

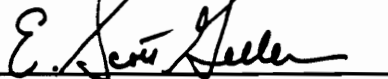
**Managing Injury Control in Driving Related Occupations:
Effects of Goal Setting, Response Generalization, and Individual Differences.**

**Dissertation submitted to the faculty of Virginia Tech
in partial fulfillment of the degree
Doctor of Philosophy**

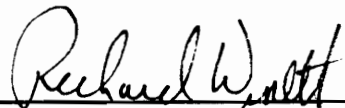
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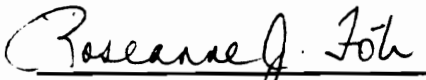
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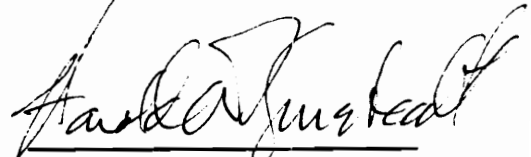
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ABSTRACT

The Safety Triad proposed by Geller (1992) suggests that interventions to increase safety in the community and workplace needs to consider three causal aspects of behavior change. 1) The Person factor considers the past history of an individual as well as specific personality characteristics which may influence responsiveness to an intervention. 2) The Environmental factor considers the manipulation of the environmental antecedents and consequences of the target behavior. It also includes identifying natural contingencies which may support the behavior after the intervention is withdrawn. 3) The Behavior factor considers the response class in which the target behavior is shaped, and the interrelationships between the target behavior and other behaviors.

The present research focuses on increasing driving safety among pizza deliverers. The immediate effects of most injury control programs are usually quite effective in altering employee behavior in the desired direction. In the past, management relied on strong external consequences such as pay or deadlines to influence behavior. However, when behavior is controlled by these salient external consequences, the behavior tends to persist only as long as the external events are present. On the other hand, when the event offers an opportunity for choice it is possible that individuals develop rules which may allow the behavior to persist after the withdraw of the event. However, in a recent book reviewing nearly 500 studies on goal setting, Locke and Latham (1990) made a strong argument that the distinction between assigned and participative set goals is nonsignificant, hence the method in which goals are set are of no consequence to later performance. The present study contrasted assigned vs participative set goals by observing immediate effects (i.e., when the goal and corresponding feedback is in place) as well as long-

term maintenance effects by continuing to monitor behavior after the goal is withdrawn.

A multiple baseline design across settings and behaviors was used to evaluate the immediate and long term impact of managerial feedback on specific driving behaviors over a two year period. Drivers at three pizza delivery locations were unobtrusively observed while making their deliveries. Behavioral records of safety belt use, turn signal use, and intersection stopping were compiled for each deliverer per their license plate numbers. After a period of baseline observations, an intervention to increase complete intersection stopping was initiated at two stores, staggered by one week. Employees at one store participated in a goal setting process whereas employees at the other store were given a mandated goal; the third store served as a nontreatment control throughout the study. Feedback was posted on the group's percentage of complete intersection stopping over the next four months. Follow-up observations followed for six months. A second set of interventions was initiated between the experimental locations. These interventions were identical to the previous year's interventions except the goal setting process was switched between stores, to counterbalance the quasi-experimental settings.

The results showed that the subjects receiving the mandated goal increased their occurrences of complete intersection stops significantly more than the subjects who participated in goal setting. This was found during the intervention and withdraw phases. However, the drivers who participated in goal setting showed beneficial response generalization as a result of the intervention. More specifically, the participative goal group showed increases in turn signal and safety belt use concurrent to the intervention targeting intersection stopping. The drivers who received the mandated goal, in

contrast, showed decreased occurrences of turn signal and safety belt use concurrent to the intervention. Such results suggest that future research take into account the potential of response generalization.

Acknowledgments

An advisor of a doctoral student is, in the truest sense of the word, a teacher. He (she) must function as a scholar, employer, motivator, lawyer, editor, coach, tennis opponent, and friend. Dr. E. Scott Geller was all of these and I would foremost like to acknowledge the time and effort he generously gave to develop this doctoral student. I will carry his lessons throughout my career.

I would like to acknowledge the faculty of the psychology department at Virginia Tech for their contributions to my development. This is especially true of my dissertation committee, Dr. Rosanne Foti, Dr. Richard Winett, Dr. Danny Axsom, Dr. Jack Finney (from my preliminary exam committee) and Dr. Harold Kurstedt who lent their time and wisdom for this project's betterment. I would like to thank Dr. Joseph Sgro, department head, who provided my passage through the program and provided the golf course the day before my wedding. Finally, I would like to acknowledge the faculty of the Applied Experimental Program for their guidance.

There were over 50 undergraduates whom I have had the opportunity to work closely with in the Center for Applied Behavior Systems (CABS) over the course of this project. While I do not have the space to thank each individually here, their names will live on in the hundreds of data sheets which were the lifeblood of this project. I have also had the enormous pleasure to be associated with a fine set of colleagues and friends within the ranks of graduate students. Each contributed to my well-being as well as my intellectual stimulation. My heartfelt thanks to Kent Glindemann, Steve Roberts, Mike Gilmore, Bob Evans, Tom Trail, Tom Berry, Steve Clarke, Tamara and Dave Neubauer Lombard, Bonnie Cleveland, Dean Stamoulis, Chris Borden, Steve Walker, etc...etc...

I would like to thank those responsible for the Cunningham Dissertation Fellowship, its review committee and sponsors. I owe a lot to Tim and Caroline Bell who opened their pizza delivery establishments to me. They are indeed good businesspersons and are concerned about Blacksburg's safety. I would like to thank Dr. Scott Sink and the Virginia Productivity Center for providing gainful and stimulating employment upon my completion.

I dedicate my dissertation to my father, Dr. David Ludwig, whose life and own career inspire me to follow and to my mother, Kathy, whose love and exuberance inspire me to lead others. I hope my younger brothers may finally understand why I stayed in school long after they had graduated college. As the reader can see I have a lot to be thankful for, the greatest of which I found at Virginia Tech. All the things that I have gathered in my life, knowledge or degree, scarcely add up to the partner I have found in my wife Denise.

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INTRODUCTION

Injury Control in Driving Related Occupations

Research in organizational behavioral management has focused on the ability of various intervention strategies to improve employee production and satisfaction. The central concern of the manager faced with improving the work group's production is often one of employee motivation. Therefore many managerial approaches in the literature draw from research in motivation to increase the desired performance of a group of employees. In many occupations, injury control is essential in maintaining performance levels of employees. When an employee is absent or handicapped due to an injury sustained either on or off the job, the ability for that employee to contribute is severely hampered. Injury in the workplace not only decreases production of those effected by accidental damages, it also costs the organization a great amount of capital in compensation, insurance, and personnel training.

The development of practical safety programs for the workplace is an especially timely applied research concern, particularly due to the proposed mandate by the federal Occupational Safety and Health Administration (OSHA) that organizations insure the safety belt use of its employees while driving a motor vehicle on the job (OSHA, 1989). A particularly dangerous driving-related occupation has been the pizza delivery business. Pizza deliverers have a driving accident rate three times the national average (Inside Edition, 1989), resulting in costs amounting to millions of dollars to the corporations involved in pizza delivery due to skyrocketing insurance costs and civil lawsuits.

The Safety Triad proposed by Geller (1992) suggests interventions to increase safety in the community and workplace need to consider three causal factors of behavior change. The safety triad specifies a socially valid, effective intervention must be developed by considering the behavioral system of which the intervention is targeting for change, the environment of which the intervention will manipulate, and the individual characteristics of the person(s) to whom the intervention is aimed. These three levels of analysis, presented in Figure 1, are labeled Environment, Behavior, and Person. The Environmental factor considers the manipulation of the antecedents and contingencies within the target setting. It also includes identifying natural contingencies which may support the behavior after the intervention. The Behavior factor considers the response class in which the target behavior is shaped, and interrelationships between the target behavior and other behaviors. Finally, the Person factor considers past history of an individual as well as specific personality characteristics which may influence responsiveness to the intervention.

Insert Figure 1 about here

The current study investigated the role of environment, behavior, and person on the effectiveness of an intervention aimed at increasing driver safety among pizza deliverers. The role of the environment was examined in the context of goal setting techniques. An intervention is essentially a manipulation of environmental cues and contingencies; goal setting is, then, an environmental manipulation. Specifically, in this study, Participative goal

setting was contrasted with assigned goal setting to test the differential effectiveness of each during both the short and long term. Secondly, the role of behavior was examined by looking at the response class in which the behavior is a part (Johnston & Pennypacker, 1982). The generalization of the effect of the intervention across behaviors is of particular interest. Finally, the role of person factors was examined by assessing individual perceptions of control (i.e., locus of control) and need for autonomy (i.e., reactance).

The nature of the safety triad implies there are significant interactions between behavior, environment, and individual. Therefore, certain hypotheses were made in this study concerning each factor in the safety triad as well as the interaction of behavior and environment, environment and person factors, and person factors and behavior. Finally, a three-way interaction was also hypothesized between environment, behavior, and person during the intervention. These hypotheses were tested in a real world setting by observing relevant behaviors concurrent to manipulating the environment in a time series design and measuring certain person variables of the deliverers who were observed and intervened upon.

The bases of specific hypotheses concerning the safety triad will be reviewed in the following sections of this manuscript. A discussion of goal setting methods will be considered first to specifically represent the environmental factor. Specific and relevant theory on the Behavior Factor within the driving safety literature will follow. Finally, certain personality variables which are relevant to this study will be reviewed to include the person factor. Specific hypotheses will then be offered based on the literature

and interactions between environment, behavior, and person will be proposed.

ENVIRONMENT

Goal Setting and Feedback

One particularly successful behavior change technique for safety is goal setting and feedback (Locke & Latham, 1990). In 1978, Komaki, Barwick, and Scott introduced an intervention which paired both posted behavioral feedback and goal setting to improve safety behaviors among workers in a bakery. This intervention consisted of a 30-minute demonstration of safe behaviors using projected slides. A graph was shown of the employees baseline behaviors (an aggregate of 35 items) and the experimenter suggested a goal of 90% of behavioral incidents performed safely. Two departments were given this intervention in a multiple baseline design with a reversal. In both cases, safe behavioral incidents increased during the intervention (i.e., 26 percentage points and 21 percentage points over baselines of 70% and 78%, respectively). However, when the posted feedback was removed (after 11 weeks and 3 weeks, respectively), levels of safe behavioral incidents returned to baseline levels.

Locke and Latham (1990) reviewed 33 studies to compare effects of goal setting paired with feedback against effects of feedback alone and goal setting alone. They concluded goals with feedback were more effective than goals alone (i.e., found in 17 of 18 studies) and were more effective than feedback alone (i.e., found in 21 of 22 studies). Locke and Latham's (1990) conclusions reflect those of Erez (1977) who demonstrated empirically that feedback is a

necessary moderator for goal setting. This conclusion seems robust based on Locke and Latham's review of empirical studies.

Locke and Latham also concluded that goals moderate the effects of feedback. This is consistent with another review of the literature completed by Balcazar, Hopkins, and Suarez (1986). They determined that studies which used feedback paired with goals to increase desirable behavior had greater effects than studies using feedback alone. Fellner and Sulzer-Azaroff (1985) tested the potential benefits of adding goal setting to posted feedback. During the baseline session, feedback was posted on the frequency of hazardous *factory conditions* (e.g., obstructions, hoses out of place) and *safety practices* of workers (e.g., using guards and ear protection) in a paper mill. During a first intervention meeting the foreperson assigned a goal to his/her workers for factory conditions. Feedback continued to be posted over subsequent weeks. Then, during a second intervention, meeting workers participated in setting their own goal for worker practices. Again feedback continued to be posted over subsequent weeks. A second department received the same two goal setting interventions but counterbalanced the target goal (i.e., factory conditions and worker practices) across interventions.

Fellner and Sulzer-Azaroff (1985) found goal setting improved overall safety when goals were assigned by foremen but not when goals were arrived at participatively by the workers. In other words, the facilitating effect of goals on feedback was only demonstrated in the assigned goal condition. A direct comparison between assigned and participatively-set goals, however, was confounded by the fact that assigned goals always preceded the worker-set goals (i.e., the foreman set the goal during the first intervention in both

experimental groups). Also, posted feedback was probably already used in the mill when Fellner & Sulzer-Azaroff began their study. Therefore, it was impossible to establish a true baseline phase in which no feedback or goal setting was in effect making comparisons more difficult.

Locke and Latham (1980) suggested that when feedback was introduced in the absence of overt goal setting such as in the baseline phase of the Fellner and Sulzer-Azaroff (1985) study (cf. Komaki, Collins & Penn, 1982; Komaki, Heinzmann, & Lawson, 1980; Pritchard, et al. 1988; Sarri, 1987), "implicit" personal goal setting nevertheless takes place spontaneously (cf. Pritchard, et al. 1988). This suggests that the paper mill workers set an implicit goal during the feedback-only baseline. These implicit goals may have been combined with the foreman's assigned goal during the first intervention (Locke & Latham, 1980). Therefore when the workers got to participate in the setting of the group goal (effectively voicing their implicit goal) during the second intervention they returned to their baseline level where they were acting on their implicit goals anyway.

Empirical studies such as those by Komaki et al. (1978) and Fellner and Sulzer-Azaroff (1985) have demonstrated the usefulness of goal setting paired with feedback for improving occupational safety. The present study paired goal setting and feedback techniques, not investigating them individually, to increase driving safety in a delivery-oriented business setting. Because of limitations in their study (i.e., no true baseline and confounding order effects in goal setting technique), Fellner and Sulzer-Azaroff could not study differences between participative and assigned set goals. Therefore, the

present study provided a direct comparison between assigned and participative-set goals.

Participative versus Assigned Set Goals

From their review of nearly 500 studies on goal setting, Locke and Latham (1990) made a strong argument for the specificity and difficulty of a goal being the key determinants of performance. Their theory of goal setting postulates a linear relationship between the extent of goal difficulty and performance improvement. This relationship has been confirmed by a number of separate meta-analyses reporting effect sizes (d) varying between .55 and .82 (Mento, Steel, & Karren, 1987; Tubbs, 1986; Wood, Mento, & Locke, 1987). These same analyses also demonstrated the primacy of specific difficult goals over other variations of goal setting (i.e., "do best" or no goal).

Two of these meta-analyses (Mento, Steel, & Karren, 1987; Tubbs, 1986) did not find convincing evidence that goals set participatively by subjects effect performance any better than goals which are assigned. Actually, this seems contrary to conventional thinking in psychology. Deci and Ryan (1985a, 1987), like deCharms (1968) and White (1959) before, spent numerous years studying the effects of self-determination and autonomy on intrinsic motivation and accompanying behavior. Brehm (1966; Brehm & Brehm, 1981) reported undesirable reactions to individual reductions of personal freedom to choose. Many organizational researchers who have been influential in developing modern management styles and job design (e.g., Herzberg, 1966; Hackman & Oldham, 1980; Likert, 1967) have advocated systems which employees are allowed greater voice in decision making and more freedom in one's job. In the organizational management literature

Sashkin (1984, 1986) called participation by employees an "ethical imperative" and the total quality movement in U.S. industry focuses on more employee involvement in all aspects of production (Deming, 1981).

However, Locke and Latham (1990) have concluded, based on these meta-analyses, and the empirical work and literature reviews of Latham (cf. Latham & Lee, 1986), that the distinction between assigned and participatively-set goals is non significant. Hence these researchers presume the method in which goals are set is of no consequence to subsequent performance. Early studies by Latham and others (Latham & Yukl, 1975; Latham, Mitchell, & Dossett, 1978) found participating subjects tended to set more difficult goals than those assigned in comparison groups. Differences in performance between participative and assigned goals found in earlier studies (cf. Latham & Yukl, 1975) were dismissed by Latham (Latham & Lee, 1986; Locke & Latham, 1990) because goal difficulty leads to higher performance by itself and thereby led to higher performance levels in the participative goals condition. When goal difficulty was held constant, participative goal setting did not lead to higher performance than assigned goals (Dossett, Latham, & Mitchell, 1979; Latham & Saari, 1979a; Latham, Steele, & Saari, 1982). In fact when assigned goals were made more difficult than participative goals, performance was higher in the assigned goal conditions (Latham, Steele, & Saari, 1982). Other confounds in early studies, such as participative groups asking more questions than the assigned goals group have been identified as increasing the performance of participative goals groups (Latham & Saari, 1979b).

Other more recent studies (Chang & Lorenzi, 1983; Kernan & Lord, 1988; Vanderslice, Rice, & Julian, 1987; Wexley & Baldwin, 1986) which compared the effects of participative and assigned goals and controlled for differences in goal difficulty reached a conclusion similar to that of Latham and Lee (1986) and Locke and Latham (1990). However, in a study with computer programmers, Campbell and Gingrich (1986) found participative goal setting led to higher performance than assigned goals in complex programming tasks. When the program tasks were simple, however, there were no differences. Campbell and Gingrich suggested participation gave the programmers opportunities to develop better task strategies because of the interaction with other programmers. In a subsequent study by Latham & Winters (1989), participation in goal setting was manipulated separately from participation in strategy development. Subjects who participated in strategy development had the highest performance regardless of how goals were set. Summarizing these results, Locke and Latham (1990) concluded that, after holding goal difficulty, information (i.e., question asking), and strategy development constant, there are no appreciable differences in performance between assigned and participatory-set goals.

A notable exception to Locke and Latham's conclusion was the work of Erez and her fellow researchers (Erez et al., 1985; Erez & Arad, 1986). Erez and her colleagues (Erez, 1986; Erez, Early, & Hulin, 1985; Erez & Kanfer, 1983) showed an externally imposed goal (i.e., assigned goal) is less likely to be accepted (e.g., self-reported commitment) than a goal set after group consensus (i.e., participatively-set goal). Similar conclusions were shown in other studies (Latham & Winters, 1989; Leifer & McGannon, 1986) where self-

reported goal commitment was higher after participatory set goals than assigned goals. Other studies by Latham and colleagues have shown no such differences in goal commitment (Dossett, Latham, & Mitchell, 1979; Latham & Marshall, 1982; Latham, Mitchell, & Dossett, 1978; Latham & Saari, 1979a,b).

In addition, Erez (Erez, 1986; Erez & Arad, 1986; Erez, Early, & Hulin, 1985; Erez & Kanfer, 1983) demonstrated that self-reported goal commitment leads to significantly greater performance. Therefore, in her studies, participatory-set goals produced higher performance than assigned goals. Procedural differences, notably in the instructions used in the assigned goal condition, can account for some of the differing outcomes between the Latham and Erez studies (Latham, Erez, & Locke, 1988). The studies conducted by Latham issued instructions and assigned goals in a manner in which the experimenter would be seen as "supportive." In contrast, Erez's instructions to the assigned goal group were more abrupt. Erez's instructions to the participative goal group were probably more supportive than in Latham's studies in that the self report levels of commitment were higher in the participative goal setting condition used by Erez.

It is also noteworthy that Erez (1986) combined participative goal setting with group discussion and consensus building among five or more subjects in her experimental condition, whereas Latham attained participative goal setting by secret ballot limiting interactions to two people (e.g., supervisor/employee or experimenter/subject. In the Erez and Arad (1986) study, effects of group discussion and participative goal setting were assessed independently. The participative goal setting with no group discussion took place using the Latham method of secret ballots. Both

participative goal setting and group discussion showed significantly higher commitment ratings and performance than did assigned goal setting and no discussion groups. However, the greatest effects were observed when participative goal setting and group discussion were paired together.

In an effort to resolve the discrepancies in their findings, Erez and Latham collaborated on a series of studies controlling for the procedural differences in their previous studies (Latham, Erez, & Locke, 1988). When experimenter support was the same across goal setting groups (i.e., participative & assigned) and goal difficulty was held constant, no differences between groups were obtained. When assigned goals were "sold" (i.e., saying the goal could be reached in a supportive tone), there were no differences in goal setting type. However when subjects were merely "told" their goal, using the abrupt nature of Erez's previous studies, there were significant commitment and performance differences especially in low-ability subjects. The interaction between perceived task importance and goal-setting type did not significantly effect performance although it did effect commitment with the assigned goal condition resulting in significantly lower commitment ratings than the participatory-set goal condition. After four studies, the conclusions reflected Latham's initial claims (Latham & Lee, 1986). When difficulty and experimenter support were held constant no appreciable differences in performance occurred between assigned and participative set goals.

Intrinsic Motivation and goal setting

Locke and Latham (1990) did not address the ability of assigned versus participatively-set goals to maintain performance after the goal has been met

or withdrawn. Managerial control present in assigned goal conditions often regulate the behavior while the goal is in place. Simply stated, when your boss tells you to do something you do it. Thus, it is of little surprise that assigned goals were equally or even more effective than participatively-set goals in producing immediate performance. Indeed, Chang and Lorenzi (1983) found no differences in immediate performance between assigned and participatively set goals. However, they did report higher levels of behavioral maintenance in the participative group than in the assigned group when subjects were working on an interesting task.¹ Also Mossholder (1980) found that subjects who had been assigned goals on interesting tasks had lower levels of behavioral maintenance than subjects in a no-goal condition. Maintaining behavior during a free-choice period subsequent to the experimental manipulation is a widely accepted measure of *intrinsic motivation* (Deci & Ryan, 1985). In these studies, intrinsic motivation was measured by observing the target behavior *after* the goal had been removed.

There is a large amount of research suggesting that external events such as task-contingent rewards (Deci, 1971; Harackiewicz, 1979), deadlines (Amabile et al., 1976), surveillance (Lepper & Greene, 1975), and evaluation (Smith, 1974, as cited in Deci et al., 1989) tend to have an undermining effect on intrinsic motivation (i.e., initial interest the individual had in the activity). Intrinsic motivation has been defined as engaging in the activity for no external rewards except one's own interest in the activity itself (Deci, 1971; Deci & Ryan, 1975). In contrast, external rewards which are contingent on the behavior establishes the activity to be extrinsically motivated. When an individual receives extrinsic consequences for working on a previously

intrinsically motivating activity, many studies have shown that these individuals show less behavior toward the activity than did other individuals who had worked on the activity without receiving a reward (for reviews see Deci & Ryan, 1985, 1987; Deci, Connell, & Ryan, 1989).

Many researchers have attempted to generalize the effects of external rewards or evaluation on intrinsic motivation to goal setting (Chang & Lorenzi, 1983; Mossholder, 1980; Shalley & Oldham, 1985; Shalley, Oldham, & Porac, 1987). The basic hypothesis maintains that assigned goals result in lower intrinsic motivation than participative goal setting. This research hypothesis has been studied with varying success. A study by Shalley and Oldham (1985) showed that assigning a hard goal lowered intrinsic motivation (i.e., duration of activity during a follow-up period). However, assigning easy goals increased intrinsic motivation. Shalley and Oldham did not use a participative goal setting condition so Shalley, Oldham, and Porac (1987) initiated a follow-up study which included both assigned and participatory set goal conditions for a model building task. The results of this study were contrary to the above hypothesis. Those assigned goals displayed significantly higher levels of intrinsic motivation than did subjects who participated in goal setting.

Shalley, Oldham, and Porac (1987) reported that, in a pilot study, subjects indicated the model-building task was "moderately interesting." Since intrinsic motivation hypothetically stems from initial interest in a task, it is expected that the type of task may moderate effects of assigned vs. participatory-set goals on intrinsic motivation. Mossholder (1980) and Chang and Lorenzi (1983) manipulated the type of task (i.e., interesting vs. boring)

and goal setting techniques. In both studies, assigned goals decreased intrinsic motivation on interesting tasks. However, the opposite was true with boring tasks; assigned goals for boring tasks actually increased intrinsic motivation (i.e., time spent on-task during a free-period subsequent to the experimental session).¹

The research combining intrinsic motivation and goal setting is far from conclusive. There are too few studies, and those available reveal conflicting results [e.g., Mossholder (1980) vs. Shalley, Oldham, & Porac (1987)] or marginal results (Chang & Lorenzi, 1983). Goal setting research, in general (cf. Locke & Latham, 1990) has failed to look at the long-term performance impact (i.e., after the goal is withdrawn) of assigned vs. participatory-set goals. Indeed, few studies actually recorded performance through baseline, goal setting, and long-term follow-up phases. Therefore, both sets of literature (i.e., goal setting and intrinsic motivation) provide little information applicable for managing performance in the real world.

Autonomy-Supportive Management

The immediate effects of a management-based injury control program is usually quite effective in altering employee's behaviors in desired directions. In the past, management relied on strong external consequences such as pay or deadlines to influence behavior (e.g., Massie, 1965; Taylor, 1967). However, when behavior is controlled by these salient external consequences, the behavior tends to persist only as long as the external events are present. On the other hand, when the event offers an opportunity for choice the target behavior is more likely to persist after the withdraw of the event (Zuckerman et al., 1978). Herzberg (1966), Likert (1967), and Hackman

and Oldham (1980) advocated management systems which give employees a greater voice in decision making and more latitude on one's job. This type of management has been labeled by Deci and Ryan (1987; Deci, Connell, & Ryan, 1989) as "autonomy-supportive" in contrast with "controlling" styles of management which rely on extrinsic means to motivate behavior.

One type of autonomy-supportive management is allowing employees to participate in decision making (PDM). Cotton, Vollrath, Froggatt, Lengnick-Hall, and Jennings (1988) reviewed PDM's effect on performance and job satisfaction in over 400 articles from Psychological Abstracts and major organizational behavior journals between the years 1967 and 1983. Overall, two-thirds of these field studies found positive effects of PDM on either performance or satisfaction. Specifically, 67% of studies categorized as "participation in work decisions" (i.e., workers have the right to veto or make final decisions on items focusing on work), 80% categorized as "informal participation" (i.e., studies which correlated performance with aspects of supervisor-subordinate relationships), and 100% of three studies on "employee ownership" (i.e., employees had the right to participate as any stockholder would) found participation to have a beneficial effect on performance. Eighty percent of studies categorized as "consultative participation" (i.e., employees gave their opinions but did not have veto power) showed a positive effect on performance; however, these effects were deemed inconclusive by Cotton et al. (1988) because of poor internal validity.

Even though the concept of autonomy-supportive management, participation in decision making, and participative goal setting have much theoretical (Deci et al., 1989), empirical (Cotton et al. 1988) and ideological

(Dachler & Wilpert, 1978; for a contrary view see Nehrbass, 1979) support, this concept has been met with mixed reviews and seemingly inconsistent empirical evidence in some areas in applied psychology. Leana, Locke, and Schweiger (1990) criticize Cotton et al.'s conclusions, contesting their classification system, selection of studies, and alleged errors in reporting results. Leana *et al.* concluded there was little evidence for the effects of PDM. Cotton, Vollrath, Lengnick-Hall, and Froggatt (1990) rebutted this critical review of their earlier work, citing journal space limitations, misunderstandings over long vs. short term, and critical disagreements as the reasons for the contrary conclusion of Leana, Locke and Schweiger.

It is also clear, based on the earlier review in this manuscript and of Locke & Latham (1990), that goal setting has been generally divided in its advocacy of the autonomy supportive ideal (*vis a vie* intrinsic motivation), especially in the workplace. Consider, Locke and Latham's (1990) critique of Deci and Ryan's (1985, 1987) "convoluted and constantly changing analysis (p. 55)" of this concept:

"Intrinsic motivation as Deci defines it (time spent during a free work period) is probably not very significant in the world of work. Work life tends to be governed more strongly by achievement motivation (involving imposed standards) and extrinsic motivation (pay, recognition, promotion) than by intrinsic motivation. This is not to deny that liking the work one does for its own sake is important for personal happiness; it clearly is. But in real work settings such motivation rarely operates in isolation from other types of motivation. When goals and incentives are in force (as opposed to when they are withdrawn), they are highly effective (p. 58).

Rule Governed Behavior

The literal construct of "intrinsic motivation" does not apply to injury control. Safe behaviors are rarely engaged in because of an intrinsic interest

in the activity. These behaviors are rarely interesting and often may delay or negate interesting features of another activity. Instead, it may be more instructive to conceive of safety behaviors as a set "rule" governed behaviors. Like intrinsically motivated behaviors, safety behaviors often occur in the absence of any direct external consequence. If safety behaviors are not interesting or personally reinforcing by themselves they must have some association with an external contingency. Indeed, a driver may come to a complete stop in order to avoid an accident. However, it is highly possible that the driver has never experienced an accident from not stopping at an intersection. Cerutti (1989) noted that "few drivers would survive learning to stop at red traffic lights if the discrimination could only be negatively reinforced by avoiding collisions (p. 262)." Instead, a driver usually develops a rule which specifies the discriminated control of the traffic light over stopping behaviors.

Rules are learned vicariously, through instruction, or through direct contact with a contingency (Cerutti, 1989). Rule governed behaviors, therefore, are not necessarily shaped through direct associations with a consequence (Blakely & Schlinger, 1987; Schlinger & Blakely, 1987). Instead, rules a) specify contingencies (i.e., consequences for not being safe), b) describe correct performance (i.e., behaviors needed to avoid the undesirable contingency), and c) designate environmental stimuli (i.e., traffic light) as discriminative stimuli (i.e., signaling the occasion when a certain response will be followed by a consequence). Therefore, safety behaviors governed by rules often occur in the absence of controlling external consequences. Individuals engage in safe behaviors because of rules learned sometime in

their history and many do not need external interventions to maintain these behaviors. Other individuals have not learned the rules needed to govern safety behaviors or they have adopted a rule causing them to avoid safety behaviors.

Applying Goal Setting to Injury Control

In the context of occupational injury control, an employee usually does not get directly paid for engaging in safe behaviors. Therefore engaging in these behaviors is often done because of self-generated rules (e.g., avoiding pain, being able to support family, actively caring about others well-being). When a supervisor imposes rules or regulations on safety behaviors in the form of mandated goals and consequences, employees engage in safe behaviors to avoid external consequences or gain external incentives. Rules, like goals, may be imposed by an external authority or they may be self-generated. It is hypothesized that there is a distinct difference in the motivating aspects of each type of rule. This is exemplified in the distinction between participative and assigned goals.

Goals are, in effect, rules which state a consequence, describe correct performance, and often provide discriminative stimuli in the form of feedback. Goals may sustain performance for long periods without any contact made with salient consequences. One explanation relates Locke & Latham's assertion (1990) that individuals set "implicit" goals for themselves. These implicit goals are, in effect, rules which may govern individual behavior in the absence of external control; they are not reinforced externally. When individuals get to participate in a goal setting method they effectively voice their implicit goals.

On the other hand, if goals are assigned by persons of authority (i.e., managers/experimenters), the origin of the goal is not from the individual (i.e., implicit). In other words, the rule is imposed externally. It is, in fact, imposed without consideration to individual implicit goals. Therefore, individuals may engage in the target behavior only to satisfy the external consequences of (not) complying with the goal. For example, a manager who tells a delivery employee to "come to a complete stop every time you come to an intersection or you'll get fired" sets up a rule based on the contingency of keeping one's job. This supersedes any implicit rule to come to a complete stop because of the (albeit unlikely) consequence of a collision. According to overjustification theory (Lepper & Greene, 1975) and the cognitive evaluation theory (Deci, 1975), the external reinforcers replace the internal reasons for engaging in a behavior. In this case, external rules replace the implicit rules. Thus, when the external rules are withdrawn, the individual has no further "justification" to engage in the behavior. Therefore, behaviors are externally governed and will show desired changes as long as the assigned goals are in effect. When assigned goals are effectively withdrawn, the external motivation to maintain the targeted behavior(s) is removed. The rules set up by the person of authority (i.e., the goal setting agent) will no longer be valid. In the absence of the externally imposed rule, the target behavior(s) is expected to return to baseline levels.

When employees are allowed to participate in goal setting, the decision to engage in safe behaviors is theoretically theirs. The change in behavior is then internally "justified" and achieving the goal may be reinforcing in its own right. This is distinct of the external consequences which may

accompany the overt goal setting intervention. Instead of being replaced or undermined, rules may be enhanced in participative goal setting. Individuals may incorporate additional rules to their motivation to engage in safe behaviors. When the formal goal contingencies are withdrawn (along with accompanying feedback), implicit goals formed during participative goal setting, remain. Therefore, participative goal setting may foster maintenance of performance in the absence of the overt goal. Therefore, when the external intervention is withdrawn the behavior may be maintained due to the intrinsic decision made by the employee.

Evaluating the Effectiveness of Participative vs. Assigned Goal Setting

The present study tested empirically the applied effectiveness of participative goal setting against assigned goal setting in a real world work setting. Applied effectiveness was evaluated on three fronts: 1) What immediate changes in targeted behaviors result in the presence of goal setting and feedback? 2) What is the long term maintenance of desirable behaviors after goals and feedback are removed? And 3) does the intervention also effect other related behaviors not directly targeted by the goal setting.

Immediate behavior change in response to the intervention. Both the motivating factors of an external event can be identified in the components of an injury control intervention (Geller et al. 1990; Geller & Ludwig, 1991). It is hypothesized that these factors determine the effectiveness of an intervention to induce a desired behavior change in a given population. For example, if an intervention provides certain response contingencies (i.e., reinforcement, punishment, evaluation, or deadlines), it is said to contain a degree of extrinsic control (i.e., a "controlling" context). However, factors such as

individual or group involvement (i.e., the amount of individual or group participation in the intervention) can also promote behavior change through the development of self-generated rules. In addition to these motivational factors, the amount of response information (i.e., the identification of correct performance and discriminate stimuli) offered in the intervention is also relevant in determining intervention effectiveness (Geller et al., 1991; Latham & Saari, 1979b).

Assigned and participative set goals can provide the same amount response *information* (i.e., rules) and *extrinsic control* (i.e., incentives/disincentives) during an intervention. It is expected that both assigned and participatory goals will have the same effect in changing the target behavior during the intervention. However, in the design used during the goal-setting studies reported by Erez and others (Erez, 1986; Erez, Early, & Hulin, 1985; Erez & Kanfer, 1983), the assigned goals condition differed greatly from participative goals condition in that the administration of assigned goals did not promote *involvement* in the intervention. Instead, only the participative goal setting group was involved in a discussion before the goal setting. The other group had no such discussion but received the same response information and external control as the other group. Therefore, it is hypothesized that participative goal setting will show a greater immediate effect during the intervention than the assigned goal.

Long term maintenance of behavior change. Because of its reliance on extrinsic control, the assigned group goal is hypothesized to return to baseline levels after the removal of the intervention. In contrast, the participatively-

set goal group is expected to show a longer maintenance period after the removal of the intervention.

The generalization of effect across non-targeted behaviors. A discussion of the third measure of effectiveness in this study goes beyond the environmental context of the intervention. Geller (1992) proposed that the Environment, Behavior, and the Person (i.e., the Safety Triad) be considered when evaluating the effectiveness of an intervention. The consideration of the Behavior factor of the Safety Triad (Geller, 1992) is especially relevant to this point. Therefore, a third measure of effectiveness (i.e., the generalization of effect across non-targeted behaviors) will serve as a transition point for the discussion of the Behavior factor within the context of this study.

BEHAVIOR

Response Classes

The third measure of effectiveness examined in this study was the comparative ability of assigned vs. participative set goals to show a generalized effect throughout related work activities not directly targeted by the goal setting. Recalling the earlier discussion of the studies by Komaki, Barwick, and Scott (1978) and Fellner and Sulzer-Azaroff (1985), the goal setting interventions were aimed at a assemblage of safety behaviors in a factory and a mill. The aim of these researchers was to target all the identified safety behaviors in the workplace. However, the feedback given to employees and the results reported in their studies depicted a combined score for groups of behaviors. Fellner and Sulzer-Azaroff, for example, aggregated behaviors into "*practices*" and "*conditions*" groups to distinguish two response classes which were directly targeted in the intervention.

Response classes have been conceived as functional correspondence between behaviors (Ludwig, 1992). In the Fellner and Sulzer-Azaroff (1985) study, behaviors such as putting on "ear protection," "turning equipment off when not in use," and "using guards when operating machinery" all were grouped under the title of "safety practices". These behaviors were functionally similar to one another because they produced the same outcome (i.e., contributed to the posted feedback). Therefore, they are classified as being in the same response class. It has been suggested by Ludwig (1992) that reinforcing an outcome (e.g., rewarding employee engagement in safety "practices") will also reinforce all the members of that particular response class. It follows that all the behaviors specified by Fellner and Sulzer-Azaroff under "safety practices" would be reinforced.

Unfortunately, neither Fellner and Sulzer-Azaroff (1985) nor Komaki, Barwick, and Scott (1978) reported the changes in individual behavior. They only reported the overall outcome results which was comprised of a combination of all behaviors. Therefore, it is impossible to estimate the spread of effect between all the behaviors within the stated response classes of "practices" and "conditions" nor could a comparative evaluation of assigned vs. participatory set goals be made at this level of analysis.

Response Generalization

Although the interventions by Fellner and Sulzer-Azaroff (1985; cf. Komaki, Barwick, and Scott, 1978) targeted all behaviors within the response classes they specified (i.e., "practices" and "conditions"), a change in nontargeted behaviors during the course of an intervention may have occurred. With their within-subject design Fellner and Sulzer-Azaroff were

able to observe certain (non-targeted) behaviors during interventions targeting other behaviors. Both "practices" and "conditions" were observed concurrently. Therefore when "practices" were targeted by assigned goals, concurrent observations of "conditions" continued even though they were not yet targeted with goal setting. These concurrent observations of targeted and non-targeted behaviors could indicate a generalization of effect between response classes. It is possible that Fellner and Sulzer-Azaroff's intervention to increase "practices" also increased certain behaviors within the "conditions" response class, even though "conditions" were not yet targeted. Unfortunately, without a true baseline this type of observation was confounded.

Nevertheless, generalization across response classes is a very important research consideration when measuring the effectiveness of an intervention, specifically, when comparing the effects of assigned vs. participatory set goals. If the frequency of a nontargeted behavior is observed to increase during an intervention targeting a separate response class, *response generalization* has taken place (Ludwig, 1992). A generalization across behaviors of separate response classes can be caused by two sources: 1) It could be the result of a failure to apply tight controls over the experimental stimuli and responses. Certainly this is always a threat in field studies, however it is important to note the beneficial side effects of an intervention (i.e., generalization to other safety behaviors). 2) An increase in a target behavior is correlated with an increase in a non-target behavior. In other words, the effect of the interventions spread across behaviors causing them to covary.

Response generalization may be a special benefit of programs that motivate behavior change with minimal assigned extrinsic controls. Ludwig and Geller (1991) observed that safety belt use and turn signal use were significantly correlated during their baseline observations of pizza deliverers. An intervention was then executed using a Discussion/Consensus meeting targeting only the safety belt use among the employees. In response to the intervention safety belt use rose significantly. In addition, the use of turn signals also increased 25% above baseline at both experimental sites during the intervention phase. In a second intervention, pizza deliverers promoted safety belt use in the surrounding community through a variety of promotional techniques. During the safety belt promotion, safety belt use rose as expected, however turn signal use also increased 20 percentage points above baseline (Ludwig, Geller, & Roberts, 1990; see also Geller & Ludwig, 1991).

A similar result was found by Streff and Geller (1987) after implementing a similar Discussion/Consensus intervention with a pledge card commitment component. Their successful intervention program targeted only the use of personal protective equipment (i.e., gloves, safety glasses, and ear plugs) on the job, but employees increased their use of vehicle safety belts when leaving the plant parking lots by 174% over Baseline (from 12.8% during Baseline to 35.1% after the occupational safety intervention).

Whereas the intervention programs proposed in the present study were designed to target only one behavior at a time (i.e., safe intersection stopping), field observations were taken concurrently of three driving behaviors (i.e., safety belt use, turn signal use, and intersection stops). No

systematic change in a nontargeted behavior (i.e., safety belts or turn signal use) following an increase in the targeted behavior (complete intersection stops) would traditionally lend support to the functional control of the intervention (Kazdin, 1973). However, if response generalization occurs, an increase in use of turn signals or safety belts should accompany an increase in complete intersection stops, since all of these behaviors belong to the same class of safe-driving responses (Ludwig, 1992). The claims of these competing theories will be evaluated empirically in this study by the longitudinal concurrent measures of all three behavioral variables.

Most individuals already have developed an implicit set of rules for (un)safe behaviors. Therefore, it was expected that individual safe driving behaviors would be correlated. Indeed, if an individual, as a rule, attempts to avoid injury by using vehicle safety belts, he/she is also likely to attempt to avoid injury by using the turn signal or coming to a complete stop. It is reasonable to presuppose that almost all individuals have associated these behaviors under a rubric of "safe driving" at sometime in their past. For instance, all teenagers, learning to drive, must take a driver training course in which these behaviors are more or less emphasized. Therefore, if the individual seeks to actively "avoid injury" or "drive safe" it is expected that all behaviors previously associated in these response classes will correlate (Ludwig, 1992). On the other hand, if an individual does not perceive it necessary to use the safety belt or turn signal, it is unlikely he/she will feel it necessary to drive safely in other areas (e.g., stopping).

It is suggested that participating in goal setting allows an individual to set implicit goals which are, in return, self-reinforced. If there is a strong

previous association between behaviors functionally related to the behavior targeted by the goal (i.e., complete intersection stops), the effect of the intervention may generalize to these other behaviors. For example, if the participative goal is directed towards complete intersection stopping, the individual may also associate other behaviors in the response class (e.g., safety belt and turn signal use) with their implicit goal. Then, events which reinforce complete stopping will concomitantly reinforce safety belt use and turn signal use.

Behavior resulting from assigned goals, on the other hand, are reinforced by external consequences such as managerial surveillance or (dis)incentives. If the goal is specific (as suggested by Locke & Latham, 1990) the target behavior is differentiated (Catania, 1979) as instrumental in satisfying the external consequences. In other words, no other behavior other than the target behavior will be reinforced by the external consequences. It is unlikely under these circumstances that response generalization will occur with assigned goals because nontargeted behaviors within an implicit "safe driving/avoid injury" are not functionally related to the external reinforcers and engaging in these nontargeted behaviors would serve no purpose. Therefore, it is hypothesized that response generalization will occur during the participative set goal (i.e., autonomy-supportive) intervention, but not during the assigned set goal (i.e., controlling) intervention.

Psychological Reactance

The theory of psychological reactance expanded over the past 25 years by Brehm and Brehm (Brehm, 1966; Brehm & Brehm, 1981) may have special relevance in the comparison of assigned versus participatory set goals. When

individuals perceive that their freedom of choice over their own actions is threatened they may feel reactance. Reactance has been shown to result in negative attitude change where an individual contests a view being advocated (e.g., safe driving) even if it is one he/she might normally endorse (e.g., Rhodewalt & Davidson, 1983; Worchel & Brehm, 1971). The situations which cause reactance in individuals may also motivate them to resist the external pressure. Resistance is manifested by performing the actions or behaviors which are threatened. For example, some individuals may use their safety belts less often because their state government has mandated their use with various Buckle Up Laws.

Geller, Casali, and Johnson (1980) investigated the relationship between the intrusiveness of safety belt inducement devices (i.e., light, buzzer, and/or ignition interlock) and actual safety belt use, and found a direct relationship between intrusiveness of safety belt inducement systems (e.g., longer warning buzzers) and the probability the system had been defeated by either locking the belt behind the front-seat occupant or disconnecting the system. Overall, 42% had defeated their safety belt inducement systems. Also, Bensley and Wu (1991) reported high-threat alcohol prevention messages actually resulted in male heavy drinkers consuming more beer in a taste test than similar subjects who received low-threat messages. This resistance to external control was actually discussed by B.F. Skinner (1953; Miller, 1991) before the construct of psychological reactance was formed into theory.

