TELL ME WHICH PERFUME YOU WEAR, I'LL TELL HOW OLD YOU ARE:

MODELING THE IMPACT OF CONSUMER AGE ON PRODUCT CHOICE

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ABSTRACT

Perfumes introduced decades ago continue to compete against recently introduced perfumes. In this high involvement category, using a large survey and a conditional logit model, the authors show that the probability of choosing a long-established perfume, rather than a recently introduced one, increases enormously with consumer age. Furthermore, by comparing three possible underlying mechanisms, they demonstrate that an attachment model based on a consumer's exposure to a perfume (preferences depend linearly on the length of time the consumer has known the perfume and can be developed at any age) fits better than an innovativeness model (younger people prefer recently introduced perfumes) or a nostalgia model (preferences are developed only during an early "sensitive period" of life). The authors draw managerial and research implications from their findings.

KEYWORDS: Consumer choice, elderly, older consumer, age, perfume, nostalgia, innovativeness, attachment, conditional logit.

Young and middle-age consumers are not the only targets of interest for marketers. Older consumers also represent a significant share of many markets, and this presence is likely to keep growing. In the United States, "The mature population [50-plus] … controls 70% of all the wealth and represents 50% of all discretionary spending, and in certain categories this is disproportionately high" (Parmar 2003, p. 6). In France, persons aged 60 years and older represent 20% of the population (Daguet 1996) but buy 29% of new cars and 75% of luxury cars. Furthermore, "30% of population (those age 50 and over) buy 43% of fast moving consumer goods" (Sansaloni 2005, p. 36). If the buying behavior of older consumers were identical to that of younger consumers, there would be no justification for research on specific age groups. However, previous, though scarce, research in marketing indicates that they behave differently, especially in terms of brand choice. Studies suggest that older consumers tend to prefer long-established brands over newer brands, consistent with other research that indicates, more generally, older people's preference for long-established options. In contrast, young consumers are often attracted by recently introduced options.

Such differences have significant managerial implications: Should manufacturers constantly introduce new options to satisfy younger consumers? Should they keep established options available to satisfy older consumers? Is it impossible to attract older or mature consumers to new options? Is it dangerous to modify the names or content of long-established brands, a common practice? What are the implications, for a brand with a given market share, to have a younger or an older clientele?

According to consumer behavior literature, the mechanisms that underlie the preference of older consumers for well-established brands remain uncertain. Holbrook and Schindler (1989, 1994; Schindler and Holbrook 1993), in the context of highly involving cultural products, rely mostly on the concept of nostalgia, according to which preferences developed during an early "sensitive period" of life explain choices observed in later life

stages. Other authors contrast the higher innovativeness of younger consumers with the lesser innovativeness of older consumers, who thus would lack the motivation to try new options (for a review, see Hauser, Tellis, and Griffin forthcoming). A third explanation is suggested by research on attachment. Consumers develop attachments to personal possessions (Kleine and Baker 2004) and brands (Fournier 1998) on the basis of the personal history of their relationships with these possessions and brands. Therefore, the preferences of older consumers for long-established options may be due simply to the attachment they have developed for them over time. This attachment differs from nostalgia, however, because it may develop at any age as a function of personal histories, rather than only during a sensitive period, and therefore depends only on the length of time since the consumer started developing the attachment. This third explanation may be linked to the mechanism of socioemotional selectivity (SES) in the gerontology and psychology literature, according to which older people give priority to known options that have become affectively laden through their experience over the years (Carstensen, Fung, and Charles 2003; Carstensen, Isaacowitz, and Charles 1999). Our objective is to identify which of these three possible mechanisms (nostalgia, innovativeness, or attachment) is most likely to generate age differences in preferences for new versus well-established options.

To permit such a comparison, we must focus on a category in which consumers have a choice between recently introduced items and long-established ones, because the three mechanisms pertain to long-term effects. That is, it must not be a matter of choosing between a six-month-old brand and a five-year-old brand but rather of choosing between a two-year-old brand and one that is decades old. Many consumer product and service categories do not meet this first criterion, because no ancient brands exist. In addition, an appropriate context must be a high involvement category, because two of the mechanisms (nostalgia and attachment) involve in-depth relationships that are unlikely to appear for low involvement

products. These two criteria lead us to study perfume, a highly involving and emotionally laden product (Laurent and Kapferer 1985) that offers both very old and very recent options: Stores display very large assortments comprising long-established perfumes launched more than 50 years ago and still offered in their mostly original form, mature perfumes launched 20 years ago, and a large number of recent perfumes (in this buoyant market, more than 100 new perfumes are launched every year in France) all together on their shelves.

