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# CORRELATION BETWEEN SELF-REPORTED RIGIDITY AND RULE-GOVERNED INSENSITIVITY TO OPERANT CONTINGENCIES

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Adults were selected on the basis of their scores on the Scale for Personality Rigidity (Rehfisch, 1958a). Their scores served as a measure of hypothesized rule governance in the natural environment. Experiment 1 studied the effects of accurate versus minimal instructions and high versus low rigidity on performance on a multiple differential-reinforcement-of-low-rate (DRL) 4-s fixed-ratio (FR) 18 schedule. When the schedule was switched to extinction, accurate instructions and high rigidity were associated with greater perseveration in the response pattern subjects developed during the reinforcement phase. In Experiment 2, the effects of rigidity and of accurate versus inaccurate instructions were studied. Initially, all subjects received accurate instructions about an FR schedule. The schedule was then switched to DRL, but only half of the subjects received instructions about the DRL contingency, and the other half received FR instructions as before. Accurate instructions minimized individual differences because both high and low scorers on the rigidity scale earned points in DRL. However, when inaccurate instructions were provided, all high-rigidity subjects followed them although they did not earn points on the schedule, whereas most low-rigidity subjects abandoned them and responded appropriately to DRL. The experiments demonstrate a correlation between performances observed in the human operant laboratory and a paper-and-pencil test of rigidity that purportedly reflects important response styles that differentiate individuals in the natural environment. Implications for applied research and intervention are discussed.

DESCRIPTORS: rule-governed behavior, instructional control, individual differences, insensitivity to contingencies, multiple schedules

A number of researchers have shown that, in the human operant laboratory, verbal rules compete with programmed contingencies of reinforcement and often produce an apparent insensitivity to these contingencies (e.g., Barrett, Deitz, Gaydos, & Quinn, 1987; Buskist, Bennett, & Miller, 1981; Catania, Matthews, & Shimoff, 1982; Hayes, Brownstein, Haas, & Greenway, 1986; Kaufman, Baron, & Kopp, 1966; Matthews, Shimoff, Catania, & Sagvolden, 1977; Shimoff, Catania, & Matthews, 1981). The exact source of this so-called insensitivity effect is still somewhat unclear, but at least two factors have been identified that may affect sensitivity. First, explicit instructions may produce ineffective contact with the programmed contingencies due to a rule-induced reduction of behavioral variability (e.g., Baron & Galizio, 1983; Hayes, Brownstein, Zettle, Rosenfarb, & Korn, 1986; Joyce & Chase, 1990). This is consistent with the observation that behavior apparently becomes more sensitive to changes in contingencies if individuals are instructed on a variety of schedules (e.g., LeFrancois, Chase, & Joyce, 1988), if they receive strategic instructions that "variable responding

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works best" (e.g., Joyce & Chase, 1990), or if they are presented with schedules that permit such precise discriminative control that it is easy to discern a discrepancy between verbal instructions and scheduled contingencies (e.g., Torgrud & Holborn, 1990). A second reason for the insensitivity effect may be that instructions add social contingencies for rule following that may compete with the scheduled consequences and, therefore, reduce sensitivity (e.g., Barrett et al., 1987; Hayes, Brownstein, Haas, & Greenway, 1986; see also Hayes, Zettle, & Rosenfarb, 1989 for a review).

By studying the effects of instructions on behavior in the experimental laboratory, operant researchers hope to identify the basic processes that affect human behavior in the natural environment. People in everyday life are subjected to verbal instructions on a regular basis. If a history of compliance with instructions indeed reduces behavioral variability and increases responsiveness to social consequences for rule following, one can expect that instruction-produced insensitivity to operant schedule parameters corresponds to a real-world phenomenon rather than being merely coincidental to certain laboratory preparations. Further, it is reasonable to assume that idiosyncratic past experiences yield individual differences both in rule following and in sensitivity to many natural consequences of behavior. Thus, "individual differences" may constitute yet a third factor that is associated with insensitivity: Subjects with a stronger history of rule following might more rigidly adhere to instructions, both in the laboratory and in the natural environment, and might in general be viewed as rigid individuals.

