‘Chews Me’: An Investigation into the Effects of Chewing Gum on Consumer Endurance and Recall During an Extended Shopping Experience

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ABSTRACT

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Of all the atmospheric factors, scent may be one of the most powerful. This research examines whether effects of olfactory stimuli on consumer behavior in retail settings can be obtained via retronasal administration, and to what extent retronasally administered stimuli affect consumer responses. The focus of this research is on consumer responses that are of interest to retailers, yet have not been addressed in the marketing literature, such as endurance at completing a shopping task, fatigue, browsing, and attention to and memory for information encountered in the retail environment. It is predicted that the scent of peppermint increases endurance and reduces feelings of fatigue, while the scent of cinnamon is expected to improve attention and memory.

Eighty-seven students (65% female) participated in field experiment with a one factor between participants design (scent: peppermint, cinnamon, control) in which scents were administered to the experimental groups using flavored chewing gum. The average time spent shopping was significantly higher for the peppermint condition than for the cinnamon or the control condition. Retronasal olfaction also influenced perceived shopping time. There were no significant effects on self-reported fatigue, workload, attention, or memory. Overall, this research shows that certain retronasally delivered olfactory stimuli lead to changes in some consumer responses.

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INTRODUCTION

Question: What does a cyclist in the Tour de France have in common with a shopper in an IKEA store?

Answer: Besides perhaps the need for a certain masochistic side, both the cyclist and the shopper require physical endurance. Endurance for the cyclist means be able to finish a 21 day race and endurance for the IKEA shopper means be able to make it through the maze of showrooms to the warehouse pick-up area and finish at the wrap up. Endurance for shoppers in general is important, as the "more time someone spends in a mall, the more stores they will visit and the more things they will buy" (Underhill 2004, p.86).

The question arises as to how to increase shopper endurance. One way may be to place feed stations throughout the store as is done throughout the Tour de France race course. This is done in IKEA with its in-store restaurant, and in shopping malls with their food courts and food stands. The use of certain scents may provide a more elegant solution to increasing shopper endurance. This research extends the literature by examining (1) whether effects of olfactory stimuli on consumer behavior in retail settings can be obtained via retronasal administration (i.e., the odorant reaches the nasopharynx via the mouth; Pierce and Halpern 1996); (2) to what extent olfactory stimuli (peppermint vs. cinnamon) affect consumer responses not addressed in the marketing literature, such as endurance at completing a shopping task, fatigue, browsing, and attention to and memory for information encountered in the retail environment.

CONCEPTUAL BACKGROUND

Retail atmospherics refers to the sounds, smells, textures, and sights found in retail environments (Kotler 1973). Research in marketing has examined a wide variety of atmospheric factors, such as background music (Milliman 1982, 1986), olfaction (Mitchell, Kahn, and Knasko 1995; Spangenberg, Crowley, and Henderson 1996), touch (Grohmann, Spangenberg, and Sprott 2007; Peck and Childers 2003) or color (Crowley 1993). This research strongly suggests that atmospheric factors influence a wide variety of consumer perceptions and behaviors in retail contexts, such as evaluation of the store and merchandise (Spangenberg et al. 1996), or time and money spent (Milliman 1982, 1986). Of all the atmospheric factors, scent may be one of the most powerful, as olfaction is the only one of the five senses directly linked to the amygdala (Cahill and McGaugh 1998), and is thus implicated in emotional responses.

Product Scent

There are two types of scent relevant to consumer research: product scent and ambient scent. Product scent refers to an odor or aroma coming from an actual good or from a person. For example, Colgate-Palmolive sells an aromatherapy dish soap scented with lavender. Previous studies have found evidence that consumers prefer scented products to non-scented products (Gulas and Bloch 1995, Hirsch and Gay 1991). Participants mentioned the durability and weave of scented hosiery as being superior to the unscented hosiery, even though there was no actual difference between the products on these attributes (Gulas and Bloch 1995). Consumers were willing to pay more for a pair of shoes that were in a scented room compared to the same shoe in a non-scented room (Hirsch and Gay 1991). A job applicant wearing a scent is rated higher than one not wearing a scent (Gulas and Bloch 1995).

Ambient Scent

Ambient scent refers to an odor or aroma that is present in the retail environment. Mars uses the smell in their M & M World Stores to sell chocolate. Pleasant ambient scent has been found to increase money spent in casino slot machines (Hirsch 1992) and time spent in a retail store (Gulas and Bloch 1995). One reason that retailers may resort to scenting the retail environment is to enhance brand memory. According to Luca Turin (2006), a popular brand of Champagne illegally adds a perfume to the product so that those who consume the product will not soon forget it. This is attributed to the belief that certain odors or aromas can trigger the recollection of memories associated with the particular aroma. For example, some Montrealers think of the Montreal metro system when exposed to the smell of peanut oil. This is due to the use of peanut oil on the brake pads of metro cars up until the mid 1990's. This is referred to as paired-associate learning (Schifferstein and Blok 2002). In other words, if a scent is always present while consuming a bottle of champagne or using the metro system, when that particular scent is experienced again, it could evoke images of the champagne's label or of a blue metro car in the user's memory. Spangenberg, Crowley and Henderson (1996) looked at the effect of a pleasant ambient scent on consumers in a simulated retail environment. After being asked to enter a simulated retail environment, the participants evaluated the store environment as more positive in the scented environment than in the control condition. The merchandise was evaluated as significantly more positive in terms of quality and selection and there was a significant difference in perceived time spent in the store.

The Stimulus – Organism – Response Model

The Mehrabian and Russell (1974) stimulus-organism-response model suggests that the environment is an important influence on the emotions and subsequent behaviors of a consumer

in a retail context. In the case of scent marketing the odor itself is the stimulus and the shopper is the organism. As for the response, previous studies have used the Mehrabian and Russell (1974) model of pleasure, arousal and dominance (PAD). It is suggested that these three response dimensions lead a shopper to exhibit approach or avoidance behaviors in the presence of the stimulus in question. The dominance dimension is often dropped from retail studies because the emotions included in the scale are too intense for a shopping context (Kaltcheva and Weitz 2006). In a review of 206 tests from 22 studies implicating the effect of an ambient scent, Bone and Ellen (1999) found that the pleasure or arousal dimensions showed an effect of scent in 5 out of 31 tests. These tests were those that involved asking the participants to evaluate objects in scented environments, to evaluate the environment itself, or asking whether the scent could induce any memories or associations. This is aside from recall or recognition tasks and other cognitive elaboration tasks. Bone and Ellen (1999) found that 15 of 21 tests involving such cognitive elaboration tasks showed an effect from scent. Another area where scent seems to be able to affect behavior is the amount of time (real and perceived) spent in the store or environment with a significant with two thirds of the tests showing significant results. In one study, participants in the scented store estimated spending less time (9.6 minutes) in the environment that those in the unscented condition (11 minutes; Spangenberg, Crowley and Henderson 1996). Overall, Bone and Ellen (1999) report that 63.2% of controlled experiments on the effects of scent reported effects that were not significant.

Orthonasal versus Retronasal Olfaction

A scent can be received either trough the orthonasal route or the retronasal route. Orthonasal olfaction refers to odors that are taken in through the mouth and processed by the olfactory mucosa while retronasal olfaction pertains to odors that flow in through the nostrils and

reach the nasopharynx (Pierce and Halpern 1996). There seems to exist a difference in the perception of odors depending on the route taken. One difference lies in the threshold. That is, for the same odor concentration, the threshold is higher for retronasal olfaction (Diaz 2004). Hummel et al. (2006) suggest that one reason for this effect may be due to the context of the odor. Retronasal odors are typically food related and therefore are experienced at higher concentrations than odors perceived orthonasally which come from the exterior environment (Heilmann and Hummel 2004; Hummel et al. 2006, Sakai et al. 2001). This perceptual difference was confirmed by comparing brain responses to orthonasal and retronasal odors with fMRI (Small et al. 2005). Different brain activity was documented when a food odor such as chocolat was presented via each of the two different olfaction routes. This difference was not significant for non-food odors such as lavender or butanol (Small et al. 2005).

There is evidence that there is a difference in the ability to identify odors from each source. Participants are better at identifying odors presented orthonasally (Pierce and Halpern 1996). Rozin (1982) came to a similar conclusion by asking participants to identify odors they were very familiar with both orthonasally and retronasally. The participants were successful at identifying the odors when presented orthonasally but not retronasally. In the case of Pierce and Halpern (1996) the perceptual difference was attenuated by suggesting a specific breathing technique to the participants (Pierce and Halpern 1996) that consisted of breathing through the mouth while simulating a congested nose. Despite the differences in the concentration and the route taken by the odorant, Sakai et al. (2001) conclude that there are few practical differences between the two types of olfaction. This seems to be especially true for a scent that can associated with food. For example, a peppermint or cinnamon odor inhaled orthonasally should have the same effect if breathed in retronasally.