Psychological reactance is an undesirable problematic possibility for many interventions at work-sites. Specifically, injury control interventions

on the job often require employees to make pronounced changes in the way they work and often subject them to compulsory training and continuous monitoring. Hung (1987) suggests intervention programs often take away reinforcing activities in the normal life of the subject. In response to the overt control of the researcher, the employee may be expected to attempt countercontrol measures (Miller, 1991; Skinner, 1953) in an attempt to regain freedom over their actions (Brehm & Brehm, 1981). Some employees may not maintain desired changes after the intervention program is removed (cf. Deci & Ryan, 1987; Lepper & Greene, 1975). Other individuals may actually attempt to suppress the target response during the intervention itself (Geller, Casali, & Johnson, 1980). Finally, in response to overt control, some individuals may in fact engage in undesirable behaviors, concomitant with the intervention, in an effort to avoid the aversive nature of the external control (Balsom & Bondy, 1983). However, it is expected that reactive behaviors do not always manifest themselves in the target behavior (Brehm & Brehm, 1981). Therefore, whereas some individuals may comply with external mandates they may also show reactance by decreasing activity in another similar behavior in an attempt to counteract the desired effects of the mandate.

It is expected that compliance to the externally assigned goal will be the same as compliance to the participatory-set goal. This will be especially true under supervisor surveillance of the target behavior where it may be perceived that employees who do not comply risk losing their job due to insubordination. Although the employees may comply with the goal intervention and engage in the targeted safe behavior, they may also react to

the perceived threat to their driving freedom and reduce their level of responding in other critical safety behaviors. It is expected that the external control imposed by the assigned goal setting condition will be perceived by some employees as a injunction on their freedom to drive in the manner they would otherwise desire. On the other hand, employees in the participatory goal setting conditions will have participated in the goal setting and may not feel that their freedom to choose will have been threatened. It is hypothesized that reactance will be manifested through reducing responding in similar yet non-targeted behaviors in the assigned set goal (i.e., L/A: Lecture/Assigned) intervention but not in the participatory set goal (i.e., D/P: Discussion/Participative) intervention.

Summary

Three ways in which effectiveness will be measured as a result of an intervention were identified. The first was an analysis of the immediate impact of goal setting. The immediate impact is any change in the targeted behavior while the goal is in place (and feedback signs are visible). A second analysis was the long term impact of goal setting. Observations continued up to five months after the withdraw of the intervention when goals and feedback were no longer posted. The final measurement of effectiveness concerns the generalization of the intervention effect across behaviors. The theory of response generalization was tested by observing non-targeted behaviors concurrent to the intervention operations. What remains to be studied is the impact that individual differences in persons has on their responsiveness to the intervention. It is suggested that Person variables will

interact with both the Environment (i.e., goal setting type) and Behavior (i.e., effecting baseline "rules" and response generalization).

PERSON

The final variable in the Safety Triad concerns the Person (Geller, 1992). Manipulations of the Environment during interventions can account for a large amount of variation in behavioral change, however, there is still a significant amount of variance within and between individuals left unaccounted. Some of this variance is attributable to unsystematic "errors." For example, some individuals may be exposed to more of the intervention than others. However, there may be systematic differences between people which may account for some of this variance. This study attempted to identify two personality variables which are relevant to driving behavior and test their association with individual responsiveness to an intervention.

Variables Affecting Baseline Behavior

Many attempts to relate personality variables to driving suggest little correlation between personality constructs and driving practices (e.g., Knapper & Cropley, 1981; Little, 1970). However some studies have been supportive (e.g., Clement & Johan, 1984; Signori & Bowman, 1974; Wuebker, 1986). It is suggested that there are personality, demographic, and lifestyle variables which are influential in determining individual baseline levels of driving behavior, individual responsiveness to an intervention, and individual maintenance of a behavior after an intervention.

Locus of Control. Montag and Comrey (1987) suggested Rotter's construct of Locus of Control is related to driving safety. Rotter (1954) originally conceived Locus of control in his social learning theory as an

expectancy over control of reinforcement. This expectancy characterized a consistent individual difference among individuals. Some individuals perceive contingencies between their own behavior and subsequent events. In other words, they believe their behavior is instrumental in achieving desired outcomes or avoiding undesirable outcomes. These individuals have an *internal locus of control* according to Rotter (1966). In contrast, some individuals do not perceive a direct contingency between their behavior and subsequent outcomes and are more likely to presume that events are beyond their personal control, in essence a result of chance, luck, or fate. These individuals have an *external locus of control*. Rotter (1966) created a scale of Internality-Externality (I-E) from earlier I-E scales (e.g., Phares, 1957) which has since been the most popular measure locus of control.

External locus of control is manifested in the lack of self-initiated preventive actions to avoid undesirable outcomes (Kristiansen, 1987; Phares, 1978; Strickland, 1978; Wallston & Wallston, 1981). However, the ability of the general I-E scales (e.g., Rotter, 1966) to predict behaviors which would prevent undesirable outcomes has been mixed. For example, cigarette smoking was more prevalent in female 9th graders with an external locus of control than an internal LOC, but no such relationship was been found in males of that age (Williams, 1973). Also, locus of control was not significantly correlated with safety belt use in a study of adolescents (Riccio-Hoe, 1991).

Research has also shown the I-E scale does not correlate highly with number of driving accidents (Clement & Jonah, 1984). However, some researchers have attempted to tailor the I-E construct more specifically toward driving behavior (Jones & Wuebker, 1985; Montag & Comrey, 1987). This

follows the success of other locus of control scales which have been tailored to specific behaviors. A widely used Health Locus of Control Scale has been developed by Wallston and Wallston (1981). Jones and Wuebker (1985) developed a Safety Locus of Control Scale which has been shown to predict employee accidents and injuries as well as driving safety on the job-site (Wuebker, 1986).

The Driver Internality (DI) and Driver Externality (DE) scales were developed by Montag and Comrey (1987) specifically to relate Rotter's I-E construct to driving behavior. Both scales significantly discriminated between normal drivers and those who had been in a serious accident (Montag & Comrey, 1987). To this point, however, Montag and Comrey's DI and DE scales have only been shown to be related to vehicle accidents, not specific behaviors which may actuate these accidents. From this it is reasonable to assume safety belt use, turn signal use, and complete intersection stopping will occur more often by people with an internal locus of control than an external locus of control. Therefore, it is hypothesized that individuals with an external locus of control will show less incidents of complete intersection stops, turn signal use, and safety belt use than individuals with an internal locus of control.

Variables Affecting Responsiveness to an Intervention

Locus of Control. Rotter (1966) defined locus of control (LOC) as the inclination to view a reward as instrumental to one's own behavior or caused entirely by external forces. Individuals with an internal locus of control should value the feedback that a reward provides because they believe their actions produce such outcomes. Information about one's competency to

produce desired outcomes is useful feedback to internal LOC individuals who may seek to adapt their behavior to better attain a reinforcer. Individuals with an external locus of control tend to perceive outcomes as a function of external causes such as luck, fate, or natural contingencies. They do not believe adapting their behavior to influence the arrival of desirable outcomes is worthwhile. Hence, they do not seek competency information from external feedback.

Individuals with an internal locus of control will seek external feedback to their behavior whereas such feedback would not be perceived as valuable by individuals with an external LOC. Therefore the effectiveness of goal setting and feedback methods may be mediated by an individual's locus of control. Yukl and Latham (1978) reported that individuals (i.e., typists) who perceived that goal attainment was instrumental in obtaining their rewards showed the greatest overall improvement in performance. In a study using digit span tests on low SES 6th grade males, internals showed more persistence on the tests than did externals. While subsequent goal setting (assigned) increased the persistence of internals there was no significant change in the persistence of externals on the digit span tests (Gagne & Parshall, 1975). Other studies have shown that individuals with an internal LOC tend to be more committed to goals (Hollenbeck, Williams, & Klein, 1989) and tend to set more difficult goals for themselves (Yukl & Latham, 1978). In fact, Bigoness, Keef, and DuBose (1983) found a positive linear relationship between goal difficulty and performance for individuals with an internal orientation but found an inverse relationship between goal difficulty and performance for individuals with an external orientation.

However studies by Latham and his associates (i.e., Dossett et al., 1979; Latham & Yukl, 1976; Latham & Marshall, 1982; Latham et al., 1982) found no moderating effects for LOC on performance after goal setting.

There is some indication that locus of control may affect performance after goal setting and feedback (both participative and assigned; Cherulnik, & Citrin, 1974; Earn, 1982; Moyer, 1978; Reeve, Olson, & Cole, 1987). Earn (1982) showed an interaction between LOC and intrinsic motivation. Using the procedure adopted by Deci (1971), Earn had subjects, randomly assigned to three payment conditions, work on simple puzzles. In traditional intrinsic motivation studies (e.g., Deci, 1971) individuals who were paid for their work on the puzzles showed less time spent working on the puzzles during a subsequent free time period. However, Earn showed this was only the case with subjects with an external LOC. As payment increased for internals (i.e., 0, \$2.50, \$5.00), their time spent on the puzzles during the free period actually increased and they reported more liking for the task. A more complex three way interaction between locus of control, intrinsic motivation, and achievement motivation was reported by Reeve *et al.* (1987). It is hypothesized that subjects with an internal locus of control (as measured by a general scale and Montag & Comrey's specific driver locus of control scale) will show more responsiveness to the intervention as well as more behavioral maintenance following the intervention.

Psychological Reactance Scale. Although the theory of psychological reactance has shown to be a robust construct ever since Brehm (1966) formed the theory there has been little research on reactance as an individual difference. In 1983, Merz made an initial attempt to develop a psychometric

indicative of reactance for research purposes. This likert-type format was translated from German to English by Tucker and Byers (1987) and factor analyzed. A major factor which appeared were items focusing on "behavioral freedoms." Other factors were not as clear. This analysis was replicated by Hong and Ostini (1989) who named the first factor "freedom in decision and behavior", the second "behavioral reactance", and a third "skepticism towards other's advice." Another factor analysis was completed by Byers and Tucker (in press) which revealed a first factor focusing on "rebellious behaviors," a second focusing on "freedom of choice," and a final factor related to "freedom from external constraint."

Despite acceptable reliability estimates (i.e., .84-.90; Merz, 1983) the internal consistency of the scale is questionable as evidenced by the changing factor structure across studies (i.e., Byers & Tucker, in press; Hong & Ostini, 1989; Tucker & Byers, 1987). It should be noted, however, that subjects for these separate analyses came from Germany, the United States, and Australia. Nevertheless the Merz Psychological Reactance Scale, in its present form, may significantly predict which subjects would show reactance in the context of the L/A intervention. Subjects who have a predisposition to experience psychological reactance will presumably manifest the most reactance in their behavior.

It is hypothesized that individuals who score high on the Merz Psychological Reactance Scale will be more likely to manifest behavioral reactance. This may happen in two ways: 1) not responding to the intervention (i.e., not increasing the incidents of complete intersection stops)

and 2) showing undesirable change in non-targeted behaviors (i.e., decreasing turn signal or safety belt use).

OVERVIEW AND HYPOTHESES

The remainder of the introduction included an overview of the observed driving behaviors as well as an overview of the research design. It concluded with a specific review of the hypotheses formulated specifically for this research.

Overview of the Observed Driving Behaviors

A necessary first step in the analysis of response generalization is an understanding of the functional similarity between the observed behaviors. Complete stopping at intersections, safety belt use, and turn signal use were observed as behavioral variables because of their potential to aid in the avoidance of vehicular accidents and injury due to accidents as well as their availability to be readily observed for research purposes.

Safety belt use. Early applications of behavior analysis targeting safety belt use reported group safety belt use within an ABA reversal, comparison group, or multiple baseline designs (e.g., Campbell, Hunter, & Gemming, 1983; Elman & Killebrew, 1978; Geller & Hahn, 1984; Horne & Terry, 1983; Johnson & Geller, 1984). These studies did not identify individual drivers during baseline, treatment, and follow-up phases. However, individual patterns of safety belt use were studied in other field experiments by recording a driver's vehicle license plate numbers along with the observation of his/her safety belt use (Geller, 1983; Geller, Johnson, & Pelton, 1982; Geller, Patterson, & Talbott, 1982). For example, Geller (1983) demonstrated the functional control of an incentive-based intervention by showing that the

observed increases in safety belt use were not biased by sampling error, but were in fact due to the behavior change of individual drivers. Using license plate numbers, Geller categorized drivers according to the number of times they were rewarded with an incentive flyer and then compared the safety belt use of these different exposure groups within intervention and follow-up phases.

To date, studies which examined changes in safety belt use among individuals could only record a subject's belt use once per day as they arrived and departed from a certain event (e.g., from work sites, Geller, 1983; Geller et al., 1982; or from school, swimming lessons, and daycare, Geller, 1989b). In contrast, the pizza deliverers make up to 12 arrivals and departures per hour and therefore they can be observed several times during an observation period.

Turn signal use. Ludwig and Geller (1991) reported that turn signal use was correlated significantly (i.e., $r = .42$) with safety belt use in a population of pizza deliverers. The percent of the time deliverers used their turn signal correlated with the percent of time they wore their safety belt. In a more extensive study on the relationship between turn signal and safety belt use, Fricker and Larsen (1989) collected turn signal and safety belt data in a wide variety of sites and traffic conditions. In a chi-square analysis, they found a significant relationship between incidents of turn signal use and safety belt use. Furthermore they found that, among drivers who wore their safety belt, 75% also used their turn signals. In a second study two years later, Fricker and Larsen put data collectors at many points on the same four-lane road. They demonstrated that if a turn signal was used at one point on the road, it was

more likely to be used at a point "downstream." Again a significant relationship was observed between turn signal use and safety belt use.

Comparing the results from their first study in 1986 when no safety belt use law (BUL) was in effect and their second study in 1988 when a safety belt use law was initiated in their state, Fricker and Lawson were able to show increases in safety belt use due to the BUL corresponded with increases in turn signal use. More specifically, turn signal use rose from a level of 68% before the belt use law was initiated to a level of 80% after the law took effect in 1988. Also in 1988, among drivers who wore their safety belt, 92% also used their turn signal. This was 17 percentage point above the same 1986 statistic (reported above).

This evidence provides some compelling evidence for the theory of response generalization (Ludwig, 1992). However, even though this epidemiological data is convincing, it is limited to only a population-level analysis. Obviously the same subjects were not observed from 1986 to 1988 and Fricker and Lawson (1989) did not collect license plate numbers concurrent to their data collection on turn signal and safety belts. Therefore, they could not track individual vehicles (and presumably, drivers) across time.

Complete stopping. The final behavior observed in this study was intersection stopping. Although, intersection stopping was used as the target behavior to test the effect of the intervention, little is known about its relationship with other driving variables. Most research to date has focused on the relationship between intersection stopping and environmental antecedents or individual attributes. For example, McKelvie (1986, 1987;

McKelvie & Schamer, 1988) observed stopping using a three-level collection scheme. Stops were recorded as either "complete," "slowing down" or "maintained speed." In three studies McKelvie (1986, 1987; & Schamer, 1988) reported 42-50% vehicles stopped completely, 40-43% slowed down, and 10-15% maintained speed. He also showed that females were more likely to stop and males were more likely to not slow down (McKelvie & Schamer, 1988), drivers in general were more likely to stop when another vehicle was in the vicinity (1986), and drivers were less likely to stop at night, especially when no traffic was in the vicinity (McKelvie & Schamer, 1988).

Using a specific population (i.e., pizza deliverers) the present study was able to track the relationship between the observed driving behaviors over time and in response to a specific intervention. Baseline correlations were taken and tracked across experimental phases to examine response generalization between the target behavior (i.e., complete intersection stops) and non-targeted driving behaviors (i.e., turn signal and safety belt use).

Overview of the Research Design

Please see Figure 2 for a schematic representation of the two experimental intervention packages in this time series design.

Insert Figure 2 about here

Three pizza delivery stores were used as experimental sites in the current study. Baseline observations were followed by a period of a goal setting intervention at two of the stores . The intervention was withdrawn after one month and observations continued into withdraw and follow-up

phases. The withdraw phase lasted for approximately one month. After a one month hiatus in data collection, follow-up observations ensued. The third store served as a control group not receiving any intervention operations.

A comparison between participative and assigned goal setting was designed into the interventions. One store received the Discussion/Participation (D/P) intervention which involved a) a meeting with a discussion format, b) participative goal setting, c) group feedback, and d) goal-contingent rewards. The other store received the Lecture/Assigned (L/A) intervention which involved a) a meeting with a lecture format, b) assigned goal setting, c) group feedback, and d) goal-contingent rewards. A second round of interventions which contained the same components as the first intervention but the manipulations between the stores were reversed.

Figure 2 also shows specific occurrences during the study such as the beginning of managerial observations of the target behavior, the posting of withdraw signs, and the administration of personality questionnaires.

Hypotheses

Hypotheses were offered on three levels: 1) General hypotheses which propose something specific to the variable(s); 2) Baseline hypothesis which propose something which may be tested with baseline observations; and 3) Goal setting hypotheses which contrast participative vs. assigned goal setting. These three levels of hypotheses were crossed by the three levels of effectiveness: 1) immediate effect, 2) long-term effect, and 3) effect on behaviors (i.e., response generalization). In addition specific hypothesis on

the personality variables were proposed. Table 1 outlines specific hypotheses in the context of this matrix.

Insert Table 1 about here

PILOT RESEARCH

In pilot research for this proposal (Ludwig & Geller, 1991), initiation of the intervention program was staggered across two test site, and consisted of a group-consensus meeting wherein employees discussed the value of safety belts, received feedback regarding their low safety belt use, offered suggestions for increasing their use of safety belts, and made personal commitments to buckle up by signing buckle up pledge cards. Subsequently, employee-designed buckle-up reminder signs were placed in the pizza stores. Similar approaches to safety belt promotion have been applied successfully at industrial plants (Cope, Grossnickle, & Geller, 1986; Geller & Hahn, 1984; Kello, Geller, Rice, & Bryant, 1988).

The intervention program targeting safety belt use of pizza deliverers (n=81) at two stores increased significantly the use of both safety belts (143% above baseline) and turn signals (25% above baseline). Control subjects (i.e., pizza deliverers at a third no-intervention store, and patrons driving to the pizza stores) showed no changes in belt or turn signal use over the course of the four-month study. Individual variations in belt use during baseline, interventions, and follow-up phases suggested a need to design more effective intervention programs for certain individuals.

METHOD

Subjects and Settings

Pizza deliverers from three different pizza stores (two treatment and one control) were observed departing for and arriving from their deliveries. Employees at one treatment store (i.e., Store A) consisted mainly of college students. The deliverers at Store A had a mean age of 24.6 years which ranged from age 19 to 42 and their mean education was about 3 years of college. Employees at the other treatment store (i.e., Store B) were also primarily college students. In comparison, deliverers at Store B had a mean age of 23.3 years which ranged from age 19 to 44 and their mean education was about 2 years of college. Both of these stores are owned by the same franchise however they were located in separate towns each with a university setting.

The pizza deliverers at a third store (i.e., Store C; another pizza enterprise in the town containing Store A) served as a nontreatment control. Demographic data were not available for the third store so comparisons cannot be made at this level. However, Store C shared the pizza delivery market with Store A in the university town and most likely employed from the same student population. All employees in these locations work on commission (per total pizzas sold), which averages approximately \$.58 a delivery plus gratuity. Also, customers entering the stores' parking lots to pick up their pizza orders were observed as another control group.

The national corporation to which the two target stores were enfranchised requires all new employees to take a Safe Delivery Program series (Kalsher, Darr, Lehman, & Geller, 1989) before they may deliver for their commission. The program consisted of a manual and videotape and

covers all major driving concerns as well as efficient pizza delivery. At the onset of their employment, employees at the two target stores individually viewed the videotape and proceeded through the manual. No contact with any franchise personnel took place at this time. For the purposes of this study, all references to safety belt use, turn signal use, and intersection stopping were eliminated from the Safe Delivery Program videotape. However, the manual was not altered. Along with the Safe Delivery Program materials, new employees received a memo stating that consultants working for the franchise will attend their monthly managerial meetings and discuss a topic concerning safe delivering.

Please see Appendix A for a display of the geographic layout of the immediate driving area around each research site. All three stores had parking lot areas whose entrances/exits were connected to four lane two-way streets. Each four lane street was in city limits and had a speed limit of 35 mph. Each store was within a mile of a college or university campus and within 200 yards of a shopping complex. Stores A & B's parking lots also connected to side streets, which also fed into the main four-lane street. Deliverers at Stores A & B were limited to only left or right turns onto the main four lane street, whereas deliverers at Store C also had the option to go straight across the four lanes onto a two-lane street. Stores B & C shared the parking lot with other business(es). At the time of this study, Virginia had safety belt use law (BUL) with secondary enforcement and a \$25 fine for convicted violators.

Observation Procedures and Data Collection

During peak business hours (i.e., 5:00 to 8:00 pm), behavioral observations of the drivers of the delivery vehicles of the research sites were unobtrusively recorded from windows of nearby businesses overlooking the pizza store parking lots. Data were collected using a checklist format developed over a decade of driver observations and, more specifically, over two years of observing pizza deliverers. The field observations were recorded by trained undergraduate research assistants at Virginia Tech. See Appendix B for the data sheet used in this study. The method for recording each of these observation is detailed in the data collection manual, Appendix C.

When entering and exiting the stores' parking lots, the data collector(s) recorded whether each pizza deliverer (i.e., the driver) used the available shoulder strap. They also recorded which direction the deliverer turned and whether the right or left turn signal was used. In addition, the observer recorded the kind of (non)stop the vehicle made while entering the main road from the intersection near each store. One of three types of stops were recorded: 1) a *complete* stop, whereby the vehicle's wheels stop moving; 2) a *slow rolling* advance, whereby the vehicle slows to approximately the walking speed of an adult; and 3) a *fast rolling* advance whereby the vehicle proceeds through the stop with little or no attempt to slow. These were labeled stop types "1", "2", and "3" respectively. Intersection stopping was only recorded when the deliverer was departing from the store parking lot. At the time of the intersection stop observation, data collectors also recorded the traffic conditions the driver confronted when entering the main road. A simple binary estimate was made to record whether the oncoming traffic

should have effected the deliverer's stopping behavior. It was emphasized that a deliverer could do a stop type #3 under traffic conditions in which they should have stopped.

In addition to recording belt use, turn signal use and stopping, the time of the observation, the license plate number of the vehicle observed, the gender of the subject, and whether the driver was departing or returning from a delivery were also observed and recorded. To increase the ease and accuracy of identifying the license plate numbers, sheets containing descriptions of each pizza deliverer's vehicle and the corresponding license number compiled for each store and used during the behavioral observations (see Appendix D).

New observers began training in data collection in five-person groups and reviewed a manual created for this study (Appendix C) which explained each part of the data sheet and outlined the correct responses for most eventualities that occur in the field. Each trainee underwent a one hour instructional meeting with the author reviewing the data collection method. Trainees then went into the field with an experienced data collector who had at least 30+ hours of data collection experience. Field observation techniques ranging from the use of binoculars to observing and recording two cars at once were taught and trainees eventually collected data concurrent with the experienced data collectors. When trainees met the performance criteria of 90% agreement in the field with an experienced data collector, they were scheduled for regular data collection. All data collectors were blind to all experimental phases, manipulations, target behaviors, and experimental hypotheses.

Interobserver Reliability

For approximately 1/3 of the observation sessions, interobserver reliability data was collected by the core of trained data collectors. During reliability sessions, two data observers collected data concurrently at a single store, however they were instructed not to confer about their observations. Those data collectors who consistently scored below 90% reliability were removed from data collection scheduling and retrained. This occurred only once during the course of the study and that person's previous data were purged from the data set.

Experimental Design

The target behavior of the interventions was the occurrence of complete intersection stopping. All intervention discussions and materials targeted specifically complete intersection stopping (as prompts of consequence strategies). Although safety belt use and turn signal use were not mentioned during any intervention activities, they were observed concurrently with intersection stopping by the data collectors.

The quasi-experimental design for this study was a multiple baseline counterbalanced across settings with a nonequivalent control group. Figure 2 represents schematically the research design. During Year 1 of the study, after a baseline observation period of six weeks (i.e., Baseline Phase), the implementation of two experimental interventions were staggered between Store A and Store B, while baseline observations continued at the Store C. The intervention consisted of a group meeting followed by four weeks of group feedback (i.e., Intervention Phase). During the first year, deliverers at Store A received the Discussion/Participation (D/P) intervention consisting

of a discussion formatted meeting, participative goal setting, and four weeks of group feedback. One week after Store A's initial meeting Store B received the Lecture/Assigned (L/A) intervention consisting of a lecture formatted meeting, assigned goal setting, and four weeks of group feedback. Store C received no experimental intervention. After the group feedback was removed from the stores, approximately four to five weeks of observations were conducted to assess the deliverer's withdraw from the intervention (i.e., Withdraw Phase). Behavioral observations were not taken for approximately seven to eight weeks. After this hiatus, observations continued for ten to eleven weeks to assess long term effects of the intervention (i.e., Follow-Up Phase). No observations were made for the 15 weeks following the follow-up phase which preceded the beginning of Year 2.

During Year 2, the research manipulations at Store A and Store B were counterbalanced. After six weeks of baseline observations, Store B received the D/P intervention followed by four weeks of group feedback. One week after the onset of Store B's intervention, Store A received the L/A intervention and four weeks of group feedback. Again Store C did not receive any experimental manipulation throughout Year 2. Withdraw and follow-up observations were continued over the next seven months.

Independent Variable

The interventions were designed to be similar in all aspects except for the experimental manipulation. Specifically, both groups attended a one-hour meeting, got the same information, left with same set goal, and received identical group feedback displayed at similar points in the store. Critical differences between the interventions were that one group generated the

information in a discussion format whereas the other had the same information lectured to them, one group participated in the goal setting whereas the other had the goal set by the other group assigned to them, and directly after the group feedback was withdrawn, each group received slightly different signs announcing the end of the intervention. Care was taken to assure that the interventions in Year 1 were identical to the interventions in Year 2.

The interventions targeted complete intersection stops. An employee meeting first took place at Store A and was then followed by a meeting at Store B one week later. Before these meetings the managers from each store met with the author separately to receive training on the technique to be used at the meeting. A script was provided for them which they studied and practiced with the author. During the meeting, the author and manager both served as the intervention agents, delivering the material, leading discussion, and prompting goal setting. At the beginning of the meeting the manager introduced the author as a safety trainer for the franchise. For about 40 minutes the trainer and the manager facilitated or lectured information about complete intersection stops in a Discussion(Store A) or Lecture (Store B) format. A detailed description of each intervention is provided below to describe the experimental manipulations and controls to establish similarities across interventions.

Managerial pre-measures. One week prior to the intervention meeting the managers at each store were given hand counters to record the occurrence of complete intersection stops (and non-stops). The counter kept a cumulative record of each occurrence. At the end of each shift the manager

transferred the information to a data sheet. These data were collected for two reasons. First, it provided behavioral feedback on complete intersection stops during the intervention meeting and set an ostensive precedent for group feedback during the four weeks following the intervention (i.e., so the deliverers believed the origin of the feedback was their manager instead of external data collectors). Secondly, these data were collected somewhat obtrusively (i.e., counters were kept in the open and their purpose was revealed to whomever asked) by the managers so any changes in behavior due to a managerial observation effect could be assessed. Increases in complete stops due possibly to an observation effect could then be attributed to the intervention, not to managerial observations.

Discussion vs. lecture format. In the Discussion format at the Store A, issues were presented in the form of questions to facilitate group involvement. For example, the discussion leader would ask, "What are situations in which you should come to a complete stop?," wait for employee response, then follow with "Why is this especially relevant to pizza deliverers?" and wait for discussion. During the discussion the facilitator would only repeat what was said by an employee or ask for others employees responses. The following questions were asked during the Discussion part of the meeting:

- 1) What are situations in which you come to a complete stop?
- 2) What are reasons for coming to a complete stop?
- 3) What are reasons for not coming to a complete stop?
- 4) How would you respond to these reasons for not stopping completely (referring to responses from Question #3)?

5) Reasons why pizza deliverers should come to a complete stop?

The entire discussion was recorded on video tape. All the information from the discussion at Store A was written out in a script for the lecture at Store B. The Lecture format used at Store B did not attempt to elicit employee involvement, instead the information presented at Store A was lectured to the employees at Store B in the form of statements. No questions were asked of the employees.

A content analysis was completed on both intervention meetings to assess the degree of overlap between information elicited from employees at Store A and the information lectured at Store B. First, a research assistant viewed both videotapes and created a list of all the information presented at the intervention meetings. This list was made into a check list of information items. At this point the content analysis was completed independently by judges to assess the reliability of their findings. The judges viewed the videotapes of both meetings with check lists containing the information presented at both sessions.

Participative vs. assigned goal setting. After the discussion, employees were asked to come to a consensus about acting to increase the occurrence of complete intersection stops. Upon the affirmative response from all the employees, the manager told the employees the percentage of times the deliverers came to a complete stop outside the store over the past week. Although the managers did collect data the week previous to the meeting, the percentage told the employees was a number reflective of data from both Store A and Store B. Thus, Store A (and Store B) were told they came to a complete stop 55% of the time. The facilitator then asked what group goal

could be set for complete stopping over the next four weeks. The goal was stated as "The percentage of complete stops to remain above __% for the next four weeks." Every member of the group was allowed to give their opinion on a goal level. After deliberating the facilitator then asked each employee to voice their vote on the goal set by the group. Store A decided unanimously on a group goal of 75%

After the lecture in Store B, the employees were told their incidents of complete stops, observed by the managers, was ostensibly 55%. The manager then announced his decision to increase the incidents of complete stops among the deliverers at Store B. The complete stopping goal agreed upon at Store A (i.e., 75%) then assigned in the form of a mandate at Store B with no discussion or consensus about the goal (A method used by Kernan & Lord, 1988).

The employees at each store were shown the poster on which bi-weekly percentages of complete stops would be posted. The current rate of complete stops (i.e., ostensibly 55%) was marked and a line at the 75% level was drawn. The employees were told that if the goal was surpassed all the individuals in the store will receive a small reward specifically a Virginia state map.

Post-meeting questionnaire. At the end of the meeting employees were administered a short questionnaire (Appendix E) to assess their perceptions of the meeting. Specifically, four of the items on the questionnaire served as a manipulation check for the independent variable. These items assessed self-report participation during the meeting and during goal setting, the perception of the meeting as a discussion or lecture, and a

check to see if they knew the goal level. Other questions were fillers (i.e., questions about driver training) or assessed the employee's intentions to come to a complete stop. The returned questionnaires also produced a list of employees who attended the meeting and who did not. A 100% return rate was obtained partly because the questionnaire was used as raffle entry for a company sweat shirt. The winning raffle entry was announced and the employees were then dismissed.

Group feedback. After the managerial meeting, the managers at each store continued observing their deliverers' complete intersection stops. The author collected the data sheets every four days and ostensibly graphed these percentages on the large in-store poster. To assure both treatment stores received the same feedback, the complete stop percentages posted were not a calculation of actual manager or external observations. Instead the percentages posted every four days were randomly chosen but always above the stated goal. The percentages posted at Store B were identical to the percentages posted at Store A one week earlier.

Feedback was posted for four weeks. After the end of four weeks the feedback posters were replaced by posters appropriate for the amount of participation each group had in the intervention:

Store A (i.e., D/P intervention): "Congratulations, you have exceeded the goal which you have set for yourselves. See your manager for your prize."

Store B (i.e., L/A intervention): "Congratulations, you have met the goal which was set for you. See your manager for your prize."

Rewards (i.e., maps) were handed out to 100% of the employees. Managers ceased collecting complete stop data. After four more days the posters were removed from the store. During the course of the entire first intervention no contact was made with the employees at the control site. Withdraw and follow-up data collection continued for 5 1/2 months.

Year 2. The second round of interventions took place six weeks after the resumption of observations (i.e., Year 2 baseline phase). At this point the manipulations at the two stores were counterbalanced. Store B participated in the employee meeting one week earlier than Store A and received the D/P intervention. They were able to set their own goal concerning percentage of complete intersection stops. In contrast, Store A received the L/A intervention with the lecture, mandated goal and no consensus discussion with the employees. The same discussion questions as Year 1 were used during the D/P meeting at Store B during Year 2. Naturally, the actual information resulting from this discussion was different than that from Year 1 at Store A. Therefore, the Lecture at Store A during Year 2 was created from the discussion the previous week at Store B.

Because the employees had the freedom to choose their goal level the actual goal set was also different during Year 2. The facilitator attempted to influence the adoption of the previous year's level of 75% complete stops. However, the employees at Store B chose a level of 90% complete stops during their goal consensus. Therefore, the level of 90% was adopted, placed on the feedback signs, and mandated at Store A. Although this was not part of the original research design, this serendipity allowed for comparisons of goal difficulty (i.e., 75% versus 90%) on intervention effectiveness. According

to the conclusions of Locke and Latham (1990), the more difficult goal should produce the greatest amount of behavior change.

All other aspects of the interventions were the same including the managerial data collection, the post-meeting questionnaire, the four weeks of posted feedback, post-feedback signs, and small reward. Data collection continued during withdraw and follow up phases to assess behavioral maintenance after the second intervention. Data collection ended after five and 1/2 months of withdraw and follow up observations. Again no contact was made with anyone at the control site during the second intervention. The final experimental design, taking into account the change in goal level, is presented in Figure 3.

Insert Figure 3 about here

Administration of Lifestyle and Personality Questionnaires

During the fourth week of withdraw observations after each intervention, a battery of personality questionnaires were administered by the managers of each store. Employees were given ten dollars each for completing the questionnaires. The employees were told their responses will be confidential, used only for research purposes, and would not be seen by their employer nor in any way influence their employment. They were told they could withdraw from the testing at any time. Informed consent forms (Appendix F) were signed by those wishing to participate. The employees turned in their questionnaires in a sealed envelop to help assure only the experimenter would view the forms. Employees were not told there was a

connection between the questionnaires and the research manipulations. Questionnaire data were not available from Store C.

The Adult Nowicki-Strickland Internal-External Control Scale (ANS-IE). The Nowicki-Strickland locus of control scale was chosen over the Rotter scale (1966) for a variety of reasons. Foremost, the Rotter scale uses a forced choice format which, combined with a difficult reading level, makes it inappropriate for noncollege populations (Nowicki, 1972). Although most of the pizza deliverers were college students, a significant minority were not. Furthermore the Nowicki-Strickland scale is not biased by social desirability (Nowicki & Duke, 1974) in contrast to the Rotter scale (Joe, 1972).

The ANS-IE scale is provided in Appendix G. It consists of 40 questions which may be answered in a "yes"-"no" format. Split-half reliabilities average .65 and test retest reliabilities were around .83 for a six week period (Nowicki & Duke, 1974). The ANS-IE scale is significantly correlated with the Rotter scale (i.e., $r = .68$ for college students and $r = .48$ for community adult samples; Nowicki & Duke, 1974).

Driving Internality and Driving Externality Scale (Montag & Comrey, 1987). The Montag and Comrey measure was constructed as two separate scales based on research by Collins (1974), Levenson (1981), and Lefcourt (1981) suggesting that the internal-external continuum is not necessarily of bipolar dimension. Instead, they suggest, this continuum is best conceived as two separate, negatively correlated scales, and thus a subject can score high or low in both dimensions. Therefore, Montag and Comrey developed the Driving Internality (DI) scale separate from the Driver Externality (DE) scale.

The Montag and Comrey DI and DE scales are integrated into one test form which is available in Appendix H. Each scale consists of 15 items. Both scales were entered into a factor analysis together which produced only two factors (Montag & Comrey, 1987). Factor 1 represented the DI scale (i.e., all DI items loading over .30, most above .50) and Factor 2 represented the DE scale (i.e., all DE items loading over .30, most above .45). A multiple correlation between the DI and DE scales and a dichotomous accident criterion was .38 showing a positive relationship to involvement in fatal accidents. Significant t-tests have shown a positive relationship between DE scores and accidents ($t=6.30$) and a negative relationship between DI scores and accidents ($t=-7.07$; Montag & Comrey, 1987).

Psychological Reactance Scale (Merz, 1983). As noted previously, the Psychological Reactance Scale was developed in Germany by Merz (1983). The English translation of the scale by Tucker & Byers (1987) was used in this study and is available in Appendix I. It consists of 18 items measured on a five point likert scale. Split-half reliability was found to be .84, internal consistency was .90, and test retest reliability was .86 (Merz, 1983). Three factors have been identified (Byers & Tucker, in press) and were examined in this study. Items in Factor 1 reflected "rebellious behaviors," items in Factor 2 reflected "freedom of choice," and items in Factor 3 reflected "freedom from external restraint."

Matching Questionnaire Data with License Numbers

Scores on the ANS-IE, DI, DE, Causality Orientations, and Psychological Reactance Scales were linked to license plate numbers and consequently to behavioral data. Subjects provided their names while completing the

questionnaires. These names were linked to license plate numbers in two ways. First, managers were asked to complete a form on their deliverers based on information given them in employee applications. Included were first names and last initials of drivers and their current license plate number. Secondly, at the end of the study, a list of license plates, seen consistently during the two year study, were sent to the Virginia Department of Motor Vehicles for identification. Through these procedures approximately 75% of license plate numbers were matched with employee names. After questionnaire data was recorded per driver according to license plate number and matched via the license plate numbers to the behavioral observations, subjects were given an arbitrary but distinct research code obviating any link to individual respondents.

RESULTS

Inter-Observer Reliability

Inter-observer agreement percentages were calculated by dividing the total number of observations agreed upon by two independent data collectors for a particular data category (i.e., complete stops, safety belt use, and turn signal use) by the total number of agreements and disagreements, and multiplying the result by 100. The percentages for each day which reliability data was collected were then averaged for the overall inter-observer reliability estimates.

Reliability data was collected on 104 data collection sessions (i.e., days). This represents 25% of the total sessions. Overall reliability for observations of complete stops was 86% agreement. Overall reliability for observations of

safety belt use was 91% agreement and reliability for turn signal use was 87% agreement. Reliability per experimental site is presented in Table 2.

Insert Table 2 about here

Content Analysis of Intervention Meeting

Two independent judges viewed videotapes of the interventions using the check sheet in Appendix I. This check sheet was developed directly from a list of all information presented at the intervention meetings which was compiled by a research assistant. The two judges agreed 85% of the time on specific topics which were presented at a particular meeting. The reliability was slightly lower in their review of the Discussion/Participation (D/P) format meeting (i.e., 82%) than the Lecture/Assigned (L/A) format meeting (i.e., 88%). Judge A reported 94% of the 36 items overlapped between the Discussion/Consensus format meeting and the Lecture format meeting. Judge B reported an 86% overlap of information between meetings. However, neither judge agreed on the specific items presented at one meeting and not the other. Judge A reported that "car lengths" and "roll through speed" were mentioned in the D/P meeting but not the L/A meeting. In contrast, Judge B reported that "weather conditions" and "only takes five seconds" and "stopping at yield signs" were mentioned in the D/P meeting but not the L/A meeting. These results suggest there was a reasonable overlap of information between the D/P meeting and the L/A meeting.

While the specific information mentioned at both meetings was designed to have a large amount of overlap, the amount of employee

participation was designed to be a critical difference between the meetings. The D/P meeting was designed to have maximal employee participation, whereas the L/A meeting minimized participation. Figure 4 shows the amount of time the facilitator, manager, or employees spoke at the D/P meeting and the L/A meeting. Interjudge reliability was 100% agreement on the amount of time the facilitator, manager, or employees spoke at the D/P meeting and the L/A meeting. The D/P meeting lasted 59'02" and the L/A meeting lasted 49'31". The facilitator spoke more during the D/C meeting than the L/A meeting by 5'37". However, the manager spoke nearly 11 minutes more during the L/A meeting than the D/P meeting. Therefore, even though it was shorter overall, the L/A meeting actually had 5'23" more non-employee speaking than did the D/P. A more critical difference was the fact that employees spoke 8'48" more during the D/P meeting than during the L/A meeting (i.e., 13'53" during the D/P meeting vs. only 5" during the L/A meeting).

Insert Figure 4 about here

Manipulation Checks

An analysis was done on the questionnaire completed by employees at the end of the intervention meetings (see Appendix E). There was a significant relationship [$X(1, 26) = 10.4, p < .01$] between the type of intervention meeting (i.e., Discussion/Participative or Lecture/Assigned) and how the employees described the meeting (i.e., "Discussion" or "Lecture"). Table 3 shows the resulting 2 x 2 matrix between employee descriptions of the

meeting and the format of the meeting.. Furthermore, attendees of the D/P meetings felt they participated in the goal setting significantly more than the attendees of the L/A meetings [t (24) = 2.25, p < .05] and felt they participated marginally more during the overall discussion [t (24) = 1.89, p=.06]. Finally, according to a non-significant trend in the data, attendees of the L/A meetings stated they *intended* to come to a complete stop more than attendees of the D/P meetings [t (24) = -1.91, p=.06]. No other questions discriminated between the L/A and D/P meetings.

Insert Table 3 about here

Overall Effects

A total of 55,940 behavioral observations of pizza deliverers were taken over the two year period of this study, representing over 900 hours of field data collection. Table 4 shows how many observations were made at each store for each year of this study.

Insert Table 4 about here

The results are reported on two levels of analysis. This was done to draw conclusions from a triangulated set of results instead of just one analysis. The community level analysis includes data collected on a daily basis with no discrimination among individual pizza deliverers. In other words, any deliverer who was observed making a delivery was included in the reported average for that data collection session. Therefore, the

community analysis included some subjects who may have been observed during only one phase along with those observed throughout the whole study. Thus, the community level analysis gives an aggregate perspective on the amount of change evidenced at a particular site. In this case, the field setting itself could be considered the "subject" experiencing different intervention conditions (Geller, Winett, & Everett, 1982). Behavioral data was collected on a total of 623 pizza deliverers over the two year study. Table 5 shows the total number of pizza deliverers observed by store and by year representing the community analysis.

Insert Table 5 about here

The repeated measure analysis, on the other hand, required that a deliverer be observed over all phases during an experimental year. Therefore, if an individual was not observed during the baseline phase, intervention phase, and the withdraw phase or follow-up phase, they were dropped from the repeated measure analysis. At this level of analysis, observations of the deliverer per phase must be a reliable index of his/her behavioral frequency. Therefore, if a deliverer's intersection stopping was not observed at least six (6) times during one of the experimental phases, they were dropped from the repeated measure analysis. There were 62 subjects whose data conformed to these criteria. Of these, there were 10 subjects who were observed during both years of the study. Because of their previous experience with the intervention during the previous year, the data of these 10 subjects were removed from the data for Year 2 analysis. Table 6 shows the

number of subjects included in the repeated measure analysis by store and by year.

Insert Table 6 about here

Store A received the D/P intervention during week 6 of observations, one week after managerial data collection commenced. Feedback was removed from the store during week 10 and withdraw observations continued. After a break, follow-up observations continued until week 14. Store B received the L/A intervention during week 7 of observations, one week after their managerial data collection commenced. Feedback was removed from the store during week 11 and withdraw observations continued. Store C did not receive any experimental intervention. The goal for Store A & B was set at 75% during the intervention of Year 1. All aspects of the time series from Year 1 remained the same except Store A received the L/A intervention during week 40 of observations, one week after Store B received the D/P intervention. The goal for Store A & B was set at 90% during the intervention of Year 2.