To explore whether there is a relationship between insensitivity in the operant laboratory and rigid behavior outside the laboratory, the present research identified persons who could be placed at different points along a rigidity–flexibility dimension and examined how individual differences on this dimension related to response patterns observed in a behavior-analytic experimental situation (see Harzem, 1984, for a behavioral analysis of individual differences). Individual differences in rigidity were assessed with a 39-item true/false self-report questionnaire developed by Rehfisch (1958a). The Scale for Personality Rigidity (hereafter termed the rigidity scale) is based to a large extent on the Minnesota Multiphasic Personality Inventory and the California Personality Inventory (Vollhardt, 1990) and appeared to be suitable for several reasons. First, the scale has face validity and was empirically derived, standardized, and cross-validated. Second, it contains items about a wide range of situations that, when answered in a certain way, imply constriction and inhibition, conservatism, intolerance of ambiguity, and perseverative tendencies (Bartz, 1969; Rehfisch, 1958a, 1958b). This is illustrated by endorsing statements such as, "I always follow the rule, business before pleasure," "I don't like to see women smoke," "I keep out of trouble at all cost," or "A strong person doesn't show emotions." Third, the scale seems to assess a history that reflects rule-induced rigidity. This is not to say that rigidity is purely learned and unrelated to biogenetic factors, but to produce rigid behavior these factors likely interacted with environmental influences, such as parents who enforced compliance with "the rules of proper conduct" through aversive means. This would explain why the rigidity scale correlates with measures of social anxiety (e.g., Naftulin, Donnelly, & Wolkon, 1974; Singh, 1978; Sinha, 1992). These "rules" may initially have been taught directly, or the person may have abstracted them from repeated contact with aversive social contingencies. (Note that it seems that people often construct rules, even when their behavior has been shaped by contingencies, because this allows them to behave effectively when the original contingencies have weakened; Skinner, 1969, p. 159.) In either case, similar histories have been said to produce rigid, compulsive individuals by instilling expectations (i.e., rules) that one needs to be perfect, to do things right, and to avoid mistakes at all cost (Beck & Freeman, 1990). Lastly, rigidity seems to be a sufficiently perceptible and stable attribute: It is discriminable by the individual and rateable by others with significant interrater agreement, and rigidity scale scores, as well as rigid behaviors, tend to persist over time (e.g., Kravas, 1973; Linn, Moravec, & Zeppa, 1982; Naftulin et al., 1974; Rehfisch, 1958a, 1958b; Schaie, Dutta, & Willis, 1991; Vollhardt, 1990). To illustrate, in one study (Rehfisch, 1958a) five or more independent observers rated male graduate students and Air Force captains on several complex behaviors that were indicative of rigidity and arrived at an average interrater agreement of .73. Another study (Linn et al., 1982) found that medical students scoring high on rigidity persisted in negative attitudes toward death and dying and showed little change over a 12-week surgical clerkship. Similarly, the higher graduate students in education scored on rigidity and dogmatism, the less they changed and benefited from training as educational helpers (Kravas, 1973). These and other studies suggest that the behavior of rigid individuals in fact tends to persist over time and may change less in response to situational demands.

In summary, based on the available evidence, it was reasonable to hypothesize that the behavior of individuals who score high on self-reported rigidity may be less sensitive to its consequences and that such persons, therefore, may more rigidly adhere to rules in a wide variety of circumstances, including the operant laboratory. This was the rationale for the design of the two studies reported below. Before explaining these studies in more detail, it is important to point out that they should be viewed as an initial step in a research endeavor that seeks to examine the relation between verbal and other operant behavior, with the establishment of the generality of phenomena observed in the laboratory as examples of typical human circumstances as the ultimate goal. Although the use of a paper-and-pencil test such as the rigidity scale is defensible as a preliminary strategy, verbal endorsements should not be confused with the actual behaviors the test purports to measure. Therefore, the studies presented below must be viewed with this caveat in mind.

Two experiments explored individual differences in self-reported rigidity, as measured by the Rehfisch rigidity scale, and sensitivity to changing contingencies in the human operant laboratory. The purpose of these studies was to examine whether a correlation exists between different types of instructions, subjects' scores on a test for rigidity, and their performance on a multiple schedule of reinforcement.

## EXPERIMENT 1

### METHOD

### *Subjects and Setting*

In a preliminary screening session, the rigidity scale was administered to 197 undergraduates to identify individuals who either scored high (≥75th percentile of the screening sample) or low (≤25th percentile) on the questionnaire. Research assistants telephoned subjects meeting the screening criterion and solicited participation in the study until 12 high scorers (5 males and 7 females) and 12 low scorers (6 males and 6 females) were enrolled. None of those contacted declined participation. Subjects received extra course credit and chances at two money prizes for participating.

The experiment was conducted in a room (2 m by 2.5 m) equipped with a chair, a table, a 48-cm color TV monitor, and a small metal box holding a normally open momentary contact button (Radio Shack 275-518). The monitor and the response button were connected to a microcomputer (Radio Shack TRS 80 color computer) in an adjoining room.

### *Procedure*

The study followed a two (high vs. low rigidity) by two (accurate vs. minimal instructions) factorial design. Four groups with 6 subjects each were formed by randomly assigning half of the high and low scorers to one of two instruction conditions: accurate or minimal. All subjects were tested individually. At the beginning of the experiment, the following instructions were provided:

> When the session begins, you will see a signal light on the screen and an array of five squares with a marker in the first square. You can earn points worth chances at two $15.00 prizes by pressing the button that moves the marker through the squares and by observing

> the signal light. Each time you move the marker through the last square in the array you will earn 1 point.

For subjects assigned to the accurate-instruction groups these additional instructions were provided:

> When the signal light on the TV screen is yellow, pushes on the button with several seconds in between them work best. When the signal light is blue, fast pushes on the button work best.

