

Role of Communication Networks in Behavioral Systems Analysis

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This article provides an overview of communication networks and the role of verbal behavior in behavioral systems analysis. Our discussion highlights styles of leadership in the design and implementation of effective organizational contingencies that affect ways by which coordinated work practices are managed. We draw upon literature pertaining to complex systems and rule governance to understand how communication networks and verbal rules contribute to the issues involved in reengineering behavioral systems in the face of continued socioeconomic and cultural demands. An analysis of leadership in relation to communication networks in organizations is discussed.

KEYWORDS *communication networks, derived relational responding, interlocking behavioral contingencies, metacontingency, rules*

ROLE OF COMMUNICATION NETWORKS IN BEHAVIORAL SYSTEMS ANALYSIS

In the behavioral literature, organizational change is addressed theoretically through metacontingency analysis (Glenn, 1991; 2004; Malott, 2003; Malott & Glenn, 2006; Mawhinney, 1992, 2001, 2009). According to this perspective, when products of organizational practices contribute to the survival of the 25 organization, the practices that generated them are more likely to reoccur. In short, metacontingency¹ depicts the contingent relation between interlocking behavioral contingencies (IBCs), their aggregate product, and

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the environmental demand. According to Glenn (2004), “the recurring IBCs comprise operant contingencies in which behavior of two or more people 25 functions as environmental events for the behavior of the others” (p. 144). IBCs can be called cultural practices when a number of organizations are characterized by the same kinds of IBCs (e.g., Japanese car industry vs. American car industry; Glenn, 2004).

Theories of selection and metacontingencies are also applied within 30 the framework of behavioral systems analysis. According to this perspective, which is based on general system theory, organizations are behavioral systems formed by individuals’ interactions (IBCs) toward a common goal (production of an aggregate product; Bowler, 1981). This interaction toward a common goal occurs within the context of the organization’s interaction 35 with a broader cultural and economic environment (Brethower, 1982; 1999; 2000; Glenn & Malott, 2004; Malott, 2003; Malott & Glenn, 2006; Rummeler, 2001; Rummeler & Brache, 1995).

In attempting to hold to the parallels between the behavioral contin- 40 gency and the metacontingency, Houmanfar and Rodrigues (2006) advocated that the first term in a metacontingency be the *cultural milieu*. The cultural milieu is comprised of material resources, overarching governmental policies, as well as organizational policies, rules, traditions, institutions, technological progress, and environmental competition. Even though verbal behaviors associated with cultural milieu are considered important to the 45 development and maintenance of cultural practices and associated metacontingencies (Glenn, 1988; 1989), their role is not explicitly discussed in previous conceptual and empirical work. In that regard, one purpose of this article is to discuss the importance of verbal behaviors, within the context of communication networks in management of IBCs of a given metacontingency. 50 *Communication network* in this context can be defined as a description of the verbal interactions that mediate influences in between components and organized groups and among individual members of a given organization (also referred to as metacontingencies; Malott & Glenn, 2006).

There are many successful organizational models developed by 55 behavioral analysts that discuss the importance of communication networks in organizational change processes (Houmanfar & Johnson, 2003). For instance, Tosti’s “Organizational Alignment” model (Kolvitz, 1997) focuses on how the organizational values and practices should apply to everyone, from the front line to the boardroom. Accordingly, the 60 clarification of individuals’ roles in relation to organizational change should be tied to the ongoing measurement of progress toward the desired outcomes. The employee has a greater degree of control over changing organizational functioning than does the consumer. Thus, the effects of communication and information dissemination on employees’ 65 behaviors and overall performance outcomes are a critical area of organizational change.

Further, organizational stimuli (e.g., rules, policies, mission statement, vision, other organizational members) may influence the maintenance of organizational members' actions. In that regard, the underlying element in this process is the communication system by which top management articulates the organizational goals, polices, rules, etc. (Houmanfar & Johnson, 2003). As antecedents or consequences (or both), these descriptions of organizational contingencies (in a form of instructions, rules or feedback) affect the interrelated behaviors of organizational members within and across the organization.

Thus, behavioral practices of leadership and management are believed to function as important factors in design and implementation of effective organizational contingencies. These leadership practices affect coordinated practices of organizational members that generate products. For instance, leadership and management practices may create an ambiguous environment in terms of work-related information that distorts the stimulus control exerted by organizational rules. This type of ambiguity is in the form of incomplete or inaccurate information that lack clear or accurate description of contingencies and their context (Houmanfar & Johnson, 2003).

