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A META-ANALYSIS OF THE EFFECTS OF ORGANIZATIONAL BEHAVIOR MODIFICATION ON TASK PERFORMANCE, 1975-95

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A META-ANALYSIS OF THE EFFECTS OF ORGANIZATIONAL BEHAVIOR MODIFICATION ON TASK PERFORMANCE, 1975–95

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Results of a primary meta-analysis indicated a significant main effect of the organizational behavior modification (O.B. Mod.) approach on task performance ($d.$ = .51; a 17 percent increase) and a significant treatment-by-study interaction. To account for within-group heterogeneity of effect sizes, we conducted a two-level theory-driven moderator analysis by partitioning the sample of studies first into manufacturing and service groups and then into seven classes of reinforcement interventions. Results indicated a stronger average effect of O.B. Mod. in manufacturing organizations, moderation by the type of contingent interventions, and "pairwise" differences among average effect sizes in both organizational types. The practical implications of these findings for solving the challenge of improving performance without adding cost are discussed.

Although the operant theoretical foundation for the application of behavioral analysis or behavior modification was established in the 1950s (Rogers & Skinner, 1956; Skinner, 1953), it has only been within the last 25 years that the basic reinforcement paradigm has been introduced to the study of organizational behavior and applied to human resource management (HRM) (Adam & Scott, 1971; Luthans & White, 1971; Nord, 1969). Among several application models proposed within this conceptual framework (e.g., Brethower, 1972; Gilbert, 1978; Komaki, 1986; Miller, 1978; Scott & Podsakoff, 1985), the organizational behavior modification (O.B. Mod.) model, first presented by Luthans (1973) and fully developed by Luthans and Kreitner (1975, 1985), has received considerable attention from both organizational behavior researchers (e.g., Andrasik, Heimberg, & McNamara, 1981; Frederiksen, 1982a, 1982b; Frederiksen & Johnson, 1981; O'Hara, Johnson, & Beehr, 1985) and HRM practitioners (cf. Andrasik, McNamara, & Edlund, 1981; Frederiksen & Lovett, 1980).

Based on the conceptual premises of classical behaviorism (Pavlov, 1927; Watson, 1913), reinforcement theory (Ferster & Skinner, 1957; Skinner, 1938, 1966, 1969), and the principles and techniques of applied behavioral analysis or behavior modification (Bandura, 1969; Ferster & Perrott, 1968; Kazdin, 1975; Wenrich, 1970), the O.B. Mod. model represents a behavioral approach to the management of human resources in organizational

settings. Specifically, the model provides a five-step application framework for identifying, measuring, analyzing, contingently intervening in, and evaluating employees' task-related behaviors aimed at performance improvement (Luthans & Kreitner, 1975, 1985). Figure 1 presents the O.B. Mod. model.

FIGURE 1
O.B. Mod. Application Model
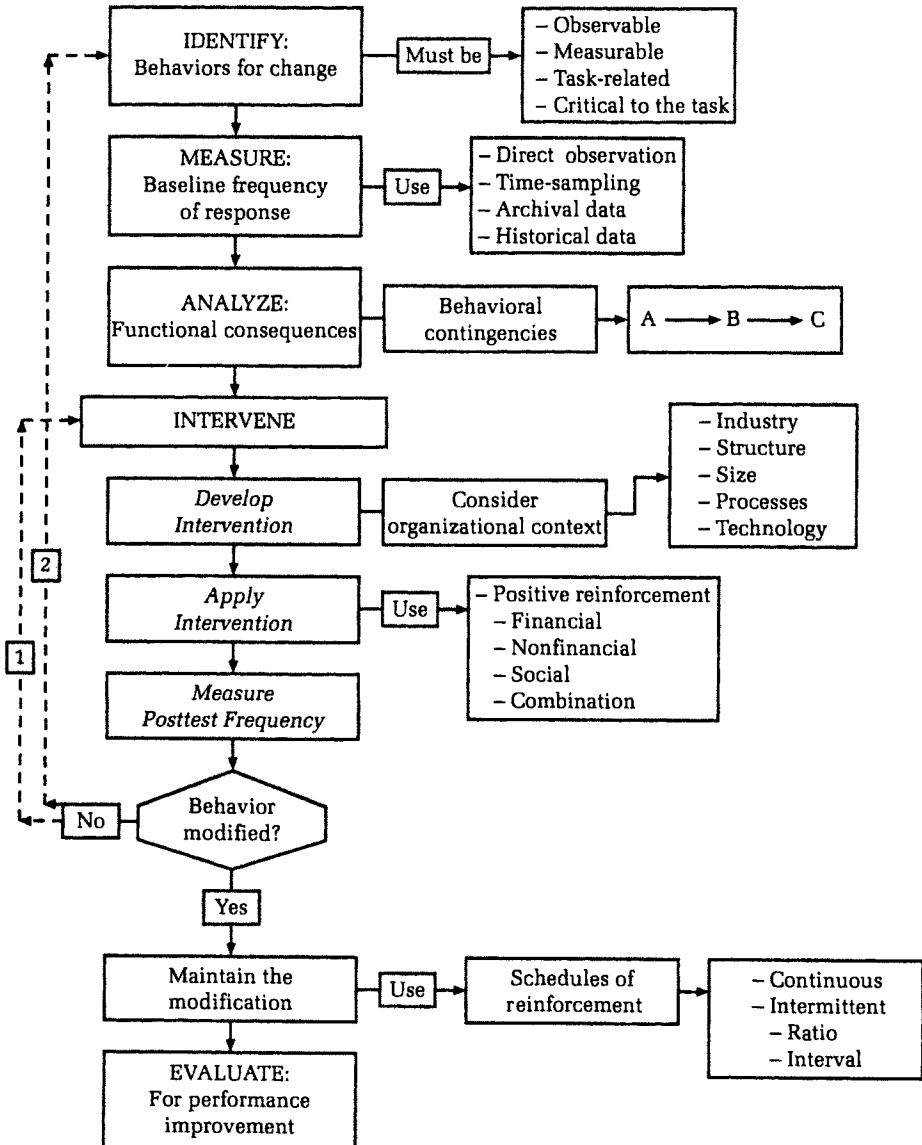
Development of the O.B. Mod. model has generated a number of studies that have tested its effectiveness in a wide range of manufacturing, service, and not-for-profit organizations and in Western and other cultures (e.g., Welsh, Luthans, & Sommer, 1993b). The application of the O.B. Mod. approach has been shown to positively affect manufacturing productivity (e.g., Welsh et al., 1993a), sales performance (e.g., Luthans, Paul, & Baker, 1981), customer service (e.g., Luthans, Fox, & Davis, 1991), absenteeism and tardiness (e.g., Kempen, 1982), and safety (e.g., Haynes, Pine, & Fitch, 1982). Although there have been several conceptual reviews of behavioral management in general (e.g., O'Hara et al., 1985; Merwin, Thomason, & Sanford, 1989), no study to date has quantitatively synthesized, tested, compared, and evaluated the variations in O.B. Mod. effect magnitudes across the available studies.

