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Common Antecedent Strategies within Organizational Behavior Management: The Use of Goal Setting, Task Clarification, and Job Aids

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ABSTRACT

Despite organizational behavior management placing a great deal of emphasis on interventions that alter consequences for performance, antecedent interventions play an important role in the practice of our field. Antecedent interventions utilizing variables such as goal setting, task clarification, and job aids are common. Each of these variables are examined in terms of research findings and potential behavioral functions. Being well-versed in such outcomes should inform both researchers and practitioners in their efforts to identify efficient and cost-effective solutions for workplace performance.

Our world is flooded with events competing to induce our behavior. A brief tour of a typical office setting quickly identifies a rich tapestry of stimuli fighting for our attention: the notification from the computer as a new e-mail arrives, signs and post-it notes reminders, a display stating the company's mission, the sight of your coworker about to ask a favor, and the sight of the supervisor approaching with a forthcoming demand. Such objects and events are considered various forms of antecedents, stimuli which occur before and exert control over behavior (Martin & Pear, 2019). Antecedents are often stated as *triggering* or *stimulating* behavior (Daniels & Bailey, 2014). This contrasts with consequences, which are stimuli that temporally follow the behavior of interest. It is often implied, if not outright stated, that antecedents only exercise a small impact on behavior. Some authors suggest antecedents exert only 20% influence on behavior, whereas consequences exert 80% (Biteler, 2008; Braksick, 2007). Such non-empirical derivations of the Pareto principle attempt to quantify the relative impact of the components that constitute targeted behavioral relations, but these statements are potentially misleading. Misleads may be understandable considering organizational consultants routinely deal with clients whose standard solutions are to implement trainings, distribute memos and edicts, and to threaten, cajole, and/or harass subordinates (Daniels, 2016). Such techniques can be subsumed under the

general category of antecedent control and consultants likely want to redirect the focus of their clients to oft-neglected variables of consequent control. However, such simple categorization may create artificial boundaries that are permeable in practice.

When behavior occurs in the natural environment, there is rarely a clear-cut method for attributing a percentage of that performance to antecedent or consequent control (with occasional exceptions such as respondent behaviors which are completely controlled by antecedent stimuli), especially considering operant behavior is multiply determined. Adding to the complexity of identifying controlling variables is that the delivery of a consequence may generate lasting antecedent effects. For example, suppose an employee is paid a monetary incentive for increased productivity immediately following a work shift. Although the incentive is clearly a consequence for performance during the prior shift, it may induce the employee to describe the contingency of reinforcement as "If I produce more, then I may get paid more." Such contingency-specifying verbal stimuli may be repeatedly self-stated by the performer covertly, including immediately before their next shift and during several later shifts right before they are to engage in performance. This response-produced verbal antecedent may evoke rule-governed behavior resulting in higher performance (Agnew & Redmon, 1992; Malott, 1993). Although the monetary consequence was the variable that was explicitly delivered, antecedent control likely played a role that was equally important to the production of behavior, especially for verbally sophisticated organisms such as employees. A sustained improvement in performance over the duration of an entire subsequent work shift (perhaps even several workdays) could not persist under the control of a single consequence delivery many hours or days prior, at least not without continued verbally mediated aid from events such as antecedent rules.

It is also important to note that interventions that only target antecedents can be very successful even when explicit attention is not paid to consequences, such as a training procedure (the antecedent of interest) that brings performers into contact with existing natural sources of reinforcement. According to VanStelle et al. (2012), antecedent manipulations were the second most popular intervention utilized in the organizational behavior management (OBM) literature. Many other interventions classified by VanStelle et al. could potentially also function as antecedents, such as feedback or incentives that are delivered right before a session (Bechtel et al., 2015; Wine et al., 2019).

One advantage of antecedent interventions is that these can be both cost-effective and time efficient for companies when implemented properly. Suppose an organization wants to increase employee hand washing. To implement a consequence intervention, such as feedback, supervisors would have to observe the current status of employee hand washing to provide timely

feedback. This may be both awkward and unfeasible in certain situations (e.g., male supervisor in female restroom) so providing reminder signs or sending out a memo to employees may be more practical. To better understand some strategies, this paper will review the literature on goals, task clarification, job aids, and checklists, since these are common examples of successful antecedent interventions in the literature.