The level of ambiguity influences the prevalence of verbal problem-solving behaviors (such as gossip and rumor) that may negatively affect the efficiency by which organizational products are generated through interrelated behaviors of individuals. This phenomenon may be described as resistance to change (Houmanfar & Johnson, 2003; Kolvitz, 1997). The verbal problem-solving behaviors in this context evolve under the absence of antecedent and consequential control of rules (e.g., clear specification of organizational contingencies). This delineation means that the absence of effective action (e.g., complete, clear, and accurate specification of organizational contingencies) is an antecedent for activity that is itself oriented toward the establishment of such actions. Therefore, to promote a healthy level of problem-solving practices organizations should practice open communication.

In the remaining sections of this article, we will explore how understanding communication networks and the nature of verbal rules may contribute to the successful reengineering of behavioral systems and associated metacontingencies in the face of continued socioeconomic and cultural demands. This discussion will include an analysis of leadership and the associated roles in relation to communication networks in organizations.

A Behavior Analytic Account of Communication Networks in Organizations

In assessing the role of communication in the analysis of leadership behavior, we consider various definitions and descriptions of leadership in the field of organizational behavior management (OBM). For instance, Daniels and

Daniels (2005) state that the role of a leader is to promote conditions that motivate employees to execute the mission, vision, and values of the organization. In doing so, the leader must clearly specify which behaviors and results are critical to the survival of the organization. Similarly, Mawhinney and Ford (1977) write, “We consider the role of the leader to be that of organizing, specifying, and maintaining complex response chains of subordinates by communicating to them the contingencies of reinforcement . . . in the workplace” (p. 406). In addition, Abernathy (1996; 2000) notes that a successful leader makes certain that employees understand what behaviors and outcomes that promote organizational survival are expected of them and provides the resources and means for them to accomplish these ends.

Communication in organizations is usually in the form of verbal products that are passed from upper management to the other parts of the organization. The purpose of communication is often to guide employee behavior to be more efficient and productive while contributing to the overall efficiency and productivity of the organization. This sort of communication comes in the form of rules that the organization assumes will have an impact on employee behavior (Malott, 1992). A *rule* is defined as a contingency-specifying stimulus that details the relationship between an antecedent, a response, and a consequence (Catania, Shimoff, & Matthews, 1989; Schlinger & Blakely, 1987); that is, a verbal description of a three-term (or four- and five-term) contingency. However, the type of rule and learning history of the employee can have a bearing on the behavior of the employee (Weatherly & Malott, 2008).

Pelaez and Moreno (1998) outlined a taxonomy wherein rules may be explicit or implicit, simple or complex, accurate or inaccurate and can vary in terms of their source. Explicit rules detail the contingency in terms of antecedents, behaviors, and their consequences unambiguously, while implicit rules leave out some of these details. The complexity of a rule refers to dimensions or characteristics of stimuli (color, shape, texture, etc.) and higher order relations between stimuli (bigger than, brighter than, shares class membership with, etc.), which in turn can increase the difficulty of comprehending the rule. Accurate rules correspond to the actual contingencies, while inaccurate rules do not describe the contingencies precisely. Lastly, the source of a rule may be oneself, another person, or entity within the organization.

Verbal products that convey effective rules reduce environmental ambiguity and should be promoted as a consistent practice on the part of leadership and management. This influence has been discussed conceptually (Houmanfar & Johnson, 2003) and more recently demonstrated experimentally (Johnson, Houmanfar, & Smith, in press; Smith, Houmanfar, & Denny, 2009), suggesting that implicit and inaccurate rules generate ambiguity and distortion of stimulus control. In these studies, distortion of stimulus control was found to occasion undesirable verbal problem-solving behavior in the

form of rumor among the verbal participants. This in turn led to the self-generation of inaccurate organizational rules on the part of participants and decrease in their overall productivity. Conversely, the delivery of explicit and accurate rules through verbal products minimized distortion of stimulus control and produced greater and longer lasting levels of productivity. When these effects are multiplied across a large population of employees, one can extrapolate the communication of organizational rules having a significant impact on organizational performance.

The source of the rules provided to employees can also impact the accuracy and clarity of the rule communication (Agnew & Redmon, 1992). When left to develop their own rules in circumstances where sufficient information has not been provided, workers may self-generate rules that do not support desired behavior. One way to avoid this outcome is through the use of role-specifying stimuli (RSSs) set forth by the organizational leaders (Mawhinney, 2005; Brethower, 1982). These RSSs are descriptions that specify job responsibilities and associated contingencies. Accordingly, they may function as antecedent stimuli to ensure appropriate employee and leader behaviors (Mawhinney, 2005).