The overall purpose of this study was to meta-analytically aggregate and analyze the research findings pertaining to the O.B. Mod. approach to performance improvement. Specifically, in a primary meta-analysis we investigated two research questions: (1) What is the average treatment effect for O.B. Mod. on task performance? and (2) Are there any study characteristics that systematically moderate the relationship between O.B. Mod. and task performance? Next, we summarized the conceptual evidence that guided our choice of moderators and then tested the derived hypotheses in the moderator analysis. The pairwise differences between moderator groups and among moderator classes were also examined. Drawing on implications of our analysis, we conclude by suggesting new directions for future research and by providing several guidelines for practical applications in the field of organizational behavior.

PRIMARY META-ANALYSIS

Identification of the Studies

The collection of studies was initiated by computerized searches of specialized databases, such as the *Business Periodicals Index, Psychlit,* the *Expanded Academic Index, Sociofile,* the *Social Science Index,* and *Dissertation Abstracts,* covering the published literature from 1975 to 1995. The key words used were *organizational behavior modification, O.B. Mod., organizational behavior management, behavior modification,* and *applied behavior analysis.* We manually searched for relevant articles that were not covered by computerized databases in the following journals: the *Academy of Management Journal,* the *Academy of Management Review,* the *Journal of Organizational Behavior Management,* the *Journal of Applied Behavioral Analysis,* the *Journal of Applied Behavioral Science,* the *Journal of Applied Psychology, Personnel Psychology, Psychological Bulletin, Psychological Review,* and the *Journal of Personality and Social Psychology.* We also conducted searches using the reference sections of conceptual reviews and books on organizational behavior management (e.g., Andrasik, 1979, 1989; Bobb & Kopp, 1978; Luthans & Kreitner, 1975, 1985; Luthans & Martinko,

1987; Mayhew, Enyart, & Cone, 1979; Merwin et al., 1989; O'Hara et al., 1985; Rapp, Carstensen, & Prue, 1983). In addition, unpublished manuscripts were solicited from a number of researchers in this field. The search was limited to articles in the English language.

Selection Criteria for Inclusion in the Analysis

Since the research on behavior modification has been conducted across various disciplines, we started by defining the boundaries of our work. This study is about the effects of O.B. Mod., as defined by Luthans and Kreitner (1975, 1985), on task performance in organizational settings. This definition places several limitations on the scope of the analysis.

First, to be included in this meta-analysis, a study was required to examine dependent variables in the form of *behavior-based task-performance* measures. We focused on task performance because the reinforcement theory background and principles of behavior modification on which the O.B. Mod. model is based postulate that every behavior identified for change must be: (1) observable, (2) measurable, (3) task-specific, and (4) performance-related (Luthans & Kreitner, 1975, 1985). Second, considering the overriding reinforcement theory assumption of O.B. Mod. that behavior is a function of its contingent consequences (Luthans & Kreitner, 1975; Skinner, 1966, 1969), a study was also required: (1) to demonstrate the use of one or more empirically distinguishable dimensions of a reinforcement modality (e.g., money, feedback, social praise), (2) to have the reinforcement contingently administered (e.g., only upon identified behavioral responses), and (3) to operationalize reinforcement contingencies as an external intervention (e.g., by a manager or researcher). This definition thus excludes antecedents for behavioral control (e.g., job design), random reinforcement, and self-generated rewards. Finally, a study was required to provide the minimum statistical information necessary to calculate effect sizes either directly or through mathematical transformations. If a report included several individual experiments, the corresponding number of effect sizes was calculated and included in the analysis. Out of 125 studies that satisfied the search criteria, 19 (15%) met the inclusion requirements: 14 published articles, 1 book chapter, 1 dissertation, and 3 unpublished manuscripts. We calculated 115 effect sizes, based on a total sample size of 2,818 subjects. The average sample size per effect was 25 subjects.

Effect-Size Estimation and Homogeneity Assumption

Calculating single effect sizes. Using the Hedges and Olkin (1985) meta-analytic method, we started the analysis by estimating the effect size for each study in the form of index *g,* using Hedges's (1986) notational system.[1] The

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[1] In the case of research studies that did not report statistical estimates (e.g., $\overline{X}$s, Ss) needed to directly calculate effect size *g,* we used computational adjustments provided by Hedges (1981, 1982a) and Rosenthal (1991, 1994) to transform different statistical indices to effect size *g.*

effect size g represents the mean difference between an experimental and a control group divided by the pooled standard deviation assumed to be common to both groups. Since for small samples ($n < 10$), g has a slight tendency to overestimate population effect size δ (Hedges & Olkin, 1985), we multiplied g with the correction factor provided by Hedges (1981), which gives an unbiased estimator (d). Hedges (1981) showed that the unbiased estimator d for every g has an approximately normal sampling distribution when all studies share a common effect size with the mean δ and variance v, where v is determined by the sample sizes and the value of d (cf. Hedges, 1986).

    Combining estimates of effect sizes. Although one way to combine estimates of single effect sizes is to simply average the values of d, the more precise procedure is to combine them by calculating a weighted average effect size that incorporates variances v_i to v_k for each d_i to d_k (Hedges, 1986). Thus, to determine whether all studies shared the common effect size, we computed the weighted average effect size ($d.$) across k studies by weighting each effect size by the inverse of its variance. After determining the weighted average effect size ($d.$) and its variance ($v.$), we tested the hypothesis that the common population effect size δ was equal to zero by comparing the ratio $d.^2/v.^2$ to the chi-square distribution for one degree of freedom. In other words, we intended to determine if there was a significant main effect for the average treatment across k studies.

    Testing for homogeneity of effect sizes. The weighted average effect size ($d.$) represents an unbiased estimate of the population effect size only if single effect-size magnitudes are consistent across all k studies examined. If single effect sizes do not deviate from each other by more than what is expected by chance, the estimates differ only by unsystematic sampling error, and one can conclude that the model of the single effect size fits the data adequately (Hedges, 1982b; Hedges & Olkin, 1985). However, significant heterogeneity of effect sizes across k studies indicates that differences in individual effect-size magnitudes may be large enough to cause rejection of the homogeneity hypothesis that single effect sizes are drawn from the same population (a significant treatment-by-study interaction; Hedges, 1986). To test for treatment-by-study interaction, we used the H_t homogeneity statistic (Hedges, 1982a, 1986), which represents the weighted sum of squares of the effect-size estimates d_i to d_k about the weighted mean ($d.$).

