MANIPULATED TIME AND EATING BEHAVIOR

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By the use of doctored clocks, the external, food-relevant cue, "dinner time," is manipulated so that some Ss entered an experimental eating situation believing it to be later than their regular dinner time and others believing it to be before dinner time. Obese Ss ate more when they thought that they were eating after their regular dinner hour than they did when they thought that they were eating before their dinner hour. There is no such effect for normal Ss. Additional data relevant to the hypotheses are presented from a questionnaire study of the eating routine and regularity of obese and normal Ss.

In a study of the effects of manipulated food deprivation and fear on the amounts eaten by obese and normal subjects, Schachter, Goldman, and Gordon (1968) found that these manipulations directly affected the amounts eaten by normal subjects but had virtually no effect on obese subjects. In an experimental eating situation normal subjects ate more when their stomachs were empty than when they were full and ate more when they were calm than when frightened. In distinct contrast, these manipulations had no effects on eating by obese subjects, who ate roughly the same amounts in all experimental conditions. These results articulate neatly with the Stunkard and Koch (1964) finding that gastric motility and self-report of hunger are highly related in normals and unrelated among obese subjects. From these two studies it seems clear that the obese do not label as hunger the set of physiological symptoms that normal subjects do and that the state of gastric motility does not trigger eating behavior in obese subjects.

In speculating as to the cues which do initiate eating in obese subjects, Schachter (1967) has suggested a distinction between external and internal control of eating. Presumably, eating behavior is a joint function of the purely internal or physiological cues one commonly associates with the state of food deprivation and of largely external cues such as smell, taste, the sight of other people eating, and so on—all food-related cues independent of the purely visceral correlates of the hunger state. Obviously such cues affect everyone. Holding internal state constant, we are all more likely to begin and to continue eating when food smells, looks, and tastes good. It is hypothesized, however, that eating by the obese is, in large part, under external control and relatively unrelated to internal state. The eating behavior of normal-size subjects, on the other hand, is determined by both internal and external cues. Evidence on differential effects of external cues is still sparse and is restricted largely to the effects of taste. Hashim and Van Itallie (1965) have presented case-study evidence that fat persons, who are normally prodigious eaters, will, when restricted to unappetizing food, eat considerably less of this food than will normal subjects. Nisbett (1968), in a study directly concerned with the effects of taste, has demonstrated experimentally that the taste of food has a stronger impact on fat than on normal subjects.

The present paper is concerned with further tests of the effects of external cues on fat and normal subjects. Given the array of food-related external cues, one of the more intriguing cues is simply the passage of time. Everyone knows that there are regular eating times; everyone knows that some 5 or 6 hours after eating his last meal he is "supposed" to eat his next one. In the absence of other food-relevant cues or of competing alternatives to eating, the eating behavior of the externally controlled person should be time bound. This suggests that if we manipulate time we should be able to manipulate the eating behavior of obese subjects.

1 This study was supported by Grant NSF-GS732 from the National Science Foundation. Our thanks are due to Reuben Silver who designed the apparatus for varying clock speed.
This report presents the results of two studies—a laboratory experiment designed to test the effects of manipulated time on the amounts eaten by obese and normal subjects and a questionnaire study designed to evaluate the relative importance of time as a determinant of day-to-day eating habits.

**METHOD**

The experimental test of these expectations requires measuring the amounts eaten by normal and obese subjects under conditions where they believe the time to be later than it actually is and under conditions where they believe the time to be earlier than it actually is—a state of affairs managed simply by the use of doctored clocks, one gimmicked to run at twice normal speed, the other at half normal speed.

The context within which these experimental requirements were satisfied was the following. The experimental session always began at 5:00 P.M. The subject was ushered into a small, windowless room and told that he was to take part in a study of "the relation between physiological reactions and psychological characteristics," which required base-level measures of heart rate and sweat gland activity. After these physiological measurements had been made, various personality tests would be administered.

The introduction over, the experimenter began attaching electrodes to the subject's wrists, picked up a tube of electrode jelly, and said,

> This stuff is necessary to get a good contact but unfortunately it gums up everything in the world— it also corrodes metal so you had better take off your watch—here let me put it away so this goo won't get on it.