In this research, the scents will be administered to the experimental group using chewing gum. Chewing gum is an affordable alternative to expensive scent diffusing machines, and allows the study to take place in a large environment (i.e., mall versus a single room). Chewing gum is noted for effects on memory (Baker et al. 2004, Wilkinson, Scholey and Wesnes 2002). In a between subjects experiment, Wilkinson, Scholey and Wesnes (2002) found that respondents who chewed gum compared to chewing a sham or not chewing anything, showed better results on episodic memory and working memory tests. In a within subjects test Stephens and Tunney (2004), replicated the findings from Wilkinson, Scholey and Wesnes (2002) while exploring the role of glucose delivery in increasing blood flow to the brain. Stephens and Tunney (2004) found that chewing gum improves language-based attention and processing speed. There is evidence for context effects of chewing gum on memory (Baker et al. 2004). The effect is most pronounced when the respondents are asked to recall 24 hours after the initial encoding took place, while chewing gum (Baker et al. 2004). Baker et al. (2004) showed that there was no significant difference for immediate and delayed recall tests between groups chewing or sucking on a gum at both encoding and recall steps.

H1: Participants in the gum chewing conditions will have higher recall and recogntion scores compared to those participants in the no-gum condition.

Effects of Peppermint Scent

Raudenbush, Corley and Eppich (2001) found evidence for a physiological effect of peppermint. A within subjects comparison showed that participants ran significantly faster and did significantly more push-ups when an adhesive strip placed under their nose was scented with peppermint compared to the unscented condition. In a between subjects experiment,

Raudenbush et al. (2004) found that participants exposed to peppermint administered via nasal cannula while being subjected to a five minute cold pressor test showed increased oxygen saturation levels and lower blood pressure than those in the control group (unscented air). The members of the peppermint group rated their pain as lower and their pain tolerance as higher compared to the control group (Raudenbush et al. 2004). Speed and accuracy in a typing task improved when the room was scented with peppermint compared to when it was not (Barker et al. 2003). Exposure to peppermint can lead to reduced fatigue ratings and higher vigor ratings (Goel and Lao 2006, Raudenbush, Meyer, and Eppich 2002) and lower workload ratings (as measured by the NASA-TLX scale; Raudenbush, Meyer, and Eppich 2002, Raudenbush et al. 2004). Taken orally, mint extract has been found to lower blood lactate levels (Sönmez et al. 2010). Ho and Spence (2005) found that peppermint increased performance on a difficult task but not for an easy task. There is evidence that peppermint increases physiological arousal, which leads to greater attention to the task that the participants are completing (Barker et al. 2003, Raudenbush, Meyer and Eppich 2002, Raudenbush et al. 2004). In applying these findings to a marketing context in which consumers are exposed to peppermint scent, the following outcomes are expected:

H2: Peppermint scent will increase endurance in participants as measured by shopping time, workload and fatigue scales, pedometer readings, and route length in the tracing task compared to the participants in the no-scent condition.

Effects of Cinnamon Scent

Cinnamon has been found to be effective in evoking nostalgic memories (Orth and Bourrain 2008). A simulated cinnamon bun odor has been related to higher scores on the

Remote Associates Test, a creativity assessment (Isen, Ashby and Waldron 1997). A cinnamon bun scent emanating from a bakery led to more displays of kindness from people in a shopping mall—as measured by providing another customer with change for a 1$ bill—compared to a lack of ambient scent (Baron 1997). The same effect was noted when the ambient scent was roasted coffee. In a within subjects design, Zoladz and Raudenbush (2005) found that cinnamon administered both orthonasally and retronasally can improve respondents' scores on attention and memory tasks. The study compared orthonasal odors, administered via tubes inserted up the nostrils, to retronasal odors, administered with chewing gum. When chewing cinnamon gum, participants scored significantly higher on a design memory task as compared to when not chewing gum or when chewing cherry gum (Zoladz and Raudenbush 2005). The administration of cinnamon and peppermint gum provided significantly higher scores in a delayed memory task as compared to not chewing gum at all (Zoladz and Raudenbush 2005). As for the orthonasal tests, peppermint led to significantly smaller drop-off of vigor and a bigger decline in fatigue than when cinnamon odor was piped through (Zoladz and Raudenbush 2005). Based on these findings, the following effects of cinnamon scent are expected in a marketing context:

H3: Cinnamon will increase attention scores in participants compared to those not exposed to a scent.

METHOD

Pretest

A pretest was conducted in order to find a gum or mint that would last throughout the experimental shopping task (around 45 minutes). This pre-test consisted of asking two raters to chew and note the length of comfortable and flavourful chewing time procured by one piece of several brands of gum. The raters were asked to chew the gums until the flavour was completely gone or the gum became too hard to chew. For the mints, the raters were asked to suck on each mint until it had completely dissolved (see Table 1). The raters agreed that the soft-chew gums were better as opposed to hard chew gums for two reasons: the soft chew lasted longer and was .5 grams larger (1.9 grams vs. 1.4 grams) than the soft chew. The brand chosen for both the peppermint and cinnamon conditions was Wrigley's Extra. This allows for the use of the same brand for both the peppermint and the cinnamon condition. In addition, the spearmint flavour of the same brand of gum had been used in previous studies looking at the effect of gum on cognition (Baker et al. 2004, Stephens and Tunney 2004, Wilkinson, Scholey and Wesnes 2002;). Before the main study began, Wrigley's reformulated its Extra line of chewing gum and eliminated the cinnamon flavour. As a result, a substitute was required for the cinnamon condition. The substitute was Dentyne Fire soft chew "Cinnamon Spice". Another test determined that both Dentyne and Extra cinnamon gums were similar in both chewing time and flavour intensity. Two raters, one from the first pre-test and a new rater, chewed both gums as per the method described above. This additional pretest stage was important, as Scholey (2004) suggests that the failure of Tucha et al. (2004) to replicate the findings that gum chewing affects memory (Wilkinson, Scholey and Wesnes 2002) may have been due to the use of a different brand of gum from a different country (Dandy Sakiz rather than Wrigley's) that offered a different level of chewing resistance. Evidence for this lies in the fact that Tucha et al. (2004) did not note a significant difference in heart rate for the gum chewers while Wilkinson, Scholey and Wesnes (2002) did (Scholey 2004). It has been hypothesized that the effect of gum on

memory may be due to an increase in blood flow to the fronto-temporal region of the brain, that may be caused by an increase in heart rate from chewing gum (Wilkinson, Scholey and Wesnes 2002).

Design and Sample

The experimental design is a one factor between participants design with three levels: peppermint gum, cinnamon gum, and no gum (control). A non-flavored gum (or sham) was not chosen as it has been shown to hinder performance because it requires extra attention due to it being an unfamiliar activity (Wilkinson, Scholey and Wesnes 2002). Eighty-seven students (65% female, average age = 23.74 years) participated in the study. Students were recruited through class visits and a classified ad ran for one week in a free weekly newspaper offering participants a reward of $15 (this was raised from an initial offering of $5). Students recruited from marketing classes participated for course credit instead (2 to 5% of their final grade). The no gum condition contained 25 participants, the peppermint condition contained 32 participants, and the cinnamon condition contained 29 participants with one participant being excluded for having guessed the hypothesis.

Experimental Procedure

Students who responded to the request for participation were scheduled to meet the researcher in the food court of an indoor mall (M1) in a large eastern Canadian city. Participants would be answering the questionnaire in the food court itself. In order to avoid any odors and crowds associated with the lunchtime rush, the meetings were scheduled to begin between 10:15, fifteen minutes after the mall opened, and 10:45, and between 1:45 and 2:45. Weekends, holidays and days with special events within and around the malls were avoided. Upon arrival,

the participant was briefed on the shopping study. Participants were told that the purpose was to study consumer behaviour in shopping malls. The main task took place in two adjacent indoor malls (M1 and M2) and participants were asked to use the indoor tunnels if going from M1 to M2 and not to go outside. This was to avoid any effect of fresh air on endurance. Participants were told to shop as long as they liked, just as they would for a regular shopping outing. There was no specific shopping goal provided to participants. If participants asked if there was a minimum or maximum shopping time, they were once again instructed to shop as they normally would. Participants were asked not to smoke, drink or eat while shopping, to avoid confounding effects and to avoid any interference with the gum. Any participant that could not fulfill this request was asked to come back when they could. This resulted in eight participants finishing a drink before starting and four participants eating before starting the study. The participants were then asked to sign a consent form for the shopping study. At this point the participant was assigned a pedometer and instructed to place it on the waistband of their pants or to clip it somewhere on their clothes near the waist. Next, the participants were asked if they would like to take part in an unrelated taste test. The participant was told that they could chew the gum while completing the shopping task and come back and fill out a questionnaire about gum chewing (along with the one for the shopping task). If the participant did not accept to participate in the taste test they became part of the control group. If the participants agreed to participate in the taste test they would be asked to sign another consent form which warned of ingredients including aspartame, butylated hydroxyanisole (BHA) and butylated hydrohytoluene (BHT) which may cause health problems, and then offered a wrapped piece of gum on a plastic plate. The peppermint condition was fulfilled first, followed by cinnamon, the remaining participants served as control. The participants were then told they were free to start shopping.

When the participants returned from shopping, the time spent shopping was noted along with the number of steps on the pedometer. The participants in the treatment conditions were given the gum questionnaire first, while those in the control group started immediately on the shopping questionnaire (the shopping questionnaire and the gum questionnaire were written in different fonts to reinforce the suggestion that both tasks were unrelated). After the questionnaires were returned the respondents were given their reward for participating.