Outlier Analysis

    Exclusion of single-case studies. Considering that the O.B. Mod. model has theoretical roots in Skinner's operant conditioning paradigm, it was no surprise to find that several studies that satisfied the criteria for inclusion in this meta-analysis reported multiple case studies each involving only one subject ($n = 1$). Although we recognize the idiosyncratic value of these experiments (cf. Luthans & Davis, 1982), we treated studies with one subject as sample-size outliers and excluded them from our study. The main reason for exclusion of single-case experiments was the strong possibility for capitalization on chance that would preclude reliable generalization of findings in

terms of external validity. Several methodological properties of Hedges and Olkin's (1985) meta-analytic method also contributed to the exclusion of single-case experiments from further analyses.[2]

Effect-size outliers and extreme values. To estimate the relative stability of unbiased effect-size magnitudes, we conducted schematic plot analysis (Light, Singer, & Willett, 1994), which indicated outliers and extreme values for the entire sample of k studies. Effect sizes positioned 1.5 to 3 lengths from the upper or lower edge of the 50 percent interquartile range (e.g., Tukey's hinges) were considered outliers, and those placed more than three lengths from the interquartile range were considered extreme values (e.g., Tukey, 1977). These limits corresponded to an effect-size value of 2.0, meaning that the average person in the control group would rise two standard deviations from the mean at the 98th percentile of the standard normal distribution after the treatment (cf. Glass, 1976). Although only a modest proportion of all effect sizes was deleted (10%), we followed the customary procedure for dealing with sample-size outliers by conducting two analyses, combining effect sizes with outliers and extreme values in one and omitting outliers and extremes in the other (e.g., Williams & Livingstone, 1994).

Results of the Primary Meta-Analysis

As indicated above, in combining the individual estimates of effect sizes to produce an overall estimate of effect magnitude d. for the entire set of k studies, we performed two analyses, one with (set 1) and one without (set 2) effect-size outliers and extreme values. For the first set of studies, the one including outliers and extreme values, the value of the average unbiased effect size d. was .95, with a variance v. of .0005. The magnitude of this average effect size indicated the presence of a significant main effect of treatment across the k studies ($\chi^2_1 = 1,536.33$, $p < .05$). After removal of the outliers and extreme values in the second set of studies, the magnitude of the average unbiased effect size d. was .51, with a variance v. of .0006. The magnitude of this average effect size also indicated the presence of a significant main effect for treatment across the remaining k studies ($\chi^2_1 = 377.61$, $p < .05$).

On the basis of the test for within-group homogeneity of effect sizes, we rejected the homogeneity assumption ($H_t = 616.76$, $p < .05$), which was as

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[2] First, since effect size g tends to slightly overestimate the population effect size δ for small samples ($n < 10$), we based our analysis on the unbiased estimator d, which provides a more reliable estimate of effect magnitude. Applying the correction factor necessary to compute d (Hedges, 1981) reduces the magnitude of g in every instance of small sample size except when $n = 1$, in which case the correction factor actually inflates the value of the already positively biased estimator g. Second, the nomographs for exact confidence intervals for population effect size δ when the lesser of n^e or n^c is less than 10 include the values for effect-size magnitude when $2 \leq n \leq 10$ (Hedges & Olkin, 1985), thus again excluding the possibility of $n = 1$. Third, when there are studies with sample-size outliers as extreme as $n = 1$, weighting the average effect-size estimate with the inverse of its variance will be unduly biased, considering the relatively greater sample estimate of variance based on single subjects.

expected, given the diverse attributes of the studies included in this meta-analysis. This finding suggested that: (1) single effect-size magnitudes were not consistent among each other, (2) there was significant treatment-by-study interaction, and, most importantly, (3) it was inappropriate to specify the predictive model by a single average estimate of effect size. Since significant heterogeneity of effect-size magnitudes was present, we engaged in a search for moderators by turning to theoretical explanations for potential sources of systematic variance among the examined studies.

THEORETICAL FOUNDATIONS OF O.B. MOD.

Reinforcement Theory

The single most important theoretical foundation for the development of the O.B. Mod. paradigm is operant learning or reinforcement theory (Ferster & Skinner, 1957; Komaki, 1986; Skinner, 1966). Largely based on Thorndike's (1913) law of effect, reinforcement theory finds the causal agents of human action in the functional relationship between environmental variables (antecedents and consequences) and the behavior they effect (Rogers & Skinner, 1956; Skinner, 1969). The arrangement of environmental conditions influences the behavioral response, and the knowledge of the relationship between behavior and its contingent consequences facilitates learning (Bandura, 1969). Considering the overall effectiveness of reinforcement theory, Vroom noted that "without a doubt the law of effect or principle of reinforcement must be included among the most substantiated findings of experimental psychology and is at the same time among the most useful findings for an applied psychology concerned with control of human behavior" (1964: 13).

In the application of reinforcement theory to modification of the behavior of organizational participants, antecedents (e.g., job design, training) of a desired behavior should be analyzed first to determine what factors functionally cue or set the occasion for that behavior to be "emitted" (e.g., Komaki, Blood, & Holder, 1980). However, antecedents assume stimulus control properties only in the presence of reinforcing contingent consequences, which in turn determine if a behavioral response will actually occur (e.g., Komaki, Collins, & Penn, 1982). In fact, as Bandura pointed out, "If people acted . . . on the basis of informative cues but remained unaffected by the results of their actions, they would be too insensible to survive very long" (1986: 228). Thus, identifying the reinforcing contingencies of the emitted behaviors is the critical process in the application of reinforcement theory to organizational settings.

Behavioral Systems Analysis

Considering its reinforcement theory background, the underlying assumption of O.B. Mod. is always the same: behavior is a function of its contingent consequences (Luthans & Kreitner, 1975, 1985). However, although this principle serves as a general guideline for O.B. Mod. applica-

tions across organizational settings, sufficient conceptual and empirical evidence has been generated to prevent scholars and practitioners from "presuming that one set of contingencies will work equivalently well across varied organizations" (Suzler-Azaroff, Pollack, & Fleming, 1992: 117). Mawhinney (1992) also argued that automatically applying one set of contingencies to distinct organizational settings would be a mistake since the extent to which certain behavioral interventions are effective depends on specific features of a particular organizational type.

The premise that the type of organization in which an application occurs may be causing differences in the effect magnitudes of O.B. Mod. is conceptually based upon behavioral systems analysis, which represents "a blend of behavior analysis and systems analysis perspectives in that the environment of interest for the behavioral systems analyst is generally a complex environment . . . and the behavior of interest is that which is controlled by that organizational environment" (Krapfl & Gasparotto, 1982: 24). In behavioral systems analysis, the network of operating reinforcers within an organization is examined to determine which application of various contingencies will be best supported by the organizational environment and which will be incongruent with the characteristics of the particular organizational type (Gilbert, 1978; Krapfl & Gasparotto, 1982). Especially important in this type of analysis is identifying the reinforcers inherent in a particular organizational setting, since intervening with reinforcers that are readily available and already congruent with distinct organizational features increases the chances for successful behavioral change (Stokes & Baer, 1977).