This much done, the experimenter left the subject who, other than thinking his private thoughts, had only two things to do—watch the presumed record of heart rate and GSR roll off the polygraph and stare at a large clock mounted on the wall directly facing him.

After a true 30 minutes, the experimenter returned, shut off the machine and removed the electrodes. He left the room for a moment, returning with a sheaf of paper in one hand and a box of crackers called "Wheat Thins" under his arm. Munching on a cracker, he seated himself opposite the subject, put down his papers and the box of crackers saying, "I like to mix pleasure with business, help yourself if you want any."

The experimenter then administered a truncated version of the Embedded Figures Test—an operation consuming roughly 4-5 minutes. Twice during this period he took two crackers and told the subject to help himself. He then handed the subject a long questionnaire saying, "I'll leave you to fill this out." While leaving the room, he pointed to the box of crackers and said, "I'll leave this here, you might want some." In exactly 10 minutes, the experimenter returned, left additional questionnaire material with the subject, casually picked up the box, and left the room.

Allowing for the crackers eaten by the experimenter, the measure of the dependent variable—amount eaten—is simply the weight of the box when it was first brought into the room minus the weight of the box when it was finally removed.

This experiment, then, covaried weight deviation and apparent time flow and examined the impact of these variations on eating.

**Manipulation of Time**

On the assumption that dinner time for most of our subjects was roughly 6:00 P.M., the experiment was always scheduled to begin at exactly 5:00 P.M. From this starting point, the flow of events was scheduled so that, by use of the doctored clock, the cracker-eating period appeared to fall well before or after this critical 6:00 P.M. dinner time. Half of the subjects were under the impression that they were eating crackers before this dinner hour and half that they were eating crackers after this time.

The exact sequence of events and its relation to both true time and the clock readings in the fast and slow time conditions is presented below:
All told there was a total of 15 minutes during which the subject could nibble at crackers. While doing so, in the slow condition he believed the time to be 5:20-5:35, in the fast condition he believed the time to be 6:05-6:20. The exact times noted above varied slightly, depending upon the exact moment a subject arrived. In all cases, however, the variations are trivial and a matter of only a few minutes.

It will be noticed that clock rate was varied only during the true 30-minute base-line period when the subject was alone. This was done in order to avoid arousing unnecessary suspicion. During the first 5 minutes the subject still had his watch. During the cracker-eating period, it seemed a reasonable guess that the subject would have at least a crude notion of the rate at which he could fill out questionnaires. On the whole, the manipulation worked astonishingly well. Only two subjects volunteered that there was something wrong with the clock and disbelieved the time. One subject simply asked if the clock was a little fast, and no other subject raised any question.

Subjects

All subjects were male students in Columbia College. From various campus offices it was possible to get data on the height, weight, and age of most of the student body. Weight deviations were calculated from Metropolitan Life Insurance Company (1959) norms and a pool of obese and normal size subjects assembled. Subjects were solicited by phone and if agreeable (as most were) an experimental appointment was made.

Experimentally relevant characteristics of the subjects are presented in Table 1. Normal and obese subjects are similar in age and height but, of course, differ markedly in weight. Before beginning the experiment the decision was made to classify all potential subjects as obese if they were 15% overweight or more and as normal if they were 10% overweight or less. Students whose weight deviations fell between these cutoff points were not considered as subjects.

Besides the 46 subjects tabulated in Table 1, eight subjects were eliminated from the experiment—two because they flatly refused to believe the clock and six (four obese and two normal) because they had either eaten dinner or a substantial snack within 1 hour of the beginning of the experiment—states of affairs which obviously violated the experimental requirements. Though the data of these eight subjects are not included in the presentation of experimental results, they are included in the analysis of questionnaire material concerned with eating habits.