With regard to characteristics of rules, a majority of the literature focuses on the topographical characteristics of communication and organizational rules. Even in the case of Pelaez and Moreno's rule taxonomy a topographical as well as a functional view of rule governance is offered. In that regard, to better understand how different types of rules function and interact, it might be worthwhile to examine them from a relational frame perspective.

RELATIONAL ACCOUNT OF RULE GOVERNANCE

Relational frame theory (RFT) makes the claim that humans engage in derived relational responding (DRR) that in turn influences their interaction with the world (Hayes, Barnes-Holmes, & Roche, 2001). DRR is an operant that can be understood in terms of traditional behavior analysis (Stewart, Barnes-Holmes, Barnes-Holmes, Bond, & Hayes, 2006) and can be easily demonstrated in an experiment using three arbitrary stimuli: A, B, and C. In this experiment, a subject's responses of selecting B in the presence of A and C in the presence of B are reinforced. Results show that the subject then goes on to select A in the presence of B and B in the presence of C without reinforcement—this is known as *mutual entailment*. Furthermore, the subject also selects C in the presence of A and A in the presence of C without reinforcement, despite the two stimuli having never appeared together before—this is known as *combinatorial entailment* (Hayes & Hayes, 1989). To extrapolate to the work world, if an employee has established a perception that her company is “team oriented” and is told that a partner firm is similar to her company, that employee is likely to relate the

partner firm to the word “team oriented” (combinatorial entailment) despite the employee not being explicitly told that the partner firm is team oriented. This type of relational responding may affect the level of employees’ buy-in in terms of adoption of new practices introduced by the partner firm.

Derived relational responding can transform the function of other stimuli. 200 Unlike transfer of function, transformation of function is not merely associative, it is relational. If, for example, C was paired with shock, the subject would show a greater arousal response to A than to C due to the derived relation of $A > C$ despite a history of A not being paired with shock (Dougher, Hamilton, & Fink, 2007). Transformation of function can affect 205 large networks of relations, resulting in a multitude of derived relations based on a few experiences. Suppose that management suggests to employees that their own company is the opposite of a rival firm. Employees may already have established a relation of “good” with aspects of their own company, leading to derived relations of “bad” with aspects of the rival company. This 210 may result in the greater probability of employees resisting a change that they associate with the rival. If the rival uses a measurement system, for instance, and the company is attempting to institute a similar system of measurement, employees may respond negatively toward the system.

RFT suggests that rules are understood by their influence on derived 215 relational responding. Consider a rule that may be communicated at an auto sales company: “The employee who sells the most cars this month will be granted the use of the convenient parking spot right in front of the store.” How rules influence employee behavior when the consequence is delayed by a month or when the employee has no history of direct contact with the 220 consequence is difficult to explain as a function of direct contingencies. Although the rule specifies a goal and the consequences that will follow from achieving it, the effect of the rule on the listener is unclear without an appeal to RFT.

Traditionally, behavior analysis has considered rules to be contingency- 225 specifying stimuli (Skinner, 1953; 1957). Rules are thought to affect behavior by their description of a contingent relationship between antecedents, responses, and consequences. This definition of rules, however, does not explain why some rules are effective and why some are not. In short, it does not provide a technical account of rules and their effect on the behavior 230 of the listener (Hayes & Hayes, 1989).

From an RFT perspective, the rule relies on frames of coordination (sameness) between the word “sells” and the behavior of selling and the word “cars” and the actual cars themselves. The rule also relies on an if-then relation between the behavior of “sells the most cars” and the potential 235 outcome of “convenient parking spot” (Stewart et al., 2006). The behavior of selling undergoes a transformation of function due to the relation of “sells the most cars” and “convenient parking spot.” During the course of the month, employees might evaluate their sales by placing verbal statements

about them in frames of comparison with other employees: “I sold 20 cars 240 in the first 10 days of this month while Sally sold 5 more cars than I did.” Statements like these may lead to further DRR that may result in other self-rules such as, “I need to copy Sally’s approach and talk about my kids and how they are doing in school” or “It takes less time to sell less expensive cars. Therefore, I should focus on selling cheaper cars so I can increase my 245 overall sales.”