The combined characteristics of networks of reinforcing contingencies inherent to various organizational settings are assumed to be conceptually generalizable according to specific organizational types (Krapfl & Gasparotto, 1982; Luthans & Kreitner, 1985; Mawhinney, 1979, 1992; Mawhinney & Ford, 1977; Stokes & Baer, 1977; Suzler-Azaroff et al., 1992). In particular, the analysis of the availability and effects of different networks of reinforcing contingencies on task performance has usually been placed within the framework of manufacturing and service organizations (e.g., Bowen, Chase, & Cummings, 1990; Collier, 1990; Connellan, 1978; Luthans, 1988; Luthans & Davis, 1990; Mirman, 1982; Quinn & Gagnon, 1986; Riddle, 1986; Schneider & Bowen, 1993; Wikoff, Anderson, & Crowell, 1982). We next examine the specific features of manufacturing and service organizations that might cause systematic variations in the effect magnitudes of the O.B. Mod. interventions studied here.

Manufacturing versus Service Organizations

In comparison to manufacturing organizations, where productivity gains are mostly made through technological innovations (Quinn & Gagnon, 1986), service organizations are labor intensive, which poses special challenges in determining the most effective behavioral interventions (Heskett, 1986). Summarized broadly, key organizational characteristics that may cause differences in the effectiveness of various types of behavioral inter-

ventions in manufacturing and service organizations are: (1) the definition and possibility for accurate assessment of performance outcomes and (2) the nature of the task-performance and work processes involved in the delivery of performance outcomes (Collier, 1990; Luthans & Davis, 1990; Parasuraman, Zeithaml, & Berry, 1985; Suzler-Azaroff et al., 1992; Wikoff et al., 1982; Williams & Zigli, 1987).

Definition and assessment of performance outcomes. The complex evaluation problems in service organizations are mostly related to the (1) conceptual definition of service as a performance outcome and (2) operationalization of those definitions by practicing managers. In manufacturing organizations, the emphasis is on the production or assembly of tangible goods (Wikoff et al., 1982), but in service organizations, the emphasis is on service as the performance outcome (Parasuraman et al., 1985). The major difference between the two performance outcomes is that goods can be easily described and directly measured, whereas service usually contains a set of intangible and implicit attributes that are hard to define in operational terms (Sasser, Olsen, & Wyckoff, 1978). The amorphous nature of service as a performance outcome is exemplified in the following definition:

> A service can be an idea, entertainment, information, knowledge, change in the customers' appearance or health, social innovation, circumstance (being at the right place at the right time), convenience, . . . security, or any of a number of other things. Service may also be defined as a deed, a performance, a social event, or an effort and output that is consumed where it is produced (Collier, 1990: 237).

Practicing managers in service organizations are also not immune from adding to the problem of clearly defining service as a performance outcome. In contrast to manufacturing organizations, where managers usually speak of performance outcomes in precise and operational terms (e.g., product specifications, how to measure quantity or quality), in service organizations managers often speak of service in vague generalities or fiery slogans, which usually falsely imply that employees know exactly what to do (Luthans & Davis, 1990). For example, in a study examining the service behaviors of grocery store clerks, when the researchers asked the manager if he specifically outlined what he wanted employees to do, he replied that "they ought to know, since that was what they were getting paid to do" (Komaki, Waddell, & Pearce, 1977: 341).

Williams and Zigli pointed out that "progress is being made in defining service and service . . . parameters, but imprecision and manufacturing mentality make the task difficult" (1987: 14). This difficulty persists because managers in service organizations must be able to at the same time (1) understand the specific characteristics of the service as a construct, (2) identify and quantify explicit and intricate implicit components of the service content, and above all (3) assess and develop representative measures of service as a performance outcome construct. Thus, whereas in manufacturing organizations performance outcomes tend to be specified in observable and mea-

surable terms, performance outcomes in service organizations represent "an exciting challenge for management to quantify and measure . . . and integrate these intangible measures with the tangible attributes of the service" (Collier, 1990: 242).

Nature of the task-performance and work processes. Another difference between manufacturing and service organizations that may cause variations in the effects of behavioral interventions has to do with the accuracy of deciding what task performance to target for change (Riddle, 1986; Suzler-Azaroff et al., 1992). This is because task performance in manufacturing and service organizations involves the use of different work processes to successfully accomplish performance outcomes. In particular, in manufacturing organizations tasks usually involve well-defined production processes (usually based on some form of predefined engineering specifications) that workers need to follow and, in addition, some form of automation is often present to simplify task performance (Quinn & Gagnon, 1986). However, in service organizations tasks innately involve service delivery processes (Parasuraman et al., 1985), which have characteristics quite different from those of production processes. Service delivery has to do with meeting or exceeding customers' expectations, which involves a complex web of dual perceptions, those of the managers and those of the customers (Luthans, 1988, 1995).

Thus, the critical difference between the two processes is that there are many more ways to misspecify what constitutes a service delivery process than a production process. As Schneider and Bowen pointed out, "Many services . . . are judged for quality based on seemingly tangential cues experienced during the delivery process" (1993: 39). One of the major problems that can cause the mismanagement of service delivery processes is discrepancy between customers' expectations and perceptions of service delivery (Parasuraman et al., 1985). Specifically, if customers' perceptions of frontline service delivery do not match what they expected in terms of style or manner (Schneider & Bowen, 1993), they may exhibit negative overt reactions, which can in turn have punishing consequences for service employees (Luthans, 1988; Luthans & Davis, 1990). The possibility that such punishing consequences may "naturally" arise might cause service employees to assume that a job not well done will lead to negative contingencies and thus might attenuate the effects of originally applied behavioral interventions.

All these circumstances contribute to there being greater potential in service than in manufacturing organizations for the development of response patterns that might be incongruent with successful task performance. Thus, we hypothesize the following:

> *Hypothesis 1. The average effect magnitude of O.B. Mod. interventions in service organizations will be lower than the average effect magnitude of O.B. Mod. interventions in manufacturing organizations.*

Effect Variations of Types of Reinforcement Interventions

As Bandura convincingly argued, "Human behavior . . . cannot be fully understood without considering the regulatory influence of response consequences" (1986: 228). In fact, according to Bandura, that human behavior is influenced by its effects is not questioned in any theory that aspires to explanatory and predictive power. However, this does not imply that different reinforcing contingencies produce uniform effects, regardless of their content. Although not necessarily provided by a particular theory or stream of research, ample conceptual and empirical evidence suggests that different reinforcing contingencies may produce different effect magnitudes not only between groupings (as outlined above), but also within a particular grouping or classification, because of the differences in their unique reinforcing potential. In elaborating this premise, we largely drew from Bandura's (1986) conceptualization of the natures of different types of reinforcers and the related theoretical and empirical evidence (e.g., Kluger & DeNisi, 1996; Komaki et al., 1982; Komaki, Coombs, & Schepman, 1996; Luthans & Kreitner, 1975, 1985). This literature suggests that different types of reinforcement are likely to produce different effects based on differences in (1) their reinforcement values, (2) their informative content and subsequent utility, and (3) the mechanisms through which they operate. On the basis of these distinct characteristics, the various reinforcers used in behavior modification in organizational settings can be classified into the following types of interventions: (1) financial/monetary, (2) nonfinancial, (3) social, and (4) various combinations (simultaneous use) of two or more types of reinforcement.

