EFFECTS OF PRIMING, FOOD PALATABILITY AND CALORIE INFORMATION ON APPETITE IN RESTRAINED EATERS

by

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(ABSTRACT)

After ingesting a moderate amount of food (e.g., a 7 oz milkshake) which is labeled as high in calories, restrained eaters (dieters) eat more food than unrestrained eaters do. This counterregulatory eating effect may depend on ingesting only a small snack, a prime. The effect of a prime may depend on its palatability and on information about its caloric value. Accordingly, restrained and unrestrained eaters received a low or high palatable prime, and no, low or high calorie information. Dependent measures were salivation and amount of 4 test foods eaten.

After subjects ingested the prime, salivation was reliably greater for high than for no calorie information groups, irrespective of restraint. Salivation was reliably correlated with calorie information, and with amount of food eaten, for restrained eaters but not for unrestrained eaters. Differences in amount eaten were negligible across groups. However, restrained eaters tended to eat more peanuts than unrestrained eaters did in the low calorie information condition.

Based on these and previous data, it was suggested that the effect of calorie information on salivation may have been a

consequence of subjects' prior experiences with foods of different caloric values. Possibly, salivation to high calorie information represents a conditioned response to a food that is perceived as palatable and filling. However, responding may be greater for restrained than for unrestrained eaters. Finally, the effect of calorie information on salivation supports the argument against an extreme separation of internal (physiological) and external (environmental) variables.

DEDICATION

I dedicate this thesis in loving memory of my grandfather, Kenneth Graham McDaniel, who believed that knowledge is the highest of aspirations.

ACKNOWLEDGEMENTS

I would like to thank the members of my committee, Drs. Franchina, Ollendick and Zeskind for their assistance and cooperation. I would especially like to thank Dr. Franchina for his patient yet persistent search for excellence. He has always insisted on the best rather than merely settling for "good". Sincere appreciations go to my colleagues, Lisa Daleo, Kathy Marshall, and Rebecca Asente, for their comradeship and moral support.

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I acknowledge James V. Bone who lived for the future. His faith in me, and his quest for truth, excellence and compassion continue to give me hope for my own success.

My dearest thanks go to my husband, Bruce Callahan, who has supported me in times of mental anguish--and in times of joy. His courageous undertakings, laughter, hopes and dreams have been invaluable to me during the writing of this thesis.

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INTRODUCTION

One approach to the study of eating behavior has been to investigate the differences between obese and normal-weight subjects. However, studies which have classified subjects only according to body weight have yielded inconclusive data about how humans regulate food consumption. As an alternative to studying overweight and normal-weight subjects, Herman and Mack (1975) have redirected research on eating behavior by studying the differences between restrained and unrestrained eaters. Restrained eaters, defined by their scores on the Restraint Scale (Herman & Polivy, 1980), report greater weight fluctuations and more concern about their weight, eating habits, and dieting than do unrestrained eaters. The rationale for studying restrained eaters, or dieters, originated from Nisbett's 1972 hypothesis that overweight individuals who diet may be underweight relative to a biologically-determined set point of body weight. Herman and Mack (1975) reasoned that due to food restriction, a dieter of any weight classification may be in a state of chronic food deprivation. Therefore, all dieters might exhibit eating patterns which were previously considered classic "obese eating patterns" (see Schachter, 1971; Schachter & Rodin, 1974). That is, normal-weight subjects who diet in order to maintain a desired weight ought to suffer the same physiological and cognitive consequences of dieting as do overweight dieters. On the other hand, overweight non-dieters should show eating patterns which are similar to those of normal-weight non-dieters. Therefore, restraint theory provides hypotheses which predict eating behavior regardless of an individual's weight (Herman & Mack, 1975; Klajner, Herman, Polivy, & Chhabra, 1981).

Paradoxically, restrained eaters sometimes eat more food after ingesting a preload (e.g. a 7 oz milk shake) than after no preload. Perhaps dieting results in physiological food deprivation (Nisbett, 1972), psychological food deprivation (Polivy, Herman, Olmsted, & Jazwinski, 1984) or stress and arousal (Hibscher & Herman, 1977; Herman, 1978; Herman & Polivy, 1980), causing restrained eaters to be hyperresponsive to external (environmental) food-related stimuli. Or, restrained eaters may be in a chronic state of arousal which generally exaggerates responses to all types of external stimuli (Herman, Polivy, Pliner, Threlkeld, & Munic, 1978). Increased responsiveness to external stimuli, especially those that are food related, may entice restrained eaters to overeat.

Several variables which may affect restrained and unrestrained eaters differentially are food palatability, alcohol consumption, mood, and preloading. Restrained eaters salivate more to highly palatable foods (but not to unpalatable foods) than do unrestrained eaters (Klajner et al., 1981). Alcohol consumption, under certain circumstances, increases the amount of food consumed by restrained eaters but not by unrestrained eaters (Polivy & Herman, 1976a, 1976b). Anxiety (Herman & Polivy, 1975) and depression (Frost, Goolkasian, Ely, & Blanchard, 1982) also increase the food consumption of restrained eaters whereas they decrease the food consumption of unrestrained eaters.

Preload Variable

In a typical preload procedure, subjects ingest a specified amount of food prior to testing. Then they are measured on either amount of food eaten *ad libitum* (Booth & Fuller, 1981; Herman & Mack, 1975; Pliner, 1973), salivation to food stimuli (Wooley, Wooley, & Woods, 1975) or hunger and food-appeal ratings (Booth & Fuller, 1981; Wooley, Wooley, & Dunham, 1972). The preload procedure may serve to identify and separate physiological from cognitive determinants of food consumption. For example, experimenters have manipulated the caloric value of a preload. This manipulation is expected to affect subjects' physiological responses via gastric distension, intestinal absorption and osmotic and chemical changes. Other experimenters have manipulated the perceived caloric value of a preload, or the taste of a preload. These manipulations are expected to affect subjects' cognitions. However, some researchers have argued that variables such as perceived and actual calories, and the taste of foods, may simultaneously and mutually influence physiological *and* cognitive responding (see Booth, Toates, & Platt, 1976; Rodin, 1981; Spitzer & Rodin, 1981).

Counterregulation Effects

The post-ingestional metabolic consequence of food consumption should be a reduction in hunger. Subjects who ingest a preload of food should eat less subsequently than those who do not ingest a preload. However, in the case of restrained eaters, the results have been counterintuitive. Although prior food consumption should decrease hunger and the desire to eat, and should thereby curtail subsequent eating, restrained eaters eat more food after ingesting a preload than after no preload (Herman & Mack, 1975; Woody, Costanzo, Liefer, & Conger, 1981). Restrained subjects also eat more good-tasting food after ingesting a preload which they believe is high in calories than after a preload which they believe is low in calories (Polivy, 1976; Spencer & Fremouw, 1979; Woody et al., 1981). Unrestrained eaters show the opposite pattern of results.

Herman and his colleagues have labeled this effect the counterregulatory phenomenon. They hypothesize that dieters who consume a preload of high caloric value believe that they have surpassed their caloric allotment for the day. Consequently, the dieter relinquishes self-imposed cognitive restraints which normally deter overeating. Once cognitive restraints have been abandoned, instead of regulating caloric intake, the dieter overeats or counterregulates.

Despite the available data on preload effects, the specific parameters of a preload that determine the counterregulatory phenomenon are largely unknown. Herman and Mack (1975) have proposed that for restrained eaters, the preload affects eating in an all-or-none fashion. This hypothesis suggests a threshold idea. Ingesting an amount of food which is below the threshold value would not lead the dieter to abrogate dietary restraints. Ingestion which exceeds the threshold value would lead to the removal of restraint and, consequently, overeating. However, if an ingestion threshold does exist, previous research has failed to reveal threshold levels or whether the threshold is volumetric, sensory or caloric in character. Possibly, dieters overeat only after consuming a preload of a particular size, degree of palatability or perceived caloric value.

Preload Parameters

The parameters of the preload in previous studies have varied. Herman and Mack (1975) reported that ingesting one or two 7.5 oz preloads led to overeating in restrained eaters relative to a no preload condition. Thus, the second preload was superfluous. Polivy (1976) reported that when an 8 oz preload was believed to be more than 600 calories, restrained eaters ate more food than when the preload was believed to be less than 600 calories. Woody et al. (1981) reported that when a 10 oz preload was described as containing 400 calories, restrained eaters ate more than when it was described as containing only 67 calories. Finally, Spencer and Fremouw (1979) reported that simply instructing restrained eaters that a 16 oz preload was very high rather than very low in calories led to increased eating.

Volume. In these previous studies, the preload's volume has ranged from 7.5 to 16 ounces and its perceived caloric value from 67 to 600 calories. Therefore, the parameters of the preload which determine counterregulation remain unclear. It is possible that the effect of a preload may depend on ingesting only a small amount of food. The ingestion threshold (Herman & Mack, 1975) may be crossed by presenting a restrained eater with a small snack. Orosensory stimulation from a snack of food may occasion anticipatory hormonal responses (Booth, 1977; Le Magnen, 1978; Nicolaïdis, 1977; Powley, 1977) and possibly cognitive responses. Hodgson and Greene (1980) reported that eating a small amount of a highly palatable food increased salivary flow, a measure of appetite (Wooley & Wooley, 1973), in hungry subjects. Perhaps for restrained eaters, a small snack of food may constitute a suprathreshold event which is sufficient to affect dietary restraint.

Calories. The effect of a small snack on subsequent ingestion may also be related to its perceived caloric value. Polivy (1976), Woody et al. (1981) and Spencer and Fremouw (1979) reported that when restrained eaters believed that a preload was relatively high in calories, they ate more food than when they believed that the preload was relatively low in calories. Perhaps caloric information pertaining to a small snack of food would affect subsequent intake as well.

Palatability. The effectiveness of a small snack in eliminating dietary restraint should also depend upon the palatability of the snack. Research suggests that when food is highly palatable, more is consumed than when food is less palatable (Hill, 1974; Hill & McCutcheon, 1975; McKenna, 1972; Nisbett, 1968; Price & Grinker, 1973; Rodin, 1975b; Rodin, Slochower & Fleming, 1977). Highly palatable foods, especially simple carbohydrates, may augment insulin release (Parra-Covarrubias, Rivera-Rodriguez & Almaraz-Vgalde, 1971; Rodin, 1978; Woods, Vasselli, Kaestner, Szakmary, Milburn, & Vitiello, 1977).

Insulin release may occasion feelings of hunger, either via hypoglycemia (Geiselman & Novin, 1982) or in the absence of hypoglycemia (Vanderweele, 1985). Resultant hunger feelings may cause an individual to view the food as increasingly more palatable. Therefore, insulin release, occasioned by a palatable food, may enhance hunger-dependent palatability for that food and increase the amount of that food eaten (Le Magnen, 1978). In addition, in providing a snack of a small amount of palatable food, insulin release may increase a subject's <u>general</u> hunger state and affect the hunger-dependent palatability of <u>other</u> foods.

In summary, specific characteristics of a small snack, a prime, may enhance or dampen the counterregulatory effect. Accordingly, restrained and unrestrained subjects received a prime of a low or high palatable food. The prime was accompanied with no information about its calorie content or with information about low or high calorie content. The effects of these procedures were assessed with measures of salivation and amount of test foods eaten subsequently.

<u>Rationale</u>

Salivation is an anticipatory, pre-ingestional response to food (Nicolaïdis, 1977; Powley, 1977) which may reflect appetite (Wooley & Wooley, 1973), or the motivation to eat (Bolles, 1980). Salivation is positively related to food deprivation, food palatability (Klajner et al., 1981; Wooley & Wooley, 1973), and expectancies to eat (Wooley,

Wooley, & Dunham, 1976; Rosen, 1981). Salivation is negatively related to the caloric value of a preload which has previously been consumed (Wooley et al., 1975).

Wooley and Wooley (1973) reported a positive relationship between hours of food deprivation and salivation. If restrained eaters are chronically food deprived (Herman & Mack, 1975), then amount salivated should be positively correlated with restraint score (Legoff & Spigelman, 1987; Sahakian, Lean, Robins, & James, 1981).

If salivation measures appetite as the motivation to eat (Bolles, 1980; Wooley & Wooley, 1973), then salivation measured immediately after subjects ingest the prime should be positively related to subsequent food consumption. Conversely, Wooley et al. (1975) reported that after subjects had consumed a preload of food, salivation was negatively correlated with the caloric value of the preload. Therefore, salivation measured after subjects have eaten the test foods should be negatively correlated with the amount of food previously consumed.

Based on the data of Wooley and Wooley (1973) and Rodin et al. (1977), palatability of the prime should influence salivation and amount of food eaten. Wooley and Wooley (1973) reported that subjects salivate more to palatable foods than to unpalatable foods. Rodin et al. (1977) reported that subjects eat more palatable foods than unpalatable foods. If the palatability of the prime influences salivation and amount eaten, then in the present study, subjects should salivate and eat more after ingesting a high palatable prime than after a low palatable prime. If restrained eaters are hyperresponsive to food cues, then receipt of a palatable food, relative to an unpalatable food, should produce greater differences between restraint groups on measures of salivation (Klajner et al., 1981) and amount eaten.

Previous research indicates that restrained eaters eat more food after ingesting a preload labeled as high calorie than after a preload labeled as low calorie. However, no known study has investigated the effect of calorie information on salivation. Because amount salivated after ingestion of the prime should coincide with amount of food eaten, a hypothesis for salivation may be derived from previous studies on the effect of calorie information on amount eaten. Therefore, restrained eaters should eat and salivate more in high than in low calorie information conditions. Conversely, unrestrained eaters should eat and salivate less in high than in low calorie information conditions. No known study has investigated the effect of no calorie information versus the effects of low or high calorie information. Therefore, no hypothesis is proposed for the effect of no calorie information.

Hypotheses

1. Restrained subjects will salivate more than unrestrained subjects will.

2. Salivation which occurs immediately after the prime will be positively related to the amount of food which is subsequently consumed.

3. In general, subjects will salivate and eat more after ingesting the high palatable prime than after ingesting the low palatable prime. Restrained subjects will show a greater increase in salivation and eating across prime conditions than will unrestrained subjects.

4. Restrained subjects will salivate and eat more when they receive high calorie information than when they receive low calorie information. Unrestrained subjects will salivate and eat less when they receive high calorie information than when they receive low calorie information.

5. Salivation measured after subjects have eaten the test foods will be negatively correlated with the amount of test foods previously consumed.

METHOD

Subjects

Subjects were 101 female undergraduate students at Virginia Polytechnic Institute and State University. They were selected from a larger pool of potential subjects on the basis of their answers to the Revised Restraint Scale (Herman & Polivy, 1980). The Restraint Scale was embedded in a 78-item Lifestyle Questionnaire (see Appendix A) which contained extraneous items related to health and food. The Lifestyle Questionnaire was administered during a screening session, after which the experimenter weighed subjects and measured their heights. Subjects received extra course credits for their participation in the screening and the present study.

Subjects with a restraint score less than 14 were classified as low restrained eaters (n = 46, M = 9, SD = 3.7) and those with a restraint score greater than 16 were classified as high restrained eaters (n = 55, M = 21, SD = 3.6). For each subject, percentage of "ideal" body weight was calculated according to Body Mass Index ($W/H^{1.5}$) Values for Women Based on Weights with Lowest Mortality, Ages 25 to 59 (Statistical Bulletin, 1984). Subjects' mean age was 20 years. For subjects under age 25, percent weight was calculated using the midpoint body mass index value for persons with small frames. For subjects over age 25, percent weight was calculated using the midpoint value for persons with medium frames. Low restrained subjects ranged in body weight from 79 to 120 percent of ideal body weight ($\underline{M}$ = 97%, SD = 9.0). High restrained subjects ranged in body weight from 89 to 165 percent of ideal body weight ($\underline{M}$ = 112%, SD = 14.0).

Subjects who met the restraint requirements of the study were contacted by telephone and were asked to participate in a study on psychophysiological perception. The stated purpose of the study was to investigate "the effect that a very small taste has on a person's perception of other food characteristics". Subjects who agreed to participate were asked to abstain from eating for 3 to 5 hours before coming to the session. Subjects were tested in a single 45 min session between 11:00 a.m. and 6:00 p.m.

Materials

Restraint Scale. The function of the Restraint Scale is to distinguish among individuals who are concerned with limiting food intake, irrespective of their body weights. However, because of social pressures urging overweight persons to diet, dietary restraint should still correlate with Percent Overweight. Scores on the Restraint Scale have been found to correlate reliably with Percent Overweight ($r = .38$, $p < .001$; Ruderman, 1985c), with bulimic tendencies ($r = .42$, $p < .001$; Ruderman, 1985c) and with a measure of weight suppression ($r = .38$, $p < .001$; Lowe, 1984). An early version of the Restraint Scale (Herman & Polivy, 1975) was reliably correlated with plasma free fatty acid (r =

.25, $p < .02$), an index of food deprivation, within normal and overweight subjects (Hibscher, 1974).