Community Analysis

Complete Intersection Stops

Figure 5 shows a time series of daily percentages of complete intersection stops for each research site during Year 1. Store A showed an increase from 56% during baseline to 67% during the intervention, dropping to 58% during withdraw, and 53% during follow up. Store B showed an increase from 45% during baseline to 67% during the intervention, dropping

to 62% during withdraw, and 42% during follow up. Both Store A and Store B show some increase coinciding with the onset of managerial observations one week before the intervention meeting. Finally, Store C showed a rate of 51% during Store A's baseline, 55% during Store A's intervention, 53% during Store A's withdraw, and 50% during Store A's follow up.

Insert Figure 5 about here

In summary, a noted increase in complete intersection stopping was observed during Year 1 at both treatment sites. A slight increase was also seen at the control site during the treatment sites' intervention phase. Contrary to hypotheses, Store B showed the most behavioral maintenance during the withdraw phase after the L/A intervention. Store A was variable, showing maintenance directly after the intervention and also toward the end of the withdraw phase (i.e., week 2 of month 3) with a noted drop in between. Both treatment stores showed no long-term maintenance during the follow up phase.

Figure 6 shows a time series of daily percentages of complete intersection stops for each research site during Year 2. Store A showed an slight increase from 51% during baseline to 55% during the intervention, dropping to 50% during withdraw, and 52% during follow up. Store B showed an increase from 37% during baseline to 47% during the intervention, dropping to 49% during withdraw, and 31% during follow up. Finally, Store C showed a rate of 53% during Store B's baseline, 32% during

Store B's intervention, 68% during Store B's withdraw, and 59% during Store B's follow up.

Insert Figure 6 about here

In summary, no effect of the intervention was seen at Store A in response to the L/A intervention. A noted increase in complete intersection stopping ws observed at Store B during the intervention and was maintained into the withdraw phas. However it returned to baseline levels during the follow-up phase. There were not enough behavioral observations at the control site during Year 2 to draw clear conclusions on the data.

Figure 7 shows a time series of daily percentages of fast rolling advances (i.e., stop #3) at each research site during Year 1. Store A showed no changes over the experimental phases (i.e., 11%, 15%, 14%, and 13% respective over baseline, intervention, withdraw, and follow-up phases). Store B showed a decrease from 19% during baseline to 7% during the intervention, maintaining at 9% during withdraw, and increasing to 19% during follow up. Finally, Store C showed a rate of 20% during Store A's baseline, 14% during Store B's intervention, 20% during Store B's withdraw, and 21% during Store B's follow up.

Insert Figure 7 about here

In summary, during the first year the D/P intervention had no effect on fast rolling advances, whereas Store B (i.e., L/A intervention) showed a

noted decrease in fast rolling advances which was maintained into the withdraw phase. A slight decrease in fast rolling advances was also noted at the control site during the treatment sites' intervention phase.

Figure 8 shows a time series of daily percentages of fast rolling advances (i.e., stop #3) at each research site during Year 2. Store A showed no changes over the experimental phases (i.e., 21%, 19%, 18%, and 18% respective over baseline, intervention, withdraw, and follow-up phases). Store B also showed no changes over the experimental phases (i.e., 19%, 19%, 18%, and 31% respective over baseline, intervention, withdraw, and follow-up phases) with the exception of a dramatic increase in fast rolling advances during the follow up phase. Finally, Store C showed a rate of 16% during Store B's baseline, 37% during Store B's intervention, 5% during Store B's withdraw, and 12% during Store B's follow up.

Insert Figure 8 about here

Turn Signal Use

Turn signal use was measured concurrently with intersection stopping although it was not targeted by the intervention. Figure 9 shows a time series of daily percentages of turn signal use at each research site during Year 1. Store A showed an increase from 67% during baseline to 79% during the intervention, maintaining at 82% during withdraw, and decreasing to 69% during follow up. Store B showed no changes over the experimental phases (i.e., 60%, 61%, 61%, and 55% respective over baseline, intervention, withdraw, and follow-up phases). Finally, Store C showed a rate of 58%

during Store A's baseline, 60% during Store A's intervention, 51% during Store A's withdraw, and 58% during Store A's follow up.

Insert Figure 9 about here

In summary, a noted increase of turn signal use was observed at Store A in response to the D/P intervention targeting complete intersection stops. This increase was maintained during the withdraw phase and represents an incident of response generalization. The same effect was not apparent at Store B which received the L/A intervention.

Figure 10 shows a time series of daily percentages of turn signal use at each research site during Year 2. Store A showed slight changes over the experimental phases (i.e., 68%, 70%, 74%, and 76% respective over baseline, intervention, withdraw, and follow-up phases) but nothing systematic. Store B also showed no changes over the experimental phases (i.e., 51%, 56%, 48%, and 59% respective over baseline, intervention, withdraw, and follow-up phases). Finally, Store C showed a rate of 57% during Store B's baseline, 52% during Store B's intervention, 59% during Store B's withdraw, and 66% during Store B's follow up.

Insert Figure 10 about here

Safety Belt Use

Safety belt use was measured concurrently with intersection stopping although it was not targeted by the intervention. Figure 11 shows a time

series of daily percentages of safety belt use at each research site during Year 1. Store A showed an slight increase from 74% during baseline to 77% during the intervention continuing to rise to a level of 82% during withdraw, and decreasing to 75% during follow up. Store B showed an increase from 60% during baseline to 68% during the intervention continuing to rise to a level of 72% during withdraw, and decreasing to 58% during follow up. Finally, Store C showed a rate of 54% during Store A's baseline, 44% during Store A's intervention, 24% during Store A's withdraw, and 44% during Store A's follow up.

Insert Figure 11 about here

In summary, no increase in safety belt use was observed at Store A, although a ceiling effect may have limited the effect of the D/P intervention. However, an increase in safety belt use was observed at Store B which received the L/A intervention targeting complete intersection stopping. The increase in safety belt use at Store B is an example of response generalization. Store B showed a curious decrease in safety belt use to a level of 50% during the last two weeks of the baseline phase. Store C showed a continuous decline in safety belt use over the course of the year. No explanation is apparent for this change.

Figure 12 shows a time series of daily percentages of safety belt use at each research site during Year 2. Store A showed no changes over the first three experimental phases (i.e., 75%, 76%, and 81% respectively over baseline, intervention, and withdraw) but showed a noted decrease to 50% during

follow up. Store B showed an increase from 55% during baseline to 68% during the intervention, maintaining at 65% during withdraw, and 61% during follow up. Finally, Store C showed a rate of 41% during Store B's baseline, 41% during Store B's intervention, 35% during Store B's withdraw, and 45% during Store B's follow up.

Insert Figure 12 about here

In summary, Store B showed a notable increase in safety belt use in response to the D/P intervention targeting complete intersection stopping. No such increase was noted at Store A which, again, may have been limited by a ceiling effect. However, Store A ended Year 2 with a 25 percentage point (i.e., 33%) decrease in safety belt use. This represents the lowest level of safety belt use at Store A over the two year course of this study. In fact, a level of 50% safety belt use had not been observed at Store A for 3 1/2 years of continuous observation.

Repeated Measure Analysis

Complete Intersection Stops

The results presented in the repeated measure analysis represents only the data observed from pizza deliverers who were observed in each of the baseline, intervention, and withdraw phases and were observed at least six times in each phase³. Daily percentages of behavioral data per deliverer were averaged to arrive at a weekly percentage. Figure 13 depicts weekly percentages of complete intersection stops in a time series design over four experimental phases during Year 1. The intervals around each weekly mean

represent the range of daily means for that week. The means for each phase (for both Year 1 and Year 2) are available in Table 7. Subjects at Store A increased their percentage of complete intersection stops across the treatment phases returning to baseline levels during the follow-up phase. A notable drop in complete stops was observed in week 12. Week 12 was the week of Thanksgiving and in Store A's town most university students had left town and therefore the traffic may have been lighter reducing the necessity for a complete stop. After a notable increase of 22 percentage points from baseline to intervention phases, Subjects at Store B showed a greater amount of behavioral maintenance during the withdraw phase than did subjects at Store A.

Insert Figure 13 about here

Insert Table 7 about here

Figure 14 depicts weekly percentages of complete intersection stops in a time series design over four experimental phases during Year 2. The only change in rates of complete intersection stopping during Year 2 occurred at Store B during the intervention and then only after the first week. According to Table 6, Store B had only 5 subjects meet the criterion for the second year and Store C only had 4. Although the repeated measures of subjects across treatment phases offers more power than conventional between-subjects analyses, the time series data for Store A & C during Year 2 should be viewed

with caution. However, it is noteworthy that Store B's results during Year 2 using the repeated measure analysis is similar to the results of Store B Year 2 in the community analysis.

Insert Figure 14 about here

Overview of the Statistical Evaluation

The statistical analysis used to analyze the effects of the intervention(s) on both the target behavior (i.e., intersection stopping) and non targeted behaviors (i.e., turn signal and safety belt use) was a Repeated Measures ANOVA. Two independent variables were tested against the repeated measure of a specific behavior. These I.V.'s were:

- 1) the type of intervention:
 - a) Discussion/Participation,
 - b) Lecture/Assigned, or
 - c) Control (i.e., no intervention);
- and 2) the level of goal:
 - a) Year 1 = 75% goal level, or
 - b) Year 2 = 90% goal level.

The repeated measure contained the dependent variable (i.e., behaviors) across levels of phases. The phases used in the statistical analysis were 1) baseline, 2) intervention, and 3) withdraw. Please see Table 8 for a representation of the statistical design.

Insert Table 8 about here

Table 8a shows a representation of the three way interaction between Year, type of intervention, and the repeated measure. This analysis was completed for all behaviors (i.e., intersection stopping, turn signal use, and safety belt use) and for all conditions within intersection stopping (i.e., right or left turn, traffic or no traffic) and turn signal use (i.e., right or left turn). Additional analysis were completed, where appropriate, to isolate a hypothesized effect. Table 8b shows a comparison between type of intervention (i.e., D/P & L/A) across all phases. This analysis was done without the control group. This comparison served as an evaluation of maintenance of an intervention's effect into the withdraw phase (i.e., long-term effect). Table 8c shows a comparison between type of intervention (i.e., D/P & L/A) across only the baseline and intervention phases. This comparison served as an evaluation of the immediate effect of the intervention(s). Finally, Table 8d shows an examination of the effect of an intervention on just one store across all phases (or just the immediate effect). These are only examples of the type of analyses used, actual comparisons may vary when appropriate.

Stop metric

For the purposes of statistical analysis, a metric more sensitive to changes in stopping patterns was calculated. The following formula was used to calculate the stop metric:

$$(S1\% + (S2\% \times 2) + (S3\% \times 3)) / (S1 + S2 + S3)$$

where S1% is the percentage of complete stops, S2% is the percentage of slow rolling advances (i.e., type 2), and S3% is the percentage of fast rolling advances (i.e., type 3). The resulting metric ranges from 1 to 3. If the metric is

closer to 1, a subject has been observed executing more complete stops than fast rolling advances. If the metric is closer to 3 then the subject has been observed committing more fast rolling advances and less complete stops. Stop #2's (i.e., slow rolling advance) are also factored into the stop metric. For example, if a subject committed fewer fast rolling advances during the intervention phase but did not come to a complete stop more often in the same time period, his/her stop metric would still show a change influenced by the greater number of slow rolling advances (i.e., S2). Therefore, the stop metric takes into account all three types of stopping behavior and gives a more relative accounting of stopping than simple percentages of complete stops.

Figure 15 shows the stop metric for each phase at each store during Year 1 and Year 2. Statistical analysis on the stop metric was performed using a 2 (Year: 75% goal, 90% goal) X 3 (Intervention type: D/P, L/A, control) X 3 (phase: baseline, intervention, withdraw) Repeated Measures ANOVA. The significant three-way interaction was found between goal level, intervention type, and the repeated measure, i.e., phase [$F(4, 108) = 8.60, p < .000$]. The summary table for this analysis is shown in Table 9. Simple effects show both goal level (i.e., Year) and intervention type interacted with the repeated measure significantly. An evaluation of Figure 15 shows that the 75% goal during Year 1 had a greater effect during the intervention phase than did the 90% goal during Year 2. Similarly, Figure 15 also shows that, during Year 1, Store A and Store B had greater changes in the stop metric over phases than did Store C (Control). No such effect was observed during Year 2.

Insert Figure 15 about here

Insert Table 9 about here

A 2 (intervention type: D/P, L/A) $\times$ 3 (phase) Repeated Measures (RM) ANOVA was performed separately for Year 1 to analyze the differences between the type of intervention without variance attributed to the control group. During Year 1 the difference between the D/P intervention and the L/A intervention across the repeated measure was not significant although a trend was found [$F(2, 58) = 2.64, p = .07$]. However, an examination of Figure 15 shows that, contrary to hypotheses, Store B had a greater stop metric change across the phases during Year 1 than did Store A. A 2 (intervention type: D/P, L/A) $\times$ 2 (phase: baseline, intervention) RM ANOVA completed for Year 1 showed that the L/A intervention (i.e., Store B) had a significantly greater immediate effect on the stop metric than the D/P intervention [$F(1, 29) = 8.20, p < .01$].

A 2 (intervention type: D/P, L/A) $\times$ 3 (phase) RM ANOVA was also completed to analyze the differences between the type of intervention during Year 2. The difference between the D/P intervention and the L/A intervention across the repeated measures (i.e., baseline, intervention, withdraw) during Year 2 was significant [$F(2, 30) = 4.64, p < .05$]. The dramatic increase in the stop metric by Store B during Year 2 (seen also in the time series analysis in Figure 14) accounts for this difference. The difference

between the D/P intervention and the L/A intervention on immediate impact (i.e., baseline and intervention only) during Year 2 was non significant using a 2 (type intervention) x 2 (phase: baseline, intervention) RM ANOVA [$F(1, 15) = .001, p = .91$].

Because of the counterbalanced research design each store received both the D/P and the L/A interventions. A comparison of the D/P and L/A interventions for Store A was non significant using a 2 (type intervention: Store A only) x 3 (phase) RM ANOVA [$F(2, 60) = .527, p = .60$]. However, a comparison of the D/P and L/A interventions for Store B was significant using a 2 (type intervention: Store B only) x 3 (phase) RM ANOVA [$F(2, 28) = .742, p < .01$]. This result, however, is probably due, again, to the dramatic increase in the stop metric during the withdraw phase of Year 2.

Stop metric conditions: right turn, left turn, traffic, and no traffic.

Additional analyses of stopping behavior were completed by dividing the stop metric among the "setting" variables (i.e., conditions) observed concurrent to the intersection stop. Conditions for the stop metric included making right turns or left turns, and entering the intersection with other vehicles in the vicinity (i.e., traffic) or no other vehicles in the vicinity (i.e., no traffic).

T-tests were completed to compare the stop metric between right and left turn, and traffic and no-traffic conditions during the baseline phase. The stop metric was significantly lower when a deliverer was making a left turn (i.e., stop metric = 1.58) than when the deliverer was making a right turn [i.e., stop metric = 1.72; $t(49) = 3.06, p < .01$]. Likewise, the stop metric was significantly lower when the deliverer was entering an intersection with traffic (i.e., stop metric = 1.18) than without traffic [i.e., stop metric = 2.23; t

(55) = -26.6, $p < .000$]. To analyze which pattern of conditions (i.e., right turn with traffic, right turn without traffic, left turn with traffic, left turn without traffic) was associated with the lowest stop metrics, a 4 way ANOVA was used. The results showed a significant difference in the stop metric between the patterns of conditions [$F(3, 39) = 89.12, p < .000$]. Most of the main effect is due to differences in traffic conditions instead of turn direction. Figure 16 shows the stop metric for each pattern of condition.

Insert Figure 16 about here

In every case, repeated measures statistical analysis on the stop metric conditions (i.e., right turn, left turn, traffic, no traffic) across phases could not be completed for Year 2 because of empty cells. Often there were no observations of a specific stop metric condition during one of the phases during Year 2 for either subjects at Store B and /or Store C. Therefore, statistical analyses will include only Year 1 data. Figure 17 shows the effects of the D/P and L/A interventions on the stop metric when the deliverer was about to make a right turn. A 3 (type intervention: D/P, L/A, control; Year 1 only) $\times$ 3 (phase) RM ANOVA revealed no significant effect for the stop metric (with right turns) for the type of intervention across phases [$F(4, 54) = 1.89, p = .13$]. Further repeated measures ANOVAs showed a trend in the data which suggests a marginally greater immediate impact (i.e., baseline to intervention phase) of the L/A intervention over the D/P intervention [$F(1, 27) = 3.57, p = .06$] and did reveal a significant effect for phase [$F(1, 27) = 11.25, p < .01$].

Insert Figure 17 about here

Figure 18 shows the comparative effects of the interventions when the deliverer was about to make a left turn. A 3 (type intervention: D/P, L/A, control; Year 1 only) $\times$ 3 (phase) RM ANOVA revealed no significant effect on the stop metric (with left turns) for the type of intervention across phases [$F(4, 38) = .668, p = .62$]. Further repeated measures ANOVAs showed no differences in immediate impact (i.e., baseline to intervention phase) between the L/A intervention and the D/P intervention [$F(1, 21) = 2.09, p = .16$] although there was a significant effect across phases [i.e., Store A & Store B; $F(1, 21) = 5.59, p < .05$].

Insert Figure 18 about here

Figure 19 shows the comparative effects of the interventions when the deliverer was about to enter the main road in traffic. A 3 (type intervention: D/P, L/A, control; Year 1 only) $\times$ 3 (phase) RM ANOVA revealed a significant effect on the stop metric (with traffic) for the type of intervention across phases [$F(4, 64) = 2.26, p < .05$]. Another analysis was completed on just the D/P and L/A interventions across phases. The resulting 2 (type intervention; without control Store C) $\times$ 3 (phase) RM ANOVA was non significant [$F(2, 52) = .419, p = .66$] suggesting that the previous interaction was only valid with the control group in the analysis. Therefore, it is concluded that there was no effect for the treatments (i.e., D/P vs. L/A) across phases. Further repeated

measures ANOVAs also showed no differences in immediate impact (i.e., baseline to intervention phase) between the L/A intervention and the D/P intervention [$F(1, 28) = 1.62, p = .21$] although there was a significant effect across phases [i.e., Store A & Store B; $F(1, 28) = 8.87, p < .01$].

Insert Figure 19 about here

Finally, Figure 20 shows the comparative effects of the interventions when the deliverer was about to enter the main road with no immediate traffic. A 3 (type intervention: D/P, L/A, control; Year 1 only) $\times$ 3 (phase) RM ANOVA revealed no significant effect on the stop metric (with no traffic) for the type of intervention across phases [$F(4, 46) = .835, p = .51$]. Further repeated measures ANOVAs revealed that the L/A intervention had a significantly greater immediate impact (i.e., baseline to intervention phase) than the D/P intervention [$F(1, 23) = 5.78, p = .05$].

Insert Figure 20 about here

Turn Signal Use

Analyses were done on the non-targeted behaviors to assess the generalization of effect across behaviors (i.e., response generalization). Figure 21 depicts weekly percentages of turn signal use in a time series design over four experimental phases during Year 1. Figure 22 depicts weekly percentages of turn signal use in a time series design over four experimental phases during Year 2. These figures are summarized in Figure 23 which shows the

percentages of turn signal use per phase for both Year 1 and Year 2. A 2 (Year: 75% goal, 90% goal) x 3 (type intervention: D/P, L/A, control) x 3 (phase: baseline, intervention, withdraw) Repeated Measures ANOVA was completed on turn signal use. A three-way interaction between year, type intervention, and phase was significant [$f(4, 114) = 2.638, p < .05$]. The summary table for this analysis is shown in Table 10.

Insert Figures 21, 22, and 23 about here

Insert Table 10 about here

During Year 1, subjects in Store A showed an increase of 7 percentage points between baseline (i.e., 69%) and intervention (i.e., 76%) phases during the D/P intervention and a continued increase to 10 percentage points above baseline during the withdraw phase (i.e., 79%). This represents a significant difference over the L/A intervention in turn signal use across phases during Year 1 [$F(2, 56) = 546, p < .01$]. Subjects in Store A also showed an increase in turn signal use between baseline (67%) and intervention (i.e., 78%) phases during the L/A intervention of Year 2. However, turn signal use returned near baseline levels during the withdraw phase (i.e., 71%) of Year 2. There was not a significant difference in turn signal use between the D/P and the L/A interventions across all phases during the Year 2 [$F(2, 30) = 1.77, p = .18$] nor was there a significant difference in immediate impact on turn signal use

for the D/P and L/A interventions; the difference was only marginal [$F(1, 15) = 3.64, p = .07$].

Turn signal use conditions: Right turn, left turn. Additional analyses of turn signal use were completed among the "setting" variables (i.e., conditions) observed concurrent to the intersection stop. Conditions for turn signal use included making a right turn or a left turn. Turn signal use was significantly lower when a deliverer was making a right turn (i.e., 56%) than when the deliverer was making a left turn [i.e., 76%; $t(59) = -5.30, p < .000$].

As with the conditions with the stop metric, repeated measures statistical analysis on the turn signal use conditions (i.e., right turn, left turn) could not be completed for Year 2 because of empty cells. Therefore, statistical analyses included only Year 1 data. Figure 24 shows the effects of the D/P and L/A interventions on the turn signal use when the deliverer was about to make a right turn. A 3 (type intervention: D/P, L/A, control; Year 1 only) $\times$ 3 (phase) RM ANOVA revealed no significant effect for turn signal use (with right turns) for the type of intervention across phases [$F(4, 76) = 1.87, p = .12$]. Further, comparisons between the D/P and L/A intervention were non significant. However, an analysis of just Store A during Year 1 shows a significant effect across phases [$F(2, 36) = 3.35, p < .05$]. This represents an occurrence of response generalization.

Insert Figure 24 about here

Figure 25 shows the comparative effects of the interventions (targeting complete stopping) on turn signal use when the deliverer was about to make

a left turn. A 3 (type intervention: D/P, L/A, control; Year 1 only) × 3 (phase) RM ANOVA revealed no significant effect on turn signal use (with left turns) for the type of intervention across phases [$F(4, 66) = 1.50, p = .22$]. Further, comparisons between the D/P and L/A intervention were non significant. Therefore, response generalization was not observed in turn signal use when the deliverer was turning left.

Insert Figure 25 about here

Safety Belt Use. Figure 26 depicts weekly percentages of safety belt use in a time series design over four experimental phases during Year 1. Figure 27 depicts weekly percentages of safety belt use in a time series design over four experimental phases during Year 2. These figures are summarized in Figure 28 which shows the percentages of turn signal use per phase for both Year 1 and Year 2. A 2 (Year: 75% goal, 90% goal) × 3 (type intervention: D/P, L/A, control) × 3 (phase: baseline, intervention, withdraw) Repeated Measures ANOVA was completed on safety belt use. A three-way interaction between year, type intervention, and phase was significant [$f(4, 110) = 682.67, p < .05$]. The summary table for this analysis is shown in Table 11.

Insert Figures 26, 27, and 28 about here

Insert Table 11 about here

During Year 1, subjects in Store A showed an increase of 10 percentage points between baseline (i.e., 75%) and intervention (i.e., 85%) phases during the D/P intervention and a maintained these levels during the withdraw phase (i.e., 83%). There was no significant difference on immediate impact (i.e., baseline and intervention phases) between the D/P and L/A intervention (without the control Store C) in safety belt use during Year 1 [$F(1, 29) = .686, p = .42$] although there was a main effect for phase [$F(1, 29) = 4.09, p < .05$]. While subjects at Store B showed an increase in safety belt use during Year 2 between baseline (i.e., 74%) and intervention (85%) phases during the D/A intervention, subjects in Store A showed an decrease in safety belt use between baseline (68%) and intervention (i.e., 58%) phases during the L/A intervention of Year 2. This represents a significant difference in the immediate impact of the D/P and the L/A interventions on safety belt use during the Year 2 [$F(1, 15) = 818, p < .05$]. This represents an occurrence of response generalization.

Analysis of Response Classes

An analyses of the inter relatedness of the observed behaviors was completed on two levels of analysis. The behavioral level of analysis and the individual level of analysis. Both types of analyses were completed on only subjects who met the stated criteria so all analyses could be repeated across phases.

Behavioral Level of Analysis

The behavioral level analysis used the actual incident of the behavior as the level of analysis. At the time of observation the behavior was recorded on a non-parametric scale of "yes" (i.e., occurred) or "no" (i.e., did not occur)

or in the case of intersection stopping, a "1", "2", or "3". Therefore, each observation of a deliverer could have resulted in a relatively concurrent observation of each behavior. The relationship between behaviors were then analyzed using a chi-square analysis to evaluate if (non)occurrences of one behavior correspond directly (in time) with (non)occurrences of another behavior. For the purposes of this analysis intersection stopping was reorganized into "1" (occurrence) or "2" (nonoccurrence). Table 12 shows the chi-square analyses for the relationship between behaviors and between specific behavioral conditions across baseline and intervention phases.

Insert Table 12 about here

Safety belt use was significantly related to complete stops but only when the driver was about to make a right turn. This is probably due to the natural high necessity of stopping when having to take a left turn across two lanes of (potential) traffic. Nevertheless, this suggests that, when individuals are using their safety belt they are significantly more likely to come to a complete stop when turning right. Also safety belt use was significantly related to complete stops when there was no traffic. Interestingly, safety belts were significantly related to complete stop when there was traffic during baseline, but during the intervention this relationship was no longer significant. Finally, safety belts were significantly related to turn signal use during both baseline [$X(1, 1663) = 53.81, p < .000$] and intervention [$X(1, 1051) = 49.35, p < .000$] phases suggesting that when individuals use their safety belt they are more likely to use their turn signal.

Other relationships between behaviors were not significant during baseline, however, a significant relationship developed during the intervention. This development occurred between turn signal use (right turn) and complete stops (right turn and traffic) as well as between turn signal use (left turn) and complete stops (traffic). For example, a comparison of crosstabulation tables across phases, shown in Table 13, demonstrates that as complete stops (right turn) increased due to the intervention the incidents of turn signal use (right turn) also increased.

Insert Table 13 about here

Individual Level of Analysis

The individual level of analysis used the percentage of times a deliverer was observed engaging in a behavior during a phase to evaluate interrelationships between behaviors. Table 14 shows the correlations between individual percentages of complete intersection stops, turn signal use, and safety belt use for baseline, intervention, and withdraw phases. There was no significant relationship between complete intersection stops and safety belt use during the baseline phase, however, a significant relationship did develop during the intervention (i.e., targeting complete intersection stopping). Likewise, the correlation between complete intersection stopping and turn signal use was not significant during baseline, however, it also became significant during the intervention phase. these increased correlations could be due to response generalization from the targeted behavior to non-targeted behaviors. Turn signal use correlated

significantly with safety belt use during both baseline and intervention phases. This result is consistent with previous findings (Ludwig & Geller, 1991) and suggests a functional relationship between these turn signal and safety belt use.

Insert Table 14 about here

Further correlations were completed to examine the relationships between behavioral conditions (i.e., right turn, left turn, traffic, no traffic). Table 15 shows a correlation matrix between safety belts, turn signal conditions (i.e., right turn, left turn), and stop metric conditions (i.e., right turn, left turn, traffic, no traffic). With traffic, safety belt use did not correlate with the stop metric during baseline, however, during the intervention(s) targeting stopping a significant relationship did develop. Interestingly, an opposite finding was revealed between safety belt use and the stop metric in the absence of traffic. A significant relationship was apparent during baseline only to become non-significant during the intervention. This same pattern of results were found in the comparison between safety belts and intersection stopping (no traffic) in the behavioral level of analysis reported earlier.

Insert Table 15 about here

A Demonstration of Response Generalization

Figure 29 shows the relationship between complete stops and turn signal use during the baseline and intervention phases. These two

scatterplots represent the correlation between individual deliverer percentages of complete stops and turn signal use. The linear regression line (of "best fit") demonstrated the change in relationship between these two behaviors. During the baseline phase the regression line is almost horizontal and most subjects averages for turn signal use did not consistently relate to any particular average of complete stops. During the intervention phase, however, the regression line shows a positive relationship between stops and turn signals. According to the correlation coefficient ($r = .40$) individuals who had a higher average of complete stops now tended to also have a higher average of turn signal use. However, in actuality, this relationship is difficult to see on the scatterplot. What is apparent in the scatterplot is a shift in the relationship from the middle of the graph to the upper right side. This provides a "shadow" of the process of response generalization; as complete stops increased so did turn signal use.

Insert Figure 29 about here

In order to visualize the process of response generalization better, Figure 30 was created from the repeated measures data to show the actual "movement" of individuals from one phase to the other. Both graphs in this figure are copies of the scatterplot between complete stops and turn signal use during the intervention phase. Their relationship per individual is represented by white squares. The darker circles represent the data of selected subjects during the baseline phase. Because these subjects were observed during both the baseline and intervention phases it was possible to link the

two segments of data. An arrow is provided to connect individual data from the baseline phase to the intervention phase.

Insert Figure 30 about here

The top graph in Figure 30 shows the movement of individuals who originally came to a complete stop 40% of the time or less during the baseline phase. The main effect of the intervention on the target behavior can be seen in the increase in the percentages of complete stops among these individuals. Of these 10 individuals, four showed a concurrent increase in turn signal use along with their increases of complete stopping and three showed slight decreases in turn signal use. It seems that a most of the individuals who have low original rates of complete stops do not show response generalization. The lower graph in Figure 30 focuses on individuals who showed at least a 10% increase in turn signal use during the intervention phase. Five out of these eleven individuals actually increased their turn signal percentage during the intervention phase while not directly responding to the intervention by increasing their percentage of complete stops. Six individuals, however, also showed at least a 10% increase in complete stopping concurrent with their increase in turn signal use. For these six people it appears that the effect of the intervention generalized to also impact turn signal use.

The relationship between complete intersection stops and safety belt use across the baseline and intervention phases is presented in Figure 31. The first scatterplot shows the non significant relationship between

individual percentages of complete stops and safety belt use during baseline. The regression line in the baseline scatterplot is nearly horizontal and the data itself appears to be somewhat multicollinear. The deliverers were either observed using their safety belts almost all the time (i.e., above 60%) or hardly ever (i.e., below 20%). During the intervention phase, the scatterplot reflects the significant correlation between stops and belts (i.e., $r = .34$). Many more individual percentages appeared in the upper right quadrant during the intervention phase than during the baseline phase.

Insert Figure 31 about here

Figure 32 shows the main effect of the intervention(s) on complete stopping and the generalization of the intervention(s) effect to safety belt use. The top graph on Figure 32 depicts the movement of individual percentages from the baseline to the intervention phase specifically for subjects who were observed coming to a complete stop less than 40% of the time during the baseline session. A few of these individuals showed an increase in safety belt use concurrent to their increase in complete stops, however, this was not the norm. In fact, one subject showed a 20 percentage point decrease in belt use coinciding with his/her 25 percentage point increase in complete stopping. The bottom graph of Figure 32 shows, in dark circles, the relationship between individual percentages of complete stops and safety belt use during baseline specifically for subjects who showed a 10% increase in safety belt use in response to the intervention(s). All but one of the subjects who were observed to use their safety belt more than 50% of the time during the baseline

phase showed dramatic response generalization characterized by movement up and to the right of the graph. With the exception of one, subjects who rarely used their safety belts during the baseline phase did not show any improvement in their percentage of complete stops during the baseline phase.

Insert Figure 32 about here

Figure 33 shows the movement of individuals who were observed to decrease their percentage of safety belt use or turn signal use at least 10 percentage points. Of these eleven subjects, two decreased their safety belt use and only one decreased his/her turn signal use concurrently with an increase in complete stopping. If Wilde's theory were to be supported, a majority of these subjects would show movement up and to the left of this graph.

Insert Figure 33 about here

Personality Variables

Four personality scales were administered to employees at Store A and Store B during both years of this study. These scales include 1) the Adult Nowicki-Strickland Internal-External Scale (LOC), 2) Montag and Cromey's Driver Externality Scale (DE), 3) Montag and Cromey's Driver Internality Scale (DI), and 4) Merz's Psychological Reactance Scale (React). In addition, the Psychological Reactance scale also includes three Factors which were also analyzed. According to Byers and Tucker (in press), items in Factor 1 reflected

"rebellious behaviors," items in Factor 2 reflected "freedom of choice," and items in Factor 3 reflected "freedom from external restraint." Analyses of personality variables was completed in four parts: 1) correlations between specific personality variables, 2) correlations between personality variables and responses to the post-meeting questionnaire, 3) correlations between the personality variables and specific behaviors during baseline, and 4) Repeated Measures ANOVAs evaluating the interaction between the personality variables and responsiveness to the type of intervention (i.e., D/P vs. L/A).

Correlations Between LOC, DE, DI, and React

Table 16 shows the correlations between LOC, DE, DI, React, React Factor 1, React Factor 2, and React Factor 3. Contrary to Montag and Cromey's claims, there was no correlation between LOC and the DI scale and only a moderate non-significant correlation between LOC and the DE scale. In addition there was no significant correlation between the React scale and the LOC or DE scale and only a moderate non-significant correlation between React and the DI scale. It seems that while the DE scale is more closely related to the LOC scale, the DI scale is more closely related to psychological reactance. Finally, all the factors within the React scale correlated significantly with the whole scale and with each other.

Insert Table 16 about here

Correlations between Personality Variables and the Post-Meeting Questionnaire

Table 17 shows the correlations between the LOC, DE, DI, React, and React Factors and items on the post-meeting questionnaire. Only two significant correlations occurred. One was between the DI scale and Contrib. (i.e., the amount individuals thought they contributed to the goal) and the other between the React Factor 1 (i.e., rebelliousness) and Intent (i.e., intent to come to a complete stop in the future). This suggests that individuals who perceive a high level of control over outcomes while driving felt they contributed to the goal more. Also, individuals who label themselves as more rebellious (i.e., React Factor 1) were less likely to say they intended to come to a complete stop after the meeting.

Insert Table 17 about here

Correlation between Personality Variables and Baseline Behavior

Table 18 shows the correlations between the LOC, DE, DI, React, and React Factors and baseline behavior percentages. The only significant relationship was between turn signal use and the reactance scale and Factor 1 of the reactance scale. This suggests that individuals who label themselves as more reactive and rebellious were significantly less likely to use their turn signal. This result seems to be robust. Turn signal conditions (i.e., right turn, left turn) and the reactance scale correlated significantly and negatively when the deliverer was about to make a right turn [$r(25) = -.40, p < .05$]. Similar negative correlations were found between turn signal use (right turn) and

React Factor 1 [$r(25) = -.40, p < .05$] and React Factor 3 [i.e., "freedom from external constraint"; $r(25) = -.37, p < .05$]. In addition, React Factor 2 (i.e., "freedom of choice") significantly correlates negatively with turn signal use when the deliverer is about to make a left turn [$r(23) = -.40, p < .05$]

Insert Table 18 about here

Interactions between the Personality Variables and Responsiveness to the Type of Intervention

For the purposes of statistical analysis each personality variable was dichotomized into high and low groups on the basis of a median split. The median split technique was used because of the low sample size (i.e., subjects who completed the questionnaires and met the stated criteria for inclusion into the repeated measures analysis). The control group were not administered the questionnaires.

Locus of Control. A 2 (LOC: high, low) $\times$ 2 (type intervention: D/P, L/A) $\times$ 3 (repeated measures: baseline, intervention, withdraw) RM ANOVA completed on the stop metric revealed no significant interactions between LOC and the type of intervention across phases [$F(2, 52) = 1.43, p = .25$] or for LOC across phases [$F(2, 52) = .687, p = .51$].

A 2 (LOC: high, low) $\times$ 2 (type intervention: D/P, L/A) $\times$ 3 (repeated measures: baseline, intervention, withdraw) RM ANOVA completed on turn signal use revealed no significant interactions between LOC and the type of intervention across phases [$F(2, 50) = .095, p = .90$] or for LOC across phases [$F(2, 50) = .268, p = .77$].

A 2 (LOC: high, low) $\times$ 2 (type intervention: D/P, L/A) $\times$ 3 (repeated measures: baseline, intervention, withdraw) RM ANOVA completed on safety belt use revealed no significant interactions between LOC and the type of intervention across phases [$F(2, 50) = .089, p = .91$] or for LOC across phases [$F(2, 50) = .996, p = .38$].

Driver Externality. A 2 (DE: high, low) $\times$ 2 (type intervention: D/P, L/A) $\times$ 3 (repeated measures: baseline, intervention, withdraw) RM ANOVA completed on the stop metric revealed no significant interactions between DE and the type of intervention across phases [$F(2, 52) = .832, p = .44$] or for DE across phases [$F(2, 52) = .189, p = .83$].

A 2 (DE: high, low) $\times$ 2 (type intervention: D/P, L/A) $\times$ 3 (repeated measures: baseline, intervention, withdraw) RM ANOVA completed on turn signal use revealed no significant interactions between DE and the type of intervention across phases [$F(2, 52) = 2.43, p = .10$] or for DE across phases [$F(2, 52) = .404, p = .68$].

A 2 (DE: high, low) $\times$ 2 (type intervention: D/P, L/A) $\times$ 3 (repeated measures: baseline, intervention, withdraw) RM ANOVA completed on safety belt use revealed no significant interactions between DE and the type of intervention across phases [$F(2, 50) = .422, p = .66$] or for DE across phases [$F(2, 50) = .633, p = .54$].

Driver Internality. A 2 (DI: high, low) $\times$ 2 (type intervention: D/P, L/A) $\times$ 3 (repeated measures: baseline, intervention, withdraw) RM ANOVA completed on the stop metric revealed no significant interactions between DI and the type of intervention across phases [$F(2, 52) = .342, p = .72$]. However, there was a significant effect for DI across phases [$F(2, 52) = 4.14, p < .05$].

Figure 34 shows the relationship of DI on the stop metric across phases. Whereas individuals with high driver Internality responded to the intervention and returned to baseline levels during the withdraw phase, individual with a low driver Internality responded to the intervention and continued to decrease their stop metric into the withdraw phase. This is contrary to hypotheses which suggested High DI individuals would show the most overall response to the intervention.

Insert Figure 34 about here

A 2 (DI: high, low) $\times$ 2 (type intervention: D/P, L/A) $\times$ 3 (repeated measures: baseline, intervention, withdraw) RM ANOVA completed on turn signal use revealed no significant interactions between DI and the type of intervention across phases [$F(2, 50) = .182, p = .83$] or for DI across phases [$F(2, 50) = .482, p = .63$].

A 2 (DI: high, low) $\times$ 2 (type intervention: D/P, L/A) $\times$ 3 (repeated measures: baseline, intervention, withdraw) RM ANOVA completed on safety belt use revealed no significant interactions between DI and the type of intervention across phases [$F(2, 50) = .404, p = .57$] or for DI across phases [$F(2, 50) = 1.55, p = .22$].

Psychological Reactance Scale. A 2 (React: high, low) $\times$ 2 (type intervention: D/P, L/A) $\times$ 3 (repeated measures: baseline, intervention, withdraw) Repeated Measures ANOVA completed on the stop metric revealed a trend in the interaction between React and the type of intervention across phases [$F(2, 46) = 2.6, p = .08$]. Further analysis suggested that Factor 1

(i.e., "rebelliousness") of the Reactance scale did significantly interact with the type of intervention across phases [$F(2, 46) = 3.1, p < .05$]. This interaction, portrayed in Figure 35, shows the differential effect of rebelliousness across the type of intervention. As a result of the D/P intervention individuals low in rebellion show continued responsiveness to the intervention into the withdraw phase whereas individuals high in rebellion actually increase their stop metric (i.e., committing more fast rolling advances). Both individuals high and low in rebellion showed responsiveness to the L/A intervention.

Insert Figure 35 about here

A 2 (React: high, low) $\times$ 2 (type intervention: D/P, L/A) $\times$ 3 (repeated measures: baseline, intervention, withdraw) RM ANOVA completed on turn signal use revealed no significant interactions between React and the type of intervention across phases [$F(2, 44) = .786, p = .47$] or for React across phases [$F(2, 50) = 5.48, p = .05$].

A 2 (React: high, low) $\times$ 2 (type intervention: D/P, L/A) $\times$ 3 (repeated measures: baseline, intervention, withdraw) RM ANOVA completed on safety belt use revealed no significant interactions between React and the type of intervention across phases [$F(2, 44) = .409, p = .67$] or for React across phases [$F(2, 50) = 1.53, p = .23$].

DISCUSSION

The general assumptions offered by the Safety Triad (Geller, 1992) were found to be valid in this study. A) An Environmental intervention to

increase the occurrences of safety intersection stopping was effective. However, contrary to hypotheses, the Lecture/Assigned intervention was found to effect complete stopping more than the Discussion/Participation intervention both during the intervention phase and over the long term (i.e., the 5 months following the intervention). This supported Locke and Latham (1990) who stressed no differences in performance between participative and assigned set goals. B) The Environment was shown to interact with Behavior in the results demonstrating response generalization. The intervention(s) aimed at increasing complete stopping also increased the occurrence of turn signal and safety belt use (i.e., non target behaviors). However, this occurred only in response to the D/P intervention, possibly revealing a beneficial "side" effect of this type of goal setting strategy. C) The Behaviors interacted slightly with Person variables. One robust finding was that a disposition to psychological reactance (i.e., measured by the Reactance scale) influenced the rate of turn signal use. D) Finally, the Environment was shown to interact with the Person variables. These effects should be considered marginal although there was some indication that a disposition toward psychological reactance interacted with the D/P intervention to significantly effect intersection stopping.

In this section, the results of this study are reviewed in light of the specific research hypotheses offered and implications of these findings are discussed. Table 1 outlines the specific hypotheses proposed for this study. By way of comparison, Table 19 outlines the results of this study in the context of the hypotheses. The remainder of this section discusses these

findings and relates them to the hypotheses, methods used, and the overall research literature on each topic.

Insert Table 19 about here

Environment

Overall Effects of the Intervention

Many different analyses were completed on the behavioral data in order to draw conclusions from a triangulated set of results. Thus, the effect of the intervention on intersection stopping was evaluated on four levels: 1) community-level complete intersection stopping for each data collection session, 2) community-level fast rolling advance for each data collection session, 3) repeated measures complete intersection stopping via weekly means, and 4) phase means of the stop metric.

Community analysis. In the community analysis, daily percentages of complete intersection stops and fast rolling advances were calculated and displayed. By graphing the daily data of individual stores, the opportunity to examine the range and variability of intersection stopping (as well as safety belt and turn signal use) within and between settings was available, an advantage of this type of field research. Day-to-day variability in this data suggested a number of individual and environmental factors separate from the intervention procedures determined the occurrence of complete intersection stopping. Examining daily patterns of behavior often reveal group averages per phase often response variability worthy of scientific investigation (Ludwig & Geller, 1991). For example, the D/P intervention at

Store A (i.e., Year 1) was effective at increasing the occurrence of complete intersections stops (see Figure 5). This increase was maintained into the withdraw phase, however, a dramatic drop in occurrences appeared about two weeks after the withdraw of the intervention. For two weeks during this period, employees at Store A averaged only 38% complete stops, lower than baseline. A slight decrease at Store B was also noted during this period. However, four weeks into the withdraw phase this decrease was reversed and complete stops regained intervention-level percentages. The two week period of lower daily percentages may have been due to environmental fluctuations specific to the Thanksgiving holiday period (e.g., less traffic) and could have also been a time of increased sales for the pizza stores. It would be instructive to compare this behavioral data with sales records from these stores.

