

## COMMUNITY INTERVENTION TO DETER ILLEGAL PARKING IN SPACES RESERVED FOR THE PHYSICALLY DISABLED

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Illegal use of reserved parking spaces represents a major obstacle to the independence and mobility of people with physical disabilities. Using an ABACACA reversal design, the daily rates of illegal parking in four reserved spaces were examined across three types of sign displays: (a) a vertical sign alone or in combination with (b) a message sign that announced the possibility of public surveillance or (c) a message dispenser device that announced community involvement and dispensed politely worded reminder notes. The average rate of illegal parking dropped from 51.3% during the initial vertical sign phase to 37.3% under the message sign condition, followed by an increase to 50.4% when the message was removed. Illegal parking decreased to 24.5% when the message dispensers were first used (followed by an increase to 57.0% when they were removed) and to 23.7% when the message dispenser condition was repeated. Illegal parking in the final vertical sign condition failed to return to previous levels ( $M = 37.3\%$ ).

DESCRIPTORS: handicapped parking, driving behavior

According to the National Council on the Handicapped (1986), transportation barriers represent a major problem to persons with physical disabilities. Reserved parking spaces represent one method of reducing transportation barriers by facilitating the use of private vehicles. As the number of independent but mobility-impaired individuals increases, the need for easily accessible parking increases, and the illegal use of these spaces becomes more detrimental (Matthews, 1981).

Although the dilemma of illegal parking spaces designated for disabled individuals has begun to receive attention in the behavioral literature (see Cope & Allred, 1991, for a review), it remains a problem. We know from the research in this area that vertical signs displaying the international wheelchair symbol are better in reducing illegal parking than ground markings, which are hard to see and can be covered by the offending vehicle (Cope, Allred, & Morsell, 1991; Jason & Jung,

1984; Suarez de Balcazar, Fawcett, & Balcazar, 1988). The addition of signs announcing large fines (White, Jones, Ulicny, Powell, & Mathews, 1988) or warning illegal parkers of public surveillance (Cope et al., 1991) was more effective than vertical signs alone. Large-scale police enforcement (Suarez de Balcazar et al., 1988) has also been used successfully. However, programs requiring enforcement (e.g., police crackdowns and the posting of fines) are time consuming and expensive, and may be hard to justify as a major police priority in high-crime areas.

Cope et al. (1991) examined a strategy that used social, rather than legal, sanctions. The differential effect of ground markings versus two different vertical signs (the international wheelchair symbol and a written message stating, "Warning: This space watched by concerned citizens"), was examined at a grocery store parking lot. In the two vertical symbol phases, the average rate of illegal parking dropped to 57.3% and 53.7%, respectively (compared to ground-sign-only averages of 69.3%, 68.7%, 69.5%, and 65.2%). The lowest average rate of illegal parking during the study (27.1%) occurred when the message sign was added beneath the vertical symbol display, suggesting that it may be possible to bring illegal parking behavior under public control. However, because the message con-

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dition was followed by a continuation of the vertical symbol condition rather than an actual return to baseline, conclusions about the effectiveness of this strategy should be made with caution.

The present research attempted to replicate and extend the findings of Cope et al. (1991). Specifically, this study examined the effectiveness of two strategies designed to transfer control of illegal parking to the community. A message sign (employed in the earlier study) was again used to announce the possibility of public surveillance (in a manner similar to the standard neighborhood watch campaign). The second strategy involved the use of a device designed to announce the possibility of community involvement and to dispense politely worded reminder notes that could be distributed by the public to individuals parking illegally.

## METHOD

### *Subjects and Setting*

Subjects were the drivers of 432 vehicles (cars and trucks) parked in four parking spaces reserved for people with physical disabilities at a supermarket located in a large shopping center in Greenville, North Carolina. The site was identified in an earlier study (Cope & Allred, 1991) as having a high rate of violations with low police enforcement. Due to the effects of weather and traffic, the spaces had changed since they were first described in Cope et al. (1991). The original (yellow) ground markings were no longer visible for any of the spaces. Each target space was identified only by the vertical sign supplied in the earlier study. Each of these reserved spaces (the first space in each of four adjacent rows of spaces) was located across a traffic lane directly in front of the store at distances of 10 to 20 m from the building.