Financial Reinforcement

The underlying characteristic of all financially based reinforcers is that organizations are directly or indirectly required to provide monetary contingencies. These usually include cash payments, although other financial rewards, such as prizes (commonly used in sales work), time off, and paid vacations have also been examined (see Merwin et al. [1989] for a review). The common value of all financial reinforcers is derived from the fact that they ultimately lead to some form of tangible payoff (Bandura, 1986). In particular, money becomes a reinforcer because it can be exchanged for other desirable consequences (e.g., goods, services) or effects (e.g., privileges) (Komaki et al., 1996), whereas other financial consequences (e.g., prizes) can reinforce because of the immediate benefits their contents provide. Another common characteristic (or better yet, deficiency) of financial reinforcers is that they provide little specific information about a person's task performance. Besides generally indicating the direction of the performance outcome (e.g., "I must have performed well if I received the reward, or vice versa") financial reinforcers neither (1) provide substantive insights about the magnitude of the congruence or discrepancy between the level of the

performance outcome and the desired standard nor (2) supply any specific task-related information to guide subsequent performance efforts (cf. Andrasik, 1979, 1989; O'Hara et al., 1985; Rapp et al., 1983).

Considering the mechanisms through which they operate, the application effectiveness of financial reinforcers is largely enhanced if the following processes are recognized (cf. Bandura, 1986). First, the more closely the incentives are tied to task performance based on individual merit, the greater the performance improvement (Lawler, 1971, 1987). Second, the merit-based individual performance must be measured objectively, since subjective performance evaluations can produce perceptions of inequitable rewards (Hammer, 1979). Finally, if a group-incentive system is used, financial incentives that reward individual merit-based performance are more effective than equally allotted rewards (Farr, 1976).

Nonfinancial Reinforcement

Nonfinancial reinforcers cost organizations little, if anything, to administer. Most of the behavioral interventions in this category can generally be classified as objective or performance feedback (Kopelman, 1986; Luthans & Kreitner, 1985); however, feedback information can be conveyed in a variety of different forms and ways (Ammons, 1956; Kluger & DeNisi, 1996; Komaki et al., 1996). In contrast to financial reinforcers, whose value is based on the tangible payoffs their contents offer, feedback interventions derive their reinforcing power from the information they provide about an employee's performance (Annett, 1969; Bandura, 1986; Kluger & DeNisi, 1996; Komaki, Heinzmann, & Lawson, 1980). Regardless of the source (e.g., supervisor, peers, task) or form (e.g., written, verbal) of feedback information, the overriding guideline for application of feedback interventions under the O.B. Mod. approach is that feedback be (1) conveyed in a positive manner, (2) immediate, (3) graphic, and (4) specific (Luthans, 1995).

There is widely held agreement across the conceptual orientations (Bandura, 1986; Carver & Scheier, 1981; Locke & Latham, 1990) that feedback regulates human action by initiating the evaluation of and stimulating the reaction to a feedback-standard discrepancy (see Kluger & DeNisi [1996] for an extensive discussion and analysis of this topic). Although all of these theories agree on how people evaluate this discrepancy, they differ in their explanations of people's reaction to it. For example, according to control theory, when people perceive a negative discrepancy (after comparing a goal with feedback), they tend to reduce the gap either by changing their behaviors or the standard, or by "leaving the scene" cognitively or physically (Carver & Scheier, 1981). However, according to goal-setting theory, the explanation of people's reaction to the discrepancy is that they are motivated to accomplish the goal, typically by increasing their effort (Locke & Latham, 1990).

According to social cognitive theory (Bandura, 1986), much of human behavior is initiated and regulated by internal self-set standards and self-evaluative reactions to exerted behaviors. After personal standards have

been set, incongruity between behavior and the standard against which it is measured activates self-evaluative reactions that in turn influence subsequent action (Bandura, 1986, 1997). This conceptual approach contrasts with negative feedback control models (e.g., Carver & Scheier, 1981; Kanfer, 1977) and the goal-setting approach (Locke & Latham, 1990), according to which the absence of a discrepancy between standards and the results of behavioral action stops the motivational process, since effort tends to be reduced or, at best, maintained. According to Bandura (1986), even if there is no incongruity between self-standards and present performance, people will tend to set higher standards for themselves and "activate" future behaviors to satisfy new standards (cf. Kluger & DeNisi, 1996).

Social Reinforcement

Social reinforcement includes the use of verbal consequences, typically expressed by individuals, such as attention, recognition, commendations, compliments, and praise (e.g., Haynes et al., 1982). Social reinforcers derive their power from the following correlation of events. As Bandura (1986) noted, valuable material rewards often occur in conjunction with or following the approval of others, and undesirable experiences tend to follow social disapproval. Social reactions, therefore, become predictors of future reinforcement, which in turn strengthens behaviors that result in social approval and weakens behaviors that lead to social disapproval. Thus, by reversing the correlates, the reinforcement value of social consequences is derived from their power to predict subsequent behaviors, rather than from the social reactions themselves (Bandura, 1986).

According to Bandura (1986), several factors contribute to the effectiveness of social reinforcement. First, the approval or disapproval of those who have the authority and resources to administer rewarding or punishing consequences produces stronger effects than the approval or disapproval of those who have no power to subsequently provide any tangible rewards. Second, indiscriminate approval that does not eventually result in material benefits becomes an empty reward, disapproval that is never followed by aversive consequences becomes an empty threat, and both lack the potential to control human behavior. Third, social support that predicts several outcomes has a greater reinforcing potency than support that relates to only a single effect. Finally, because of both its intermittency and diverse correlates, social reinforcement maintains its effectiveness even with minimal tangible support (Mowrer, 1960).

The above theoretical discussion leads to several hypotheses, which we outline according to the progression of Hedges and Olkin's (1985) meta-analytic procedures:

> *Hypothesis 2. Each type of reinforcement intervention will produce significant average effects on task performance in both manufacturing and service organizations.*

Next, in view of the test for between-group homogeneity of effect sizes, we hypothesize that:

> *Hypothesis 3. Given their different reinforcing potentials, different reinforcement interventions will produce different average effect sizes in both manufacturing and service organizations.*

Lastly, with regard to the test for the within-class homogeneity of effect sizes, we hypothesize that:

> *Hypothesis 4. On the basis of their within-class unique sources of reinforcing potential, each type of reinforcement intervention will produce significant within-class homogeneity of average effects in both manufacturing and service organizations.*

META-ANALYTIC MODERATOR ANALYSIS

The Coding of Studies

Each study that met the selection criteria was coded for two moderators on the basis of the conceptual criteria outlined above. The two moderators and their specific categories were: (1) *type of organization* (manufacturing and service) and (2) *type of intervention* (financial intervention, nonfinancial intervention, social reward, and combinations of these three). We included the combinations of two or more types of reinforcement in the analysis for the sake of completeness since several studies simultaneously used different behavioral interventions. Data were coded independently by one of the authors and another trained rater. The values of the interrater agreement statistic (rho) were .96 and .98, respectively, for the moderator groups, and the mean agreement between raters when coding was aggregated across the moderator groups was a rho of .97. The "effective" reliability (R) was .99, indicating the probability that a similar group of two other raters would reach the same conclusions regarding the variables coded (Rosenthal, 1991).