Hypotheses

Given the design of the study, let us now spell out the predictions generated by the line of thought presented in the introduction of this paper. We have assumed that external cues are the major determiners of eating behavior for the obese, while both external and internal cues determine the eating behavior of normals. Ignoring, for the moment, all other stimulants or inhibitors of eating, if one grants that the passage of time is indeed a potent external cue, it should follow that obese fast (6:05) subjects will eat more than obese slow (5:20) subjects. For fast subjects it is past dinner time. For slow subjects it is before dinner time. For normal subjects it is dinner time. For normals, one should also anticipate that fast (6:05) subjects will eat somewhat more than slow (5:20) subjects. However, since we assume that external cues have less of an impact on normal than on obese subjects, this difference should be smaller for normal than for obese subjects and the crucial prediction is that of a significant interaction between degree of obesity and time.

Results

The basic data are presented in Table 2. It is immediately evident that there are profound differences in the effects of the manipulation of time on the two groups. Obese fast subjects eat almost twice as much as obese slow subjects. The impression that it is roughly dinner time is a spur to the eating behavior of the obese. For normal subjects the effect of the time manipulation is the reverse of its effect on obese subjects, for they eat much more in the slow than in the fast time condition. The expected Time X Obesity interaction is strongly supported, though not quite in the form anticipated. Where the fast time manipulation does stimulate eating among obese subjects, contrary to expectations, it inhibits the eating of normal subjects.

The explanation of this turnabout seems embarrassingly simple and is documented by the several normal fast subjects who politely

<table>
<thead>
<tr>
<th>TABLE 1</th>
<th>CHARACTERISTICS OF THE SUBJECTS</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>N</td>
</tr>
<tr>
<td>Obese</td>
<td>22</td>
</tr>
<tr>
<td>Normal</td>
<td>24</td>
</tr>
</tbody>
</table>

* Based on measurements made at the conclusion of the experiment.
TABLE 2
AMOUNT EATEN (IN GRAMS) BY SUBJECTS IN THE FOUR CONDITIONS

<table>
<thead>
<tr>
<th>Weight</th>
<th>Time</th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Slow</td>
<td>Fast</td>
<td></td>
</tr>
<tr>
<td>Obese</td>
<td>19.9</td>
<td>37.6</td>
<td></td>
</tr>
<tr>
<td>Normal</td>
<td>41.5</td>
<td>16.0</td>
<td></td>
</tr>
</tbody>
</table>

Analysis of variance

<table>
<thead>
<tr>
<th>Source</th>
<th>df</th>
<th>SS</th>
<th>MS</th>
<th>F</th>
</tr>
</thead>
<tbody>
<tr>
<td>Weight (A)</td>
<td>1</td>
<td>.17</td>
<td>.17</td>
<td>.01</td>
</tr>
<tr>
<td>Time (B)</td>
<td>1</td>
<td>19.28</td>
<td>19.28</td>
<td>.51</td>
</tr>
<tr>
<td>A X B</td>
<td>1</td>
<td>447.74</td>
<td>447.74</td>
<td>11.94*</td>
</tr>
<tr>
<td>Error</td>
<td>42</td>
<td>37.49</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

*p = .002.

declined the experimenter’s offer of crackers saying, “No thanks, I don’t want to spoil my dinner.” If, as seems likely, some factor of this sort was widespread among normal fast subjects it does suggest that the fast time manipulation has acted as a major inhibitor of eating among normal subjects. Obviously, cognitive factors have affected the eating behavior of both normal and obese subjects with, however, a vast difference. While this manipulation of perceived time passage triggers or stimulates eating among the obese it has the opposite effect on normals, most of whom are at this hour physiologically hungry, aware in the fast condition that they will eat dinner very shortly and unwilling to wreck dinner by filling up on crackers.

If this is correct, it does raise a crucial question—why has this purely cognitive manipulation which inhibits eating by normal subjects failed to inhibit obese subjects? The answer we suspect is simple. Eating crackers (or anything else) does not “spoil” dinner for the fat subject. It has probably occurred to the reader that this experiment and our several related studies have in good part been concerned with the “start” mechanisms of eating, that is, the relative role of internal and external cues in triggering eating behavior. It seems a reasonable guess that this general line of reasoning applies as well to the “stop” mechanism. If the state of the stomach is unrelated to the hunger experience in fat subjects, it may also be unrelated to the satiety experience. Evidence from several sources inferentially supports this guess. Schachter et al. (1968) have demonstrated that fat subjects eat just as much shortly after they have eaten a meal as they do when they have been deprived of food for some 10 hours, whereas normal subjects, of course, eat considerably more after food deprivation than after they have eaten a meal. Similarly, the notorious binge eating (Stunkard, 1961) of the obese can be considered as indicative of some failure of the stop or satiety mechanism.

