Rules, Rule-Governed Behavior, and Organizational Change in a Large Metropolitan Research University

Douglas L. Robertson and Martha Pelaez
Florida International University

We examine the use of rules to influence organizational change in a large metropolitan research university. The macrobehaviors of interest involved student success metrics (such as on-time graduation) that are part of the performance metrics favored by the university system's selecting environments, such as the Florida State University System's Board of Governors, federal funding programs, and national philanthropic organizations. Five dimensions of a recently revised taxonomy of rules and rule-governed behavior (Pelaez, 2013) are used to analyze rules that have been introduced to effect the desired behavioral change in students. The context is Florida International University (Miami), and the change effort is its national award-winning Graduation Success Initiative (GSI; 2011–2015). The interrelated GSI interventions are large and complex. Therefore, isolating and evaluating each individual intervention has not been possible. However, the GSI's cumulative effect appears to have been to help to increase on-time graduation by 16 points in 4 years. The manipulation of rules specifying contingencies seems to have played an important role in that success and is the subject of this discussion.

Keywords: organizational change management, macrobehaviors, metacontingencies, rules, undergraduate student success

The ability to identify specific interventions with large ripple potential is critical for achieving organizational change at scale. Put simply, a focused intervention can have large scale, positive impact as its consequences work through the system's nested hierarchies and its elements' complex horizontal and vertical relationships. The skillful manipulation of well-targeted rules has this potential, which is the subject of this article. For 4 years (2011–2015), the Graduation Success Initiative (GSI) was a comprehensive, university-wide set of interventions that aimed to improve student success (as measured by variables such as 6-year graduation rates for first time in college students) at Florida International University (FIU), a large public metropolitan research university in Miami, Florida (fall 2016 enrollment = 55,157; 89% underrepresented, 64% Hispanic; 91% commuter; Carnegie classifications: highest research activity and engaged). The GSI was informed by behavior analytic concepts (Robertson & Pelaez, 2016) and in its 4 years appears to have helped to improve the on-time graduation rate by 16 points from FIU's historical low (41%) to its historical high (57%; see Figure 1). In November 2013, the GSI received the Most Visible Progress Award from the Association of Public and Land-Grant Universities.
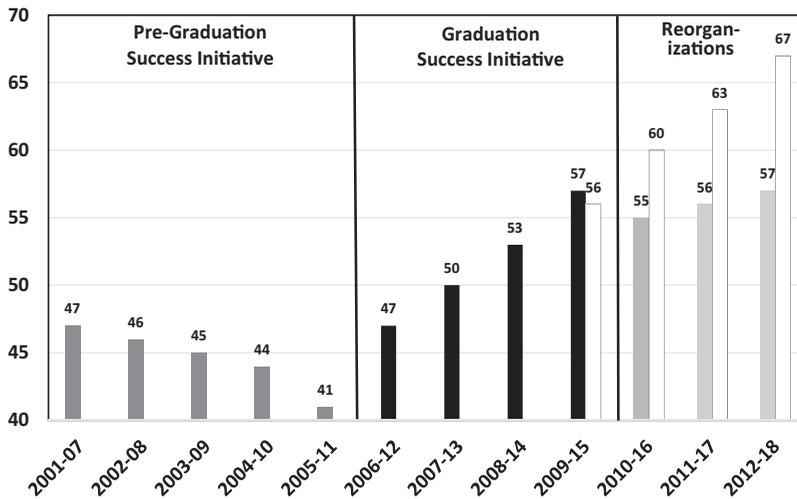
Figure 1. Six-year graduation rate (percentage who graduate on time) for cohorts of students in college for the first time at Florida International University (FIU): (a) Pre-Graduation Success Initiative (GSI) actual rates are dark gray; (b) GSI actual rates are black; (c) postreorganizations projected rates are light gray (2010–2016 is now an actual postreorganizations rate); and (d) target rates of FIU's *Beyond Possible* 2020 Strategic Plan (approved by the FIU Board of Trustees in March 2015) are white.

A change in university leadership has brought precipitously announced, rolling reorganizations; the disruption of highly functioning synergies; and uncertain contingency and reinforcement fields (see Table 1). The impact of these reorganizations on student success met-

Table 1
Florida International University Reorganizations for 2015–2016

- Breakup of the College of Arts and Sciences
- Creation of a new free-standing School of International and Public Affairs
- Elimination of the free-standing Division of Undergraduate Education, which provided university-wide leadership for the Graduation Success Initiative
- Elimination of the free-standing University Graduate School
- Elimination of the free-standing University College
- Elimination of the free-standing School of Journalism and Mass Communication
- Merger to create a new College of Communication, Architecture, and the Arts
- Elimination of the free-standing College of Education
- Merger to create a new College of Arts, Sciences, and Education
- Creation of multiple new executive positions at the level of dean, associate and assistant vice president, vice and associate provost, and executive director

rics are not precisely known, although some consequences have already become apparent and some empirically based projections are possible (see Figure 1).

This article discusses examples of the use of rule manipulation during the GSI (2011–2015) as successful interventions to bring about large-scale organizational change. In particular, it demonstrates the utility of using the specific dimensions of a particular rules taxonomy (Pelaez, 2013) not only to create contingencies that lead to effective change but to unpack and analyze the efficacy of rules so that their effect on rule-governed behavior is understood as it relates to desired change. But first, we define three key concepts that helped us analyze the context of the university.