Analytical Procedures

According to Hedges and Olkin's (1985) meta-analytic method, three sets of statistical tests were necessary to determine whether the moderator or moderators adequately explained the nature of the moderation. First, we tested for the homogeneity of effect sizes within the two categories (manufacturing vs. service) of the first moderator group (type of organization) to determine whether this grouping variable adequately explained the study-by-treatment interaction found in the primary meta-analysis. For this test, we used the H_w homogeneity statistic (Hedges, 1982a, 1986), which represents an overall test of the homogeneity of effect sizes *within* the partitioned groups across k studies. Second, we tested for the homogeneity of effect sizes between two categories of the first moderator to examine whether their respective average effect sizes significantly differed *between* each other, using the H_b homogeneity statistic (Hedges, 1982b, 1986). We continued the process of subdividing and testing for within- and between-group fit according

to the second moderator group (type of intervention) until within-group homogeneity with respect to effect magnitude was achieved. Finally, since we found that the effect sizes for final partitions were homogeneous within classes but heterogeneous between classes, we compared the effect sizes for different classes within each group by means of linear combinations using orthogonal polynomials (see Hedges and Olkin [1985] for a detailed discussion of these procedures).

Results of the Moderator Meta-Analysis

Type of organization. Using the type of organization as the first moderator, we split the original set of studies into two groups reflecting manufacturing and service organizations. Weighted average effect sizes for both manufacturing ($d_{.1} = .96$) and service organizations ($d_{.2} = .37$) were significant ($p < .05$), indicating the presence of a significant main effect for the O.B. Mod. approach in each group. However, the average effect sizes varied significantly between the manufacturing and service groups ($H_b = 90.54$, $p < .05$), indicating that type of organization was a categorical variable significantly related to the magnitude of effect sizes. These findings supported Hypothesis 1. Further analysis indicated that individual effect sizes were also heterogeneous within each group (see Table 1), signaling that a significant treatment-by-study interaction was present in each group. To account for this interaction, we proceeded with second-level partitioning according to the second moderator that had been conceptually derived a priori, the type of reinforcement intervention.

Type of reinforcement intervention. Each of the initial two groups (manufacturing and service) were further partitioned into several classes according to the type of reinforcement intervention used in the studies. This moderator included seven categories: (1) financial interventions, such as money or valued prizes, (2) nonfinancial interventions, such as performance feedback, (3) social rewards, such as recognition and attention, (4) intervention package 1, the combination of 1 and 2, (5) intervention package 2, the combination of 1 and 3, (6) intervention package 3, the combination of 2 and 3, and (7) intervention package 4, the combination of 1, 2, and 3. Because the number of categories was relatively large, social rewards by themselves and intervention packages 1 and 2 were not represented in the manufacturing

TABLE 1
Summary Statistics for Manufacturing and Service Organizations

Type of Organization	$d.$	$v.$	95% Confidence Limits		χ^{2a}	$H_{wi}{}^b$
			Lower	Upper		
Manufacturing	.96	.003	0.858	1.072	312.56*	161.91*
Service	.37	.001	0.314	0.431	155.59*	364.31*

[a] $\chi^2 = d.^2/v.$ for each group.
[b] Within-moderator-group homogeneity statistic.
* $p < .05$

organizations, and intervention package 2 was not covered in the service group.

For manufacturing organizations, the average effect sizes $(d_{.1j})$ were significant $(p < .05)$ and homogeneous for these types of intervention: financial $(d_{.11} = 1.36)$, nonfinancial $(d_{.12} = 1.48)$, intervention package 3 $(d_{.16} = 1.49)$, and intervention package 4 $(d_{.17} = 1.82)$. Homogeneity was achieved both across the classes $(H_{w1} = 15.94, p > .05)$ and within each class (see Table 2). However, the average effect sizes for each type of intervention for manufacturing organizations were heterogeneous between classes $(H_b = 600.82, p < .05)$, indicating a significant difference in their effect magnitudes. These findings supported Hypotheses 2, 3, and 4, pertaining to types of interventions in manufacturing organizations.

For service organizations, the average effect sizes $(d_{.2j})$ were also all significant $(p < .05)$ and homogeneous for each type of intervention: financial $(d_{.21} = 0.42)$, nonfinancial $(d_{.22} = 0.19)$, social rewards $(d_{.23} = 0.44)$, intervention package 1 $(d_{.24} = 0.89)$, intervention package 3 $(d_{.26} = 0.53)$, and intervention package 4 $(d_{.27} = 0.27)$. As in the case of the manufacturing organizations, for service organizations within-group homogeneity was also achieved both across the classes $(H_{w2} = 52.05, p > .05)$ and within each class (see Table 3). Significant between-class heterogeneity of average effect sizes $(H_b = 564.70, p < .05)$ indicated that in service organizations, as in the manufacturing ones, different types of interventions produced different effects. These findings supported Hypotheses 2, 3, and 4, pertaining to types of interventions in service organizations.

Type of organization and type of intervention. Since we calculated upper and lower confidence limits for every average unbiased effect size, corresponding to the specific combination of type of organization and type of intervention, the data lend themselves to a useful graphical presentation using a clustered side-by-side schematic plot that can further clarify the

TABLE 2
Summary Statistics for Type of Intervention for
Manufacturing Organizations

Type of Intervention[a]	$d.$	$v.$	95% Confidence Limits		$\chi^{2\text{[b]}}$	H_{wi}[c]	k	n
			Lower	Upper				
1	1.36	.009	1.173	1.553	197.65*	2.94	3	263
2	1.48	.058	1.011	1.955	37.87*	4.34	3	45
6	1.49	.023	1.202	1.793	98.85*	8.52	4	115
7	1.82	.028	1.490	2.150	117.62*	0.14	2	100

[a] Moderator codes for type of intervention: financial intervention = 1, nonfinancial intervention = 2, social rewards = 3, intervention package 1 (combination of 1 and 2) = 4, intervention package 2 (1 and 3) = 5, intervention package 3 (2 and 3) = 6, intervention package 4 (1, 2, and 3) = 7.

[b] $\chi^2 = d.^2/v.$ for each class.

[c] Within-class homogeneity statistic.