Goal setting

Goal setting remains a simple yet effective antecedent intervention successfully implemented across many organizations. At its most basic level, goal setting involves specifying a criterion (i.e., goal) for performance (Daniels & Bailey, 2014). Beyond this initial requirement, implementation takes many forms. Goals can be self-set or determined by supervisors, easy or difficult to achieve, set for an individual or collectively set for a group of employees, broken into several sub-goals or just a single specified level, etc. The logic behind goal setting is similar to the logic for a changing criterion experimental design in that each phase entails specific goals to achieve (Erath et al., 2020), except in this context goal setting is the intervention itself rather than a methodology to evaluate another intervention. Wilk and Redmon (1998) provide an example of goal setting in which they investigated the effectiveness of goal setting and feedback on the productivity and satisfaction of clerical employees in a university admissions department. In consultation with the researchers, the supervisor provided a specific goal that included a precise number of tasks that employees needed to attain (e.g., enter application information on 55 students and update the records for 15 files) and was adjusted daily based upon previous performance and current workplace needs. A multiple baseline design across job roles was applied. During the intervention, individualized daily goal setting and verbal feedback were applied (praise if goal met and prompting if goal unmet). During phase two graphic feedback was added to the first intervention. The results showed both interventions significantly increased productivity and satisfaction among clerical employees. Furthermore, the effects successfully maintained at follow up.

Another representative goal setting study was conducted at a multinational manufacturing plant. Jessup and Stahelski (1999) investigated effects of an intervention package comprised of goal setting, feedback, and performance contingent rewards at a large aluminum smelter. During intervention in a reversal design, progressively more difficult goals were implemented for reductions of defective products with various rewards available for meeting established criteria. This intervention showed consistent reductions in defects, meeting both production and organizational goals that realized a significant cost savings (which was critical since competition and excessive supply had forced the business to reduce half of its operations). During the return to

baseline, there was a clear increase in defective products, demonstrating the intervention package was responsible for prior improvements. The authors mentioned that feedback alone did not appear sufficient to improve performance because quality did not improve until a difficult-to-attain goal was set. Furthermore, goal setting in the absence of rewards and feedback (the reversal phase) also appeared ineffective, demonstrating the need for the packaged components.

Amigo et al. (2008) studied the effects of task clarification, goal setting, and feedback on employee busing time at a high-volume pizza restaurant. Busing behavior was defined and measured as the amount of time it took waitstaff to correctly clear dirty dishes and reset the table. Baseline data were collected for 2 weeks and the average busing time was over 300 seconds. During the first phase of intervention, employees were given a memo with task clarification and a goal set by managers to reduce table busing time to 180 seconds or less. During this initial phase busing time decreased to 284 seconds. In the second intervention phase, a mixture of individual verbal and graphic feedback as well as group feedback were delivered by managers weekly. Weekly group feedback was posted on a large graph in the back of the restaurant. Upon completion of this phase the average busing time was reduced to 152 seconds. Note that initial goals were only successfully met when feedback supplemented the initial intervention package. When feedback was removed during follow-up, busing times reversed to near baseline.

As illustrated with the above examples, goal setting is simply information about the standard by which performance is considered successful. Such goal setting has been shown to positively impact employee behavior across a variety of settings, job types, and research designs. Properly set goals can drive improved performance whereas improperly set performance goals run the risk of being ignored or even demotivating performers. Therefore, understanding potential variables for successful implementation of goal setting is important. The aforementioned studies already hinted at how goal setting can be enhanced or attenuated by the presence of other experimental variables. The variables that impact goal setting have been extensively investigated by both behavior analysts and traditional organizational psychologists. One widely investigated variable is degree of goal difficulty. For example, Roose and Williams (2018) examined different levels of goals (i.e., set at 150% and 175% of baseline performance) and two types of feedback on performance. A group design was used with participants receiving one of two goal levels and two different types of feedback. The authors found the types of feedback did not impact performance. However, as goal difficulty increased, the performance improved until goals became so difficult that performance could not improve. Similarly, Tammemagi et al. (2013), exposed 26 participants to a computer-based data entry task. Performance was measured during the first phase with no goal, then either a low attainable goal (i.e., 20 correct

data entry in 12 minutes) followed by a high unattainable goal (i.e., 40 correct data entry in 12 minutes) counterbalanced with a group which got a high unattainable goal followed by a low attainable goal. Introducing the higher goal demand first showed a greater benefit for performance than leading with the lower goal demand, although performance deteriorated over time under unattainable conditions for both sequences. Ultimately, even though high goals stimulate performance, these short-term gains come with a risk of eventual loss in performance if employees do not contact reinforcement due to goals persistently beyond current skill levels. This summary was corroborated by Locke and Latham (1990), who reviewed 400 empirical research articles and found goal difficulty and performance have a linear relationship. The more difficult the goal the better the performance. Therefore, it is best to set goals high, however, with the caveat that such goals should not be out of reach.