Macrobehaviors, Macrocontingencies, and Metacontingencies

Macrobehaviors (or cultural practices) refers to particular behavioral patterns that many individuals exhibit. This often occurs when many people happen to do the same thing independently not collaboratively (Glenn, 2004, p. 140). *Macrocontingencies* refers to the cumulative sum of the consequences from the individ-

ual behavior of many people doing the same thing (Glenn, 2004, pp. 142–143). *Metacontingencies* involves interrelated behavior patterns (or interlocking behavioral contingencies) that are supraorganismic phenomena existing at the cultural level of analysis (Glenn, 1988, p. 167; Glenn, 2004, pp. 144–145). In our case, when a large number of individual students at Florida International University behave in such a way that they do not graduate in 6 years (macrobehaviors) and the university system manifests recurring interlocking behavior patterns that support or promote this unsuccessful student behavior (metacontingencies), we have seen in South Florida a large number of students (and their families) with no degree and large debt, as well as a regional economy lacking in the skilled labor force that it needs (macrocontingencies). These metacontingencies are typical of a sufficiently large enough number of universities, particularly metropolitan universities, that elevating the on-time graduation rate has become an explicit national priority. During its 4 years of operation (2011–2015), Florida International University's Graduation Success Initiative attempted to implement rules (policies) to change these undesirable macrocontingencies (e.g., reducing the number of students with no degree, high debt, and poor employment) by changing both macrobehaviors (changing reinforcement systems for individuals so that they graduated on time) and metacontingencies (changing nested hierarchies of recurring interlocking behavior contingencies such that on-time graduation was supported rather than hindered; Glenn & Malott, 2004; M. E. Malott, 1999, 2001, 2003; M. E. Malott & Glenn, 2006; M. E. Malott & Salas Martinez, 2006; Robertson & Pelaez, 2016).

In this article we discuss several examples in which the manipulation of rules has been used in interventions to produce large organizational change (Houmanfar, Rodrigues, & Smith, 2009; R. W. Malott, 1993; Pelaez, 2013; Robertson & Pelaez, 2016).

Rules and Rule-Governed Behavior

In this section, we first provide some background of the original taxonomy of rules and rule-governed behavior (Pelaez, 2013; Pelaez & Moreno, 1999). We have proposed elsewhere that the probability that the listener (e.g., a

student) will behave according to a rule provided by an authority or institution (e.g., the university) will depend on the type of rule provided (e.g., its dimensions), the context in which the rule is provided (e.g., conditions), and the listener's history with that rule or other similar rules (e.g., a student's knowledge of university rules; Pelaez, 2013; Robertson & Pelaez, 2016). We want to acknowledge here that manipulations of other types of rules and dimensions have been conducted in studies of stimulus equivalence, relational frames, and derived stimulus relations and that behavior analysts have distinguished rule-governed behavior from direct contingency-shaped behavior on the basis of different sets of controlling contingencies (e.g., Galizio, 1979; S. Hayes, 1989; S. C. Hayes, Barnes-Holmes, & Roche, 2001; Hayes & Hayes, 1992; Reese, 1989; Verplanck, 1992; Zettle & Hayes, 1982). Moreover, Barnes-Holmes, Barnes-Holmes, Smeets, Cullinan, and Leader (2014) have already shown how relational frame theory (RFT) can provide a behavior-analytic account of both stimulus equivalence and human language.

Given the purpose of this article, however, we limit our discussion here to the taxonomy offered by Pelaez (2013) because it is the conceptual model that we used for the GSI interventions. Pelaez's revised taxonomy of rules takes into account five dimensions of an entire contingency arrangement specified in the rule and explains how these dimensions may relate to the listener's behavior. The classification is made according to rule (a) explicitness, (b) accuracy, (c) complexity, (d) source, and (e) time. But first, we provide some background on the behavioral meanings of rule and rule-governed behavior for those not trained in behavior-analytic traditions.

Rule-governed behavior has been theoretically and experimentally contrasted from behavior that is learned and maintained by its direct consequences (e.g., Catania, 1985; Catania, Shimoff, & Matthews, 1989; Cerutti, 1989; Hineline & Wanchisen, 1989; Vaughan, 1989; Zettle & Hayes, 1982). Skinner (1953, 1957, 1966, 1969) distinguished between behavior shaped by direct consequences, naming it contingency-shaped behavior, and behavior controlled by verbal antecedents, naming it rule-governed behavior. In Skinner's account, contingency-shaped behavior is maintained by

direct consequences and comes under the control of discriminative stimuli. In contrast, rule-governed behavior is controlled by verbal behavior and is only indirectly maintained by its consequences. In this sense, Skinner (1966) identified rules as contingency-specifying verbal stimuli—as stimuli that specify, either directly or indirectly, consequences for the behavior.

By applying RFT concepts to the notion of verbal operants proposed by Skinner (1957), RFT provides a modern behavior-analytic account of human language and cognition, including listener's rule-following (S. C. Hayes et al., 2001). RFT has also expanded the scope of organizational behavior management and its complex human behavior (see S. C. Hayes, Bunting, Herbst, Bond, & Barnes-Holmes, (2006). Next we distinguish between behavior that is directly shaped and maintained by its consequences and behavior that is controlled or influenced by rules that verbally specify the contingencies involved.

We find the concept of rule-following behavior helpful because it describes how human behavior can come under the control of contingencies and can be modified by antecedent verbal stimuli (i.e., rules). The function of a rule or instruction, in this case of GSI, was to influence and guide the behavior of the students, faculty, and staff (i.e., listeners). That is, the goal was to control the listeners' behavior in a way specified by the verbal behavior of the speaker (the university). Although the control of rules in governing behavior has been demonstrated, the distinction between contingency-shaped behavior and rule-governed behavior, at times, can be confusing. This is why theoretical inconsistencies in the distinction between notions of contingency-shaped and rule-governed behavior have been discussed (e.g., Cerutti, 1989; S. Hayes, 1991); Pelaez-Nogueras & Gewirtz, 1995; Ribes, 1992). Although both direct contingency-shaped and rule-governed behaviors are established by consequences, their controlling variables and functional properties differ.