* $p < .05$

TABLE 3
Summary Statistics for Type of Intervention for Service Organizations

Type of Intervention[a]	d.	v.	95% Confidence Limits		χ^{2}[b]	H_{wi}[c]	k	n
			Lower	Upper				
1	.42	.009	0.234	0.613	19.19*	1.93	6	124
2	.19	.002	0.101	0.277	17.70*	44.35	37	1,044
3	.44	.046	0.030	0.866	4.40*	0.13	6	96
4	.89	.185	0.050	1.736	4.31*	0.87	4	24
6	.53	.005	0.398	0.662	61.91*	4.69	12	350
7	.27	.007	0.114	0.433	11.27*	0.09	2	425

[a] Moderator codes for type of intervention: financial intervention = 1, nonfinancial intervention = 2, social rewards = 3, intervention package 1 (combination of 1 and 2) = 4, intervention package 2 (1 and 3) = 5, intervention package 3 (2 and 3) = 6, intervention package 4 (1, 2, and 3) = 7.

[b] $\chi^{2} = d.^{2}/v.$ for each class.

[c] Within-class homogeneity statistic.

* $p < .05$

relationships analyzed (e.g., Light et al., 1994). Figure 2 presents a schematic plot of average unbiased effect sizes for both the manufacturing $(d_{.1j})$ and service organizations $(d_{.2j})$, categorized by each type of intervention.

Orthogonal Comparisons among Classes

Since the average effect sizes for each initial moderator group produced varying between-class magnitudes, we used orthogonal polynomials

FIGURE 2
Schematic Plot of Average Effect Sizes and Corresponding Confidence Intervals by Type of Organization and Type of Intervention

Type of Reinforcement Intervention
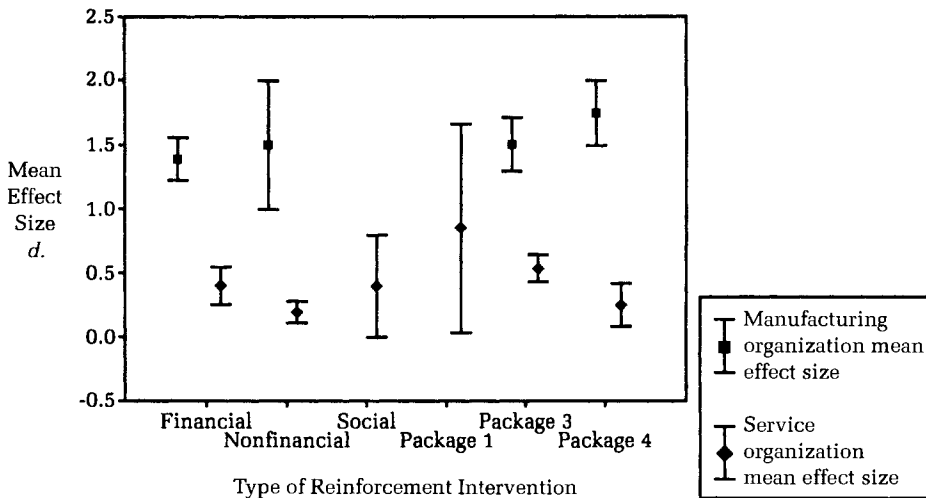
(Hedges & Olkin, 1985) to determine the pairwise differences for each linear combination for different classes. For manufacturing organizations, we compared effect sizes among different classes by means of six linear combinations. Significant differences between the average effect sizes were detected for comparison III, contrasting financial interventions and intervention package 4, which represents the combination (simultaneous use) of financial interventions, nonfinancial interventions, and social rewards ($\gamma_{\text{III, }17}$ = .46, $v_{\gamma\text{III, }17}$ = .029, 95% confidence interval [CI] = .125 to .795, $p < .05$). Using the same procedure for service organizations, we contrasted the average effect sizes among classes within this moderator group by means of 15 linear combinations. Results revealed significant differences for comparison I, which contrasted financial interventions and nonfinancial interventions ($\gamma_{\text{I, }12}$ = −.23, $v_{\gamma\text{I, }12}$ = .011, 95% CI = −.439 to −.021, $p < .05$); comparison VIII, contrasting nonfinancial interventions and intervention package 3, simultaneous use of nonfinancial interventions and social rewards ($\gamma_{\text{VIII, }27}$ = .34, $v_{\gamma\text{VIII, }27}$ = .007, 95% CI = .181 to .499, $p < .05$); and comparison XV, comparing intervention package 3, nonfinancial interventions and social rewards, and intervention package 4, simultaneous use of financial and nonfinancial interventions and social rewards ($\gamma_{\text{XV, }67}$ = −.26, $v_{\gamma\text{XV, }67}$ = .007, 95% CI = −.467 to −.053, $p < .05$).

DISCUSSION

Primary Meta-Analysis

The main purpose of this study was to provide a meta-analytic review of the O.B. Mod. approach to human resource management in organizational settings. By synthesizing the results of the empirical studies conducted over the past 20 years examining the impact of O.B. Mod. on task performance, we intended to answer two major questions: (1) What was the overall effect of O.B. Mod. on task performance? and (2) Were there any study characteristics that systematically moderated the effect magnitudes of O.B. Mod. interventions? With regard to overall effectiveness, the results from our primary meta-analysis indicated a significant main effect (adjusted for overestimation bias, outliers, and extreme values) for the O.B. Mod. approach of .51. Corresponding to half of one standard deviation from the mean, this effect magnitude indicates that the average person in the control group will rise to the 67th percentile (17 percent improvement in performance) after an O.B. Mod. intervention. The derivation of this particular effect size represents the first time that an indicator of the overall effectiveness of a behavioral approach to management has been quantitatively analyzed and reported.

Moderator Meta-Analysis: Toward a Contingency Approach to Behavioral Management

Findings from the primary meta-analysis also revealed that different study characteristics significantly moderated the relationship between the

application of O.B. Mod. and task performance. In evaluating the explanatory power of selected moderators, we found that the magnitude of the relationship between O.B. Mod. interventions and task performance significantly differed depending on the type of organization. Although in both manufacturing and service organizations, various O.B. Mod. interventions produced significant average effects, the average effect for manufacturing organizations was considerably stronger than that for service organizations. This finding indicates that the type of organization should be considered as an important contingency variable when behavioral management is applied. Overall, these results suggest the importance of initiating the development of a contingency approach to behavioral management. Thus, our findings suggest that the first step in this direction would be to recognize that, although behavioral management can produce significant effects in both manufacturing and service organizations, the larger impact tends to be in manufacturing organizations.

