

*A LONGITUDINAL STUDY OF INFORMATIONAL  
INTERVENTIONS TO SAVE ENERGY IN  
AN OFFICE BUILDING*

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Informational interventions were employed to promote two behaviors relevant for efficient heating of individual offices in a large office building. In two successive winter seasons, interventions were applied during 4-week periods. Short-term effects were assessed weekly, and long-term effects were assessed 1 year after each of the two intervention periods. Improvements were observed in each intervention period, with partial behavior maintenance 1 year later. The changes observed in the individual offices across conditions are suggestive of the program's capacity to correct relapses in earlier proenvironmental behavior.

DESCRIPTORS: energy conservation, informational interventions, behavior maintenance, office buildings

A substantial proportion of a nation's total energy use is consumed in office buildings and other utility buildings like hospitals and schools. Nevertheless, behavioral interventions for energy saving in this domain are relatively unexplored (Kempton, Darley, & Stern, 1992).

In a university building we investigated whether simple and low-cost informational interventions, applied periodically, might affect proenvironmental behavior change and long-term maintenance of change (the latter being a frequently neglected issue; see, e.g., De Young, 1993) of the office occupants. The interventions targeted two heating-related behaviors that were tied to easily observable attributes of each individual office, addressing a population whose members

were constantly identifiable across experimental phases.

## METHOD

### *Setting, Target Behaviors, and Data Collection*

In each of the 384 offices of the building, two or three radiators heat the air through grates in the windowsill above. Each radiator has its own thermostat with six settings (0 through 5). To reduce natural gas consumption, the grates above the radiators should be uncovered and the thermostats of the radiators in each office should be on identical settings. These behavioral targets require that office occupants resist using the windowsill as a bookshelf or adjusting only one thermostat to change temperature.

The grate coverings and thermostat settings in each of the offices were unobtrusively observed 11 times (T1 through T11) on weekends, when the building was closed. Radiators covered by objects less than 10% were scored as uncovered, and radiators covered 10% or more were scored as covered. Scores were dichotomized per office as uncovered (all radiators in an office uncovered)

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or covered (one or more radiators in an office covered). Thermostat settings in an office were scored as identical (all radiators on identical settings) or not identical (one or more thermostats on different settings). Interobserver reliability was assessed by having 27 offices observed by a second rater. Reliability was calculated by dividing the number of agreements by the number of agreements plus disagreements and multiplying by 100%. Interobserver agreement was 96% for the covering of grates and 93% for thermostat settings. In addition, the consumption of natural gas in the building was monitored weekly, and after T10 a short questionnaire was administered ( $N = 94$ ). (Details concerning the exact method used to calculate savings in gas consumption, such as the corrections for outside temperature, opening hours of the building, etc., can be obtained on request from the first author.)

#### *Experimental Design*

An ABACA design was used. Two 4-week intervention periods had an identical main component plus different supplementary components. Intervention periods were separated by a withdrawal period of 1 year. T1 served as a baseline for the first intervention. T6 served as baseline for the second, and as a measure of behavioral maintenance (1 year) for the first. T11 served as a measure of behavioral maintenance (1 year) for the second intervention.

#### *Interventions*

*Brochure.* At the beginning of each intervention (directly after T1 and T6; see Figure 1) a brochure was given to each office occupant. The brochure's request was to uncover all grates and to adjust all thermostats to identical settings in order to reduce natural gas consumption. It was stressed that cooperation required only limited effort and would not reduce thermal comfort. The brochure that was distributed after T6 included

an overview of the results of the first intervention.

*Collective feedback.* During both intervention periods, weekly updated collective feedback was provided via 20 bulletin boards, in the proximity of the elevator doors and next to the central stairway at all floors of the building. Graphic displays showed the percentages of offices with all grates uncovered and the percentages of offices with all thermostats on identical settings, from the baseline up to the most recent observation.

*Poster.* In the first intervention period, following T2, a poster was put up on the 20 bulletin boards for 10 days that reminded office occupants to lower and equalize thermostat settings during the Christmas break.

*Individual feedback.* In the second intervention period, between T8 and T9, individual feedback was given. A personal letter informed the office occupants whether the grates were uncovered and whether the thermostats were on identical settings in their offices.

## RESULTS AND DISCUSSION

The group data on both target behaviors (displayed in Figure 1) suggest that the successive interventions produced improvements that were maintained after a 2-year follow-up assessment. The increase of proenvironmental behavior in the office building, accompanied by a 6% reduction of gas consumption, amounted to a saving of approximately \$6,000 over the 2 years of the program. The effectiveness of the program's two target behaviors was also recognized by the office occupants. The survey after T10 showed that 80% of the respondents considered the two target behaviors to be effective in reducing gas consumption.