One consideration that helps mediate especially difficult goals are subgoals. Subgoals are small and obtainable steps that lead to the ultimate goal. If assigned a single ultimate goal, employees only have a single opportunity for success. However, subgoals enable employees to receive frequent reinforcement for goal attainment (Daniels & Bailey, 2014). For example, Sulzer-Azaroff et al. (1990) set successively higher goals to improve safety behaviors in a large industrial plant. Approximately 200–250 employees in three different departments where injuries showed the highest rates were involved. Safety behaviors were determined by reviewing accident and injury records, interviewing job incumbents, and conducting direct observations. Based on information gathered by this selection of safety behavior procedures, the dependent variable was determined as a percent of safety achievements, the aggregated percentages of correctly performed behaviors. Intervention consisted of feedback, reinforcement, and goal setting with subgoals for 4–5 weeks. Subgoal levels were determined by the highest percent scored from previous weeks. Employees received weekly graphic feedback with social recognition and low-cost rewards for the first goal achievement. Additionally, monthly special rewards (e.g., refreshments) were distributed. Employees' safety performance improved and eventually exceeded the targeted goal. Although successful in this case, deciding on the specific criteria for goals and subgoals can be challenging as one works across different settings and industries. As a general rule, Daniels and Bailey (2014) suggested that the initial goal be determined by the level of failure the organization can accept. Then, as time passes and success is met, more challenging yet attainable goals can be determined.

Another variable that will affect goal setting is specificity. According to Locke and Latham (1990), a specific and difficult goal is better in improving performance than a vague goal such as "do your best." One reason is that "do your best" goals do not provide clear criteria from the organization and

therefore individual employees may infer different expected performance standards from their supervisors (Locke & Latham, 2002). In this situation, employees give themselves the benefit of the doubt concerning adequacy of their performance and maximum effort will not be exerted (Kernan & Lord, 1988). When such self-directed goals fall short of management's expectations, the corresponding consequences (e.g., recognition, rewards, incentives, etc.) are withheld following employee performance, despite the fact the employee may have labeled their performance as fulfilling "do your best." This mismatch between employee's verbal self-appraisals and managerial evaluations may unintentionally create an extinction procedure which culminates in deterioration of performance and may also add conflict between subordinates and supervisors. A specific goal eliminates ambiguity as to what constitutes successful performance and precludes any arguments about the criteria. Furthermore, specific goals elucidate behavioral constitutions that lead to successful performance and these facilitate feedback on goal attainment since that feedback will be interpreted in relation to the goals (Latham, 2005).

Several studies have demonstrated the abovementioned argument. For example, Locke and Bryan (1967) conducted a series of experiments to identify a relationship between goal level and degree of interest in the task. Participants completed simple addition, perceptual speed, and psychomotor coordination tasks. In the first experiment participants were assigned either a specific and difficult goal or "do your best" goal. The specific and difficult goal group scored 9% higher than the "do your best" group. Latham and Baldes (1975) applied specific and difficult goals with truck drivers to increase net weight of log transporting trucks. A 94% truck net weight was determined as a difficult but attainable goal. Before implementing the specific and difficult goal, a nonspecific goal to simply "do their best" was presented. In this phase, the 36 logging trucks were reported between 55% and 65% of net weight. After the onset of a specific and difficult goal, substantial increase to approximately 90% net weight was shown and this maintained across time.

One long running debate during the 1970s and 1980s concerned whether goals should be assigned or set participatively (Latham & Arshoff, 2013). Fellner and Sulzer-Azaroff (1984) reviewed a series of articles on this topic and concluded that goals selected by employees were as effective in influencing performance as goals assigned by others. Similarly, Locke and Latham (1990) confirmed that if goal difficulty is held constant, an assigned goal is as effective as one set participatively. Even though assigned goals are as effective, many authors favored participative goals for reasons beyond direct performance (Fellner & Sulzer-Azaroff, 1984; Ludwig & Geller, 1997). Most research on goal setting only examines one or two goal-directed behaviors. However, in the real world, employee behaviors are intertwined such that success of one task will impact success of other tasks. Therefore, it is practical to assume employees' behaviors may share functional similarities to each other. In other words,

non-target behaviors that share behavioral functions increase when the behavior targeted by goal-setting intervention increases (Ludwig, 2002). Therefore, employees articulate their implicit goals when participating in goal setting to provide opinions about the performance that shares behavioral functions (Locke & Latham, 1990). Success of implicit goals within an intervention can be considered by the association of functionally related behaviors. That is, by utilizing targeted behaviors which maintain a previous functional relationship with nontargeted behaviors, the likeliness of generalization is further augmented. Though, a central consideration is whether the implicit goal behavior is maintained externally. If so, it is unlikely that response generalization will occur for related but nontargeted behavior (Ludwig & Geller, 1997).

