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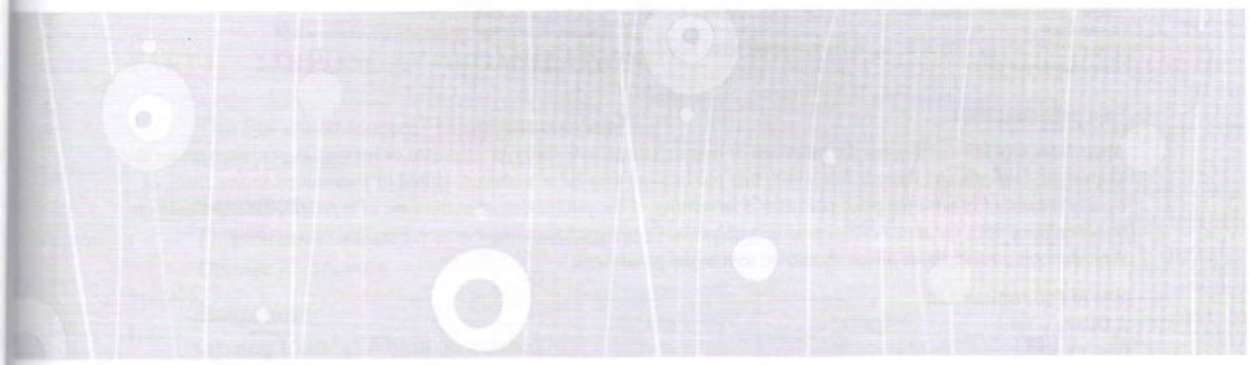

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The Frustrating Search for Interaction Effects

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An interaction effect occurs when the relationship between two variables depends on the value of a third variable. For example, if the relationship between individual skills and job performance depends on the level of employee motivation, then there is an interaction (also labeled a moderating effect) between skills and motivation (e.g. Aguinis, 2007).

Interaction effects have been hypothesized in such diverse research domains as job satisfaction, job stress, pre-employment testing, career management, perceived fairness of organizational practices, leadership, organizational performance, and international business (Aguinis, 2004). In spite of strong theory-based rationale for such hypotheses, researchers often lament the fact that hypotheses about interaction effects are not supported and, if they are, the observed size of interaction effects is quite small. For example, we reviewed 30 years of published articles in *Academy of Management Journal, Journal of Applied Psychology*, and *Personnel Psychology* and found that the median effect size for interaction effects involving a categorical moderator (e.g. gender, nationality, organizational unit, ownership control) was only $f^2 = .002$ (Aguinis et al., 2005). This means that the ratio of systematic variance accounted for by the moderator variable relative to unexplained variance in the criterion or dependent variable is only .02%. Given that variance explained could potentially range from 0 to 100%, this observed median effect size may be considered miniscule by any standards we use.

Why is it that the search for interaction effects in management and organization studies is such a frustrating endeavor? Is it possible that most hypothesized interaction effects do not actually exist? Is it possible that management and organization studies theories including hypothesized moderators such as gender, ethnicity, goal difficulty, organizational unit, type of feedback, task control, training method, employment status, type of compensation, leadership style, nationality, ownership control, pay plan, and so forth, are simply wrong? Of course, we cannot discard this possibility with complete certainty. However, a more likely explanation is that, assuming many of these theories are correct, measurement and design issues are the culprits.

Aguinis (2004) reviewed the numerous measurement and design issues that often prevent researchers from detecting interaction effects that exist in the population. These often-referred-to as statistical and methodological artifacts include issues related to the distributions of the variables (e.g., error variance heterogeneity, predictor variable truncation), the way in which the variables are operationalized (e.g., measurement error, scale coarseness), sample size (i.e., total sample size as well as subgroup-based sample size when the moderator is categorical), and characteristics of the predictor variables (e.g., multicollinearity between the predictors, relationship between the predictors and the criterion). Strategies aimed at improving the estimation of interaction effects that rely on one or two sources of the problems only are not likely to lead to substantial improvements in the accuracy of estimation of interaction effects (Aguinis and Stone-Romero, 1997).

So, what can researchers in management and organization studies do to improve their chances of estimating interaction effects accurately? First, researchers need to become aware of the numerous artifacts that are likely to render interaction effect hypothesis testing invalid (see Aguinis, 2004, for a thorough description of these artifacts). Second,

precautions must be taken at the research design stage so that, prior to collecting data, researchers minimize the negative impact of artifacts. For example, these include not dichotomizing truly continuous variables, avoiding variable truncation, using scales with proven psychometric properties, and so forth. Third, computer programs should be used prior to collecting data to estimate statistical power (Aguinis, 2004, provides a description of such programs, which are available online at http://carbon.cudenver.edu/~haguinis/mmr/index.html). Estimating power a priori will provide researchers with information on the type of research design that will be conducive to detecting an existing interaction effect. Fourth, after the study is completed, results should be reported not only in terms of statistical significance but also in terms of practical significance.

In short, every time a researcher describes anticipated results in terms of contingencies or uses the phrase 'it depends', he or she is referring to an interaction effect. Interaction effects are pervasive in management and organization studies and their presence in our theories will become even more pervasive as our models become more complex. Researchers should be aware of the latest methodological advances if they want their attempts to estimate interaction effects to be less frustrating and more rewarding.

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