The subject remained alone in the room during the session. The array of squares with the marker appeared on the TV screen, and button presses were reinforced with movements of the marker and points on a multiple DRL 4-s FR 18 schedule. Subjects worked in three consecutive 32-min sessions separated by 5-min breaks. The DRL and FR components alternated every 2 min. The reinforcement contingency was in effect during the first two sessions but was discontinued without announcement at the beginning of the third session. During extinction, the signal lights continued to alternate, but the marker no longer moved and no further points could be earned.

Only subjects who showed good schedule control and earned points in both the DRL and FR components during Session 2 were retained in the study. Because of this requirement, 4 subjects were replaced: 1 from the accurate-instruction condition with a high rigidity score and 3 from the minimal-instruction condition (1 with a low rigidity score and 2 with high rigidity scores). This criterion ensured that in Session 2 all subjects responded differentially to DRL and FR and earned a comparable number of points, regardless of their rigidity scores or the instructions they had received. Hence, differences in performance during extinction could not be attributed to deficient schedule control and different amounts of points earned. This made it possible to compare the effects of instructions and individual differences in rigidity (as measured by the rigidity scale) without confounding them by differential reinforcement effects.

## RESULTS AND DISCUSSION

Rigidity scores were comparable for the two high-scoring groups (mean scores, 28.0 and 28.7) and the two low-scoring groups (mean scores, 9.5 and 10.0). As shown in Figure 1, schedule contact in Session 1 was somewhat variable: The behavior of individuals who received accurate instructions tended to contact the schedule quickly, whereas responding under minimal instructions initially was much more variable. However, during Session 2 the performance of all subjects, regardless of instructions or rigidity scores, showed good schedule control, and there were no appreciable differences within or across conditions. Any differences during extinction therefore could not be attributed to different response rates or inadequate schedule control when the reinforcement contingency was in effect. To capture stable performances (especially during extinction when responding initially tended to be more variable), only responses during the latter halves of Sessions 2 and 3 were compared (see Hayes, Brownstein, Haas, & Greenway, 1986).

The degree to which a response pattern evident during reinforcement persisted during extinction served as the behavioral indicator of rigidity. Despite some variability within each condition, notable differences across the four conditions emerged in Session 3. As shown in Figure 1, subjects in the accurate-instruction/high-rigidity condition showed the greatest persistence in a similar response pattern from reinforcement to extinction. As a group, their responses to the last four FR components in Session 3 decreased by 22% relative to Session 2, while DRL responses remained stable. The only exception in this group was Subject 2; his FR responses declined by half, and his DRL responses nearly doubled. Subjects in the accurate-instruction/low-rigidity and minimal-instruction/high-rigidity conditions showed a moderate convergence in FR and DRL rates during extinction. In both groups, responding to the FR light decreased by approximately 50%, while responding to the DRL light occurred at the same or a slightly increased level. Finally, subjects' performance in the minimal-instruction/low-rigidity condition showed the great-