For instance, Ludwig and Geller (1997) investigated the relative effects of participative and assigned goals on target and non-target behaviors. Pizza deliverers from three different restaurants were observed departing for and arriving from deliveries. Intersection stopping was selected for a target behavior. Signal use and safety belt use were also observed, but not targeted for intervention. After baseline, employees at restaurant 1 participated in goal setting that targeted complete stops. Employees at restaurant 2 were assigned a goal while the third served as control. Over 4 weeks, the intervention groups' percentages of complete intersection stopping were posted as feedback. Results showed both intervention groups significantly increased complete intersection stops during intervention. The participative goal setting group also showed significant increases in turn signal and safety belt use (non-targeted behaviors) concurrent with their increases in intersection stopping (targeted behaviors). Assigned goal drivers decreased their turn signal and safety belt use concurrent with targeting complete stops. The authors explained that participative goal setting facilitated implicit rules, which, in turn, influenced behavior beyond the external consequence of the intervention.

Organizations have shifted their structures from hierarchical individualized performance to group-based structures over the last few decades (Kramer et al., 2013). Due to this reason there is increasing demand for research on group-based goal setting. However, little research has compared the relative effects of individual-based and group-based goals. In a representative study by Gowen (1985), the relative effects of an individual-based goal, team-based goal, and a combination of individual and team-based goals were investigated. Gowen (1985) defined an individual-based goal as "an overt statement about the desired level of future personal performance" and a group-based goal as "an overt statement about the desired level of future group performance." The experimental task was a sentence construction exercise to stimulate group behavior for an interdependent task. Three participants in a group performed the experimental task independently from other groups. The participants were divided into two groups: experimental and control. Participants in the experimental group were exposed to three intervention phases which were no goal,

individual-based goal, and group-based goal consecutively. The participants in the control group had no goal conditions during these phases. Results found that individual-based goal increased 19% in group performance compared to no goals; group-based goal increased 12% compared to no goals; the combination of individual and group-based goals increased 31% compared to no goals. In an individual goal setting situation, the responsibility for correctly completed tasks rested solely with the individual. Therefore, differential efforts reliably resulted in differential task completion, which in turn led to differential consequences. Contrasted with group-based goals, a high performer's behavior may be unrewarded when other performers show a deficit on tasks. Since aggregated performance determines results, consequences may or may not match the group members' behaviors. If individual goals were not added to group goals, performers' effort would decline and collectively decrease organizational performance.

Jeffrey et al. (2012) revealed an important implication regarding individual and group goals. The authors pointed out previous studies exclusively implemented "one goal for all" in which group members had the same goal. Alternatively, they suggested ability-based goals where individuals of similar ability level receive the same goal. One hundred thirty-eight undergraduate students decoded numbers to the alphabet test for the experiment, half in one-goal-for-all condition. The other half in ability-based goal were divided into three levels (i.e., lower, medium, and higher ability). Repeated measures analysis revealed lower-ability individuals in the ability-based group increased their performance the most. Moreover, lower and moderate ability participants in the one goal for all condition showed larger decreases in performance.

Since goal setting depends upon other variables with which it is packaged, it may be useful to understand and isolate potential functions goal setting may serve. Goal setting can supply information regarding the desired behavior and be correlated with the availability of a consequence subsequent to behavior. In this case, goal setting functions as a discriminative stimulus for reinforcement (e.g., Daniels & Bailey, 2014). A discriminative stimulus is a condition that has frequency-altering effects because of a historical relation between behavior and the availability of an effective consequence (Michael, 2004). Suppose a supervisor is present at the workstation of an employee and states a goal that they would like that employee to meet. The authority figure making such a statement is, in essence, stating that "I will now pay attention to what you are doing." For many, verbal stimuli with properties that suggest management is currently attending to performance of subordinates have historically been paired with sudden availability of approval, bonuses, monetary incentives, or other reinforcing stimuli for superior or improved performance (S^D), whereas such consequences were unavailable when management does not provide such monitoring notifications (S^Δ). Not only are reinforcement-based discriminative relations possible, but punishment-based discriminative relations would

also likely be relevant. Such a monitoring notification could also function as a threat or warning. Criticism, reprimands, or other punishing stimuli will suddenly be available for substandard performance or off-task behaviors (S^{Dp}), whereas such aversive consequences were historically absent of goal setting initiatives from management ($S^{\Delta p}$). Due to prior learning while under direct supervision, the presence of a stated goal may immediately evoke improved performance and abate other behavior.