Due to the nature of derived relational responding, rules provided by management may have many unforeseen consequences. For example, employees might focus on improving their sales volume by decreasing the time spent negotiating with customers by dropping the price of a car imme- 250 diately, thus cutting into the company’s profit margin. With regards to IBCs, employees may place the behavior of helping another salesperson in a frame of coordination with the outcome of losing out on the parking spot and may refuse to help each other. Employees may give up on achieving the highest sales if they feel they are too far behind other employees in 255 sales made so far. Employees may delay sales until the beginning of next month to get a head start on their sales totals by telling customers that they can give them a better deal if they return next month. It is therefore important for an organization to recognize these unanticipated effects of rules and guard against them. The taxonomy of rules (Pelaez & Moreno, 1998) 260 mentioned earlier may be useful in accomplishing this.

We discussed earlier how Pelaez and Moreno (1998) suggested that rules may vary in terms of such characteristics as explicitness, complexity, accuracy, and source. From an RFT perspective, these characteristics of rules may result in different derived relational responding that may better 265 account for their effect on behavior. The more explicit a rule is, the higher the salience of the relations specified by the rule. When a rule is not explicit, derived relations between the components of the rule and the workplace to which they refer would be based on learning history, not necessarily the present contingency. Thus different employees may come to 270 a different understanding of a rule due to their different learning histories. On the other hand, in circumstances where the contingencies are in flux and one would therefore like the employee to be sensitive to the contingencies, an explicit rule may result in more consistent performance (Hayes, Brownstein, Zettle, Rosenfarb, & Korn, 1986). This functional account of 275 rules demonstrates the effects that derived relational responding of each individual may have on others in a given IBC. In other words, IBCs consist of the sequential behavior of individuals, and the behavior is determined by contingencies prevalent at the individual level of analysis. Accordingly, the adverse effect of a given rule on relational responding of one employee can 280 function as the setting factor (see Kantor, 1967) or context for the behavior of another employee and result in a perpetual effect among a collectivity of employees in a given IBC. In short, the level of consistency or variability of

IBCs can be affected by ways organizational information is disseminated via contingency-specifying verbal products. 285

For instance, the variability of responding that is promoted by incomplete instruction may hinder or promote effective performance, depending on the organizational characteristics. For example, in some organizations (e.g., Sony, Microsoft, and Intel), where creativity and problem solving are the basis for business success, variability of responding and hence utilization 290 of heuristic rules (Chase & Bjarnadottir, 1992) by employees may be a more optimal set of conditions for managers to promote, rather than those conditions occasioned by the use of explicit and complete rules. On the other hand, incomplete rules may have negative implications for management and employees in situations where the consistent recurrence of certain 295 performance patterns (e.g., customer greeting, merchandising, manufacturing) is required. The variability in responding generated by incomplete rules may have a negative impact on productivity in the cases of standardized, repetitive tasks (Johnson et al., in press).

The complexity of a rule may also affect the consistency of IBCs' reoc- 300 currence and the extent to which employees will need to engage in derived relational responding to understand the rule. Thus, complex rules rely on already-established relational networks for their effectiveness. For instance, the inclusion of a metaphor in a rule (e.g., "Customers are like big fish. If you try to reel them in too fast the line might break.") increases the com- 305 plexity of the rule and requires the listener to abstract the relationship between fishing and making a sale to a customer. Metaphors are effective at promoting variability of responding (McCurry & Hayes, 1992), which may be particularly applicable when employees keep repeating an unsuccessful behavior. These sorts of rules may be more appropriate for employees who 310 have been with the organization for a long time and would likely be confusing and less effective for newcomers.

Although we do not disagree completely with Pelaez and Moreno's definition of rule complexity, we would like to add another dimension to it, namely the number of steps or conditionals referenced in a rule. For example, 315 a complex rule might state, "If a customer asks about the standard package, advise them of the advantages that the deluxe package has over the standard package; if the customer is with a family member and asks for the standard package, refer them to the family package and discuss its advantages; if the customer is there on the weekend with a family member, refer 320 them directly to the deluxe package without mentioning the family package; if the customer refuses the deluxe package, discreetly get the attention of the floor supervisor; if the floor supervisor is unavailable and the customer declines the deluxe package, mention the family package." The rule is complex due to the number of conditionals as well as the number of other 325 rules it references. Thus, from an RFT perspective, the size of the relational network occasioned by a rule, is also a measure of the complexity of a rule.