If this general line of interpretation is correct, it does suggest that the effects of the time manipulation on normal subjects are a result of the decision to make experimental eating a casual, predinner affair. Should such an experiment be conducted in a dinner or full meal context, we would anticipate that our original expectations for normal subjects would be supported.²

It should be specifically noted that the difference between obese fast and slow subjects is significant (p = .07) at a somewhat uncomfortable level, and that the substantial interaction effect is as much due to the unexpected reversal of the two normal groups as to the predicted difference between the obese conditions. Since the point is crucial, the following section is devoted to a more refined analysis of the effects of the time manipulation on these two groups of subjects.

Effects of “Usual” Eating Time

A subject in this experiment is faced with two possibly dissonant sets of cues relevant to eating: first, the actual state of his viscera and second, the clock which leads him to believe that it is either earlier or later than true time. To the extent that reasonable guesses can be made about actual physiological state we should be able to examine the relative effects of these two sets of cues. We have, of course, no physiological measures but we shall assume

² Precisely what to anticipate for obese subjects in such an experiment is somewhat more obscure. As the reader will shortly see, the obese, under the proper circumstances, can be considerably more flexible about eating or not eating than normal subjects—a condition which could lead one to expect no effects of a time manipulation on the obese in the experimental context of a delicious, full meal.
that people organize and routinize their lives in such a way that those who normally eat before the experimental eating period are physiologically "hungrier" during the experiment than those who normally eat a late dinner. Making this assumption, we can to some extent examine the differential operation of these two sets of cues by comparing the effects of the true discrepancy between the subjects' normal eating times (as determined by answers to the question, "What is your usual dinner time?") and the cracker-eating period with the effects of the clock manipulated discrepancy.

For both "true" time and "clock" time separately subjects are partitioned into two groups—those normally eating dinner before the start of the cracker-eating period and those usually eating dinner after the start of this period. A subject's classification as experimentally eating before or after his usual dinner time may be different for the true and the clock time distributions. Thus, in the fast condition, a subject who normally eats at 6:00 P.M. is classified as eating crackers after his usual dinner hour according to clock time (6:05–6:20 during the cracker-eating period) and classified as eating before his usual meal-time according to true time (5:35–5:50).

Given these distinctions, it should be anticipated that the amount eaten by externally controlled, obese subjects will be directly related to clock time and bear little relationship to true time.

For normal subjects the relationship to anticipate is unclear, for two opposing tendencies are involved. If our general framework is correct the actual time should have a greater impact on the eating behavior of normals than of the obese. On the other hand, the "spoil dinner" artifact should attenuate the effects of true time, for those who are actually closest to dinner seem most likely to inhibit cracker eating. Knowing absolutely nothing of the relative impacts of these two tendencies, only one guess seems reasonable—clock time should have less effect on normal than on obese subjects.

The data for obese subjects are presented in Table 3. Fast and slow conditions are combined and the subjects are divided into categories according to the relationship of their usual dinner time to both clock and actual time. It can be seen that in every possible comparison clock time determines the amount eaten and actual time has virtually no effect.

Those obese subjects who in actuality are eating crackers before their usual dinner time eat more than twice as much if the clock indicates that it is after usual dinner time than do those for whom the clock indicates that it is before dinner time ($p = .05$). Similarly, for those who actually eat crackers after their usual dinner hour, clock time is all-determining. Those to whom the clock indicates that it is before dinner time eat less than one-third the amount eaten by those who believe it to be after dinner time ($p = .07$).

The most revealing comparison is that between Cells B and C in Table 3, for here the two sets of cues are in direct opposition. If one accepts the assumption that physiological hunger is greater for those subjects for whom it is actually after the usual dinner time than for those for whom it is before the usual dinner time we should expect Cell C subjects to be physiologically hungrier than Cell B subjects. In the face of this presumed internal difference, it is evident that the external cue, clock time, is all powerful, for Cell B subjects eat almost four times as much as do Cell C subjects ($p = .02$).