### *Observation and Record Keeping*

Data were collected for 104 days (excluding weekends and university holidays) between August 28, 1990, and April 17, 1991. Each 2-hr observation period began at 4:00 p.m. or 4:30 p.m., depending on the onset of nightfall. The time pe-

riod provided a high number of store patrons (shopping on the way home from work) and represented a time when the data collectors were not likely to be in classes.

Data collection methods were similar to those used in the study by Cope et al. (1991). All observations were collected and recorded by trained undergraduate college students supervised and randomly spot checked (throughout the study) by a graduate assistant. To assess reliability, each data collector was accompanied (when possible) by a second independent observer (both observers were instructed to keep their work separate and not to confer). The two observers generally stood in front of the store about 2 m apart and about 10 m from the target spaces. The data collectors were instructed to record observations only after the driver had entered the store and to remain as unobtrusive as possible (which proved to be quite easy due to the amount of general pedestrian traffic in front of the store); however, they were allowed to walk out to the parking lot to confirm license plate numbers and proper parking authorization. The observers were also instructed to use a standardized response to questions: "We are conducting a traffic study involving parking behavior." The purpose of the data collection activities was not readily apparent.

Observers recorded data for each vehicle parked in a targeted space on a standardized data sheet. Each vehicle was classified as being legally or illegally parked. In North Carolina, a car must display a special tag on the driver's side of the dashboard (or have a specially marked license tag) to park legally in spaces reserved for the physically disabled. Vehicles not displaying a legal authorization tag were recorded as being illegally parked, even if the driver was obviously disabled. This procedure adopted a legal view and avoided interpretive problems inherent in more precise recording formats. The license plate number, the driver's gender, and the driver's race were also recorded for each vehicle parking in the targeted spaces.

To compare individuals parking in the reserved spaces with those parking in other nonreserved spaces, demographic information was also recorded for vehicles parked in the space immediately ad-

adjacent to each target space. In addition, the number of store patrons entering the store (from the parking lot) was recorded for each observation period.

During the two message dispenser conditions, the data collectors also counted, restocked, and picked up any discarded reminder notes at the beginning of each observation period. Observations concerning the disposition of the reminder notes were also recorded on the data sheets.

### *Interobserver Agreement*

Reliability measures were obtained for 286 (66.2%) of the 432 observations. The number of reliability measures taken during each of the seven different conditions varied due to the availability of student observers and ranged from 16 of 55 observations (29.1%) to 75 of 81 observations (92.6%). Interobserver agreement was determined by examining data taken independently by two different observers for each vehicle (all data were sorted and matched by license plate number). Estimates of agreement were determined by calculating the percentage of times two observers agreed on a particular response category (agreements divided by agreements plus disagreements times 100). The following percentages were obtained: 97.6% overall agreement, with 97.4% agreement for observations of legal parkers and 97.9% agreement for observations of illegal parkers.

### *Experimental Conditions*

An ABACACA reversal design was used. Two different types of message presentations were alternated as additions to (a) a vertical sign displaying the international wheelchair symbol; (b) a message sign, announcing community observation; and (c) a message dispenser, which announced and provided the opportunity for actual community intervention.

**Vertical sign.** A sign (30 cm by 46 cm) containing the international wheelchair symbol (white on blue background) was attached (at a height of about 1.4 m) to a signpost mounted in an automobile tire filled with cement. A signpost unit was centered at the head of each of the target spaces.

**Message sign.** The message "Warning: This



Figure 1. Reminder note dispensed in the message dispenser.

space watched by concerned citizens" (in black letters 2.5 cm high) was displayed on a sign (30 cm by 46 cm) painted bright yellow. The message sign was attached to the signpost just below the international symbol sign (with 2 cm clearance) at a height of about 0.9 m.