Measures

Control Variables. Each participant's shopping time was recorded. The shopping time is measured as the time that the participant leaves the researcher's table to the time that they come back and present themselves to the researcher. Individual characteristics such as gender and age can affect one's ability to smell. For example, there is evidence that women are superior to men when it comes to identifying odors (Gulas and Bloch 1995). These variables were all noted in the questionnaire.

As part of the gum questionnaire, participants were asked about the amount of caffeine they had consumed during the day leading up to the task, along with their smoking and exercise habits. These three factors could each have either a positive or negative effect on their endurance. Participants were asked how often they shopped at malls, and how often at malls M1 and M2 specifically. A high level of familiarity with malls—and M1 and M2 in particular—could help participants be more efficient and therefore conserve energy and be more enduring.

Manipulation checks. Participants in the two treatment conditions were asked to guess the flavor of the gum they had chewed throughout the study. They also rated gum pleasantness (unpleasant/pleasant) and intensity (very weak/very strong) on seven-point scales. Bone and

Ellen (1999) suggest that two important factors for an odor are its pleasantness and its intensity. In a review of 31 tests, 11 (35.5%) proved to be significant. The authors suggest that a high intensity of a pleasant scent can render it unpleasant while a more pleasant scent will strengthen positive responses. As Baker et al. (2004) found evidence for a context dependent effect of gum on memory, participants in the treatment conditions were asked if they were still chewing the gum while filling out the questionnaires after the shopping task. Those who were not still chewing were asked at which point during the task they threw the gum out and how long they had chewed the gum up to that point.

Since differences in chewing experience were cited as a possible reason for the diverging results of Stephens and Tunney (2004b) and Wilkinson et al. (2002; see Scholey 2004), participants were asked what their preferred flavor was, how long a gum usually lasts, how often they chew gum, how many pieces at a time, hard or soft chew, along with the brand they regularly chew and in which situations they chew. The rest of the gum questionnaire was populated with filler questions in order to reinforce the belief that the questions were related to the gum chewing and not the shopping task. These include listing positive and negative aspects of gum chewing and any gum ingredients the participant tries to avoid.

Recognition. Recognition and recall were measured by asking the respondents to match a store name to its location in the mall using a map of the mall. This task was repeated for both malls that were part of the shopping task. For M1 the respondent was required to locate eight stores, four of which were not located in the mall. For M2, seven stores made up the list with three of those stores not actually in the mall. If the participant did not actually visit the mall they were asked to check a box and move onto the next page of the questionnaire.

Attention. Attention was assessed by asking the respondent to list all of the items they touched or looked at, at which store and the price of the item. The number of complete items listed comprised the attention score.

Endurance. Endurance was measured three ways (1) time spent during the shopping task; (2) a pedometer that counted the number of steps taken during the task, (3) distance in centimeters of the path respondents traced on a map of the mall which represented their movement during the shopping task. Respondents were asked to mark the path they had taken through M1 and M2 on a paper map of both malls and note any store (in chronological order using numbers or letters) in which they had spent more than ten minutes. The paths were then measured in centimeters using a tailor's (i.e. flexible) measuring tape.

Fatigue. The NASA-TLX (Hart and Staveland 1988) has been used to measure the effect of a scent on workload perceptions (Raudenbush, Meyer and Eppich 2002, Raudenbush et al. 2004, Zoladz and Raudenbush 2005). The NASA-TLX was thus used to measure the perception of workload. Frustration level was left off from the original scale because the task was not expected to cause any frustration. The performance item (poor/good) was included in the questionnaire but was left off the analysis because it was formulated in a double-barreled manner. For the analysis, this left six items measured on seven-point scales: overall workload, task difficulty, time pressure, mental effort, physical effort, and stress level. The reliability analysis showed lower than .5 for stress level (.477) and mental effort (.376). The factor analysis showed two factors with overall workload, task difficulty, time pressure, and physical effort strongest on the first factor. Subsequently, both mental effort and stress level were dropped. This left a unidimensional factor with a Cronbach's α of .78. A four-item seven-point Likert

sub-scale of the NASA-TLX was used to measure fatigue (Hart and Staveland 1988). The items were exhausted/alert, tired/fresh, weary/vigorous, and worn out/energetic. The scale has a Cronbach's α of .91 and is unidimensional.

Mood. Mood was assessed using the Mood Short Form (Peterson and Sauber 1983). The scale consists of four items (two reverse coded) on a seven-point Likert scale anchored strongly disagree/strongly agree. The items are: currently I am in a good mood; as I answer these questions I feel cheerful; for some reason I am not comfortable right now; and at this moment I feel edgy or irritable. The scale has a Cronbach's α of .70, with all four items loading on one factor.

Attitudes toward the Retail Environment. In measuring attitude towards the layout of the mall, a scale from Wakefield and Baker (1998) was used for each of the two malls visited during the shopping task. For mall M1 the four-item layout scale used a seven-point Likert scale anchored strongly disagree/ strongly agree. The original scale had a Cronbach's α of .70. The following item "the layout of the mall makes it easy to get to the food areas" was removed due to an item-total correlation of .299, resulting in a Cronbach's α of .75 (this may be due to the fact that the participants were asked to meet in the food-court area of M1). The remaining three items formed one factor. For M2 the four item scales had a Cronbach's α of .77. All four items created one factor. Attitude towards the variety of each mall was measured by a three item scale with a seven-point Likert scale anchored strongly disagree/strongly agree (Wakefield and Baker 1998; M1: Cronbach's α = .71; M2: Cronbach's α = .52).

PAD. Mehrabian and Russell's (1974) eighteen item semantic differential scale was used to measure the emotional response of the participants toward the environment. Six items measured pleasure, arousal, and dominance, respectively. The Cronbach's α for the pleasure dimension was .88. For the arousal dimension Cronbach's α was .78; for the dominance dimension the Cronbach's α is .76. For the complete scale, Cronbach's α was .90.

Personality and Shopping Scales. Price consciousness was measured by a three-item seven point Likert scale (Ailawadi, Neslin and Gedenk 2001) which is anchored by strongly disagree and strongly agree. The Cronbach's α for this scale is .80. Need to explore was measured by seven items on a seven-point Likert scale anchored strongly disagree/strongly agree (Cronbach's α = .74). The factor analysis showed the reverse coded "I have little interest in fads and fashion" and "I hate window shopping" weighted on a second factor. They were removed so the final Cronbach's α of the five item scale is .77. Variety seeking was measured in order to rule out any possible effect it may have on the number of steps taken or on shopping time. The scale from Donthu and Gilliland (1996) includes three items measured on a seven-point Likert scale anchored strongly disagree/strongly agree (Cronbach's α = .74). An eighteen item need for cognition scale was included. This was to rule out any possible effects of NFC on memory or attention (Cronbach's α = .79).

Money Spent. Participants indicated how much money they spent during the task.

Hypothesis Guessing. At the end of the shopping questionnaire the participants were asked what they believed to be the purpose of the study.

RESULTS

Hypothesis Guessing and Manipulation Checks

One of the 87 participants guessed the purpose of the study. The data collected from this participant was removed for the analysis. According to Gulas and Bloch (1995), one of the requirements for ambient scent to have an influence on consumer behavior is that it has to be perceived. Participants were asked to state what flavor of gum they chewed during the task as a check to ensure that the participants have indeed sensed the presence of the flavoured gum. In the peppermint condition 30 participants correctly guessed the flavor of the gum they were given to chew, one participant wrongly identified the gum, and another did not answer. In the cinnamon gum condition 22 participants guessed correctly, while six guessed wrong and one did not know. Of the two participants that answered either 'I don't know' or that did not guess, both rated the gum they were chewing on intensity and pleasantness. Therefore it is assumed that every one of the participants in the gum condition perceived the stimulus.

Pleasantness ratings did not differ between cinnamon and peppermint gum chewers. There was a significant difference for intensity ratings. Participants in the cinnamon (mean=6.07) condition rated their gum as significantly more intense ($F(1,60)=12.45$, $p=.001$) than those chewing peppermint gum (mean=5.16) (see Table 5).

Hypotheses 1 and 3: Memory and Attention

H1 proposed that chewing gum would increase consumers' attention and memory compared to a no gum control group. A comparison of recognition levels across gum chewers and the control group was not significant ($F(1,78)=.001$, $p=.97$). H1 was thus not supported.

H3 proposed that the presence of a cinnamon scent would increase attention and memory scores as measured by the number of items listed and recall and recognition tasks, respectively. Attention as measured by the number of products listed as being touched during the shopping task was not significant ($F(2,82)=.98$, $p=.38$). In addition, no effect on memory was found for the recognition tasks for either M1 ($F(2,69)=.15$, $p=.86$), M2 ($F(2,59)=.81$, $p=.45$) nor for both malls together ($F(2,77)=.01$, $p=.99$). H3 was not supported.

Hypothesis 2: Endurance

In H2, it was suggested that the presence of a peppermint scent would increase endurance as measured by the number of actual time spent shopping, lower workload and fatigue ratings, steps taken, as well as a longer (in terms of cm) tracing on the provided maps.