While this latter sort of complexity might be applicable to everyday tasks that the employee engages in, it might be inimical to prompt response in the case of an emergency. 330

Accuracy is another factor that contributes to the effectiveness of rules. An RFT perspective suggests that the future possibility of following rules would be reduced by their history of inaccuracies. Inaccurate rules result in poor performance, especially by employees with a history of rigid rule following (Wulfert, Greenay, Farkas, Hayes, & Dougher, 1994). Otherwise, 335 Q1 employees who come to recognize that the rule is inaccurate are likely to consider management as “inept” or “not knowledgeable” in frames of coordination with each other. This may lead to a decreased possibility that the employee will follow subsequent rules provided by management. Thus, the history with the source from which rules come can affect the probability of 340 employee compliance with the rule.

In an organization, the greater the extent rules from management are detrimental (in terms of accuracy and clarity) to performance, the greater the chance that employees will discard rules from that source and rely on self-generated rules or rules from other sources such as coworkers and 345 friends (Houmanfar & Johnson, 2003; Kolvitz, 1997). Due to the potential of DRR to generate new relations rapidly and efficiently, the characteristics of a rule (such as its source) may come to be related with other perspective toward the rule from the listener’s standpoint. Therefore, implicit, highly complex, or inaccurate rules may result in employees’ relating of their 350 negative impact to management.

Another characteristic that impacts the effect of rules (Malott, 1992) are the consequences specified by rules. Rules that are ineffective often describe outcomes that are too small or too improbable to matter to the listener. Although the small outcomes are too little to matter in the short 355 term, they may have a significant cumulative effect over time. However, this cumulative effect does not occur until much later, and the verbal description of the distal consequence is ineffective in controlling behavior. The startlingly high rates of obesity might be considered the product of ineffective rules of this sort. We may be aware of the rule that if we eat large quantities 360 of unhealthy food, we will gain weight. The outcome of gaining weight is highly probable, but it is too small, and only in the long run—due to the cumulative effect—is the outcome large. Similarly, the rule that wearing a seat belt reduces the risk of injury is not effective in maintaining seat belt use. Despite the significant outcome of injury, the probability of getting in 365 an accident is miniscule. Hence, the rule is ineffective in affecting behavior.

Malott (1992) and Weatherly and Malott (2008) suggest that when small or distal rules are effective, it is because the listener is affected by aversive emotional states that come to control the behavior through negative reinforcement. Although rules are said to describe a contingency, one may 370 not immediately come into contact with the contingent outcome specified in

the rule. From an RFT perspective (Hayes et al., 2001), the distal rules described by Malott (1992) and Weatherly and Malott (2008) might be ineffective because, in the short term, the consequence of engaging in an undesirable behavior is considered less punishing than the small and/or 375 negative outcome that arises from following the rule toward a longer term consequence. In other words, the listener places the two different short-term consequences in a relational frame of comparison with one another, where the positive outcome is framed as being “better than” the negative outcome. It is also likely that the short-term behavior may not be highly 380 predictive or causal in relation to the long-term outcome to be reinforced, even with feedback. Further, we cannot directly manipulate the guilt or aversive feeling that is hypothesized to be related to the behavior. Therefore, for a distal rule to function effectively, the listener must place the long-term outcome in a relational frame equivalent with the short-term outcome as 385 well as in a cause-effect frame with the behavior. In this way, the behavior, through DRR, comes to acquire a relation with both short- and long-term outcomes and may also elicit the same kinds of aversive emotional states that accompany possible negative long-term outcomes.

A final characteristic of rules is the source of their consequence. A rule 390 that specifies a consequence that will be delivered by another person or people (i.e., the consequence is socially mediated), has been called a *ply* (Hayes, Zettle, & Rosenfarb, 1989). If an employee is told that the manager disapproves of loose clothing on the workshop floor, this would be an example of a ply. Alternatively, a rule that specifies a consequence that 395 occurs naturally, as part of the interaction with the environment, has been called a *track* (Hayes et al., 1989). If an employee is told that loose clothing tends to get snagged in the equipment and leads to injuries on the workshop floor, this would be an example of a track. Both kinds of rules can be effective; however, a ply is less likely to be effective when the social con- 400 text is absent, suggesting a diminished likelihood of contacting the social consequence. A track, on the other hand, ought to retain its effectiveness regardless of the presence or absence of a social context.