**Message dispenser.** This device was a small box with a pitched roof that displayed a message and dispensed reminder notes (citizen citations) that could be given to drivers or placed on the windshield of illegally parked vehicles. (The dispenser boxes are available from National Sign and Display, Inc., 340 E. Alondra Blvd., Gardena, California 90248.) Although the reminder notes were readily available to anyone walking through the parking lot, no attempt was made to encourage their actual use. Store personnel and the data collectors were instructed not to use the reminder notes or to advertise their availability.

The boxes (36 cm by 22 cm by 7 cm) were originally designed to distribute promotional material. The box (white with a removable red top)

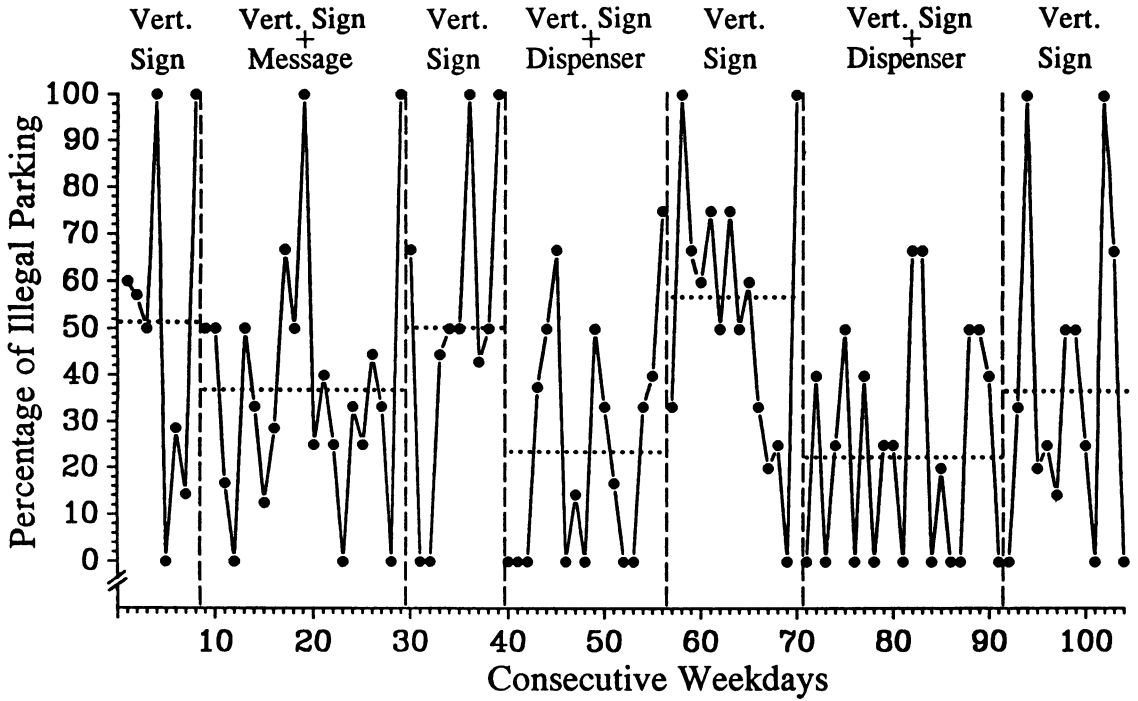


Figure 2. Percentage of illegal parking across experimental phases. The mean of each phase is indicated by a dotted horizontal line.

was attached to each signpost under the international symbol sign (with 2 cm clearance), at a height of about 1 m. A message, printed with black letters on a white background, was attached to the front of the box with clear plastic laminate. The message stated: "Warning: This space watched and ticketed by concerned citizens." The statement "Citizens Citations Below" was placed about 6 cm above the bottom of the box.