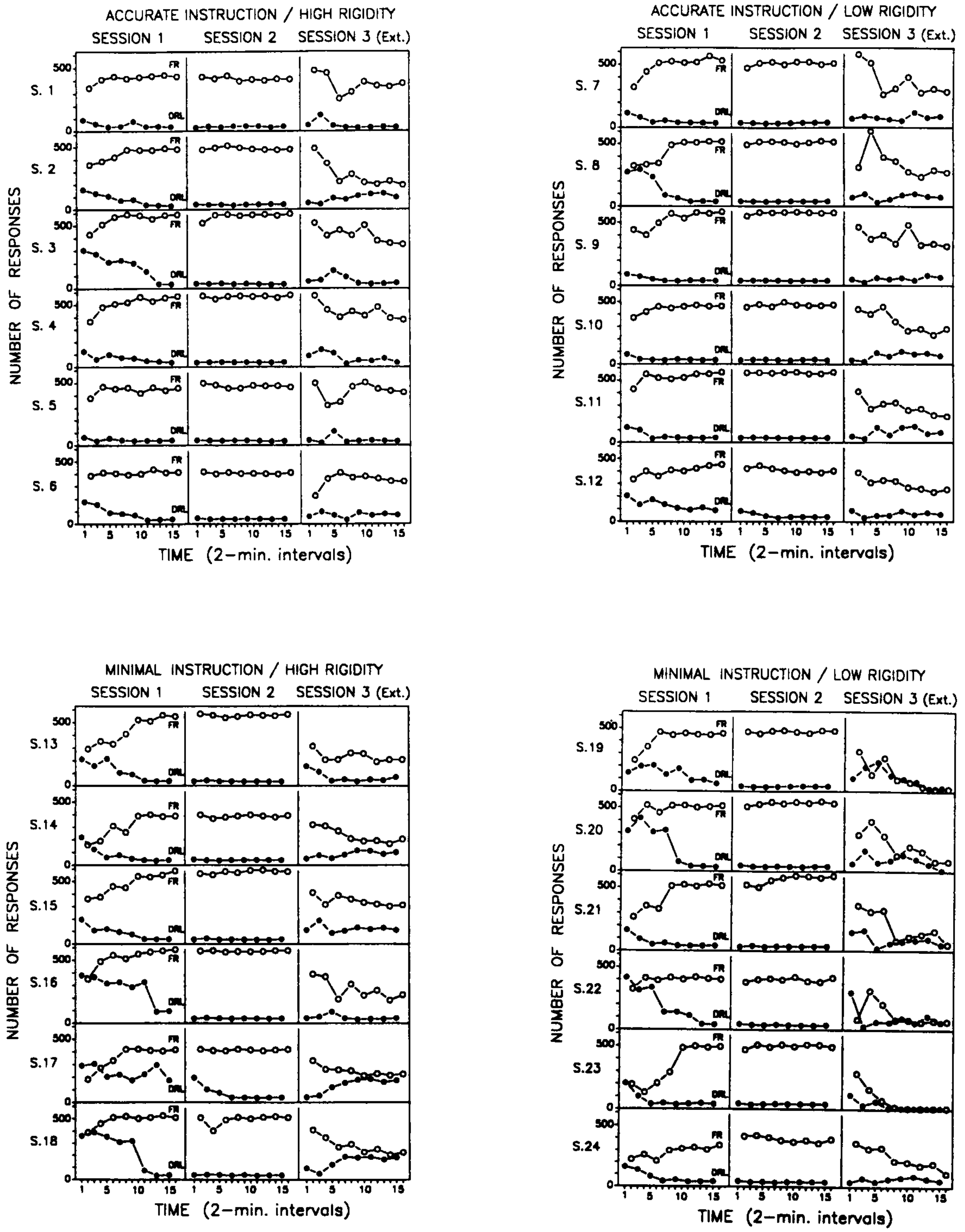

Figure 1. Performance on a multiple DRL 4-s FR 18 schedule during reinforcement (Sessions 1 and 2) and extinction (Session 3) of subjects in four experimental conditions. Subjects 1–6: accurate instructions/high rigidity (upper left panel); Subjects 7–12: accurate instructions/low rigidity (upper right panel); Subjects 13–18: minimal instructions/high rigidity (lower left panel); and Subjects 19–24: minimal instructions/low rigidity (lower right panel). Each data point represents the number of responses in each 2-min interval.

est convergence of FR and DRL rates. For 5 of the 6 subjects, responding to the FR light declined by 82%, but tended to increase to the DRL light. Finally, 1 subject in this group (Subject 23) completely ceased responding.

In summary, performances in the four conditions showed differential extinction effects, depending on the types of instructions subjects had received and their scores on the rigidity scale. Consistent with previous work (e.g., Catania et al., 1982; Hayes, Brownstein, Haas, & Greenway, 1986; Hayes, Brownstein, Zettle, Rosenfarb, & Korn, 1986), Experiment 1 found that accurate instructions induced greater persistence in the response pattern from reinforcement to extinction. In addition, individual differences in rigidity were also associated with sensitivity to programmed contingencies: Higher scores on the rigidity scale predicted greater persistence in response patterns when the contingencies changed. These findings suggest that the insensitivity effect seen in laboratory settings may reflect a form of behavior of more general applicability and relevance: In the present experiment, subjects whose scores on the rigidity scale suggested a more rigid response style in natural settings tended to adhere more to instructions and to a previously adopted response pattern on an operant task when the schedule changed.

Interestingly, for high scorers on the rigidity scale (who are hypothesized to be more rule governed in the natural environment), apparently even minimal instructions to "press the button" continued to exert some control during extinction. This, at least, is one plausible explanation for the moderate degree of persistence in responding displayed by subjects in the minimal-instruction/high-rigidity condition. However, an alternative interpretation is also possible. It is conceivable that rigidity in the natural environment is not so much an issue of greater compliance with rules as a more general insensitivity to changing contingencies that may manifest itself as a problem with modulating behavior in general. Once rigid individuals have some success on a task, perhaps their behavior becomes more resistant to changing contingencies, even in the face of rules indicating that a change is now required. This was suggested by Bartz (1969), who argued that one of the characteristics of individuals scoring high on the rigidity scale may be not only their "failure to adapt to changing situations" but their "involuntary repetition of responses" (p. 917). In essence, Bartz submitted that rigid individuals not only have difficulty adapting to changing situational requirements but also display "obsessional and perseverative tendencies" and often "cannot change even if they want to." If this notion is correct, the correlation between scores on the rigidity scale and insensitivity in the operant laboratory might not simply reflect a greater propensity to comply with instructions but rather a generalized deficit in conforming behavior to changing contingencies, regardless of instructions. To examine this possibility, a second study was conducted.

## EXPERIMENT 2

We tested the above hypothesis by contrasting subjects' performances under accurate versus inaccurate instructions about contingencies. If rigidity reflects perseverative response patterns and, thus, a generalized resistance to change, highly rigid individuals should continue in a given response pattern, even if told about a change. In contrast, if rigidity is more an issue of excessive rule following, high and low scorers on the rigidity scale should not differ when they receive accurate instructions; but when given inaccurate instructions, high scorers should follow them more closely than low scorers.

### METHOD

#### *Subjects and Setting*

As in Experiment 1, prospective subjects were screened with the rigidity scale. Ten high scorers and 10 low scorers were selected to participate in the study for course credit and chances at two $15.00 prizes. Setting and apparatus were identical to the previous study.