Factor analysis of the Restraint Scale has yielded two primary factors, Weight Fluctuation (WF) and Concern with Dieting (CD). These two subscales are reliably correlated with each other ($r = .53$, $P < .001$; Blanchard & Frost, 1983). However, CD scores, but not WF scores, are negatively correlated with scores on the Rational Beliefs Inventory ($r = -.32$, $p < .0001$; Ruderman, 1985b), and positively correlated with public self-consciousness ($r = .30$, $p < .001$) and social anxiety ($r = .12$, $p < .05$; Blanchard & Frost, 1983). These correlations suggest that the CD factor may be highly related to responses thought to characterize restrained eaters (Ruderman, 1985b).

Some researchers have questioned the use of total Restraint scores to discriminate any subject, especially in the case of overweight subjects. Blanchard and Frost (1982) reported that although WF and CD scores were each reliably correlated with indices of overweight, WF scores were more highly correlated than were CD scores. They suggested that WF may be the better predictor of eating behavior (also Drewnowski, Riskey, & Dreser, 1982; Frost et al., 1982). Lowe (1984) reported that CD scores were more highly correlated with indices of overweight than were WF scores. He recommended including both factors when using the Restraint Scale. Still further, Ruderman (1985a, 1985c) has argued that CD may be the better predictor of eating behavior. Ruderman (1983) has reported that the index of reliability (the square root of the reliability coefficient alpha) was significantly higher for normal-weight (alph = .86) than for overweight (alpha = .51) subjects. She provides further evidence that the scale may measure different constructs in these two groups of subjects.

These limitations and contradictions of the Restraint Scale notwithstanding, total Restraint scores have been shown to be reliable predictors of salivation and food intake regardless of individual body weight (e.g., Klajner et al., 1981; Legoff & Spigelman, 1987; Spencer & Fremouw, 1979). After reviewing their own and two additional studies, Ruderman and Wilson (1979) have concluded that restraint is a better predictor of eating behavior than is body weight.

Type of prime. A chocolate chip cookie (10 g) was chosen as a high palatable food. Palatability of this prime was assessed prior to the experiment by means of student ratings on a pencil and paper rating scale.

A sesame seed chip (6 g) was chosen as a low palatable food. Palatability was assessed prior to the experiment through informal taste-tests with students and co-workers.

Test foods. Four test foods were selected from among those snack items that were rated as most preferable by a group of students (n = 149) prior to the initiation of the present study. The test foods were dry roasted peanuts, vanilla-filled chocolate cookies, crackers and potato chips. These foods were selected in order to diversify the selection of foods available to subjects in the present experiment.

Test foods were stored at room temperature in tupperware containers and were presented to subjects in these containers. The approximate quantities of the foods which were made available to subjects were 470 g of peanuts, 640 g of cookies, 360 g of crackers, and 235 g of potato chips.

Overview

In an experimental session, subjects completed two salivation trials for baseline measures, and then subjects received one of two different types of primes. One prime represented a low palatable food, and the other prime represented a high palatable food. When subjects received the prime, they also received either no, low, or high calorie information. After they ingested the prime, subjects completed a third salivation trial. Then subjects were asked to rate the appearance, taste, and caloric value of 4 test foods. After rating and eating the test foods, subjects were administered a fourth salivation trial, and they completed a questionnaire which was used as a manipulation check. The dependent measures were amount salivated on trials one through four and amount of test foods consumed.

Procedure

Subjects were tested individually. Each subject was welcomed by the experimenter and was seated to the right of a 5 by 3 ft table. The table was set with a white tablecloth, a red placemat, a pitcher of water, a drinking glass and napkins. The experimenter sat at a desk to the right of the subject. The experimenter said:

I'm interested in the effect that a very small taste has on a person's perception of other food characteristics such as the color, appearance and general appeal of different foods. For example, after a person eats miracle fruit, other foods tend to taste rather sweet. I'm not using miracle fruit in this study, but this is the kind of effect that I am interested in.

What I am doing in this study is I'm measuring people's perceptions of food characteristics in two different ways. One measure is a physiological measure, which is salivation. Therefore, I will be asking you to put some dental rolls into your mouth to measure your salivation. The other way that I am measuring people's perceptions of food characteristics is a cognitive measure based on simple rating scales. I will be asking you questions such as, "How appealing do you find this food, very appealing or not so appealing?" Do you have any questions?

Subjects wishing to participate in the study completed an Informed Consent Form (see Appendix B). No subject declined participation.

Salivation measures. At the start of the experimental procedure, subjects were informed that salivation is a very sensitive measure which is obtained with dental rolls. Therefore, to adjust their salivary flow, a couple of practice trials was required.

Each subject was asked to drink approximately 3 oz of water prior to the first salivation trial to hydrate and to clean out the subject's mouth. After hydration, subjects inserted two preweighed 1 1/2 in. dental rolls into their mouths, one on each side of the lower jaw, laterally between the teeth and gums. Subjects were instructed to keep their jaw and head still and level, to avoid swallowing, and to relax.

After the experimenter signaled the end of a salivation trial (90 sec), subjects removed the dental rolls from their mouths with their fingers and placed them into a sealable plastic baggie. Subjects were reminded to take at least one small drink of water, approximately 1 or 2 oz, between each salivation trial, and subjects were allowed to drink as much additional water as they desired.

There were a total of four salivation trials: two were baseline measures which occurred prior to the experimental manipulations, a third measure occurred after subjects ingested the prime, and a fourth measure occurred after subjects rated the test foods. Each salivation trial was 90 sec long with a minimum 2-min intertrial interval.

Priming. After the two baseline salivation trials, the experimenter told the subject:

> Before I give you the small taste, I want to point out that for purposes of control, it is necessary that I ask you to taste the whole portion that I am about to give to you. I also want to point out that this is the only thing that I specifically ask you to taste during this session.

Then the experimenter offered the prime to the subject along with one of the following sets of calorie information:

No Calorie Information: Here is the small taste.

Low Calorie Information: This is a low-fat food because it is made with a fairly new dietary oil substitute, so it is also really low in calories. Your portion has approximately 20 calories in it.

High Calorie Information: This is a high-energy food because it is made with a fairly new energy and nutrient concentrated oil, so it is also really high in calories. Your portion has approximately 200 calories in it.

After the subject ingested the prime, she cleansed her mouth with water. After a 2 min interval, a third salivation trial was administered.

Taste test. After ingesting the prime and completing three salivation trials, subjects were asked to rate the appearance, taste and caloric value of the four test foods (Rating Scale; Appendix C). While the experimenter was setting the foods on a table in front of the subject, the experimenter explained that the subject would be left alone for 12 min to make her ratings. The experimenter further explained that although the subject was to rate the food's taste, it was not necessary for her to actually eat the foods. The subject was instructed that she could rate the food's taste on the basis of previous experience with that food. On the other hand, because the subject was asked not to eat before coming to the session, she was invited to try as much of each food as she liked because the experimenter had plenty more.

Subjects were not instructed to rate the foods in a particular order, but foods were arranged on the table coincident with the order in which the foods were listed on the rating scale: peanuts, crackers, cookies and potato chips. This procedure allowed subjects to continue to eat their favorite food while they were rating other foods.

After 12 min the experimenter returned to the room to put away the foods. The subject was asked to cleanse her mouth with water, and after a 2-min interval a fourth salivation trial was begun. After this final salivation trial, the subject was asked to rate the taste and caloric value of the prime, thus providing a manipulation check (Questionnaire II; Appendix D). The subject was also asked to indicate how much time had passed since her last meal, her current hunger and satiety level, and the number of calories that she thought she had consumed during the session. Finally, the experimenter answered the subject's questions and the subject was thanked.

After the subject left, the foods were weighed immediately. The dental rolls were weighed within six hours.

Analyses

The major dependent measures were amount salivated on trials one through four and amount eaten for the four test foods. Amount salivated was calculated to the nearest .1 mgm as the difference in the weight of the dental rolls from pretest to posttest. Amount eaten was calculated to the nearest 100 mgm as the difference in the weight of the foods from pretest to posttest. The data were analyzed with 2 (Restraint) x 2

(Type of Prime) x 3 (Calorie Information) between subjects analyses of variance (ANOVA). In order to determine the effect of type of test food on consumption, a within subjects ANOVA was conducted with Type of Food as a repeated factor. Pearson product moment correlation coefficients were obtained for amount salivated and amount eaten.

RESULTS

Amount Eaten Data

Total amount. Figure 1 presents mean amount of food eaten by low and high restrained eaters (RE) who received no, low, or high calorie information (CI) and the sesame seed chip (SS) or the chocolate chip cookie (CC) prime. Following receipt of the CC prime, the high RE group ate more food than did the low RE group in low and high CI conditions. This difference between RE groups occurred following receipt of the SS prime only in the low CI condition. In the no CI condition, receipt of the high palatable CC prime produced greater food intakes than did the low palatable SS prime, irrespective of restraint condition. Differences between restraint groups were negligible in the no CI condition following receipt of either prime, and in the high CI condition following receipt of the SS prime. Analysis of variance (ANOVA) of all the data in Figure 1 yielded no reliable effects for Restraint, Type of Prime, Calorie Information or their interactions (Table 1-E; Appendix E).

Failure of the ANOVA to yield reliable results could have been due to a high degree of variability in the data. Table 1 presents standard deviations (SDs) for amount of food eaten for low and high restrained eaters who received the SS or CC prime and no, low or high CI. In a

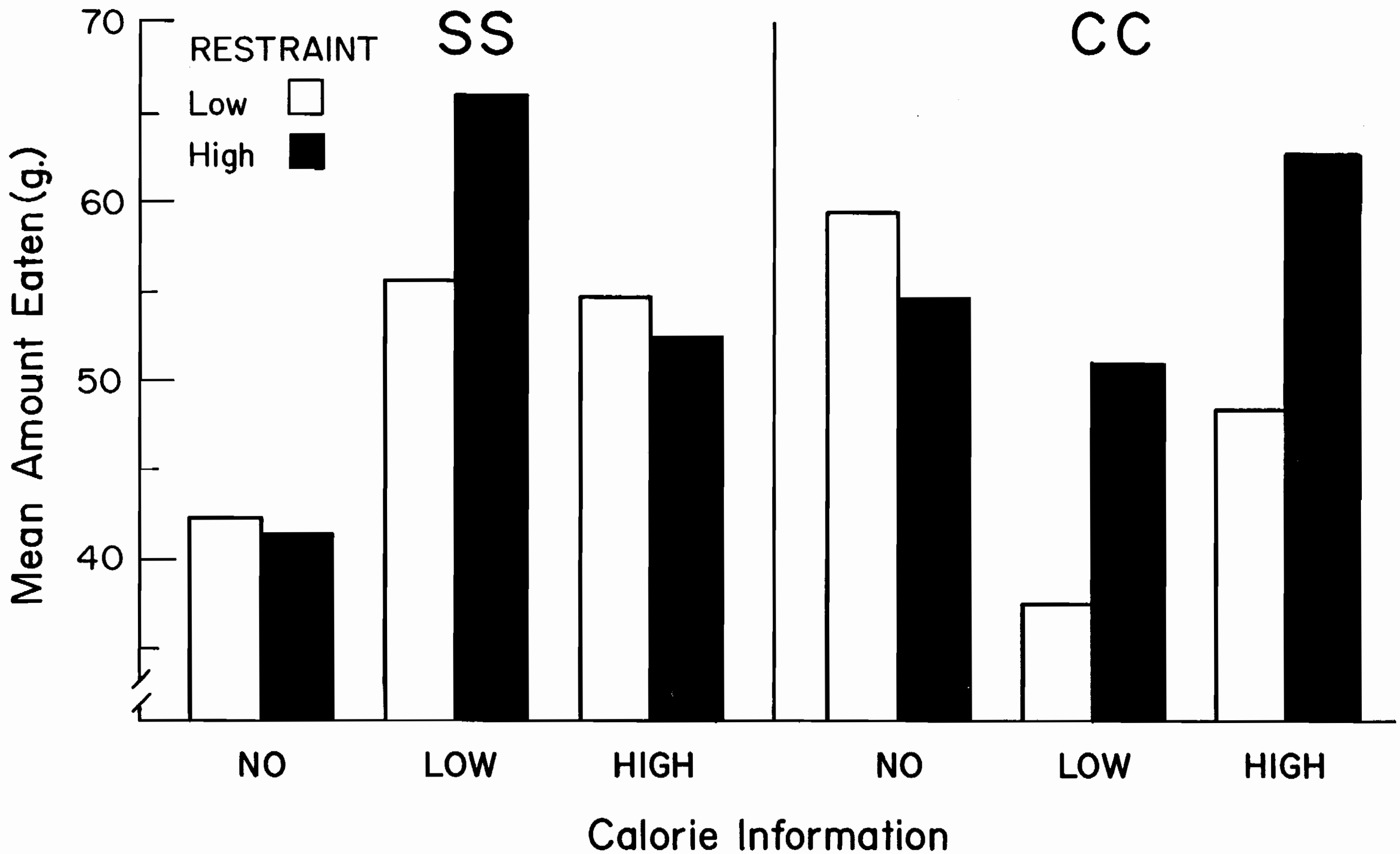

Figure 1. Mean amount (g.) of food eaten for low and high restrained eaters who received a sesame seed chip (SS) or chocolate chip cookie (CC) prime and no, low or high calorie information.

Table 1.

Standard Deviations for Total Amount of Food Eaten for Low and High Restrained Eaters (RE) Who Received a Sesame Seed Chip (SS) or Chocolate Chip Cookie (CC) Prime and No, Low or High Calorie Information.

	SS		CC	
Calorie Information	Low RE	High RE	Low RE	High RE
No	24	53	32	34
Low	24	30	17	35
High	30	42	27	55

test for homogeneity of variance (Cochran, 1941), the null hypothesis of equal variances was rejected ($\hat{G}_{max}$ = .25, p < .05). In a test for normality, the distribution of scores was found to be nonnormal (Kolomogorov D = .13, p < .01). To normalize the distribution of the data and reduce the heterogeneity of variance, a square root transformation of $\sqrt{x} + \sqrt{x + 1}$ (Freeman & Tukey, 1950) was employed. This transformation yielded normally distributed data (D = .06, p > .15) and reduced the variance to an acceptable level (x^2 (11, N = 101) = 16.08, p > 1.0; Bartlett, 1947). However, an ANOVA of these transformed scores still failed to reveal reliable effects (Table 2-E).

Amount eaten for each test food. It was possible that the experimental manipulations affected subjects' consumption of some foods but not of others. Thus, total amount of food consumed may have been too broad and undiscriminating a response measure because it may have masked differences in intake for different food items.

Figures 2 - 5 show, in sequence, mean amount of cookies, peanuts, crackers and potato chips eaten by low and high restrained eaters who received the SS or CC prime and no, low or high CI. (See Tables 2 - 5 for SDs.) Overall, the grand means of amount eaten of cookies were, 21 g; peanuts, 15 g; crackers, 10 g; and potato chips, 7 g. Square root transformations were employed for all analyses of these data.