Each box contained enough room inside to hang about 50 reminder notes, although they were routinely stocked with only 15 notes at a time to avoid the potential for litter. The notes were positioned so that they hung below (about 0.5 cm) the bottom of the box, which was notched on the front panel to provide easy access. Each sheet of paper could be torn away with little effort. The reminder notes (Figure 1) were typed on red paper.

RESULTS

Figure 2 shows the percentage of illegal parking (i.e., number of illegal vehicles divided by all ve-

hicles observed multiplied by 100) in the four reserved spaces. Results showed that violation rates dropped from a mean of 51.3% (of 41 vehicles observed over 8 days) during the initial vertical sign condition to a mean of 37.3% (of 81 vehicles over 21 days) when the message sign was added to the signpost unit. Illegal parking increased to a mean of 50.4% (of 44 vehicles monitored over 10 days) when the message sign was removed. The rate of illegal parking then decreased to a mean of 24.5% of 67 vehicles (over 17 days) when the message dispenser was first added, then increased to a mean of 57.0% of 62 vehicles (over 14 days) when it was removed. Subsequently, illegal parking dropped to a mean of 23.7% of 82 vehicles when the message dispenser condition was repeated (21 days) and again increased to a mean of 37.3% of 55 vehicles during the final vertical sign condition (13 days).

Due to the low number of illegally parked vehicles in each space per day, a further breakdown by space was not reported because of the sporadic nature of the data. In fact, the high variability in

the combined data is probably due to the periodic occurrence of low sample sizes per space on various days throughout the study. The number of daily observations of illegal parking across the four spaces ranged between 0 and 6, with a mean of 1.5, for a total of 154 vehicles.

To determine whether differences in the number of available shoppers during the experimental conditions could have influenced the above results, the number of customers entering the store during each observation period was counted. Overall, the mean number of customers observed entering the store was 113.6 ( $SD = 41.9$ ). The average number of customers per condition was not significantly different,  $F(6, 97) = 0.82, p = .56$ .

Illegal parking was not significantly related to availability of the adjacent (nonreserved) space,  $\chi^2(1) = 0.16, p = .69$ . Violation rates were approximately equal whether the adjoining space was occupied (35.0%) or empty (36.9%).

Illegal parkers were not found to be demographically different from drivers using the four adjacent spaces. Of 151 drivers (demographic data were missing for three vehicles) parked illegally in the reserved spaces, 70 (46.4%) were male, and 81 (53.6%) were female. Of the 1,370 vehicles observed in the adjacent spaces, 539 (39.3%) of the drivers were male, and 832 (60.7%) were female. These data were not significantly different,  $\chi^2(1) = 2.85, p > .05$ . Similar results were found for race. In the reserved spaces 82 (54.3%) of the drivers parked illegally were black, and 69 (45.7%) were white. In the adjacent spaces, 713 (52.0%) were black, and 657 (48.0%) were white. Again these data were not significantly different,  $\chi^2(1) = 0.28, p > .05$ .

Illegal parkers were also compared with drivers legally using the reserved spaces. Of the 277 vehicles (demographic data were missing for one vehicle) legally parked in the reserved spaces, 102 (36.8%) of the drivers were male, and 175 (63.2%) were female. However, legal users were significantly more likely to be white (209, or 75.5%) than black (68, or 24.5%),  $\chi^2(1) = 69.9, p < .001$ .

The number of missing reminder notes in each box ranged from 0 to 15, with a daily average of 1.5 ( $SD = 2.7$ ) for the first message dispenser

condition and 2.4 ( $SD = 3.0$ ) when the condition was repeated. There were no reported observations of the reminder notes actually being used by patrons during the daily observation periods. There were some anecdotal reports (informal comments from store personnel) that the notes were occasionally removed and read by customers and then discarded as litter.

## DISCUSSION

The effectiveness of the message sign provides additional support for the premise suggested in Cope et al. (1991) that messages increasing expectation of negative social consequences can augment the ability of a standard vertical sign to reduce illegal parking in spaces reserved for the disabled. The message conveys the idea that sanctions can originate from immediate sources in the general public compared to the traditional (yet less probable) threat of intervention by the police, who are not frequently present in most parking lots.

