process; to this end, we posit that meta-analysis is most appropriate to use as an intermediary rather than concluding step in our quest for scientific inference. It is commonly recognized that variability in rho suggests the need to explore moderators of a relationship in future research. For example, after early meta-analyses in I/O psychology identified variability in the relationships between employment interviews and job performance, subsequent research found interview structure moderated the effectiveness of interviews (McDaniel, Whetzel, Schmidt, & Maurer, 1994; Wiesner & Cronshaw, 1988). However, the inclusion of an ever-growing numbers of moderators should not take precedence over the need to reevaluate and—most importantly—update one's initial theory or explanation for how, why, and when a relationship should manifest. For example, meta-analytic evidence that reveals high situational specificity should cause the researcher to question the original expectation of a between-individual, linear relationship. In any case, it strikes us as both more instructive and constructive to the goals of scientific inference to view situational specificity not as a "failure" of generalization, but as an indication that the precision of the theory motivating the empirical results needs to be improved. Consequently, meta-analysis is more appropriate as a means for reconnecting the scientific process feedback loop and a diagnostic indicator of the extent to which one's theoretical rationale and interpretations of empirical observations are aligned.

Expanding to Where Life Does Happen

Although we recognize the functional roles and potential benefits of meta-analysis, we also believe it can inadvertently steer our field away from "where life does happen." That is, because the nature of meta-analytic inference emphasizes between-individual, linear, and cross-sectional generalizations *by design*, it affords few opportunities to generate, evaluate, and update psychological theory at the dynamic and within-person level where most of our primary phenomena of interest actually function. For example, subtle features of the relationship between self-efficacy and performance that are illuminated when analyzed within-individual are lost or misinterpreted when treated as only a between-individual effect (Vancouver et al., 2001, 2002). Furthermore, concepts such as job satisfaction, racial stratification, and team cohesion are rarely effects of singular causes and undoubtedly themselves induce subsequent effects—yet it is not hard to come by meta-analytic treatments of these variables as static, between-person antecedents and outcomes in linear, cross-sectional relationships in our literature. Consequently, we believe that significant improvements to the quality of our scientific inferences can be achieved by efforts to step below the aggregate generalizations afforded by meta-analytic techniques and to consider the dynamic and within-unit intricacies of the phenomena of interest to psychological researchers.

Somewhat paradoxically, such dynamism is commonly discussed or assumed in our descriptive theories. Unfortunately, these *processes* are difficult to capture and thus rarely examined using archetypal construct-to-construct empirical studies (Cronin, Weingart, & Todorova, 2011; Kozlowski, Chao, Grand, Braun, & Kuljanin, 2013). Meta-analysis is a useful method for evaluating construct-to-construct relationships, but is limited in its ability to evaluate the validity and generalizability of dynamical theories. Yet when the underlying dynamism and complexity in psychological concepts are recognized, we return to the process of scientific inquiry and the question, “why?”. The specification of process underlying the connection between two constructs often drives further specification when new questions are raised. Theories become more precise and more transparent. The strengthening of construct conceptualization and the explication of linking mechanisms improves construct and internal validity and increases the accessibility of the “black box” between the theorized inputs and outputs (Davis, Eisenhardt, & Bingham, 2007). Furthermore, the development of one’s empirical tests of theory become better grounded, potential errors in the theory are more apparent and appropriately addressed by the field, and unanswered research questions are potentially unearthed. Thinking and theorizing in terms of dynamics naturally facilitates discourse and revision of theory in a manner that can be difficult to achieve through meta-analytic means.

Tackling the underlying dynamism of psychological constructs is itself a complex task, and predicting outcomes of these processes even more so. As simple assumptions and logic that form the structure of a theory compound on one another and are carried out over time, the consequences become nearly impossible to derive (Axelrod, 1997). Meta-analysis, whether used to explore variability in a relationship or to summarize between-person, linear, and cross-sectional tests of a theory, does not support the exploration of dynamics. The processes within the black box get lost in aggregation. Alternative methods are needed to pursue this new paradigm of theoretical development.

One potentially valuable tool to facilitate the accumulation, evaluation, and updating of dynamic theory is computational modeling and simulation. Building a computational model involves translating theory into algorithmic representations, which can subsequently be used to simulate data and conduct virtual experiments by feeding the algorithm theoretically-driven values to represent different levels of the constructs (Davis et al., 2007; Harrison, Lin, Carroll, & Carley, 2007). This translation necessitates specificity and simulation allows processes that are difficult to study in the lab or in the field to develop in a much shorter window of time than would be required in reality. Computational modeling and simulation is useful both in the early stages of theory development, prior to empirical validation (see Kozlowski, Chao, Grand, Braun, and Kuljanin, 2016, and Grand, Braun, Kuljanin, Kozlowski, and Chao, 2016, for an example in the context of multi-level emergent effects), or to pursue the processes that underlie empirically-collected data (e.g., Vancouver, Weinhardt, and Schmidt's, 2010, explanation for Schmidt and DeShon's, 2007, reversal effect in dynamic goal prioritization). Thus, computational modeling offers a useful method to support scientific inference and explore the generalizability of theory in contexts that may be ill-suited for meta-analysis (e.g., when phenomena are within-person, nonlinear, and dynamic).

Conclusion

Through this commentary, we hope to extend Tett et al.'s (2017) analysis of the benefits of meta-analysis as a tool for identifying and inspiring the exploration of variability in relationships between psychological and organizational constructs. We emphasize, however, that the suitability of meta-analysis for the relationship of interest should be considered in order to avoid flattening non-linear or time-dependent effects and misrepresenting within-individual processes. For such relationships, alternative tools such as computational modeling and simulation may be more appropriate. By turning attention to the fundamental nature of constructs and relationships of interest, rather than aggregating over the "black box," we reduce the risk of "freezing" the field's scientific inquiry.

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