According to Figures 2 - 5, following receipt of the CC prime the high RE group ate more cookies, peanuts and crackers than did the low

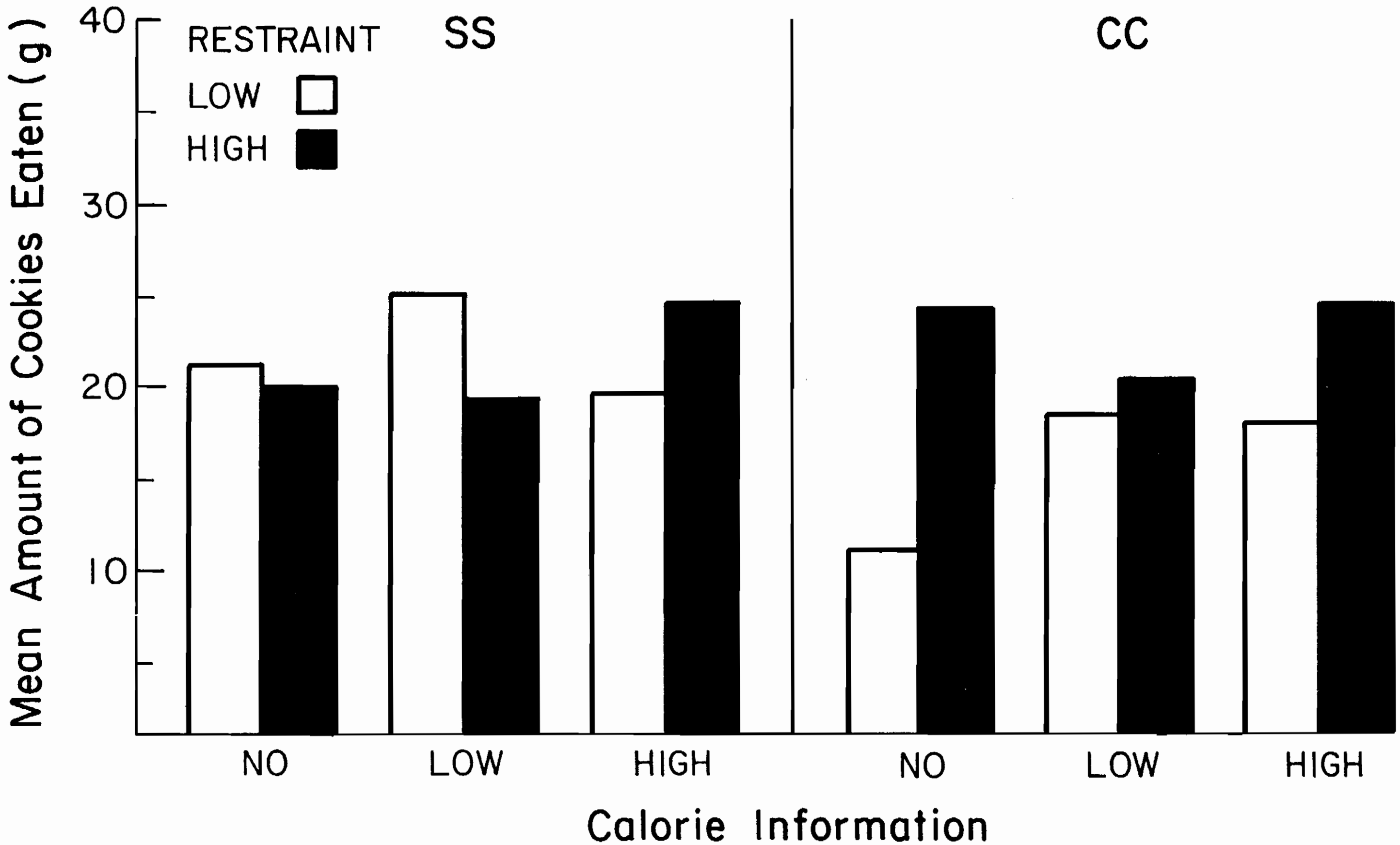

Figure 2. Mean amount (g.) of cookies eaten for low and high restrained eaters who received a sesame seed chip (SS) or chocolate chip cookie (CC) prime and no, low or high calorie information.

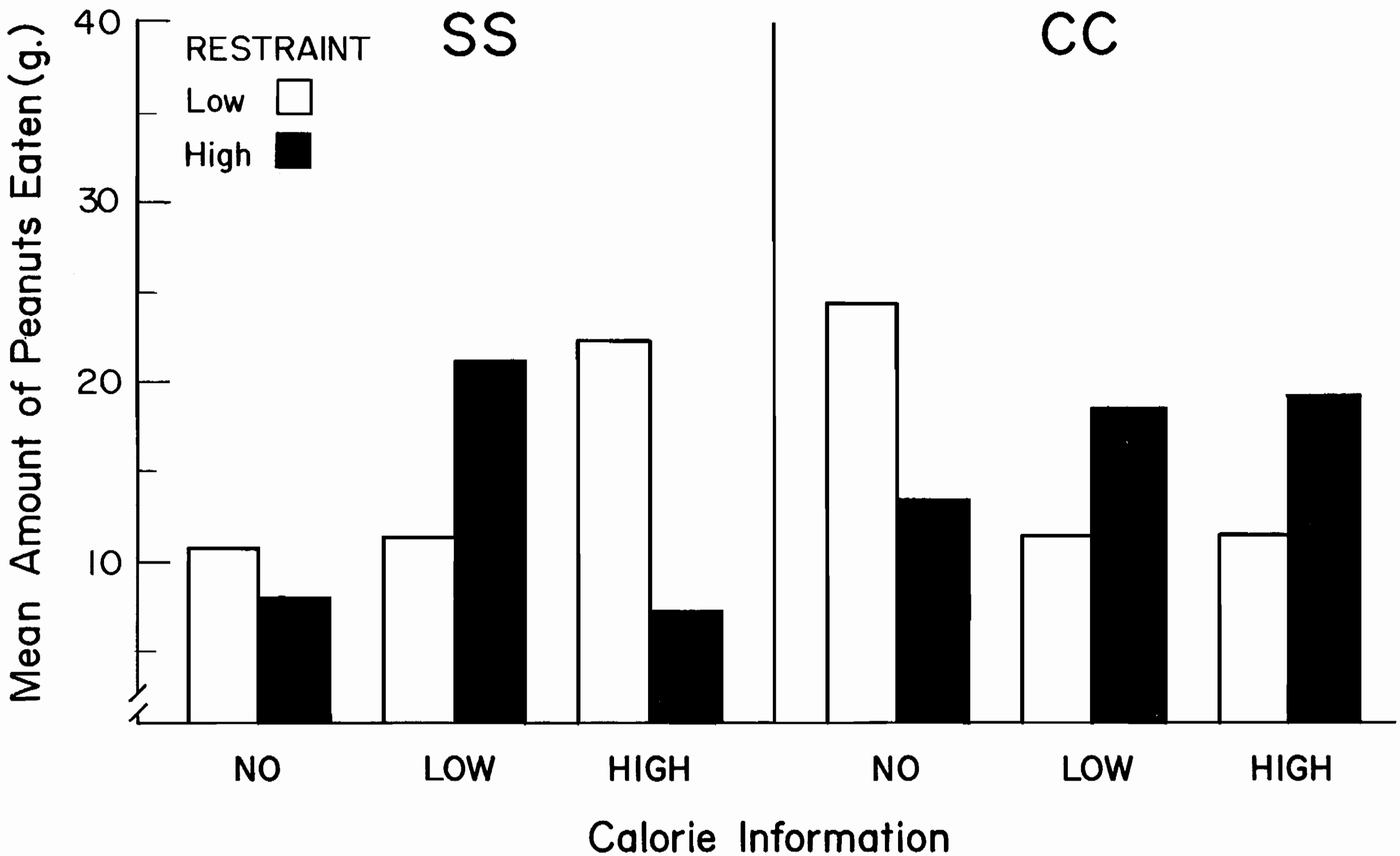

Figure 3. Mean amount (g.) of peanuts eaten for low and high restrained eaters who received a sesame seed chip (SS) or chocolate chip cookie (CC) prime and no, low or high calorie information.

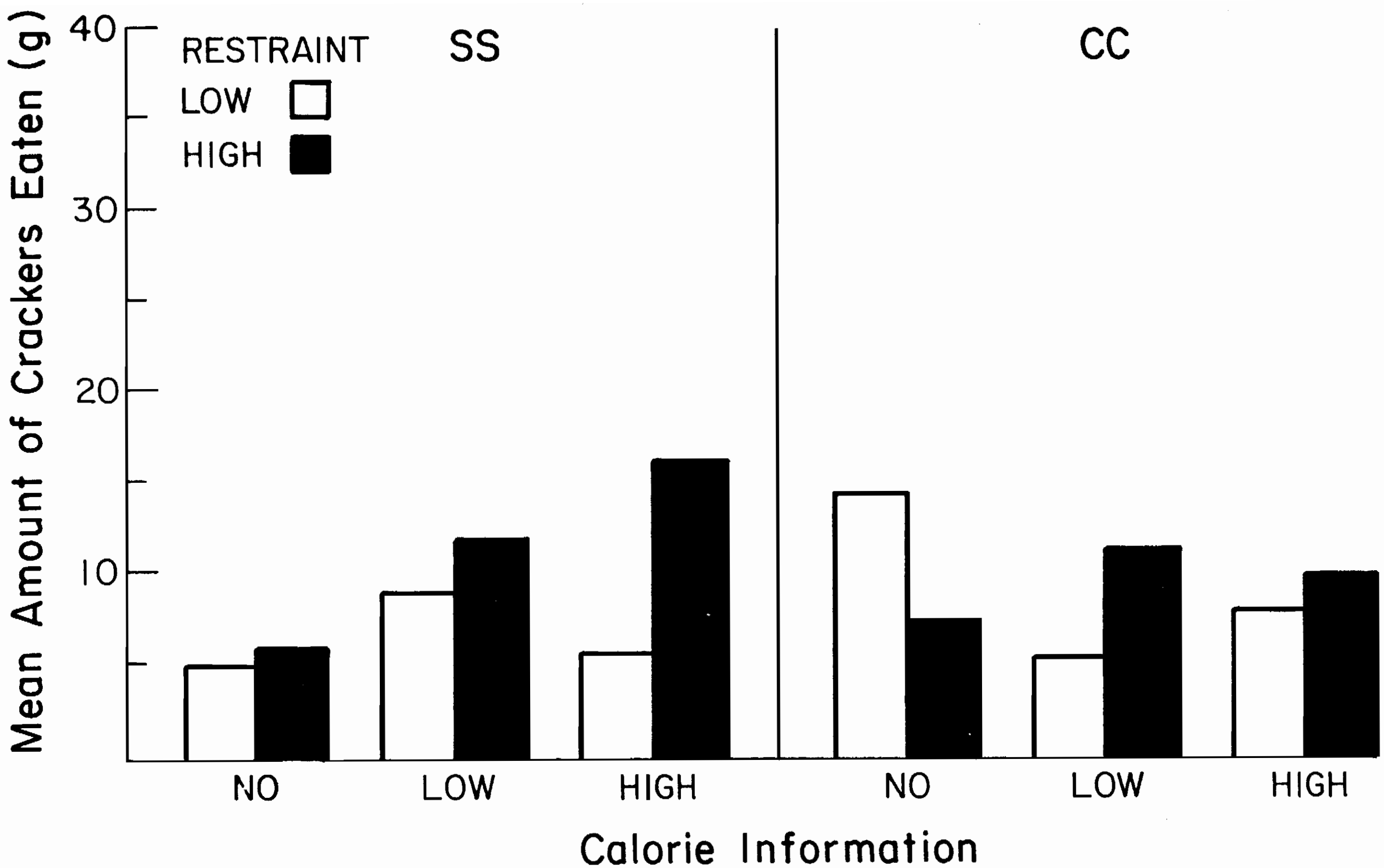

Figure 4. Mean amount (g.) of crackers eaten for low and high restrained eaters who received a sesame seed chip (SS) or chocolate chip cookie (CC) prime and no, low or high calorie information.

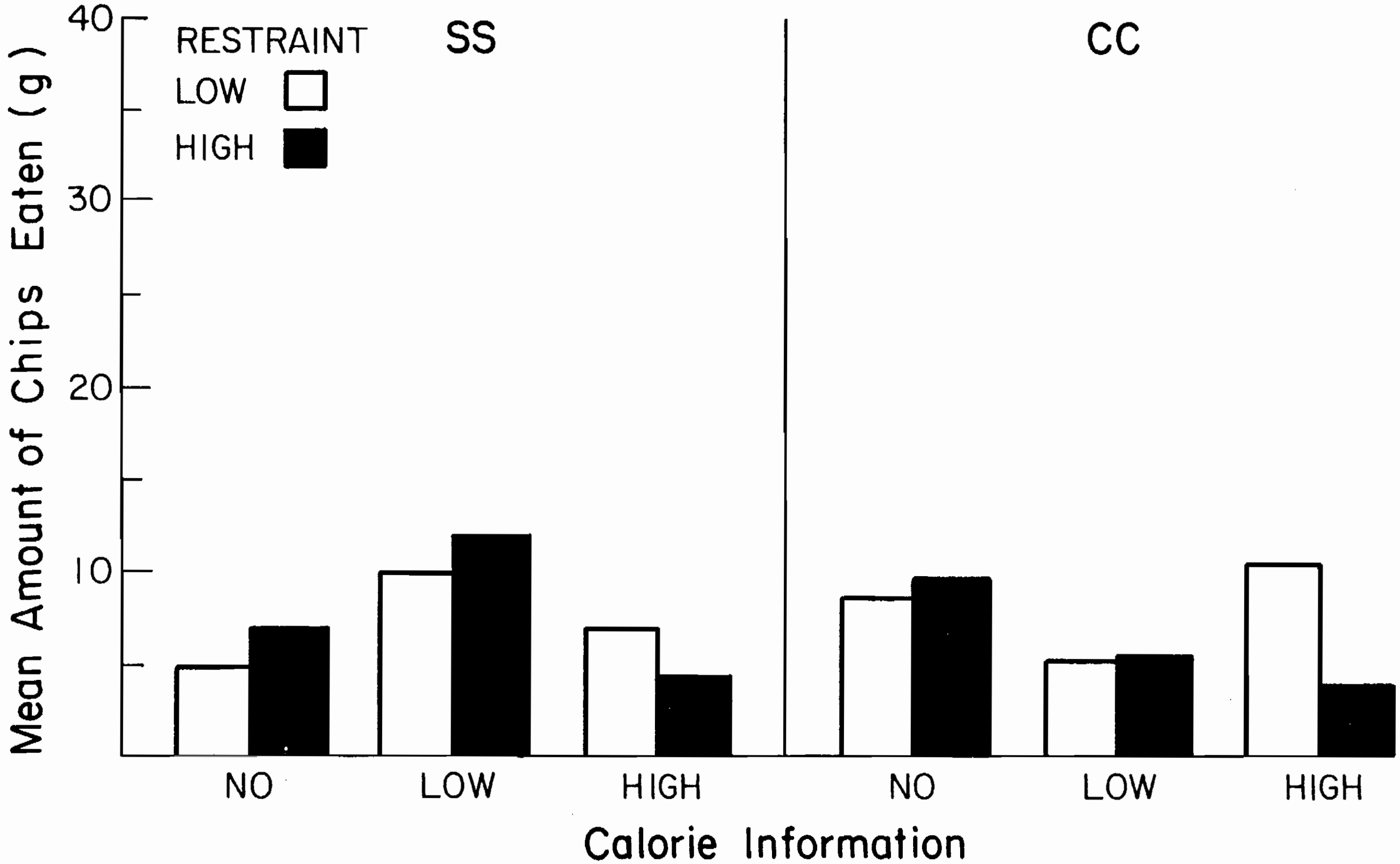

Figure 5. Mean amount (g.) of potato chips eaten for low and high restrained eaters who received a sesame seed chip (SS) or chocolate chip cookie (CC) prime and no, low or high calorie information.

Table 2.

Standard Deviations for Amount of Cookies Eaten for Low and High Restrained Eaters (RE) Who Received a Sesame Seed Chip (SS) or Chocolate Chip Cookie (CC) Prime and No, Low or High Calorie Information.

Calorie Information	SS		CC	
	Low RE	High RE	Low RE	High RE
No	18	31	16	20
Low	12	13	13	13
High	17	33	20	25

Table 3.

Standard Deviations for Amount of Peanuts Eaten for Low and High Restrained Eaters (RE) Who Received a Sesame Seed Chip (SS) or Chocolate Chip Cookie (CC) Prime and No, Low or High Calorie Information.

	SS		CC	
Calorie Information	Low RE	High RE	Low RE	High RE
No	11	9	21	10
Low	16	17	10	10
High	22	7	7	29

Table 4.

Standard Deviations for Amount of Crackers Eaten for Low and High Restrained Eaters (RE) Who Received a Sesame Seed Chip (SS) or Chocolate Chip Cookie (CC) Prime and No, Low or High Calorie Information.

Calorie Information	SS Low RE	SS High RE	CC Low RE	CC High RE
No	5	7	14	7
Low	5	9	5	18
High	4	18	5	8

Table 5.

Standard Deviations for Amount of Potato Chips Eaten for Low and High Restrained Eaters (RE) Who Received a Sesame Seed Chip (SS) or Chocolate Chip Cookie (CC) Prime and No, Low or High Calorie Information.

	SS		CC	
Calorie Information	Low RE	High RE	Low RE	High RE
No	5	11	8	8
Low	7	10	4	6
High	4	6	10	1

RE group in low and high CI conditions. Following receipt of the SS prime, the high RE group ate more peanuts, crackers and potato chips than did the low RE group in the low CI condition. Other differences between restraint groups were unsystematic across test foods. This pattern of food consumption for test foods generally coincides with the total amount eaten data presented in Figure 1.