Reversing this analytic approach by holding clock time constant in order to compare the effects of actual time, the differences are non-significant, and in a direction opposite to what one would expect from the assumption that eating behavior is related to actual time. Within this experimental context, the amounts

<table>
<thead>
<tr>
<th>Actual time</th>
<th>Clock time</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Grams eaten when S thinks it is:</td>
</tr>
<tr>
<td></td>
<td>Before usual dinner time</td>
</tr>
<tr>
<td>Before usual dinner time</td>
<td>A 23.9 (12)</td>
</tr>
<tr>
<td>After usual dinner time</td>
<td>C 13.3 (4)</td>
</tr>
</tbody>
</table>

Note.—n's in parentheses.
TABLE 4
EFFECTS OF ACTUAL AND CLOCK TIME ON THE AMOUNTS EATEN BY NORMAL SUBJECTS

<table>
<thead>
<tr>
<th>Actual time</th>
<th>Clock time</th>
<th>Grams eaten when S thinks it is:</th>
</tr>
</thead>
<tbody>
<tr>
<td>Before usual dinner time</td>
<td>Before usual dinner time</td>
<td>29.1 (13)</td>
</tr>
<tr>
<td>After usual dinner time</td>
<td>After usual dinner time</td>
<td>36.0 (1)</td>
</tr>
</tbody>
</table>

Note.—n's in parentheses.

Eaten by obese subjects have nothing to do with actual time and are wholly determined by the external, manipulated cue of clock time.

For normal subjects, there are no indications that clock time has acted as a spur to eating behavior. Table 4 reveals no differences of consequence between categories, and the trends are in a direction opposite to those evident for the obese. By this analysis, the manipulation of time has major effects in triggering eating behavior in obese subjects and no such effects on normals. By the same token, there are no indications, within the short time limits of this experiment, that actual time has had an effect on normal eating—a fact attributed to the “spoil dinner” artifact. Though we cannot, in this experiment, support the assertion that eating by normal subjects is directly related to internal state, other studies indicate that this is the case. Limiting ourselves, however, to the present study, the most conservative conclusion that can be drawn is that manipulation of the external cue, time, has strong stimulating effects on the eating behavior of the obese and no such effect on normals.

Regularity of Eating Habits

Though there is little question that the passage of time, independent of internal state, has a major effect on the eating behavior of the obese, this phenomenon has been demonstrated in an experimentally pure situation devoid, save for some relatively uninteresting crackers, of any other food-related cues. In real life, of course, the passage of time is just one of a host of external cues, some stimulating eating, others, undoubtedly, diverting the subject from any thoughts of food. Given the facts of the present experiment alone, it might be anticipated that the eating times of the obese would be rigid and time bound. Given the real life potpourri of environmental, food-related cues, just how potent a cue time is as a determinant of eating behavior is an open question but one which is amenable to answer by studying the daily eating habits of obese and normal subjects. The source of information about eating habits is one of the questionnaires administered during the “personality testing” phase of the experiment which required all subjects to make a detailed report of eating and sleeping behavior during the last 3 days.

To translate our experimental findings of the relative external sensitivity of the obese into predictions about everyday eating habits will, in the following discussion, require that we make a series of more or less commonsense assumptions about the distributions of food-related cues in the college student's environment and about the factors determining when and with what regularity he has contact with these cues.

1. Eating between meals. For our college subjects food-related cues are abundant and prominent. Restaurants surround the Columbia campus, children walk along the streets eating ice cream and hot dogs, etc. If, as our facts indicate, such cues are more likely to trigger eating in the obese than in normals, the obese should be more likely to eat between meals.

The relevant data are reported in Table 5 which tabulates responses to the question, “Do you usually eat between meals?” Some 59% of all obese subjects answer yes while only 32% of all normals do so.