Not only may goals be correlated with the availability of consequences, but goals could potentially make normally available consequences more effective as reinforcement (Agnew, 1998). This functional relation is best captured by the concept of a conditioned motivating operation (CMO), which is an environmental variable that evokes behavior because that variable also alters the value of some stimulus, object, or event due to prior learning history (Michael, 2004). This can be accomplished through a variety of means. For example, suppose a goal is set as part of a disciplinary measure following a manager and employee discussing a performance improvement plan. Following this meeting, the transitory but pervasive status of the employee's performance being below the goal serves to threaten their job security under such circumstances. This possibility of job termination while the goal remains unmet (the CMO) is a condition that will evoke behaviors to fulfill that goal and the removal of the threat will function as a source of reinforcement. To put it differently, job security did not become more available, but more valuable after the performance improvement plan. Another example could involve a goal being set for collecting and turning in completed customer satisfaction cards at a restaurant. Previously, satisfaction cards were typically ignored at customer tables and often thrown in the trash by waitstaff. However, due to the newly established goal (the CMO), behaviors such as seeking, collecting, and turning in satisfaction cards will be evoked. Although the availability of these satisfaction cards remained constant, their reinforcing effectiveness is now increased due to this goal setting intervention. Naturally, stimuli such as goals could serve multiple functions at once, such as a stated goal that functions as a CMO to evoke behaviors relevant to job security (e.g., collecting satisfaction cards) and an S^{Dp} that abates behavior that is not relevant to job security (e.g., talking to the line cooks despite being warned to attend to customer tables) due to the correlation between the set goal and the availability of punishment for nonproductive performance.

Besides the immediate evocative and abative properties seen with possible discriminative and motivational aspects of goal setting, goals may also function as or produce stimuli that can successfully control delayed behavior. Most employees possess adequate verbal skills of how relevant verbal contingencies operate, even for the simplest of interventions. Employees, like all verbally sophisticated individuals, routinely describe themselves, their world, and the possible relationships among events they observe. Such descriptive repertoires

impact goal setting, including descriptions of relations between behavior and environmental outcomes explicitly echoed from the goal statements or inferred by the employee due to informal goals or unspoken elements of vague goals. Either way, the contingency is specified and the resulting verbal stimulus functions as a rule which can govern future behavior as performers restate the rule to themselves. Therefore, organizations can use goal statements to prompt employees to efficiently engage in desirable performance without shaping direct contingencies (Agnew & Redmon, 1992; Baum, 1995; Fellner & Sulzer-Azaroff, 1984).

A typical rule statement includes the relationship among a goal, goal-directed behavior, and corresponding consequences (Catania et al., 1989; Malott, 1993). For example, suppose that a brewery had a high rate of accident and injuries among employees. The safety manager gathers employees together at the end of one of their shifts and announces, "If we see safety improve by at least 20% over the next six months, then everyone can expect a nice bonus at the end of the year." Performers may state the contingency to themselves as "If I wear my helmet, gloves, goggles, and safety vest for the next six months, then I will probably get $500 or something like that." Note that this vague goal (i.e., improve safety) resulted in performers inferring unspoken elements (i.e., wear helmet, gloves, goggles, and safety vest; outcome of $500) in their description of the contingency. In practice, it would be better for the safety manager to explicitly state-specific behaviors, results desired, as well as consequences to be delivered, to prevent undesirable misinterpretations or disconnects (e.g., "We should hide accidents and injuries" or employees discovering the bonus was less than assumed). However, contingency-specifying stimuli can still be produced by performers in the absence of best practices. The end-of-shift goal announcement does not immediately evoke behaviors related to safety gear, but the newly created verbal stimulus (i.e., rule) can evoke rule-governed behavior for the next six months even before the incentive is delivered. This behavior is maintained by self-delivered covert verbal stimuli to mediate temporal gaps (e.g., "I'm another day closer to getting that payout"). Again, the more explicit the rule is, the better results likely achieved. Furthermore, rule-governed behavior cannot persist in perpetuity and eventual consequences should match verbal descriptions by performers to maintain productive behaviors, or else alternative verbal descriptions may produce undesirable behavior (e.g., "I can't trust the promises of management, so I might as well just do my own thing and ignore their lies about goals").