#### *Procedure*

Procedures were arranged in a two by two factorial design. The factors consisted of two levels of

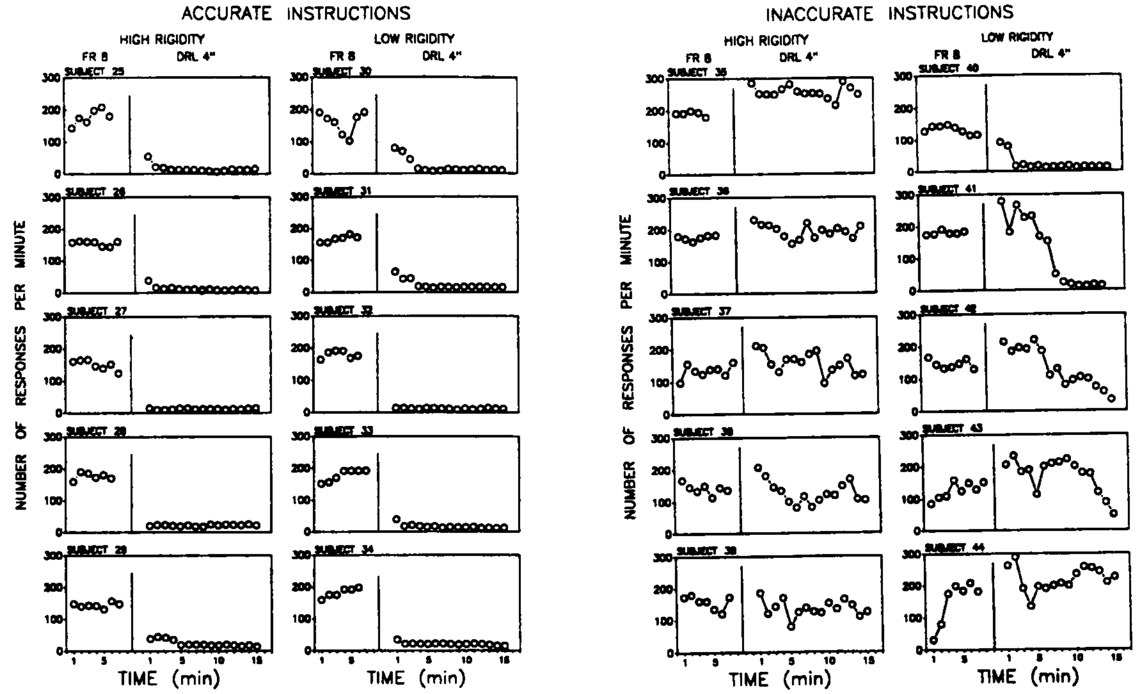

Figure 2. Performance on an FR 8 (Session 1) and a DRL 4-s schedule (Session 2) of subjects in four conditions. Subjects 25–29: high rigidity/accurate DRL instructions (first panel); Subjects 30–34: low rigidity/accurate DRL instructions (second panel); Subjects 35–39: high-rigidity/inaccurate DRL instructions (third panel); and Subjects 40–44: low rigidity/inaccurate DRL instructions (fourth panel). Each data point represents the number of responses in each 1-min interval.

rigidity (high vs. low) and two levels of instructions (accurate vs. inaccurate). Four groups with 5 subjects each were formed by randomly assigning half of the high and low scorers to accurate-instruction conditions and the other half to inaccurate-instruction conditions.

Subjects individually completed two consecutive sessions, separated by a 5-min break. In Session 1, all subjects, regardless of their assigned condition, were exposed to an FR 8 schedule and received accurate instructions ("To earn points, pressing the button fast works best"). This session lasted until subjects earned 31 points. After a 5-min break, Session 2 was initiated. The schedule for all subjects was switched to DRL 4 s, and new instructions were provided. One high- and one low-rigidity group received accurate instructions ("To earn points, pressing the button slow, with pauses between individual presses, works best"). The other high- and low-rigidity groups received inaccurate instructions ("To earn points, pressing the button fast works best"). Session 2 lasted 15 min.

## Results and Discussion

Because all subjects had received accurate instructions for Session 1, there were no appreciable performance differences among the four conditions (see Figure 2). However, significant differences emerged in Session 2. All subjects in the two accurate-instruction groups responded appropriately to the DRL schedule, regardless of their scores on the rigidity scale (the average number of responses during the latter half of Session 2 was 110 for high scorers and 108 for low scorers). This finding is inconsistent with a generalized inflexibility hypothesis, because it shows that individuals with higher levels of self-reported rigidity can and do conform their behavior to changing instructions. In contrast, when subjects received inaccurate instructions in Session 2, none with a high rigidity score earned points, whereas 4 subjects with low rigidity scores eventually contacted the DRL schedule (the average number of responses during the second half of Session 2 was 1,238 for high scorers and 539 for low scorers). Only 1 individual in this group (Subject 44) continued to respond at a high rate throughout the session. This result is consistent with a rule-governance interpretation of the insensitivity effect. Persons who self-report high rigidity also, under some conditions, show less sensitivity to schedule changes in the operant laboratory.