Another interesting variation in the data occurred one week before the L/A intervention meeting at Store B (i.e., Year 1). At this point the managerial staff at Store B began obtrusively counting observations of complete stops. In response, the data suggest that this, in itself, increased the occurrence of complete stops almost immediately. A similar increase was noted at Store A during the week before the intervention meeting. This suggests that most of the intervention effect may have been due to the obtrusive observations of the managers. Indeed, the level of complete intersection stopping during the week before the meetings approximated the level attained in the midst of the intervention phase itself, although both treatment stores did show some continued increase after the meeting. It is noteworthy that both stores maintained occurrences of complete stops during

Year 1 into the withdraw phase, after obtrusive managerial data collection ceased.

At the community level it is evident that the goal setting intervention, consisting of managerial observations, a group meeting, goal setting, feedback, and small reward, was successful in increasing the occurrences of complete stops. This was especially the case during Year 1. Only observations at Store B during Year 2 showed an effect of the intervention on complete stopping (see Figure 6). Likewise, the goal setting intervention also seemed to have an impact on fast rolling advances at Store B during Year 1 but not on Store A.

Repeated measures analysis. Only about 10% of the total deliverers observed in this study met the criteria to be included in the repeated measures analysis. At one level this represents a large decrease in statistical power which may increase the likelihood of Type 2 error. In actuality, however, because of their repeated observations over many months of the study, the 10% of individuals used in the repeated measures analysis actually represented over 50% of the data collected. Therefore, the time series data on the repeated measures analysis was similar to the community analysis. What was gained from the repeated measures analysis is the added preciseness of using the individual as the level of analysis instead of the treatment setting.

The time series data of the repeated measures analysis took a weekly mean of each deliverer meeting criteria and averaged these means to arrive at the weekly mean for the store (see Figures 13 & 14). This reduced a good amount of the environmental variance seen in the community analysis. However, the range of daily means among drivers were included to add the perspective of the variance across individuals for each week. The effect of

the goal setting intervention can be seen in the weekly means as well as the individual range of daily means for deliverers meeting the criteria. The conclusions drawn about the intervention effectiveness are similar to those at the community level. The impact of the intervention on complete intersection stops was apparent at both target stores during Year 1 and at only Store B during Year 2. Maintenance of the intervention effect was also noted during Year 1.

Stop metric. The stop metric was used to give a relative accounting of the change in stopping behavior over the experimental phases. The presentation of the stop metric data was calculated by taking the mean of each driver for each phase (from behavioral incidents not from daily means⁴) and averaging them to arrive at a store mean. Therefore, individuals who may have been observed more often than others during a particular phase did not contribute a greater weight than other deliverers in the store mean.

The analyses of the stop metric did show that the goal setting intervention had an effect on intersection stopping. Significant effects for the overall intervention (across phases) were found with the stop metric for Year 1. More specifically the intervention significantly impacted the stop metric for right turns, the stop metric for left turns, and the stop metric for traffic. No significant effects were found for the intervention during Year 2.

During Year 1 employees at the D/P intervention chose 75% complete stops as their goal. This goal was then mandated at the L/A store. In contrast, during Year 2 employees at the D/P intervention chose 90% complete stops as their goal. Because this was not part of the original research design, it would be inappropriate to draw the conclusion that the 75% goal had a greater effect

on behavior than the 90% goal. First of all this finding is contrary to most of the findings in the goal setting literature. Of 192 studies reviewed by Locke and Latham (1990) which compared goal difficulty, only 17 did not conclude that the difficulty of the goal positively influenced the effectiveness of goal setting. Secondly, the small subject size at Store B (i.e., 5 who met the criterion and did not receive the intervention during the first year) does not provide a reliable comparison to the results from Year 1. Thirdly, no manipulation checks were done to show that one goal was perceived as more difficult from the others.

Although no conclusions can be drawn on the different effects of goal level on complete stops, it is interesting to examine the data from Store A across Year 1 and Year 2 (in which both years had reasonable subject sizes in the repeated measures analysis). During Year 1, Store A received the D/P intervention with the 75% goal. During Year 2, Store A received the L/A intervention with the 90% goal. According to Locke and Latham's goal setting theory (1990), the L/A intervention with the 90% goal should have had a greater effect than the D/P intervention with the 75% goal. However, the opposite was found. The D/P intervention had a significantly greater change in the stop metric with the 75% goal than the L/A intervention showed with the 90% goal.

Again, these results should be viewed with caution. Because this comparison was not part of the original research design certain threats to internal validity were not controlled for. For example, while intervention type was counterbalanced between stores, goal level was not. Although care was taken to make the intervention during Year 2 identical to the

intervention during Year 1, without a counterbalance, there is no way to control for order effects (i.e., variance attributed to the fact that the 75% goal came first followed by the 90% goal).

An additional occurrence partially confounded the data for the second year. During the intervention phase both Store A and Store B became involved in a regional sales competition. This was an especially salient activity for Store A because they had held monthly national sales records on many different occasions. Most of managerial effort and employee attention went into marketing pizzas in the communities. Additional meetings were held and employees were asked to make phone calls and hand out flyers. Although the goal setting intervention was completed in its entirety at both stores during Year 2, the additional attention given the sales effort may have reduced some of the intervention's effects. Therefore, conclusions stemming from the results of Year 2 are not, for the most part, be offered in the rest of this section.

Summary. In an effort to triangulate the actual impact of the goal setting intervention, four different analyses were done on the incidents of stopping behavior over the experimental phases. In each case the effect of the intervention program was apparent and significant during Year 1. However, a significant effect of the intervention for Year 2 was not found at both stores. Comparisons of the effects of goal level between Year 1 and Year 2 should be viewed with caution. Because of the small subject size for Store B and C during Year 2 most of the discussion during the remainder of this section will focus on Year 1 unless otherwise stated.

Participatory vs. Assigned Goals

This study supported the conclusions of Locke and Latham (1990) and Latham and Lee (1986; see also Mento, Steel, & Karren, 1987; Tubbs, 1986) in that it provided no evidence that goals set participatively by subjects, effected the *target performance variable* any better than goals which were assigned. Goal difficulty was held constant (within years) across treatment sites (cf. Dossett, Latham, & Mitchell, 1979; Latham & Saari, 1979a; Latham, Steel, & Saari, 1982) as was the amount and type of information presented each group (cf. Latham & Sari, 1979b). The research design was modeled after that of Erez and her associates (Erez, 1986; Erez & Arad, 1986; Erez, Early, & Hulin, 1985; Erez & Kanfer, 1983) using the group discussion technique along with the participative goal setting. Using this method Erez was able to show differences between discussion/participative goal setting and the more "terse (Locke & Latham, 1990, pg. 164)" assigned goal setting technique.

The Lecture/Assigned intervention was shown to effect stopping behavior (i.e., via stop metric) significantly more than the Discussion/Participation intervention. This finding was triangulated from many sources of analysis, including the community analysis of fast rolling advances during Year 1 and the statistical analysis of the stop metric with right turns. The most convincing statistical analysis revealed that the L/A intervention had a significantly greater immediate impact (i.e., intervention phase) on the stop metric during Year 1 than did the D/P intervention. Some of the difference in immediate impact between the L/A (i.e., Store B) and the D/P (i.e., Store A) during Year 1 may have bene due to the fact that Store A had a 10 percentage point higher baseline of complete intersections stops (and

a lower baseline of the stop metric). However, the difference between baseline levels of the stop metric was non significant [$F(2, 41) = 1.96, p = .15$]. Also, analyses of the stop metric in the traffic condition showed significant immediate effects of the L/A intervention over the D/P intervention even though the stop metric means were almost identical. Therefore, it is concluded that the L/A intervention had a greater immediate effect than the D/P intervention on stopping behavior.

This conclusion is contrary to the hypothesis that the D/P intervention will have the greater immediate impact on stopping. The actual manipulation between the D/P and L/A stores took place only during the intervention meeting. All other aspects of the intervention were the same after this point (with the possible exception of the signs that were posted announcing the end of the intervention). It is possible the lecture and the mandated goal from the manager were paired with the obtrusive surveillance of the target behavior by the managerial staff which continued throughout the intervention. Therefore, the managerial observations may have taken on a different motivating function during the L/A intervention than the D/P. During the L/A intervention these observations may have been viewed as an additional external consequence to the goal setting with possible implications to future employment. During the D/P intervention, on the other hand, the managerial observations may have been viewed as providing relevant feedback to employee behavior and helping them progress toward their goal. Although both are motivating, the external consequences may have been far more salient, thereby having a greater impact on the target behavior.

Secondly, the hypothesis that the D/P intervention would have a greater long term effect than the L/A intervention was not supported. According to both the community and repeated measures time series data both Store A and Store B showed maintenance of their complete stopping behaviors during the withdraw phase of Year 1. In fact, Store B, which received the L/A intervention showed greater (albeit non significant) maintenance than Store A, which received the D/P intervention.

Rule governed behavior. It is possible that the goal setting procedures promoted the development of specific "rules" which governed stopping behavior. Earlier in this manuscript it was suggested that goals themselves are rules which govern the behavior they target. Indeed, while the goals were in effect, increases in complete stopping were evident, even in the absence of direct external consequences. The goals in this intervention: a) specified a small contingency (i.e., the reward) as well as implied a greater, albeit less likely, meta-contingency (i.e., involvement in an accident); b) designated environmental stimuli as a discriminative stimuli (i.e., feedback signs and managerial observations); and c) described correct performance (i.e., complete stop at a specific intersection). These are consistent to what Blakely and Schlinger (1987, Schlinger & Blakely, 1987) conceived as "rules."

After the goals were withdrawn, both stores maintained an increased level of complete intersections stops in the absence of any overt external mechanisms to motivate complete stopping during the withdraw phase. It was suggested earlier that employees who participate in goal setting may incorporate these goals as personal rules which will continue to influence their behavior in the absence of the goal. It is possible that both the D/P and

L/A intervention facilitated the development of personal rules which governed deliverers' stopping behavior into the withdraw phase.

This is understandable in the context of the pizza delivery business. Assuming that individual driving behavior was governed by a personal set of rules before being employed, subjects of this study were required to incorporate new rules in their capacity as a pizza deliverer. For example, as a deliverer, they needed to review a map before beginning their trip, run to their car, and keep their car running when going to a customer's door. All these things they may not have done previous to their employment and probability do not do when driving during their free time. It is possible that the goal setting intervention facilitated yet another rule specific to making pizza deliveries for their store. Therefore, when driving for their job, even after the intervention was withdrawn, individuals may have continued to come to a complete stop because it was incorporated into their job-related rules. A true test of this theory would be to observe these pizza deliverers driving in their free time to evaluate if the intervention effect generalized to other settings.

In their manuscript "An implicit technology of generalization," Stokes and Baer (1977; later Stokes & Osnes, 1989) discussed the generalization of intervention effects across setting, times, persons, and behavior. Generalization across times (i.e., maintenance) was evaluated in this study by continuing observations into the withdraw and follow-up phases. Generalization across behavior was evaluated by observing non targeted behaviors concurrent to the target behavior before, during, and after the intervention. In both cases it was hypothesized that generalization would

occur in response to the D/P intervention and not in response to the L/A intervention. It follows that generalization across settings would also result only from the D/P intervention. Therefore, it is suggested that individuals who received the D/P intervention would be more likely to come to a complete stop while not delivering pizzas than individuals who received the L/A intervention. Although concurrent observations of free time driving were not collected in this study it does offer an interesting comparison for future studies.

Summary. The immediate impact of the L/A intervention was significantly greater than the D/P intervention. This is contrary to the hypotheses and supports the conclusions reported by Locke and Latham (1990). Furthermore, there was no difference in the long term impact of the D/P and L/A intervention. It was suggested that both interventions facilitated development of rules which governed stopping behavior while making deliveries on the job. Observations of free-time driving behavior would be beneficial in understanding possible differential effects of the D/P vs. L/A intervention. One appropriate alternative were the observations of non targeted behaviors concurrent to the D/P and L/A interventions in this study.

Behavior

While doing the pilot research for this study (Ludwig & Geller, 1991) a test of generalization across behaviors was instructive. Therefore, this study used three indices of effectiveness. The first two dealt with a change in the target behavior during and after the intervention phase. The third focused on the generalization of the intervention's effect on behaviors not directly

targeted by the intervention. This index of effectiveness has seldom been used in the goal setting, organizational behavior management, or applied behavior analysis literature. This is despite the fact that many researchers in the field have called for a greater ecological perspective in applied research. Willems (1974) challenged applied researchers to anticipate and investigate "second- and third-order consequences" of interventions (cf. Eisenberg, 1972; Rogers-Warren & Warren, 1977). Indeed, recent perspectives on social validity featured in a special issue of the Journal of Applied Behavior Analysis called for an evaluation of "unpredicted side effects" (Schwartz & Baer, 1991) or the undesired behaviors which occur concurrent to an intervention program (Geller, 1991; 1987). In a much cited work, Stokes and Baer (1975) suggested ways in which generalization may be programmed into an intervention. Hawkins (1991) stated in his comment on social validation, "The best validation of what behavior is most adaptive is to test experimentally the outcomes produced by different behaviors and different levels of their performance (p.209)."

Response generalization was operationally defined in this study as a change in a non targeted behavior (i.e., turn signal use, safety belt use) in response to an intervention targeting complete intersection stopping. Turn signal and safety belt use were chosen for observation because of their functional similarity with the target behavior (i.e., complete intersection stopping). Although they were not directly intervened upon, turn signal and safety belt use were hypothesized to increase concurrently with intersection stopping in response to the intervention. If these three behaviors were not functionally similar it would be unlikely that they would interact in such a

manner. Therefore, it was hypothesized that intersection stopping, turn signal use, and safety belt use are members of the same response class.

Identifying Response Classes

A first step in defining and then acting upon a response class is to probe for behaviors observed to be correlated. This can be assessed through the correlation coefficient. However, when many behaviors are observed over relatively long periods of time, factor analysis and cluster analysis (Voeltz & Evans, 1982; Wahler, 1975), as well as regression analysis (Martens & Witt, 1984) have been suggested. When behaviors correlate (i.e., occur concomitantly within a unit of time), three different explanations are possible (Ludwig, 1992). First, there may be no functional relation between behaviors at all; the correlation is spurious. Secondly, the behaviors may be functionally related and both operating concomitantly to attain the same outcome. Hence, behaviors acting in this way may be described as members of the same response class. Thirdly, but not exclusive of the second explanation, is the possibility that a behavior may be dependent on another behavior or on the outcome of another behavior (Kazdin, 1982). A change in one response initiates changes in other responses has been called response covariance (Kazdin, 1982; Pigott, Fantuzzo, & Gorsuch, 1987; Wahler, 1975). It is the second explanation above which seems to be most appropriate to the relationship between intersection stopping, turn signal use, and safety belt use. (However, it is possible that turn signal use may be a covariate of stopping because the episode of stopping gives the driver more time to engage the turn signal.)

Notable efforts have been made to specify and isolate methodologically the existing interrelationships between correlated response patterns (e.g., Voelts & Evans, 1982; Wahler, 1975; Wahler & Fox, 1980, 1981a). Pigott, Fantuzzo, and Gorsuch (1987) have suggested using a scatterplot to analyze the correlation between baseline and post baseline observations. If responses interrelate, the correlation between behaviors will approximate a linear relationship during both the baseline and post baseline phases. Assuming that only one behavior was targeted by the intervention, these results would indicate a change in one behavior (i.e., the target) caused concomitant change in the second (covariate). If there is no apparent correlation during the baseline phase but the scatterplot reveals an approximate linear relationship during the post baseline phase, the intervention may have strengthened the relationship between the behaviors. This indicates a functional relationship between behaviors based on the contingencies in the intervention and, hence, represents an incident of response generalization.

Significant chi-square analyses in this study strongly suggest the inter relatedness of the three observed behaviors. When deliverers used their safety belt, they were significantly more likely to come to a complete stop (i.e., specifically when turning right, with traffic, or without traffic) and use their turn signal during the same trip. Likewise, significant correlations were found between individual averages of safety belt and turn signal use as well as between individual averages of safety belt use and complete stops when there was no traffic. There was no significant relationship, however, between incidents (i.e., chi-square) or percentages (i.e., correlation) of complete stops

and turn signal use during the baseline phase. Also, the correlation between complete stops and safety belt use was also non significant during baseline.

After the intervention(s) to increase the occurrences of complete intersection stops, the relationship between complete stops and turn signals became significant using both specific incidents (i.e., chi-squares) of behavior and individual percentages (i.e., correlation). Likewise, the correlation between complete stops and safety belt use also was strengthened as a result of the intervention to the point of being significant. Following the suggestion of Pigott, Fantuzzo, and Gorsuch (1987), scatterplots between the baseline and intervention phases were compared to understand the relationship between these behaviors and to visualize the process of response generalization.

Four patterns emerge from the scatterplots reported in the results. First, there are clear suggestions of response generalization. Secondly, there are those who responded to the intervention by increasing their percentage of complete stops but did not show a corresponding increase in the non target behavior. Thirdly, there were those who did not show an increase in complete stopping during the intervention but, for some reason, increased their percentage of a non targeted behavior. These tended to be individuals who had lower percentages of the non targeted behavior during baseline. It is possible that some of these subjects may have increased their percentage of complete stops specifically in one of the conditions (i.e., right turn, left turn, traffic, no traffic) which may not be reflected in the overall percentage of complete stops, or they showed a decrease in the stop metric not reflected in the overall percentage of complete stops. Otherwise no explanation can be offered for the pattern of their data.

Risk homeostasis. The final pattern that emerged from this type of representation of the data is a decrease of an individual's percentage of the non target behavior from the baseline to intervention phase concurrent with an increase in the target behavior (i.e., complete intersection stops). This type of responding may be an example of Wilde's theory of risk homeostasis (1982). According to Wilde, when individuals make a decision that may have implications for health or safety they compare the current experienced level of risk with the level of risk they wish to take. The subsequent decisions alter behavior to comply with the level of risk the person wishes to maintain. This implies that, in response to an intervention that successfully increases a safe behavior (e.g., complete intersection stopping), the individual, wishing to maintain a certain level of risk (i.e., homeostasis), may perform a less safe behavior concomitantly (e.g., decreasing turn signal or safety belt use).

Wilde cites evidence in the area of traffic safety which suggests overall accident rates often return to a baseline rate after the implementation of safety interventions such as encouraging drivers to use their low beam lights instead of parking lights after dusk (Schreuder, 1969) or installing a three-phase traffic light (Short, Woelfl, & Change, 1982). In Australia, mandatory safety belt use laws were associated with an immediate 12% reduction in road fatalities within the first two years. However, over the next six years road fatalities increased about 20% in comparison to no-law countries (Adams, 1981). Finally, in another domain, Lee (1979) reported that doctors who reduced their cigarette smoking also reduced their incidents of smoking-related deaths but increased their incidents of deaths related to alcohol consumption, accidents and other causes.

Although lending support to Wilde's theory, this evidence may be considered antidotal in terms of showing actual behavior change in undesired areas in response to interventions because it focused only on outcome measures tracked over a number of years. Therefore it is not surprising that Wilde's theory of risk homeostasis is not wholly supported when applied to the present study, particularly with individuals whose turn signal or safety belt use decreased during the intervention phase.

Causal Evidence of Response Generalization

The time lag correlations discussed appear to confirm instances of response generalization by showing how the relationships between targeted and non targeted behaviors changed across baseline and intervention phases. They do conform to the longitudinal criteria for estimating indirect effects suggested by Gollob and Reichardt (1991). However, Gollob and Reichardt recommend that "Other things being equal, the more time points between Time 1 and Time 2 at which X (independent variable: intervention), Y (direct effect: complete intersection stopping), and Z (indirect effect: non targeted behaviors) are measured, the better the estimates of the size of the overall direct and indirect effects (p. 259; parentheses added)." Indeed, a more comprehensive estimation of causality between an intervention and non targeted behaviors is provided through a longitudinal time series analysis of the data.

The results of the time series analysis from the repeated measures analysis showed an increase in turn signal use resulting from the D/P intervention (see Figure 21). Likewise, the results of the time series of the repeated measures analysis of safety belt use showed a sustained increase over

time corresponding to the D/P intervention (see Figure 26). The functional control (cf. Kazdin, 1973) of the D/P intervention (i.e., targeting complete intersection stops) on each non target behavior is evident and implies a causal relationship between the intervention and the non targeted behavior(s).

Participative vs. Assigned Goals, Revisited

A major contribution of this research is the investigation of the effects of an intervention strategy on an entire response class of behaviors. Most research in goal setting has focused on the efficacy of differential goal setting strategies to promote a desired change in the behavior(s) targeted by the goal. Not one of the over 500 studies reviewed by Locke and Latham (1990) explicitly set out to examine the effects of a goal setting intervention on non targeted behaviors. However, Locke and Latham concluded:

"Further research on the motivational effects of different goal setting methods would appear to have limited value. This conclusion is based on both the number of meta-analyses of goal setting studies and the participation literature, which have found a negligible participation effect on either satisfaction or performance (p. 172)"

It is an unfortunate possibility that if research were to cease on participative goal setting the non obvious beneficial "side" effects of participative goal setting could be overlooked.

According to both the statistical and time series analysis response generalization occurred only at the store which received the Discussion/ Participation intervention. Turn signal use at the store which received the D/P intervention increased over all phases significantly more than turn signal use at the store which received the L/A intervention (see Figure 23;

Year 1). Although the D/P intervention site showed sustained increases in turn signal use over all phases during Year 1, the L/A intervention site showed sustained decreases over the same period of time. Likewise, safety belt use at the D/P intervention site increased over all phases significantly more than safety belt use at the L/A intervention site (see Figure 28; Year 1). While the D/P intervention showed sustained increases of safety belt use over the phases during Year 1, the percentage of safety belt use dropped to below baseline levels during the withdraw phase at the L/A intervention site. Although the data from Year 2 is questionable, it is noteworthy that Store A exhibited its lowest percentages of safety belt use in three and a half years during the follow up phase after completing the L/A intervention. These results suggest that a beneficial "side" effect of the D/P intervention may be a desirable change in related, non targeted behaviors while the L/A intervention may produce undesired side effects in non targeted behaviors.

The generalization of effect in the D/P intervention supported the hypotheses offered at the onset of this study. It is possible that the D/P intervention facilitated the development of implicit rules which, in turn, influenced behavior beyond the external consequences of the intervention thereby effecting non targeted behaviors. The goal setting intervention itself offered salient outcomes for coming to a complete stop (i.e., influencing the feedback chart, receiving a reward). It was suggested earlier that the goal is a rule specifying these outcomes and the correct behavior to attain them. Perhaps an added feature of the discussion and participation in goal setting is that deliverers internalized the higher order outcome of not coming to a complete stop (i.e., injury in an accident) and that other behaviors sharing the

same higher order outcome (i.e., safety belt use and turn signal use) may have also been influenced.

In contrast, the deliverer at the L/A intervention may have been almost wholly motivated to come to a complete stop by the external contingencies provided by the goal, feedback, and managerial observations. Although the deliverers at the L/A intervention site may have actively sought to avoid probable undesirable consequences of disobeying his/her manager, they seemingly reacted to the overt control by undermining the intervention through decreases in related behaviors not directly associated with the manager's contingencies. This is consistent with the literature on psychological reactance which would predict similar countercontrol actions (Brehm & Brehm, 1981; Skinner, 1953).

Summary

Response generalization was examined using scatterplots of the correlations between the targeted and non targeted behaviors. Response generalization occurred when a previously non significant relationship between the targeted and non targeted behaviors was strengthened during the intervention phase to the point of significance. An examination of the time series analyses demonstrated the functional control of the D/P intervention over the non targeted behaviors. Furthermore, findings showed that while the D/P intervention was associated with increases in non targeted behaviors, the L/A intervention was associated with decreases in non targeted behaviors. A successful counterbalance of intervention types (i.e., D/P, L/A) between stores would be desirable to replicate these findings.

Person

An examination of the Person factor within the Safety Triad produced a few findings worthy of note. The Psychological Reactance scale is a recently developed (Merz, 1983) measurement device to assess the disposition of individuals to feel reactance when there are threats to their freedom. It hasn't received much psychometric or research attention in this country since its introduction to the United States in 1987 (Tucker & Byers, 1987). Nevertheless, the reactance scale was shown to be negatively related to incidents of turn signal use. Specifically, replicated by nearly every Factor within the scale, individuals who described themselves as reactive (vis a vie responses to the Reactance scale) were less likely to use their turn signal at an intersection. Whereas, complete stopping and safety belt use are critical behaviors to avoid accidents, turn signal use may be interpreted as more of a social mandate to ensure proper communication between drivers. Individuals high in reactance may have manifested their reactive style by resisting the social norm of using turn signals. While this conclusion is, for the most part, conjecture, this finding does seem to be robust.

Secondly, the Reactance scale was found to be marginally related to intent to come to a complete stop after the intervention meeting. Subjects scoring high on the reactance scale rated their intent lower than less reactive individuals. This result seems to have predicted actual responsiveness to the intervention. Individuals who described themselves as "rebellious" [i.e., according to Byers and Tucker's (in press) designation for Factor 1 of the Reactance scale] actually decreased their incidents of complete stops during and after the D/P intervention. In contrast, individuals who scored low on

Factor 1 responded to the intervention by increasing their incidents of complete stops.

This partially supports the hypothesis that subjects scoring high on the Reactance scale will show undesirable changes in behavior as a result of the intervention(s). It was expected, however, that individuals would manifest their reactance by decreasing their incidents of non targeted behaviors. The relationship between the Reactance scale and changes in non targeted behaviors over phases was not significant. Also, at this point, it is unclear why the Reactance scale was associated with rate of responding to the D/P and not the L/A intervention.

Conclusion

The issue of generalization is a particularly interesting research question. Too often research in goal setting, OBM, and applied behavior analysis only measure a specific target variable and fail to investigate the rich information which may be gained in a more ecological analysis of the problem. In the area of behavior analysis and management the conceptualization of the response class is of particular use. It forces the researcher to ask specific questions about the target behavior, related behaviors, and setting events which could naturally support the target behavior. It has been suggested by Wahler and Fox (1981a, b) that prolonged naturalistic observation of behavior and setting is a must for applied research. Indeed, pilots to this study identified two behaviors over a four year period which were found to be related to complete intersection stopping. However, there are undoubtedly more. Vehicular following distance and speed in relation to posted limits come to mind. An understanding of how these

behaviors fit together under the rubric of response class may move the literature in traffic safety past simple demonstration projects or epidemiological surveys to a systematic analysis of intervention effectiveness, response generalization, and natural maintaining contingencies.

An understanding of the setting in which behavior is maintained is also a critical aspect of field research. The seemingly obvious is often overlooked when developing a behavioral observation scheme to evaluate the effectiveness of an intervention. In this study, different setting variables were defined as "conditions" which influence the observed behavior. Specifically, observations were made on the type of turn the deliverer made and the presence of other vehicles in the vicinity. Care was taken to pick pizza delivery stores for use in this study which were comparable among numerous setting variables. In fact, the site for Store B was changed right before the beginning of the study. Deliverers at all three stores had to enter a four-lane road to begin their trip. Likewise, each had a clear view of traffic from both sides. Two of the stores sat across from a shopping center, two shared a parking lot with other businesses, two had side roads leading to the four-lane road. However, it was impossible to match more than a couple key variables. And, because randomization of subjects was not possible, these variables undoubtedly effected the results as evidenced by the large amount of variation in the community analyses. This is yet another reason for prolonged naturalist observations (i.e., baseline).

Finally, generalization must be a key index of intervention effectiveness. This study measured generalization on two levels. First, it

evaluated generalization of effect over time; was the effect of the intervention sustained over qualitatively different time periods (i.e., phases)? Secondly, this research evaluated generalization across behaviors; was the effect of the intervention spread to other non targeted, yet similar behaviors? However, other methods of evaluating generalization existed for this research. One promising possibility would be observing the deliverers driving in their free time to assess generalization across settings.

In conclusion, this study introduced some new methodologies and presented noteworthy findings worthy of replication. This research exemplified the need to venture beyond short-term demonstration projects, and to: a) develop a taxonomy of behavior change techniques according to the relative effectiveness of particular behavior change strategies, b) examine individual differences with respect to the influence of particular intervention programs, c) continue to pursue participative goal setting as a research area worthy of investigation, and d) study response generalization outcomes of injury control interventions.

Endnotes

¹ The behavioral measure of intrinsic motivation in the Chang & Lorenzi study was marginally significant (i.e., $p=.059$). There was a average 32 second difference between assigned and participative-set goal conditions in time spent on task during the free period subsequent to the experimental manipulation. The attitudinal measure of intrinsic motivation was significant.

² A study by Erez and Arad (1986) combined the effects of participation in setting a goal with those of group discussion. They found not only that both of these components had significant effects on goal commitment and performance, but when combined the two produced a significant increase over the additive effect.

³ It is important to reiterate that the criterion did not include the need to be observed during the follow-up phase. This was decided in order to maintain the subject size for statistical analysis. The actual subject sizes for the follow-up phase are included in the appropriate figures and tables but the follow-up phase were not included in the statistical analysis of the data.

⁴ The individual means were computed by behavioral incidents averaged over the entire phase (instead of computing daily means into a phase mean for each individual) and these individual means are averaged to arrive at a store mean for the phase. Because of this, the store mean of turn signal use and safety belt use for a given phase may appear different from the mean of

weekly data points (i.e., in the time series repeated measures graphs) or the mean of daily data points (i.e., in the community time series graphs).

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Table 1. Research Hypotheses.

Table 1a. IMMEDIATE IMPACT

GENERAL	The goal setting intervention will significantly increase the occurrence of complete intersection stopping.
BASELINE	n/a
PARTICIPATORY VS. ASSIGNED	The P/D intervention will have a greater immediate impact on stopping, measured during the intervention stage, than the L/A intervention.

Table 1b. LONG TERM IMPACT

GENERAL	n/a
BASELINE	n/a
PARTICIPATORY VS. ASSIGNED	The P/D intervention will have a greater long term impact on stopping, measured during the withdraw and follow-up phases, than the L/A intervention.

Table 1 (Continued). Research Hypotheses.

Table 1c. BEHAVIORS

GENERAL	1) Turn signals will be used more when the driver is taking a left turn than a right turn. 2) Drivers will come to a complete stop more often when taking a left turn than a right turn. 3) Drivers will come to a complete stop more often in traffic than when no other vehicles are in the vicinity. 4) Response generalization will take place as a result of the intervention.
BASELINE	Individual driver percentages of complete intersection stopping, turn signal use, and safety belt use will correlate with each other during baseline. A significant relationship will also be seen in an analysis of specific occurrences (not a percentage) between each behavior.
PARTICIPATORY VS. ASSIGNED	The P/D intervention will show greater response generalization between stopping and turn signal use and safety belt use, measured during the intervention phase, than the L/A intervention.

Table 1 (Continued). Research Hypotheses.

Table 1d. PERSONALITY VARIABLES

GENERAL	1. The Nowicki-Strickland LOC scale will correlate with Montag and Cromey's DE and DI scales. 2. There will be a moderate correlation between Merz's Psychological Reactance Scale and the LOC scales.
BASELINE	1. The Nowicki-Strickland LOC scale will correlate with baseline observations of stopping, turn signal, and safety belt use. Externals will show lower incidents of these behaviors than will internals. 2. Montag and Cromey's DE and DI scales will correlate with baseline observations of stopping, turn signal, and safety belt use. Externals will show lower incidents of these behaviors than will internals.
PARTICIPATORY VS. ASSIGNED	n/a
IMMEDIATE IMPACT	1. Subjects with an internal LOC (Nowicki-Strickland & Montag and Cromey scales) will show more responsiveness to the intervention (as well as more long term maintenance). 2. Subjects who score high on the Merz Reactance Scale will be less likely to respond to the intervention.
BEHAVIORS	1. Subjects with an internal LOC will show the greatest amount of response generalization. 2. Subjects who score high on the Merz Reactance Scale will be more likely to show undesirable changes in non-targeted behaviors.

Table 2. Inter-Observer Reliability by behavior and store.

	OVERALL	STORE A	STORE B	STORE C
COMPLETE STOPS	89%	86%	86%	95%
TURN SIGNAL USE	86%	87%	86%	85%
SAFETY BELT USE	92%	90%	92%	95%

Table 3. Responses to the manipulation check questionnaire item "How would you characterize this meeting?"

	D/P Meeting	L/A Meeting	
"Discussion"	9 35%	1 4%	10 39%
"Lecture"	4 15%	12 46%	16 62%
	13 50%	13 50%	26*

* Only includes subjects who met the criteria and were included in the individual analysis.

Table 4. Total number of observations by behavior, store and year over the two year course of this study.

	Year 1	Year 2
Store A		
Stops	4955	4971
Safety Belts	4397	4203
Turn Signals	5596	5309
Store B		
Stops	2532	2529
Safety Belts	2755	2471
Turn Signals	2948	2730
Store C		
Stops	2005	1852
Safety Belts	1895	1303
Turn Signals	1832	1657

Table 5. Number of subjects in the community analysis by store and year.

	OVERALL	STORE A	STORE B	STORE C
Year 1	374	125	112	137
Year 2	249	100	59	90
OVERALL	623	225	171	227

Table 6. Number of subjects meeting criteria and included in the repeated measures analysis by store and by year.

	OVERALL	STORE A	STORE B	STORE C
OVERALL	62	31	15	16
Year 1	42	20	10	12
Year 2*	20	11	5	4

* Year 2 does not include subjects who were observed both years.

Table 7. Percent complete intersection stops by individuals across treatment and control sites during baseline, intervention, withdraw and follow-up phases of Year 1 and Year 2.

YEAR 1	STORE A	STORE B	STORE C
BASELINE	53%	43%	52%
INTERVENTION	65%	71%	58%
WITHDRAW	59%	63%	56%
FOLLOW-UP	53%	40%	55%

YEAR 2			
BASELINE	53%	46%	53%
INTERVENTION	54%	56%	40%
WITHDRAW	50%	39%	56%
FOLLOW-UP	52%	22%	54%

Table 8. A representation of the statistical design strategy using the Repeated Measures ANOVA.

Table 8a. Examining the three way interaction.

Representation of a 2 (Year) x 3 (type intervention) x 3 (repeated measure) ANOVA

Type of intervention	YEAR 1 75%			YEAR 2 90%		
	Baseline	Intervention	Withdraw	Baseline	Intervention	Withdraw
D/P	Bx	Bx	Bx	Bx	Bx	Bx
L/A	Bx	Bx	Bx	Bx	Bx	Bx
Control	Bx	Bx	Bx	Bx	Bx	Bx

repeated measures →

Table 8b. Examining the interaction between type of intervention without the control group for only one year.

Representation of a 2 (type intervention) x 3 (repeated measure) ANOVA without Year 2

Type of intervention	YEAR 1 75%			YEAR 2 90%		
	Baseline	Intervention	Withdraw	Baseline	Intervention	Withdraw
D/P	Bx	Bx	Bx			
L/A	Bx	Bx	Bx			
Control						

repeated measures →

Table 8 (Continued). Statistical strategies.

Table 8c. Examining the immediate effect of type of intervention without the control group for only one year.

Representation of a 2 (type intervention) x 2 (repeated measure) ANOVA without Year 2

Type of intervention	YEAR 1 75%			YEAR 2 90%		
	Baseline	Intervention	Withdraw	Baseline	Intervention	Withdraw
D/P	Bx	Bx				
L/A	Bx	Bx				
Control						

repeated measures
—————>

Table 8d. Examining the effect of one intervention on the behavior.
* Immediate effect only.

Representation of a 2 (type intervention) x 3 (repeated measure) ANOVA without Year 2

YEAR 1 75%				YEAR 2 90%		
Type of intervention	Baseline	Intervention	Withdraw	Baseline	Intervention	Withdraw
D/P	Bx*	Bx*	Bx			
L/A						
Control						

repeated measures
—————>

Table 9. Summary of design for Three-Way Repeated Measures ANOVA on the stop metric.

Repeated Measures Factor:		(Rep) Baseline Phase Intervention Phase Follow-Up Phase			
Independent Variables:		A B	Year Type Intervention		
Effect	SS	df	MS	F	p
A	.085	1	.085	.689	.42
B	.440	2	.220	1.78	.18
A X B	.224	2	.112	.909	.41
Error 1	6.66	54	.123		
Rep	.037	2	.018	.294	.75
A X Rep	.472	2	.236	3.80	.02
B X Rep	1.44	4	.360	5.80	.000
A X B X Rep	2.14	4	.534	8.61	.000
Error 2	6.70	108	.062		

Table 10. Summary of design for Three-Way Repeated Measures ANOVA on turn signal use.

Repeated Measures Factor:		(Rep) Baseline Phase Intervention Phase Follow-Up Phase			
Independent Variables:		A B	Year Type Intervention		
Effect	SS	df	MS	F	p
A	1061	1	1061	.924	.34
B	5017	2	2508	2.17	.12
A X B	8946	2	4473	3.90	.03
Error 1	65422	57	1147		
Rep	274	2	137	.751	.48
A X Rep	696	2	348	1.91	.15
B X Rep	1584	4	396	2.17	.07
A X B X Rep	1926	4	481	2.64	.04
Error 2	20803	108	182		

Table 11. Summary of design for Three-Way Repeated Measures ANOVA on safety belt use.

Repeated Measures Factor:		(Rep) Baseline Phase Intervention Phase Follow-Up Phase			
Independent Variables:		A B	Year Type Intervention		
Effect	SS	df	MS	F	p
A	181	1	181	.057	.80
B	31006	2	15503	4.85	.01
A X B	1758	2	879	.275	.76
Error 1	176009	55	3200		
Rep	833	2	416	1.61	.20
A X Rep	1536	2	768	2.97	.05
B X Rep	3245	4	811	3.14	.02
A X B X Rep	2730	4	683	2.64	.04
Error 2	28426	110	258		

Table 12. Chi-Square results of relationships between behaviors and between behavioral conditions across baseline and intervention phases. Chi-squares for the baseline phase appears above chi-squares for the intervention phase in each cell.

	Safety Belt	Turn Signal (right)	Turn Signal (left)
Complete Stop (right)	22.97** 7.01**	.037 4.99*	-
Complete Stop (left)	2.79 .323	-	6.38** 6.78**
Complete Stop (traffic)	7.50** .745	.57 7.35**	.01 3.5*
Complete Stop (no traffic)	16.4** 4.5*	.506 .125	2.18 .01

* $p < .05$

** $p < .01$

Table 13. Crosstabulation tables for (non)incidents of turn signal use (right turn) by (non)incidents of complete stops (right turn) across baseline and intervention phases. Number of incidents appear above the percentage of incidents across cells.

BASELINE	Turn signal (right) occurrence	Turn signal (right) non-occurrence
Complete stop (right) occurrence	307 28%	217 20%
Complete stop (right) non-occurrence	349 31%	241 22%

INTERVENTION		
Complete stop (right) occurrence	290 41%	155 22%
Complete stop (right) non-occurrence	151 21%	115 16%

Table 14. Correlation matrix for complete intersection stops, safety belt use, and turn signal use across baseline, intervention, and withdraw phases.

	Turn Signals	Complete Stops	
Safety Belts	.43**	.19	baseline
	.47**	.34**	intervention
	.14	-.05	follow-up
Turn Signals		.11	baseline
		.40**	intervention
		.16	follow-up

* $p < .05$
 ** $p < .01$

Table 15. Correlation matrix for conditional stop matrix scores (i.e., right turn, left turn, traffic, no traffic), safety belt percentages, and conditional turn signal percentages (i.e., right turn, left turn) across baseline, intervention, and withdraw phases.

	Stop, Right	Stop, Left	Stop, Traffic	Stop, No Traffic
Safety Belts	-.24	.12	-.01	-.27*
	-.22	-.08	-.31**	-.19
	.08	.06	-.03	-.30*
Turn, Right	-.27*	.10	.13	.07
	.00	-.10	-.13	.02
	.10	-.03	-.07	.08
Turn, Left	.22	.07	.04	.17
	.02	-.25	-.01	.14
	-.18	.19	.02	-.12

* $p < .05$

** $p < .01$

Table 16. Correlation matrix between personality variables.

LoC=Locus of Control
 DE=Driver Externality
 DI=Driver Internality
 React=Psychological Reactance Scale
 & Factor 1, Factor 2, and Factor 3.

	LoC	DE	DI	React	R. Factor 1	R. Factor 2	R. Factor 3
LoC	-	.30	.02	.10	.17	.18	-.19
DE		-	.10	.16	.17	.14	-.01
DI			-	.32	-.22	-.22	-.33
React				-	.89**	.87**	.81**
R. Factor 1					-	.67**	.59**

n=31
 * p < .05
 ** p < .01

Table 17. Correlation matrix between personality variables and post meeting questionnaire items.

LoC=Locus of Control

DE=Driver Externality

DI=Driver Internality

React=Psychological Reactance Scale

& Factor 1, Factor 2, and Factor 3.

Allow= How much Ss perceived participation in meeting

Contrib= How much Ss perceived contribution to goal setting

Intent= Ss intent level to come to a complete stop at intersections

Why= Ss reason why they will stop.

Scaled 1=made to by management; 5=own idea

	LoC	DE	DI	React	R. Factor 1	R. Factor 2	R. Factor 3
Allow	.22	.23	-.04	.18	.40	.09	-.13
Contrib	.04	.20	.44*	..01	.24	-.13	-.16
Intent	-.09	-.20	-.24	-.37	-.48*	-.30	-.11
Why	.24	.19	-.05	-.24	-.33	-.01	-.20

n=17

* p < .05

** p < .01

Table 18. Correlation matrix between personality variables and baseline behavior percentages.

LoC=Locus of Control
 DE=Driver Externality
 DI=Driver Internality
 React=Psychological Reactance Scale
 & Factor 1, Factor 2, and Factor 3.

	LoC	DE	DI	React	R. Factor 1	R. Factor 2	R. Factor 3
Complete Stop	.20	.15	-.32	-.05	-.01	-.11	-.06
Fast Rolling Advance	-.15	-.22	.01	.26	.22	.24	.26
Turn Signal	-.28	.08	.02	-.38*	-.35*	-.26	-.31
Safety Belt	-.20	.09	-.10	-.01	.08	-.14	.07

n=26
 * p < .05

Table 19. Results of the current study in the context of the research hypotheses.

* Finding supported hypothesis.

Table 19a. IMMEDIATE IMPACT

GENERAL	*The goal setting intervention significantly increased the occurrence of complete intersection stopping.
BASELINE	n/a
PARTICIPATORY VS. ASSIGNED	The L/A intervention had a greater immediate impact on stopping, measured during the intervention stage, than the D/P intervention.

Table 19b. LONG TERM IMPACT

GENERAL	n/a
BASELINE	n/a
PARTICIPATORY VS. ASSIGNED	The L/A intervention had a greater long term impact on stopping, measured during the withdraw and follow-up phases, than the D/P intervention.

Table 19 (Continued). Research Hypotheses.