A 2 x 2 x 3 x 4 ANOVA was applied over all the data for Figures 2 - 5 with Test Food as a repeated factor (Table 3-E). Results showed reliable effects for Test Food and the interaction Test Food by Restraint by Calorie Information. Simple effects ANOVA for each test food showed a reliable Restraint by Calorie Information interaction for peanuts (Table 4-E) and no reliable effects for any other test food (Tables 5-E, 6-E and 7-E). ANOVA of peanut intake for each CI group yielded a marginally-reliable effect for Restraint in the low CI condition (Table 8-E) and no reliable effects for any factor in analysis of no and high CI conditions (Tables 9-E and 10-E).

Table 6 shows Pearson product moment correlations between total amount eaten and amount of each test food eaten by low and high RE groups. For both RE groups, total amount eaten was reliably correlated with amount of each test food eaten. These correlations were slightly greater for high than for low RE groups. Together, the correlations and the amount eaten data presented in Figures 1 - 5 suggest that total food consumption reasonably reflected the amount of each food eaten.

Table 6.

Pearson Product Moment Correlations Between Total Amount of Food Eaten and Amount of Each Test Food Eaten for Low and High Restrained Eaters.

	Cookies	Peanuts	Crackers	Chips
		Low Restrained Eaters		
Total	.64***	.63***	.52**	.31*
Cookies		.00	.10	-.06
Peanuts			.14	-.01
Crackers				.36**
		High Restrained Eaters		
Total	.81***	.68***	.54***	.61***
Cookies		.35**	.17	.29*
Peanuts			.13	.28*
Crackers				.47***

* $p < .05$ ** $p < .01$ *** $p < .0001$.

Salivation Data

Figure 6 presents mean amount (g/90 sec) salivated on trials 1 through 4 for low and high restrained eaters (RE) who received the sesame seed chip (SS) or the chocolate chip cookie (CC) prime and no, low or high calorie information (CI). (See Table 7 for SDs.) On baseline trials 1 and 2, subjects showed similar levels of performance across all groups. ANOVA of performance on trials 1 and 2 yielded no reliable Restraint effect ($p < .58$ and $p < .28$ respectively) or any other group differences or interactions (Tables 11-E and 12-E).

In general, on trial 3 the high CI group salivated more (GM = .63) than did the low CI group (GM =.56) than did the no CI group (GM = .43). In addition, the high RE group salivated slightly more (GM = .58) than did the low RE group (GM = .49), and more so in the high palatable prime group (GM = .63 and .49 for high and low RE groups respectively) than in the low palatable prime group (GM = .55 and .49, for high and low RE groups respectively).

An ANOVA of the data for trial 3 yielded a reliable effect only for Calorie Information (Table 13-E). Tukey's HSD t-tests ($p < .05$) showed a reliable difference between high and no CI groups, and the low CI group did not differ reliably from these two groups. However, further inspection of the data with Spearman rho rank order correlations revealed a positive correlation between level of calorie information and salivation for the high RE group ($r = .39$, $p < .05$) but not for the low RE group ($r = .16$, $p > .05$).

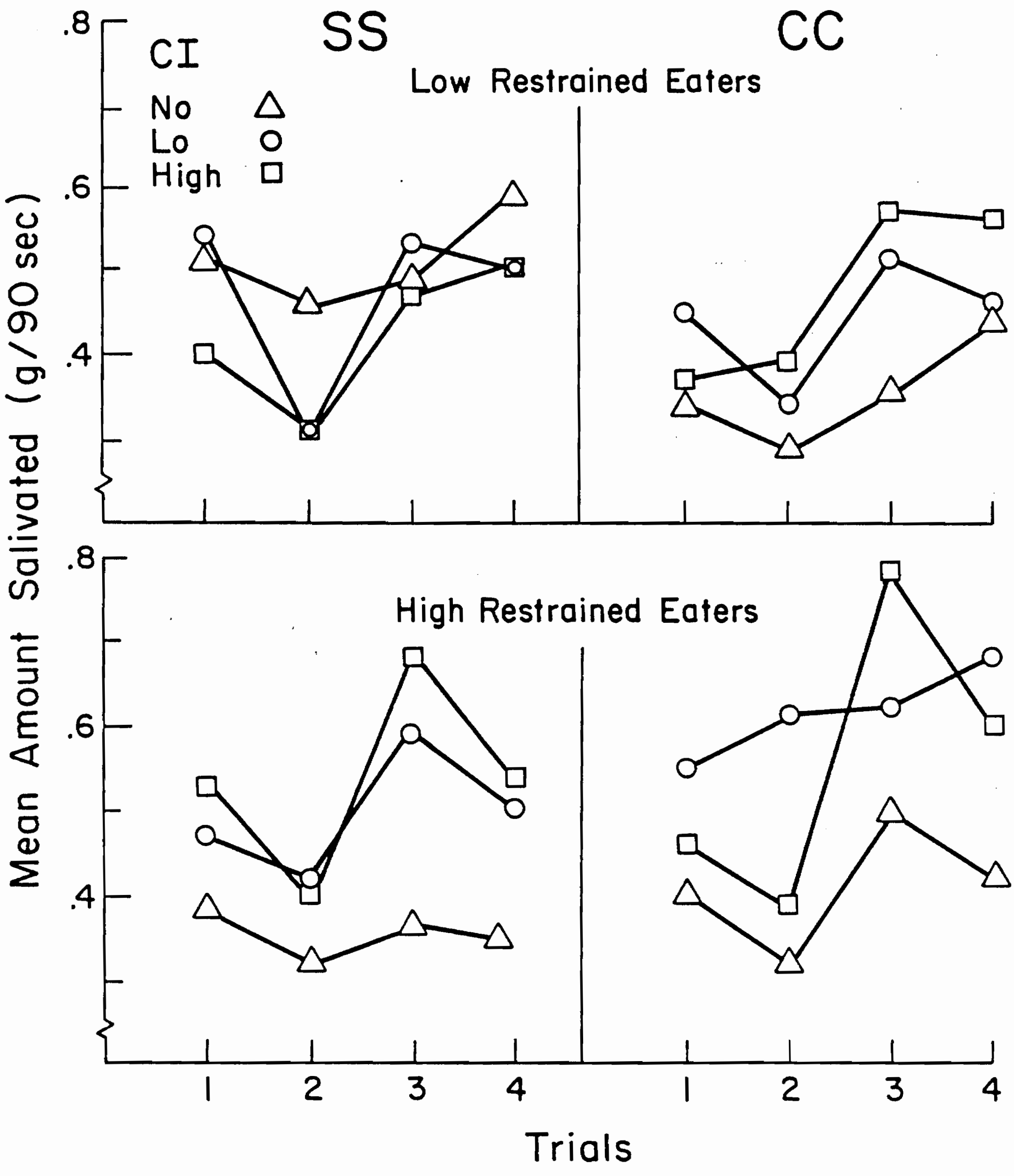

Figure 6. Mean amount (g./90 sec.) salivated on trials 1-4 for low and high restrained eaters who received a sesame seed chip (SS) or chocolate chip cookie (CC) prime and no, low or high calorie information (CI).

Table 7.

Standard Deviations for Amount Salivated on Trials 1-4 for Low and High Restrained Eaters (RE) Who Received a Sesame Seed Chip (SS) or Chocolate Chip Cookie (CC) Prime and No, Low or High Calorie Information.

	TRIAL 1			
	SS		CC	
Calorie Information	Low RE	High RE	Low RE	High RE
No	.32	.32	.25	.21
Low	.23	.27	.27	.45
High	.19	.26	.25	.32

	TRIAL 2			
	SS		CC	
Calorie Information	Low RE	High RE	Low RE	High RE
No	.26	.28	.17	.12
Low	.14	.27	.24	.56
High	.18	.23	.28	.27

	TRIAL 3			
	SS		CC	
Calorie Information	Low RE	High RE	Low RE	High RE
No	.19	.26	.17	.24
Low	.26	.33	.39	.26
High	.16	.30	.37	.64

	TRIAL 4			
	SS		CC	
Calorie Information	Low RE	High RE	Low RE	High RE
No	.28	.26	.19	.22
Low	.26	.29	.31	.23
High	.16	.31	.35	.44

To evaluate whether the experimental manipulations influenced salivation after subjects had eaten the 4 test foods, a covariate ANOVA was applied to the salivation measure for trial 4 (Table 14-E). The covariates were the amount eaten for each test food because the foods may have affected salivation differentially. Results showed no reliable effects for the main variables or for their interactions.

To evaluate the relationship between salivation and amount eaten, Table 8 presents Pearson product moment correlations between amount salivated on trials 1-4 and amount of food consumed for low and high restrained eaters. For the high RE group, salivation measures on each trial were reliably correlated with total amount of food eaten and amount of cookies eaten. For the low RE group, salivation measures were unsystematically related to measures of amount eaten.

If salivation is an anticipatory response to ingestion (Powley, 1977; Wooley & Wooley, 1973) and the characteristics of the prime differentially influenced subjects' anticipatory responses to future food consumption, then salivation on trial 3 might be differentially related to subsequent food intake. To test this possibility, Pearson product moment correlations evaluated the relationship between amount salivated on trial 3 and total amount of food eaten for each experimental group. Table 9 shows a reliable correlation between trial 3 salivation and total amount eaten for high restrained eaters in the high CI, high palatable CC prime condition. No reliable correlation was obtained for any other group. Individual correlations for each test food indicated that the reliable correlation for high restrained eaters

Table 8.

Pearson Product Moment Correlations Between Amount Salivated on Trials 1-4 and Measures of Amount Eaten for Low and High Restrained Eaters.

Trial	Total	Cookie	Peanut	Cracker	Chip
			Low Restrained Eaters		
1	-.10	.01	-.12	-.05	-.08
2	.27	-.12	-.23	-.09	-.16
3	-.24	-.09	-.13	-.20	-.21
4	-.21	-.13	-.05	-.24	-.14
			High Restrained Eaters		
1	.34**	.34**	.11	.24	.18
2	.35*	.34**	.12	.26*	.14
3	.42**	.28*	.44**	.19	.16
4	.39**	.31*	.33**	.17	.18

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

Table 9.

Pearson Product Moment Correlations Between Amount Salivated on Trial 3 and Total Amount of Food Eaten for Low and High Restrained Eaters Who Received the Sesame Seed Chip (SS) or Chocolate Chip Cookie (CC) Prime and No, Low or High Calorie Information (CI).

	Low Restraint		High Restraint	
CI	SS	CC	SS	CC
No	.03	-.47	.50	.45
Low	-.54	-.40	.18	.18
High	.33	-.32	-.03	.75*

* $p < .03$.

in the CC prime, high CI group reflected a strong correlation between trial 3 salivation and amount of peanuts eaten ($r = .85$, $p < .008$) and a moderate though nonsignificant correlation between trial 3 salivation and amount of cookies eaten ($r = .62$, $p < .10$).

Ratings for Test Foods

The amount of each test food eaten in this experiment could be related to subjects' perceptions of the palatability and caloric values of the foods. To evaluate this possibility, separate ANOVA were applied to the data of palatability and of calorie ratings. The main factors of the ANOVA were Restraint, Type of Prime, Calorie Information and Test Food.

Palatability ratings. For all experimental groups combined, subjects rated peanuts as being more palatable (GM = 5.8) than cookies (GM = 5.7), than crackers (GM = 5.4), than potato chips (GM = 5.2). Repeated measures ANOVA of mean palatability ratings for all four test foods revealed reliable effects for Test Food and the interaction Test Food by Restraint by Calorie Information (Table 15-E). Subjects reliably rated peanuts and cookies as more palatable than crackers and potato chips (Tukey's HSD t-tests, $p < .05$). Simple effects ANOVA for each test food revealed reliable effects for peanuts and not for any other test food.

Table 10 shows means and SDs for the palatability ratings of peanuts for each restraint, calorie information and type of prime group. High restrained eaters in the low CI group yielded higher palatability ratings than did any other group. ANOVA of the data of Table 10 revealed a reliable Restraint by Calorie Information interaction (Table 16-E). Simple effects ANOVA for each RE group revealed a reliable effect of Calorie Information for the high RE group (Table 17-E) and not for the low RE group (Table 18-E). The high RE group made reliably higher palatability ratings for peanuts in the low CI condition than in the no CI condition (Tukey's HSD t-test, $p < .05$). The high CI condition did not differ reliably from either of these two groups. Simple effects ANOVA for each CI condition revealed a reliable Restraint effect for the low CI condition (Table 19-E) and not for no and high CI conditions (Tables 20-E and 21-E). ANOVA of palatability ratings for cookies, crackers and potato chips revealed no reliable effects for Restraint or Calorie Information (Tables 22-E, 23-E and 24-E).

Calorie ratings. For all experimental groups combined, subjects rated cookies as being higher in calories (GM = 6.0) than were potato chips (GM = 5.4), peanuts (GM = 5.0), and crackers (GM = 4.1). In general, the high RE group rated the test foods as more caloric (GM = 5.3) than did the low RE group (GM = 4.9). High restrained eaters in the SS prime condition gave higher ratings of calories (GM = 5.5) than did high restrained eaters in the CC prime condition (GM = 5.1). Low RE

Table 10.

Means and Standard Deviations (SD) for the Palatability Ratings of Peanuts for Low and High Restrained Eaters (RE) Who Received a Sesame Seed Chip (SS) or Chocolate Chip Cookie (CC) Prime and No, Low and High Calorie Information.

	SS Prime		CC Prime	
Calorie Information	Low RE	High RE	Low RE	High RE
No	5.7	5.9	5.9	5.0
(SD)	(0.7)	(0.3)	(0.7)	(1.8)
Low	5.1	6.5	5.9	6.2
(SD)	(1.5)	(0.7)	(0.6)	(0.8)
High	6.1	5.7	5.9	5.5
(SD)	(0.6)	(0.7)	(1.0)	(1.1)

groups gave similar ratings for calories across prime conditions (GM = 5.0 and 4.9 respectively).

ANOVA the of calorie ratings with Test Food as a repeated factor revealed reliable effects for Test Food, Restraint, and the interactions, Test Food by Restraint, and Test Food by Restraint by Type of Prime by Calorie Information (Table 25-E).

ANOVA for each test food yielded reliable effects for peanuts and not for any other test food. Table 11 shows means and SDs for calorie ratings of peanuts for low and high restrained eaters who received the SS or CC prime and no, low or high CI. In the SS condition, high restrained eaters generally had higher calorie ratings than did low restrained eaters. ANOVA of the data of Table 11 yielded reliable effects for Restraint and the interaction Restraint by Type of Prime by Calorie Information for peanuts (Table 26-E). Simple effects ANOVA for each type of prime yielded reliable effects for Restraint and the interaction Restraint by Calorie Information in the SS prime condition (Table 27-E) and not in the CC condition (Table 28-E). For the SS prime, simple effects ANOVA for each CI condition showed that the high RE group reliably rated peanuts as more caloric than did the low RE group in no and low CI conditions (Tables 29-E and 30-E) and not in the high CI condition (Table 31-E). ANOVA of the calorie ratings for cookies, crackers and potato chips yielded no reliable effects (Tables 32-E, 33-E and 34-E).

Table 11.

Means and Standard Deviations (SD) for the Calorie Ratings for Peanuts for Low and High Restrained Eaters (RE) Who Received a Sesame Seed Chip (SS) or Chocolate Chip Cookie (CC) Prime and No, Low and High Calorie Information.

	SS Prime		CC Prime	
Calorie Information	Low RE	High RE	Low RE	High RE
No	4.4	5.9	4.6	4.7
(SD)	(1.5)	(0.6)	(1.0)	(1.7)
Low	3.9	6.1	4.6	5.0
(SD)	(1.7)	(0.9)	(0.9)	(1.7)
High	5.5	5.4	4.5	5.4
(SD)	(0.8)	(1.0)	(1.7)	(1.1)

Ratings for the Prime

The amount of food eaten in this experiment could be related to subjects' perceptions of the palatability and caloric value of the primes. To evaluate this possibility, separate ANOVA were applied to the data of palatability and of calorie ratings for the primes. The main factors of the ANOVA were Restraint, Type of Prime and Calorie Information.

Palatability ratings. Table 12 presents means and SDs for the palatability ratings of the SS and CC primes for low and high RE groups who received no, low or high CI. Palatability ratings were higher for the CC than for the SS prime at each level of calorie information and restraint.

ANOVA of the data of Table 12 showed a reliable effect for Type of Prime (Table 35-E). Palatability ratings were not reliably affected by Restraint, Calorie Information or any interactions. Results indicate that subjects' ratings of the palatability of the primes were consistent with the experimental definition of low and high palatability.

Calorie ratings. Table 13 presents means and SDs for calorie ratings of the SS and CC primes for low and high RE groups who received no, low or high CI. Generally, both RE groups rated the primes as being more caloric in the high (GM = 6.0) than in the no (GM = 4.7) than in the low (GM = 3.6) CI conditions. Collapsing across CI and prime

Table 12.