In the remainder of this article, we review consumer behavior literature on the impact of age on brand choice, as well as literature on the three possible underlying mechanisms (nostalgia, attachment, and innovativeness), to formulate hypotheses based on these mechanisms. After describing our data set, we perform an initial assessment of the three mechanisms by developing simple theoretical models (Moorthy 1993) derived from our hypotheses and comparing their insights and predictions against observed data. We then perform a formal statistical test of the three mechanisms with a conditional logit model, with which we show a very strong impact of age on perfume choice. Among the three possible mechanisms, we find a better fit for the model based on attachment (in which preferences increase linearly with the length of time a consumer has known the perfume, and preferences can be developed at any age) than for those based on innovativeness (in which younger people prefer recently introduced perfumes) or nostalgia (in which preferences are only developed during an early sensitive period of life). Finally, we discuss some theoretical and managerial implications.

Literature Review

Age and Brand Choice

Few empirical studies analyze how brand preferences vary with age. Studies focusing on choice by older consumers instead look at how the number of options considered changes (Cole and Balasubramanian 1993; Johnson 1990; Uncles and Ehrenberg 1990) or how buying

rates vary across age groups and product categories (Uncles and Lee 2006). In such studies, older consumers' preference for well-established options has been analyzed as a side result, not the central focus. As Shocker and colleagues (1991, p. 192) state, "much research dealing with consideration sets has focused upon descriptive aspects (notably size) and ignored their specific content and structure." For example, Furse, Punj, and Stewart (1984, p. 421) perform a cluster analysis of search patterns among purchasers of new cars, in which one cluster consists of older buyers "most likely to consider favorably the products of Ford and General Motors." According to Lapersonne, Laurent, and Le Goff (1995), respondents aged 60 years and older, when purchasing a new car, are more prone to consider only their previous brand. More recently, Lambert-Pandraud, Laurent, and Lapersonne (2005) show that older buyers of new cars are more likely to consider and choose long-established national brands. Specifically, among French buyers of new cars, 69% of those aged 60–74 years and 74% of those aged 75 years and older purchased one of the three well-established national brands that had been available for about a century,[1] whereas only 56% of buyers 40–59 years of age and 49% of those aged 18–39 years did so. Furthermore, this result cannot be attributed entirely to the increased tendency of older buyers to repeat purchase, because older consumers were more likely to consider and buy well-established national brands even if they switched from their previous brand.

These scattered results on brand choice are consistent with another stream of research on consumer behavior that shows, more generally, that older consumers tend to prefer long-known options. In various research settings, Holbrook and Schindler find that consumers maintain their preferences for cultural items first encountered in their late adolescence and early adulthood, including older movie stars (Holbrook and Schindler 1994), car styles (Schindler and Holbrook 2003), and music forms (Holbrook and Schindler 1989).

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[1] These three brands were Peugeot (introduced in 1896), Renault (1899), and Citroën (1918).

Nostalgia

Holbrook and Schindler (1991, p. 330) define nostalgia as "a preference … toward objects (people, places, or things) that were more common (popular, fashionable, or widely circulated) when one was younger (in early adulthood, in adolescence, in childhood, or even before birth)." Psychologists explain that a person has a critical period "early in her life" in terms of her psychological development (Bornstein 1989, qtd. in Schindler and Holbrook 2003, p. 277). This concept was first applied by *gestalt* theory to the imprinting of animal species during an early critical period, which conditions animal behavior for the rest of their lives (Lorenz 1951, qtd. in Holbrook and Schindler 1989, p. 550, and in Holbrook and Schindler 1991, p. 331). Regarding consumer preferences, Holbrook and Schindler (1994, p. 414) explain that "consumers form enduring aesthetic preferences during a sensitive period," specifically "late adolescence or early adulthood" (Holbrook and Schindler 1989, p. 119) or "late teens and early twenties" (Schindler and Holbrook 1993, p. 551), and suggest that consumers maintain these early imprinted preferences for the rest of their lives.

The specific limits of this sensitive period are somewhat uncertain: Consumers most like the pop songs that were introduced when they were about 23 years of age (Holbrook and Schindler 1989), fashion styles that emerged when they were about 33 (Schindler and Holbrook 1993), movies stars from when they were about 14 (Holbrook and Schindler 1994), motion pictures awarded an Oscar when they were about 27 (Holbrook and Schindler 1996), and automobiles from when they were about 26 (scored by male subjects; Schindler and Holbrook 2003). This conceptualization implies that a cohort of persons born at about the same time should have similar tastes for objects encountered at the same early age (Schuman and Scott 1989).

This stream of research generally has concentrated on "popular, fashionable or widely circulated"—in other words, salient but unbranded—items: pop songs, movie stars, motion

pictures, car models (Holbrook and Schindler 1991, p. 330). In contrast, nostalgic preferences have not been tested for branded products, which are of major interest for marketers. This gap motivates the present study, in which we attempt to assess, among other things, whether similar nostalgic preferences exist for brands encountered in the consumer's youth.