Although the message sign was inexpensive (\$15 per sign) and relatively easy to use with the existing signpost units (which cost about \$33 to make from used automobile tires), a community-wide action strategy based solely on this type of sign may prove to be unreliable over time if community intervention is unspecified and occurs infrequently. The message does not specify for the illegal parker or the public in general the actual community response and does not state how or when it might occur. In time the probability of public intervention may decrease (which could lessen the impact of the message sign) if community action is difficult and cumbersome to provide. Unlike the neighborhood watch participant who can often summon help from the safety of his or her home, the observer of illegal parking behavior has only a few intervention choices (e.g., direct confrontation, calling in a police report, or informing store personnel), all of which involve considerable inconvenience or personal risk. Indeed, an elderly gentleman was aggressively attacked and sexually assaulted by two men in Peoria, Illinois, when he admonished them for parking in a handicapped zone ("Adult Behavior," 1991). Maintaining active public participation for a neighbor-

hood watch type of program in this type of setting may prove difficult and would require additional study.

The message dispenser proved successful as a simple extension of the message sign condition, which could announce (using a slightly reworded message) a specific social contingency and provide a mechanism for its occurrence (via the reminder notes) that was convenient and could be performed in a nonconfrontational (safer) manner. Although the message dispensers (which were donated for this study) were more expensive (about \$20 per box plus labeling costs) and required some effort to keep fully stocked and tidy, they were quite effective, yielding the lowest level of illegal parking in the study. This change in behavior was most likely due to an increase in the perceived probability of social intervention rather than actual applications of public sanctions.

To study the effect of the dispenser boxes alone without the additional effects of a publicity campaign, no overt attempt was made to promote or advertise the project to the community. Because of the lack of specific instructions as to the use of the notes, it is unlikely that many were actually dispensed by the public. Because no observations of the reminder notes being used were reported during the observation periods, it is possible that the few notes found missing each day may have been simply examined and discarded as litter (as suggested by the anecdotal evidence supplied by the grocery store staff).

Hence, the boxes most likely functioned as antecedents, prompting potential illegal parkers into alternative parking choices, rather than as consequences contingent on illegal parking. In the absence of a public campaign or more formalized procedures to promote the actual use of the reminder notes by the public, the message dispensers may suffer from the same problems over time as the simple message signs. Yet, given the short duration of the treatment conditions in the present research, it is difficult to predict long-term effects. Again additional research is needed to explore the effectiveness of these devices as antecedents.

Allred and Cope (1990) found that in a college

student sample, self-reports of illegal parking behavior were related to gender, a result that was not found in this study. Illegal parking was not related to gender or race. However, there were significantly more white legal users than blacks. Because it is hard to argue for a race difference in the rate of physical disabilities, it is plausible that blacks may be less likely to get the special parking tag (which requires payment of an additional fee and a doctor's signature) when they need it. Although there were no observations of visibly disabled individuals without tags, many disabilities are not visible. A similar race effect was found by Cope and Allred (1991), in which the violation rate was higher for blacks than for whites. The present study indicates that this higher violation rate is likely due to the higher use of special plates by whites, who may be less affected by the additional fee for the plate.

Given that reminder notes administered by the community have been used successfully in the past (e.g., Architectural and Transportation Barrier Compliance Board, 1982; "Parking Violator," 1984), it should be possible to reduce illegal parking further, once the message dispenser boxes are incorporated into a comprehensive community action plan that encourages and facilitates public participation. Future research should focus on how to design, implement, and maintain such a plan over time and in different environmental settings. Such a plan should also include careful documentation of the actual disposition of the reminder notes and examine ways of minimizing the possibility of acts of retaliation (by offending drivers) that might be directed toward the message dispensers or to those administering the reminder notes.

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