Means and Standard Deviations (SD) for the Palatability Ratings of the Sesame Seed Chip (SS) and Chocolate Chip Cookie (CC) Primes by Low and High Restrained Eaters (RE) Who Received No, Low and High Calorie Information.

	SS Prime		CC Prime	
Calorie Information	Low RE	High RE	Low RE	High RE
No	3.9	4.1	5.9	5.4
(SD)	(1.4)	(1.2)	(0.7)	(1.0)
Low	4.0	5.1	6.1	5.7
(SD)	(1.6)	(1.0)	(0.6)	(1.2)
High	4.9	4.3	5.2	5.5
(SD)	(1.5)	(1.2)	(1.2)	(0.5)

Table 13.

Means and Standard Deviations (SD) for the Calorie Ratings of the Sesame Seed Chip (SS) and Chocolate Chip Cookie (CC) Primes for Low and High Restrained Eaters (RE) Who Received No, Low and High Calorie Information.

	SS Prime		CC Prime	
Calorie Information	Low RE	High RE	Low RE	High RE
No	2.9	4.3	5.7	6.0
(SD)	(1.0)	(0.9)	(0.8)	(0.7)
Low	2.1	3.8	4.1	4.8
(SD)	(0.7)	(1.4)	(1.8)	(0.8)
High	5.6	6.0	6.4	5.9
(SD)	(1.6)	(1.3)	(0.5)	(0.7)

conditions, the high RE group generally rated the primes as being more caloric than did the low RE group (GM = 5.1 and 4.5 respectively).

ANOVA of the data of Table 13 showed reliable effects for Restraint, Type of Prime, Calorie Information, and the interactions, Restraint by Type of Prime, and Type of Prime by Calorie Information (Table 36-E). ANOVA for each type of prime revealed reliable effects of Restraint and Calorie Information for the SS prime condition (Table 37-E). In the SS condition, the high CI group made reliably higher ratings than did the no and low CI groups (Tukey's HSD t-tests, $p < .05$) which did not differ reliably. ANOVA for the CC prime condition yielded a reliable effect for Calorie Information (Table 38-E). In the CC condition, ratings made by the low CI group were reliably lower than were those by no and high CI groups (Tukey's HSD t-tests, $p < .05$) which did not differ reliably. These data indicate that the manipulation of caloric information was effective. ANOVA for each CI condition revealed an effect for Type of Prime for no and low CI groups (Tables 39-E and 40-E) and not for the high CI group (Table 41-E). No other effects for calorie ratings of the primes were significant.

DISCUSSION

Hypotheses

Results of the salivation data for restrained subjects generally supported hypotheses 2 and 4 (p. 10). Specifically, amount of salivation measured immediately after subjects ingested the prime (trial 3) was positively correlated with amount of test foods eaten for restrained eaters but not for unrestrained eaters (hypothesis 2). According to hypothesis 4, restrained eaters were expected to salivate and eat more when they received high calorie information than when they received low calorie information, and unrestrained eaters were expected to show the reverse pattern of results. Results showed that subjects salivated more in the high, than in the low, than in the no calorie information conditions, irrespective of level of restraint. However, only high and no calorie information conditions differed reliably. Results of amount eaten and results for unrestrained subjects did not support hypothesis 4.

According to hypothesis 3, restrained subjects were expected to show greater increases in salivation and eating responses from the low to the high palatable prime condition than were unrestrained subjects. The only support for this hypothesis was suggestive: There was an unreliable trend in the predicted direction for the salivation data. Hypotheses 1 and 5 were not supported.

Salivation

The primary finding of this study was that after ingesting a snack of food, the high calorie information group salivated reliably more than did the no calorie information group. This effect occurred irrespective of restraint and type of prime conditions. However, restrained eaters did salivate slightly (but unreliably) more than unrestrained eaters did, and more so after ingesting a high palatable prime than a low palatable prime. Spearman's rho indicated a reliable relationship between salivation and calorie information for restrained eaters but not for unrestrained eaters. Together, these reliable and suggestive results may indicate that calorie information and palatable foods elicit greater increases in salivation for restrained than for unrestrained eaters.

The effect of calorie information on salivation may be a consequence of subjects' prior experiences with foods of different caloric values. Prior experiences which involved media advertisements, nutrition books, and the ingestion of a variety of food types, may lead people to expect that certain types of foods have characteristics which are idiosyncratic. For example, in the present study subjects rated the high palatable prime as high in calories and the low palatable prime as low in calories. This finding suggests that people associate calories and palatability. Other research has shown that judgments of the extent to which a food is "filling" and "nice to eat when hungry" are more in accord with the food's caloric content when subjects have previously ingested the food than when they have not (Fuller, 1979, cited in Booth, 1981). Prior ingestion may enable subjects to respond to food characteristics on the basis of sensory qualities (taste, texture) or post-ingestional metabolic effects, or both (Booth, 1978; Booth, Lee, & McAleavey, 1976; Booth, Toates, & Platt, 1976). Metabolic effects of ingesting a food, including feelings of appetite-satisfaction, may act to increase the subsequent perception of the food's palatability (Booth, 1981; Le Magnen, 1978). Post-ingestional effects may also act as unconditioned stimuli for the conditioned release of insulin to a food's taste (Deutsch, 1974). Conditioned insulin release may further increase perceived palatability (Le Magnen, 1978). Taken as a whole, both current and previous research suggest that people may learn to associate caloric values, post-ingestional effects and food palatability. If so, salivation responding to high calorie information may represent a conditioned response to a food which is perceived as palatable and filling.

This analysis views calorie information as an external, cognitive variable which has internal, physiological consequences. Previous research has shown that other external variables, such as the sight and smell of foods, and expectations about eating, may evoke physiological responses such as salivation (Wooley, Wooley, & Dunham, 1976; Wooley & Wooley, 1973) and insulin release (Para-Covarrubias, Rivera-Rodriques, & Almarez-Ugalde, 1971; Rodin, 1978). These data seem consistent with Rodin's (1978, 1981) contention that dividing food-related cues into a simplistic internal-external dichotomy may not be empirically valid.

Schachter and his colleagues have previously proposed that individual differences in responsiveness to internal versus external variables account for differences in body weight (Schachter, 1971; Schachter & Rodin, 1974). However, Rodin and Slochower (1976) showed that externally-oriented subjects may be found in all weight categories. Moreover, external stimuli may directly influence the internal, physiological state, as was demonstrated with salivation measures in the present study. Therefore, the present data complement previous findings and support Rodin's argument against the dichotomous separation of internal and external cues in the regulation of eating.

Physiological salivation responses to calorie information may vary in strength for low and high restrained eaters. In the present study, different correlations between salivation and calorie information were obtained for restrained and unrestrained eaters. This differential relationship supports two aspects of restraint theory. First, restrained eaters may be more responsive to eating-related cues than are unrestrained eaters. This hyperresponsiveness may be expressed at physiological (salivation, insulin) and behavioral (eating) levels. Hyperresponsiveness to eating cues may develop from physiological food deprivation (Herman & Mack, 1975; Klajner et al., 1981) psychological food deprivation (Polivy et al., 1984) or stress and arousal (Herman et al., 1978; Hibscher & Herman, 1977). Second, because salivation serves an alimentary function, the salivation data suggest that eating responses may be under greater cognitive control for restrained than for unrestrained eaters. Unrestrained eaters may be slightly less affected by calorie information because, according to self-reports on the Restraint Scale, they are less concerned with dieting than are restrained eaters. However, because variables such as calorie information and food palatability may produce changes in salivation in restrained eaters, it seems reasonable that restrained eaters only appear to control eating based on cognitive cues. That is, restrained eaters may regulate food consumption based on external (cognitive) cues because of the physiological consequences of external variables (see Booth, 1978; Polivy, Herman, & Warsh, 1978; Rodin, 1980). The possibility that restrained eaters control eating based on internal, physiological consequences occasioned by external variables further supports Rodin's (1978, 1981) warning against maintaining an extreme and simplistic dichotomy for internal versus external variables.

Amount Eaten

The results of salivation generally supported restraint theory, but the measure of total amount of food eaten did not. Results for each test food eaten indicated that restrained eaters ate more peanuts than did unrestrained eaters, but only in the low calorie information condition. Similarly for peanuts, there was a reliable Restraint effect in the low calorie information condition for palatability ratings, and a reliable Restraint effect in the SS prime no and low calorie information conditions for calorie ratings. These data suggest a relation between level of restraint, peanut intake, and perceived palatability and perceived calories of peanuts, only for the low calorie information condition. Why a relation might exist for this test food and particular condition is unclear.

One explanation for these somewhat ambiguous results may be that the probability of making a Type I error was increased as a result of conducting post hoc analyses. Amount of peanuts eaten was analyzed in order to investigate the lack of reliable results for the measure of total amount eaten. Analyses of palatability and calorie ratings were performed also to explain previous results. Thus, these analyses should be viewed as post hoc. To investigate the degree to which the Type I error rate was inflated, a familywise error rate (Kirk, 1982) was calculated for each of three interactions associated with three different dependent measures: amount of each test food eaten, palatability ratings, and calorie ratings. According to Kirk (1982), for multifactorial designs, "contemporary practice favors the family of contrasts associated with a treatment or interaction as the conceptual unit for error rate" (p. 105).

ANOVA of the amount of test foods eaten yielded a reliable Test Food by Restraint by Calorie Information interaction. For the family of contrasts associated with analysis of this interaction, the familywise error rate was $p <= .34$. Results of these contrasts indicated a Restraint effect in the low calorie information condition. ANOVA of palatability ratings also yielded a reliable Test Food by Restraint by Calorie Information interaction. Further analyses again indicated a reliable Restraint effect in the low calorie information condition, and the obtained familywise error rate was again, $p <= .34$. ANOVA of calorie ratings yielded a reliable Test Food by Restraint by Type of Prime by Calorie Information interaction. The familywise error rate associated with analysis of this interaction was $p <= .40$. Analysis of the interaction revealed a reliable Restraint effect in the low and no calorie information conditions of the SS prime condition.

In conclusion, for these analyses the probability of incorrectly rejecting the null hypothesis is modestly high. Therefore, the significance of the results for peanuts should be viewed cautiously.

There are several reasons why the experimental variables may have failed to differentiate subjects on total amount of food eaten. First, Polivy et al. (1984) suggest that restrained eaters are likely to counterregulate when they believe that they have already overeaten. The preload (or prime) should be excessive to a meal, occurring 1 to 3 hours after the subject's regular meal. In the present study, subjects were asked to refrain from eating for 3 to 5 hours before attending the experiment, but many subjects, both low and high restrained, reported being more than 5 hours deprived. In fact, mean time since last meal was 7 hours for both restraint groups. Second, the volume of the prime was small, and for this reason, the high calorie information was relatively low compared to that which was employed in previous studies. Although subjects in the high calorie information condition of the present study rated the prime as highly caloric, subjects may have rated the caloric value of the prime relative to other food servings of a similar size. Therefore, the prime may have been perceived as highly 3aloric, but not necessarily as an excessive amount. In the future, researchers might obtain ratings of calories as well as ratings of how much subjects felt that they had overeaten by consuming the preload or prime. Third, Polivy et al. (1984) suggest that the test food should be highly palatable for counterregulatory behavior to occur. As with the calorie ratings, palatability ratings for the test foods may have been of a relative nature. A test food which was frequently utilized in previous studies is ice cream. Although foods in the present study were rated as highly palatable, the test foods might be viewed as less palatable compared to ice cream.

Relationship Between Salivation and Amount Eaten

In this study, calorie information had a reliable differential influence on salivation, but not on amount eaten, for both restraint groups. If salivation is a measure of appetite, and a preparatory response to food, then the hyperresponsiveness of restrained eaters, as indexed by salivation, should have been reflected in amount of food eaten. Possibly, restraint groups do not always differ on salivation and amount eaten _per se_, but the relationship between salivation and amount eaten for restraint groups may differ. For example, reliable correlations between salivation on trials 1-4 and amount eaten were obtained for restrained but not for unrestrained eaters. Therefore, although the amount eaten data did not reliably support restraint theory, the correlations do support the hyperresponsiveness hypothesis. According to these correlations, restrained eaters who were hyperresponsive physiologically by showing the greatest salivation responses, were also hyperresponsive behaviorally, eating the greatest amounts of food. Moreover, the more that restrained eaters salivated, the more they ate of the foods which were rated as most palatable, peanuts and cookies. Thus, restrained eaters were hyperresponsive to food palatability. On the other hand, low restrained subjects who salivated the most did not eat more food than low restrained subjects who salivated less. Therefore, salivation may not be a reliable predictor of food intake for all subjects. Possibly, salivation measures appetite as the motivation to eat, but it may not always predict food intake because of competing events. Appetite may be only one determinant of how much food a person will eat. Once eating commences, the tendency to regulate caloric intake, or the availability of palatable foods, might conflict with appetite, and might govern total food intake. The correlational data in the present study suggest that the eating situation may have stimulated appetite for both restraint groups, but only high restrained eaters may have acted upon that motivation to eat.

CONCLUSIONS AND THEORETICAL EXTENSIONS

The present data address a number of theoretical issues concerning the relations among variables and their effects on restraint and food regulation. In this study, some restraint groups responded opposite to the hypotheses. For example, restrained eaters tended to eat more in the low palatable prime, low calorie information condition than in other conditions. On the other hand, unrestrained eaters exhibited a counterregulatory pattern of consumption in the low palatable prime condition. Results of counterregulation by unrestrained eaters in previous studies (Kirschenbaum & Tomarken, 1982; Polivy, Herman, Younger, & Erskine, 1979; Tomarken & Kirschenbaum, 1984) have prompted researchers to suggest that restraint is a continuum, or a matter of degree, rather than a dichotomy (Herman & Polivy, 1980; Tomarken & Kirschenbaum, 1984). The present data, although unreliable, lend suggestive support to the idea that restraint is a continuum in which both low and high restrained eaters are capable of regulatory or counterregulatory eating behavior under appropriate conditions.

The present data further suggest that the idea of an ingestion threshold, whether volumetric, caloric, sensory or otherwise, may be too simplistic. Ruderman, Belser, and Haperin (1985) suggested that disinhibition of restraint may not be an all-or-none phenomenon, as was once thought. They proposed that a taste test may be a mild disinhibitor while a milk shake may be a strong disinihibitor. Thus a threshold value which marks a person's decision to overeat or not overeat may not exist as a static and defined quantity of food, palatability or caloric value. Rather, the threshold may be contextually determined and it may depend on individual responding to a complex array of stimuli present in each eating situation. In eating situations, people are reactive to factors such as time of day (time of last meal, expected time of next meal, expected vigorous activity between meals), social conventions (companions and occasion: party vs lunch vs experiment), available foods (perceived palatability, texture, caloric value, color and smell), mood (depression, anxiety), dietary habits and weight level, perceptions of what is expected of an individual, and prior experiences with particular foods in particular contexts (Booth, 1978, 1981). Moreover, these factors are simultaneously internal and external. They are in "continuous cognitive interaction" (Booth, Toates, & Platt, 1976, p. 141) and may acquire physiological roles (Booth, 1978). Therefore, instead of suggesting a threshold idea, the complex nature of food regulation suggests the idea of momentary, or context-dependent, food acceptability. Acceptability, as defined by Booth (1981) is "a dispositional structure - the tendency of an individual to accept a food as perceived, or reject it" (p. 49). Acceptability is a dynamic, restructurable, and polyadic relation in which one determinant of acceptability can alter the operation of another determinant.

In conclusion, momentary acceptance of foods may be a valid description of food regulation. Moment to moment changes in acceptability, such as during the course of a meal, may account for total food intake whereas the threshold idea accounts only for the initiation of binge eating. Further, the momentary acceptance idea incorporates immediate context, prior experiences and physiological and cognitive states of the individual. At any moment in time, the immediate determinants of food acceptability are aspects of the situation as they are perceived, momentarily, by the individual. And as demonstrated by the present and previous results, perceptions can alter physiological state, and physiological state can alter cognitive perceptions. Therefore, from a momentary acceptance perspective, relations between internal and external variables may be rightfully viewed as wholly integrative.

FUTURE STUDIES

Priming

Receipt of a snack which was labeled as high in calories reliably increased salivation responding relative to receipt of a snack and no calorie information. Similarly, for restrained eaters, low and high calorie information increased amount of food eaten relative to no calorie information, although not reliably so. Taken together, these data suggest that information about foods (a verbal prime) may itself influence subsequent responding. Future research should investigate the separate effects of a verbal prime from a food prime. A verbal prime, such as calorie information, could be manipulated as in the present study. Measures of salivation, insulin and amount eaten could then be obtained subsequent to the verbal prime, but prior to consumption of a food prime. This type of study would help to separate the effects of verbal information from the effects of orosensory stimulation due to eating.