Reinforcement interventions in manufacturing organizations. The moderator analysis also revealed the presence of a significant treatment-by-study interaction within both manufacturing and service organizations. Further partitioning of each group according to the second moderator—type of reinforcement intervention—indicated that for manufacturing organizations all four types of reinforcement interventions analyzed produced significant results. However, the magnitudes of the effects revealed different patterns of relationships between the types of O.B. Mod. interventions and task performance. For example, the simultaneous application of financial interventions, nonfinancial interventions, and social rewards (intervention package 4) produced the strongest effect. However, the effect magnitude of this combination intervention was not statistically different from that produced by nonfinancial interventions alone. Furthermore, the effect size for financial interventions alone was also not found to be significantly different from the one for nonfinancial interventions. Finally, microanalysis of comparison III provided additional evidence indicating nonfinancial contingencies as a source of significant increases in task performance.[3]

Reinforcement interventions in service organizations. As in manufacturing organizations, every type of reinforcement intervention analyzed for service organizations produced significant effects, which were also found to be significantly different among the different types of interventions. However, results for the service organizations revealed an interesting relationship between financial and nonfinancial interventions that appeared to be almost the opposite of the relationship of those two interventions in the manufacturing organizations. For instance, in the service organizations financial rewards produced a significantly stronger average effect than nonfinancial interventions. Moreover, nonfinancial interventions such as performance

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[3] Comparison III refers to contrasting nonfinancial interventions and intervention package 3, which represents the simultaneous use of nonfinancial interventions and social rewards.

feedback produced the weakest (but still significant) results in the service organizations. A possible explanation for this finding may be that performance feedback in manufacturing organizations tends to be more specific, accurate, and immediate than it is in service organizations, where it is relatively ambiguous, typically more poorly defined, and subjective. However, when social rewards are used in combination with nonfinancial interventions such as performance feedback (intervention package 3), effects on task performance significantly improve (see comparison VIII) even beyond (although not statistically so) the effect produced by financial rewards alone.

Regarding other types of reinforcement interventions in service organizations, although the effects of financial interventions were larger than those of nonfinancial interventions, interestingly enough, they were not statistically different from those produced by social rewards. Another relationship emerged in comparison XV, in which, when compared to intervention package 4, intervention package 3 produced significantly stronger effects on task performance. Uniquely enough, the only difference between these two intervention packages was the addition of financial rewards in intervention package 4. Thus, it appears that when financial rewards are used in combination with nonfinancial contingencies such as performance feedback and social rewards, the monetary rewards may actually diminish the effect of the whole intervention.

Limitations and Future Research

Several limitations of the current research deserve further consideration. First, although not generally recognized by reinforcement and behavioral theorists, it is quite plausible that, in addition to the examined grouping variables, the relationship between O.B. Mod. applications and task performance may also be moderated by human judgmental processes (Bandura, 1986). Since we could not have tested this assumption in this meta-analysis (because no study we examined accounted for such a possibility), we address this potential limitation at the conceptual level. As Bandura (1986, 1997) simply pointed out, when "people have incomplete or erroneous information about alternatives and their probable consequences, they process information through cognitive biases, and what they value might be rather odd" (1986: 231). Also, besides basing their actions on the effects of immediate reinforcement, people may also act on their judgments of how well they can perform the behaviors necessary to receive the consequences (Bandura, 1997). In essence, expectations of personal inefficacy appear likely to hinder an individual's coping behavior directed toward the most cherished outcomes if the person doubts that he or she can do what is necessary to succeed, whereas a sense of high personal efficacy may help sustain efforts even in light of uncertain outcomes (cf. Bandura, 1997; Maddux, 1995). Thus, future research should examine the potential for the moderating impact of human judgmental processes (e.g., self-efficacy) on the relationship between O.B. Mod. and task performance.

A second limitation is the somewhat narrow focus of the O.B. Mod.

approach, which emphasizes only the contingent consequences of observable and measurable performance-related behaviors. Although we believe that our findings can serve as a *point of departure* in an empirical effort to develop a contingency approach to behavioral management, in building a comprehensive contingency theory and pragmatic guidelines for practice, future research should focus on expanding the scope of our analysis. Examining a broader range of effect sizes and variables—such as the antecedents used for behavioral control interventions (cf. Manz & Sims, 1980, 1981), random reinforcement, self-generated rewards, and possible interaction effects between these variables and the reinforcing contingent consequences—may provide a more thorough understanding of the complexities of human behavior in organizational settings.

Third, on a more methodological level, it is possible that an unknown moderator (or moderators) might be related to sample size or to the content of a sample, thus causing nonrandom sample selection error (Russell & Gilliland, 1995). In this scenario, some screening or moderating process, rather than the moderator itself, operates to select certain types of subjects in a particular sample. Thus, besides the always-present possibility that sample differences might be due to the "true" impact of a certain moderator, differences in effect sizes between different samples might also be due to differences in the way the samples were composed (a moderating process). Since in meta-analyses moderator effects are detected through residual variances (e.g., Hedges and Olkin's [1985] χ^2–homogeneity-of-effect-sizes test, or Hunter and Schmidt's [1995] 75 percent rule), a moderator analysis can indicate the presence of a moderator effect, but it cannot determine any conceptual processes behind the effect (Russell & Gilliland, 1995). Only primary research with random assignment of subjects to experimental and control groups can, so far, adequately resolve this problem (Cook & Campbell, 1977). Addressing the complexities of nonrandom sampling error is an area in need of further methodological and conceptual development within the field of research synthesis.

Practical Implications

The results of this meta-analysis have several practical implications for managers who are interested in enhancing the performance of their employees in an efficient, inexpensive, and relatively simple manner. Two dimensions of our findings seem of particular importance: (1) understanding that, overall, the O.B. Mod. approach was found to have a significant positive effect on task performance and (2) understanding the contingent nature of the O.B. Mod. interventions. In line with the contingent aspect of the O.B. Mod. approach, we offer several specific recommendations for future practical applications.

First, O.B. Mod. produces stronger effects in manufacturing than in service organizations. In manufacturing organizations, intervention packages (simultaneous use of several types of reinforcement) and financial reinforcement both have significant effects, but they do not produce effects

that are significantly different from those of nonfinancial interventions. Thus, the use of nonfinancial interventions is recommended because it does not appear to be beneficial for the managements of these organizations to spend extra resources for financially based rewards (money or valued prizes) or to spend extra time and effort to apply intervention package 4, when the application of nonfinancial interventions alone basically produces the same results.

Second, in service organizations, financial reinforcers seem to result in significantly stronger effects than nonfinancial interventions. However, if social reinforcement is applied in combination with nonfinancial interventions (e.g., performance feedback), the effect magnitude increases slightly beyond that of the monetary rewards used alone. The practical contingency guideline in this case would be that in service organizations, as well as in manufacturing ones, there appears to be a favorable probability that the same positive effects (even slightly higher effects) on task performance can be obtained by applying nonfinancial—in this case, social—rewards, as opposed to costly financial interventions.

Overall, the major implication of these contingency guidelines is that, at least from a cost-benefit perspective, practitioners should more closely examine the natures of different behavioral interventions in both manufacturing and service organizations. We believe that the suggestions provided can serve as useful practical guidelines to help managers resolve the increasingly complex challenge organizations face now and in the future—increasing employee performance effectiveness without increasing costs.

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