## GENERAL DISCUSSION

The purpose of the present research was to identify factors associated with the apparent insensitivity to programmed contingencies that has frequently been reported from the operant laboratory. Before discussing the findings in more detail, it is important to emphasize that the studies should not be construed to imply that some people's behavior is in fact insensitive to contingencies. In general, behavior is controlled by contingencies, although in laboratory situations, sometimes not by those the experimenter intended. The issue, then, is to identify variables that might be responsible for this apparent insensitivity effect.

Consistent with previous research, Experiment 1 demonstrated that accurate instructions about contingencies are one of the variables that can alter the effects of programmed contingencies. Although all subjects in Experiment 1 showed changes in responding from reinforcement to extinction, those who had received accurate instructions showed fewer extinction effects and tended to perseverate more in the response pattern they had adopted during the reinforcement phase. Previous research has shown instructed performance to conform to changes in contingencies if, for example, individuals are instructed about a variety of schedules to produce more extensive contact with the environment (e.g., LeFrancois et al., 1988) or if they are explicitly told that "variable responding works best" (e.g., Joyce & Chase, 1990). Many other manipulations would probably lead to similar outcomes. For example, if in Experiment 1 session length had been increased indefinitely, it is reasonable to assume that the behavior of all subjects would ultimately have been extinguished. But none of these manipulations invalidates the finding that instructions alter the effects of programmed contingencies. By definition, rule following implies sensitivity to the contingencies defined by rules; whether these produce an apparent sensitivity or insensitivity to other contingencies outside of the rule may depend upon how the two sets of contingencies interact (Zettle & Hayes, 1982).

A unique contribution of the present research was the identification of an individual-difference variable associated with the insensitivity effect. Both studies showed that different levels of rigidity or rule governance, as measured by the rigidity scale, were related in an orderly fashion to schedule performance. Although the exclusive reliance on a paper-and-pencil test to assess rigidity would be viewed as a clear weakness by many behavior analysts, it is important to remember that the studies in fact found systematic performance differences in the predicted direction among high and low scorers on this scale. Individuals whose behavior appeared to be less sensitive to changes in an operant schedule were precisely those who endorsed a greater number of statements reflecting conservative attitudes and behaviors indicative of rule governance. If the rigidity scale measures a general disposition to follow rules, then it is reasonable to assume that individual differences on this scale correlate with schedule performance in the operant laboratory. This statement must be qualified, however, because the correlation will be affected by contextual variables. To illustrate, an object may be labeled "water soluble," but this does not mean that one will find it dissolved; it only means that under appropriate conditions the object will dissolve (Brody, 1988). Analogously, an individual labeled "rigid" or "rule governed" will display rigid behavior only under certain evoking conditions. In structured situations, such as in church, most people behave alike, regardless of their behavioral dispositions. In contrast, marked individual differences arise in unstructured or ambiguous situations that provide no specific cues for behavior. Viewed from this perspective, it is not surprising that in the present experiments high and low scorers on the rigidity scale did not differ in structured situations (i.e., when specific and accurate instructions about the contingencies were given). Yet high scorers showed much greater rigidity in ambiguous situations when no specific discriminative stimuli for effective performance were available (i.e., when only minimal or inaccurate instructions were given or when unannounced changes in the schedule occurred). Under such ambiguous conditions, the behavior most likely to emerge may have been a repertoire with a strong history of reinforcement (i.e., complying with whatever instructions were provided rather than discovering what works best).

The present studies have shown a relationship between laboratory performance and rigidity scale scores. Nonbehavioral researchers have demonstrated a correspondence between rigidity scale scores and behavior in real-world situations (e.g., Kravas, 1973; Linn et al., 1982; Rehfisch, 1958a). Although we cannot conclude from the present studies alone that schedule-insensitive performance in the operant laboratory correlates with rigid behavior in natural settings, our research, together with nonbehavioral research, makes it plausible that such a relationship indeed exists. We therefore speculate that the apparent insensitivity observed in the laboratory is an element of a more extended pattern that includes verbal behavior (i.e., responses to the rigidity scale), rigid behavior in natural settings, and schedule-insensitive performance in the human operant laboratory.

Why do individuals who score high on a self-report measure of rigidity appear to be less sensitive to scheduled contingencies? We speculate that persons with rigid response patterns may be good rule followers because of a history of punishment for noncompliance with rules (explicit or implicit) specifying "correct" behavior in a wide range of settings. This might explain why rigidity scale scores correlate with measures of social anxiety (e.g., Naftulin et al., 1974; Singh, 1978; Sinha, 1992). Similar histories, besides generating evaluative anxiety, may produce stimulus control by instructions (even minimal ones) in a variety of settings, including the experimental laboratory. This happens because such histories tend to produce "pliance" (compliance with instructions per se) rather than "tracking" (rule following because the consequences specified in the contingency function as reinforcers) (Zettle & Hayes, 1982, pp. 80–81). To illustrate, a parent may say, "It's cold outside, put your coat on." The child may not feel cold and may hate wearing a coat, but he or she complies to avoid reprimands. A history in which compliance with parental rules and norms was strictly enforced, often through aversive means, may well establish a generalized compliance with instructions provided by authority figures. Moreover, because many parental rules are prohibitions consisting of "don'ts" rather than "do's," the child may gradually learn to exhibit a more restricted range of "safe" behaviors, which seems typical of individuals described as rigid. Hence, rigid individuals may follow instructions in experimental situations more closely, not because they are insensitive to changes in schedules per se, but because rule following has been strictly enforced in their past.