Table 19c. BEHAVIORS

GENERAL	1) *Turn signals were used more when the driver was taking a left turn than a right turn. 2) *Drivers came to a complete stop more often when taking a left turn than a right turn. 3) *Drivers came to a complete stop more often in traffic than when no other vehicles were in the vicinity. 4) *Response generalization took place as a result of the intervention. Correlations between complete stops and non-targeted behaviors (i.e., turn signal and safety belt use) became significant during the intervention phase. Time series data showed increases in turn signal and safety belt use resulting from the intervention.
BASELINE	*Individual driver percentages of turn signal use and safety belt use correlated with each other during baseline. A significant relationship was also found in an analysis of specific occurrences between complete stops and safety belt use as well as between conditions of complete stops (left) and turn signal use (left).
PARTICIPATORY VS. ASSIGNED	*The P/D intervention resulted in greater response generalization between stopping and turn signal use and safety belt use, measured during the intervention phase, than the L/A intervention.

Table 19 (Continued). Research Hypotheses.

Table 19d. PERSONALITY VARIABLES

GENERAL	1. The Nowicki-Strickland LOC scale did not correlate with Montag and Cromey's DE and DI scales. 2. There was one moderate correlation between Merz's Psychological Reactance Scale and the LOC scales specifically the DI scale.
BASELINE	1. The Nowicki-Strickland LOC scale did not correlate with baseline observations of stopping, turn signal, or safety belt use. 2. Montag and Cromey's DE and DI scales did not correlate with baseline observations of stopping, turn signal, or safety belt use.
PARTICIPATORY VS. ASSIGNED	n/a
IMMEDIATE IMPACT	1. Subjects with an internal LOC (Nowicki-Strickland & Montag and Cromey scales) did not show more responsiveness to the intervention (as well as more long term maintenance). 2. Subjects who score high on the Merz Reactance Scale were less likely to respond to the D/P intervention.
BEHAVIORS	1. Subjects with an internal LOC did not show the greatest amount of response generalization. 2. Subjects who score high on the Merz Reactance Scale did not show more undesirable changes in non-targeted behaviors.

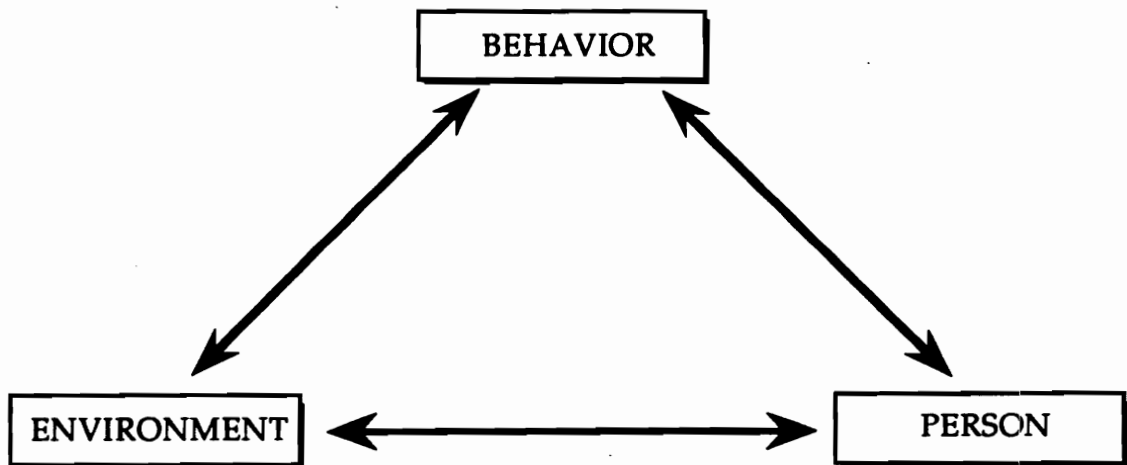


Figure 1. The Safety Triad.

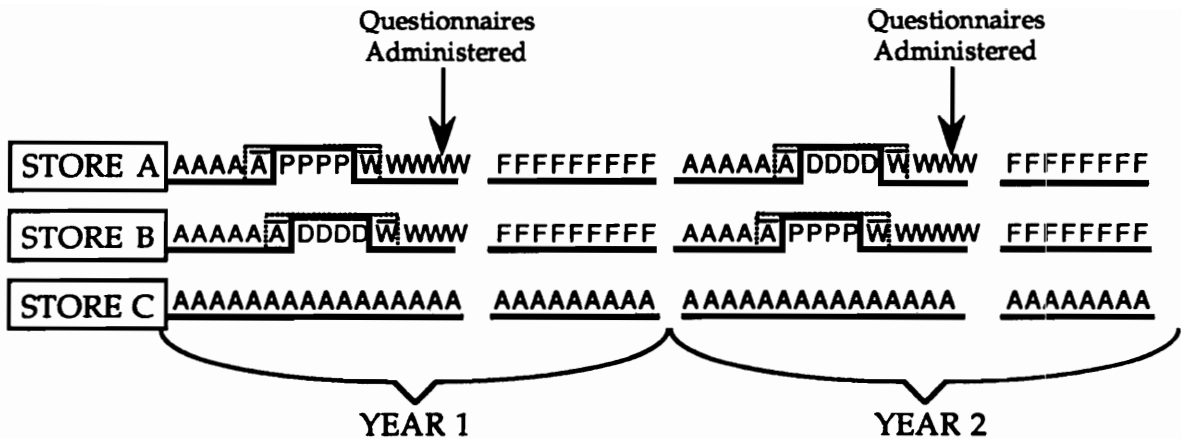


Figure 2. Research Design

-Each letter represents a week of observation-

A = Baseline observations

A = Managerial observations begin

P = Participative Intervention

(D/P: Discussion/Participation)

D = Directive Intervention

(L/A: Lecture/Assigned)

W = Withdraw of feedback posters.

Signs announcing end of program put up.

W = All signs and intervention materials withdrawn.

F = Follow-Up observations.

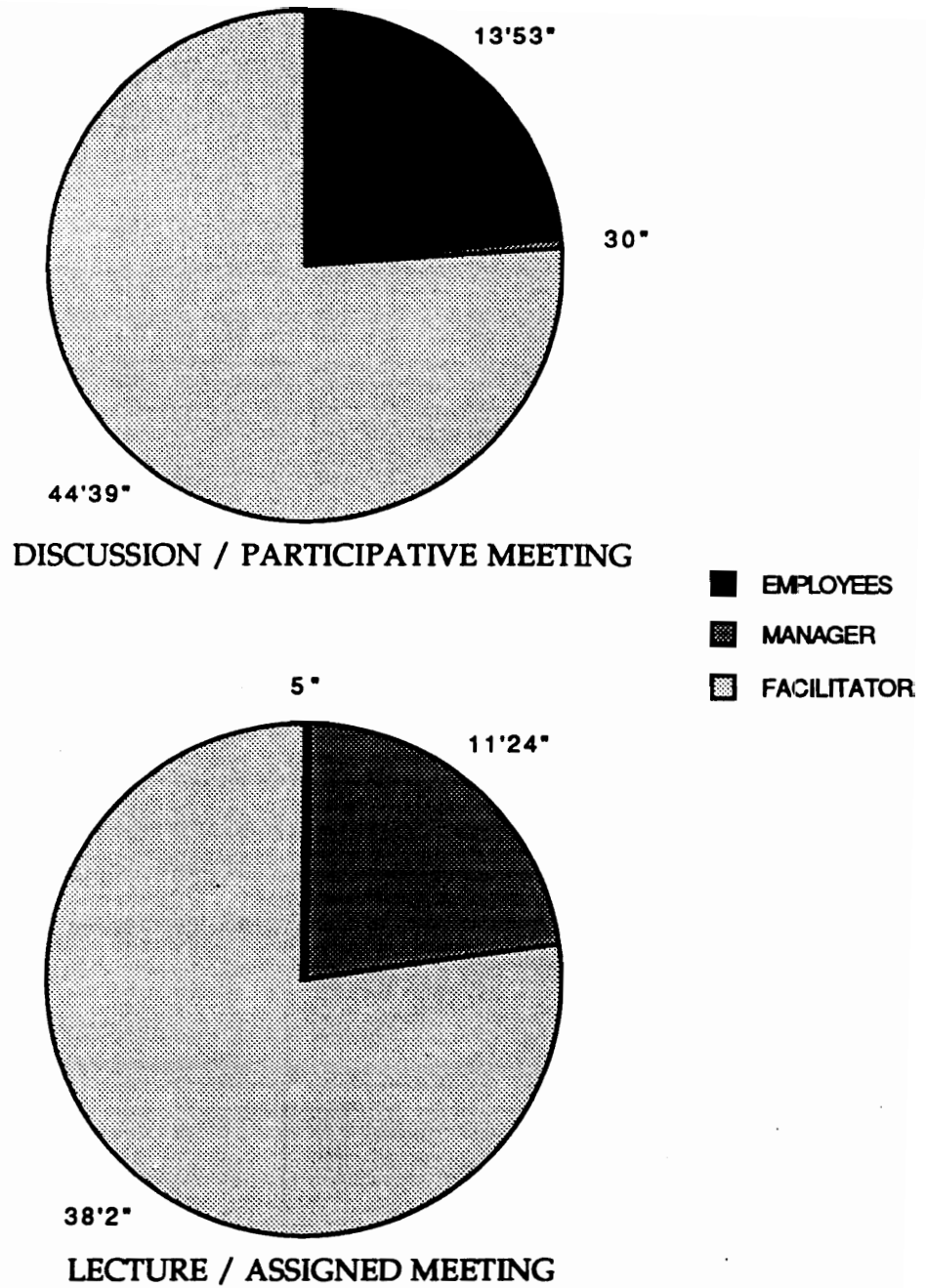


Figure 4. A comparison of participation, measured by amount of time speaking, between the D/P meeting and the L/A meeting.

PERCENT COMPLETE INTERSECTION STOPS

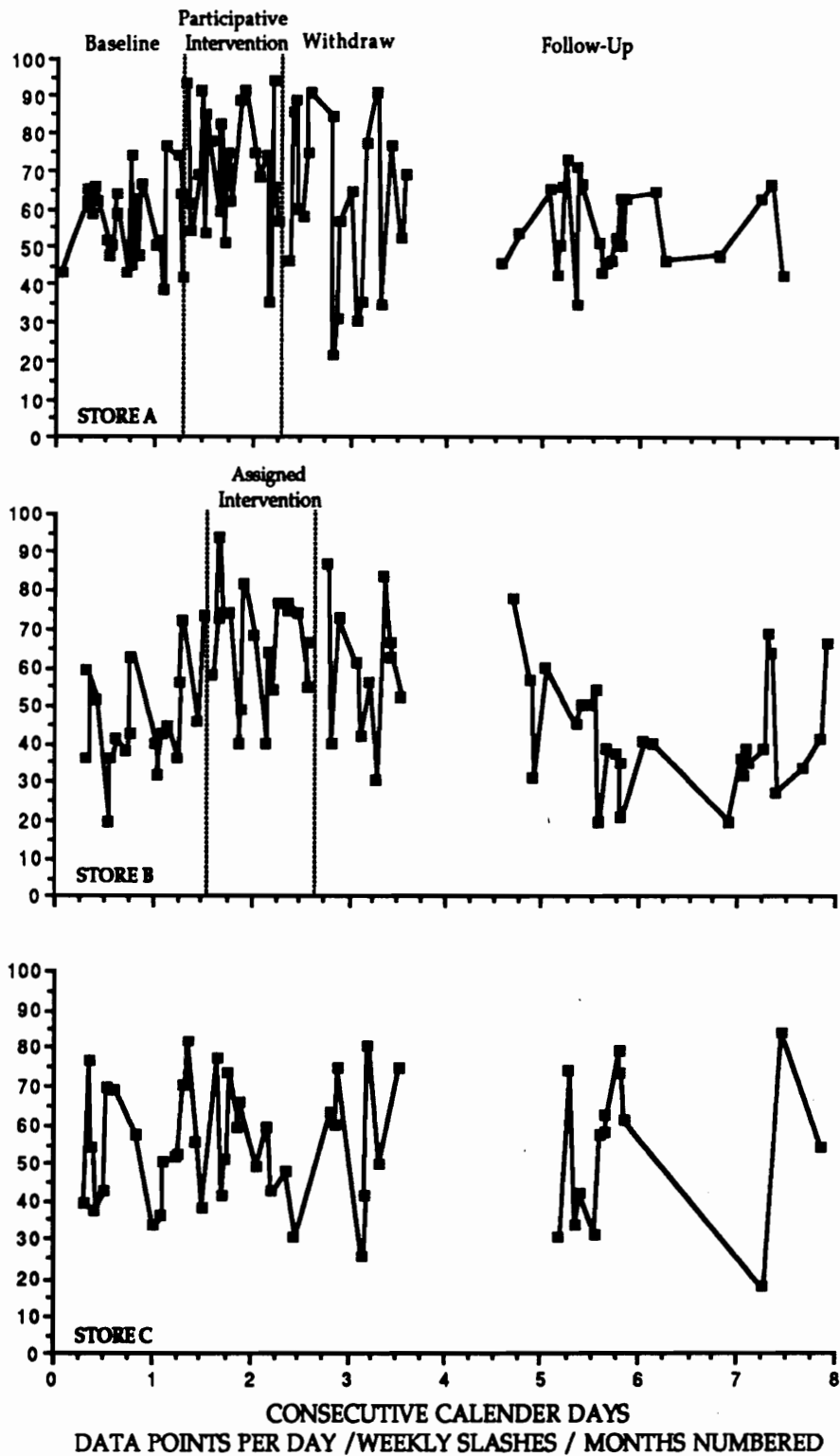


Figure 5. Community level time series analysis of complete intersection stops during Year 1.

PERCENT COMPLETE INTERSECTION STOPS

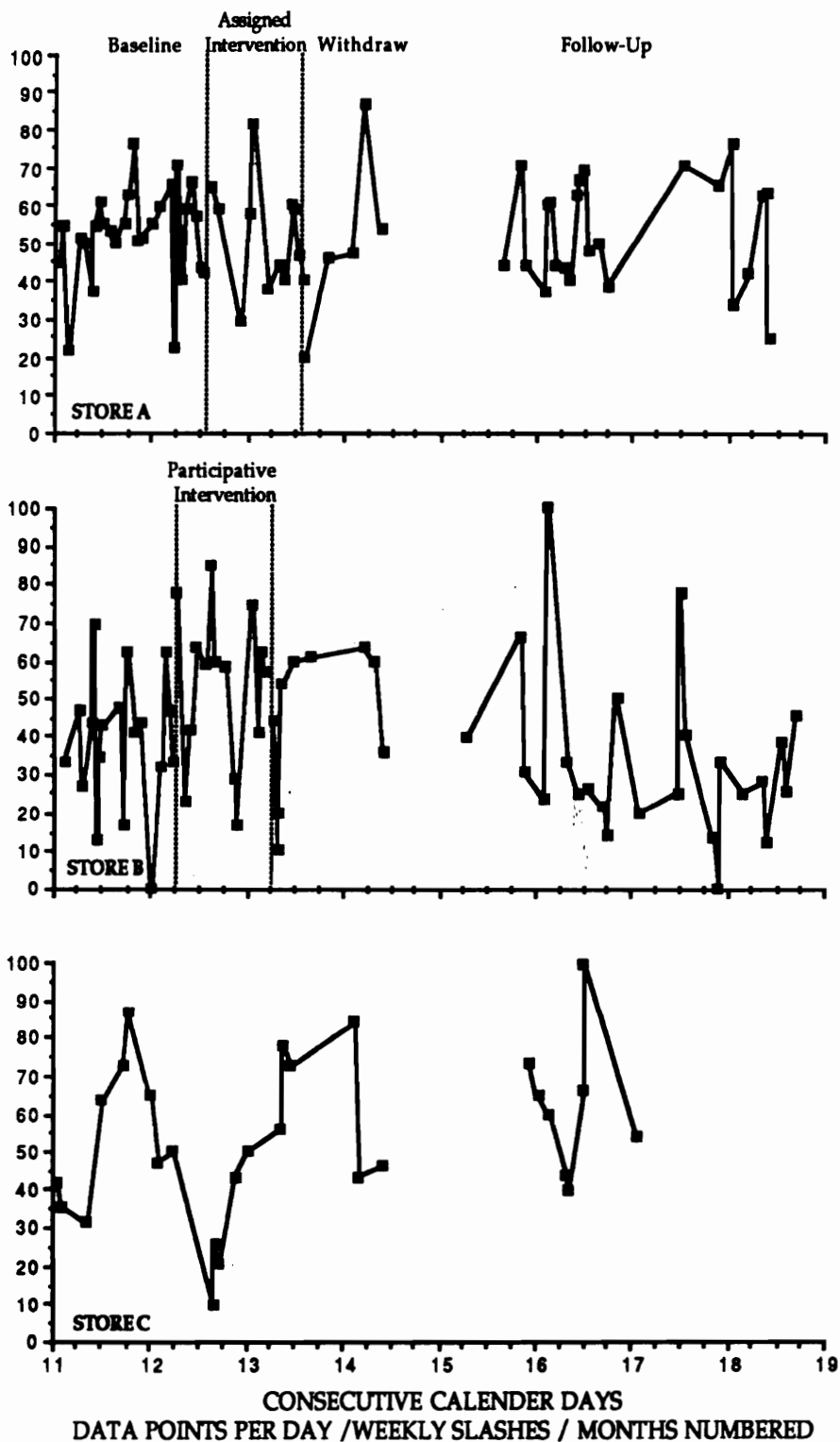


Figure 6. Community level time series analysis of complete intersection stops during Year 2.

PERCENT FAST ROLLING ADVANCES

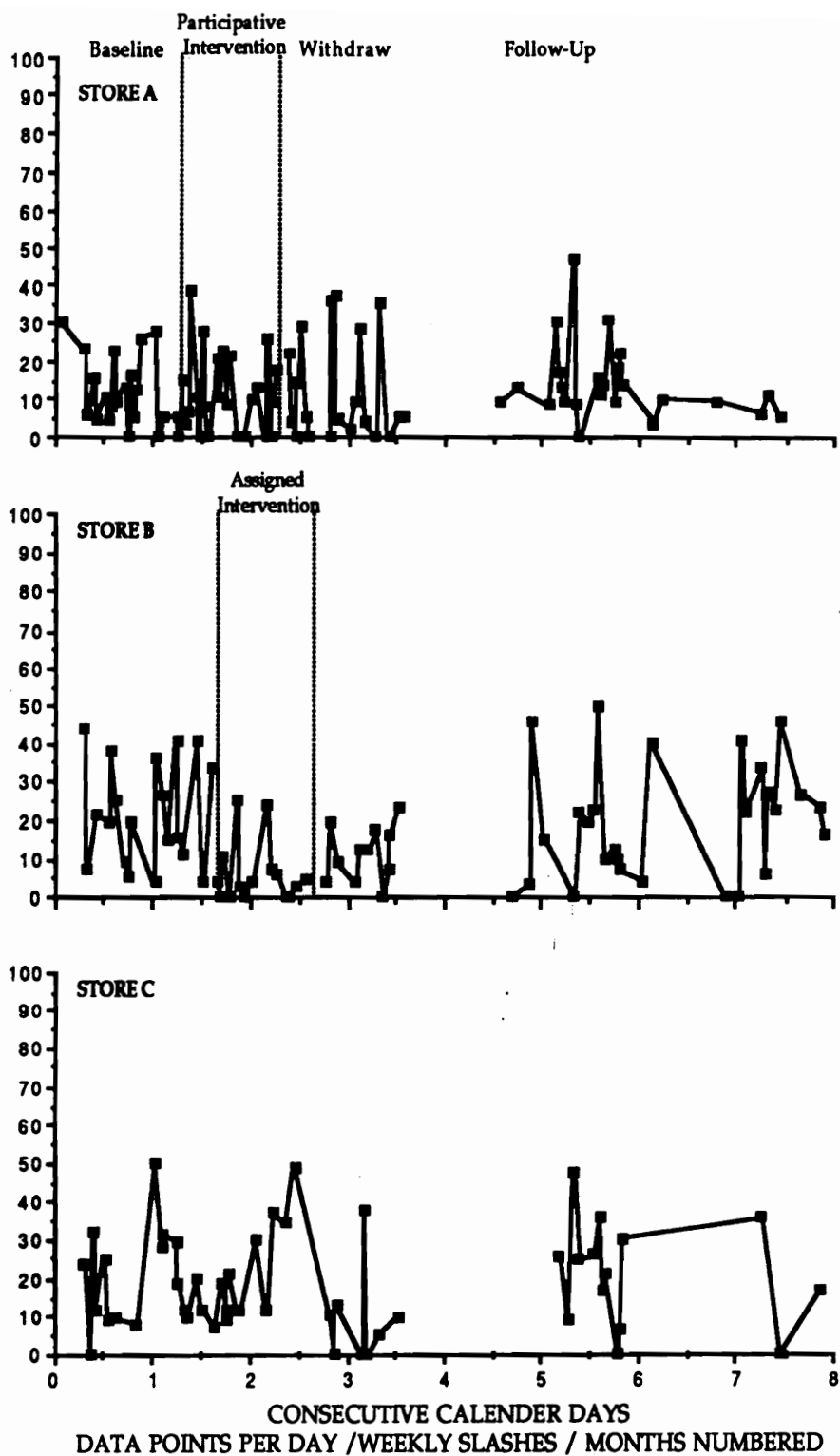


Figure 7. Community level time series analysis of fast rolling advances (i.e., stop #3) during Year 1.

PERCENT FAST ROLLING ADVANCES

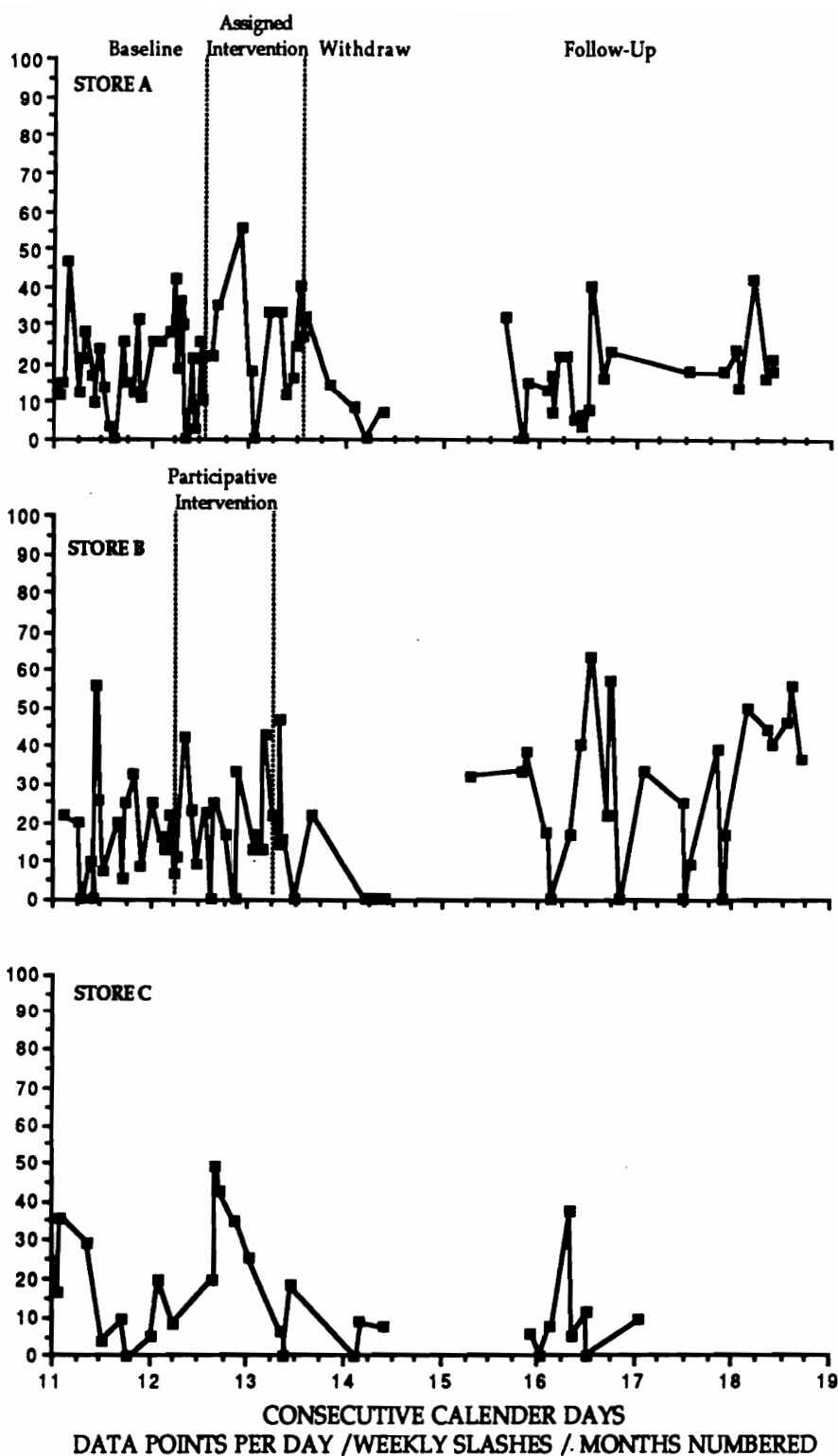


Figure 8. Community level time series analysis of fast rolling advances (i.e., stop #3) during Year 2.

PERCENT TURN SIGNAL USE

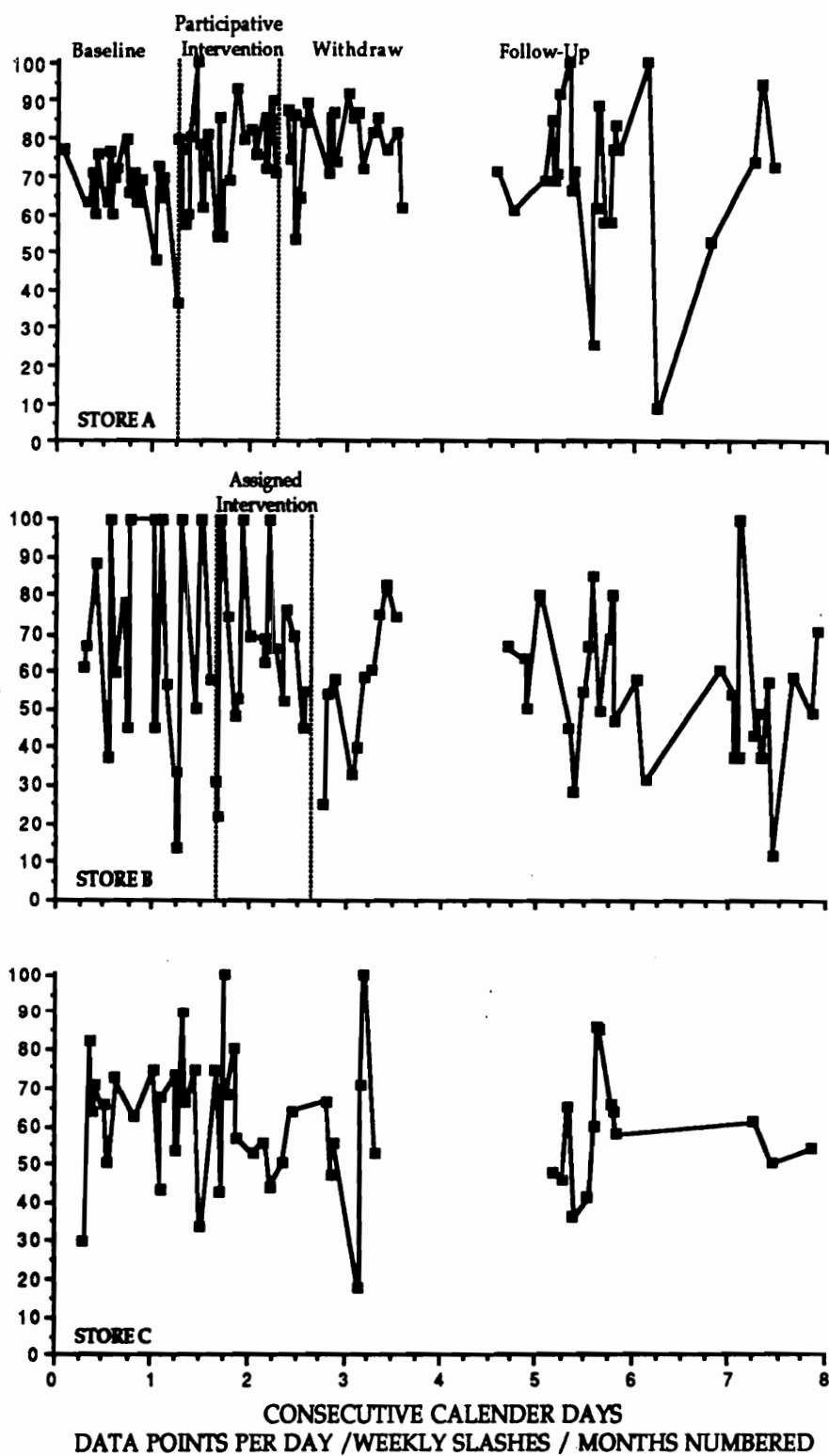


Figure 9. Community level time series analysis of turn signal use during Year 1.

PERCENT TURN SIGNAL USE

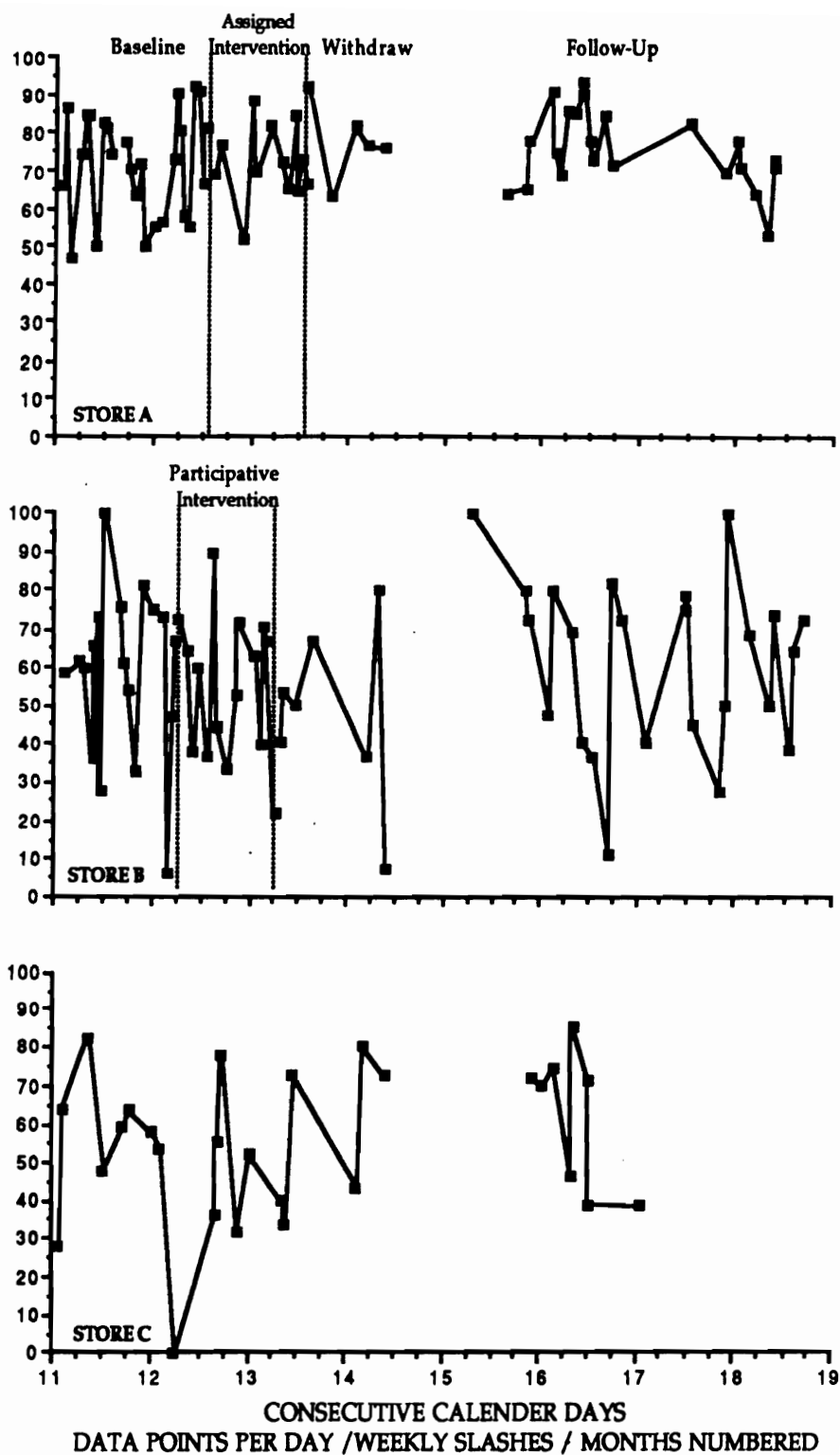


Figure 10. Community level time series analysis of turn signal use during Year 2.

PERCENT SAFETY BELT USE

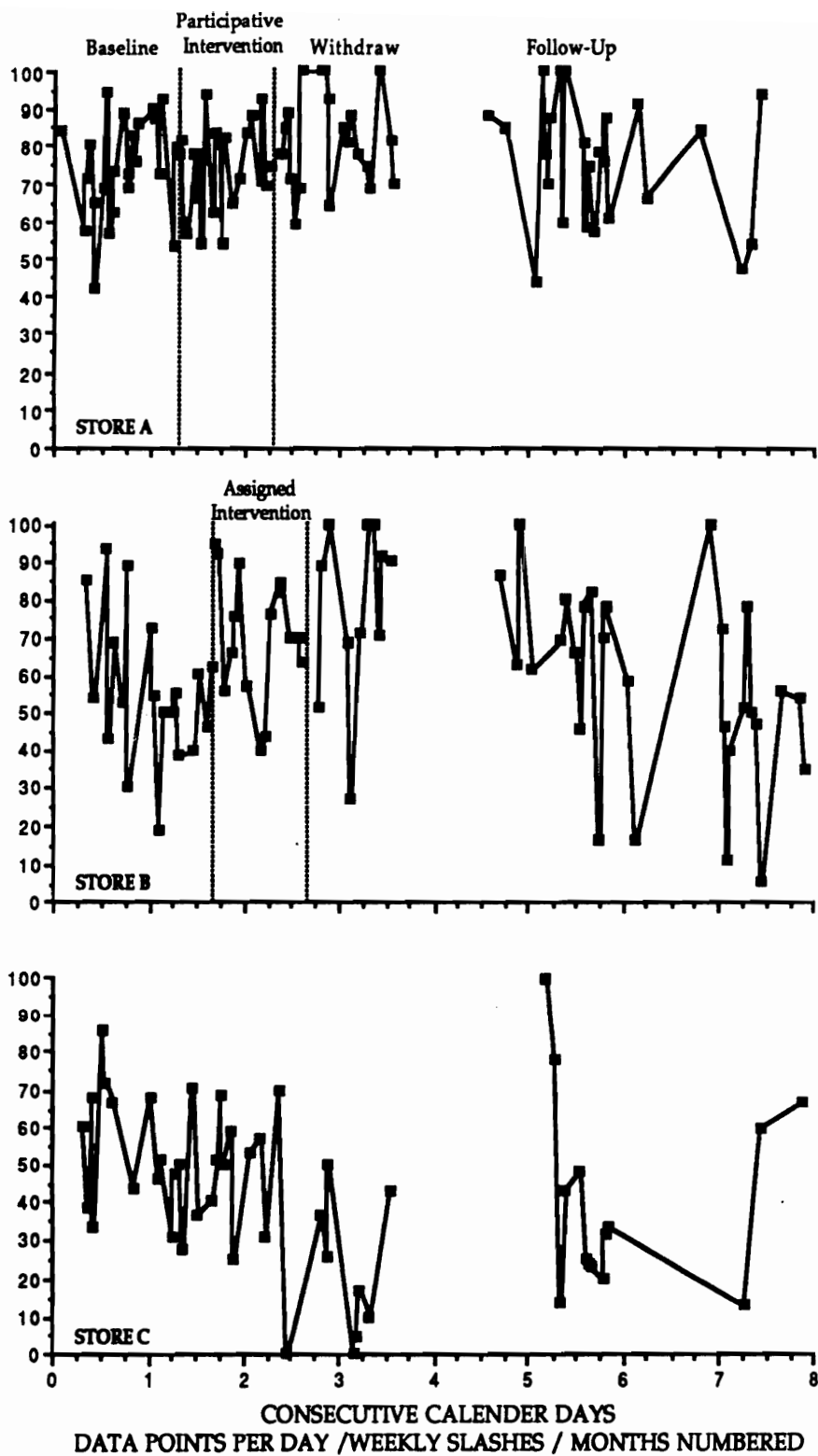


Figure 11. Community level time series analysis of safety belt use during Year 1.

PERCENT SAFETY BELT USE

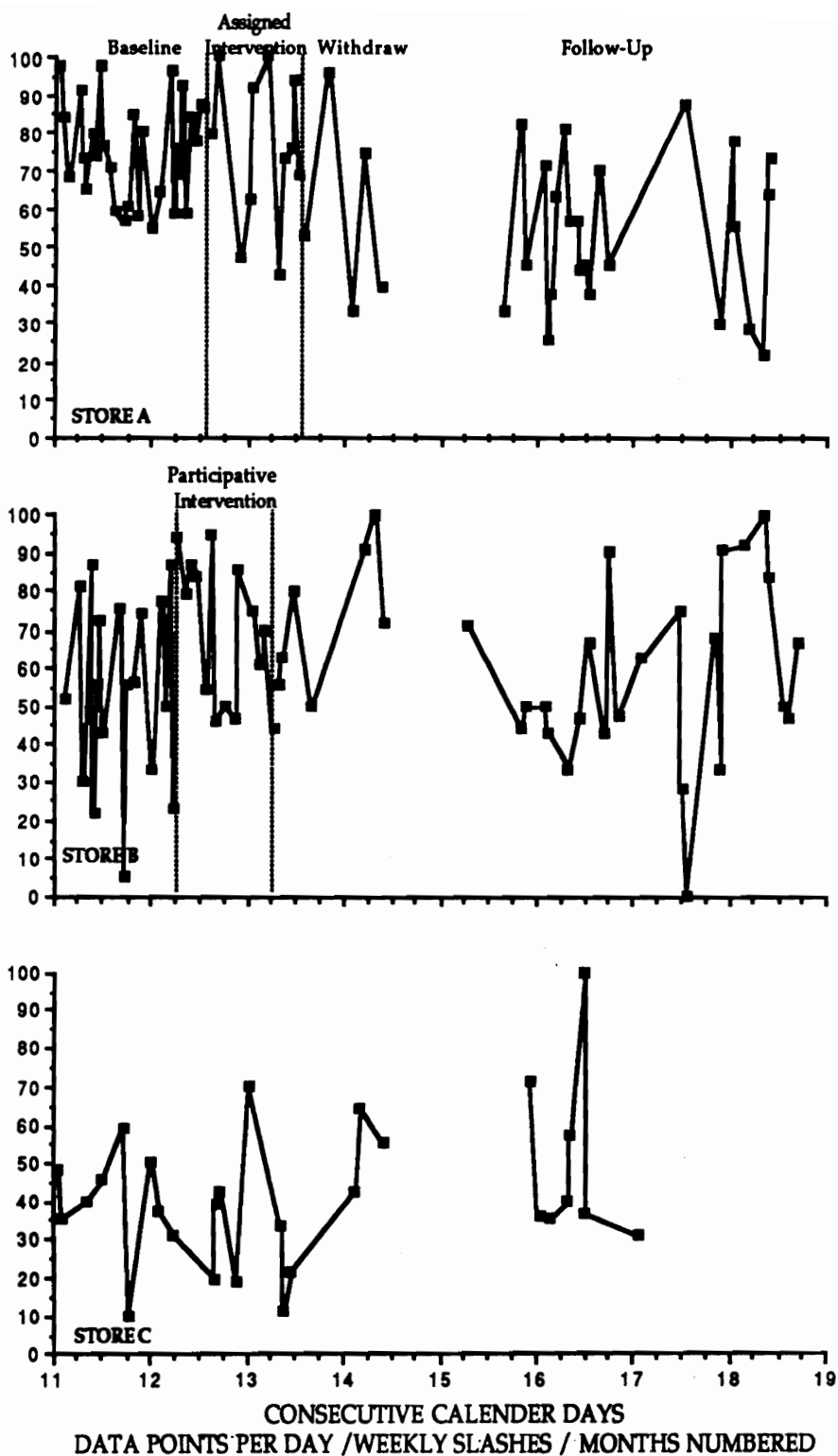


Figure 12. Community level time series analysis of safety belt use during Year 2.

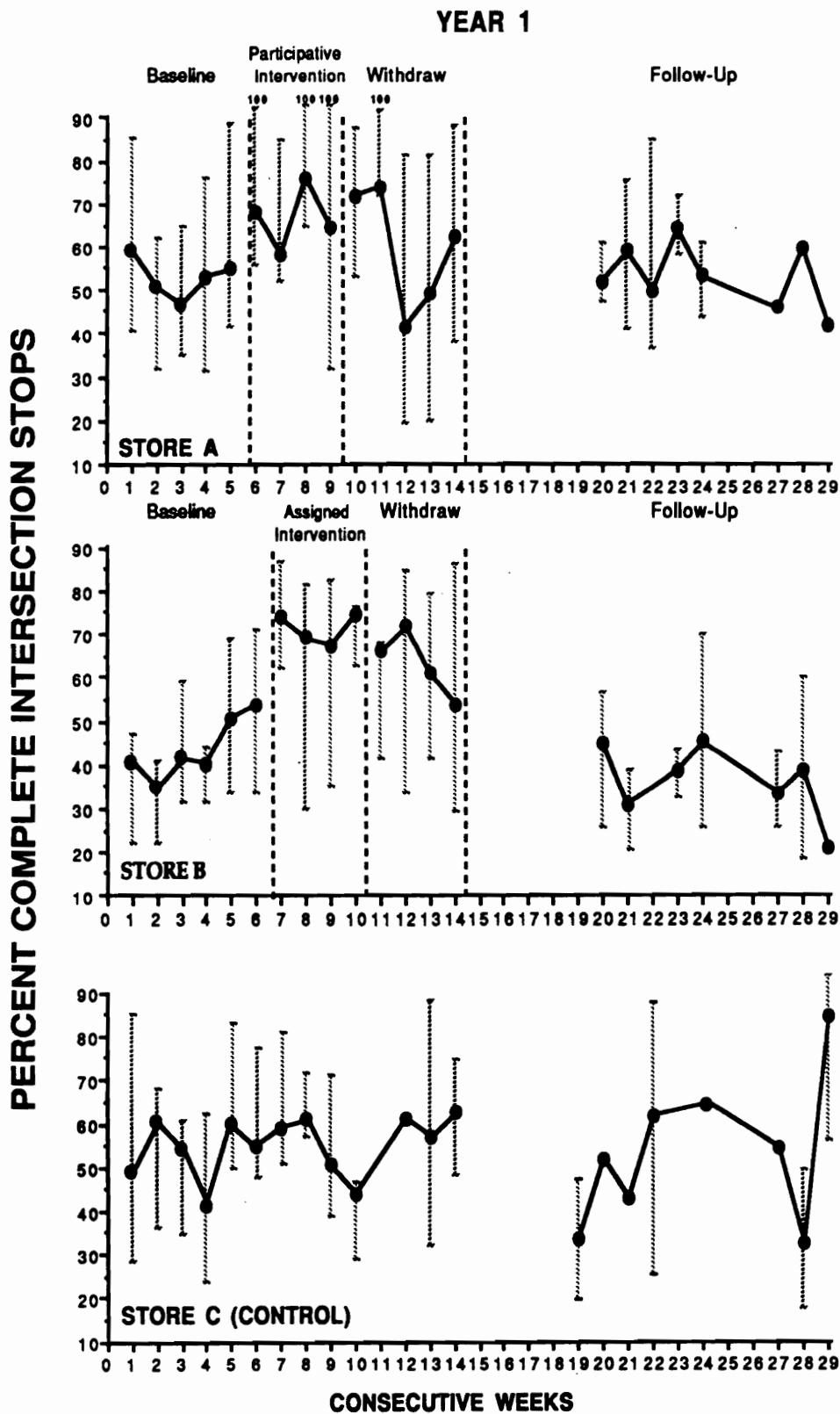


Figure 13. Weekly percentages of complete intersection stops.