Time Spent Shopping. Actual time spent shopping is defined as the time elapsed between participants leaving the researcher and the time they come back. The average time spent shopping was higher ($M=63.72$, $SD=25.39$) for the peppermint condition, than for the cinnamon condition ($M=49.86$, $SD=20.76$) or for the control condition ($M=47.13$, $SD=19.04$). This is significant ($F(2,82)=4.72$, $p<.05$). Perceived time spent shopping is significant ($F(2, 82)=3.67$, $p<.05$). It is interesting to note that participants in both the gum conditions perceived shopping for a shorter period than they actually did, whereas those in the control condition thought they shopped longer (see Table 2). This is in line with Raudenbush et al.'s (2004) suggestion that peppermint may work by distracting the participant from the task, thereby leading the participant to lose track of time or pay less attention to feelings of fatigue.

Fatigue and Workload. Fatigue as measured by the NASA-TLX sub-scale was significant between groups at the .1 level ($F(2,82)=2.45$, $p=.09$). Peppermint gum chewers felt significantly less fatigued than the participants chewing cinnamon gum ($p=.04$) or those not chewing gum ($p=.07$; see Table 3). Similar to the way it seems to have distracted from time keeping, the peppermint gum seems to have distracted the participants from any fatigue that the task might have induced. This result is even more interesting when taking into account the finding that the peppermint group actually spent more time completing the task but were significantly less fatigued. However, if this were indeed the case one would have expected a significant difference in self-reported fatigue between the no-gum group rather than the cinnamon group. The effect on workload was not significant ($F(2,82)=1.91$, $p=.16$).

Steps Taken. The number of steps taken was measured by placing a pedometer on the participant's waistband. Due to placement errors (i.e., too tight against the body), one dead battery, and three non-returned pedometers, the number of steps was recorded for only 65 of the 86 eligible respondents. The number of steps taken was not significant ($F(2, 64) = .21$, $p=.81$).

Map Tracing. The map tracing distance (i.e., distance in centimeters) was significant between groups at the .1 level ($F(2, 76)=2.94$, $p =.06$) but not in the hypothesized direction. That is, on average those with the longest map trails were in the no gum group. Participants in this group traced longer paths (in cm) than those in the peppermint group ($p=.08$) or those in the cinnamon group ($p=.10$; see Table 4). This result suggests that perhaps, as the participants lost track of time in the gum conditions they lost track of the paths they took during the task. In other words, the participants in the gum conditions may have been somewhat distracted while shopping and did not note their whereabouts as well as those in the no gum condition. In sum,

there was partial support for H2: Consumers in the peppermint condition spent more time shopping but felt less fatigued than consumers in the cinnamon or control conditions. No significant effects emerged in terms of steps taken and map tracing, however.

Additional Analysis. Further analysis found no effect of age or gender. The presence of hunger and the consumption of caffeine showed no effect, either. There was no difference between mood means across conditions. Familiarity with M1 and M2, and malls in general had no effect. There was no difference in chewing experience between both gum conditions.

Test of potential moderators. No moderating effect was found from need for cognition, variety seeking behavior, or tendency to explore. Money spent and price consciousness were tested and found to be not significant as moderators.

Test of potential mediators. Pleasure and arousal were tested as mediators of the relationship between condition and time spent shopping, using the Preacher and Hayes (2004) model. No effect for either was found. This suggests that it was not the pleasure of gum chewing nor the arousing effect that led to more time spent shopping. Pleasure does not seem to differ between conditions suggesting that the significant difference in the intensity of the gums does not take away from the pleasure of chewing. That is, the cinnamon gum might not have been so intense that it would take any chewing pleasure away from the participant.

Discussion

The findings from this experiment show that odors administered orthonasally can affect consumer response. Most notably, the administration of a peppermint scent increased participant

endurance and decreased fatigue. The analysis shows evidence that peppermint scent can affect perceived time. However, no effect was found in the length of the shopping route (map tracing) or number of steps taken.

Raudenbush et al. (2004) suggests that the scent of peppermint can actually distract from the task at hand. This allows the participant to forget about time or fatigue signals that may normally cause them to stop shopping or start thinking about how tired they are. It seems possible that if the scent of peppermint can distract from timekeeping or from fatigue signals it may affect the perception of places visited. In other words, a participant exposed to the scent of peppermint may not have noted their surroundings as much as a participant who was not chewing peppermint gum. This may help explain the unexpected, albeit un-significant findings of the map tracing task. Peppermint gum chewers may simply have been distracted from noting the stores they passed or how far into the reaches of the mall they actually roamed.

The hypothesis that cinnamon would increase attention and memory as first reported by (Zoladz and Raudenbush 2005) was not supported. Fatigue was significant when comparing the peppermint group to the cinnamon group rather than when comparing the former to the no gum group. That is, cinnamon seems to have had a negative effect on participant fatigue. The relative unpopularity of cinnamon flavored chewing gum may help explain this finding. It is noted above that the brand of cinnamon soft-chew gum originally chosen for use in the experiment was discontinued shortly after being selected. During the task the researcher noted several negative reactions to the cinnamon gum. After being assigned a piece of gum some participants looked at the researcher and said that they did not like cinnamon gum. No such reaction was noted in the peppermint group. This unpopularity may be explained by the difference in intensity between the two gum conditions. Perhaps cinnamon gum exceeds the preferred intensity threshold for most chewers, but as mentioned above, without removing a

significant amount of pleasure. This may also be reflected in the answers given by the participants when asked to note their favorite gum flavor. Table 6 shows the frequency of responses to this question. Mint is by far the favorite, being mentioned 53 times. Included in the mint category, peppermint was listed 5 times and mint was listed 30 times. Comparatively cinnamon was only listed 8 times and 6 of these came from participants in the cinnamon condition. Until recently, with the launch of *Wrigley's 5 Flare* cinnamon flavored gum, a cinnamon flavored gum has not been introduced to the Canadian market for at least three years. It is interesting to note that *5 Flare* gum has been on sale in the United States since 2007 but was only launched in Canada in 2010, 2 years after the *5* gum series was officially launched in Canada. In fact, 6 flavors of *5* gum including 3 mint flavored gums, 2 fruit flavored and 1 bubble gum flavor, were available for purchase before the cinnamon flavor. Several other mint and fruit flavored gums have been introduced by other brands including *Trident's Layers* gum.

The results from the experiment did not show any support for the findings of previous research into the positive effect of gum on memory. The above findings are in line with the null findings of Tucha et al. (2004) as opposed to Baker et al. (2004), Stephens and Tunney (2004) and Wilkinson, Scholey and Wesnes (2002), all of which found evidence for a positive effect of gum chewing on memory. This study only tested immediate recall and not delayed recall. As discussed above, Baker et al. (2004) found the greatest effect of gum chewing on memory when the participants were asked to recall 24 hours after encoding.

In summary, peppermint administered orthonasally using a piece of gum can have an effect on behavior. Most notably it effects the perception of time and fatigue. Cinnamon gum showed no effect on attention and memory, which contradicts Hypothesis 2. Finally, no evidence was found for an effect of gum on memory, a finding that runs counter to most of the previous literature in this area.

SUMMARY AND CONCLUSIONS

Summary

Scent is arguably one of the most powerful atmospheric factors. Previous studies have found positive effects of peppermint scent on endurance (Raudenbush, Corley and Eppich 2001) and positive effects of the scent of cinnamon on attention and memory (Zoladz and Raudenbush 2005). In a field study conducted with eighty-seven students, peppermint was found to positively effect time spent shopping, compared to cinnamon and control conditions and significantly lower fatigue ratings as compared to the cinnamon group. This research provides evidence for the effect on consumer responses of retronasally administered scents in retail settings.

Limitations and Directions for Future Research

There exists a difference between orthonasal and retronasal olfaction. This difference concerns whether the odor is emanating from food in the mouth or a non-food ambient scent. This difference affects the perception threshold. That is, scents from inside the mouth will normally be more concentrated and as a result odors perceived orthonasally are at higher concentrations than when perceived retronasally. The question arising from this study is whether an ambient peppermint scent would have the same effect on endurance. That is, the participants may have a different reaction to the scent if it comes from the environment. As an ambient scent, peppermint could be perceived as coming from a teashop or from a store selling bath products. This perception may affect the efficiency of the scent or may even cause consumer to believe they are being manipulated. In this study, gum was chosen as a non-environmental,

inexpensive, and simple way to administer scent. A future study could diffuse peppermint or cinnamon scents throughout a large shopping mall or store such as IKEA, where the average shopping time is almost 2 hours (Strauss 2010). The present study was a between subjects design. A future study could use a within subjects design and have each participant shop 3 times—once in each condition. However, such a study would be time consuming and potentially fatiguing for the participants.

Measurement Issues. Several measures could be improved upon in order to allow for a better analysis. A more accurate pedometer could be used for future studies. Problems with the pedometer ranged from it not being possible to hang it from a participants' hidden waistband, hanging too securely or having a handbag or purse hit the pedometer as the person walks. A future study could use a GPS device or an RFID tag in order to more accurately track the shopper's whereabouts. This would allow the researcher to compare whether a participant exposed to peppermint would choose to use the stairs rather than the more energy conserving escalator or elevator. The path taken through the mall along with time spent in each store could be more easily compared. This could help explain the unexpected direction of the results in the map tracing task. The maps pose a potential problem as well. It was not possible to mark the escalators, elevators and stairways, making it difficult for the participants to note where they might have changed floors. It is possible that this may have led to over- and under-estimations. For example one participant may have drawn through a mall level they did not visit in order to indicate that they changed floors, while another may have drawn around the floor.