TABLE 5
EATING HABITS AND OBESITY

<table>
<thead>
<tr>
<th>Sample who:</th>
<th>Obese</th>
<th>Normals</th>
<th>p value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Eat between meals</td>
<td>58.6</td>
<td>32.0</td>
<td>.05</td>
</tr>
<tr>
<td>Eat breakfast</td>
<td>20.7</td>
<td>56.0</td>
<td>&lt;.01</td>
</tr>
<tr>
<td>Miss one or more lunches on:</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Weekdays</td>
<td>21.4*</td>
<td>25.0</td>
<td>ns</td>
</tr>
<tr>
<td>Weekends</td>
<td>53.3</td>
<td>11.1</td>
<td>&lt;.05</td>
</tr>
</tbody>
</table>

Note.—In percentages. * p = .07 for obese weekday versus weekend lunch-eating.
2. Eating breakfast. For students breakfast is probably the meal least involved with external cues and most confounded by competing alternatives such as sleeping late, dozing and daydreaming, or taking one's ease at shaving and washing. The obese, then, should be less prone to eat breakfast than normals. Table 5 records answers to the question, "What time do you usually eat breakfast?" Some subjects listed a specific time and others checked the alternative, "I never eat it." Clearly normals are far more likely to eat breakfast than are the obese.

An obvious alternative explanation is that the obese are dieting and therefore willing to dispense with breakfast. The data, however, belie this alternative. Of the 19 obese subjects who answered, "Yes" to the question, "Have you ever been on a diet to lose weight?" 26% eat breakfast; of the 10 obese subjects who answered, "No" only 10% eat breakfast. Irrespective of dieting, normals are more prone to eat breakfast than are the obese.

3. Weekday versus weekend eating. For college students, as for almost everyone, weekdays are highly routinized with tightly programmed sets of restricted activities. Classes are scheduled, libraries are open only at particular hours, athletic practice and club meetings are at specified times, and so on. This degree of routinization of daily life inevitably imposes a limited range of physical paths along which the individual repeatedly travels, a restricted number of places he visits, and a relatively small number of people, all also tightly scheduled, whom during the week he sees again and again in much the same circumstances. Translating this routine into its relevance for food-related cues, it follows that the presence or absence of such cues must be as routinized and repetitive during the week as the presence or absence of any other sort of physical or social stimuli.

In distinct contrast, the weekend is a time of unpredictability. No classes, no schedule. The student may do anything from taking a trip home, dating, wandering, or staying in his room studying and sleeping. From Saturday to Sunday, from weekend to weekend, the degree of routine and repeated activity is simply lower than on weekdays. Inevitably, contact with food-related cues on weekends is relatively unsystematic and unpredictable.

It should follow, then, that for the obese on weekdays, eating times should be very regular, meals being taken at much the same time each day. On weekends, however, meal times should be highly irregular, subject to all of the vagaries of an unpredictable round of activities. For normals, on the other hand, there should be relatively little difference between weekday and weekend regularity of eating. Less responsive to external cues, the normal is inclined to eat when his stomach tells him to, rather than when circumstances dictate.

Consider the implications of this line of thought for lunch-eating. During weekdays, virtually all undergraduates have morning classes. Come noontime, all students are up and about, surrounded by crowds on their way to lunch, inevitably passing lunch counters and dining halls. Whether for internal or external reasons, under such circumstances all students should be equally likely to eat lunch. On weekends, however, with no classes, the student may choose to stay in his room and study, go to the library, visit a museum, or indulge in countless activities that remove him from food-related cues. We should then anticipate that on weekends fat subjects are more likely to forego lunch than are normals.

The relevant data are reported in Table 5. All subjects answered questions about when and if they had eaten lunch during the two previous days. Subjects were run only on weekdays. If a student was a subject on a Wednesday, Thursday, or Friday, his answer referred to weekday lunches. If he was a subject on Monday or Tuesday his answers referred to lunch on one or both days of the weekend. Table 5 records the percentage of

In considering this result the reader may well have wondered if there is a difference in the degree of gastric motility characteristic of obese and normal subjects. The Stunkard and Koch (1964) study indicates no difference between these two groups in this respect. This finding is particularly applicable to these "breakfast" results, for they recorded gastric motility from 9:00 a.m. to 1:00 p.m. on subjects who had been instructed not to eat breakfast.