We summarize the nostalgia approach with the following hypothesis. (Given the somewhat divergent results from prior research on the limits of the "sensitive period," we define its limits conservatively.)

H_1 In later periods of their lives, consumers maintain their preferences for perfumes imprinted when they were in their sensitive period, between the ages of 15 and 30 years.

Innovativeness

Innovativeness is the "propensity of consumers to adopt novel products" (Hirschman 1980, p. 283). It is related to novelty seeking, described as "an internal drive or motivating force the individual is activating to seek out novel information" (Hirschman 1980, p. 284). Innovativeness "comprises dual dimensions, both cognitive and sensory" (Venkatraman and Price 1990, qtd. in Cotte and Wood 2004, p. 79). Sensory-oriented innovativeness should play a role in perfume trial and choice, because innovative persons are inclined to take risks (Rogers 2003, p. 283) and accept changes; it previously has been measured as the need for change by Wood and Swait (2002, p. 8) (e.g., "When I see a new or different brand on the shelf, I often pick it up just to see what it is like").

In a classical paper, Botwinick (1978) finds that younger subjects are much more likely than older subjects to make a choice that could entail a change in daily life situations and to take risks in general, whereas older respondents are more cautious. Similarly, Lesser and Kunkle (1991) describe exploratory behavior as a main feature of younger respondents aged 18–39 years. Transposing this finding to consumer behavior, and specifically to brand

choice, we posit that younger persons will be more likely to try new options that may or may not prove satisfactory, whereas older people prefer to stick to well-known options, even if they are not perfectly satisfying, because their available knowledge of such options eliminates risks. Unfortunately, Botwinick (1978) studies only very young (college students) and very old (over 60 years) subjects and gives no indications about intermediate ages.

Consumer behavior studies have mostly tried to find a relationship between age and adoption of new products (rather than with adoption of new brands in an existing category) and do not reach a consensus. In an oft-quoted classical review, Rogers and Shoemaker (1971, p. 352) mention 76 studies that find a positive correlation between age and time of adoption, 44 with a negative correlation, and 108 studies in which no correlation exists. Thirty-two years later, Rogers (2003, p. 288) confirms that

> Earlier adopters are no different from later adopters in age. There is inconsistent evidence about the relationship of age and innovativeness. About half of the many diffusion studies on this subject show no relationship, a few found that earlier adopters are younger, and some indicate they are older.

These variations may be due to differences in the products under study. Similarly, Hauser, Tellis, and Griffin (forthcoming) conclude in their review that "While some studies have shown that innovators are better educated, wealthier, more mobile, and younger, other studies have failed to validate these findings." Still other studies identify a negative relationship between age and innovativeness, including Tellis, Yin, and Bell (2005, p. 21), who claim that innovativeness measured by "reluctance is best explained by age and income, closely followed by mobility, education and gender."

These results pertaining to innovativeness lead, for the case of perfume, to a hypothesis that, given these conflicting results, we must assess carefully against empirical

evidence. We posit that younger consumers should be more prone to exploration, variety, and change, which stimulates the choice of new perfumes, whereas older consumers should prefer to stay with perfumes they know rather than try new ones (Botwinick 1978). This hypothesis applies only to recently introduced perfumes, namely, those brought to market within the previous five to ten years.

H_2 Compared with older consumers, younger consumers have a higher preference for recently introduced perfumes.

We note again that the literature, because it mostly contrasts older against younger subjects, provides little guidance on the variations of innovativeness at intermediate ages. We propose to hypothesize that this "innovativeness premium" decreases monotonically between its maximum for younger consumers and its minimum for older consumers.

Attachment

We extend to perfume the concept of material possession attachment: A consumer can develop an attachment to a perfume, similar to the attachment she can develop to a material possession. This relationship would lead her to use this perfume rather than try new ones. Although the concept of attachment originally was introduced with regard to the bond between an infant and parent (Bowlby 1979), it has been applied to consumers of all ages.

In their review, Kleine and Baker (2004, p.4) define material possession attachment as "a multi-faceted property of the relationship between an individual … and a specific material object that has been psychologically appropriated, decommodified and singularised through person–object interaction." They distinguish nine characteristics of material possession attachments, namely, that they (1) form with a specific material object; (2) involve psychologically appropriated possessions; (3) are self-extensions; (4) are decommodified and singular; (5) require a personal history between the person and the possession; (6) are strong, (7) multifaceted, (8) and emotionally complex; and (9) evolve over time as the meaning of the

self changes. Most of these characteristics fit well with perfume, in that a perfume is psychologically appropriated ("my perfume"), often over very long periods, represents an intimate self-extension of the consumer that she projects onto her immediate social environment, and involves a highly personal choice that indicates a strong manifestation of personality and is not substitutable. Furthermore, a consumer often develops a personal history with her perfume through daily applications and associates it with memorable, emotional moments. In turn, a person's attachment to a perfume can have the property of strength—many consumers remain loyal to the same perfume for long periods— and emotional complexity in terms of both olfactory sensations and associated affective memories.