Ratings of Food Characteristics

The data of calorie ratings suggested that subjects have preconceived ideas about calories and that these perceptions may vary systematically across restraint groups (also Polivy, 1976). Future research should examine the relationship between perceived calories and salivation in the absence of calorie information. To the extent that subjects differ in their perceptions of a food's caloric value, salivation responses to that food may vary. Moreover, for restrained eaters, changes in salivation which are occasioned by perceptions of calories may be followed by commensurate changes in amount eaten. Therefore, researchers might ask restrained and unrestrained eaters to rate the caloric values of foods in the absence of calorie information, and measure subjects' salivation and eating responses subsequent to ingestion of the foods. In addition, researchers could manipulate information about the nutritional content or metabolic effects of a food, and subsequently measure salivation, food consumption and ratings for that food.

Ratings of food characteristics, made either in the absence or presence of verbal information, could elucidate the relationships among food characteristics as they are perceived by subjects. For example, subjects may perceive highly palatable foods as highly caloric. Experimental documentation of how subjects view foods would be invaluable to future researchers who attempt to experimentally manipulate subjects' perceptions of food characteristics, as in the present study. Because some subjects are more knowledgeable about foods, or have different biases in how they view foods, providing subjects with cognitive information may induce different perceptions across experimental groups. Similarly, because subjects are not naive about foods, providing subjects with no information may still result in disparate perceptions. Experimental results which might indicate how restraint groups differ in their perceptions of foods may help experimenters to minimize these perceptual biases. In addition, information about how subjects perceive the relations among food characteristics may direct future research to examine those food characteristics which are most important in food regulation.

Food Consumption

Despite a lack of reliable results, the amount eaten data provide suggestive trends which may stimulate future research. Differences in amount eaten across test foods suggested that the food items which are available for consumption may influence total food intake. Previous researchers have frequently presented subjects with three flavors of ice cream, and the counterregulatory pattern of food consumption was observed for high restrained eaters. However, other patterns of food consumption might emerge from more naturalistic settings which offer subjects a variety of food types. Future researchers should consider presenting subjects with more than one food type such as snacks, sweets, and meal foods (e.g. sandwiches), including a variety of low and high calorie foods.

Restrained eaters tended to eat the most food in the low palatable prime, low calorie information condition. These data suggest that the palatability and calorie characteristics of the first bite of a food may influence the amount of foods subsequently eaten. These results could have outstanding implications for dieters who plan to snack on only a small bite of food. The present study should be replicated with a larger number of subjects in an attempt to qualify the effects that palatability and calorie characteristics associated with a snack of food have on subjects' cognitive and physiological responding. For example, Polivy (1976) hypothesized that restrained eaters may believe that they have overeaten after they have ingested a food which is labeled as high in calories. Therefore, they may give up their diets for the day and continue to overeat. Conversely, the present data might suggest that restrained eaters believe that they have maintained their diets after they have ingested a food which is labeled as low in calories. Restrained eaters who have eaten a low calorie food may think that they can continue to eat more food and still maintain their diets. Therefore, in some instances, low calorie, presumably diet-maintaining foods, may increase the likelihood that restrained eaters will overeat. This analysis is consistent with the hypothesis that stringent dieting induces binge eating (see Polivy et al., 1984). This speculative interpretation lends support to the idea that dieters may have greater success in maintaining their diets if they do not perceive foods as simply good diet-foods versus bad fattening-foods (dichotomous thinking, Polivy et al., 1984). However, hypotheses about subjects' cognitions have not been tested directly. Subjects should be asked to report their cognitions and feelings after they have ingested a food. If this type of study reveals reliably greater food intakes in low than no calorie information conditions, and if subjects report cognitions coincident with the above hypotheses, then the results could have major clinical implications: Cognitive restructuring strategies have previously been used to help dieters refrain from binge eating after they have eaten a high calorie food (Dunkel & Glaros, 1978; Mahoney & Mahoney, 1976; Polivy, 1976). Instead of thinking, "I've blown my diet, I might as well eat", dieters learn to think, "Now that I've overeaten, I'm not going to make it worse". Dieters may also need to learn to think, "Now that I've eaten a low calorie food, I should continue to eat sensibly".

The Development of Restraint

Wardle and Beales (1986) reported that in girls, dietary restraint is well developed by age 12. However, it is not known whether high-restrained adolescent girls exhibit eating patterns similar to those found in high-restrained adults. Research should be undertaken to evaluate how adolescents regulate food consumption physiologically (by manipulating the caloric density of a preload) and cognitively (by manipulating the calorie information associated with a preload). Possibly, adolescent girls exhibit restraint in their attitudes toward food, as reported on a restraint questionnaire, but they may or may not have developed the restrained eating style reported for adults in laboratory settings.

Infants (Fomon, 1974) and very young children (Birch & Deysher, 1986) have been shown to exhibit physiological regulation, adjusting their volume of food intake in order to compensate for caloric density. Taken together, these data for very young children and for adolescents suggest that a restrained eating style, and restraint-typical attitudes toward food, dieting and body weight, may emerge between the ages of 5 and 12. One study (Pruitt & Thelen, 1987) examined familial influences on the development of eating behaviors. Results indicated that bulimics report more frequent dieting by their mothers than non-bulimics do. Perhaps a mother's dietary restraint influences the development of a restrained eating style in children. On the other hand, similarities in food preferences are greater among siblings than they are among parents and their offspring (Eppright, Fox, Fryer, Lamkin, & Vivian, 1969; Pliner & Pelchat, 1986). Perhaps the dietary restraint of siblings has an equal, or even greater influence than does parental dietary restraint on the development of restrained eating in young children. If the processes which are involved in dietary restraint and food regulation are to be better understood, researchers must begin to examine the establishment, as well as the maintenance, of these behaviors.

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APPENDIX A

Lifestyle Questionnaire and *Restraint Scale

LIFESTYLE QUESTIONNAIRE

Please indicate your answer to each of the following questions by filling in the appropriate circle on the opscan. Your thoughtful consideration of the questions and your cooperation are greatly appreciated.

1. Do you normally eat breakfast?
   1) YES 2) NO

2. If yes, at about what time do you usually eat?
   1) 5:00 - 6:00 a. m.
   2) 6:00 - 7:00 a. m.
   3) 7:00 - 8:00 a. m.
   4) 8:00 - 9:00 a. m.
   5) 9:00 - 10:00 a. m.
   6) 10:00 - 11:00 a. m.
   7) No set time

3. Do you normally eat lunch?
   1) YES 2) NO

4. If yes, at about what time do you usually eat?
   1) 11:00 a. m. - 12:00 noon
   2) 12:00 p. m. - 1:00 p. m.
   3) 1:00 p. m. - 2:00 p. m.
   4) 2:00 p. m. - 3:00 p. m.
   5) No set time

5. Do you normally eat dinner?
   1) YES 2) NO

6. If yes, at about what time do you usually eat?
   1) 3:00 - 4:00 p. m.
   2) 4:00 - 5:00 p. m.
   3) 5:00 - 6:00 p. m.
   4) 6:00 - 7:00 p. m.
   5) 7:00 - 8:00 p. m.
   6) 8:00 - 9:00 p. m.
   7) No set time

7. Do you normally eat a snack between breakfast and lunch?
   1) YES 2) NO

8. Do you normally eat a snack between lunch and dinner?
   1) YES 2) NO

9. Do you ever try foods that are unfamiliar to you?

   1) NEVER 2) RARELY 3) SOMETIMES 4) ALWAYS

10. Are you allergic to any foods?
    1) YES 2) NO

* 11. How conscious are you of what you are eating?

1) NOT AT ALL   2) SLIGHTLY   3) MODERATELY   4) EXTREMELY

12. Are there any foods which you will not eat?
1) YES   2) NO

* 13. Do you give too much time and thought to food?

1) NEVER   2) RARELY   3) OFTEN   4) ALWAYS

On the scale below, please indicate your preference for each of the following food items.

DISLIKE EXTREMELY (1)	DISLIKE VERY MUCH (2)	DISLIKE SLIGHTLY (3)	INDIFFERENT (4)	LIKE SLIGHTLY (5)	LIKE VERY MUCH (6)	LIKE EXTREMELY (7)

14. Apples
15. Bread Sticks
16. Popcorn (without salt or butter)
17. Peanuts (unsalted)
18. Oreo Cookies
19. Cheese Doodles
20. Carrot Sticks
21. Grapes
22. Cheese Pizza
23. Peanut Butter on Bread or Crackers
24. Chocolate Chip Cookies
25. Potato Chips
26. Vanilla Wafers
27. Animal Crackers
28. Saltine Crackers (unsalted)
29. Saltine Crackers (salted)
30. Ritz Crackers
31. Doritos
32. Graham Crackers
33. Cheezits
34. Plain Doughnuts
35. Pretzels (unsalted)
36. Triscuits

On the scale below, please indicate how often you eat the following food items.

DAILY	2 or 3 TIMES A WEEK	ONCE A WEEK	TWICE A MONTH	ONCE A MONTH	ONCE EVERY TWO MONTHS	TWICE A YEAR	ONCE A YEAR	NEVER
(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)

37. Apples
38. Bread Sticks
39. Popcorn (without salt or butter)
40. Peanuts (unsalted)
41. Oreo Cookies
42. Cheese Doodles
43. Carrot Sticks
44. Grapes
45. Cheese Pizza
46. Peanut Butter on Bread or Crackers
47. Chocolate Chip Cookies
48. Potato Chips
49. Vanilla Wafers
50. Animal Crackers
51. Saltine Crackers (unsalted)
52. Saltine Crackers (salted)
53. Ritz Crackers
54. Doritos
55. Graham Crackers
56. Cheezits
57. Plain Doughnuts
58. Pretzels (unsalted)
59. Triscuits

60. Are you currently taking any prescribed medication?
    1) YES 2) NO

61. Are you allergic to any medications?
    1) YES 2) NO

62. Do you smoke cigarettes?
    1) NOT AT ALL
    2) LESS THAN 5 CIGARETTES PER DAY
    3) 5 TO 10 CIGARETTES PER DAY (1/4 to 1/2 a pack)
    4) 11 TO 15 CIGARETTES PER DAY (1/2 to 3/4 a pack)
    5) 16 TO 20 CIGARETTES PER DAY (3/4 to 1 pack)
    6) MORE THAN 20 CIGARETTES PER DAY (more than 1 pack)

*63. Do you have feelings of guilt after overeating?

    1) NEVER 2) RARELY 3) OFTEN 4) ALWAYS

* 64. What is the maximum amount of weight (lbs.) that you have ever lost within one month?
1) 0 - 4
2) 5 - 9
3) 10 - 14
4) 15 - 19
5) 20 +

* 65. What is your maximum weight gain (lbs.) within a week?
1) 0 - 1
2) 1.1 - 2
3) 2.1 - 3
4) 3.1 - 5
5) 5.1 +

* 66. In a typical week, how much does your weight (lbs.) fluctuate?
1) 0 - 1
2) 1.1 - 2
3) 2.1 - 3
4) 3.1 - 5
5) 5.1 +

67. In a typical month, how much does you weight (lbs.) fluctuate?
1) 0 - 1
2) 1.1 - 2
3) 2.1 - 3
4) 3.1 - 5
5) 5.1 +

68. In a typical 6 month period, how much does your weight (lbs.) fluctuate?
1) 0 - 1
2) 1.1 - 2
3) 2.1 - 3
4) 3.1 - 5
5) 5.1 +

69. Over the past 6 months, would you say you have

1) lost weight 2) maintained your weight 3) gained weight

* 70. How many pounds (lbs.) over your desired weight were you at your maximum weight?
1) 0 - 1
2) 1 - 5
3) 6 - 10
4) 11 - 20
5) 21 +

* 71. How often are you dieting?

1) NEVER 2) RARELY 3) SOMETIMES 4) OFTEN 5) ALWAYS

72. Are you currently dieting?
1) YES 2) NO

73. Were you on a diet in the past year?
1) YES 2) NO

74. If yes, during the past year, what's the most weight (lbs.) you lost by dieting?
1) 0 - 4
2) 5 - 9
3) 10 - 14
4) 15 - 19
5) 20 - 24
6) 25 - 29
7) 30 - 34
8) 35 - 39
9) 40 - 44

75. When you finished dieting, how much weight (lbs.) did you regain?
1) 0 - 5
2) 5.1 - 10
3) 10.1 - 15
4) 15.1 - 20
5) 20.1 - 25
6) 25.1 - 30
7) 30.1 - 35
8) 35.1 - 40
9) 40.1 - 45
10) 45.1 +

* 76. Do you eat sensibly in front of others and splurge when you're alone?

1) NEVER 2) RARELY 3) OFTEN 4) ALWAYS

* 77. Would a weight fluctuation of 5 lbs. affect the way you live your life?

1) NOT AT ALL 2) SLIGHTLY 3) MODERATELY 4) VERY MUCH

78. Would you like to be contacted so that you may earn additional Psychology 2000 extra credit points through participation in our other ongoing research?
1) YES 2) NO

APPENDIX B

Informed Consent Form

Informed Consent Form

Psychophysiological Perception

You will be asked to provide measures of your salivation by putting 2 dental rolls in your mouth. You may be asked to taste and rate your preference for some ordinary snacks, and you will be asked to fill out some simple questionnaires.

The experiment will take about 45 minutes. Your answers and responses will remain anonymous and entirely confidential. Your participation in this experiment will earn you 1 point toward your credit point total in Introductory Psychology (or other psychology course as indicated by instructor). If you are willing to participate, please read the following statement and sign below.

"I have read and understand the above instructions. I am willing to provide measures of salivation and to complete the ratings and questionnaires. I understand that I may cease participation in this study at any time without penalty." Information about this survey may be obtained from Kristine Slank, Department of Psychology, VPI & SU (Tel. 961-2235) or Dr. J. J. Franchina, Department of Psychology, VPI & SU (Tel. 961-5664), or Dr. S. J. Zaccaro, Chairman of the Human Subjects Committee, Department of Psychology, VPI & SU (Tel. 961-7916) or Mr. Chuck Waring, Chair of the Institutional Review Board

Signed ______________________________ Date ______________

Print Name ___________________________ ID No. ____________
Last First

APPENDIX C

Rating Scale

Rating Scale

<u>Item No. 1 - Peanuts</u>

1. Please rate the item's <u>Appearance</u>

extremely unappealing	very unappealing	slightly unappealing	neutral	slightly appealing	very appealing	extremely appealing
1	2	3	4	5	6	7

2. Please rate the item's <u>Taste</u>.

extremely bad	very bad	slightly bad	neutral	slightly good	very good	extremely good
1	2	3	4	5	6	7

3. Please estimate the item's <u>Caloric Value</u>.

extremely low	very low	slightly low	medium	slightly high	very high	extremely high
1	2	3	4	5	6	7

What do you think the specific caloric value is per peanut? ______ calories.

Item No. 2 - Crackers

4. Please rate the item's Appearance.

extremely unappealing	very unappealing	slightly unappealing	neutral	slightly appealing	very appealing	extremely appealing
1	2	3	4	5	6	7

5. Please rate the item's Taste.

extremely bad	very bad	slightly bad	neutral	slightly good	very good	extremely good
1	2	3	4	5	6	7

6. Please estimate the item's Caloric Value.

extremely low	very low	slightly low	medium	slightly high	very high	extremely high
1	2	3	4	5	6	7

What do you think the specific caloric value is per cracker? _______ calories.

Item No. 3 - Cookies

7. Please rate the item's Appearance.

extremely unappealing	very unappealing	slightly unappealing	neutral	slightly appealing	very appealing	extremely appealing
1	2	3	4	5	6	7

8. Please rate the item's Taste.

extremely bad	very bad	slightly bad	neutral	slightly good	very good	extremely good
1	2	3	4	5	6	7

9. Please estimate the item's Caloric Value.

extremely low	very low	slightly low	medium	slightly high	very high	extremely high
1	2	3	4	5	6	7

What do you think the specific caloric value is per cookie? _______ calories.

Item No. 4 - Chips

10. Please rate the item's Appearance.

extremely unappealing	very unappealing	slightly unappealing	neutral	slightly appealing	very appealing	extremel appealir
1	2	3	4	5	6	7

11. Please rate the item's Taste.

extremely bad	very bad	slightly bad	neutral	slightly good	very good	extremely good
1	2	3	4	5	6	7

12. Please estimate the item's Caloric Value.

extremely low	very low	slightly low	medium	slightly high	very high	extremely high
1	2	3	4	5	6	7

What do you think the specific caloric value is per chip? ______ calories.