According to Linda Hayes (1991), the main difference between rule-governed behavior and contingency-shaped operants is that the antecedent stimuli in the former case are always verbal in nature, (p. 7). That is why the dimensions of the rules need to be examined. The particular functions of the controlling rules are

to specify (either explicitly or implicitly) the entire contingency array among antecedent stimulus, response, and consequence in a given context (Pelaez, 2013). A rule must be understood in terms of the descriptions it makes of contingent relations among the three-term contingency (or four- or five-term) in context. Such relations might or might not be present in the very situation where the rule is given, which implies more complexity of all contingencies embedded in the rule. The transmission of these non present complex contingent relations can be achieved only through the substitutional function of language. As Pelaez and Moreno (1999) stated: "The ultimate controlling character of a rule would be based on ready-made discriminative attributes that, by virtue of the listener's verbal history, do not require new conditioning in every new situation in which the rule is provided" (p. 22).

In this way, people can behave from the outset in accordance with rules and instructions that they have never before experienced. Let us explain further. It is important to distinguish between two sets of contingencies in rule-governed behavior: those contingencies related directly to the behavior of interest (*tracking*) and those related to the verbal antecedents of such behavior (*pliance;* Zettle & Hayes, 1982). Rule-following behaviors like pliancy and tracking behaviors have been extensively discussed in the literature on rule-governed behavior and instructional histories (e.g., Dixon & Hayes, 1998). From our perspective, the emphasis is on the analysis of the two sets of all contingencies involved in terms of both form (or topography) and function. The two sets of contingencies of interest are those specified verbally in the rule *discriminative stimulus* (Sd) → *response* (R) → *reinforcing stimulus* (Sr), or (Sd–R–Sr), and those in which the listener's behavior is embedded (Sd–R–Sr), the latter contingencies resulting from direct tracking or experiencing consequences. Rules and rule-related behaviors can be meaningfully understood only when analyzed as an interdependent unit. There exists a codependent relation between the rule and the behavior of the listener. As stated earlier, a rule's function can be identified only in terms of its relation to rule-governed behavior, and rule-governed behavior makes sense only in reference to a rule, or set of specified contingencies. A rule's form or structure or dimension, however, can be

identified a priori, before identifying its function on the listener's behavior.

This is why we have emphasized that the probability that the listener (e.g., a student) will behave according to an institutional rule will ultimately depend on (a) the contingencies verbally specified in such rule, (b) the context within which the rule is provided, and (c) the listener's history (e.g., culture) with that or similar rules. In our present analysis, we focus on rules and on the set of contingencies that they specify for the listener (Skinner, 1989). Our main purpose in the next section is to emphasize that the analysis of rule-governed behavior should involve both the form and the function of rules. Thus, each of the rule dimensions in the proposed taxonomy can influence the listener's rule-following behavior (Herrera, Pelaez, Reyes, Figueroa, & Salas Martinez, 2001).

Dimensions of Rules

At least five dimensions (continua) affect the function of rules to shape behavioral change (Pelaez, 2013). These five dimensions as binary choices generate 32 different combinations or types of rules. As continua, of course, the possibilities are endless. Rules' dimensions can be as follows:

1. *Explicit versus implicit.* "Rules can be distinguished based upon the completeness or specificity of the contingencies expressed" (Pelaez, 2013, p. 262). This means that a rule *explicitness* identifies all the components of the three-term contingency model: (a) desired student behavior, (b) the antecedents or context in which such behavior should occur, and (c) the consequences for following or not following such instruction. On the other hand, "when examining an implicit rule, we will note that the contingencies may not have gained verbal expression—either because some of the components were unnamed or because they were expressed in a way not identifiable in time and space" (Pelaez, 2013, p. 262).

2. *Accurate versus inaccurate.* "An *accurate* rule specifies contingencies that, when followed, match certain event-consequence relationship in the environment— they are congruent" (Pelaez, 2013, p. 263). In other words, the contingencies verbally specified in the instruction have correspondence with the environmental contingencies that are experienced by the student. Rule-governed behavior is sensitive to the contingencies specified only when these prescriptions correspond with the programmed or real consequences (say–do correspondence). In turn, following inaccurate rules can desensitize the listener to the effects of programmed consequences (e.g., Buskist & Miller, 1986; Catania, Matthews, & Shimoff, 1982; Martinez-Sanchez & Ribes-Iñesta, 1996). Hence, in addition to the degree of accuracy in a given contingency-rule prescription, the listener's history and current context significantly affect the extent to which rules will influence behavior.

3. *Lower versus higher order rule complexity.* "The contingencies specified in a rule include at least one relation between the behavior, its antecedent stimuli, and its consequences. . . . [R]*ule complexity* refers to the number of dimensions of the antecedent stimuli and the stimulus relations" (Pelaez, 2013, p. 263). To explain, a rule of high complexity can be embedded within another rule and be conditional to particular conditions. This implies conditional discrimination. For example, a rule that is conditional or related to another rule would be saying to the students that if you registered for class (R) during this preregistration week (Sd), you will receive a tuition credit (Sr), *but only* if you register for 12 credits and if you are in good standing with the university (no debt). This is a response–environment relation that is constrained to another condition(s). Thus, rules of higher level of complexity involve a secondary or higher order class of relation. A second-order response then involves deriving a relation from another relation(s). Thus, a higher order relation includes a second-order stimulus control of rules and associates one relation to other dimensions (or to other relations). This level seems to correspond to Sidman's (1986) five-term contingency (5–*SD*-{*SD*-R-SR}). There is no limit to the complexity embedded in these rules.