In order to measure endurance and fatigue more accurately, participants could be asked to wear real-time heart rate monitors or calorie counters. This would allow the researcher to look at

exertion throughout the task and allow for a comparison of actual exertion between subjects and perhaps help explain the effect of peppermint gum on perceived fatigue.

Chewing time. Another limitation comes from the chewing gum itself. Not everybody chews the same way. Chewers can differ in terms of chewing force and chewing frequency (Overjero-Lopez 2004). It is possible that some participants kept the gum in their mouths passively, keeping the flavor within the gum, while others chewed the gum hard, helping to release the flavor from the gum sooner.

Gum Control. Participants in the control condition could have been asked to complete an adapted gum questionnaire including questions such as chewing experience and flavor preference. This would have allowed for further analysis. For example, a comparison between high experience gum chewers within the control and the gum-chewing conditions. Other key questions that were not asked of the control group, but were included in the gum questionnaire were exercise, caffeine and smoking habits.

Delayed Recall. This study did not find any effect of gum chewing on memory. Baker et al. (2004) found that gum chewing could have context dependent effects on memory. This effect seemed more pronounced twenty-four hours after encoding. A future study could measure the recall and recognition of stores visited and products touched one day after the main experiment.

Implications

This study is the first to look at endurance in a shopping context. Overall, average shopping times for previous studies have ranged from 2.17 minutes (Mitchell, Kahn, and Knasko

1995), and 9.7 minutes (Spangenberg, Crowley and Henderson 1996) to 19.99 minutes (Spangenberg et al. 2006) , whereas the current study has an overall average shopping time of 54 minutes. This may be due to the fact that it is a field study while previous studies (aside from Spangenberg et al. (2006)) have been lab studies with simulated retail environments.

This study has implications for the use of taste tests or sampling in malls and grocery stores. A grocery store manager may be able to choose sampling flavours based on average shopping times throughout the week. For example, a manager may want to provide samples of products containing peppermint or menthol (e.g. a peppermint tea) on Thursday nights where one might expect longer lines or crowded aisles. This could possibly lead to a reduction in abandoned carts or products ditched at the cash wrap. Another possible application could be handing out candy canes during busy holiday hours. Once again, the purpose would be to distract the shopper from the long lines and crowded aisles.

The use of taste tests or samples allows the retailer to effectively target individual shoppers while avoiding those shoppers with multiple chemical sensitivities (MCS). Unlike sounds, which can be filtered by earphones, an ambient scent is virtually unavoidable for consumers. This can cause problems for those with MSC, such as migraine sufferers. Taste tests effectively allow consumers to self-select themselves for exposure to the stimulus. As a result, a retronasal scent administered via a taste test may even allow for the possibility of personalized atmospherics.

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Appendix A

SHOPPING STUDY INSTRUCTIONS

Participant Instructions

Thank you for participating in this research project. The goal of this study is to examine how consumers shop in the Montréal Underground, more specifically at the Place Montréal Trust (mall with Indigo and Zara) and the Montréal Eaton Center.

Description of Task

You will receive a pedometer. A member of the research team will help you calibrate it. After the pedometer has been calibrated you can start shopping or browsing. You can shop for as long as you like. It would be preferable if you try and make your way around the mall. Please stay within the limits of the Place Montreal Trust and the Montréal Eaton Center. If you are not sure of the limits please ask a member of the research team.

- The task is to be completed individually.
- Please do not go outside during the task.
- Please do not eat or drink anything during the task.
- You are not obligated to buy anything.

When you decide to come back to where the research team is located you will be asked to fill out a questionnaire which should not take more than 10 minutes.

Once again thank you for your participation.

Appendix B

Thank you for participating in the *Chewing Gum Taste Test*. Please answer the following questions.

1) What flavour of gum did you chew today?

_____

2) Indicate on the scale how strong the initial flavour of this gum was.

Very Weak 1 2 3 4 5 6 7 Very Strong

3) Indicate on the scale how pleasant this gum's flavour was.

Unpleasant 1 2 3 4 5 6 7 Pleasant

4) How long did this gum's flavour last until it was completely gone? _____ minutes

5) What flavour(s) of gum do you normally chew?

_____

_____

6) Are you still chewing your gum?

Yes
No

7) If you are not still chewing your gum, please explain where and how did you disposed of it.

_____

8) How long did you chew your gum before you threw it out?

_____ minutes

9) How long does your gum usually last?

_____ minutes

10) How long would you like a piece of gum to last?

_____ minutes

11) How often do you chew gum?

Never
Rarely
1 - 2 pieces a week
1 piece a day
2 – 3 pieces a day
4 or more pieces a day

12) When you chew gum, how many pieces do you chew at a time?

Half a piece
1 piece
2 pieces
More than 2 pieces

13) Which type of gum do you normally chew?

Hard chew (with a hard outer shell)
Soft chew

14) Which brand of gum do you normally chew? (Please check all that apply)

Trident
Extra
Mentos
Clorets
Dentyne
Excel
Nicorette
Other (please specify) _____

15) Why do you normally chew gum? (Please check all that apply.)

Help stop smoking
Help concentrate
Prevent hunger
Freshen breath
Nothing better to do
Prevent thirst
Whiten teeth
Just for the taste
Other (please specify) _____

16) In what situations do you normally chew gum? (Please check all that apply).

During physical activity
During homework
Before meeting someone
While studying
After eating
During exams
Other (please specify) _____

17) List any negative aspects of gum chewing that you can think of.

_____

_____

_____

_____

_____

18) List any positive aspects of gum chewing that you can thing of.

_____

_____

_____

_____

_____

19) What chewing gum ingredients do you try to avoid, if any?

_____

_____

20) How often do you consume products with caffeine? (e.g. coffee, energy drinks)

Never
Rarely
Once or twice a week
Once a day
Twice a day
More than twice a day

21) Did you consume anything with caffeine before coming here today?

Yes
No

22) If you answered yes, please specify what type of product you consumed.

_____

23) How often do you participate in a form of exercise?

Never
Once or twice a month
Once or twice a week
Three or more times a week
Everyday

24) Do you smoke?

Yes
No

25) If you smoke, did you smoke before coming here today?

Yes
No

26) At the present moment, are you hungry?

Yes
No

27) What effect does chewing gum normally have on your hunger?

Makes me hungrier
Makes me less hungry
Has no effect on my hunger

28) How old are you?

Under 18
18 – 24
25 – 29
Over 29

Thank you for your help!

Appendix C

SHOPPING STUDY QUESTIONNAIRE

Please answer the following questions about the time you have spent at *Place Montreal Trust* and the *Montréal Eaton Center*.

1) Please rate to what extent you agree or disagree with each of the following statements.

Currently, I am in a good mood.

Strongly disagree	1	2	3	4	5	6	7	Strongly agree

As I answer these questions I feel cheerful.

Strongly disagree	1	2	3	4	5	6	7	Strongly agree

For some reason I am not comfortable right now.

Strongly disagree	1	2	3	4	5	6	7	Strongly agree

At this moment I feel edgy or irritable.

Strongly disagree	1	2	3	4	5	6	7	Strongly agree

2) Please rate today's shopping task on the following scales:

Overall workload
The total workload associated with the task, considering all sources and components.

Low	1	2	3	4	5	6	7	High

Task Difficulty
Whether the task was easy or demanding, simple or complex, exacting or forgiving.

Low	1	2	3	4	5	6	7	High

Time Pressure
The amount of pressure you felt due to the rate at which the task elements occurred. Was the task slow and leisurely or rapid and frantic?

None	1	2	3	4	5	6	7	Rushed

Performance
How successful you think you were in doing what we asked you to do and how satisfied you were with what you accomplished.

Failure	1	2	3	4	5	6	7	Perfect

Mental Effort
The amount of mental and/or perceptual activity that was required (e.g. thinking, deciding, calculating, looking, searching, etc.)

None 1 2 3 4 5 6 7 Impossible

Physical Effort
The amount of physical activity that was required.

None 1 2 3 4 5 6 7 Impossible

Stress Level
How anxious, worried, uptight, irritated, and annoyed versus secure, gratified, content, and complacent you felt.

Relaxed 1 2 3 4 5 6 7 Tense

Fatigue
How tired, weary, worn out, and exhausted or fresh, vigorous, and energetic you felt.

Exhausted	1	2	3	4	5	6	7	Alert
Tired	1	2	3	4	5	6	7	Fresh
Weary	1	2	3	4	5	6	7	Vigorous
Worn Out	1	2	3	4	5	6	7	Energetic

3) How long do you think you were shopping today?

_____ minutes

4) Approximately how much money did you spend on your shopping trip today?

