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ABSTRACT

The role of environmental stimuli in the control of cigarette smoking has been the object of theoretical speculation, but there have been few experimental demonstrations of the control exerted over smoking by environmental events. Self-report data on smoking in the natural environment were compared to observations made of smoking among subjects residing in a laboratory. Participants in the residential studies were exposed to one of two activity schedules in which they were either allowed to determine the duration of each activity (N=11 subjects) or were required to change activities every hour on the hour (N=8 subjects). The smoking patterns of the subjects on the temporally unstructured activity schedule in the residential laboratory were similar to the smoking patterns of subjects in the natural environment. Subjects on the activity schedule showed both changes in the shape of the intercigarette interval distribution and a decrease in the number of cigarettes smoked per day. The findings suggest that smoking patterns may be dependent on temporal characteristics of daily activities and that experimental analyses of smoking patterns may reveal relationships not observed in studies using per-unit time measures of smoking. (Author/JAC)

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Title: Cigarette smoking in the natural environment and in the laboratory: similarities and differences

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(1) Title of Paper

Cigarette smoking in the natural environment and in the laboratory: similarities and differences

(2) Topical Session Preference

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(3) Purpose

The role of environmental stimuli in the control of cigarette smoking has been the object of theoretical speculation (e.g., Pomerleau, 1979), and a variety of smoking intervention strategies involve the manipulation of environmental events associated with smoking (Bernstein, 1969). However, there have been few experimental demonstrations of the control exerted over smoking by such environmental events (Herman, 1974). The study of the conditions under which smoking takes place in the natural environment is difficult due to the problem of systematizing and quantifying complex events which vary over time, although attempts to do so have been made using subject self-report (Best & Hakstian, 1978; Epstein & Collins, 1977). In the present study, self-report data on smoking in the natural environment were compared to observations made of smoking among subjects residing in a laboratory in which reliable measurements of smoking behavior as well as concurrent behavioral and environmental events were collected. The purpose of the study was twofold: 1) to determine the extend to which self-reported smoking patterns in the natural environment resemble smoking

patterns observed under laboratory conditions, and 2) to assess the effects of temporally structured and unstructured activity schedules in the laboratory on patterns of smoking.

(4) Subjects

Smoking data were collected from a total of 35 volunteer subjects recruited through two sources: (1) participants in a smoking cessation program and (2) subjects participating in performance studies conducted in a residential laboratory. The participants in the smoking cessation program, 8 males and 8 females, were either recruited through newspaper advertisements and paid a fee of $6 per session or were invited to participate free of charge as a part of a disease prevention program. The subjects in the residential studies, 13 males and 6 females, were recruited through newspaper advertisements for participation in 3-person performance studies. The subjects were screened using standard psychological tests and were familiarized with the laboratory during pre-experimental briefings. Subjects earnings were determined by performance on a variety of tasks and ranged from $25-40 per day. Informed consent was obtained.

(5) Procedure

Participants in the smoking cessation program were instructed to continue smoking at their normal rate during a pre-intervention phase of the program and to keep daily records of the time of day when each cigarette was smoked. The number of such daily records collected from each subject ranged from 6 to 16, with a mean of 10.4. Samples of expired air

were measured for CO content at the initial session, and the measures were found to be positively correlated with the mean number of cigarettes reported smoked (r=.698).

Participants in the performance studies resided in a self-contained residential laboratory for periods of 2-12 days, with a mean of 8.3 days. The laboratory permits continuous programming of a variety of activities (e.g., work, physical exercise, recreation). The activities of all subjects were governed by an experimentally controlled behavioral program in which activity units are contingently sequenced according to specified rules. The subjects' behavior was continuously observed via television cameras by two monitors. The cigarette smoking of the subjects was monitored during a series of three-person studies in which the effects of different programming sequences on work performance were assessed. Subjects supplied their own cigarettes and were free to smoke at any time. The onset of smoking, as indicated by the operation of a cigarette lighter, was recorded by observers monitoring the TV system. Additionally, 13 of the subjects smoked all of their cigarettes through automated puff-detecting devices which provided satisfactory estimates of the reliability of the TV observers' data collection (approximately 95% aggreement).

Throughout each study, subjects were exposed to one of two activity schedules. Subjects (N=11) in one set of residential studies were allowed to determine the duration of each activity, while subjects (N=8) in another set of studies were required to change activities every hour on the hour.

These experimentally controlled activities consisted of sequences of work tasks (e.g., computer tasks, lever pulling) and recreational activities (e.g., reading, arts and crafts).

(6) Results

Figure 1 shows the average number of cigarettes smoked per day, the average standard deviation of the number of cigarettes smoked per day, the average intercigarette interval (IRT) and the average standard deviation of the intercigarette interval for all three groups. Inspection of this figure reveals that, with respect to measures of location (i.e., average number of cigarettes per day and average intercigarette interval), the three groups are similar. However, with respect to measures of dispersion (i.e., the average standard deviation of the number of cigarettes smoked per day and the average standard deviation of the intercigarette interval), the group receiving the temporally structured schedule was considerably less variable than the temporally unstructured group. Kruskal-Wallis analyses of variance failed to reveal a significant group effect for either mean number of cigarettes smoked per day ($X^2$ = 1.89, df = 2) or average intercigarette interval ($X^2$ = 0.19, df = 2). However, the effect of groups was highly significant for the standard deviation of number of cigarettes smoked per day ($X^2$ = 10.82, df = 2) and the average standard deviation of the intercigarette interval ($X^2$ = 7.59, df = d2).