YEAR 2

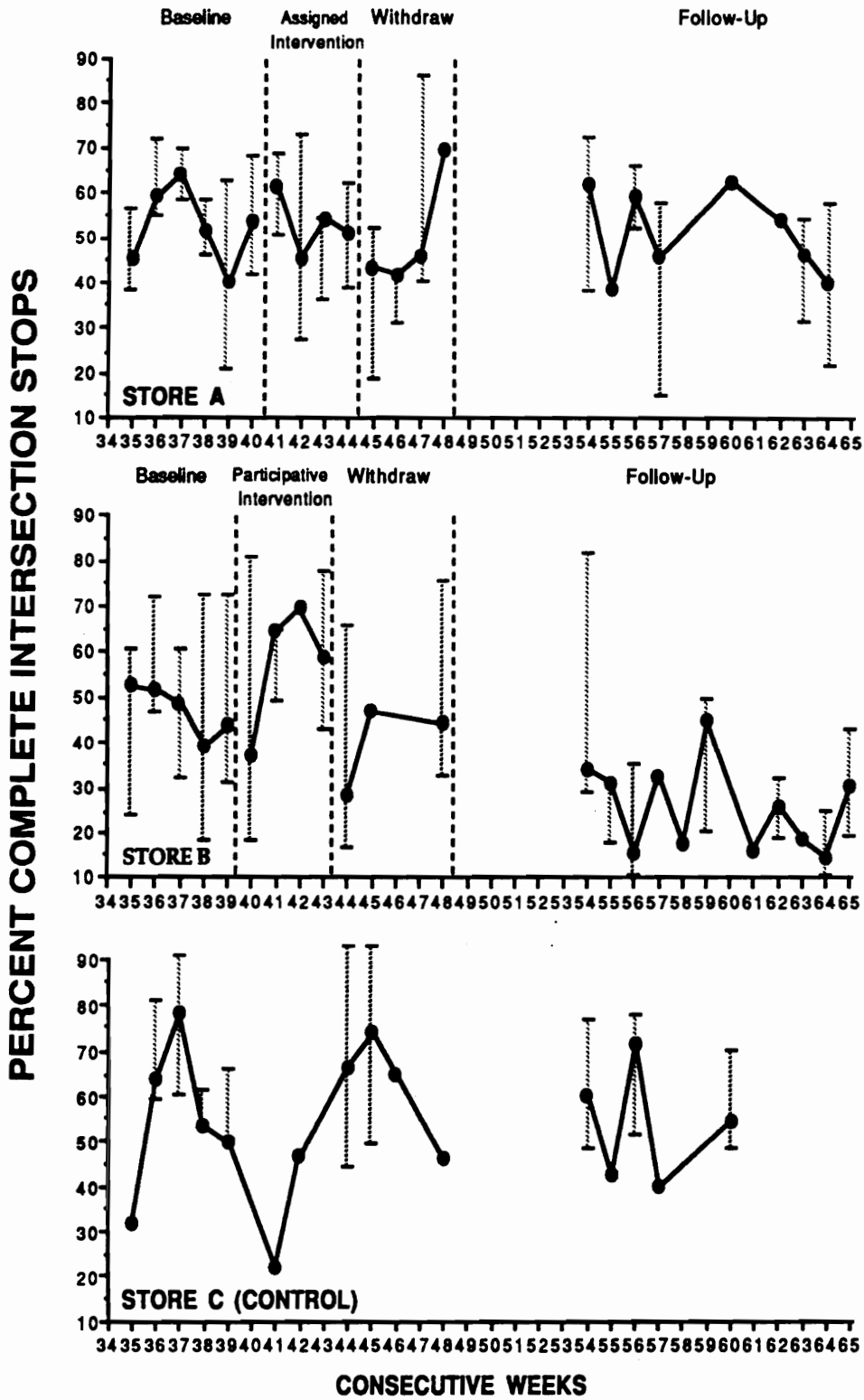


Figure 14. Weekly percentages of complete intersection stops.

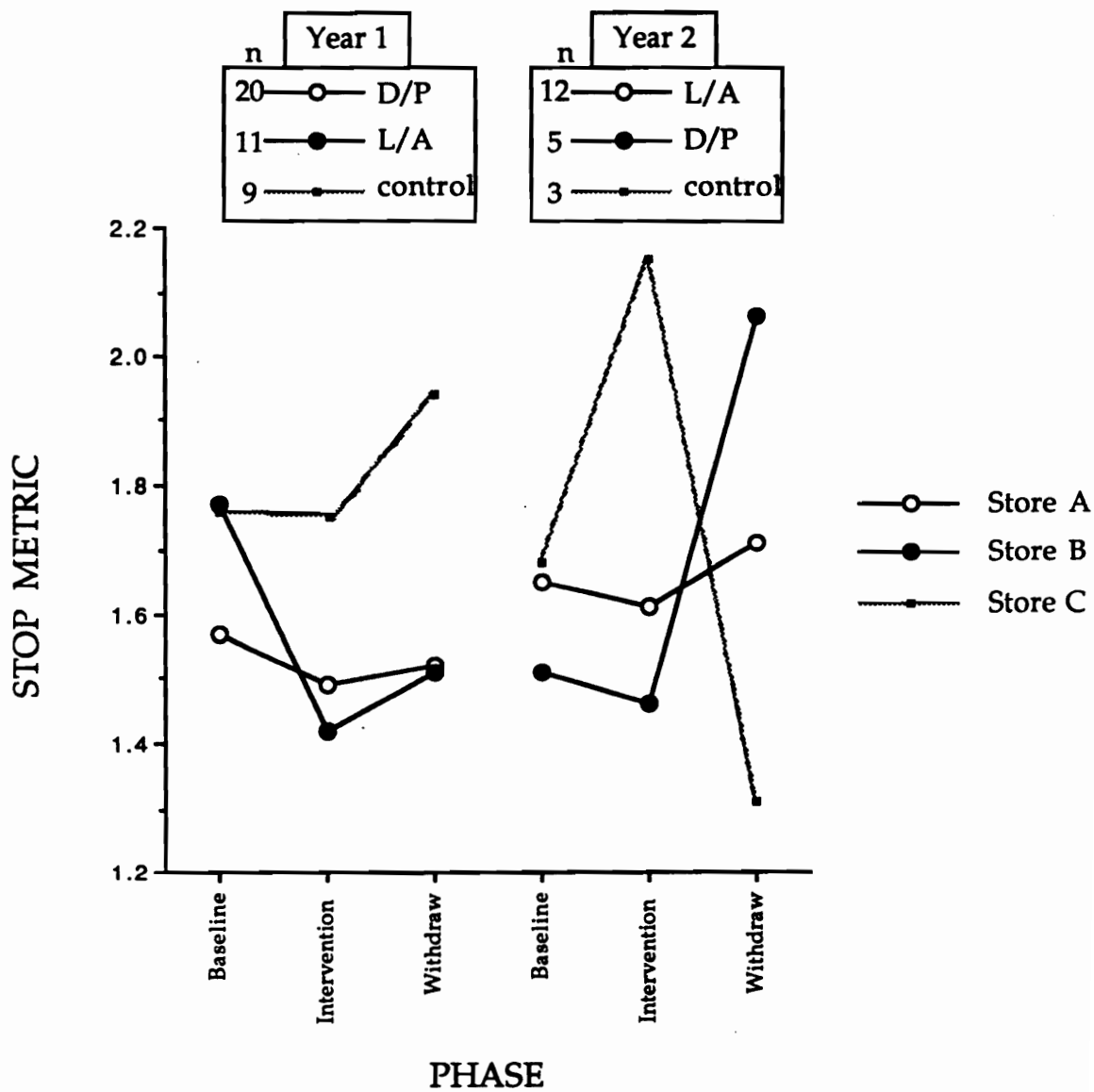


Figure 15. Stop metric for each phase at each store during Year 1 and Year 2

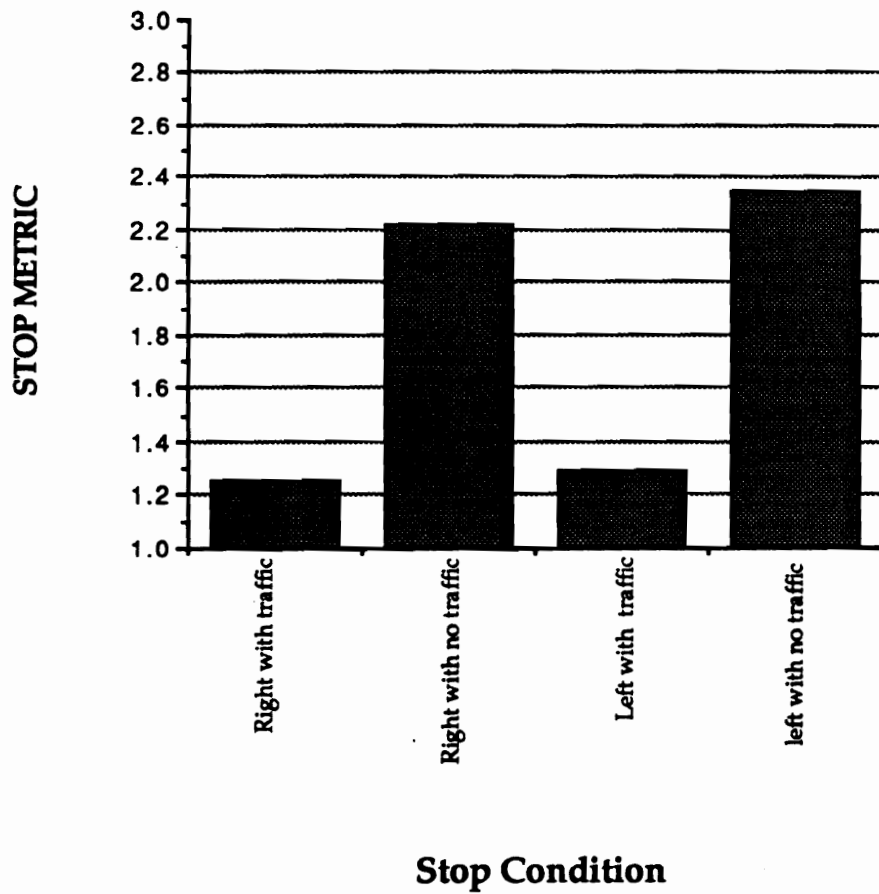


Figure 16. Stop metrics of different patterns of intersection conditions.

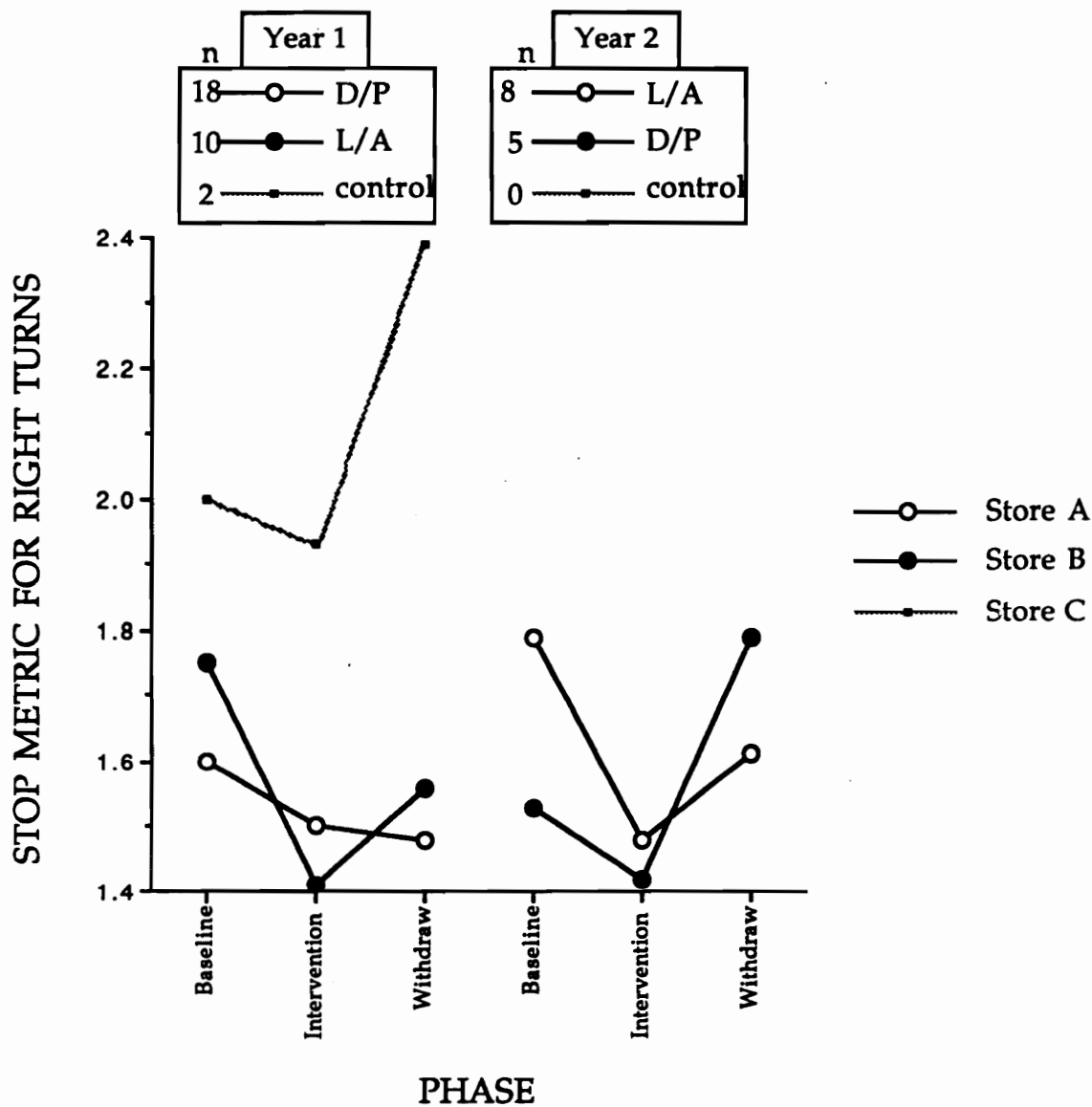


Figure 17. Stop metric for right turns considering each phase each store during Year 1 and Year 2

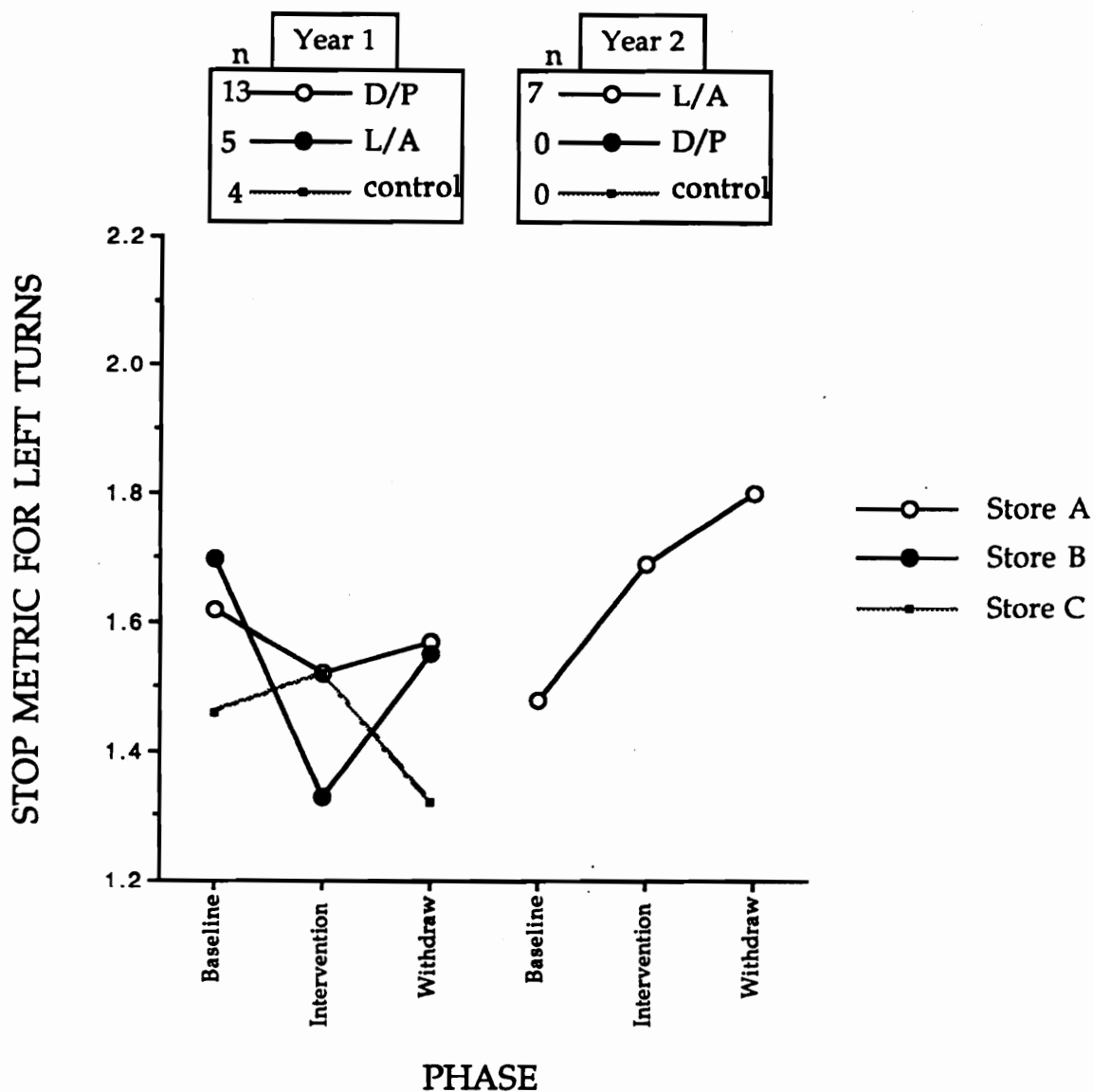


Figure 18. Stop metric for left turns considering each phase and each store during Year 1 and Year 2

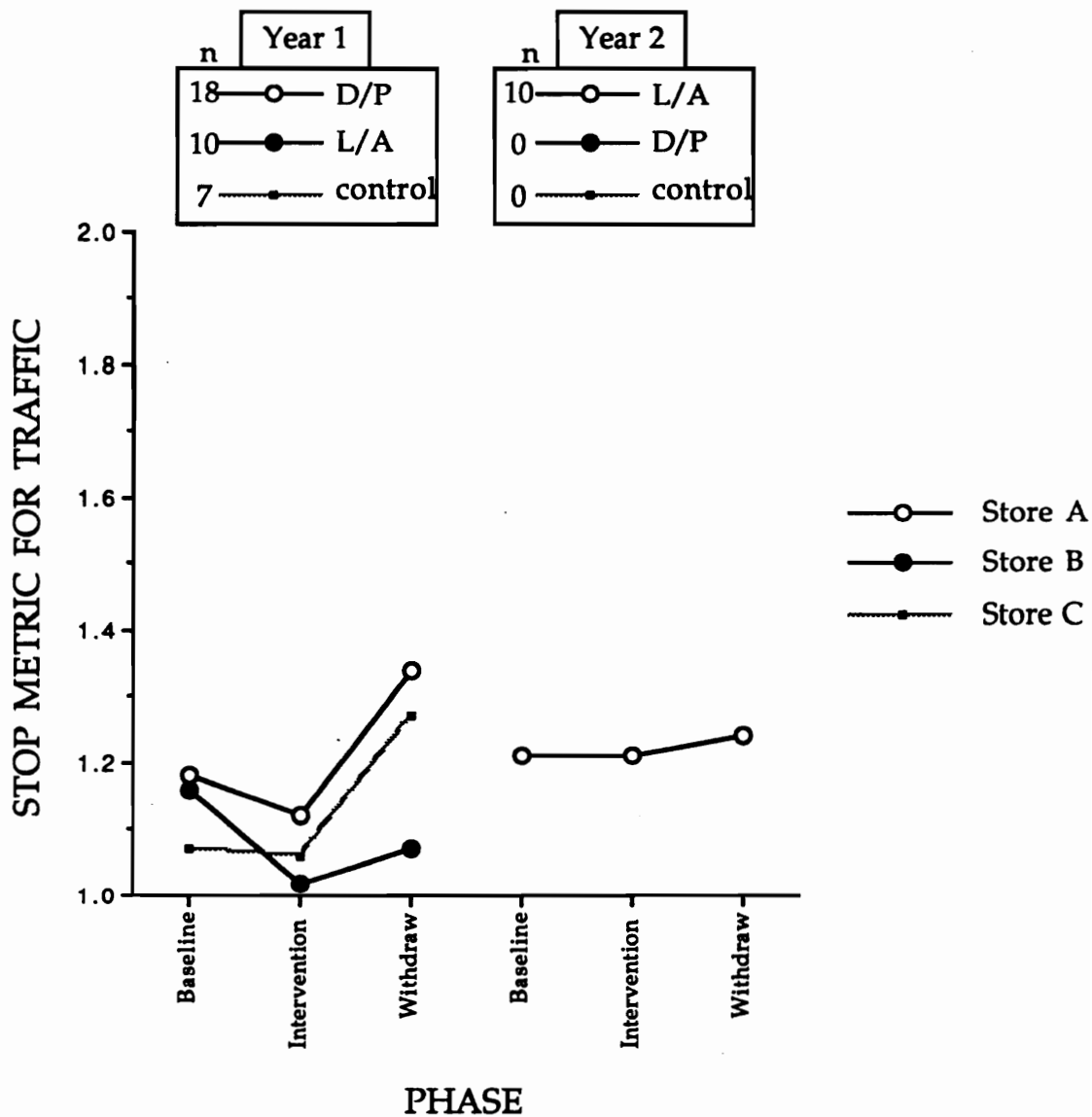


Figure 19. Stop metric for traffic condition considering each phase and each store during Year 1 and Year 2

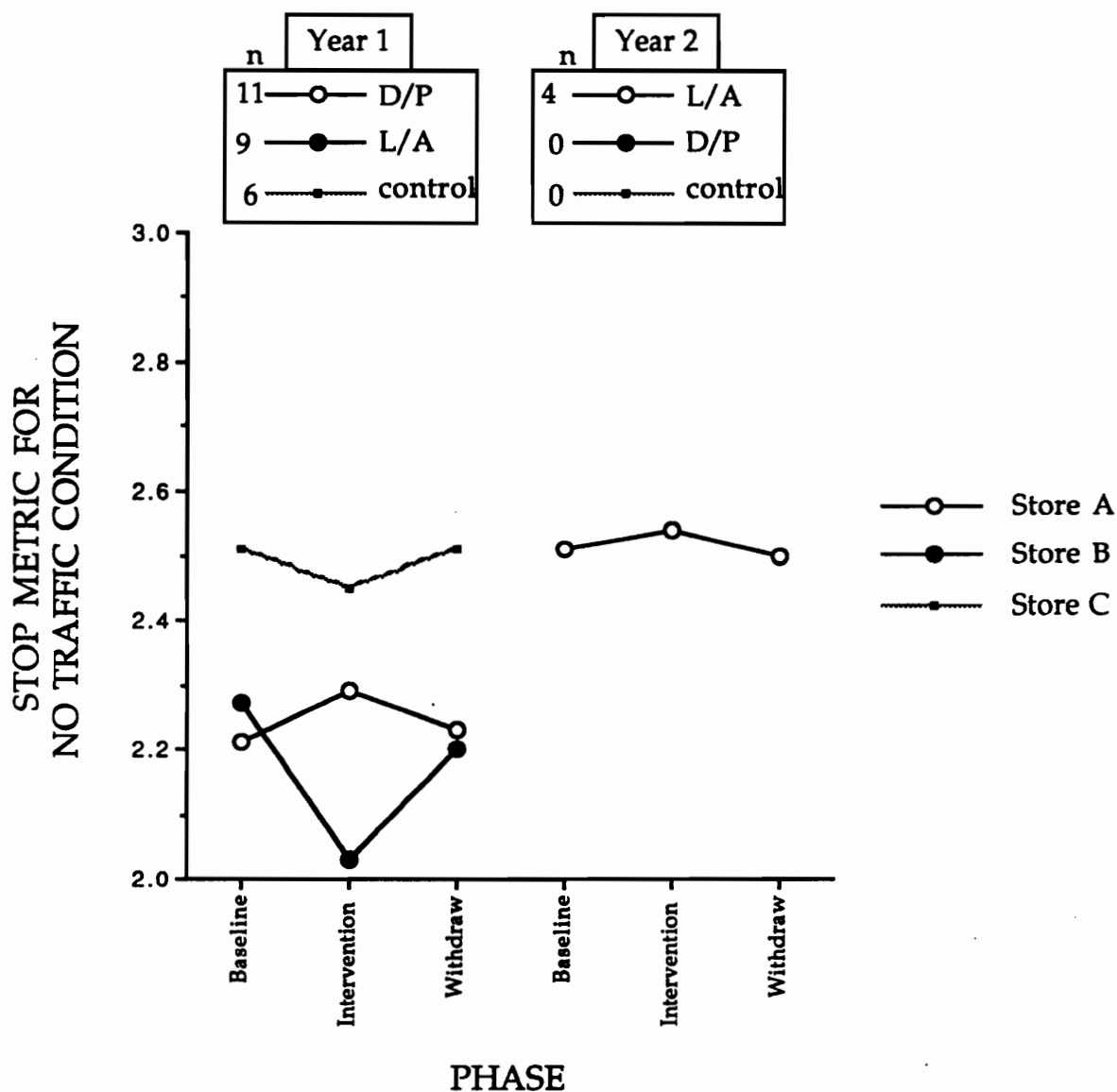


Figure 20. Stop metric for no traffic conditions considering each phase and each store during Year 1 and Year 2

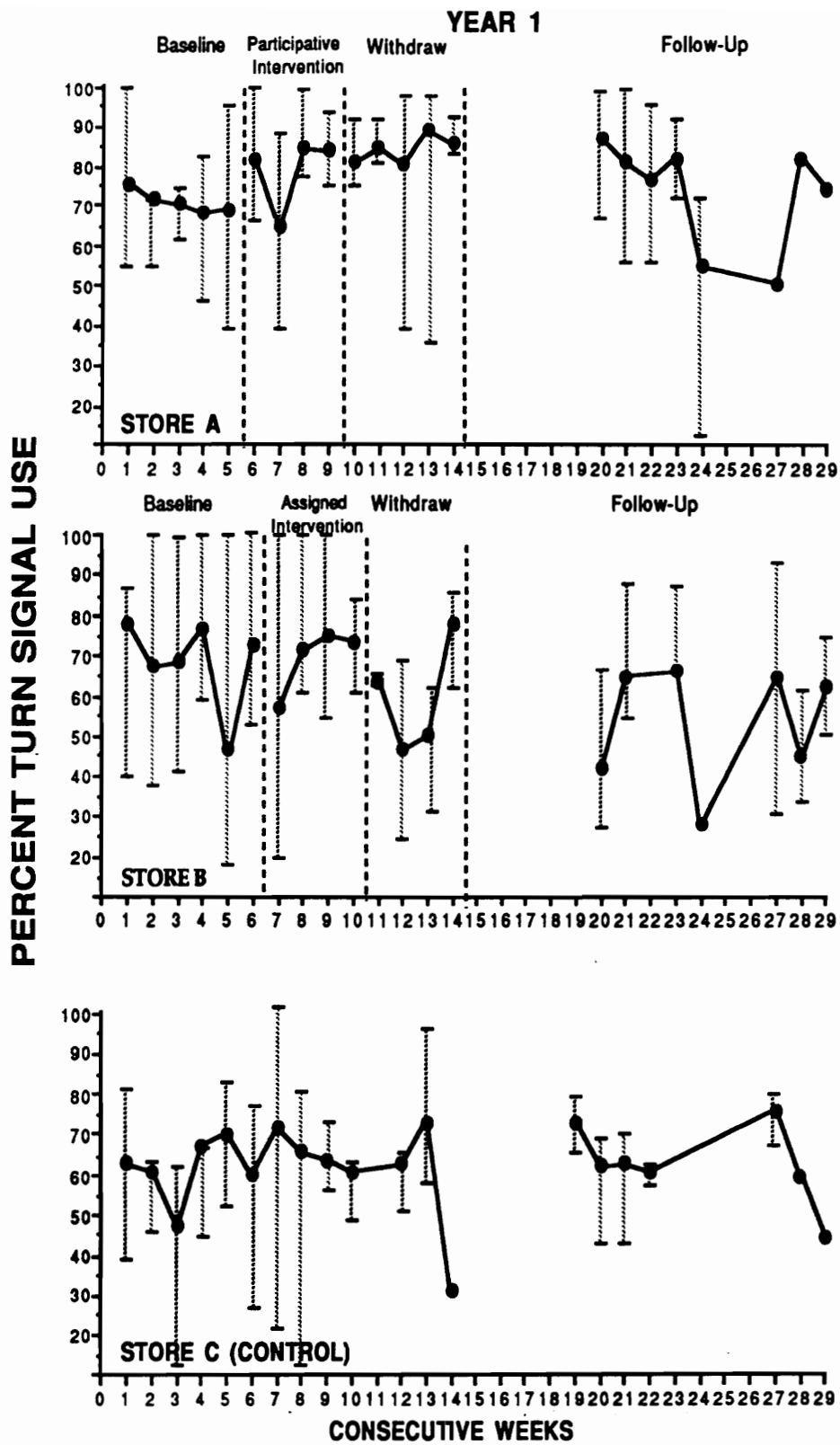


Figure 21. Weekly percentages of turn signal use

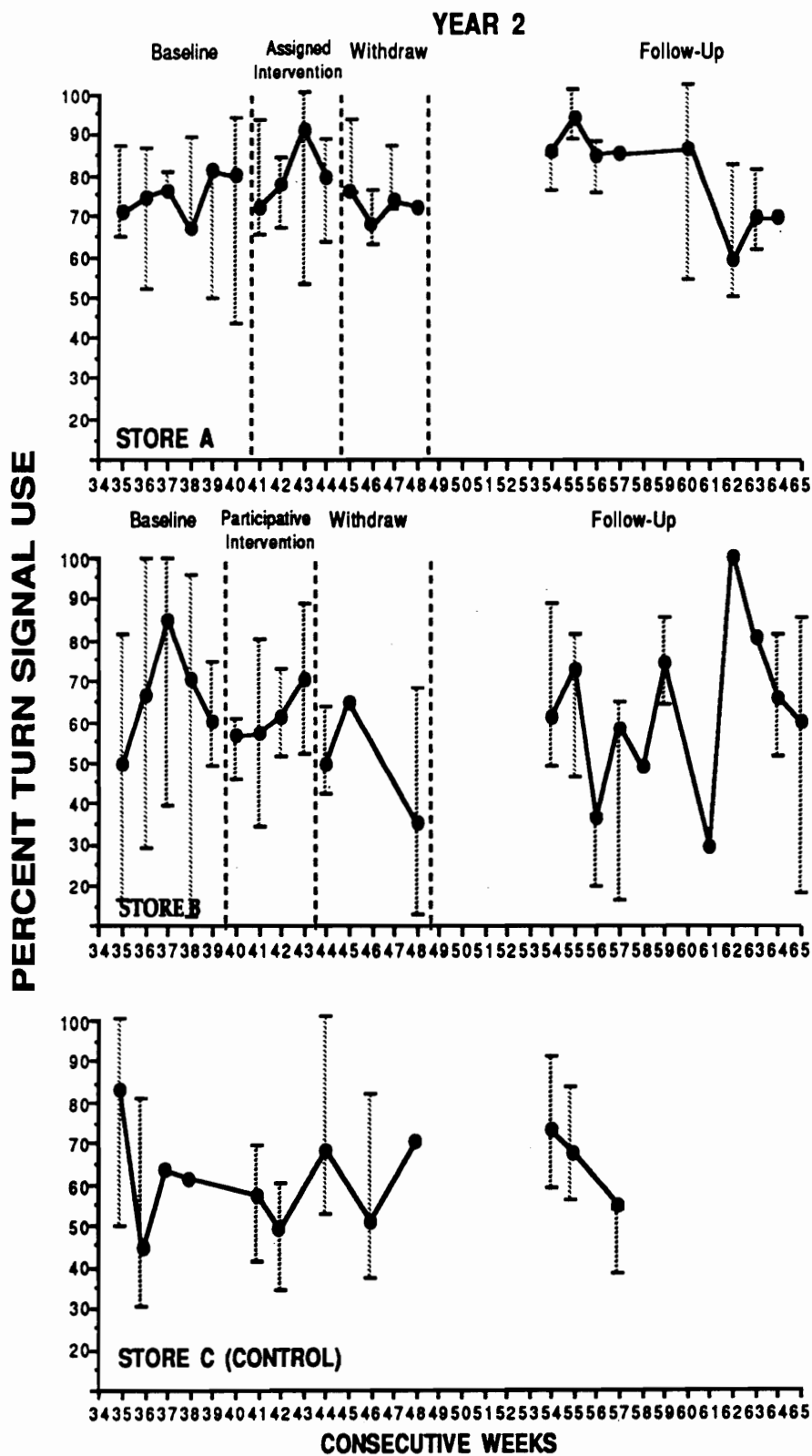


Figure 22. Weekly percentages of turn signal use.

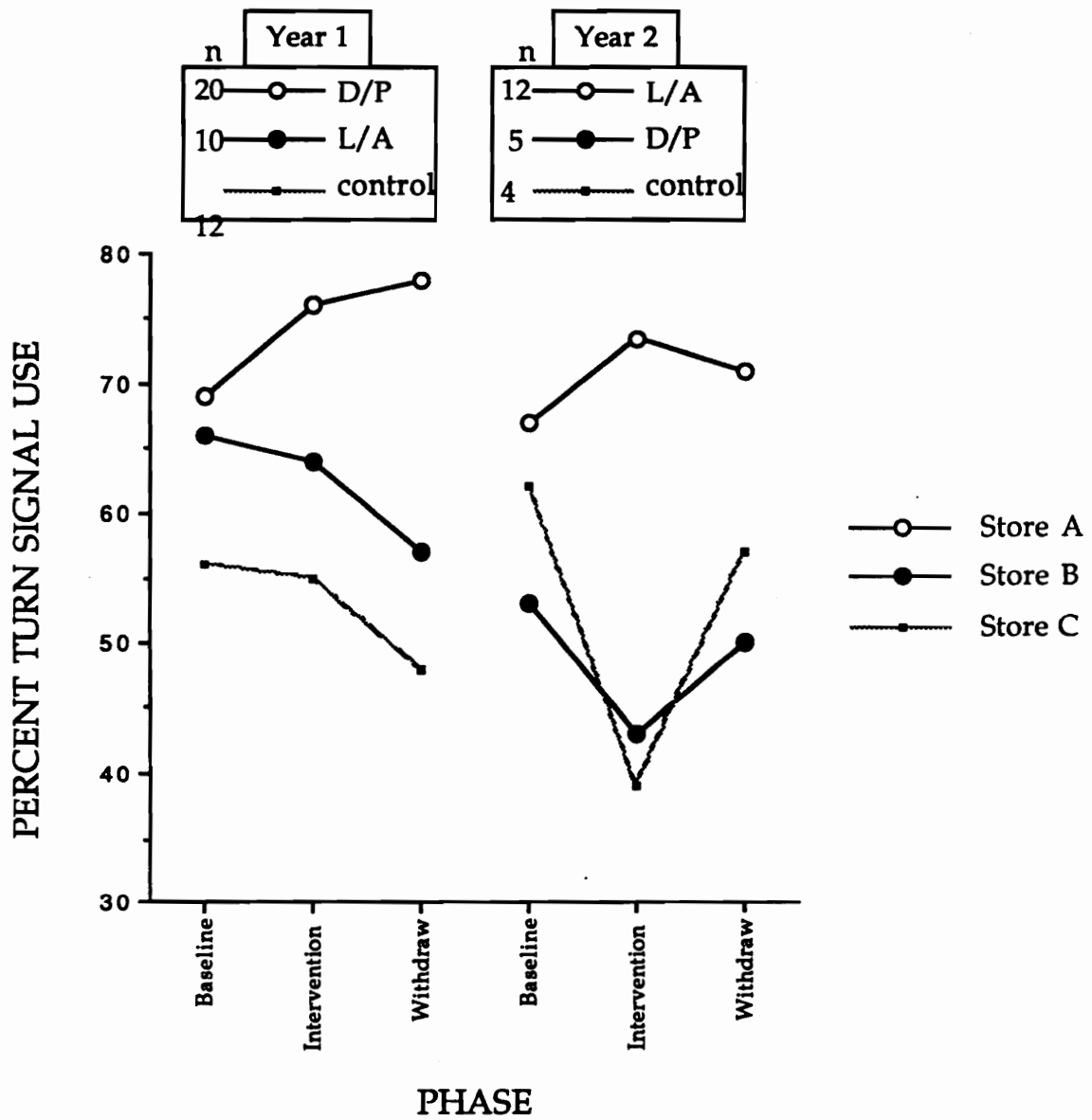


Figure 23. Percent turn signal use for each phase at each store during Year 1 and Year 2

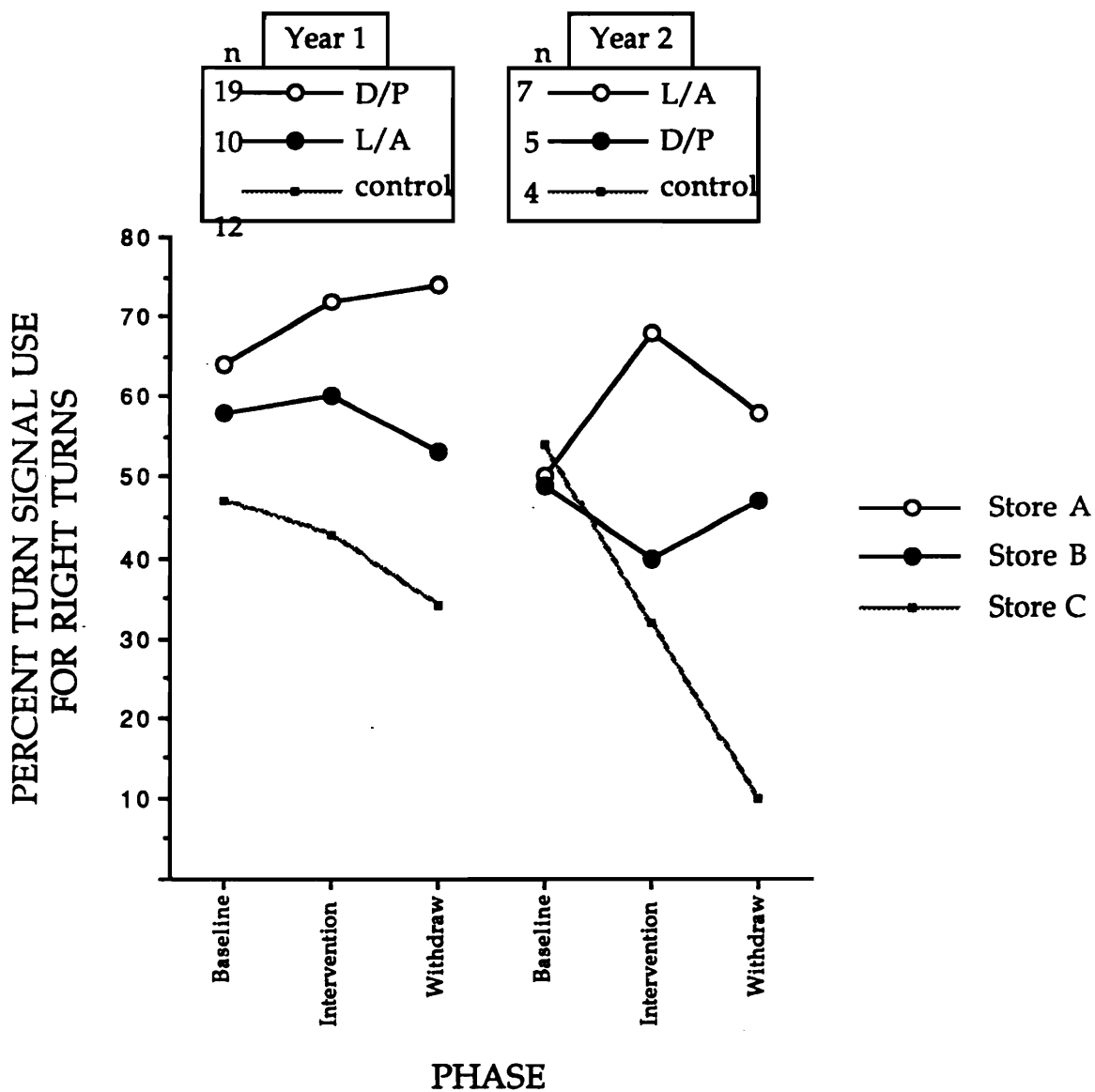


Figure 24. Percent turn signal use for right turns considering each phase and each store during Year 1 and Year 2.