_____ dollars

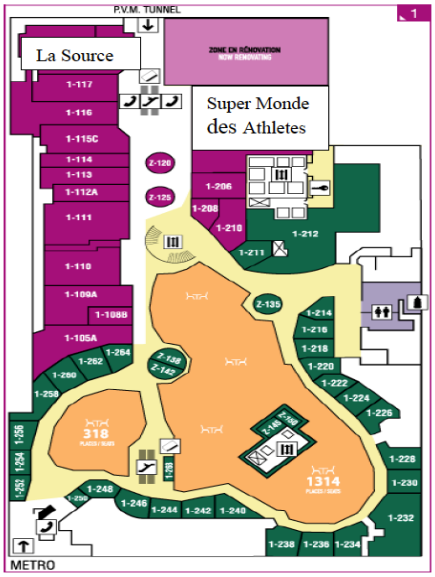
5) On the maps provided below, please mark the location of the following stores by placing the letter denoting the store on the map below. Of the stores listed, <u>cross off the ones which are not located at Place Montréal Trust.</u>

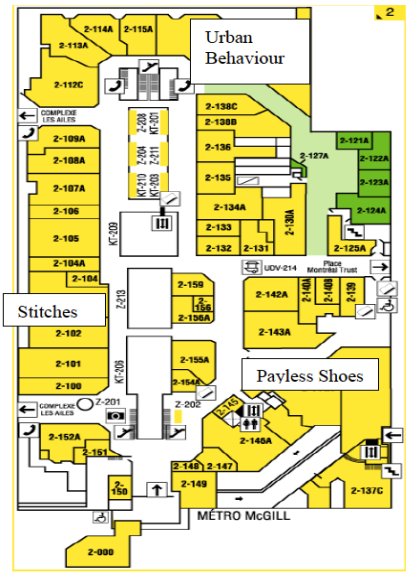
A. *Centre du Rasoir*
B. *Bikini Village*
C. *Foot Locker*
D. *Monde des Athlètes*
E. *Lens Crafters*
F. *Omer DeSerres*
G. *Archambault*
H. *Blockbuster*

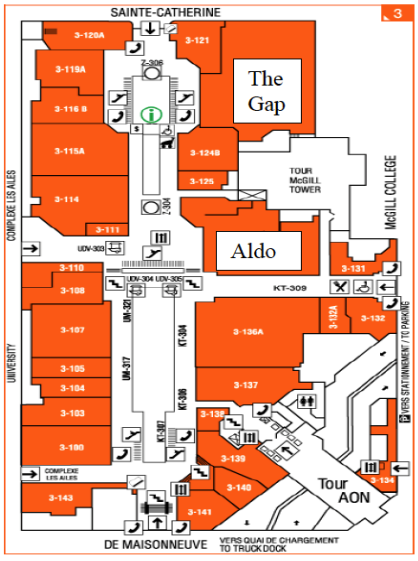
6) On the maps provided on the next page, please mark the location of the following stores by placing the letter denoting the store on the map below. Of the stores listed, <u>cross off the ones which are not located at the Montréal Eaton Center.</u>

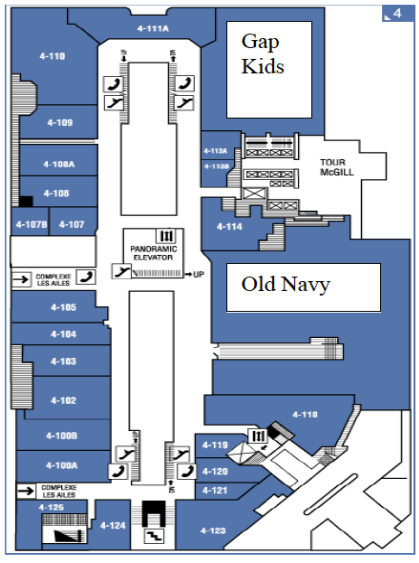
□ **If you did not visit the Montréal Eaton Center today, please check the box and go to the next question.**

A. *Dynamite*
B. *HMV*
C. *Levi's*
D. *Banque Royale*
E. *Espace Bell*
F. *American Eagle*
G. *Bombay*









7) Please trace your visit on the maps provided. Please number in chronological order those stores or areas where you spent more than 10 minutes. For example, if your first stop was the Body Shop and you spent 10 minutes there you would place the number 1 at the corresponding place on the map. Note movement to get to another level of the mall by connecting the maps of the corresponding floors with arrows.

8) Please list any products (including food and beverages) that you bought at either *Place Montreal Trust* or *the Montréal Eaton Center* today.

_____

_____

_____

_____

_____

_____

_____

9) Please list as many products that you looked at or touched today as you can while you were shopping at *Place Montreal Trust* and the *Montréal Eaton Center.* Where possible, list the name of the store where the product is available and the product's price.

Product Description	Store	Price
_____	_____	_____
_____	_____	_____
_____	_____	_____
_____	_____	_____
_____	_____	_____
_____	_____	_____
_____	_____	_____
_____	_____	_____

10) Please list anything else that you feel is worth noting or that caught your attention.

_____

_____

11) Please rate the *Place Montreal Trust* on the following scales:

The layout of the mall makes it easy to get to the stores you want.

Strongly disagree 1 2 3 4 5 6 7 Strongly agree

The layout of the mall makes it easy to get to the food areas.

Strongly disagree 1 2 3 4 5 6 7 Strongly agree

The layout of the mall makes it easy to get to the restrooms.

Strongly disagree 1 2 3 4 5 6 7 Strongly agree

Overall, the layout of the mall makes it easy to get around.

Strongly disagree 1 2 3 4 5 6 7 Strongly agree

The variety of food offered at the mall is excellent.

Strongly disagree 1 2 3 4 5 6 7 Strongly agree

The mall has an excellent variety of stores.

Strongly disagree 1 2 3 4 5 6 7 Strongly agree

This mall has excellent entertainment options.

Strongly disagree 1 2 3 4 5 6 7 Strongly agree

12) Please rate the *Montréal Eaton Center* on the following scales:

If you did not visit the Montréal Eaton Center today please go to the next question.

The layout of the mall makes it easy to get to the stores you want.

Strongly disagree 1 2 3 4 5 6 7 Strongly agree

The layout of the mall makes it easy to get to the food areas.

Strongly disagree 1 2 3 4 5 6 7 Strongly agree

The layout of the mall makes it easy to get to the restrooms.

Strongly disagree 1 2 3 4 5 6 7 Strongly agree

Overall, the layout of the mall makes it easy to get around.

Strongly disagree	1	2	3	4	5	6	7	Strongly agree

The variety of food offered at the mall is excellent.

Strongly disagree	1	2	3	4	5	6	7	Strongly agree

The mall has an excellent variety of stores.

Strongly disagree	1	2	3	4	5	6	7	Strongly agree

This mall has excellent entertainment options.

Strongly disagree	1	2	3	4	5	6	7	Strongly agree

13) Each pair of words below describes a feeling dimension. Some of the pairs might seem unusual, but you may generally feel more one way than the other. In order to show that you feel something is near rather than far you would put an X closer to the word near: Near ___:_X_:___:___:___:___:___:___ Far

Using the scales below, put a check mark to show how you feel about today's shopping experience.

Happy	___:___:___:___:___:___:___:___	Unhappy
Pleased	___:___:___:___:___:___:___:___	Annoyed
Satisfied	___:___:___:___:___:___:___:___	Unsatisfied
Contented	___:___:___:___:___:___:___:___	Melancholic
Hopeful	___:___:___:___:___:___:___:___	Despairing
Relaxed	___:___:___:___:___:___:___:___	Bored
Stimulated	___:___:___:___:___:___:___:___	Relaxed
Excited	___:___:___:___:___:___:___:___	Calm
Frenzied	___:___:___:___:___:___:___:___	Sluggish
Jittery	___:___:___:___:___:___:___:___	Dull
Wide awake	___:___:___:___:___:___:___:___	Sleepy
Aroused	___:___:___:___:___:___:___:___	Unaroused
Controlling___	:___:___:___:___:___:___:___	Controlled
Influential ___	:___:___:___:___:___:___:___	Influenced
In Control ___	:___:___:___:___:___:___:___	Cared for
Important ___	:___:___:___:___:___:___:___	Awed
Dominant ___	:___:___:___:___:___:___:___	Submissive
Autonomous	___:___:___:___:___:___:___:___	Guided

14) Please rate your shopping style on the following scales:

I compare prices of at least a few brands before I choose one.

Strongly disagree 1 2 3 4 5 6 7 Strongly agree

I find myself checking the prices even for small items.

Strongly disagree 1 2 3 4 5 6 7 Strongly agree

It is important to me to get the best price for the products I buy.

Strongly disagree 1 2 3 4 5 6 7 Strongly agree

I like to try different things.

Strongly disagree 1 2 3 4 5 6 7 Strongly agree

I like a great deal of variety.

Strongly disagree 1 2 3 4 5 6 7 Strongly agree

I like new and different styles.

Strongly disagree 1 2 3 4 5 6 7 Strongly agree

I have little interest in fads and fashion.

Strongly disagree 1 2 3 4 5 6 7 Strongly agree

I like to shop around and look at displays.

Strongly disagree 1 2 3 4 5 6 7 Strongly agree

I like to browse through mail order catalogs even when I don't buy anything.

Strongly disagree 1 2 3 4 5 6 7 Strongly agree

I shop around a lot for my clothes just to find out more about the latest styles.

Strongly disagree 1 2 3 4 5 6 7 Strongly agree

I hate window shopping.

Strongly disagree 1 2 3 4 5 6 7 Strongly agree

When I see a new brand somewhat different from the usual, I investigate it.

Strongly disagree 1 2 3 4 5 6 7 Strongly agree

I enjoy exploring several different alternatives or brands while shopping.

Strongly disagree 1 2 3 4 5 6 7 Strongly agree

15) Please indicate to what extent you agree or disagree with each of the following statements by circling the appropriate number.

I really enjoy a task that involves coming up with solutions to problems.