As seen in these examples, consequences that follow goal achievement are key to successful implementation of goal setting. Feedback, monetary incentives, and social reinforcement (e.g., praise, acknowledgment) are the most representative consequences. Goal setting is effective when consequences follow. In goal setting alone, performance may not be adequately reinforced

in the presence of the goal (Fellner & Sulzer-Azaroff, 1984). However, when a goal is combined with consequences, goal attainment may not only increase reinforcement opportunity, but also eventually function as a conditioned reinforcer for specific employees due to their unique reinforcement history (Kang et al., 2005). Thus, organizations use packaged interventions with goal setting and consequences. For example, Gil and Carter (2016) investigated the effectiveness of a single intervention (i.e., graphic feedback) and a packaged intervention (i.e., goal setting and graphic feedback) in a human service organization. Using a multiple baseline design, these two independent variables were compared which showed that goal setting with graphic feedback yielded better performance than graphic feedback alone, but interventions were not counterbalanced to control for order effects. Numerous articles demonstrate this result (e.g., Bateman & Ludwig, 2004; Calpin et al., 1988; Downing & Geller, 2012; Eikenhout & Austin, 2005; Goomas et al., 2011; Huberman & O'Brien, 1999; Loewy & Bailey, 2007; Nicol & Hantula, 2002; Stephens & Ludwig, 2005; Wilk & Redmon, 1990).

Task clarification

Task clarification is another effective antecedent intervention. Crowell et al. (1988) defined task clarification as the precise behavioral descriptions of a performance. Such descriptions clarify and prompt behavioral components that lead to successful performance (Amigo et al., 2008). Unlike goal setting, which involves the evaluative standards for exemplary or improved performance, task clarification involves evaluative standards for minimal performance. Evaluative standards of task clarification will detail the expectations, responsibilities, and criteria used to consider performance acceptable. Task clarification not only reminds employees of existing contingencies but also introduces a new set of contingencies (Palmer & Johnson, 2013). For example, Anderson et al. (1988) evaluated the effects of task clarification and feedback on eleven low-probability cleaning behaviors (e.g., putting up bar stools, emptying trash cans) at a university bar. The dependent variable was mean percent of completed checklist for each cleaning behavior. Task clarification was achieved by providing checklists along with explicit description of each cleaning activity to bar staff. Task descriptions involved necessary behaviors for each cleaning activity and corresponding outcomes. Public individual feedback was provided after completion of the task clarification phase. Results showed introduction of task clarification increased overall completion of the checklist by 13%. Subsequent feedback posting increased 23% of completed checkmarks.

A similar result was obtained by Crowell et al. (1988) who investigated task clarification, performance feedback, and praise in improving customer service for bank tellers. Eleven target verbal behaviors of teller-customer interactions

had assigned points based on tellers' performance. For example, the first was time to service. When customers approached the teller window within a yard, tellers needed to make vocal acknowledgments within 5 seconds. If the latency of acknowledgment was 0 to 5 seconds, 12 points were given. If from 6 to 11 seconds, 7 points were given. When the latency was over 11 seconds, no points were provided. The dependent variable was mean of quality points assigned for target behaviors. After baseline, task clarification was introduced to tellers by providing a memo of clear definitions of target behaviors. Then public graphic feedback was delivered on individual tellers' performance, coded to maintain anonymity. Managers also provided verbal feedback for individual tellers in weekly meetings. Next, in a praise phase, if individual teller's quality points were over 85 or their current score was higher than the previous day, managers complimented them individually. Task clarification abruptly increased teller performance an average 12% over baseline. Feedback and praise gradually increased teller performance more by 6% and 7%, respectively. As in the previous research, task clarification alone effectively increased performance.

Most task clarification investigations are part of intervention packages. Austin et al. (2005) evaluated task clarification and feedback to improve closing task completion at a restaurant. The dependent variable was the percent of completed checklist per shift. Task clarification (i.e., posted checklist), verbal feedback, and graphic feedback were provided to servers and dishwashers. Results demonstrated task completion increased by 15% among servers and 38% among dishwashers. Another task clarification study (Amigo et al., 2008) reduced busing time among servers at a restaurant. Task clarification with goal setting and manager feedback were applied. Task clarification in a memo included detailed steps and goal time of busing tables. Mean busing time slightly reduced from 315 seconds in baseline to 284 seconds after the memo. When the manager's verbal feedback was provided, busing time decreased to 152 seconds.

Durgin et al. (2014) employed task clarification and supervisor training to improve the performance of animal (i.e., pouched rats) trainers at a nongovernmental organization located in East Africa. As a part of supervisor training, job aids were created for total of 11 tasks. The job aids included a brief explanation of ways to monitor animal trainers' performance as well as provide appropriate prompts and feedback. Job aids served as data collection, task clarification, and appropriate feedback delivery to animal trainers. For example, when determining "the trainers never pull the rope/rat," trainers were only allowed to tug when the rat stopped to groom for more than 15 seconds. Having this task clarification list on hand, supervisors marked yes or no based on trainer observations. If supervisors marked no, they provided corrective feedback to trainers. The dependent variable was a percent of correct score calculated by number of correctly completed items

divided by total items. Scores were collected from both supervisors and animal trainers. During the baseline, a mean percent score for supervisor A, B, and C were 68.6%, 53.7%, and 49.7%, respectively. A mean percent score for trainers A, B, and C were 66.8%, 45.5%, and 49%, respectively. Supervisor training and a job aid increased mean scores by 86.4%, 100%, and 91.7% for each supervisor and 79.6%. 81%, and 86.3% for animal trainers. Finally, during the independent supervision session, while a mean score for supervisor A, B, and C showed 98.4%, 98.5% and 95.9% respectively, a mean score for trainers A, B, and C indicated 96%, 87.3%, and 90.7%, respectively.