Rules specify an if-then or contingent relation between responses and stimuli and therefore are essential in guiding employee behavior. However, 405 not all verbal communication within organizations is in the form of rules. Many of the communications serve to alter the function of stimuli in the workplace, which in turn impacts employee behavior. Rules that change the reinforcing or punishing effectiveness of consequences (in much that same way the establishing operations nonverbally alters the effect of conse- 410 quences) have been called *augmentals* (Hayes et al., 1989). Formative augmentals establish a previously neutral stimulus as a reinforcer or punisher. For example, “If we keep expenses under \$100,000 for the month, employees will receive a bonus,” will probably result in employees seeking feedback on company expenses, possibly a previously neutral stimulus, and 415

attempting to stay below the specified spending limit. Motivative augmentals, on the other hand, alter the effectiveness of stimuli by altering a consequential function. For example, "Sales are the backbone of our company finances. If we don't sell, we don't make money." This statement takes a stimulus (making a sale) that already functions as a reinforcer for salespeople and increases its reinforcing effectiveness. Augmentals, therefore, are a way to bring about transformation of stimulus functions through DRR and hopefully a subsequent change in employee behavior as a result of the alteration of stimulus functions. 420

The above-mentioned account of rule governance highlights the importance of functional characteristics of rules in management of IBCs or organized group practices in organizations. With regards to topography and function of rules, organizational rules are institutional stimuli that correspond to a shared response from a group (Kantor, 1982). Therefore, the institutionalized nature of organizational rules requires our focus on not only the shared function they serve among employees but also the topographical characteristics that mediate stimulus control among collectivity of individuals (Kantor, 1982). Organized group practices or IBCs can be defined as learned interactions with institutionalized stimuli (e.g., rules, policies, other organizational members, etc.) acquired under group auspices and shared among members of a given organization (Houmanfar & Johnson, 2003). And, given the coordinated nature of these practices, they can be influenced by verbal products such as rules and augmentals. 425 430 435

Management of Interlocking Behavioral Contingencies

The product or service delivered by an organization does not depend solely on the behavior of a single employee. The coordinated behaviors of many employees from many departments generate the organizational aggregate product (e.g., cars and computers) or service. Thus, successful behaviors of employees within organizations tend to rely on the successful behaviors of other employees. As mentioned earlier, when the product of the behavior of an employee acts as an antecedent for the behavior of another employee, IBCs (Glenn, 2004) are said to exist. For example, within the publishing department, the employee designing the layout of a brochure cannot arrange things precisely until she receives the photographs and product information from the other employee responsible for providing them. This sort of interrelated behavior is often taken for granted in organizations, yet it is essential to proper functioning. 440 445

The interlocked nature of contingencies also exists among metacontingencies (Glenn & Malott, 2004; Malott & Glenn, 2006; Houmanfar & Rodrigues, 2006). For example, the publishing department cannot design the brochure until the marketing department has decided on the items that will be going on sale. So, these departments constitute the metacontingencies 455

associated with the internal functioning of the organizations. For instance, when analyzing the IBCs of core departments (e.g., production) and support departments (e.g., human resources) in a given organization, the cultural milieu (e.g., organizational policies, material resources), internal consumer feedback (feedback provided from one department to the other), and the aggregate product of each department (e.g., new employees hired by human resource) are the settings factors that occasion the occurrence of the associated IBCs (assembling of computer parts) that bring about the production of aggregate products that meet the internal consumer (e.g., other departments such as customer service) demand. 460 465

In short, departments or organizational teams within and across organizations rely on IBCs to accomplish their duties. Accordingly, managers must ensure that the IBCs are running efficiently and effectively. Just as management can influence employee behavior through verbal products such as rules and augmentals, so too can it influence interrelated employee behavior using the same verbal products. 470

Fujimoto (2001) provides an account of how Toyota used variations of explicit and implicit rules in its manufacturing plants around the world. Shop floor management was historically governed by explicit rules for plants that did not allow deviation. These rules were considered to be the most efficient because they had been tested in other locations. However, in recent years, smaller Toyota plants had been allowed to try new approaches in dealing with a specific problems pertaining to accuracy and speed of production. If the approach was successful, it was implemented at a few more plants and, if proven useful there, was turned into a standard practice. For instance, one plant used smaller work teams without reliance on explicit rules pertaining to floor operations to increase the efficiency of the assembly process. Based on its success, this management practice was implemented in other plants and soon became a standardized practice in all plants. Thus, by using more implicit rules to encourage variation, Toyota was able to improve its rate of production. This example also demonstrates the importance of evaluating the effectiveness of organizational rules on a continuous basis. 475 480 485 490

Another example that is demonstrative of the influence of verbal products on collectivity of employees' behaviors and the associated IBCs is Alavosius, Getting, Dagen, Newsome, and Hopkins' (2009) field experiment on a systematic implementation of an incentive system within cooperative associations of 350 companies (inclusive of small manufacturing companies such as boat builders, plating operations, jewelry manufacture, etc.). This process included a series of promotion efforts (facilitated through communication networks across member companies) designed to maximize discussion of safety management by all members of the companies. The authors reported that verbal behavior of many employees was changed by introduction of the promotional materials, incentives, and celebrations. In short, the 495 500

incentives set the occasion for communications from the shop floor upward through work organizations that solicited and supported active safety management.