Figure 2 shows the average indices of skewness and kurtosis for the intercigarette interval distributions for all the groups. Inspection of

this figure shows that the intercigarette distributions of subjects in the temporally structured group are less skewed or asymetrical and less leptokurtic or sharply peaked than the intercigarette interval distributions of subjects in the temporally unstructured or natural environment groups. Kruskal-Wallis analyses of variance were significant for both the measure of skewness ($X^2 = 8.60$, df = 2) and the measure of kurtosis ($X^2 = 6.53$, df = 2).

(7) Implications and Conclusions

The smoking patterns of subjects on a temporally unstructured activity schedule in a residential laboratory were found to be similar to the smoking patterns of subjects in the natural environment, while subjects on an activity schedule requiring hourly activity transitions showed both changes in the shape of the intercigarette interval distribution and decreased variability in the mean intercigarette interval and in the number of cigarettes smoked per day. These observations indicate that smoking patterns can be dependent upon the temporal characteristics of daily activities, and more generally, suggest that experimental analyses of the patterning of smoking in time may reveal relationships not observed in studies using per-unit time measures of smoking (e.g., number of cigarettes smoked per day).

(8) References

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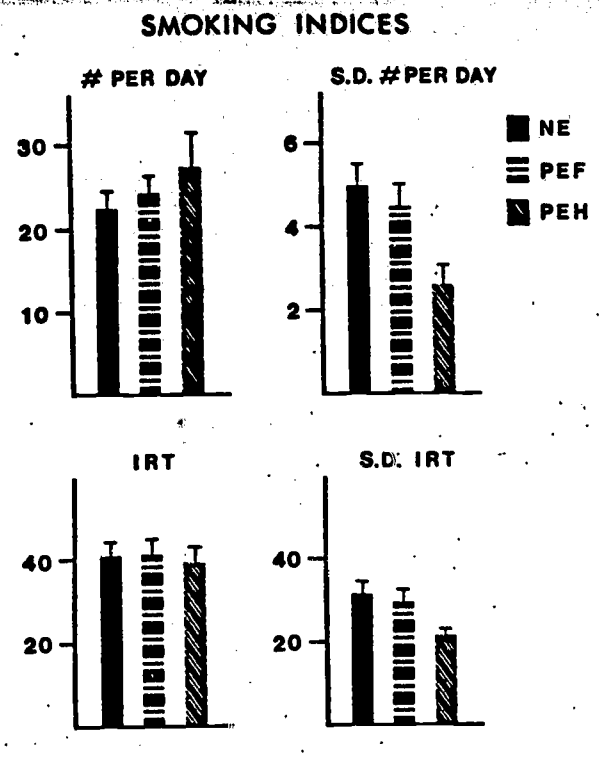


Figure 1. Average values of four smoking indices for the natural environment group (NE), the programmed environment group on an unstructured or free activity schedule (PEF), and the programmed environment group on a structured hourly activity schedule (PEH).

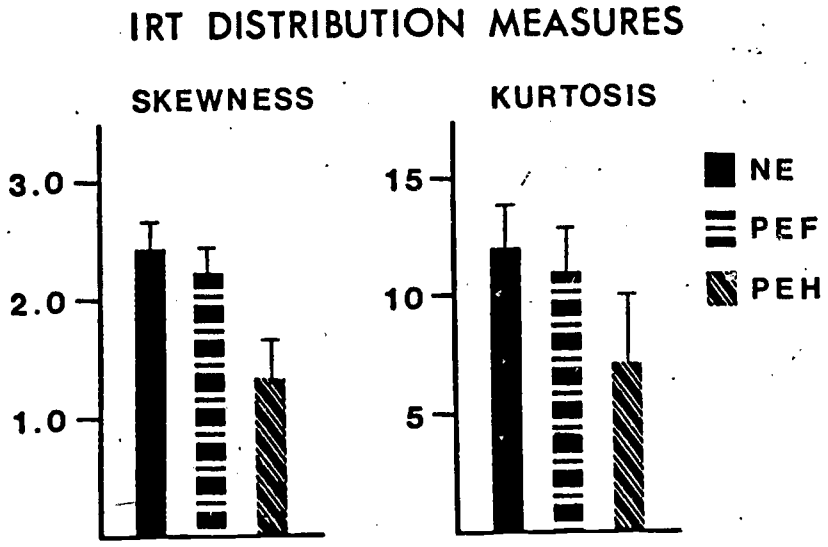


Figure 2. Average values of indices of skewness and kurtosis for each subject's IRT distribution in the natural environment group (NE), the programmed environment group on an unstructured or free activity schedule (PEF), and the programmed environment group on a structured hourly activity schedule (PEH).