Task clarification can be conceptualized as low-level training. Typical behavioral training components are as follows: 1) instruction of job responsibilities, 2) task demonstration, 3) employee practice with feedback delivery until meeting the predetermined criteria, and 4) evaluation. Task clarification can be categorized as the first part of training in that it specifies job duties. In other words, operational definitions for job duties essentially become task clarification itself. This most likely functions as a contingency-specifying stimulus, it precisely specifies behaviors to be performed with an implied or explicit statement related to outcomes. Since task clarification details minimal performances, there remains a possibility it also functions as a CMO if it implies a social warning that current performance is not meeting minimal levels required to maintain employment. For example, an employee designated to unload food products from a delivery truck to refrigerator may simply group new and old items with minimal organization (e.g., lettuce goes with lettuce, sauce with sauce). This practice may irritate coworkers and the supervisor, but the employee may remain oblivious to such negative appraisals. The behavior may be under control of a faulty rule, such as "unload the truck as fast as possible and just match product types when placing them in the fridge." Task clarification specifies the importance of ensuring older stock is placed in front of newer and imply or outright state that criticisms and possible disciplinary measures follow failure to adhere to this policy. This specification of performance standards will likely result in the employee revising their verbal description of the contingency related to product deliveries. Further, the implied threat may evoke performance such as going and immediately rearranging stock from the previous delivery.

Job aids and checklists

Checklists and other forms of job aids have also been frequently utilized by both OBM researchers and practitioners (Gawande, 2009; Gravina & Cunningham, 2010; McSween, 2010; Smith, 2010). Unlike goal setting and task clarification, which may be verbally described once or as part of periodic sessions, job aids provide ongoing support that can be consulted by performers during their performance, typically as signage, documents, schedules, and other forms of

readily available descriptions for expected actions. As such, job aids may prompt job-relevant behaviors and outcomes. A prompt is a stimulus that arranges the environment to evoke a particular behavior (Mcconville et al., 1998). An inexpensive but moderately effective intervention, prompts have a successful history in organizations. For example, Clayton and Blaskewicz (2012) evaluated visual aids to decrease urinal splatter on men's restrooms at a college campus. Three men's restrooms in the same building were selected, one was a control to evaluate follow-up. In both settings the visual prompt was located between two urinals with the text of "For Pete's sake, Gentleman. Please Stand Closer. Thank you." Additionally for setting 2, bull's-eye with the heat-activated message was located inside of urinals. When users hit the bull's-eye for several seconds, the message "Help the Cleaners. Please Aim Straight" appeared. The dependent variable was the number of floor tiles (1.3 cm × 1.3 cm) with urinal splatter. Introduction of text signs decreased urinal splatter by 37.5% in setting 1 and 40.2% in setting 2. In setting 2, when a heat-activated target was introduced, the splatter further decreased by 24%. Follow-up data indicated a continued reduction for both restrooms.

Warman et al. (2019) evaluated static and variable prompt effectiveness on employee performance at a private day school for students diagnosed with developmental disabilities. In experiment 1, the static prompt included the message "Please sign your student out using the form." Variable prompts consisted of the same message with random changes in font size, font type, color, and position of the sign. Humorous versions of these job aids were also employed, such as the cartoon character Popeye stating a variation of his catchphrase: "I am what I am, but at least I signed out before exiting to the playground." Signing in and out rates did not increase with static signs, but both variable and humorous signs changed behaviors. In experiment 2 static and humorous signs located in a café where staff members were likely to see the prompt were compared. The static sign was: "Please ensure the students are clocked-in and clocked-out." The humorous prompt was similar to experiment 1. During baseline, no clock-ins and outs were observed. As the static prompt was introduced, adherence increased by 3 times but returned to zero after 6 days. Humorous signs increased responses immediately and its effect maintained over time. Static signs showed transitory effect while humorous signs showed continuous and high level adherence. As such, simple ongoing prompts proved to be effective, although innovative variation was necessary to maintain the effects over time.