The present studies raised two additional issues. First, in Experiment 1 it was apparent that extinction of response rates to FR was much more pronounced than under DRL (see Figure 1). In fact, almost all subjects, regardless of the experimental condition, continued responding at low rates to the DRL light. Only 2 subjects in the minimal-instruction/low-rigidity condition stopped responding completely (Subject 23) or almost completely (Subject 19). One reason for the differential extinction effects might be the different amounts of effort involved in FR and DRL responding. More specifically, extinction may have affected FR responding more because continuing at high rates (some subjects had 500 or more responses per 2-min interval during reinforcement) required much more muscular effort than did responding at low rates (subjects had 30 or fewer responses per 2-min interval on the DRL). Thus, the cost of continued responding was higher in FR than in DRL. This interpretation is consistent with previous experimental research that has reported an inverse relationship between response force and rate of responding (e.g., Miller, 1968, 1970). It is also consistent with many real-world observations suggesting that responding is affected by the effort it takes to emit a given behavior. For example, when recovering alcoholics were instructed to participate in weekly aftercare sessions, their compliance during a 3-month period was found to be largely a function of the number of miles from their homes *to* a freeway rather than miles *on* a freeway to the hospital (Prue, Keane, Cornell, & Foy, 1979). This finding suggested that effort to reach the aftercare facility was a more critical variable than distance per se.

The second issue involves a possible criticism of the present experiments (and a frequent criticism of human operant research in general)—that the reinforcement contingencies manipulated were not particularly powerful. Because points worth chances at money prizes may be rather weak consequences, different performances might have emerged if subjects had been offered more money for points they earned on the schedules. However, given that the present research examined the combined effects of programmed and social consequences on behavior, it would not suffice to increase the incentive value of the scheduled consequences; one would also have to arrange stronger social consequences for following or not following instructions. Because neither may be feasible (the former for practical reasons and the latter for ethical reasons), in most laboratory studies social consequences and scheduled reinforcers are relatively weak. Nonetheless, they are generally strong enough to produce systematic differences as a function of the variables manipulated (e.g., Barrett et al., 1987; Hayes, Brownstein, Haas, & Greenway, 1986).

Let us now focus on the major findings from the present research. We hypothesized that rigidity is a label for a response pattern that probably stems from a history of forced compliance with rules and is evident in verbal behavior (i.e., responses to the rigidity scale), performance in the operant laboratory, and behavior in the natural environment. The present studies provided partial support for these assumptions. They can therefore be considered to be a first step in an analysis of the link between laboratory phenomena and behaviors in natural settings. More specifically, the experiments showed that an orderly relationship exists between verbal behavior and insensitivity to scheduled contingencies. Because the experiments relied on self-report, we cannot assert that laboratory performance reflects a response style in real-world settings. However, it is possible to link laboratory and real-world behavior via the rigidity scale, if the scale has predictive validity for behavior in both settings. As noted above, this seems to be the case. The present studies showed that rigidity scores predict insensitive laboratory performance; nonbehavioral research has shown that rigidity scores predict resistance to change in the natural environment (e.g., Kravas, 1983; Linn et al., 1982; Naftulin et al., 1974; Rehfisch, 1958b; Schaie et al., 1991). Thus, insensitivity in the operant laboratory and rigidity in the natural environment may be different aspects of a general response style.

These findings have important applied implications, because people who fall at the higher end of a flexibility–rigidity dimension may behave in ways considered to be maladaptive under many circumstances. Although rigidity implies trait-like qualities, the behaviors subsumed under this label are better conceptualized as a response class predominantly involving compliance with instructions. A marked inclination to show compliance can result in problematic consequences because the narrow adherence to rules reduces adaptive variability in their behavior. People may begin to follow rules that phenomenologically are "irrational beliefs" (e.g., "to be a worthwhile human being, one *must* be loved and approved of by everyone" or "one *shouldn't* make mistakes"). If compliance has been achieved through a history of aversive means, people may follow rules simply "to avoid the catastrophe that might attend rule breaking" (Zettle & Hayes, 1982, p. 95), despite the personal unhappiness that may ensue in the long run from always doing as told. In extreme cases, compliance with rules can result in behavior patterns that traditionally have been referred to as personality disorders. To illustrate, people whose compliance has consistently been coerced may have difficulty distinguishing between speaker-issued tacts and mands. They may therefore either follow tacts as if they were mands, which would create "passive-dependent" behavior, or they may attempt to undermine them (i.e., show "counterpliance"), which would lead to "passive-aggressive" conduct (Zettle & Hayes, 1982).