4. *Rules provided by others versus self-provided (self-directed).* "In cases of *rules provided by others,* the speaker (rather than the listener) specifies, implicitly or explicitly, the criterion for the listener's behavior. In the case of *self-provided (self-given or self-directed) rules,* the speaker and the listener are the same individual" (Pelaez, 2013, p. 264). Furthermore, a rule can be self-generated or self-derived from other sets of previously learned rules. The term *self* is used here not to imply the initiation of a behavior by an autonomous internal agent or by some imaginary part of the individual. It refers to the individual's behavior repertoire. That is, the self-provided or self-directed rules were originally taught by others. Furthermore, they can also be self-generated or self-derived. Students derive rules from their own learning experiences and learned relations. Self-directed rules are helpful for problem solving. Self-constructing rules about what to do and how to solve a problem arise in following instructions (Barnes-Holmes, Hayes, & Dymond, 2001).

5. *Rules that specify immediate versus delayed contingencies.* "A rule could specify or imply *immediate* or a *delayed consequence* for following or not following such rule" (Pelaez, 2013, pp. 265–266). Students often identify improbable and remote consequences of their actions, as when they say or think, "If I keep getting bad grades and decreasing my GPA, the university may take away my financial aid." Often, students may conform or not to such a rule with remote consequences, and at other times they just comply with it. There is a distinction between complying with and conforming to a rule (Verplanck, 1992). Rule compliance involves following and behaving according to a rule that has been either stated to the listener or self-directed. Rule conforming involves responses consistent with the rule, although the listener (the student) may remain unable to verbalize or derive the rule (see Pelaez, 2013, for further elaboration).

Instructions, requests, and demands can function as contingency-specifying verbal stimuli.

Instructions specify the response that will produce the reinforcing (positive or negative) consequence, as well as its context (discriminative stimuli). The result is often that students engage in generalized compliance. That is, students learn to follow nearly all instructions provided by the university system and, given the history of reinforcement to responding to other members of this instructional stimulus class, they quickly derive new rules. In other words, their performance is maintained as long as there is a correspondence between the instructions provided, the behavior specified, and consequences that follow. Rule compliance tends to generalize due to arbitrary applicable responding or derived relational responding (for research examples and a more elaborate analysis of derived relational responding see S. C. Hayes et al., 2001; O'Hora, Pelaez, Barnes-Holmes, & Amesty, 2005).

Using the topographic (or structural) dimensions that we emphasize here (and that are intrinsically related to the function of the rule) as lenses to create and analyze student rule-following has been helpful in the large-scale GSI intervention. The GSI developed and implemented rules that are explicit, accurate, simple, and produce feedback and consequences as immediately as possible. Although the rules were provided by the system (others), the goal is for the other-provided rules to be learned and function as self-provided over time as students learn enlightened self-advising regardless of major. Learning enlightened self-advising is one of the GSI's goals in much the same way as improving students' ability to conduct effective self-directed learning is an important goal in courses regardless of subject.

GSI Conceptual Framework and Change Template

Although the GSI's interventions were made horizontally and vertically throughout the university and were complex, the GSI vision (goal and route to the goal) was simple and involved a straightforward four-point framework to arrive at on-time graduation: (a) help students to identify their appropriate major (matching their preparation, abilities, interests, vocation, and goals) as early as possible, preferably at admission; (b) provide a clear semester-by-semester path to on-time graduation in that major; (c)

give immediate feedback concerning whether a student is on or off the path; and (d) remove barriers and add supports on that path. Realizing each of these points identified specific problems that needed to be solved and thereby created the GSI work plan.

An equally simple change template was used to execute this vision. The major agents who were involved with the student success metrics that comprised the specific objectives of the GSI were identified. The *desired behavior* was described (i.e., behavior that would contribute to achieving the overall student success objectives, the macrobehaviors). The current behavior was compared to the desired behavior and if lacking became the *target behavior* for that agent (i.e., dysfunctional behavior vis-à-vis the objectives that was targeted for change). A *strategic intervention* was determined, and *reinforcing contingencies* were built into the system to sustain the targeted behavior outcome. Next we discuss several examples where the manipulation of rules outlined earlier was the *strategic intervention*.

Rule Compliance Example: Complete MyMajorMatch

The first point in the GSI's four-point conceptual framework is to help students to *select an appropriate major,* preferably at admission. A romantic vision exists that in a liberal arts curriculum students should wander through a Chinese-menu-style general education curriculum for 2 years or more trying this and that in largely unsupervised experimentation and that at some point they will have a Damascus Road experience and suddenly see what their major should be and how it relates to their future life. The data for FIU students simply do not support this vision. In 2009 (prior to the GSI), 75% of students who dropped out had never declared a major. In 2009, 77% of students who were admitted to a major graduated on time. However, also in 2009, over 5,900 students (21% of active undergraduates) had earned more than 72 credits (of 120) but were not admitted to a major. They were supposed to declare a major at 60 credits. FIU's overall on-time (6-year) graduation rate was in the alarming mid-40% range and falling.

An analysis of the data regarding the behavior of FIU students appeared to show a relationship between being in an appropriate major and graduating on time. The desired behavior for students was to discern and select an appropriate major at admission. The targeted behavior was the normative pattern of not selecting a major well into the junior year, if then even. A pre-GSI university policy required students to select a major at 60 credits (of the 120 credits needed to graduate), but the policy was not enforced. Strategic interventions included introducing the rules that, beginning with the entering class of fall 2012, all students would have to complete MyMajorMatch and declare a major to complete the admission process. MyMajorMatch is a highly valid and reliable online vocational interest inventory whose results are connected to MyMajor, an online compendium of all FIU majors including a precise eight-semester map of what students would take for each major, which essentially defines what the major means when that meaning may not be altogether clear to the applicants, particularly first-generation applicants (http://undergrad.fiu.edu/gsi/advisors.html). Applicants take 10 minutes to complete the online inventory, then see their top five (of 77) vocational interests, then see what FIU majors and specific courses they would take to get those jobs. Incidentally, MyMajorMatch's job taxonomy is identical to that of the national Occupation Information Network (O*Net; http://www.onetcenter.org), a richly interactive, user-friendly site to which applicants are encouraged to go. Reinforcing contingencies include being able to complete the admission process as well as later doing significantly better in the first year (in terms of grade point average and retention) if a major was selected that corresponded to those that MyMajorMatch indicated (Trusty, 2014).