A checklist is distinguished from other types of job aids by the fact that a checklist involves a list of specified activities, rather than just a single activity, to be prompted. For example, Bacon et al. (1983) developed a checklist system for employees in a large midwestern university. The checklist included 17 items of specified tasks with reference to outcome measures. Employees were given handouts including performance criteria for each item. Employees completed

checklists daily and the experimenter examined checklists weekly, while task completion was covertly observed on major permanent measures. Results showed task completion among employees increased by 28.8% under the checklist intervention.

In another example, Doll et al. (2007) implemented a public checklist to increase cleaning behavior at a ski shop. Using Austin's Performance Diagnostic Checklist (2000) and Daniels and Daniels' PIC/NIC Analysis (2004), seven target behaviors were identified. A packaged intervention including task clarification, a checklist, and feedback was applied. During a task clarification meeting, a store manager specified how to correctly complete behaviors of interest and a checklist of cleaning behaviors was posted next to the cash register. Weekly graphic feedback was given to employees in a public place. In a second phase, task-specific daily feedback was provided. Cleaning behavior improved by 52% in the packaged intervention and task-specific daily feedback increased cleaning by 12%.

Job aids and checklists are particularly advantageous for safety situations in which trial-and-error learning via direct consequences would be hazardous and potentially life-threatening, such as operating an aircraft (Gawande, 2009; Rantz et al., 2009). Job aids and checklists seem better alternatives to reliably prompt appropriate behaviors. For example, Clayton et al. (2006) evaluated prompts to reduce cell phone and improve seat belt use while exiting a parking lot. Individuals presented a sign (i.e., "Please Hang Up, I Care" or "Please Buckle Up, I Care") to drivers and flipped the prompt to provide a consequence (i.e., "Thank You") when drivers adhered. Results indicated seat belt use averaged 44% in the baseline and increased to 56% in intervention. The proportion of drivers hanging up their cell phones was similar to seat belt use, although this unsafe behavior was lower initially.

Job aids and checklists function as an indirect contingency shaping under control of overt or covert rules that provide the information of consequences (Mueller et al., 2001). When the existing contingencies are not in effect, job aids and checklists can be added to employees' environment as an alternative (Weatherly & Malott, 2008). When used in public, job aids and checklists can function as a CMO because they create social warning when the current behavior is not meeting what is described in job aids or checklists. Suppose that a manager posted visual signage that described putting on safety helmets before entering workstations. If employees entered workstations without safety helmets, coworkers might stare at them. This situation would create an aversive situation and alter the probability of employees putting on safety helmets.

Conclusion

Antecedents, when appropriately used, can be powerful, which should be compelling considering their relative ease and lack of expense. Naturally, consequences will probably dominate OBM, given its origin from operant conditioning. Indeed, the notion that antecedent control alone will not maintain performance has long been accepted throughout the history of the field (Brethower et al., 2021). However, the potential of simply using antecedent control, or carefully aligning antecedent with consequent control, should not be neglected. Goal setting, task clarification, job aids, and checklists all show substantial effectiveness in improving performance. Our purpose was to illustrate the general utility of popular antecedent interventions within OBM. To achieve this objective, representative research examples, variables for successful implementation, and behavioral functions for each antecedent were articulated. However, not all variables that might impact performance were examined. There remain many variants of antecedent control, both in isolation and in combination with consequences, that merit exploration and represent fruitful potential research lines. For example, the effects of multiple or tiered goals on performance lacks research (Locke & Latham, 2013), including how such goals might interact with monetary incentives.

Despite positive signs from the literature, the effectiveness of task clarification, job aids, and checklists still warrants caution with interpretation. Most research has been implemented as parts of a packaged intervention. Concerning the purpose of OBM research, this situation might be expected. Most OBM studies apply consequence-based interventions such as feedback, monetary incentives, or social reinforcers due to their powerful results. The increasing effectiveness of interventions is important since most research investigated performance in businesses and industries. Due to this reason, investigating the effects of antecedent interventions might have been neglected. However, component analyses or dismantling studies for task clarification, job aids, and checklists are necessary to identify the independent effects of these interventions. Perhaps antecedent interventions might be overused or underused in packaged interventions due to a lack of understanding of their independent efficacy. Identification of their own success will eventually demonstrate time- and cost-efficiency.

Finally, researchers and practitioners must be cautious not to rely excessively on goal setting, task clarification, job aids, and checklists. Since these antecedents seem undemanding to implement, corporate initiatives tend to overuse them to increase desired performance (Braksick, 2007). Without scrutinizing environmental components, introduction of antecedents will not change behavior in the long term. If corresponding consequences do not follow behavior evoked by the antecedent, the behavior will be eventually extinguished. We hope this paper serves as an antecedent, prompting further

study and evaluation, so that the consequences of applied best practices maintain investigative efforts over the long term.

Disclosure statement

No potential conflict of interest was reported by the author(s).

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