APPENDIX D

Questionnaire II

Questionnaire II

Item No. 5 - the first small taste

13. Please rate the item's Appearance.

extremely unappealing	very unappealing	slightly unappealing	neutral	slightly appealing	very appealing	extremely appealing
1	2	3	4	5	6	7

14. Please rate the item's Taste.

extremely bad	very bad	slightly bad	neutral	slightly good	very good	extremely good
1	2	3	4	5	6	7

15. Please estimate the item's Caloric Value.

extremely low	very low	slightly low	medium	slightly high	very high	extremely high
1	2	3	4	5	6	7

What do you think was the specific caloric value of your serving?
_______ calories.

Did you take at least one taste of each of the foods?

16.	peanuts	yes 1	no 2
17.	crackers	yes 1	no 2
18.	potato chips	yes 1	no 2
19.	cookies	yes 1	no 2

20. How hungry are you now?

not at all hungry			moderately hungry			extremely hungry
1	2	3	4	5	6	7

21. How full are you now?

not full at all			moderately full			extremely full
1	2	3	4	5	6	7

How long has it been since you last ate a meal before coming to the experiment?
_______ hours, _______ minutes.

22. Did you have a snack after that meal and before coming to the experiment?
Yes 1
No 2

If yes, what did you have for a snack? _________________________.

How long ago? _________________________.

23. On a scale of 0 to 1000, how many calories do you think you ate during the experiment?

0-100	100-200	200-300	300-400	400-500	500-600
1	2	3	4	5	6
	600-700	700-800	800-900	900-1000	
	7	8	9	10	

APPENDIX E

Summary Tables of Grand Means and Analysis of Variance:

Tables 1E - 43E

Table 1-E.

Summary of Grand Means and Analysis of Variance (ANOVA) of Total Amount (g) of Food Eaten for Low (Lo) and High (Hi) Restrained Eaters Who Received a Sesame Seed Chip (SS) or Chocolate Chip Cookie (CC) Prime and No, Low (Lo) or High (Hi) Calorie Information.

Source	df	SS	F
Restraint (R)	1	7,017.22	n.s.[1]
Lo = 50 Hi = 56			
Type of Prime (P)	1	541.44	n.s.
SS = 52 CC = 54			
Cal Information (C)	2	6,051.27	n.s.
No = 49 Lo = 55 Hi = 54			
R x P	1	2,208.08	n.s.
R x C	2	9,960.83	n.s.
P x C	2	31,300.25	1.23
R x P x C	2	4,514.39	n.s.
Error	89	1,135,308.41	

[1] n.s. indicates F < 1 for all subsequent tables.

Table 2-E.

Summary of Grand Means and ANOVA of Square Root Transformed Data of Total Amount (g) of Food Eaten for Low (Lo) and High (Hi) Restrained Eaters Who Received a Sesame Seed Chip (SS) or Chocolate Chip Cookie (CC) Prime and No, Low (Lo) or High (Hi) Calorie Information.

Source	df	SS	F
Restraint (R)	1	.07	n.s.
Lo = 4.3 Hi = 4.4			
Type of Prime (P)	1	6.85	n.s.
SS = 4.3 CC = 4.4			
Cal Information (C)	2	2.56	n.s.
No = 4.1 Lo = 4.5 Hi = 4.5			
R x P	1	15.62	n.s.
R x C	2	30.92	n.s.
P x C	2	85.09	1.73
R x P x C	2	9.26	n.s.
Error	89	2,193.48	

Table 3-E.

Summary of Grand Means and ANOVA of Amount (g) of Test Foods Eaten for Low (Lo) and High (Hi) Restrained Eaters Who Received a Sesame Seed Chip (SS) or Chocolate Chip Cookie (CC) Prime and No, Low (Lo) or High (Hi) Calorie Information.

Source	df	SS	F
Restraint (R)	1	.06	n.s.
Lo = 2.0			
Hi = 2.0			
Type of Prime (P)	1	3.98	n.s.
SS = 1.9			
CC = 2.0			
Cal Information (C)	2	29.33	n.s.
No = 1.9			
Lo = 2.1			
Hi = 2.0			
R x P	1	16.65	n.s.
R x C	2	31.71	n.s.
P x C	2	92.30	2.03
R x P x C	2	12.89	n.s.
ERROR	89	2,022.99	
Test Food (TF)	3	631.96	22.98**
Cookie = 2.5			
Peanut = 2.2			
Cracker= 1.7			
Chips = 1.5			
Tf x R	3	16.16	n.s.
Tf x C	6	19.43	n.s.
Tf x P	3	47.80	1.74
Tf x R x C	6	117.83	2.14*
Tf x R x P	3	51.63	1.88
Tf x P x C	6	41.15	n.s.
Tf x R x P x C	6	81.25	1.48
ERROR	267	2,447.09	

* $p < .05$. ** $p < .0001$.

Table 4-E.

Summary of Grand Means and ANOVA of Amount (g) of Peanuts Eaten for Low (Lo) and High (Hi) Restrained Eaters Who Received a Sesame Seed Chip (SS) or Chocolate Chip Cookie (CC) Prime and No, Low (Lo) or High (Hi) Calorie Information.

Source	df	SS	F
Restraint (R)	1	.04	n.s.
Lo = 2.2 Hi = 2.2			
Type of Prime (P)	1	39.08	3.10
SS = 2.0 CC = 2.4			
Cal Information (C)	2	2.99	n.s.
No = 2.1 Lo = 2.3 Hi = 2.2			
R x P	1	9.73	n.s.
R x C	2	84.33	3.34*
P x C	2	19.67	n.s.
R x P x C	2	77.98	3.09*
Error	89	1,123.84	

* $p < .05$.

Table 5-E.

Summary of Grand Means and ANOVA of Amount (g) of Cookies Eaten for Low (Lo) and High (Hi) Restrained Eaters Who Received a Sesame Seed Chip (SS) or Chocolate Chip Cookie (CC) Prime and No, Low (Lo) or High (Hi) Calorie Information.

Source	df	SS	F
Restraint (R)	1	2.72	n.s.
Lo = 2.5 Hi = 2.6			
Type of Prime (P)	1	11.71	n.s.
SS = 2.6 CC = 2.4			
Cal Information (C)	2	29.40	n.s.
No = 2.3 Lo = 2.5 Hi = 2.3			
R x P	1	55.23	2.65
R x C	2	7.83	n.s.
P x C	2	8.37	n.s.
R x P x C	2	13.88	n.s.
Error	89	1,854.12	

Table 6-E.
Summary of Grand Means and ANOVA of Amount (g) of Crackers Eaten for Low (Lo) and High (Hi) Restrained Eaters Who Received a Sesame Seed Chip (SS) or Chocolate Chip Cookie (CC) Prime and No, Low (Lo) or High (Hi) Calorie Information.

Source	df	SS	F
Restraint (R)	1	2.04	n.s.
Lo = 1.6 Hi = 1.7			
Type of Prime (P)	1	.03	n.s.
SS = 1.7 CC = 1.7			
Cal Information (C)	2	8.10	n.s.
No = 1.5 Lo = 1.7 Hi = 1.8			
R x P	1	2.79	n.s.
R x C	2	28.81	1.41
P x C	2	47.21	2.30
R x P x C	2	1.75	n.s.
Error	89	911.95	

Table 7-E.

Summary of Grand Means and ANOVA of Amount (g) of Potato Chips Eaten for Low (Lo) and High (Hi) Restrained Eaters Who Received a Sesame Seed Chip (SS) or Chocolate Chip Cookie (CC) Prime and No, Low (Lo) or High (Hi) Calorie Information.

Source	df	SS	F
Restraint (R)	1	11.42	1.75
Lo = 1.6 Hi = 1.4			
Type of Prime (P)	1	.96	n.s.
SS = 1.5 CC = 1.5			
Cal Information (C	2	8.27	n.s.
No = 1.5 Lo = 1.6 Hi = 1.4			
R x P	1	.52	n.s.
R x C	2	28.57	2.19
P x C	2	58.20	4.46*
R x P x C	2	.52	n.s.
Error	89	580.17	

* $p < .01$.

Table 8-E.

Summary of Grand Means and ANOVA of Amount (g) of Peanuts Eaten for Low (Lo) and High (Hi) Restrained Eaters Who Received a Sesame Seed Chip (SS) or Chocolate Chip Cookie (CC) Prime and Low Calorie Information.

Source	df	SS	F
Restraint (R)	1	51.28	3.82*
Lo = 1.8 Hi = 2.6			
Type of Prime (P)	1	3.43	n.s.
SS = 2.3 CC = 2.3			
R x P	1	3.11	n.s.
Error	30	402.36	

* $p < .059$.

Table 9-E.

Summary of Grand Means and ANOVA of Amount (g) of Peanuts Eaten for Low (Lo) and High (Hi) Restrained Eaters Who Received a Sesame Seed Chip (SS) or Chocolate Chip Cookie (CC) Prime and No Calorie Information.

Source	df	SS	F
Restraint (R)	1	28.86	2.70
Lo = 2.4 Hi = 1.8			
Type of Prime (P)	1	46.23	4.32*
SS = 1.7 CC = 2.4			
R x P	1	3.30	n.s.
Error	29	310.05	

* $p < .05$.

Table 10-E.

Summary of Grand Means and ANOVA of Amount (g) of Peanuts Eaten for Low (Lo) and High (Hi) Restrained Eaters Who Received a Sesame Seed Chip (SS) or Chocolate Chip Cookie (CC) Prime and High Calorie Information.

Source	df	SS	F
Restraint (R)	1	4.32	n.s.
Lo = 2.4 Hi = 2.1			
Type of Prime (P)	1	11.85	n.s.
SS = 2.4 CC = 2.4			
R x P	1	81.77	5.96*
Error	30	411.43	

* $p < .02$.

Table 11-E.

Summary of Grand Means and ANOVA of Amount (g) Salivated on Trial 1 for Low (Lo) and High (Hi) Restrained Eaters Who Received a Sesame Seed Chip (SS) or Chocolate Chip Cookie (CC) Prime and No, Low (Lo) or High (Hi) Calorie Information.

Source	df	SS	F
Restraint (R)	1	248.43	n.s.
Lo = .4362 Hi = .4694			
Type of Prime (P)	1	476.13	n.s.
SS = .4734 CC = .4339			
Cal Information (C)	2	1,517.69	n.s.
No = .4111 Lo = .5027 Hi = .4477			
R x P	1	539.59	n.s.
R x C	2	788.15	n.s.
P x C	2	245.20	n.s.
R x P x C	2	711.67	n.s.
Error	89	73,540.02	

Table 12-E.

Summary of Grand Means and ANOVA of Amount (g) Salivated on Trial 2 for Low (Lo) and High (Hi) Restrained Eaters Who Received a Sesame Seed Chip (SS) or Chocolate Chip Cookie (CC) Prime and No, Low (Lo) or High (Hi) Calorie Information.

Source	df	SS	F
Restraint (R)	1	905.64	1.18
Lo = .3511 Hi = .4095			
Type of Prime (P)	1	92.19	n.s.
SS = .3726 CC = .3938			
Cal Information (C)	2	945.02	n.s.
No = .3472 Lo = .4293 Hi = .3712			
R x P	1	371.44	n.s.
R x C	2	2,342.56	1.52
P x C	2	1,669.56	1.08
R x P x C	2	865.26	n.s.
Error	89	68,550.59	

Table 13-E.

Summary of Grand Means and ANOVA of Amount (g) Salivated on Trial 3 for Low (Lo) and High (Hi) Restrained Eaters Who Received a Sesame Seed Chip (SS) or Chocolate Chip Cookie (CC) Prime and No, Low (Lo) or High (Hi) Calorie Information.

Source	df	SS	F
Restraint (R)	1	2,357.13	2.27
Lo = .4921 Hi = .5853			
Type of Prime (P)	1	365.94	n.s.
SS = .5250 CC = .5619			
Cal Information (C)	2	6,892.71	3.31*
No = .4296 Lo = .5644 Hi = .6313			
R x P	1	742.14	n.s.
R x C	2	1,804.20	n.s.
P x C	2	534.19	n.s.
R x P x C	2	897.08	n.s.
Error	89	92,570.05	

* $p < .05$.

Table 14-E.

Summary of Grand Means and Covariate ANOVA of Amount (g) Salivated on Trial 4 for Low (Lo) and High (Hi) Restrained Eaters Who Received a Sesame Seed Chip (SS) or Chocolate Chip Cookie (CC) Prime and No, Low (Lo) or High (Hi) Calorie Information.

Source	df	SS	F
Restraint (R)	1	8.04	n.s.
Lo = .5123 Hi = .5138			
Type of Prime (P)	1	150.99	n.s.
SS = .4975 CC = .5296			
Cal Information (C)	2	1,679.69	1.04
No = .4484 Lo = .5382 Hi = .5508			
R x P	1	828.26	1.03
R x C	2	2,115.96	1.31
P x C	2	1,024.61	n.s.
R x P x C	2	1,001.63	n.s.
Error	85	68,483.53	

Table 15-E.

Summary of Grand Means and ANOVA of Palatability Ratings of Each Test Food for Low (Lo) and High (Hi) Restrained Eaters Who Received a Sesame Seed Chip (SS) or a Chocolate Chip Cookie (CC) Prime and No, Low (Lo) or High (Hi) Calorie Information.

Source	df	SS	F
Restraint (R)	1	.81	n.s.
Lo = 5.5			
Hi = 5.6			
Type of Prime (P)	1	4.28	2.32
SS = 5.6			
CC = 5.4			
Cal Information (C)	2	4.67	1.26
No = 5.4			
Lo = 5.6			
Hi = 5.5			
R x P	1	.23	n.s.
R x C	2	2.09	n.s.
P x C	2	.52	n.s.
R x P x C	2	2.68	n.s.
ERROR	89	164.54	
Test Food (TF)	3	24.92	7.92**
Cookie = 5.7			
Peanut = 5.8			
Cracker= 5.4			
Chips = 5.2			
Tf x R	3	5.20	1.67
Tf x C	6	3.20	n.s.
Tf x P	3	2.94	n.s.
Tf x R x C	6	15.79	2.53*
Tf x R x P	3	3.53	1.13
Tf x P x C	6	5.87	n.s.
Tf x R x P x C	6	5.56	n.s.
ERROR	267	277.65	

* $p < .05$. ** $p < .0001$.

Table 16-E.

Summary of Grand Means and ANOVA of Palatability Ratings of Peanuts for Low (Lo) and High (Hi) Restrained Eaters Who Received a Sesame Seed Chip (SS) or Chocolate Chip Cookie (CC) Prime and No, Low (Lo) or High (Hi) Calorie Information.

Source	df	SS	F
Restraint (R)	1	.02	n.s.
Lo = 5.8 Hi = 5.8			
Type of Prime (P)	1	.43	n.s.
SS = 5.9 CC = 5.7			
Cal Information (C)	2	1.64	n.s.
No = 5.6 Lo = 5.0 Hi = 5.8			
R x P	1	2.64	2.91
R x C	2	8.44	4.65*
P x C	2	1.69	n.s.
R x P x C	2	1.55	n.s.
Error	89	80.88	

* $p < .01$.

Table 17-E.

Summary of Grand Means and ANOVA of Palatability Ratings of Peanuts for High Restrained Eaters Who Received a Sesame Seed Chip (SS) or Chocolate Chip Cookie (CC) Prime and No, Low (Lo) or High (Hi) Calorie Information.

Source	df	SS	F
Type of Prime (P)	1	2.84	2.83
SS = 6.0 CC = 5.6			
Cal Information (C)	2	8.94	4.47*
No = 5.4 Lo = 6.4 Hi = 5.6			
P x C	2	1.28	n.s.
Error	49	49.04	

* $p < .02$.

Table 18-E.

Summary of Grand Means and ANOVA of Palatability Ratings of Peanuts for Low Restrained Eaters Who Received a Sesame Seed Chip (SS) or Chocolate Chip Cookie (CC) Prime and No, Low (Lo) or High (Hi) Calorie Information.

Source	df	SS	F
Type of Prime (P)	1	.44	n.s.
SS = 5.7			
CC = 5.9			
Cal Information (C)	2	1.88	1.18
No = 5.8			
Lo = 5.5			
Hi = 5.0			
P x C	2	1.90	1.19
Error	40	31.84	

Table 19-E.

Summary of Grand Means and ANOVA of Palatability Ratings of Peanuts for Low (Lo) and High (Hi) Restrained Eaters Who Received a Sesame Seed Chip (SS) or Chocolate Chip Cookie (CC) Prime and Low Calorie Information.

Source	df	SS	F
Restraint (R)	1	6.06	7.06*
Lo = 5.5 Hi = 6.4			
Type of Prime (P)	1	.43	n.s.
SS = 5.9 CC = 6.1			
R x P	1	2.13	2.48
Error	30	25.79	

* $p < .01$.