The key here is helping the student to select an appropriate major, not just any major (a choice that might be uninformed, fanciful, frivolous, and highly inappropriate). So the key explicit rule is that all students must complete MyMajorMatch (essentially an online learning system to discern an appropriate major) to complete the admission process. The rule that all students must declare a major to complete the admission process is necessary but not sufficient to achieve the goal of helping the students to discern and select an appropriate major at admission. Internal research has shown that completing MyMajorMatch is where the gain is

earned (Trusty, 2014). Next we examine this demonstrably effective rule in terms of our rule taxonomy dimensions.

Regarding the explicit–implicit dimension, an explicit rule should include all three contingency components and specify not only the required student's response but the context for such behavior. On the other hand, in the implicit rule or instruction the contingencies may not have gained verbal expression—the consequences for not following the rule are not verbally specified. That is, in an implicit rule, the contingencies are often unnamed or not identifiable.

In our intervention, it was explicitly stated that to complete the admission process, the applicant needs to complete MyMajorMatch. When applicants begin the online admission process, a portal is created for each one of them, and on their portal is a to-do list, which must be completed to complete the admission process. Although completing MyMajorMatch is on the to-do list, in fact, applicants are considered for admission even if they have not completed MyMajorMatch. The applicants do not know this fact. We would emphasize that the consequence of not completing MyMajorMatch, however, is implicit. That is, students follow the rules because of the learning history in other institutions or large bureaucracies. Students learn that they need to pay attention to the rules or they get stalled by noncompliance.

Regarding the accurate–inaccurate dimension, the rule is not entirely accurate, nor does it have good correspondence with the actual contingencies. The rule nonetheless influences the applicant's behavior because of the implicit learning history just described. Typically, the listener's behavior (the student's) adjusts to the rules when the reinforcing contingencies specified in those rules are accurate or correspond to the programmed or "direct" contingencies (e.g., DeGrandpre & Buskist, 1991). In turn, following inaccurate rules may ultimately desensitize the listener to the effects of actual contingencies (e.g., Catania et al., 1982; Martinez-Sanchez & Ribes-Iñesta, 1996). Hence, as stated in Pelaez (2013), "In addition to the degree of accuracy in a given contingency-rule prescription, the listener's history and the current context significantly affect the extent to which rules will influence behavior" (p. 263). This well-documented phenomenon of humans following

inaccurate–incongruent rules is worth noting with respect to the GSI. Student applicants believe that the description of the consequence is accurate because in their experience bureaucratic rules such as this one are usually accurate and correspond to the actual consequences. In fact, if applicants do not complete MyMajorMatch but they complete everything else on the to-do list (e.g., submit documents such as transcripts, pay the application fee), they are admitted if they qualify even without completing MyMajorMatch.

The reason for this rule inaccuracy is the pragmatic fact that university leadership believes that the university cannot afford to lose qualified applicants over this peccadillo. If the applicants' academic records are sterling and their checks do not bounce, university leadership wants these applicants in the entering cohort. This inaccuracy works well in this case because applicants are not yet a part of student networks and are relying on their learning history (where the consequences were accurate) rather than on knowledge of the FIU inaccuracy. If the learning history that implicitly supports the accuracy of the rule is not extant, then the bluff may not work. Here it worked.

Regarding the lower–higher rule complexity dimension, the rule is simple, or exhibits low rule complexity. Less complexity in rules likely makes them more effective (Herrera et al., 2001). A more complex level of the rule or instruction may specify a relation among two or more dimensions, each relation forming a relational frame (Trigo, Martinez, & Moreno, 1995). In the GSI implementation, the relations specified in the rule between the antecedent stimulus (signaling students by placing the completion of MyMajorMatch on their to-do lists), the target behavior (the actual completion of MyMajorMatch), and its consequences (removing that task from applicants' to-do lists that locks them in the system) are straightforward and uncomplicated by qualifications.

Regarding the other-provided–self-provided dimension, the rules in our intervention were clearly provided. Effective rules that are constructive for students can often begin as other-provided and transform into self-provided rules. For example, in the rule that applicants must complete MyMajorMatch, the idea is that by completing the online learning system to discern their appropriate major, applicants will see

the value of the databases involved, such as MyMajorMatch, MyMajor, and O*Net, and then will return to those databases as a self-provided rule that they must themselves integrate their academic and vocational interests using these data. This process serves the goal of developing self-directed lifelong learners.

Regarding the immediate–delayed contingencies dimension, a similar discussion regarding accuracy–inaccuracy pertains to this rule. It is stated that the immediate consequence of not completing MyMajorMatch is not completing the admissions process and therefore not being eligible for admission. However, if applicants do everything on their to-do list except complete MyMajorMatch, they will be admitted. The implicit consequences in the rule appear to be immediate to the student, but they are actually delayed. If applicants are admitted, they are immediately assigned to a professional adviser in their major. These professional advisers have access to sophisticated data portals for each advisee, and they can see whether each student has completed MyMajorMatch and whether each student chose a major that corresponded to the indicated vocational interest. At the same time, professional advisers are trained to persist in getting all of their advisees to complete MyMajorMatch and to discuss the choice of majors with regard to the vocational interests indicated by MyMajorMatch. If advisees do not heed their advisers, the advisers have the ability to place a hold on their advisee's ability to register and require the advisee to meet with the adviser to lift the hold. So the consequences of not completing MyMajorMatch are considerable and effective, even though they are delayed (albeit made to appear immediate).