Conceptualizing rigid behavior as generalized pliance suggests ways to modify "blind" adherence to rules. The general strategy might involve arranging conditions in which individuals, rather than being coerced into compliance with rules, are taught to follow rules when the contingencies specified in the rules function as reinforcers. Given the finding that individuals who are likely to show insensitivity to changing contingencies in the laboratory can be identified with a paper-and-pencil test, future research might begin with a similar selection strategy and, as a first step, attempt to modify these individuals' task approach in the human operant laboratory. The purpose of these laboratory studies would be to develop and test principles and procedures about how best to manipulate rigid behavior and how to help individuals to become more creative and flexible. Previous research has already shown some ways to reduce instruction-produced insensitivity (e.g., Joyce & Chase, 1990; LeFrancois et al., 1988; Torgrud & Holborn, 1990). Similar methods can be tested with rigid individuals, if we conceptualize rigidity mainly as an instance of excessive rule following. Many other manipulations are possible and should be examined systematically. For example, one might decrease rigidity by requiring subjects to generate and follow a variety of testable rules. (Clinically, this is not unlike Beck's, 1976, hypothesis-testing strategy that helps depressed individuals to abandon irrational beliefs through contacting contingencies that support alternative behaviors.) For individuals who have difficulty with rule generation, prompting and shaping of verbal rules might be useful. Further, one might expose subjects to complex schedules of reinforcement or other problems (e.g., puzzles, Porteus mazes, water-jar problems), shape appropriate solutions, and have subjects extract verbal rules that in other situations can then serve as self-prompts or self-rules. The overriding idea behind all these interventions would be to build strong histories of variable responding and multiple extraction of rules, and to examine whether a carryover occurs to novel problem-solving situations. If it does, then successful strategies can be translated into interventions in real-world settings.

To examine whether rigidity, in fact, involves a tendency to show pliance, laboratory and analogue studies could be conducted to investigate whether rigid and nonrigid individuals differ in their responsiveness to social consequences. For example, rigid and nonrigid subjects could be exposed to multiple situations with competing scheduled and social contingencies (e.g., points worth money vs. disapproval for earning points; aversive noise vs. praise for tolerating it). Behavior resulting from these contingencies could be compared to conditions in which only scheduled consequences or only social consequences are provided. A different way of examining "rule following for the sake of compliance" versus "rule following because the contingencies specified in the rule function as reinforcers" is to manipulate the public/private dimension of behavior. This involves observing performance when subjects know that social monitoring is possible and comparing it to performance when subjects believe that their behavior cannot be monitored by anyone, not even the experimenter (for examples of public/private manipulations in human operant studies, see Hayes, Munt, et al., 1986, and Hayes, Rosenfarb, Wulfert, Korn, & Zettle, 1985; and in experimental research with clinical populations, see Markham, Dougher, & Wulfert, 1993, and Rosenfarb & Hayes, 1984). Finally, one might recruit nonrigid subjects, establish a history of forced compliance across many experimental situations and problems, and examine whether this history results in less flexible and less creative approaches to novel problems.

In sum, these examples illustrate the type of questions that can be examined under well-controlled conditions in the human operant laboratory. If through laboratory analogues behavior analysts have successfully identified intervention principles and procedures, the next step would be to adapt them to interventions for problems that occur in the natural environment. Their effectiveness could initially be tested with nonclinical populations, such as college students who show maladaptive rigid behaviors in a circumscribed area (e.g., deficient cognitive problem-solving skills or social skills). Finally, based on the experiences gained with analogue populations, interventions could then be designed and tested with clinical populations (e.g., disorders of pathological rule following, such as obsessive-compulsive disorders or obsessive-compulsive and dependent personality disorders).

The studies presented here also suggest that researchers should focus on individuals who fall at the opposite extreme of the flexibility–rigidity dimension. Individuals who are "overly flexible" may be not only spontaneous but also possibly impulsive and careless, and perhaps may show too little concern for social norms and rules. For these individuals, increasing adherence to rules could be achieved, for example, by increasing social monitoring, increasing social contingencies for rule following, increasing the accuracy of rules, decreasing the predictability of the environment other than through rules, and by punishing spontaneous behavior. Although a more detailed discussion of this possibility is beyond the scope of this paper, it would certainly be worthwhile for future studies to investigate the implications of being "not rigid enough."

In summary, the research presented here suggests one initial strategy for a behavioral analysis of individual differences. Although behavior analysts traditionally have eliminated individual differences through experimental control procedures, given their orderly characteristics it seems to be more appropriate to study them directly (Harzem, 1984). The human operant laboratory seems to be a suitable place to start, although, like the nonhuman animal operant laboratory, it has often been criticized for its simplicity and apparent lack of ecological validity. Humans pushing buttons for points do not appear to be doing the same kinds of things as humans worrying about being disapproved of by others or who have a hard time "making up their minds." Yet, the present studies provide some evidence that the contingencies controlling such behaviors—or at least the self-report of them—may, in fact, overlap. The human laboratory does not examine behavior in isolation, and people who come to the laboratory are not cut off from their broader histories. Therefore, performances observed in the human operant laboratory may well be relevant to important response patterns that differentiate individuals.

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