Strongly disagree 1 2 3 4 5 6 7 Strongly agree

I would prefer a task that is intellectual, difficult, and important to one that is somewhat important but does not require much thought.

Strongly disagree 1 2 3 4 5 6 7 Strongly agree

Learning new ways to think doesn't excite me very much.

Strongly disagree 1 2 3 4 5 6 7 Strongly agree

I usually end up deliberating about issues even when they do not affect me personally.

Strongly disagree 1 2 3 4 5 6 7 Strongly agree

The idea of relying on thought to get my way to the top does not appeal to me.

Strongly disagree 1 2 3 4 5 6 7 Strongly agree

The notion of thinking abstractly is not appealing to me.

Strongly disagree 1 2 3 4 5 6 7 Strongly agree

I only think as hard as I have to.

Strongly disagree 1 2 3 4 5 6 7 Strongly agree

I like tasks that require little thought once I've learned them.

Strongly disagree 1 2 3 4 5 6 7 Strongly agree

I prefer to think about small daily projects to long-term ones.

Strongly disagree 1 2 3 4 5 6 7 Strongly agree

I would rather do something that requires little thought than something that is sure to challenge my thinking abilities.

Strongly disagree 1 2 3 4 5 6 7 Strongly agree

I find little satisfaction in deliberating hard and for long hours.

Strongly disagree 1 2 3 4 5 6 7 Strongly agree

I don’t like to have the responsibility of handling a situation that requires a lot of thinking.

Strongly disagree 1 2 3 4 5 6 7 Strongly agree

I feel relief rather than satisfaction after completing a task that required a lot of mental effort.

Strongly disagree 1 2 3 4 5 6 7 Strongly agree

Thinking is not my idea of fun.

Strongly disagree 1 2 3 4 5 6 7 Strongly agree

I try to anticipate and avoid situations where there is a likely chance I’ll have to think in depth about something.

Strongly disagree 1 2 3 4 5 6 7 Strongly agree

I prefer my life to be filled with puzzles that I must solve.

Strongly disagree 1 2 3 4 5 6 7 Strongly agree

I would prefer complex to simple problems.

Strongly disagree 1 2 3 4 5 6 7 Strongly agree

It’s enough for me that something gets the job done; I don’t care how or why it works.

Strongly disagree 1 2 3 4 5 6 7 Strongly agree

Please answer the following questions about yourself:

16) On average how many times per month do you visit a shopping mall? (Circle one.)

0-1 times 2-3 times 4-5 times more than 6 times

17) On average, how many times per month do you visit *Place Montreal Trust*? (Circle one.)

0-1 times 2-3 times 4-5 times more than 6 times

18) On average, how many times per month do you visit the *Montréal Eaton Center*? (Circle one.)

0 – 1 times 2-3 times 4-5 times more than 6 times

19) What is your year of birth? _____

20) What is your gender? (Check one.) ☐ male ☐ female

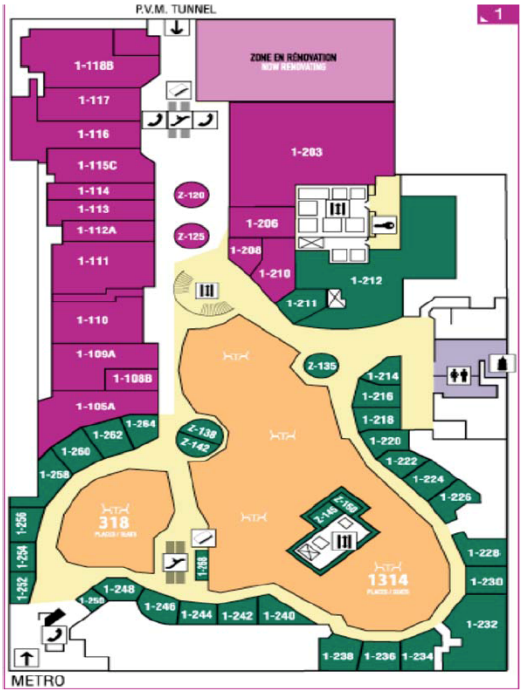
21) What is your postal code? _____

22) In your own words, what do you think was the purpose of this study?

_____

_____

_____


P.V.M. TUNNEL
1
ZONE EN RÉNOVATION
NOW RENOVATING
1-118B
1-117
1-116
1-115C
1-114
1-113
1-112A
1-111
1-110
1-109A
1-108B
1-105A
1-264
1-262
1-260
1-258
1-256
1-254
1-252
1-283
Z-120
Z-125
1-206
1-208
1-210
1-211
1-212
Z-135
1-214
1-216
1-218
1-220
1-222
1-224
1-226
Z-138
Z-142
Z-146
Z-150
1-158
318
1314
1-228
1-230
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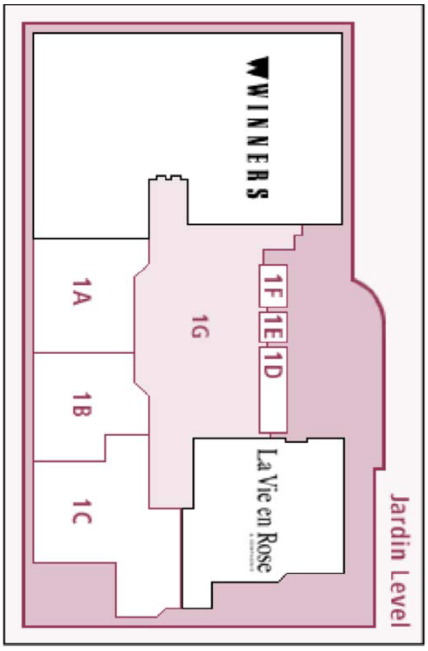
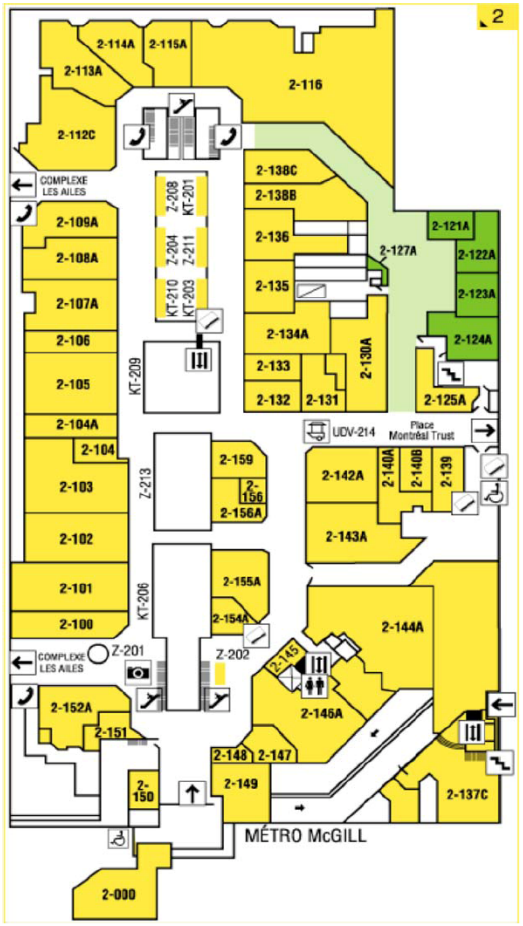
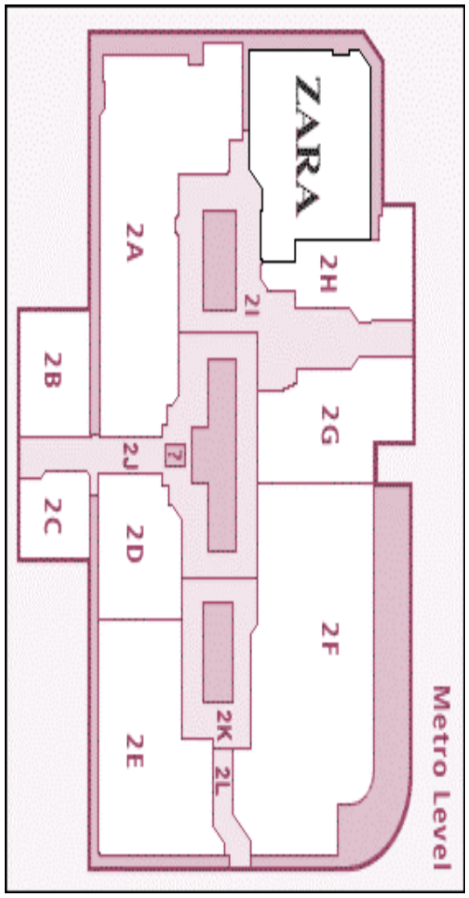
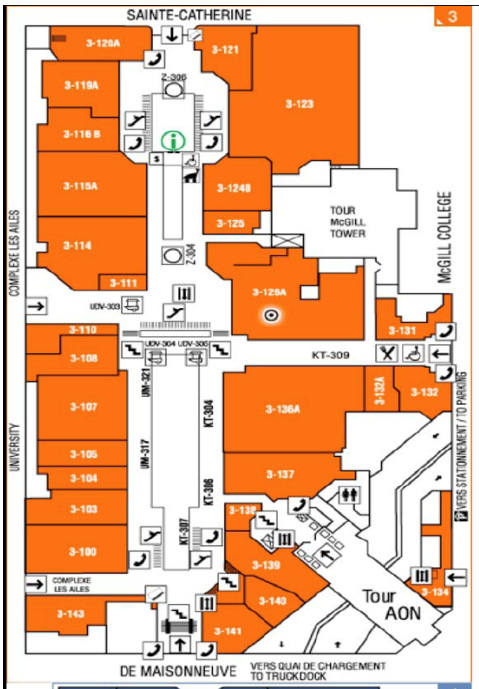
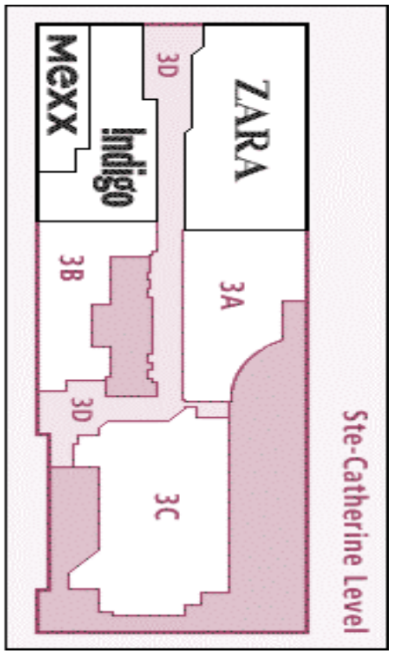
1-244
1-242
1-240
1-238
1-236
1-234
METRO