A relational understanding of the verbal products that are communi- 505 cated through organizational networks can enhance our ability to craft the above-mentioned verbal products and so render them more suitable to the needs of specific organizations, departments, and teams. Providing employees with simple, accurate rules that come from a respected source can help to improve the effectiveness of their behavior while reducing the possibility of 510 time wasted on creating (and disseminating) self-rules that may turn out to be inaccurate. Recognizing the nature of different departments and teams and their relation to the organization can guide leadership in presenting formative and motivative augmentals that produce shared goals and hence improved cooperation within the organization. Through recent empirical 515 work in RFT, behavior analysis is increasingly placing itself in a position to theorize effectively and empirically test these educated guesses about the functioning of verbal behavior in organizations.

For instance, establishing shared goals among team members can be accomplished by communicating a clear vision for the team that is in 520 alignment with the goals and mission of the organization. Specifying rewards or outcomes that will result from team success can also mediate an increase in the reinforcing value of the team goals (O'Hora & Maglieri, 2006). If necessary, augmentals can be used to increase the importance of team goals while communicating a clear connection between the team 525 actions and goals—placing desirable team behaviors in frames of “before-after” with the team goals—may help increase team members' prediction of accomplishing the team goals (O'Hora & Maglieri, 2006).

With regard to circumstances where variability of IBCs is promoted by leadership (e.g., Microsoft's design team practices), preparing the team for 530 different scenarios can aid in team success. Ensuring members are aware of the greatest number of potential conditions can be done by generating “if-then” relations between hypothetical scenarios and the proper responses to those situations. If possible, rehearsal of difficult or complex tasks should be arranged so the team has a learning history of performing under different 535 conditions. Problem solving within simulations of various scenarios can also help member skills be identified so role clarity can be established reinforced; these are also factors in successful team performance (Alavosius, Houmanfar, & Rodrigues, 2005).

To increase buy-in (decreased resistance to change) and therefore the 540 effectiveness of their messages, management may want to craft messages to suit the circumstances of the organization as well as the situation of the employees. For that reason, the level of specification of rules can be varied according to the type of team that the employee belongs to. With some groups in organizations (e.g., manufacturing), the rules provided may need 545

to be more specific such that the roles of team members and the goals of the team are unambiguous. With other groups, such as design teams, on the other hand, the goal may be clearly specified, but the manner in which the goal is to be accomplished is loosely defined (e.g., “efficiently”), which gives team members the ability to generate their own rules based on their own experiences as well as some trial and error. 550

Moreover, in their role as guides, leaders have to create new verbal relations between the current and future state of the organization, between the future organization and its niche in the future environment, and between current employees and the future organization. Leaders have to take into consideration the ever-evolving external environment and verbally evaluate the potential adaptations the organization can make to those possible futures. These relations are based on a verbally constructed future that, for the leader at least, bears some connection with the current situation. However, these relations must be communicated effectively to the rest of the people in the organization if they are to behave in accordance with said relations. 555 560

Finally, individuals’ histories of relational networks have a significant influence on the way by which a collection of individuals in a given IBC responds to organizational information generated by each other through communication networks. This interaction between relational networks and communication networks can be captured through the phenomenon of self-organization, which is one of the characteristics of social systems. 565

Characteristics of Communication Networks

As we discussed earlier, the verbal networks formulated by employees in an organization depend on their prior history of already-established verbal relations. New relations are more easily formed if they are in accordance with existing relational networks. Due to the role of coherence (consistency of DRR in the absence of explicit reinforcement) as a reinforcement (Dean, Johnston, & Saunders, 2006; Festinger, 1957; Hayes et al., 2001), relational networks are often created without external input or interference. In other words, the dynamics of relational framing behavior are such that an individual’s set of verbal relations tends to become more ordered over time even in the absence of external consequences. This inherent dynamic is referred to as self-organization in other sciences and is one of the defining characteristics of a complex system (Bar-Yam, 1997; Kauffman, 1993). Relational networks as well as the communication networks within an organization seem to display this feature of self-organization. Thus, communication networks may develop in organizations without being specifically put in place by management. People with access to more information, through social links or by virtue of their position within the organization, may act as hubs in these networks (Sandakar, 2009). Similarly, rumor and gossip may proliferate through many parts of the company in the absence of external feedback (Kauffman, 1993). 570 575 580 585