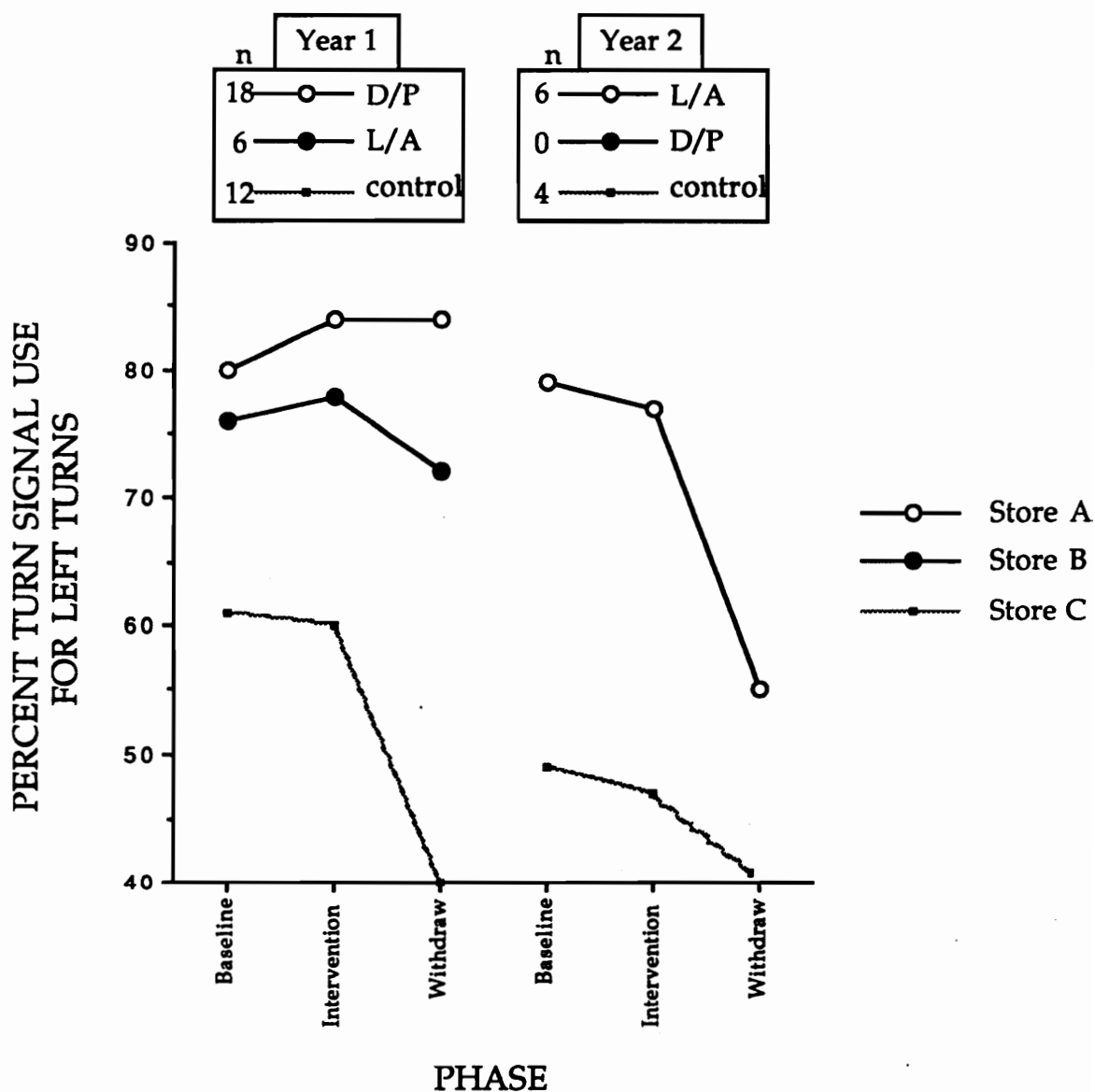


Figure 25. Percent turn signal use for left turns considering each phase and each store during Year 1 and Year 2

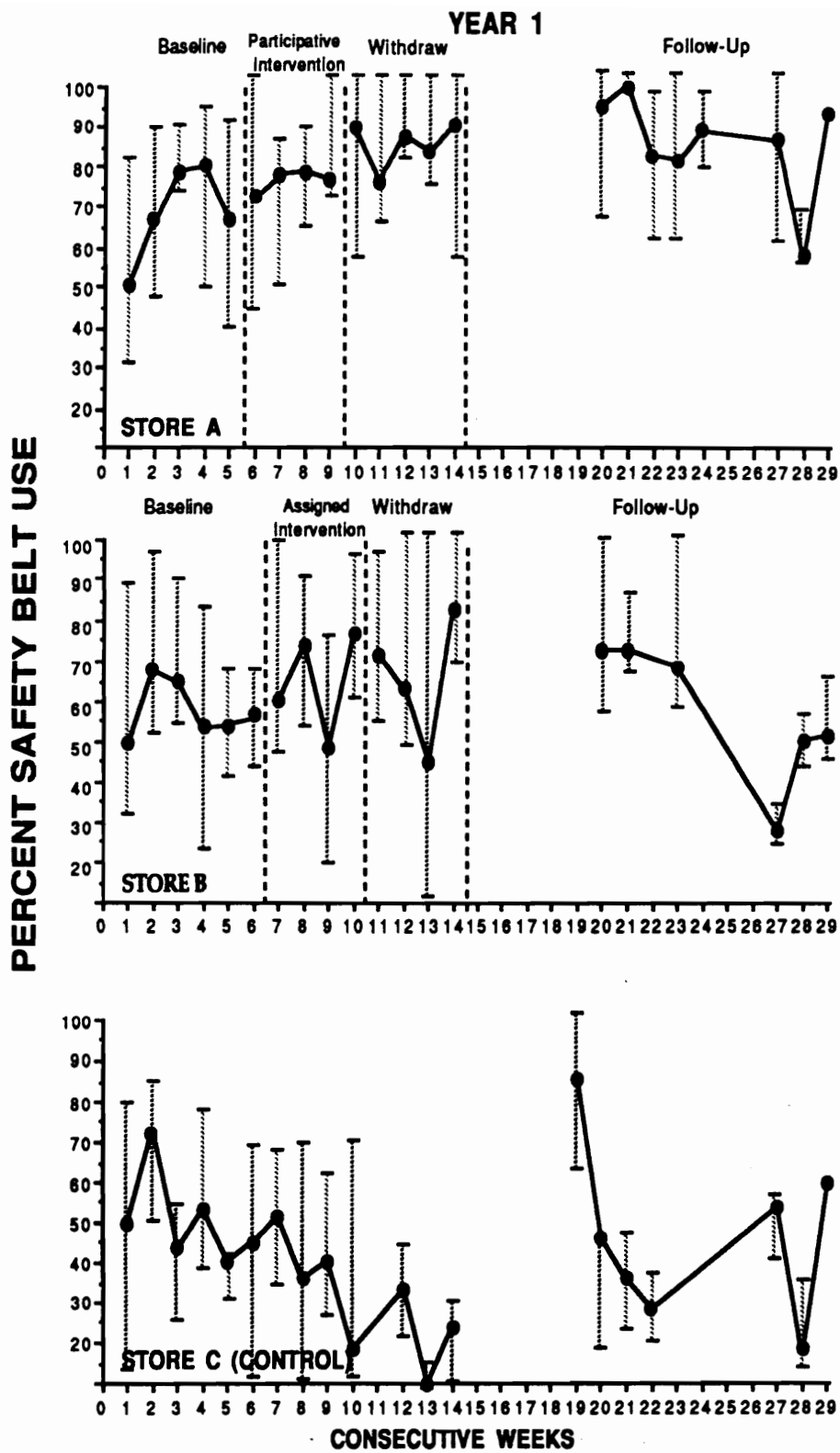


Figure 26. Weekly percentages of safety belt use.

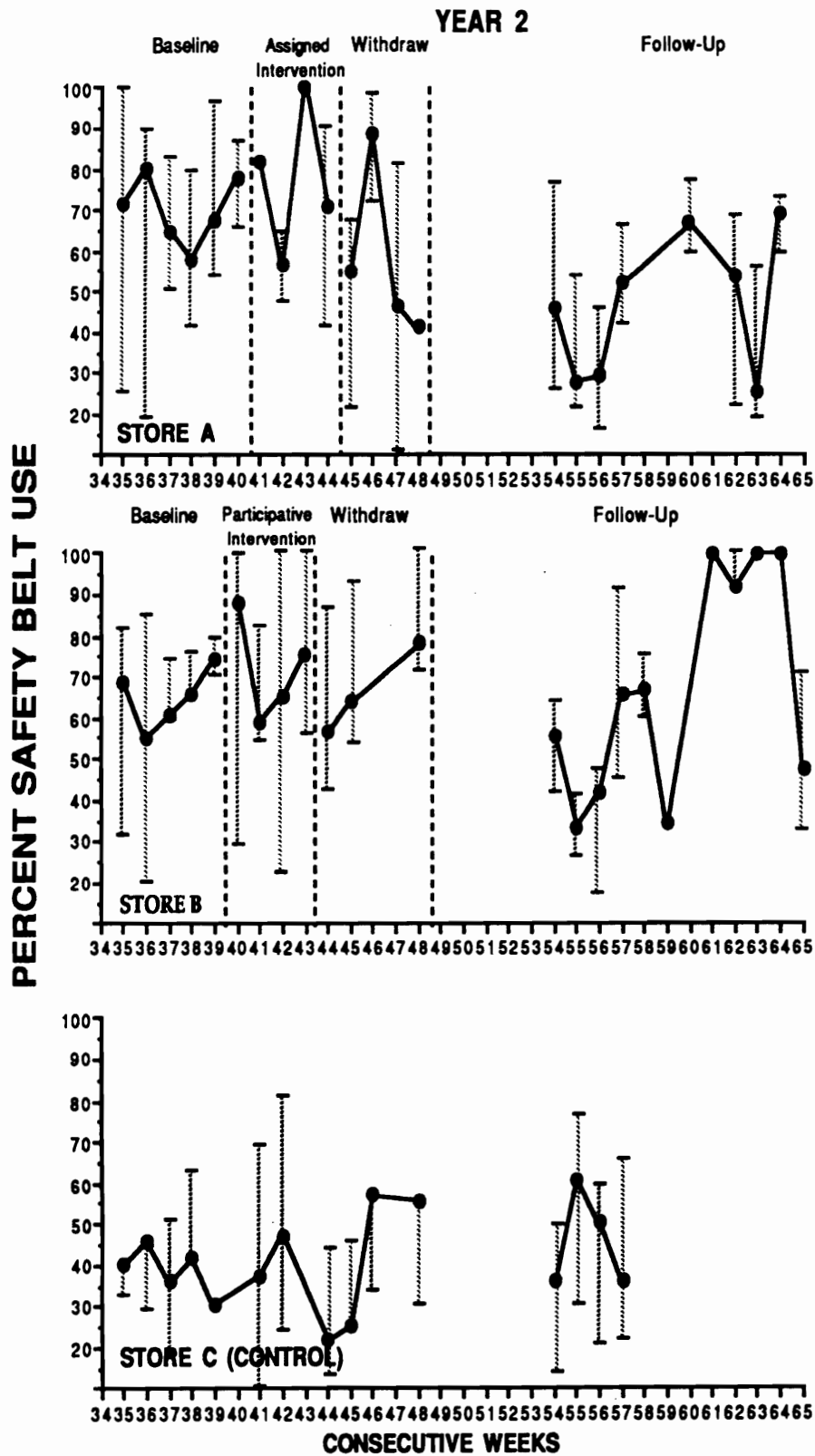


Figure 27. Weekly percentages of safety belt use.

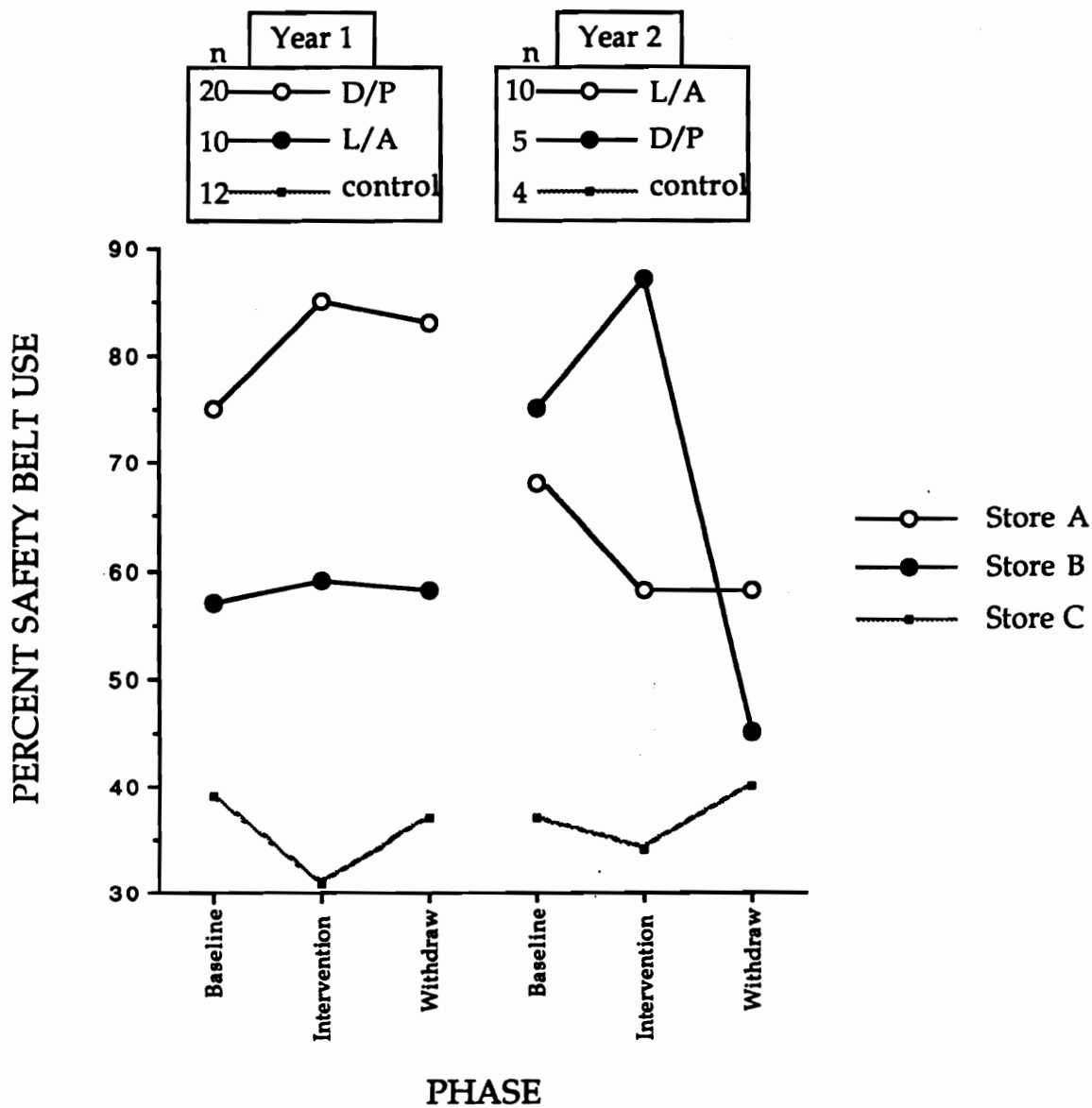


Figure 28. Percent safety belt use for each phase at each store during Year 1 and Year 2

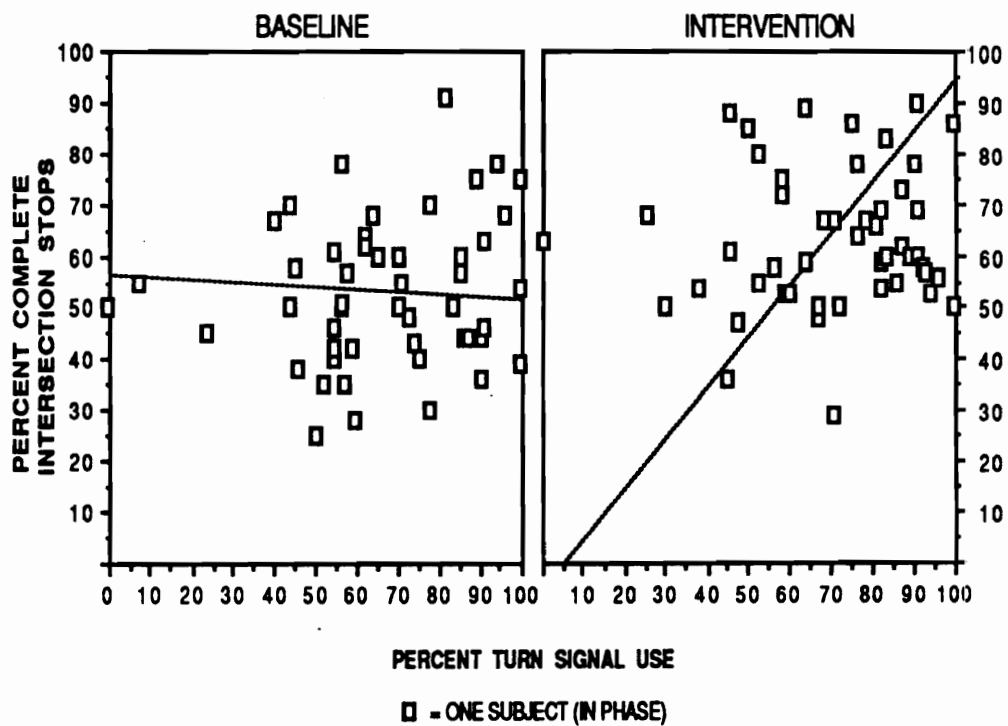


Figure 29. Comparative scatterplots of complete intersection stops and turn signal use between baseline and intervention phases.

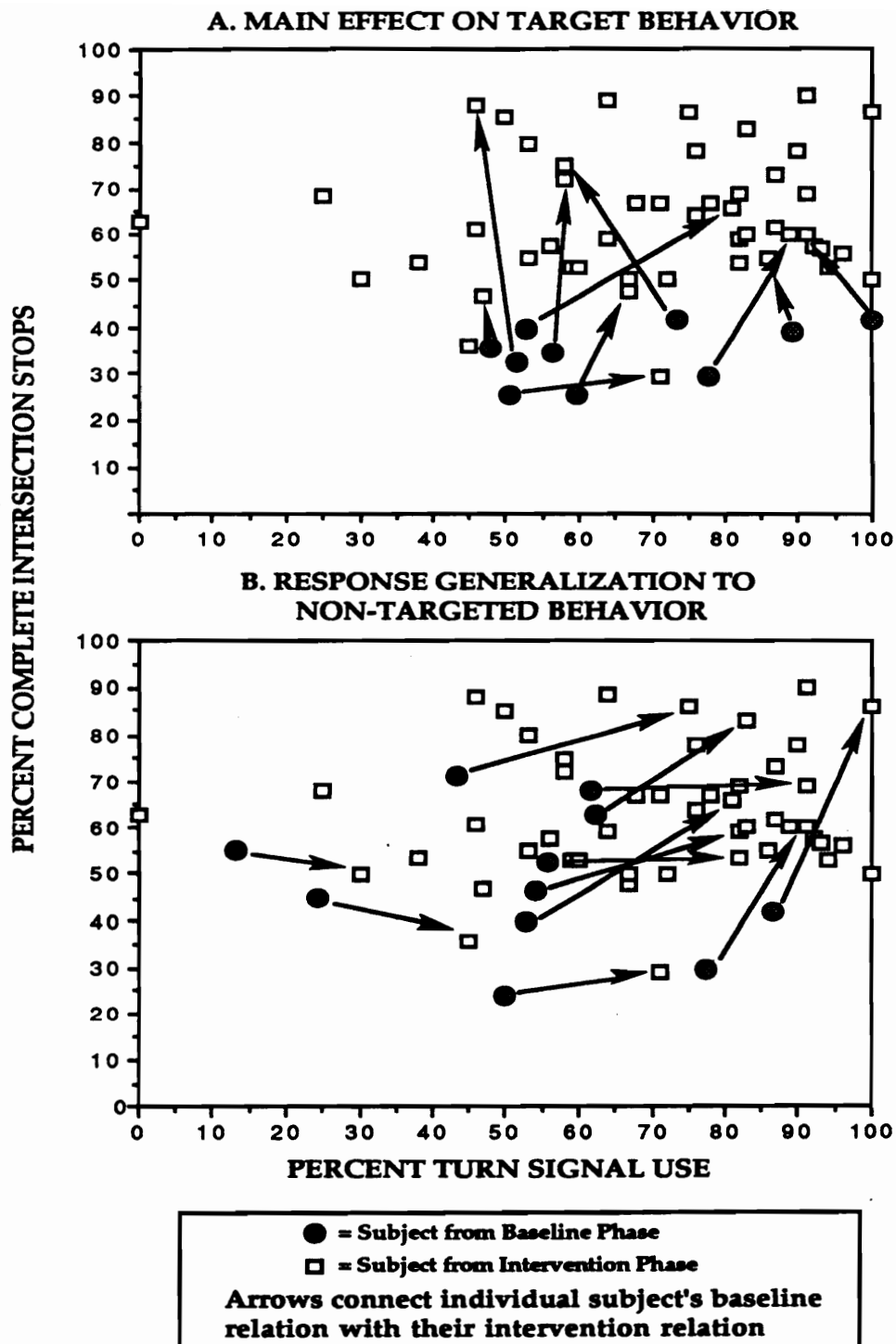


Figure 30. An example of response generalization between the target behavior (i.e., complete intersection stops) and a non-targeted behavior (i.e., turn signal use).

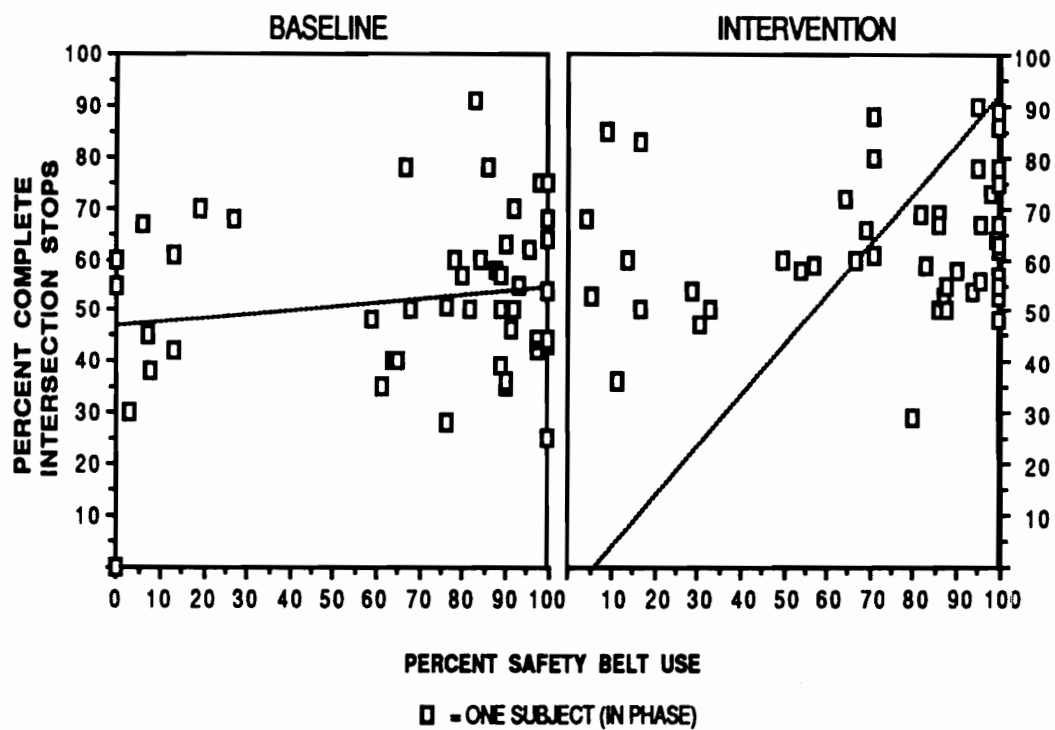


Figure 31. Comparative scatterplots of complete intersection stops and safety belt use between baseline and intervention phases.

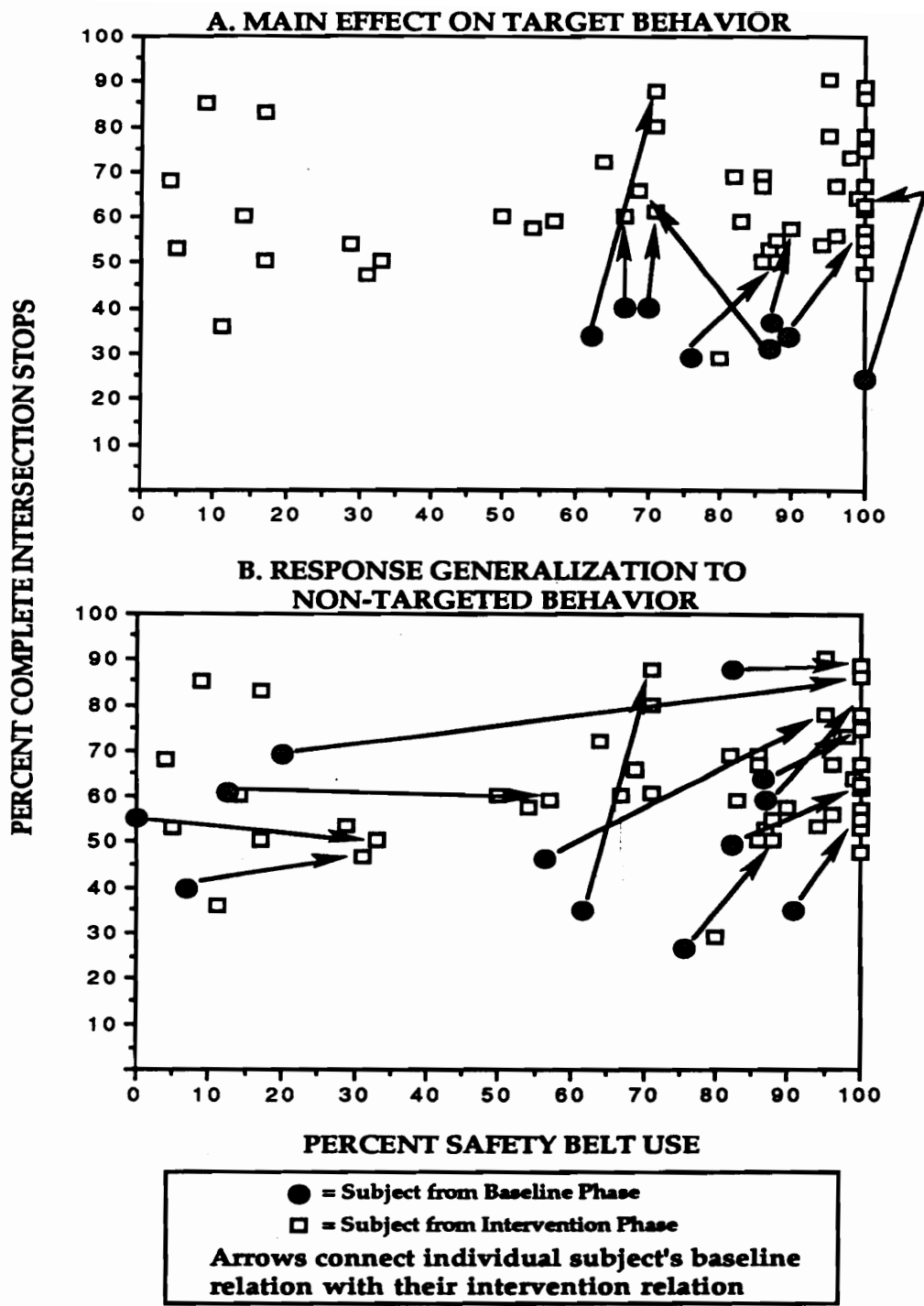


Figure 32. An example of response generalization between the target behavior (i.e., complete intersection stops) and a non-targeted behavior (i.e., safety belt use).

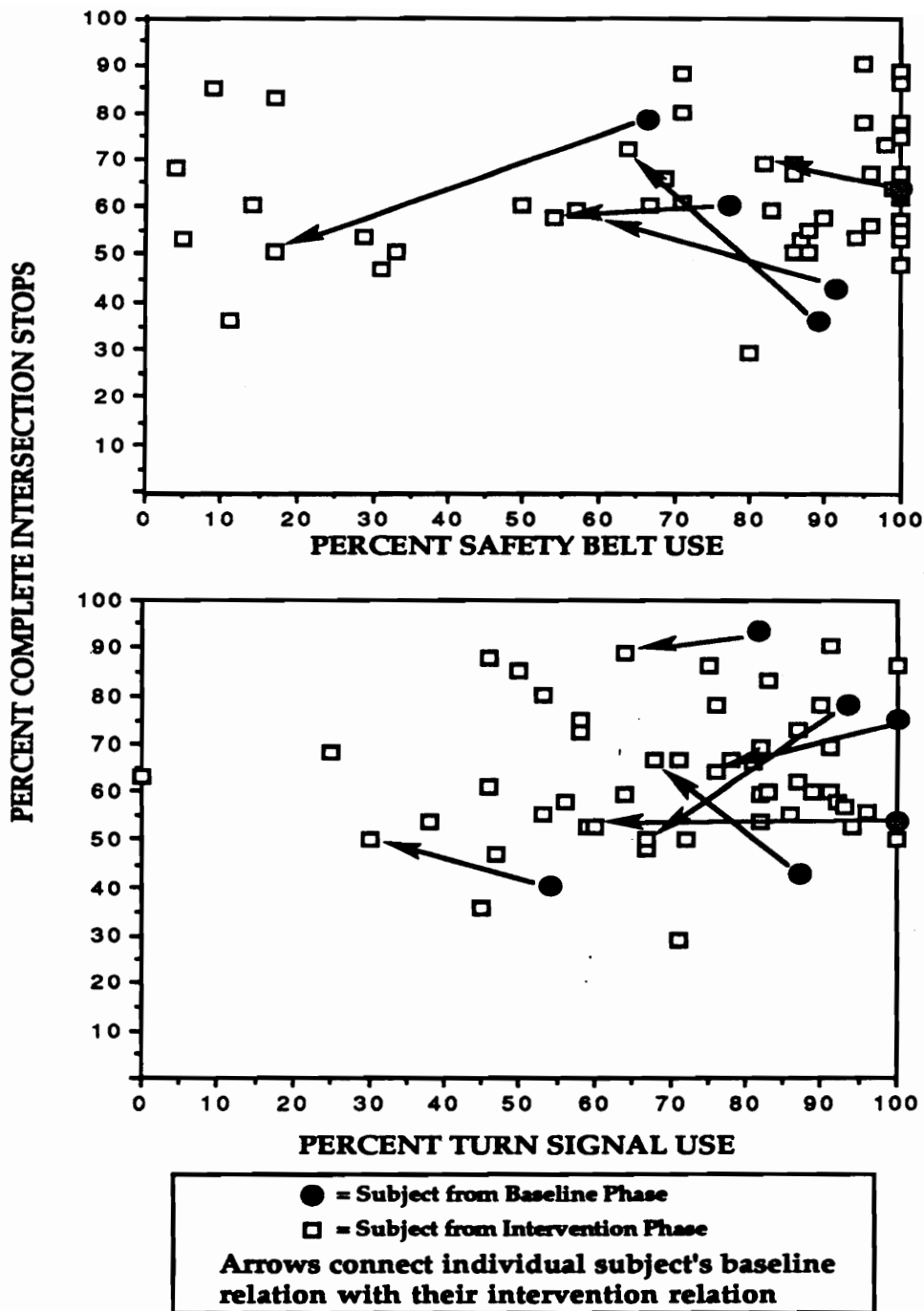


Figure 33. Decreases in non-targeted behaviors (i.e., safety belt use and turn signal use) during the intervention to increase complete intersection stops.

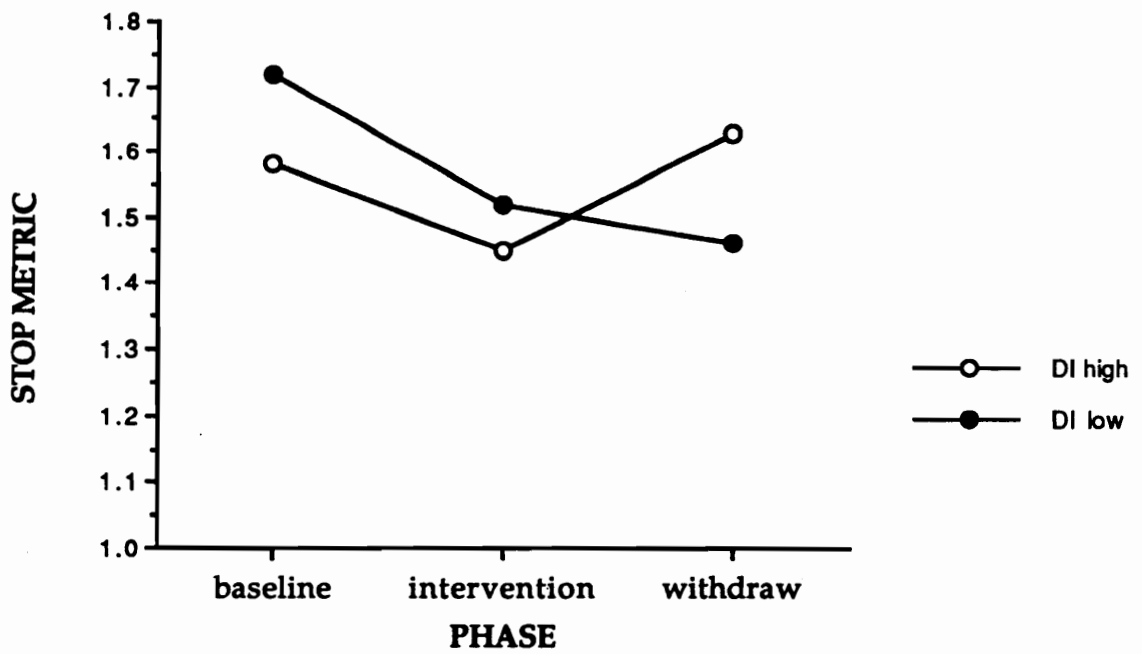


Figure 34. The relationship between Driver Internality and the Stop Metric

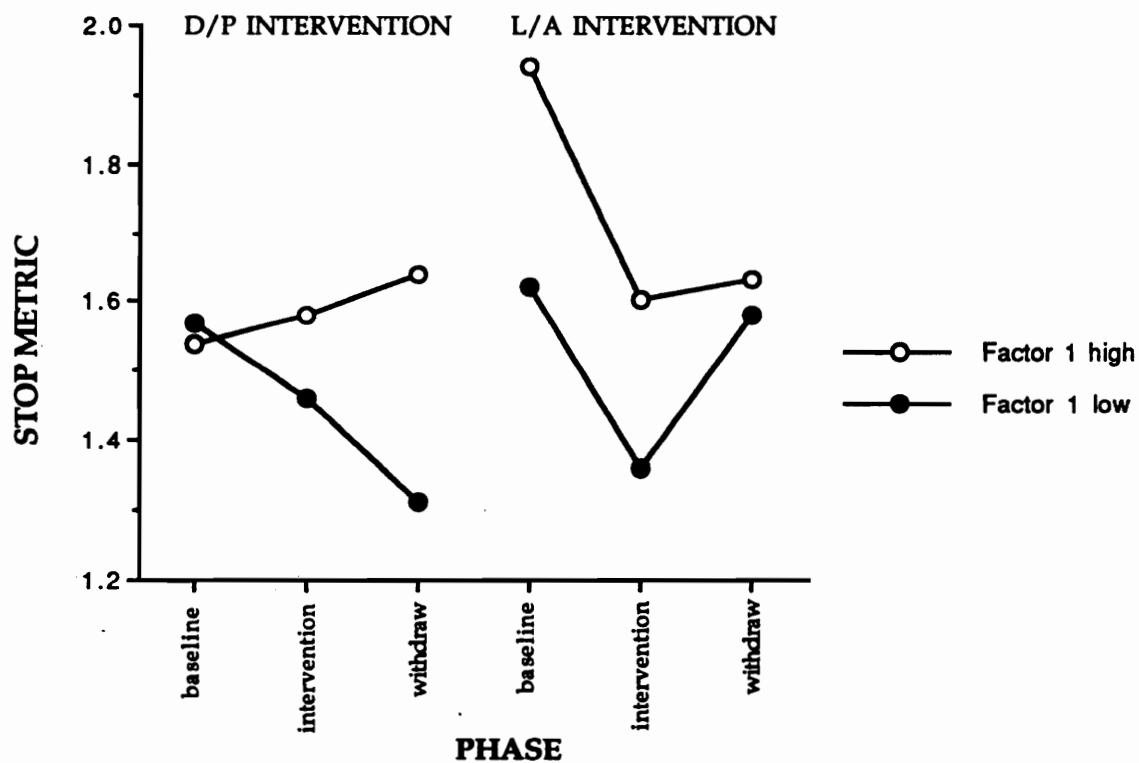
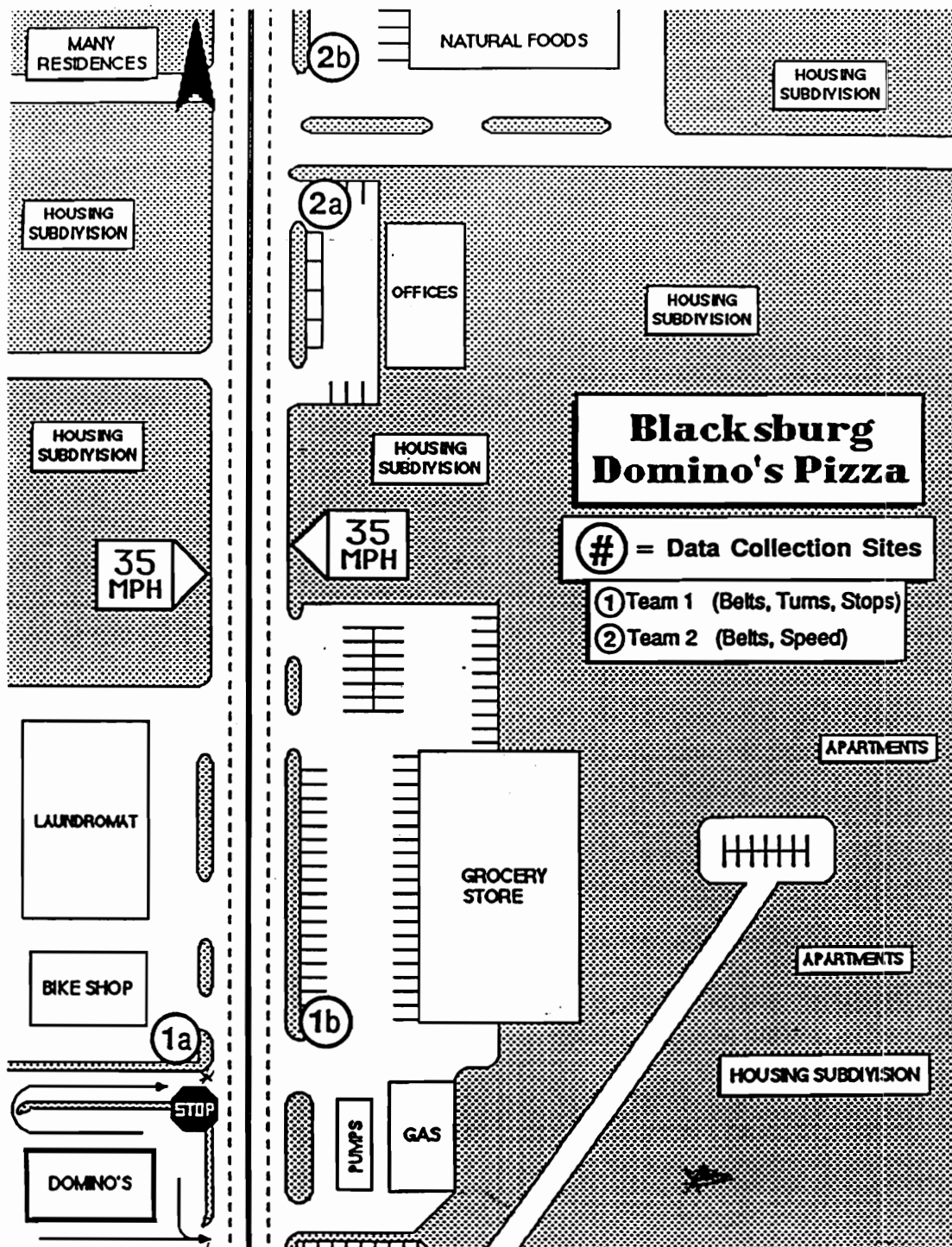


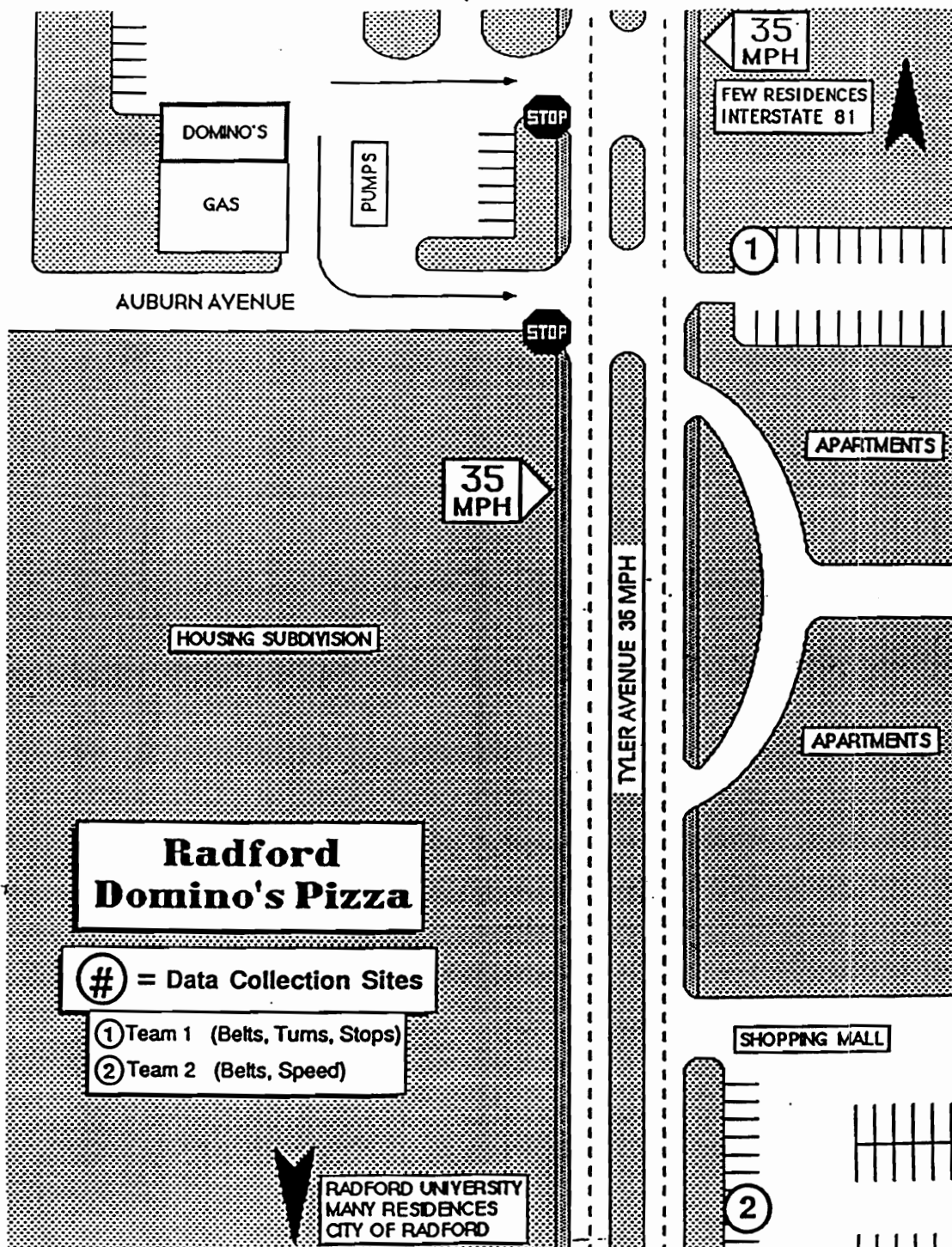
Figure 35. The interaction between Factor 1 of the reactivity scale and the type of intervention

APPENDIX A

Data Collection Sites for Store A and Store B

* - collect data here





APPENDIX B

Behavioral Checksheets

PIZZA
TEAM 1

STORE RADFORD

PAGE 1 OF 2

Team 2 Names _____

Team 1 Names BUCK + CHRIS

DATE SEPT. 28, 1994

TIME 14³⁰

You are the:

☐ Primary
☒ Reliability

observer

Data Collection
Location:

PARKING LOT OF
RADFORD DOMINOS

Weather: ☒ Clear ☐ Rain ☐ Snow ☐ Fog

Temp: Cold Cool Warm Hot ☐

Road Cond: ☒ Dry ☐ Wet ☐ Snow ☐ Ice

Arrive Depart	License Number	Driver		Turn Signal	Stops		Delivery Vehicle?	Time
		Gender	Belt		Type	Traffic		
OA ● D	KFP 216	● M ○ F	● Y ○ N	○ L ○ N ● R	3	○ Y ○ N	● Y ○ N	14 ³²
● A ○ D	TWS 783	○ M ● F	● Y ○ N	● L ○ N ○ R	-	○ Y ○ N	● Y ○ N	43
● A ○ D	KFP 216	● M ○ F	● Y ○ N	● L ○ N ○ R	-	○ Y ○ N	● Y ○ N	44
OA ● D	HD HD	● M ○ F	○ Y ○ N	○ L ○ N ● R	1	● Y ○ N	● Y ○ N	56
OA ● D	NJP 244	● M ○ F	○ Y ○ N	○ L ○ N ● R	1	○ Y ○ N	● Y ○ N	59
● A ○ D	NJP 244	● M ○ F	○ Y ○ N	● L ○ N ○ R	-	○ Y ○ N	● Y ○ N	15 ⁰⁷
OA ● D	TWS 783	○ M ● F	● Y ○ N	○ L ○ N ● R	1	○ Y ○ N	● Y ○ N	08
OA ● D	KFP 216	● M ○ F	● Y ○ N	○ L ○ N ● R	1	○ Y ○ N	● Y ○ N	14
OA ● D	-	○ M ● F	● Y ○ N	● L ○ N ○ R	3	○ Y ○ N	○ Y ○ N	19
● A ○ D	KFP 216	● M ○ F	● Y ○ N	● L ○ N ○ R	-	○ Y ○ N	● Y ○ N	20
● A ○ D	TWS 783	○ M ● F	● Y ○ N	○ L ○ N ● R	-	○ Y ○ N	● Y ○ N	21
OA ● D	NJP 244	● M ○ F	○ Y ○ N	○ L ○ N ● R	2	○ Y ○ N	● Y ○ N	23
OA ● D	KFP 216	● M ○ F	● Y ○ N	○ L ○ N ● R	3	○ Y ○ N	● Y ○ N	29
OA ● D	TWS 783	○ M ● F	● Y ○ N	○ L ○ N ● R	1	○ Y ○ N	● Y ○ N	29
OA ● D	-	○ M ● F	● Y ○ N	● L ○ N ○ R	2	○ Y ○ N	○ Y ○ N	34
● A ○ D	NJP 244	● M ○ F	○ Y ○ N	● L ○ N ○ R	-	○ Y ○ N	● Y ○ N	41
● A ○ D	KFP 216	● M ○ F	● Y ○ N	● L ○ N ○ R	-	○ Y ○ N	● Y ○ N	42
OA ● D	NJP 244	● M ○ F	● Y ○ N	○ L ○ N ● R		○ Y ○ N	● Y ○ N	43
OA ● D	KFP 216	● M ○ F	● Y ○ N	○ L ○ N ● R	3	○ Y ○ N	● Y ○ N	44
OA ● D	TWS 783	○ M ● F	● Y ○ N	● L ○ N ○ R		○ Y ○ N	● Y ○ N	46

Number Belted 21 = 87.5%
Total Number 24 Percent Belted

Total Signal Used 10 = 44%
Total Turns 25 Percent Signal Used

1 6
2 2
3 6 14 = 43%
Stops 1490
43%

APPENDIX C

Data Collection Manual

Team Description

This box, located in the upper right corner of the data sheet, indicates the type of data the data collector would gather. Team 1 collects belt, turn signal and stopping data, while Team 2 collects belt and speed data.