Table 20-E.

Summary of Grand Means and ANOVA of Palatability Ratings of Peanuts for Low (Lo) and High (Hi) Restrained Eaters Who Received a Sesame Seed Chip (SS) or Chocolate Chip Cookie (CC) Prime and No Calorie Information.

Source	df	SS	F
Restraint (R)	1	1.05	n.s.
Lo = 5.8 Hi = 5.4			
Type of Prime (P)	1	1.25	1.09
SS = 5.8 CC = 5.4			
R x P	1	2.02	1.77
Error	29	33.25	

Table 21-E.

Summary of Grand Means and ANOVA of Palatability Ratings of Peanuts for Low (Lo) and High (Hi) Restrained Eaters Who Received a Sesame Seed Chip (SS) or Chocolate Chip Cookie (CC) Prime and High Calorie Information.

Source	df	SS	F
Restraint (R)	1	1.35	1.85
Lo = 6.0 Hi = 5.6			
Type of Prime (P)	1	.43	n.s.
SS = 5.9 CC = 5.7			
R x P	1	< .00	n.s.
Error	30	21.85	

Table 22-E.

Summary of Grand Means and ANOVA of Palatability Ratings of Cookies for Low (Lo) and High (Hi) Restrained Eaters Who Received a Sesame Seed Chip (SS) or Chocolate Chip Cookie (CC) Prime and No, Low (Lo) or High (Hi) Calorie Information.

Source	df	SS	F
Restraint (R)	1	5.44	3.76*
Lo = 5.5 Hi = 5.9			
Type of Prime (P)	1	5.73	3.96**
SS = 5.9 CC = 5.5			
Cal Information (C)	2	2.11	n.s.
No = 5.7 Lo = 5.9 Hi = 5.6			
R x P	1	.98	n.s.
R x C	2	3.34	1.15
P x C	2	.83	n.s.
R x P x C	2	1.73	n.s.
Error	89	128.86	

* $p < .0557$. ** $p < .05$.

Table 23-E.

Summary of Grand Means and ANOVA of Palatability Ratings of Crackers for Low (Lo) and High (Hi) Restrained Eaters Who Received a Sesame Seed Chip (SS) or Chocolate Chip Cookie (CC) Prime and No, Low (Lo) or High (Hi) Calorie Information.

Source	df	SS	F
Restraint (R)	1	< .00	n.s.
Lo = 5.3 Hi = 5.4			
Type of Prime (P)	1	< .00	n.s.
SS = 5.4 CC = 5.3			
Cal Information (C)	2	3.19	1.62
No = 5.1 Lo = 5.5 Hi = 5.5			
R x P	1	0.12	n.s.
R x C	2	2.75	1.39
P x C	2	1.09	n.s.
R x P x C	2	2.01	1.02
Error	89	87.77	

Table 24-E.

Summary of Grand Means and ANOVA of Palatability Ratings of Potato Chips for Low (Lo) and High (Hi) Restrained Eaters Who Received a Sesame Seed Chip (SS) or Chocolate Chip Cookie (CC) Prime and No, Low (Lo) or High (Hi) Calorie Information.

Source	df	SS	F
Restraint (R)	1	.54	n.s.
Lo = 5.2 Hi = 5.1			
Type of Prime (P)	1	1.09	n.s.
SS = 5.3 CC = 5.1			
Cal Information (C)	2	.93	n.s.
No = 5.0 Lo = 5.2 Hi = 5.3			
R x P	1	< .00	n.s.
R x C	2	3.35	1.03
P x C	2	2.77	n.s.
R x P x C	2	2.95	n.s.
Error	89	144.68	

Table 25-E.

Summary of Grand Means and ANOVA of Calorie Ratings of Each Test Food for Low (Lo) and High (Hi) Restrained Eaters Who Received a Sesame Seed Chip (SS) or Chocolate Chip Cookie (CC) Prime and No, Low (Lo) or High (Hi) Calorie Information.

Source	df	SS	F
Restraint (R)	1	8.94	3.95*
Lo = 4.9			
Hi = 5.3			
Type of Prime (P)	1	3.27	1.44
SS = 5.2			
CC = 5.0			
Cal Information (C)	2	2.27	n.s.
No = 5.1			
Lo = 5.0			
Hi = 5.2			
R x P	1	.15	n.s.
R x C	2	3.96	n.s.
P x C	2	2.27	n.s.
R x P x C	2	2.24	n.s.
ERROR	89	202.37	
Test Food (TF)	3	69.68	31.41***
Cookie = 6.0			
Peanut = 5.0			
Cracker= 4.1			
Chips = 5.4			
Tf x R	3	11.03	4.97**
Tf x C	6	.96	n.s.
Tf x P	3	1.63	n.s.
Tf x R x C	6	6.09	1.37
Tf x R x P	3	4.78	2.15
Tf x P x C	6	5.68	1.28
Tf x R x P x C	6	9.98	2.25*
ERROR	267	197.43	

* $p < .05$. ** $p < .005$. *** $p < .0001$.

Table 26-E.
Summary of Grand Means and ANOVA of Calorie Ratings of Peanuts for Low (Lo) and High (Hi) Restrained Eaters Who Received a Sesame Seed Chip (SS) or Chocolate Chip Cookie (CC) Prime and No, Low (Lo) or High (Hi) Calorie Information.

Source	df	SS	F
Restraint (R)	1	17.28	11.11**
Lo = 4.6 Hi = 5.4			
Type of Prime (P)	1	3.99	2.57
SS = 5.3 CC = 4.8			
Cal Information (C)	2	2.07	n.s.
No = 4.9 Lo = 5.0 Hi = 5.2			
R x P	1	3.69	2.37
R x C	2	3.60	1.16
P x C	2	.64	n.s.
R x P x C	2	9.78	3.15*
Error	89	138.38	

* $p < .05$. ** $p < .001$.

Table 27-E.

Summary of Grand Means and ANOVA of Calorie Ratings of Peanuts for Low (Lo) and High (Hi) Restrained Eaters Who Received a Sesame Seed Chip Prime and No, Low (Lo) or High (Hi) Calorie Information.

Source	df	SS	F
Restraint (R)	1	18.99	15.91**
Lo = 4.6 Hi = 5.8			
Cal Information (C)	2	1.99	n.s.
No = 5.2 Lo = 5.2 Hi = 5.4			
R x C	2	12.40	5.19*
Error	46	54.92	

* p < .01. ** p < .0002.

Table 28-E.

Summary of Grand Means and ANOVA of Calorie Ratings of Peanuts for Low (Lo) and High (Hi) Restrained Eaters Who Received a Chocolate Chip Cookie Prime and No, Low (Lo) or High (Hi) Calorie Information.

Source	df	SS	F
Restraint (R)	1	2.44	1.26
Lo = 4.6 Hi = 5.0			
Cal Information (C)	2	.82	n.s.
No = 4.6 Lo = 4.8 Hi = 4.9			
R x C	2	1.24	n.s.
Error	43	83.46	

Table 29-E.

Summary of Grand Means and ANOVA of Calorie Ratings of Peanuts for Low (Lo) and High (Hi) Restrained Eaters Who Received a Sesame Seed Chip Prime and No Calorie Information.

Source	df	SS	F
Restraint (R)	1	9.71	7.76*
Lo = 4.4 Hi = 5.9			
Error	15	18.76	

* $p < .01$.

Table 30-E.

Summary of Grand Means and ANOVA of Calorie Ratings of Peanuts for Low (Lo) and High (Hi) Restrained Eaters Who Received a Sesame Seed Chip Prime and Low Calorie Information.

Source	df	SS	F
Restraint (R)	1	20.71	13.08*
Lo = 3.9 Hi = 6.1			
Error	15	23.76	

* $p < .002$.

Table 31-E.

Summary of Grand Means and ANOVA of Calorie Ratings of Peanuts for Low (Lo) and High (Hi) Restrained Eaters Who Received a Sesame Seed Chip Prime and High Calorie Information.

Source	df	SS	F
Restraint (R)	1	.04	n.s.
Lo = 5.5 Hi = 5.4			
Error	16	12.40	

Table 32-E.
Summary of Grand Means and ANOVA of Calorie Ratings of Cookies for Low (Lo) and High (Hi) Restrained Eaters Who Received a Sesame Seed Chip (SS) or Chocolate Chip Cookie (CC) Prime and No, Low (Lo) or High (Hi) Calorie Information.

Source	df	SS	F
Restraint (R)	1	.01	n.s.
Lo = 6.0 Hi = 6.0			
Type of Prime (P)	1	.38	n.s.
SS = 6.0 CC = 5.9			
Cal Information (C)	2	.23	n.s.
No = 6.0 Lo = 5.9 Hi = 6.0			
R x P	1	.56	n.s.
R x C	2	2.96	1.76
P x C	2	1.51	n.s.
R x P x C	2	.68	n.s.
Error	89	74.64	

Table 33-E.

Summary of Grand Means and ANOVA of Calorie Ratings of Crackers for Low (Lo) and High (Hi) Restrained Eaters Who Received a Sesame Seed Chip (SS) or Chocolate Chip Cookie (CC) Prime and No, Low (Lo) or High (Hi) Calorie Information.

Source	df	SS	F
Restraint (R)	1	1.59	1.94
Lo = 4.0 Hi = 4.2			
Type of Prime (P)	1	1.64	2.01
SS = 4.3 CC = 4.0			
Cal Information (C)	2	3.37	2.06
No = 4.3 Lo = 3.9 Hi = 4.2			
R x P	1	.60	n.s.
R x C	2	.61	n.s.
P x C	2	3.06	1.87
R x P x C	2	1.64	1.00
Error	89	115.09	

Table 34-E.

Summary of Grand Means and ANOVA of Calorie Ratings for Potato Chips for Low (Lo) and High (Hi) Restrained Eaters Who Received a Sesame Seed Chip (SS) or Chocolate Chip Cookie (CC) Prime and No, Low (Lo) or High (Hi) Calorie Information.

Source	df	SS	F
Restraint (R)	1	2.67	2.12
Lo = 5.2 Hi = 5.5			
Type of Prime (P)	1	.15	n.s.
SS = 5.4 CC = 5.3			
Cal Information (C)	2	.72	n.s.
No = 5.4 Lo = 5.3 Hi = 5.5			
R x P	1	.12	n.s.
R x C	2	.53	n.s.
P x C	2	4.29	1.70
R x P x C	2	1.08	n.s.
Error	89	112.13	

Table 35-E.

Summary of Grand Means and ANOVA of Palatability Ratings of the Primes for Low (Lo) and High (Hi) Restrained Eaters who receive the Sesame Seed Chip (SS) or Chocolate Chip Cookie (CC) Prime and No, Low (Lo) or High (Hi) Calorie Information.

Source	df	SS	F
Restraint (R)	1	.01	n.s.
Lo = 5.1 Hi = 5.0			
Type of Prime (P)	1	39.81	30.79*
SS = 4.4 CC = 5.6			
Cal Information (C)	2	2.70	1.04
No = 4.8 Lo = 5.3 Hi = 4.9			
R x P	1	1.32	1.02
R x C	2	1.13	n.s.
P x C	2	3.23	1.25
R x P x C	2	6.07	2.35
Error	89	115.09	

* $p < .0001$.

Table 36-E.

Summary of Grand Means and ANOVA of Calorie Ratings of the Primes for Low (Lo) and High (Hi) Restrained Eaters Who Received the Sesame Seed Chip (SS) or Chocolate Chip Cookie (CC) Prime and No, Low (Lo) or High (Hi) Calorie Information.

Source	df	SS	F
Restraint (R)	1	10.46	8.54**
Lo = 4.5 Hi = 5.1			
Type of Prime (P)	1	44.58	36.39***
SS = 4.2 CC = 5.5			
Cal Information (C)	2	83.74	34.18***
No = 4.7 Lo = 3.8 Hi = 6.0			
R x P	1	6.45	5.26*
R x C	2	6.75	2.76
P x C	2	15.68	6.40**
R x P x C	2	.08	n.s.
Error	88	107.80	

* $p < .05$. ** $p < .005$. *** $p < .0001$.

Table 37-E.

Summary of Grand Means and ANOVA of Calorie Ratings of the Prime for Low (Lo) and High (Hi) Restrained Eaters Who Received a Sesame Seed Chip Prime and No, Low (Lo) or High (Hi) Calorie Information.

Source	df	SS	F
Restraint (R)	1	17.31	11.85*
Lo = 3.6 Hi = 4.7			
Cal Information (C)	2	77.05	26.37**
No = 3.6 Lo = 3.1 Hi = 5.8			
R x C	2	4.13	1.41
Error	46	67.21	

* $p < .001$. ** $p < .0001$.

Table 38-E.

Summary of Grand Means and ANOVA of Calorie Ratings of the Prime for Low (Lo) and High (Hi) Restrained Eaters Who Received a Chocolate Chip Cookie Prime and No, Low (Lo) or High (Hi) Calorie Information.

Source	df	SS	F
Restraint (R)	1	.23	n.s.
Lo = 5.4 Hi = 5.3			
Cal Information (C)	2	26.12	13.52*
No = 5.9 Lo = 4.5 Hi = 6.1			
R x C	2	2.81	1.45
Error	42	40.59	

* $p < .0001$.

Table 39-E.

Summary of Grand Means and ANOVA of Calorie Ratings of the Prime for Low (Lo) and High (Hi) Restrained Eaters Who Received a Sesame Seed Chip (SS) or Chocolate Chip Cookie (CC) Prime and No Calorie Information.

Source	df	SS	F
Restraint (R)	1	6.21	8.86**
Lo = 4.2 Hi = 5.2			
Type of Prime (P)	1	41.43	59.17***
SS = 3.6 CC = 5.6			
R x P	1	2.81	4.01*
Error	29	20.30	

* $p < .05$. ** $p < .006$. *** $p < .0001$.

Table 40-E.

Summary of Grand Means and ANOVA of Calorie Ratings of the Prime for Low (Lo) and High (Hi) Restrained Eaters Who Received a Sesame Seed Chip (SS) or Chocolate Chip Cookie (CC) Prime and Low Calorie Information.

Source	df	SS	F
Restraint (R)	1	11.14	6.84*
Lo = 3.2 Hi = 4.3			
Type of Prime (P)	1	18.29	11.22**
SS = 3.1 CC = 4.5			
R x P	1	2.11	1.29
Error	30	48.89	

* $p < .01$. ** $p < .002$.

Table 41-E.

Summary of Grand Means and ANOVA of Calorie Ratings of the Prime for Low (Lo) and High (Hi) Restrained Eaters Who Received a Sesame Seed Chip (SS) or Chocolate Chip Cookie (CC) Prime and High Calorie Information.

Source	df	SS	F
Restraint (R)	1	.04	n.s.
Lo = 6.0 Hi = 5.9			
Type of Prime (P)	1	.75	n.s.
SS = 5.8 CC = 6.1			
R x P	1	1.62	1.21
Error	29	38.61	

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B.A.	1983	Psychology	Berea College, Berea, Kentucky
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Professional Experience

1986-present	Assistant Coordinator for the Program of Introductory Psychology, VPI & SU
1984-present	Research Assistant, VPI & SU
1982-1983	Experimental Psychology Laboratory Assistant, Berea College
1979-1982	Reading and Writing Laboratory Assistant, Berea College

Teaching Experience

1984-1986	Lecturer (Introductory Psychology), VPI & SU
1982-1983	Teaching Assistant (Experimental Psychology and Statistics), Berea College

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__Papers Presented at Scientific Meetings__

Slank, K. L., & Franchina, J. J. (1987). Effects of food palatability and calorie information on appetite in restrained eaters. Southeastern Psychological Association, Atlanta.

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Slank, K. L., & Franchina, J. J. (1986). Effects of deprivation on salivary responding in the absence of food stimuli. Southeastern Psychological Association, Orlando.

Slank, K. L., & Franchina, J. J. (1986). Effects of deprivation level and food palatability on salivary responding in dieters and nondieters. Midwestern Psychological Association, Chicago.

Arnegard, R. J., Slank, K. L., Marshall, K. S. (1986). Magnitude estimation of sweetness in compounds of sweet and bitter flavor concentrations. Paper presented to the Virginia Academy of Science, Harrisonburg, Virginia.

Slank, K. L., Seaver, B., & Arnegard, R. (1985). Effects of deprivation level on preference behavior for pictures of foods. Virginia Academy of Science, Richmond, Virginia.

Manuscripts

Franchina, J. J., & Slank, K. L. Effects of deprivation on salivary flow in the apparent absence of food-related stimuli. In Review, Appetite.

Professional Affiliations

Society for Research in Child Development

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