TABLE 1 Glossary of Definitions

Term	Definition
Augmentals	rules that change the reinforcing or punishing effectiveness of consequences (in much the same way the establishing operations nonverbally alter the effect of consequences).
Cultural milieu	comprise material resources, overarching governmental policies, as well as well organizational policies, rules, traditions, institutions, technological progress, and environmental competition.
Derived Relational Responding	operant responding to the relations among properties of two or more stimuli that have not been directly trained.
Interlocking Behavioral Contingency	comprise operant contingencies in which behavior of two or more people functions as environmental events for the behavior of the others.
Metacontingency	depicts the contingent relation between interlocking behavioral contingencies (IBCs), their aggregate product, and the environmental demand.
Ply	a rule that specifies a consequence that will be delivered by another person or people.
Role-Specifying Stimuli	descriptions that specify job responsibilities and associated contingencies that may function as antecedent stimuli to ensure appropriate employee and leader behaviors.
Relational Network	a series of relations between different stimuli (that participate in already established relational responding).
Setting Factors	general surrounding circumstances that operate as inhibiting or facilitating condition in a given behavior-environment interaction.
Track	a rule that specifies a consequence that occurs naturally, as part of the interaction with the environment.

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Communication networks also seem to embody several of the other characteristics of complex systems. Complex systems tend to be sensitive to initial conditions (Bar-Yam, 1997; Kauffman, 1993). From an organizational perspective these initial conditions might be the size of the company, the information given during initial orientation sessions, the nature of the interview process that new employees go through, the history and perspective of the founders of the organization, and so on. These factors may have a significant impact on how information is transmitted differently within one organization compared to another. Interactions in complex systems are often not predictable, which seems to be true of employee verbal interactions within an organization. For example, social contingencies that may serve as the bases for communications, the talkativeness of employees in different roles, and employee reactions or interpretations to official organizational communications are often unpredictable because they may be affected by several factors such as their impression of the organizational culture, events in the news, and their overall impression of the economy.

Since communication networks are unpredictable, sensitive to initial conditions, and often self-organized, it is often unclear how one ought to

manage the system. Although the organization's leaders may desire to limit variability and increase the predictability of the verbal relations, such a strategy often does not work (Marion & Uhl-bien, 2001). Disrupting the inherent dynamics of the system often leads to the system self-organizing unpredictably in some other way. For although complex systems tend to have internal characteristics that guide their development, they are also sensitive to their environments. Establishing a system of feedback and clear communication should attempt to limit communication networks from being governed too much by its self-organizational characteristics and be more responsive to the needs of the organization (Brethower, 1982; 1999; 2000; Diener, McGee, & Miguel, 2009; Malott, 2003). 610

As we move from primarily rule-governed repertoires of some departments (e.g., manufacturing department) to contingency-shaped repertoires of other departments (e.g., design department), self-organization may increase. It would therefore be more effective for management to attempt to provide a modicum of organization to the communication networks while simultaneously recognizing and taking advantage of the communication dynamics that self-organize within the company. To this end, gaining constant feedback from the employees about the effectiveness of management's efforts to influence the content of the communication is necessary. 620 625

CONCLUSION

This article provided an overview of communication networks and role of verbal behavior in behavioral systems analysis. The discussion included ways by which leaders' communication of organizational contingencies impact relational responding as well as coordinated and interrelated behaviors in and across metacontingencies. As we see it, the purpose of communication is often to guide employee behavior to be more efficient and productive while contributing to the overall efficiency and productivity of the organization. This sort of communication is generally in the form of rules that the organization assumes will have an impact on employee behavior. In that regard, we addressed the implications that the analysis of rules may have for behavioral systems analysis and more particularly, behavior analysis of organizational effectiveness. Additionally, examples associated with the applicability of behavioral techniques that can be utilized in the analysis of rules, particularly in organizational settings, were provided. 630 635 640

Our analysis also drew upon different behavioral perspectives to demonstrate how communication networks and the nature of verbal rules may contribute to understanding the issues involved in reengineering behavioral systems in the face of continued socioeconomic and cultural demands. In short, we believe that further empirical analyses associated with precise specification and demonstration of the means by which 645

communication networks influence our analysis of behavioral systems is a challenge that is worth the direct attention of behavior analysts—engineers of human behavior—in the field of organizational behavior management.

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