PIZZA TEAM 1

Location of Store

Located at the top of the data collection sheet, space is provided to write in the name of the town or, if there are multiple stores per town, the intersection at which the store where data is collected is located.

STORE	
-------	----------------------

Page, Date & Time

Located in the top right-hand corner, is the dating information. Here, indicate the date and the 2 hour time period during which you collected data, as well as the current page number and the total number of pages from your collection period.

PAGE ____ OF ____
DATE _____
TIME _____

Names of the Data Collection Teams

Near the top of the data collection sheet you'll find spaces for your Team's names, as well as the names for the other Team. Generally speaking, the data collector having the most experience is the primary collector.

TEAM 1 NAMES _____
TEAM 2 NAMES _____

Location of the Data Collection Vehicle

In this box, write a brief description of the location of your data collection vehicle. If Team 1 is collecting data from the parking lot of the Radford Brothers Supermarket, an adequate description might be "Radford Bros. parking lot." If

Team 2 is collecting data from the parking lot of Maxwell's or Eats, the format would be the same.

Legend

Team 1 has a legend on the data sheet, Team 2 doesn't. This legend applies to the Turn Signal and Stopping data. More on this when we explain each separate dependent variable.

L E G E N D	
TURN S	STOP S
L=LEFT	1=COMPLETE STOP
N=NONE	2=SLOW ROLLING
R=RIGHT	3=FAST ROLLING

Weather & Road Conditions

As you're collecting data, note the weather conditions and circle the appropriate descriptor. When deciding which descriptor to circle, consider which condition predominated during the two hour period in which you were collecting data. Circle that one. Do the same for the temperature and road conditions. If you happen to be near a bank sign that displays the time and temperature, record in the box provided, the temperature that appears at the one hour mark (i.e., after your first hour of data collection has elapsed).

Weather: Clear Rain Snow Fog	
Temp: Cold Cool Mild Warm Hot	
Road Cond: Dry Wet Snow Ice	

Arrive/Depart

On the far left, you'll find the Arrive/Depart column. In this column, by darkening the appropriate circle, you'll indicate whether the vehicle was arriving or departing the parking lot. Each arrival or departure of a single vehicle constitutes a single entry. If a delivery vehicle or civilian vehicle arrives, picks up a pizza, then immediately departs, you'd have two entries, back to back, for the same vehicle.

ARRIVE DEPART
● A ○ D
○ A ● D
○ A ○ D

License

The License column provides space to record the license number of the target vehicle. The majority of license plates you see will be from Virginia which has three letters followed by three numbers. There are exceptions of course, most notably in the form of vanity plates. Our data entry program has space for only six characters, so when recording the license number, if the plate exceeds six characters, record only the first six. If it has less than six characters, record however many there are. For example, if you see "IAMCOOL" (7 characters) you'd record "IAMCOO"; if you see "MRG61" (< 6 characters)

you'd record "MRG61". One advantage to repeatedly recording data from the same small sample is that you'll see the same vehicles anywhere from 5-25 times a night. This means:

- 1) There should be no errors as far as License plate accuracy. You'll be seeing the the same plate repeatedly during the two hour shift and you should get a good look at it several times.
- 2) You'll begin to recognize the target vehicles from a distance and either with memory or a cheat sheet, you'll be able to record the license number on the data sheet long before you actually see it. This should increase your efficiency as you can concentrate on other data as the vehicle approaches your position.

A cheat sheet will be developed, with your input, for each store listing all the known vehicles paired with their license plate numbers. For example,

Blue Ford Pickup = ABC123; Red Chevette = CAB321....

Driver

In the "Driver" columns, indicate the gender of the driver, M or F, and whether or not they were belted. If you can't tell the gender of the driver, darken both circles to indicate gender uncertainty. This would be equivalent to writing an "A" for adult and an "A" will be entered into the computer database. Since you will be observing the same drivers repeatedly in each session, this will probably not be a problem. By the end of the shift, you should not have any doubts as to the gender of each driver. If you do, see Dr. Ruth for a refresher course...On pre-1967 vehicles, you may notice that there are no shoulder safety belts; all that's available

are lap belts. We can't mark occupants as not wearing a safety belt if we can't see their waist belts and it's impossible to see a waist belt from where we normally sit to collect data; we're usually sitting too low to get a good view of the driver's waist. Incidentally, this is one of the main reasons we don't collect rearseat belt data on a regular basis. In order to see the waist belt, you'd need to be right next to the vehicle, and it's quite difficult to remain unobtrusive when you're on top of the car like that.

If you don't see a shoulder belt available, darken both the "Y" and "N" circles in the Belt Column. This will indicate that a shoulder strap was unavailable to the driver. Hence, we couldn't mark the driver as not wearing a shoulder harness because he/she does not have the opportunity to do so. If you see a shoulder belt available, but forgot to darken either circle, or if you forgot whether they were belted or not, draw a horizontal line through both circles.

Turn Signal

In this column, indicate the turning direction of the vehicle and the (non)use of the turn signal. If the driver used a their turn signal, darken the appropriate "L" or "R" circle. If the driver *did not* use their turn signal, darken the circle indicating which direction they turned plus the "N" circle (indicating signal nonuse). If you didn't see the signal or forgot, draw a horizontal line through all three circles. As little as one flash of the signal constitutes use of the turn signal.

TURN SIGNAL		
☐ L	☐ N	☐ R
☐ L	☐ N	☐ R
☐ L	☐ N	☐ R
☐ L	☐ N	☐ R
☐ L	☐ N	☐ R

Stopping

This column allows space to indicate what kind of stop the vehicle came to before proceeding onto the main road. Consulting the legend, we see that there are three types of stops: 1) a complete stop, in which the vehicle comes to a *complete* stop; 2) a slow rolling stop, in which the vehicle slows to approximately the walking pace of an adult; and 3) a fast rolling stop, in which the vehicle proceeds through the stop with no apparent regard for the stop sign (i.e., approximately the pace of a running adult). Under the "Stops" heading, you'll also see a "Traffic" column. Here, darken the appropriate circle, Yes or No, if there was oncoming traffic in the lane(s) that would cause or motivate the driver of the target vehicle to stop or slow. If the target vehicle is turning right onto the near lane, just look for oncoming traffic in that lane. If the target vehicle is turning left onto the far lane, look for oncoming traffic in both lanes.

S T O P S	
TYPE	TRAFFIC
1	☒ Y ☐ N
2	☐ Y ☒ N
3	☐ Y ☒ N
X	☒ Y ☐ N

oncoming traffic in the lane(s) that would cause or motivate the driver of the target vehicle to stop or slow. If the target vehicle is turning right onto the near lane, just look for oncoming traffic in that lane. If the target vehicle is turning left onto the far lane, look for oncoming traffic in both lanes.

Delivery Vehicle

In this column, indicate whether the target vehicle is a Domino's Pizza delivery vehicle (Yes) or whether its a civilian vehicle (No) by darkening either the Yes or No circle.

DELIVERY VEHICLE?
☒ Y ☐ N
☒ Y ☐ N
☐ Y ☒ N

APPENDIX D

License Identification Sheet

BLACKSBURG DOMINOS
2/26/92

Beige (Tan) Subaru Wagon	BULLY 2
Beige (Tan) Toyota Truck	EDD 151
Black Ford Truck	DSQ 359
Black Nissan Truck	SRF SNO
Blue Escort	251 077
Blue Mazda Sedan	KHN 830
Blue (light) Nissan Truck	GHI 837
Blue Valare Wagon (w/ wood siding)	OGA 399
Brown / Bronze Toyota Camry	IVT 191
Brown 2 Door Datsun	KA3 VFT
Grey Civic Sedan	BDO 782
Orange Datsun	OOP 904
Red Blazer	OOG 492
Red Jeep	CTACEAN
Red Subaru	INN 607
Red Toyota Corolla (old)	BMO 807
Silver Toyota S. Wagon	BMO 315
Tan S. Wagon	QEU 719
White Chevy (old)	ERS 443

APPENDIX E

Post Meeting Questionnaire

Thank you for spending your time this morning involved in this driver training seminar. As you know Domino's Pizza, Inc. is committed to developing the best driver training in the business. Therefore, we would appreciate your honest comments on the following questions. Your feedback will help improve the already state-of-the-art driver training we have at Domino's Pizza, Inc. After completing this short questionnaire, please tear off the bottom portion with your signature and place it in the raffle for a free Domino's Pizza T-shirt as our way of thanking you.

Please answer these questions about the Driver Training Manual and Video.

1) Did the video presentation hold your attention for the entire 40 minutes? ☐ Yes ☐ No

2) If you were to take the quiz in the driver training manual now, how many questions do you think you would answer incorrectly:
 ☐ 0 ☐ 1-2 ☐ 3-4 ☐ 5-6 ☐ 7-8 ☐ 9 +

Now please answer some questions about the driver training seminar you just attended.

1) How would you describe the presentation made today?
 Discussion ☐ Lecture ☐

2) How much do you think you were allowed to participated in the session? (please circle one)

a-"not at all" b-"a small amount" c-"moderately"
d-"a lot, but I didn't say anything" e-"a lot, and I did participate."

3) How much do you think you contributed in arriving at the group goal for intersection stopping? (please circle one)

a-"not at all" b-"a small amount" c-"moderately"
d-"a lot, but I didn't say anything" e-"a lot, and I did participate."

4) Please write the goal here _____.

5) After this meeting, do you intend to come to a complete stop at every intersection while driving for Domino's Pizza? (please circle one)

a-"no" b-"not any more than I used to"
c-"probably a little more" d-"probably a lot more than I used to"
e-"definitely all the time"

6) Why would you come to a complete stop at every intersection while working for Domino's Pizza? (please circle one)

a-"I'm not going to" b-"because it is company policy"
c-"It's my own decision"
d-"It's partly my own decision and partly because it is company policy"

_____tear here_____

Sign here to enter the raffle. Also indicate your shirt size.

By signing this you will enter a raffle for a Domino's Pizza T-Shirt- stock #8309

APPENDIX F

Informed Consent Form

Informed Consent

In order to evaluate the driving behavior and driving-related thoughts of pizza deliverers, you will be administered a series of questionnaires that require about 30 minutes to answer. Questions will focus on your personal attitudes and driving behavior. Some questions may be perceived as personal but most will not. Please answer as honestly as possible. Your responses will NOT be available to your employer or anyone other than the research staff. There is NO way that any information can be used against you in any way. All answers will be treated confidentially. Upon completing these questionnaires, please place them back into the envelope, seal the envelope and sign your name across the seal. If there are any questions that cause you to become uncomfortable, skip the question. The choice to participate is voluntary.

If you are interested in the results of this research, a summary will be made available at a later date. For subjects requiring counseling assistance or a discussion of any issue raised by the questionnaires, a list of resources is available upon request.

This research has been approved by the "Institutional Review Board" (IRB) at Virginia Polytechnic Institute and State University. Any questions are to be addressed to the chair of those committees or to the research director of this project (see below).

If you have read and understand the above, please sign here.

signature

please print name

Dr. E. Scott Geller
Research Director
231-8145

Dr. Ernest Stout
IRB Chair
231-5281

Dr. Helen Crawford
Human Subjects Committee
231-6520

APPENDIX G

Adult Nowicki-Strickland Internality Externality Scale

Questionnaire #3

This is an inventory of the way you believe and feel about various things. There are a number of statements with which you will tend to agree or disagree. After each question please circle the Y for yes if you agree, and the N for no if you disagree, for each of the following questions.

It is not necessary to think over any item very long. Mark your answers quickly and go on to the next statement.

Be sure to mark how you actually feel about the statement, not how you think you should feel.

.

- 1) Do you believe that most problems will solve themselves if you just don't fool with them?
Y or N
- 2) Do you believe that you can stop yourself from catching a cold?
Y or N
- 3) Are some people just born lucky?
Y or N
- 4) Most of the time do you feel that getting good grades meant a great deal to you?
Y or N
- 5) Are you often blamed for things that just aren't your fault?
Y or N
- 6) Do you believe that is somebody studies hard enough he or she can pass any subject?
Y or N
- 7) Do you feel that most of the time it doesn't pay to try to hard because things never turn out right anyway?
Y or N
- 8) Do you feel that if things start out well in the morning that it's going to be a good day no matter what you do?
Y or N
- 9) Do you feel that most of the time parents listen to what their children have to say?
Y or N
- 10) Do you believe that wishing can make good things happen?
Y or N
- 11) When you get punished does it usually seem its for no good reason at all?
Y or N
- 12) Most of the time do you find it hard to change a friends (mind) opinion?
Y or N
- 13) Do you think that cheering more than luck helps a team to win?
Y or N
- 14) Did you feel that it was nearly impossible to change your parents mind about anything?
Y or N
- 15) Do you believe that parents should allow children to make most of their own decisions?
Y or N
- 16) Do you feel that when you do something wrong there's very little you can do to make it right?
Y or N

- 17) Do you believe that some people are just born good at sports?
Y or N
- 18) Are most of the other people your age stronger than you are?
Y or N
- 19) Do you feel that one of the best ways to handle most problems is just not to think about them?
Y or N
- 20) Do you feel that you have a lot of choice in deciding whom your friends are?
Y or N
- 21) If you find a four leaf clover, do you believe that it might bring you good luck?
Y or N
- 22) Did you often feel that whether or not you did your homework had much to do with what kind of grades you got?
Y or N
- 23) Do you feel that when a person your age is angry with at you , there's little you can do to stop him or her?
Y or N
- 24) Have you ever had a good luck charm?
Y or N
- 25) Do you believe that whether or not people like you depends on how you act?
Y or N
- 26) Did your parents usually help you if you asked them to?
Y or N
- 27) Have you felt that when people were angry with you it was usually for no reason at all?
Y or N
- 28) Most of the time, do you feel that you can change what might happen tomorrow by what you do today?
Y or N
- 29) Do you believe that when bad things are going to happen they just are going to happen no matter what you try to do to stop them?
Y or N
- 30) Do you think that people can get their own way if they just keep trying?
Y or N
- 31) Most of the time do you find it useless to try to get your own way at home?
Y or N
- 32) Do you feel that when good things happen they happen because of hard work?
Y or N
- 33) Do you feel that when somebody your age wants to be your enemy, there's little you can do to change matters?
Y or N
- 34) Do you feel it's easy to get friends to do what you want them to do?
Y or N
- 35) Do you usually feel that you have little to say about what you get to eat at home?
Y or N

- 36) Do you feel that when someone doesn't like you there's little you can do about it?
Y or N
- 37) Did you usually feel that it was almost useless to try in school because most other children were just plain smarter than you?
Y or N
- 38) Are you the kind of person who believes that planning ahead makes things turn out better?
Y or N
- 39) Most of the time do you feel that you have little to say about what your family decides to do?
Y or N
- 40) Do you think it's better to be smart than to be lucky?
Y or N

APPENDIX H

Montag & Cromeey Driver Internality and Driver Externality Scale

Questionnaire #1

Instructions

You will find in the following questionnaire some opinions stated by various drivers concerning causes of accidents. Please express your degree of agreement or disagreement with each statement, selecting a number from the following scale.

- 0 -- DISAGREE VERY MUCH
- 1 -- DISAGREE QUITE A BIT
- 2 -- DISAGREE SOME
- 3 -- AGREE A LITTLE
- 4 -- AGREE QUITE A BIT
- 5 -- AGREE VERY MUCH

It is not necessary to think over any item very long. Mark your answers quickly and go on to the next statement.

Be sure to mark how you actually feel about the statement, not how you think you should feel.

.....

1. Driving with no accidents is mainly a matter of luck.

0 1 2 3 4 5

2. Accidents happen mainly because of different unpredictable events.

0 1 2 3 4 5

3. The driver can do nothing more than drive according to traffic regulations.

0 1 2 3 4 5

4. Accidents happen because of so many reasons we will never know the most important one.

0 1 2 3 4 5

5. People who drive a lot with no accidents are merely lucky; it is not because they are more careful.

0 1 2 3 4 5

6. The careful driver can prevent any accident.

0 1 2 3 4 5

7. When a driver is involved in an accident, it is because he did not drive as he should.

0 1 2 3 4 5

8. When a driver is involved in an accident, it is because he did not pay attention to his driving.

0 1 2 3 4 5

9. Accidents are the results of mistakes made by the driver.

0 1 2 3 4 5

10. The driver is to be blamed almost always when an accident occurs.

0 1 2 3 4 5

11. It is difficult to prevent accidents in bad conditions such as darkness, rain, narrow roads, curves, and so on.

0 1 2 3 4 5

12. Most accidents happen because of bad roads, lack of appropriate signs, and so on.

0 1 2 3 4 5

13. It is very hard to prevent accidents involving pedestrians who come out from between parked cars.

0 1 2 3 4 5

14. Accidents in which children are involved are hard to prevent because they do not know how to be careful.

0 1 2 3 4 5

15. It is very hard to prevent accidents in which old people are involved because they do not see or hear well.

0 1 2 3 4 5

16. Accidents happen because drivers have not learned to drive carefully enough.

0 1 2 3 4 5

17. It is always possible to predict what is going to happen on the road and so it is possible to prevent almost any accident.

0 1 2 3 4 5

18. Accidents happen when the first driver does not take into consideration all the possible actions of the second driver.

0 1 2 3 4 5

19. Accidents happen because the driver does not make enough effort to detect all sources of danger while driving.

0 1 2 3 4 5

20. Most accidents happen because of lack of knowledge or laziness on the part of the driver.

0 1 2 3 4 5

21. If you are to be involved in an accident, it is going to happen anyhow, no matter what you do.

0 1 2 3 4 5

22. Most accidents happen because the second driver does not pay attention to traffic regulations even when the first driver does.

0 1 2 3 4 5

23. The driver does not have enough control over what happens on the road.

0 1 2 3 4 5

24. Most accidents happen because of mechanical failure.

0 1 2 3 4 5

25. There will always be accidents no matter how much driver try to prevent them.

0 1 2 3 4 5

26. Accidents happen when the driver does not take into consideration all the possible behavior of pedestrians.

0 1 2 3 4 5

27. Accident-free driving is a result of the driver's ability to pay attention to what is happening on the roads and sidewalks.

0 1 2 3 4 5

28. The driver can always predict what is going to happen; that is why there is no room for surprises on the road.

0 1 2 3 4 5

29. It is possible to prevent accidents even in the most difficult conditions such as narrow roads, darkness, rain, and so on.

0 1 2 3 4 5

30. Prevention of accidents depends only on the driver and his characteristics rather than on external factors.

0 1 2 3 4 5

APPENDIX I

Merz Psychological Reactance Scale

Questionnaire #2

Instructions

This is an inventory of the way you believe and feel about various things. There are a number of statements with which you will tend to agree or disagree. For each statement, you should give your answer as follows, according to your own reaction to that item:

SD -- STRONGLY DISAGREE
D -- DISAGREE
N -- NEUTRAL
A -- AGREE
SA -- STRONGLY AGREE

It is not necessary to think over any item very long. Mark your answers quickly and go on to the next statement.

Be sure to mark how you actually feel about the statement, not how you think you should

Try to avoid the neutral response as much as possible. Select this answer only if you really decide whether you tend to agree or disagree with a statement.

* * * * *

1. Rules and regulations trigger a sense of resistance in me.

SD D N A SA

2. It excites me to contradict others.

SD D N A SA

3. In my behavior, I rarely consider what others are thinking.

SD D N A SA

4. When I am told I can't do something, I react against it by thinking,
"That's exactly what I'm going to do."

SD D N A SA

5. The thought of having to depend on others is unpleasant to me.

SD D N A SA

6. I don't like it when people try to give me advice.

SD D N A SA

7. Making independent decisions is very important to me.

SD D N A SA

8. It makes me angry when people point out things which are obvious.
- | | | | | |
|----|---|---|---|----|
| SD | D | N | A | SA |
|----|---|---|---|----|
9. I often feel like not doing something simply because others expect me to.
- | | | | | |
|----|---|---|---|----|
| SD | D | N | A | SA |
|----|---|---|---|----|
10. I react strongly when someone tries to restrict my freedom.
- | | | | | |
|----|---|---|---|----|
| SD | D | N | A | SA |
|----|---|---|---|----|
11. I tend to want to just the opposite when people give me advise.
- | | | | | |
|----|---|---|---|----|
| SD | D | N | A | SA |
|----|---|---|---|----|
12. Only those things which I do freely really agree with me.
- | | | | | |
|----|---|---|---|----|
| SD | D | N | A | SA |
|----|---|---|---|----|
13. I resist the attempts of others to influence me.
- | | | | | |
|----|---|---|---|----|
| SD | D | N | A | SA |
|----|---|---|---|----|
14. It makes me angry when someone is presented to me as a role model.
- | | | | | |
|----|---|---|---|----|
| SD | D | N | A | SA |
|----|---|---|---|----|
15. When someone forces me to do something, I say to myself,
"Now that is exactly what I don't want to do."
- | | | | | |
|----|---|---|---|----|
| SD | D | N | A | SA |
|----|---|---|---|----|
16. It pleases me to see how others conform to society's expectations.
- | | | | | |
|----|---|---|---|----|
| SD | D | N | A | SA |
|----|---|---|---|----|
17. I am skeptical of strong praise.
- | | | | | |
|----|---|---|---|----|
| SD | D | N | A | SA |
|----|---|---|---|----|
18. I react negatively when someone tries to tell me what I should or should not do.
- | | | | | |
|----|---|---|---|----|
| SD | D | N | A | SA |
|----|---|---|---|----|

APPENDIX J

Intervention Type Content Analysis Check Sheet

INTERVENTION TAPE DATA SHEET

DATE:

LOCATION:

NAME:

DURATION (LENGTH OF TIME SPEAKING IN MINUTES):

- Tim -
- Manager -
- Employees (as a group) -

INFORMATION PRESENTED: (MAKE A CHECK IN SPACE IF INFO. IS PRESENTED)

Situations in which you come to a complete stop:

- Getting out of car ____
- At intersection ____
- Another car is in front of you ____

Reasons for coming to a stop:

- Legal reasons ____
- Lose job ____
- Weather conditions ____
- Police in vicinity ____
- Heavy traffic ____

Reasons for not coming to a stop:

- In a hurry ____
- Extra effort involved ____
- Aggravating ____
- Not efficient/ takes too long ____
- Other (specify) _____

Response to reasons for not stopping:

- Only takes five seconds ____
- Efficiency:

No time lost in court ____

No money loss due to:

tickets ____

accidents ____

insurance ____

- Other (specify) _____

Reasons why you SHOULD come to stop:

- Survey situation better ____
- Improve image ____
- Prevent injuries/ deaths ____
- Other (specify) _____

General information / Examples presented:

- Reason for meeting is to increase stopping behavior ____
- Will use program with goals and incentives ____
- You're professional drivers ____
- You're behavior influences co-workers and society ____
- You reflect Domino's image ____
- Domino's has a bad reputation ____
- Incident in Indiana mentioned ____
- Cars should be at least five car lengths away before you proceed through an intersection ____
- You can't get full view of traffic conditions at intersection if you don't completely stop ____
- Example presented to demonstrate a roll through at intersecting-walking towards wall ____
- Should stop at yield intersections as well as intersections with stop signs and lights ____
- Goal is to stay above 75% for four weeks ____
- Will have poster to show progress ____
- Will receive maps if you meet goal ____
- Other (specify) _____

VITA
Timothy D. Ludwig, Ph.D.

Personal Information

Social Security Number:

Date of Birth: 10/31/63

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Married: 6/2/90

Spouse: Denise M. Martz-Ludwig, M.S.

Spouse's Occupation: Doctoral student in clinical psychology

Education

Lenoir-Rhyne College
Hickory, NC

Major: Psychology
Bachelor of Arts-1986

Wake Forest University
Winston-Salem, NC

Major: Experimental Psychology
Master of Arts-1988

Masters Thesis title: A question of self-determination: The effect of adding controlling feedback to mediation models of intrinsic motivation.

Advisor: David Hills

Virginia Polytechnic Institute and State University
Blacksburg, VA

Major: Applied Experimental Psychology
Doctorate of Philosophy-1992

Dissertation Title: Managing Injury Control in Driving Related Occupations: Effects of Response Generalization, Goal Setting, and Individual Differences.

Advisor and Committee Chair: E. Scott Geller

Honors and Awards

Cunningham Dissertation Year Fellowship for Outstanding Research in Psychology,
\$12,500. Virginia Polytechnic Institute and State University

Psi Chi National Honors Society in Psychology Wake Forest University

Magna Cum Laude, Honors in Psychology Lenoir-Rhyne College

Psychology Award for Research, \$500 Lenoir-Rhyne College

Professional Organizations

American Psychological Association Southeastern Psychological Association

Association for Behavior Analysis Center for Applied Behavioral Systems

Relevant Professional Experience

4/93-Present. Research Scientist for the Virginia Productivity Center, Department of Industrial Systems Engineering, Virginia Tech.

- 6/92-4/93. Research Associate for the Virginia Productivity Center, Department of Industrial Systems Engineering, Virginia Tech. In this capacity I have assumed a business role as an organizational psychologist on major contracts with VPC, a research role as PI and co-PI of three study areas of a special federal grant (see below), a consulting role for other research and business areas within VPC, and a research advising role for graduate students within VPC.
- 11/92-Present. Project Manager on a contract to the VPC from National Grocers Co. Ltd. of Canada. National Grocers is a distribution and warehousing company headquartered in Toronto, Ontario. In this project I advise and lead design and management teams charged with increasing performance in a distribution system by 30%. This involves development of a project plan, designing and delivering educational interventions, and coordinating implementation of the project.
- 7/92-Present. Principle Investigator for Research Study Area 200: "Developing the Grand Strategy System" (\$100,000 for one year) within a special research grant from the Department of Energy/NP; Principle Investigator: D. Scott Sink.
- 8/92-Present. Principle Investigator for Research Study Area 410: "Performance Improvement Engineer Program" (\$150,000 for one year) within a special research grant from the Department of Energy/NP; Principle Investigator: D. Scott Sink. Other areas of responsibility within the DoE grant include Co-PI in charge of grant-related publications (\$45,000) and primary researcher of the motivation management Front (\$25,000).
- 5/92-Present. Research consultant for the Lutheran Church, Missouri Synod, Southeastern District Wellspring Program. The Wellspring Program is designed to equip church professionals to successfully carry out their ministry in the 1990's and beyond. My responsibilities will include overseeing and developing the evaluation methodology for the "Dimensions in Leadership, Wellspring Program" (Volunteer).
- 7/89 - 5/92. Undergraduate Research Coordinator for the Center for Applied Behavioral Systems. Created a program for the development of undergraduate research skills while coordinating their efforts on a number of funded and non-funded projects. In addition to scheduling responsibilities across all active projects and conducting a weekly meeting of around thirty undergraduates, I supervised the independent research projects of qualified undergraduates and was responsible for their academic evaluation. Director- Dr. E. Scott Geller (VPI&SU)
- 6/90 - 3/91-Co-Principal Investigator for the Biomedical Research Support Grant (National Science Foundation). Geller & Ludwig "Developing Intervention Programs to Increase Safe Driving." \$5000.
- 9/88 - 8/90. Project Coordinator for a grant from the Safety and Loss Control Council of Domino's Pizza Corporation. The position was responsible for developing and evaluating programs to increase pizza deliverer's safe driving behaviors. This included the development and systematic administration of training seminars to employees of Domino's Pizza, the management of large scale data collection, the database manipulation and final analysis of results, and the co-writing of the final report to the funding corporation. Principle Investigator- Dr. E. Scott Geller (VPI&SU).

- 1/89 - 5/90. Graduate Assistant for the Department of Psychology, VPI&SU. Position was in the Undergraduate Information Office which advises and coordinates undergraduate activities at the departmental level. Responsibilities included academic and career advising, of faculty advising, the maintenance and operation of an active database of all undergraduate and graduate students in psychology, and the coordination of graduation ceremonies. Supervisor- Dr. Joseph Sgro (VPI&SU).
- 5/89 - 6/90. Project Manager on a grant from the Centers for Disease Control. The position was responsible for developing and evaluating programs to increase children's safety belt use. Activities included the development and application of educational seminars for elementary school children, grant administration, database manipulation and final analysis of results, and aided in the writing of the annual and final report to the CDC. Principle Investigator- Dr. E. Scott Geller (VPI&SU).
- 9/88 - 1/89. Project Manager for "Operation Buckle-Up," sponsored by Virginia DMV. I acted as a liaison between the Virginia Safety Belt Task Force and county and city police chiefs throughout the state, managed nine project settings, analyzed data, and co-wrote an annual and the final report to the Virginia DMV. Co-Principle Investigators- Dr. Michael Kalsher (Rensselaer Polytechnic Institute, Troy NY; and Dr. E. Scott Geller (VPI&SU).

Grant Writing Experience

- 6/89. Centers for Disease Control. Title Determinates of Safe Driving: Intervention Effectiveness. Amount \$826,886. 2 Revisions (8/90 and 2/91). Priority Score 136. Not funded.
- 8/91. Center for Disease Control. Title Increasing Intervention Effectiveness for Injury Control. Amount \$ 230,647. Not funded.
- 6/90. BMOC Biomedical Research Support Grant (National Science Foundation). Title: Developing Intervention Programs to Increase Safe Driving. Amount: \$5000
- 7/91. Health and Healing Ministries Committee of the Lutheran Church Missouri Synod. Title: A Wellness Project for the Quality of Health in the Lutheran Church Missouri Synod. Pending.

Teaching Experience

- 1/92 - 5/92- Teaching Assistant, Dept. of Psychology, VPI&SU.
Principles of Psychological Research, Sophomore level.
Supervisor-Dr. J.A. Sgro.(VPI&SU). Evaluation=3.8 (4.0)
- 8/91 - 12/91- Teaching Assistant, Dept. of Psychology, VPI&SU.
Principles of Psychological Research, Sophomore level.
Supervisor-Dr. J.A. Sgro.(VPI&SU). Evaluation=3.8 (4.0)
- 6/90 - 8/90- Teaching Instructorship, Dept. of Psychology, VPI&SU.
Psychology of Learning, Sophomore level. Evaluation=3.6 (4.0)
Supervisor-Dr. J.A. Sgro.(VPI&SU).

8/88 - 12/88- Graduate Teaching Assistant, Dept. of Psychology, VPI&SU.
Introductory Psychology, Freshman level. Evaluation=3.6 (4.0)
Supervisor-Dr. J.A. Sgro (VPI&SU).

Document Reviews

Reviewer for the *Journal of Applied Behavior Analysis*.
Reviewer for the *American Psychologist*

Book Chapters

Ludwig, T.D., and Geller, E.S. (under preparation). On the Necessity of Structure in an Arbitrary World: Behavioral Co-occurrence within and between Response Classes. For (R.M. Eisler, Ed.) Progress in Behavior Modification.

Refereed Publications

Glindemann, K.E., Ludwig, T.D., and Geller, E.S. (under editorial review). Behavioral Intentions and Blood Alcohol Concentrations: A Relationship for Prevention Interventions. Journal of Studies on Alcohol.

Ludwig, T.D., and Geller, E.S. (1991). Improving the Driving Practices of Pizza Deliverers: Potential Moderating Effects of Age and Driving Record. Journal of Applied Behavior Analysis, 24 (1), 31-44.

Geller, E.S., and Ludwig, T.D. (1991). A Behavior Change Taxonomy for Improving Road Safety. In Proceedings of the OECD International Road Safety Symposium, September 19-21, 1990, Copenhagen, Denmark.

Geller, E.S., Berry, T.D., Ludwig, T.D., Evans, R.E., Gilmore, M.R., and Clarke, S.W. (1990). A Conceptual Framework for Developing and Evaluating Behavior Change Interventions for Injury Control. Health Education Research: Theory and Practice, 5 (2), 125-137.

Geller, E.S., Ludwig, T.D., Gilmore, M.R., and Berry, T.D. (1990). A Taxonomy of Behavior Change: Techniques for Community Intervention. The Community Psychologist, 23 (2), 4-6.

Published Abstracts

Ludwig, T.D., Geller, E.S., & Glendemann, K.E. (1993). Person, environment, and behavior factors contributing to the impact of a driver safety program. Under review for appearance in the Proceedings of the annual meeting of the Society for Behavioral Medicine, San Francisco, CA.

Ludwig, T.D., Geller, E.S., & Holland, M.S. (1993). An eco-behavioral analysis of commercial driving practices: A field study of behavioral co-occurrence. Under review for appearance in the Proceedings of the annual meeting of the Association for Behavior Analysis, Chicago, IL.

Kaly, P.W., Ludwig, T.D., & Geller, E.S. (1991). Comparing directive versus non-directive methods of persuasion: Getting pizza deliverers to come to a complete stop. Appears in the Undergraduate Proceedings of the annual meeting of the Southeastern Psychological Association, New Orleans, LA.

Molnar, A.E., Ludwig, T.D., & Geller, E.S. (1991). Locus of control as a predictor of risky driving. Appears in the Undergraduate Proceedings of the Southeastern Psychological Association, New Orleans, LA.

Yankay, C.L., Ludwig, T.D., & Geller, E.S. (1991). Does driving record predict future driving behaviors. Appears in the Undergraduate Proceedings of the Southeastern Psychological Association, New Orleans, LA.

Bergholz, K.S., Wangler, J., & Ludwig, T.D. (1990). Increasing safety belt use in community settings: An examination of different intervention strategies. Virginia Journal of Science, 41(2), 116.

Technical Reports

Ludwig, T.D. (1992). Managing work motivation within the grand strategy system framework: A review of the body of knowledge. Virginia Tech: Technical report sponsored by a special grant from the Department of Energy.

Sink, D.S., Estes, C.B., & Ludwig, T.D. (1992). Post-classical methods in management systems. Final report for a special grant awarded by the Department of Energy.

Geller, E.S., & Ludwig, T.D. (1989). Efficiency, safe deliveries, and safety belts. Final report for a grant awarded by the Safety and Loss Control Council of Domino's Pizza Corporation

Geller, E.S., Kalsher, M.J., Clarke, S.W., & Ludwig, T.D. (1988). The effects of selective enforcement of the Virginia Safety Belt Use Law. Final report for a grant awarded by the Commonwealth of Virginia Department of Motor Vehicles.

Presentations

Ludwig, T.L., Geller, E.S., & Roberts, D.S. (1992). A direct comparison between assigned versus participatory set goals: Which one delivers?. Presented at the annual meeting of the American Psychological Association, Washington, DC.

Geller, E.S. (1992). Roundtable discussion involving: S.R. Roberts, T.D. Ludwig, T.D. Berry, and K.E. Glindemann. Industry and community applications of behavioral science: Making a Difference. Presented at the annual meeting of the American Psychological Association, Washington, DC.

Roberts, D.S., Geller, E.S., & Ludwig, T.L. (1992). Industry based research to develop an actively caring model for injury control. Presented at the annual meeting of the American Psychological Association, Washington, DC.

- Ludwig, T.D. (1992). Symposium Chairperson. Behavioral community psychology: Identifying attitudes, behaviors, and intentions for intervention effectiveness. Division 27 (Regional) program at the annual meeting of the Southeastern Psychological Association, Knoxville, TN.
- Ludwig, T. D., Cho, S. A., & Scanlon, J. C. (1992). Predicting individual driving behaviors and responsiveness to safe driving interventions. Division 27 (Regional) program at the annual meeting of the Southeastern Psychological Association, Knoxville, TN.
- Yankay, C. L., Molnar, A.E., & Ludwig, T.L. (1991). Can driving record and locus of control predict future driving behaviors? Presented at the annual meeting of the Southeastern Association for Behavior Analysis, Charleston, SC.
- Ludwig, T.D., Geller, E.S., & Yankay, C. (1991). The effects of managerial feedback on pizza deliverers' intersection stopping and turn signal use. Presented at the annual meeting of the Association for Behavior Analysis, Atlanta, GA.
- Ludwig, T.D. (1991). Symposium Chairperson. Behavioral community psychology: Intervention and assessment programs to increase quality of life. Division 27 (Regional) program at the annual meeting of the Southeastern Psychological Association, New Orleans, LA.
- Ludwig, T.D., Kaly, P., & Molnar, A. (1991). A multiple baseline test of participative versus assigned goal setting methods to promote complete intersection stopping among pizza deliverers. Presented for Division 27 (Regional) program at the annual meeting of the Southeastern Psychological Association, New Orleans, LA.
- Ludwig, T.D., Geller, E.S., Berry, T.D., & Evans, R.E. (1990). Developing behavior change interventions: A conceptual framework and literature review. Presented at the annual meeting of the American Psychological Association, Boston, MA.
- Roberts, D.S., Ludwig, T.D., & Bergholz, K (1990). Improving driving behaviors of pizza deliverers: Comparing four intervention strategies. Presented at the annual meeting of the American Psychological Association, Boston, MA.
- Ludwig, T.D., Gilmore, M.R., & Wangler, J. (1990). A comparison of educational strategies: Reward vs. commitment. Presented by invitation at the annual meeting of the Association for Behavior Analysis, Nashville, TN.
- Roberts, S.D., Needleman, L.D., & Ludwig, T.D. (1990). Exploring individual differences as moderators of intervention effectiveness. Presented at the annual meeting of the Association for Behavior Analysis, Nashville, TN.
- Balcazar, F.E. (1990). Invited panel discussion involving: T.D. Berry, T.D. Ludwig, M.R. Gilmore, A. Paine, G. White, K. Blanchard, M.L. Kessler, F. Ugalde, E.S. Geller, S.B. Fawcett, and B. Greene. Balancing rigor and relevance in behavior analysis research. Presented at the annual meeting of the Association for Behavior Analysis, Nashville, TN.

- Ludwig, T.D., Geller, E.S., & Roberts, D.S. (1990). Intervening to increase safe driving among pizza deliverers: Tests of response generalization. Presented by invitation for Division 27 (Regional) program at the annual meeting of the Southeastern Psychological Association, Atlanta, GA.
- Wrangler, J.A., Ludwig, T.D., Kollas, S. & Geller, E.S. (1990). Applications of behavior analysis to improve the driving practices of pizza deliverers. Presented at the Southeastern Association for Behavior Analysis Convention, Wilmington, NC.
- Ludwig, T.D., Baker, B.A., & Gilmore, M.R. (1989). Domino's avoids the Noid: Corporate image and safety belt promotion. Presented at the annual meeting of the American Psychological Association, New Orleans, LA.
- Ludwig, T.D., Bergholz, K., Porter, B., & Geller, E.S. (1989). Increasing corporate image through community safety belt promotion. Presented at the annual meeting of the American Psychological Society, Arlington, VA.
- Ludwig, T.D., Baker, B.A., & Lefkowitz, D.P. (1989). Safety belt use among pizza delivery employees: An evaluation of safety training interventions. Presented at the annual meeting of the Association for Behavior Analysis, Milwaukee, WI.
- Ludwig, T.D., & Glindemann, K.E. (1989). Working with local police departments to increase communitywide safety belt use. Presented at the annual meeting of the Southeastern Psychological Association, Washington, DC.
- Ludwig, T.D., Hills, D.A., & Morris, J. (1989). A question of self-determination: The effect of adding controlling feedback to mediation models of intrinsic motivation. Presented at the annual meeting of the Southeastern Psychological Association, Washington, DC.
- Ludwig, T.D., Hills, D.A., & Wilson, E. (1988). Expressive self-confidence and creativity. Presented at the annual meeting of the Southeastern Psychological Association, New Orleans.