Rule Compliance Example: Stay on the Path

To reiterate, the four-point GSI conceptual framework was as follows: (a) choose an appropriate major, (b) provide a clear path to on-time graduation, (c) give immediate feedback whether on or off the path, and (d) remove barriers and add supports on the path. The desired behavior for students is to stay on the path to on-time graduation. Prior to GSI, normative behavior for students was not to have a clear and specific path and to take courses that did not contribute to their graduation, which became

the targeted behavior. Among the strategic interventions was introducing the rule that students need to stay on track or they will not be allowed to proceed (register) without a meeting with their adviser. A companion strategic intervention was the development and deployment of My_eAdvisor, a sophisticated tracking tool that matched the students' behavior (which courses they were taking and what their performance was) with the courses and performance levels on the students' major map (semester-by-semester path to on-time graduation in each specific major). Reinforcing contingencies included (a) praise from the adviser when staying on track and (b) alerts and interventions (including having holds on registration) when not staying on track.

Next, we take the rule that students must stay on track or they will not be allowed to proceed without meeting with their adviser and discuss it with regard to the five dimensions of our rule taxonomy. In reference to the explicit–implicit dimension, this rule is explicit. Students are informed by numerous sources (orientation counselors, academic advisers, peer advisers) about the rule. However, this information comes at the beginning of their academic career, when they are being informed of many rules that are all important, all at the same time. The consequences are stated explicitly and are not implied, which is about all that can be done at the beginning. Later, actually experiencing the direct consequences stated in the rule reinforces its accuracy.

Regarding the accuracy–inaccuracy dimension, the rule is strongly toward the accuracy end of the continuum, although the consequences described verbally do not totally correspond to the actual consequences in the environment. That is, when one unpacks an undergraduate curriculum, one finds that it is full of rules—policies regarding general education, the major, the overall baccalaureate degree, financial obligations, social and academic conduct, parking infractions, and so forth. For each major, the tracking tool is built with as many of these rules as possible and automatically reads the students' documented behavior vis-à-vis these rules and provides immediate feedback to the student and to the adviser. The rule that students must stay on their path really encompasses many rules that constitute the path. In the beginning, My_eAdvisor was gen-

erating too many alerts (Sds), an overwhelming number, and all of the alerts were not worthy of concern. For example, if a student failed a prerequisite math course and had to retake it, that student would never be on the eight-semester MajorMap and would continually generate alerts, which would lose their meaning for both the student and the adviser. Students' maps needed some individualization. In fact, even though the maps lead to graduation in 4 years, the goal is to have students graduated within 6 years. So significantly fewer critical indicators were enabled in the tracking tool (e.g., critical indicator courses with high predictive value of success in specific majors, maintenance of an adequate grade point average), and these critical indicators (some universal for all majors and others specific to the major) were the basis for the reduced automated alert generation. The rule remained that students need to stay on the path or they will not be allowed to proceed without meeting with their advisor, which introduced some inaccuracy in favor of functionality and simplicity.

Which leads to the dimension of lower versus higher rule complexity. The antecedent cues (Sds) appear in the path; the target behavior is staying on the path; and the consequence is being praised and allowed to proceed or, if the behavior is not emitted, not being allowed to proceed until having a conference with the advisor. Rule complexity revolves around the complexity of the antecedent—the path. In this case, the antecedents for the entire student body are complex (multitudinous paths), but the antecedent for each individual student (the individualized path) is simple. The macrobehaviors (many people doing the same thing) are changed by changing the behavior of individuals. The rule is simple at the individual level—stay on your particular path, which you and your advisor have set for you.

In reference to the other-provided–self-provided dimension, the rule definitely begins as other-provided, with the intention of becoming self-provided or self-directed (Barnes-Holmes et al., 2001), although self-provided is not equivalent to a self-generated or self-derived rule (see Pelaez, 2013). One of the GSI goals is to create learning systems that support enlightened self-advising. Achieving this goal not only introduces significant efficiencies and savings for the university but, more important,

serves the overarching curricular goal of developing highly functioning, self-directed, lifelong learners.

My_eAdvisor and the professional advisors constitute a GSI learning system intended to help students to learn to advise themselves effectively—to monitor their own behavior and progress. Not unlike course-management systems (e.g., Blackboard and Canvas), My_eAdvisor provides students with the basics of their progress, thus leaving advisors with more time to have the really important conversations with students about their concerns, aspirations, and vocation, just as course-management systems handle the basics of course management and free the teacher to do the nuanced work that leads to deep learning.

Finally, concerning the immediate–delayed contingencies dimension, the rule has immediate consequences that have the potential to build to more significant, delayed consequences. When students receive My_eAdvisor alerts, they have the option not to read them, to read them and disregard them, or to read them and take corrective action. For example, regarding corrective action, the My_eAdvisor tracking system has the ability to interact in real time with the online course registration system so that if students' corrective action involves signing up for a particular course, the students see in real time the available sections and can register immediately upon receiving the My_eAdvisor feedback. If students do not read the alerts or disregard them and furthermore do not respond to advisor attempts to communicate with them, then the advisor can place a registration hold on these students until they contact their advisor and do what is requested to remove the hold. Prolonged self-destructive behavior has been stopped. Incidentally, a challenge of the My_eAdvisor system is that it is transcript-based and is set up to respond to behavior at the end of each semester. Although its contingencies are immediate for the semester, they may not be immediate for the failing behavior. Early alert systems that are being developed are course-based rather than transcript-based and can detect at-risk students early in the semester when they are behaving problematically but before they have actually failed the course and can still be helped.

Another challenge for the My_eAdvisor system that reduces the immediacy of its consequences is that the university encourages students to register several semesters in advance. So by the time the My_eAdvisor alerts are issued indicating that the student is off the path, that student may already be enrolled for an inappropriate course for the next semester. Advisors can detect this problem and correct it. However, advanced registration does increase the possibility of unnoticed, inappropriate enrollment. Notwithstanding these challenges, the improvements in the immediacy of response to students' off-path behavior has improved significantly.