The study of individual offices that were in a proenvironmental position at T11 revealed that of the 257 (67%) offices with

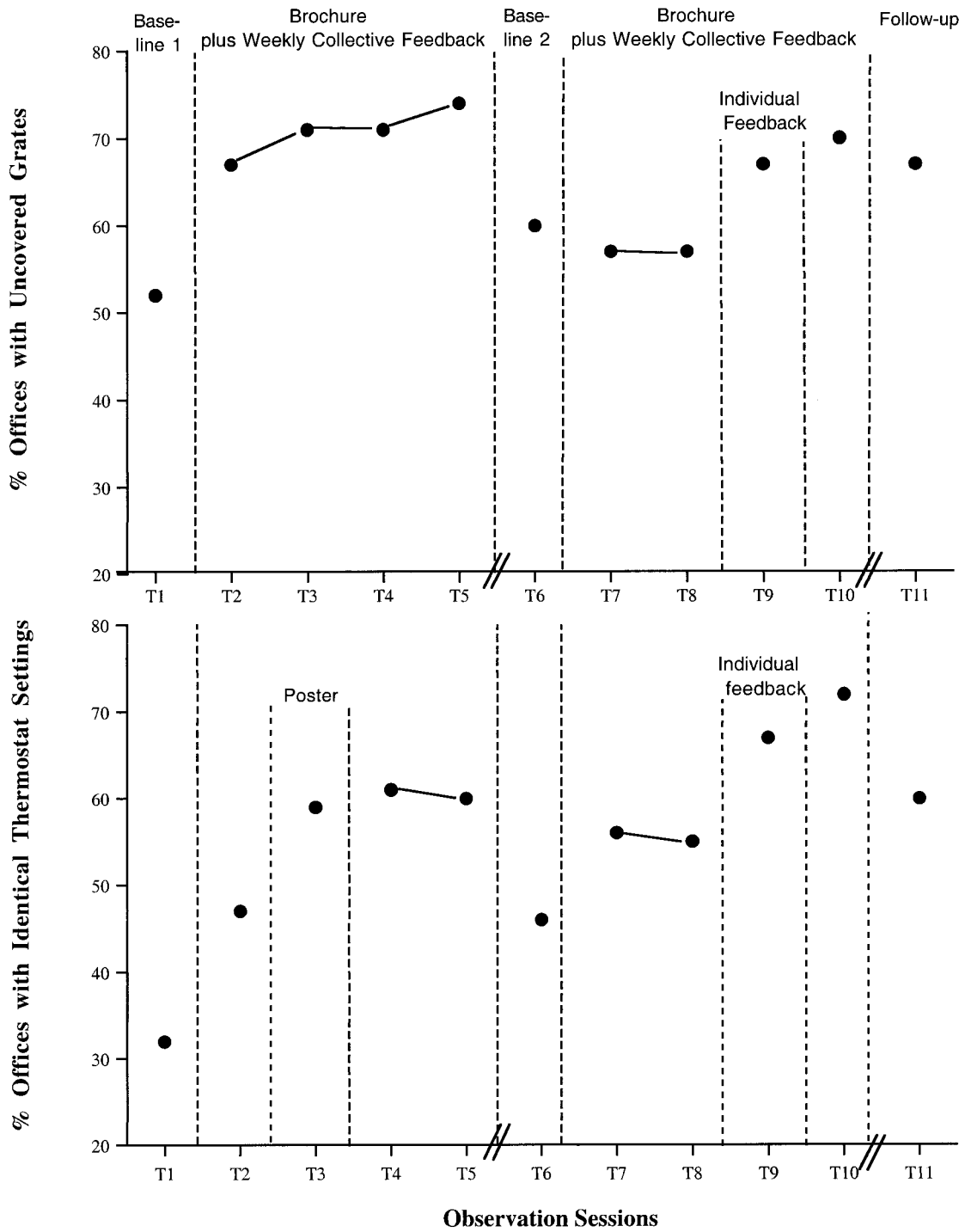


Figure 1. Change in percentage of offices with uncovered grates (top panel) and change in percentage of offices with identical thermostat settings (bottom panel), from Baseline 1 to follow-up. The number of offices was 384. Intervals between observations were 1 week (T1 to T2, T3 to T5, T6 to T10) or 10 days (T2 to T3, due to Christmas break) or 1 year (T5 to T6, T10 to T11).

uncovered grates at T11, 100 offices had had covered grates at T1. Of these 100 offices, 54 showed one single proenvironmental change, whereas 46 offices showed two or three such changes after temporary relapses. Of the 157 offices that already had uncovered grates at T1, 92 showed no change, whereas the remaining 65 showed up to three proenvironmental changes after temporary relapses. A similar calculation on the thermostat settings showed that the 230 (60%) offices with identical thermostat settings at T11 included 146 offices with non-identical settings at T1. Of these 146 offices, 65 showed one proenvironmental change, and 81 showed two or three such changes after temporary relapses. Of the 84 offices that already had identical settings at T1, 42 showed no change, and the remaining 42 showed one or two proenvironmental changes after temporary relapses. These individual-level calculations show that in approximately half of the cases studied, temporary relapses were followed by proenvironmental corrections that were actually targeted by the intervention.

The group observational data and the supporting energy and self-report data suggest that the periodic application of the in-

formational intervention used here may have produced the proenvironmental changes that were the object of this research. However, the data also suggest that augmented interventions were periodically needed to maintain the changes. The findings must be considered preliminary, however, because the design and data collection did not fully meet the standards of experimental behavior analysis: No single intervention was exactly replicated, few observation sessions were performed per condition (e.g., single baseline observations T1 and T6), and the reliability of these observations was marginally checked. Nevertheless, the findings are provocative and may encourage further research that follows the methodology explored in this study.

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