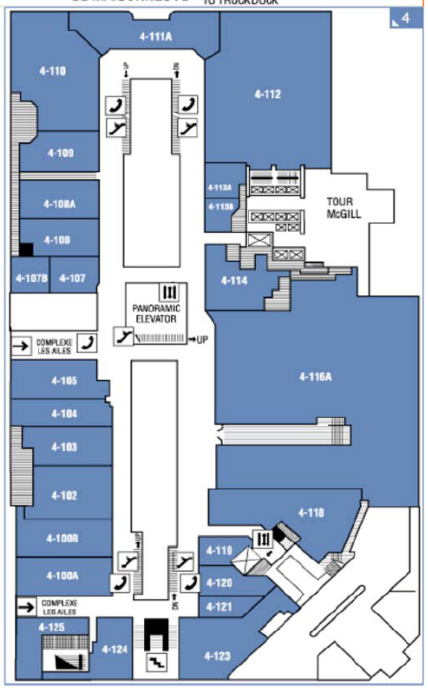

WINNERS
1A
1B
1C
1G
1F
1E
1D
La Vie en Rose
Jardin Level

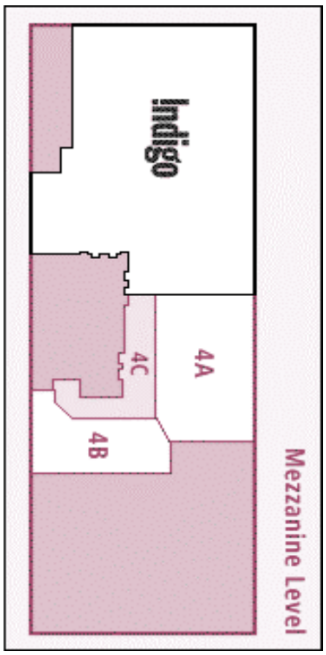

2
2-114A
2-115A
2-113A
2-116
2-112C
COMPLEXE LES AILES
2-138C
2-138B
2-136
2-135
2-134A
2-133
2-132
2-131
2-130A
2-127A
2-121A
2-122A
2-123A
2-124A
2-125A
2-109A
2-108A
2-107A
2-106
2-105
2-104A
2-104
2-103
2-102
2-101
2-100
Z-208
KT-201
Z-204
Z-211
KT-210
KT-203
KT-209
UDV-214
Place Montréal Trust
2-159
2-156
2-156A
2-142A
2-140A
2-140B
2-139
2-143A
Z-213
KT-206
2-155A
2-154A
2-144A
Z-201
Z-202
2-145
2-145A
2-152A
2-151
2-148
2-147
2-149
2-150
2-137C
MÉTRO McGILL
2-000


ZARA
2A
2H
2I
2B
2G
2J
2C
2D
2F
2K
2E
2L
Metro Level

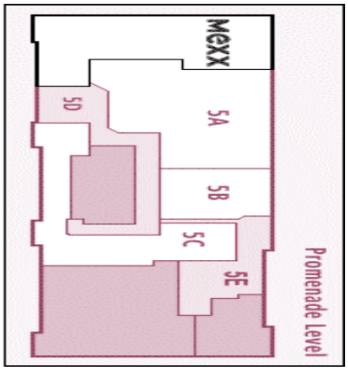

SAINTE-CATHERINE
3
3-120A
3-121
3-119A
3-123
3-116 B
3-115A
3-1248
3-125
3-114
TOUR McGILL TOWER
McGILL COLLEGE
3-111
3-126A
3-131
3-110
3-108
KT-309
3-107
3-132A
3-132
3-136A
3-105
3-137
3-104
3-103
3-138
3-100
3-139
3-140
Tour AON
3-143
3-141
DE MAISONNEUVE
VERS QUAI DE CHARGEMENT TO TRUCKDOCK
COMPLEXE LES AILES
UNIVERSITY
VERS STATIONNEMENT / TO PARKING


ZARA
Mexx
Indigo
3D
3A
3B
3D
3C
Ste-Catherine Level


4
4-111A
4-110
4-112
4-109
4-113A
4-113B
TOUR McGILL
4-108A
4-108
4-107B
4-107
4-114
PANORAMIC ELEVATOR
UP
4-116A
4-105
4-104
4-103
4-102
4-100B
4-118
4-119
4-100A
4-120
4-121
4-125
4-124
4-123


Indigo
4C
4A
4B
Mezzanine Level


5
5-103
V-2
V-1
5-101A
5-104


Mexx
5D
5A
5B
5C
5E
Promenade Level

APPENDIX D

Table 1. Mint and Gum Duration Pre-Test

Name	Format	Taste	Duration 1	Duration 2
Peak Performance Stick	inhaler	peppermint	momentary	1
One Second	gel	menthol, eucalyptus	0.5	0.25
Listerine Cool Mint	oral care strips	mint	1.5	1.5
Mentos gum	gum	cinnamint	25	29
Wrigley's Extra Peppermint*	soft-chew	peppermint	55	65
Wrigley's Extra Cinnamon*	soft-chew	cinnamon	31	27
excel Peppermint	gum	peppermint	40	47
Trident Peppermint Superpak	soft-chew	peppermint	45	50
Trident Spicy Cinnamon	soft-chew	cinnamon	31	26
Dentyne fire cinnamon	gum	cinnamon	36	33
Dentyne ice peppermint	gum	peppermint	60	50
Dentyne fire cinnamon	mints	cinnamon	2.5	2
Dentyne ice peppermint	mints	peppermint	3	1.5
Dentyne fire cinnamon**	soft-chew	cinnamon	45	31

*Chosen for study
**Chosen as replacement for Wrigley's Extra Cinnamon

Table 2. Perceived Shopping Time Per Condition

Perceived Shopping Time

	(I) flavor condition	(J) flavor condition	Mean Difference (I-J)	Std. Error	Sig.
Bonferroni	peppermint	cinnamon	14.833*	5.651	.031
		no gum	10.573	5.952	.238
	cinnamon	peppermint	-14.833*	5.651	.031
		no gum	-4.260	6.082	1.000
	no gum	peppermint	-10.573	5.952	.238
		cinnamon	4.260	6.082	1.000

*. The mean difference is significant at the 0.05 level.

Table 3. Perceived Fatigue Per Condition

Perceived Fatigue

	(I) flavor condition	(J) flavor condition	Mean Difference (I-J)	Std. Error	Sig.
Bonferroni	peppermint	cinnamon	-.68696	.32764	.117
		no gum	-.54688	.34508	.351
	cinnamon	peppermint	.68696	.32764	.117
		no gum	.14009	.35264	1.000
	no gum	peppermint	.54688	.34508	.351
		cinnamon	-.14009	.35264	1.000

Table 4. Map Tracing Results

Map Tracing Analysis

Distance (cm)

	(I) flavor condition	(J) flavor condition	Mean Difference (I-J)	Std. Error	Sig.
Bonferroni	peppermint	cinnamon	-1.357	13.130	1.000
		no gum	-30.169	13.825	.097
	cinnamon	peppermint	1.357	13.130	1.000
		no gum	-28.812	13.825	.122
	no gum	peppermint	30.169	13.825	.097
		cinnamon	28.812	13.825	.122

Table 5. Chewing Gum Intensity

Chewing Gum Intensity

	Sum of Squares	df	F	Sig.
Between Groups	12.673	1	12.445	.001
Within Groups	60.081	59		
Total	72.754	60		

Chewing Gum Intensity

	N	Mean	Std. Deviation
peppermint	32	5.16	1.019
cinnamon	29	6.07	.998
Total	61	5.59	1.101

Table 6. Favorite Gum Frequency

Favorite Gum Flavours

Flavour	Frequency	Percentage
Mint	53	0.52
Fruit	25	0.25
Cinnamon	8	0.08
None	3	0.03
Any	2	0.02
Bubble gum	4	0.04
Chlorophyll	3	0.03
Vanilla	2	0.02
Eucalyptus	1	0.01
Total	101	1