Conclusion

Rules and rule-following behavior were used extensively in the GSI as strategic interventions with pertinent agents in the university system (e.g., students, advisors, advisors' supervisors, faculty, chairs, deans). The intention was that rules were explicit, accurate, and simple; that they began as other-provided and became self-provided over time; and that they had immediate consequences for student successes and failures. Although isolating and evaluating the myriad of interrelated, university-wide interventions that comprised the GSI is impossible, worth noting is the fact that GSI's cumulative effect appears to have helped to produce a 16-point increase in on-time graduation (the macrobehavior) in the GSI's 4-year existence. Although a tightly controlled analysis of one particular intervention variable is impossible in a real-world, large-scale, multivariate set of interrelated interventions in a complex organization, the creation and analysis of rules (or policies) using the five dimensions of a rules taxonomy (Pelaez, 2013) seems to have contributed to changing these targeted macrobehaviors and metacontingencies in order to change targeted student success macrocontingencies that have critical significance in the university's selecting environment (Robertson & Pelaez, 2016).

References

Barnes-Holmes, D., Barnes-Holmes, Y., Smeets, P. M., Cullinan, V., & Leader, G. (2014). Relational frame theory and stimulus equivalence: Conceptual and procedural issues. *International Journal of Psychology & Psychological Therapy, 4,* 181–214.

Barnes-Holmes, D., Hayes, S. C., & Dymond, S. (2001). Self and self-directed rules. In S. C. Hayes, D. Barnes-Holmes, & B. Roche (Eds.), *Relational frame theory: A post-Skinnerian account of human language and cognition* (pp. 119–139). New York, NY: Kluwer Academic/Plenum Press.

Buskist, W. F., & Miller, H. L. (1986). Interaction between rules and contingencies in the control of human fixed-interval performance. *Psychological Record, 36,* 109–116.

Catania, A. C. (1985). Rule-governed behavior and the origins of language. In C. F. Lowe, M. Richelle, D. E. Blackman, & C. M. Bradshaw (Eds.), *Behavior analysis and contemporary psychology* (pp. 135–156). London, United Kingdom: Erlbaum.

Catania, A. C., Matthews, B. A., & Shimoff, E. (1982). Instructed versus shaped human verbal behavior: Interactions with nonverbal responding. *Journal of the Experimental Analysis of Behavior, 38,* 233–248. http://dx.doi.org/10.1901/jeab.1982.38-233

Catania, A. C., Shimoff, E., & Matthews, B. A. (1989). An experimental analysis of rule-governed behavior. In S. C. Hayes (Ed.), *Rule-governed behavior: Cognition, contingencies and instructional control* (pp. 119–150). http://dx.doi.org/10.1007/978-1-4757-0447-1_4

Cerutti, D. T. (1989). Discrimination theory of rule-governed behavior. *Journal of the Experimental Analysis of Behavior, 51,* 259–276. http://dx.doi.org/10.1901/jeab.1989.51-259

DeGrandpre, R. J., & Buskist, W. F. (1991). Effects of accuracy of instructions on human behavior. *Psychological Record, 41,* 371–384.

Dixon, M. R., & Hayes, L. J. (1998). Effects of differing instructional histories on the resurgence of rule-following. *Psychological Record, 48,* 275–292.

Galizio, M. (1979). Contingency-shaped and rule-governed behavior: Instructional control of human loss avoidance. *Journal of the Experimental Analysis of Behavior, 31,* 53–70. http://dx.doi.org/10.1901/jeab.1979.31-53

Glenn, S. S. (1988). Contingencies and metacontingencies: Toward a synthesis of behavior analysis and cultural materialism. *Behavior Analyst, 11,* 161–179.

Glenn, S. S. (2004). Individual behavior, culture, and social change. *Behavior Analyst, 27,* 131–151.

Glenn, S. S., & Malott, M. E. (2004). Complexity and selection: Implications for organizational change. *Behavior and Social Issues, 13,* 89–106. http://dx.doi.org/10.5210/bsi.v13i2.378

Hayes, L. (1991). Substitution and reference. In L. J. Hayes & P. N. Chase (Eds.), *Dialogues on verbal behavior* (pp. 3–14). Reno, NV: Context Press.

Hayes, S. (1989). *Rule-governed behavior: Cognition, contingencies and instructional control*. New York, NY: Plenum Press.

Hayes, S. (1991). A relational control theory of stimulus equivalence. In L. J. Hayes & P. N. Chase (Eds.), *Dialogues on verbal behavior* (pp. 19–40). Reno, NV: Context Press.

Hayes, S. C., Barnes-Holmes, D., & Roche, B. (2001). *Relational frame theory: A post-Skinnerian account of human language and cognition*. New York, NY: Kluwer Academic/Plenum Press.

Hayes, S. C., Bunting, K., Herbst, S., Bond, F. W., & Barnes-Holmes, D. (2006). Expanding the scope of organizational behavior management: Relational frame theory and experimental analysis of complex human behavior. *Journal of Organizational Behavior Management, 26,* 1–23. http://dx.doi.org/10.1300/J075v26n01_01

Hayes, S. C., & Hayes, L. J. (1992). Verbal relations and the evolution of behavior analysis. *American Psychologist, 47,* 1383–1395. http://dx.doi.org/10.1037/0003-066X.47.11.1383

Herrera, G., Pelaez, M., Reyes, G., Figueroa, S., & Salas Martinez, W. (2001). Seguimiento de reglas en función del desarrollo psicológico y de la comprensión del lenguaje [Rule-following as a function of psychological development and language comprehension]. *Mexican Journal of Behavior Analysis, 27,* 403–429.