If a student was a Tuesday subject his data are coded only for Sunday lunch. Since eight of the Tuesday subjects were obese and five were normal, this coding rule should work against the hypothesis.
students who skipped one or more lunches on weekends versus weekdays. It is evident that on weekdays there is no difference in the lunch-eating proclivities of normal and obese subjects. On weekends, the two groups differ distinctly. Where only 11% of normals missed at least one lunch on the weekend, 53% of the obese did so. On weekdays, normals and obese are equally likely to eat lunch; on weekends, the obese are far less likely to do so.

Let us examine next the impact of weekday routine and weekend freedom on the regularity of eating, that is, the day-to-day variation in the precise time of eating meals. If indeed the timing of food-related cues is irregular and unpredictable on weekends and systematic on weekdays, the obese should be far more irregular about mealtimes on weekends than on weekdays. For normals, this difference, if any, should be considerably smaller.

Since so very few fat subjects eat breakfast and since the majority skip at least one lunch on weekends, our analysis is limited to the time of eating dinner—a meal which most subjects, obese or normal, on weekends or weekdays, do eat.°

Subjects were asked the time they had eaten dinner on the two previous evenings. Table 6 plots the mean discrepancy in minutes, between the two times listed for all subjects who ate dinner on both nights.° For the obese there is a dramatic difference between weekends and weekdays. While on weekends, their two dinner times differ by an average of 1 1/2 hours; on weekdays the discrepancy is only 12 1/2 minutes. For normals, there is no such relationship—merely a trivial and nonsignificant trend in the opposite direction. It is evident that the obese are far more irregular about their mealtimes on weekends than on weekdays and that there is no such effect for normal subjects.

**DISCUSSION**

Though this free-wheeling theoretical marriage of speculation about daily routine with hypotheses and facts about obesity and eating behavior has the charm of leading to some totally nonobvious findings, it is clear that this is the loosest sort of semiliterary conceptual scheme. For any single one of these findings about eating habits, alternative explanations are abundant. Many of these have been considered in the text but others are, of course, still possible for any specific finding. Though we rather doubt that any seriously different theoretical scheme can incorporate quite this variety of findings, there is an alternative way of looking at this entire body of data which must be considered. Conceivably these various findings about eating habits and regularity are simply a special case of a much broader phenomenon. Possibly all of the bodily processes or biological drive states of the obese are more vulnerable to environmental influence than are those of normal subjects.° If so, these data may indicate nothing more broadly still, there is an obvious family resemblance between this external-internal schema and Witkin's (1954) field dependence-independence formulation. Karp and Pardes (1965) have reported that the obese are more field dependent than are normal subjects. In our laboratories, however, Kay and Pliner (unpublished study) have been unable to replicate this finding.

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**TABLE 6**

<table>
<thead>
<tr>
<th></th>
<th>Discrepancy (in min.) between dinner times on:</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Weekdays</td>
</tr>
<tr>
<td>Obese</td>
<td>12.5</td>
</tr>
<tr>
<td>Normals</td>
<td>83.9</td>
</tr>
</tbody>
</table>

Note.—Statistical comparisons: obese weekday versus weekend, $p < .01$; normal weekday versus weekend, ns; obese weekday versus normal weekday, $p < .01$; obese weekend versus normal weekend, ns.
special about the relationship between obesity and food intake but are simply one manifestation of a more pervasive difference between normals and the obese. To test for this, data were gathered on the sleeping habits of these same subjects. Though these data revealed no differences between the obese and normal subjects, further data that we are currently collecting on sleeping suggests that there may be such differences. The point is still at issue, however, and research is currently under way on internal and external control of thirst, urination, and sleeping.

Returning to more immediate considerations, it does appear that the effects of time on the eating behavior of the obese are considerably more complex in real life than our experimental results would indicate. In the laboratory situation where, other than crackers, the passage of time is the only food-relevant cue, time is a potent cue. In real life, where time is but one of many food-relevant cues, the impact of time seems mediated by the weekday-weekend dimension of routinization. On weekdays, when life is routine, indications are that the eating schedule of the obese is rigid and time bound. On weekends, the effects of time seem slight and the obese person seems even more variable in his eating times than the normal.

REFERENCES


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