Hineline, P. N., & Wanchisen, B. A. (1989). Correlated hypothesizing and the distinction between contingency-shaped and rule-governed behavior. In S. C. Hayes (Ed.), *Rule-governed behavior: Cognition, contingencies and instructional control* (pp. 221–268). http://dx.doi.org/10.1007/978-1-4757-0447-1_7

Houmanfar, R., Rodrigues, N. J., & Smith, G. S. (2009). Role of communication networks in behavioral systems analysis. *Journal of Organizational Behavior Management, 29,* 257–275. http://dx.doi.org/10.1080/01608060903092102

Malott, M. E. (1999). Creating lasting organizational change. *Performance Improvement, 38,* 33–36. http://dx.doi.org/10.1002/pfi.4140380209

Malott, M. E. (2001). Putting the horse before the cart: Process-driven change. In L. Hayes, R. Fleming, J. Austin, & R. Houmanfar (Eds.), *Organizational change* (pp. 297–320). Reno, NV: Context Press.

Malott, M. E. (2003). *Paradox of organizational change: Engineering organizations with behavioral systems analysis*. Reno, NV: Context Press.

Malott, M. E., & Glenn, S. S. (2006). Targets of intervention in cultural and behavioral change. *Behavior and Social Issues, 15,* 31–56. http://dx.doi.org/10.5210/bsi.v15i1.344

Malott, M. E., & Salas Martinez, W. (2006). Addressing organizational complexity: A behavioural systems analysis application to higher education. *International Journal of Psychology, 41,* 559–570. http://dx.doi.org/10.1080/00207590500492773

Malott, R. W. (1993). A theory of rule-governed behavior and organizational behavior management. *Journal of Organizational Behavior Management, 12,* 45–65. http://dx.doi.org/10.1300/J075v12n02_03

Martinez-Sanchez, H., & Ribes-Iñesta, E. (1996). Interactions of contingencies and instructional history on conditional discrimination. *Psychological Record, 46,* 301–318.

O'Hora, D., Pelaez, M., Barnes-Holmes, D., & Amesty, L. (2005). Derived relational responding and human language: Evidence from the WAIS-III. *Psychological Record, 55,* 155–176.

Pelaez, M. (2013). Dimensions of rules and their correspondence to rule-governed behavior. *European Journal of Behavior Analysis, 14,* 259–270.

Pelaez, M., & Moreno, R. (1999). Four dimensions of rules and their correspondence to rule-governed behavior: A taxonomy. *Behavioral Development Bulletin, 8,* 21–27. http://dx.doi.org/10.1037/h0100528

Pelaez-Nogueras, M., & Gewirtz, J. L. (1995). The learning of moral behavior: A behavior-analytic approach. In W. M. Kurtines & J. L. Gewirtz (Eds.), *Moral behavior: An introduction* (pp. 173–199). Boston, MA: Allyn & Bacon.

Reese, H. W. (1989). Rules and rule-governance: Cognitive and behavioristic views. In S. C. Hayes (Ed.), *Rule-governed behavior: Cognition, contingencies, and instructional control* (pp. 3–84). http://dx.doi.org/10.1007/978-1-4757-0447-1_1

Ribes, E. (1992). Some thoughts on thinking and its motivation. In S. C. Hayes & L. J. Hayes (Eds.), *Understanding verbal relations* (pp. 211–224). Reno, NV: Context Press.

Robertson, D., & Pelaez, M. (2016). Behavior analytic concepts and change in a large metropolitan research university: The Graduation Success Initiative. *Journal of Organizational Behavior Management, 36*(2–3), 123–153. http://dx.doi.org/10.1080/01608061.2016.1200513

Sidman, M. (1986). Functional analysis of emergent verbal classes. In T. Thompson & M. D. Zeiler (Eds.), *Analysis and integration of behavioral units* (pp. 93–114). Hillsdale, NJ: Erlbaum.

Skinner, B. F. (1953). *Science and human behavior*. New York, NY: Macmillan.

Skinner, B. F. (1957). *Verbal behavior*. http://dx.doi.org/10.1037/11256-000

Skinner, B. F. (1966). An operant analysis of prob-

lem solving. In B. Kleinmuntz (Ed.), *Problem solving: Research, method and theory* (pp. 225–257). New York, NY: Wiley.

Skinner, B. F. (1969). *Contingencies of reinforcement: A theoretical analysis*. New York, NY: Appleton-Century-Crofts.

Skinner, B. F. (1989). The behavior of the listener. In S. C. Hayes (Ed.), *Rule-governed behavior: Cognition, contingencies, and instructional control* (pp. 85–96). http://dx.doi.org/10.1007/978-1-4757-0447-1_2

Trigo, E., Martinez, R., & Moreno, R. (1995). Rule performance and generalization in a matching-to-sample task. *Psychological Record, 45,* 223–240.

Trusty, J. (2014). *Study of outcomes associated with use of the Kuder career search with person match at a public research university in greater Miami, FL.* Retrieved from http://www.kuder.com/wp-content/uploads/2014/07/Outcomes-Associated-with-Use-of-KCS-FL.pdf

Vaughan, M. (1989). Rule-governed behavior in behavior analysis: A theoretical and experimental history. In S. C. Hayes (Ed.), *Rule-governed behavior: Cognition, contingencies, and instructional control* (pp. 97–118). http://dx.doi.org/10.1007/978-1-4757-0447-1_3

Verplanck, W. S. (1992). Verbal concept "mediators" as simple operants. *Analysis of Verbal Behavior, 10,* 45–68.

Zettle, R. D., & Hayes, S. C. (1982). Rule governed behavior: A potential theoretical framework for cognitive-behavior therapy. In P. C. Kendall (Ed.), *Advances in cognitive-behavioral research and therapy* (Vol. 1, pp. 73–118). http://dx.doi.org/10.1016/B978-0-12-010601-1.50008-5