The only characteristic listed by Kleine and Baker that may seem arguable for perfume is its characterization as a specific material object, because a perfume bottle must be replaced. However, we argue that a perfume is a unique possession because the same liquid, bottle, and name reappear over decades, like a phoenix miraculously reemerging in its original state after it seemed exhausted, through repurchase. Therefore, perfume can be considered a possession that is a part of a person's extended self. Belk's (1988) memorable formulas transpose easily to perfume, in that consumers consider perfume part of themselves and use it to connect with memories of the past. As people accumulate more memories affiliated with the perfume, their attachment to it grows, to the extent that the perfume may seem like a "second skin" that helps define and offer an objective manifestation of the person (Belk 1988). Finally, the formal definition of attachment proposed by Ball and Tasaki (2001, p.158) applies well to perfume: "the extent to which an object which is owned, expected to be owned, or previously owned by an individual, [and] is used by that individual to maintain his or her self-concept."

However, the question of how such attachment develops remains unanswered because no longitudinal studies of material possession attachment exist, even though Ball and Tasaki

(1992, p. 156) find specifically that attachment evolves "over time, according to self-meaning" during childhood, adolescence, young adulthood, mature adulthood, young old, and older ages. For example, an adolescent might consider a drawing box a self-affirmation, whereas a young adult woman could consider a necklace from her boyfriend to be "the right thing at the right time to show me I was special to him" (Myers 1985, p. 564).

However, most authors suggest the monotonic growth of attachment over time, based on the consumer's interactions with the possession. Ball and Tasaki (2001) stress that greater attachment relates to longer ownership and increased emotional significance. For respondents older than 24 years of age in their sample, attachment increases regularly from preacquisition to early ownership to mature ownership and declines only if the owner seriously considers getting rid of or discards the object. Similarly, Kleine and Baker (2004) find that attachments to objects mirror those to other people, such that the continuous activities undertaken with the object (e.g., cleaning, displaying, discussing) inhabit the object with greater meaning. According to Thomson, MacInnis, and Park (2005), strong attachments require time, repeated interactions, and memories pertaining specifically to the object and thus encourage the person to invest the object with greater meaning. Finally, Price, Arnould, and Curasi (2000, p. 188), analyzing the "cherished possessions" of respondents aged 65 years and older, cite a verbatim: "It's almost like a history of our life."

In the absence of existing mathematical models of how attachment grows over time, we use a parsimonious, linear form, in which attachment is proportional to the number of years of interaction between a consumer and a perfume. This interaction should begin when the consumer becomes interested in perfume, which we assume occurs around age 15, the age of the first autonomous perfume purchases in France.

H$_3$ Over time, consumers accumulate an emotionally laden attachment to perfumes with which they have been in contact. The longer the contact, the stronger is the attachment and the higher is the preference.

With regard to our three hypotheses relative to nostalgia, innovativeness, and attachment, we note three codicils. First, innovativeness and nostalgia both contrast two periods of life: an early period (say, up to 30 years) during which innovativeness is high and the bases for future nostalgia are acquired versus a later period during which innovativeness subsides and nostalgia increases consumers' motivation to choose items they first encountered in the early period. However, if a nostalgic orientation is an individual trait that does not change with age, its effects still may appear only later in life, after the end of the sensitive period.

Second, we note two key differences between nostalgia and attachment. According to the nostalgia approach, a consumer maintains preferences acquired ("imprinted") early but does not develop new preferences after the end of the sensitive period. In contrast, the attachment approach suggests a consumer can initiate an emotional attachment at any age, even after the sensitive period is over. Attachment evolves according to self-meaning, and, as such, choices made when "coming of age" may not satisfy the goals of a mature adult at a later age. New choices may then be made, and new attachments started. Both mechanisms predict that the strongest preferences of, say, an 80-year-old consumer will be those initiated when she was young, but nostalgia predicts she will not have developed a preference for a perfume launched when she was 50 years of age, whereas attachment predicts she might have developed such an attachment in the prior 30 years. Similarly, according to the nostalgia approach, a 25-year-old consumer is too young to feel nostalgia for a perfume launched when she was 15 years of age, whereas the attachment approach suggests she could have developed an emotional attachment to it during the 10-year period.

Third, innovativeness predicts that recently introduced perfumes should enjoy higher shares among young consumers, but by definition, established perfumes (i.e., introduced more than ten years ago) can no longer benefit from an innovativeness premium. As a consequence, innovativeness predicts, in theory, that the relative shares of choices among established perfumes should be about the same for young, mature, and older consumers.

Methodology

To illustrate our hypotheses, we interviewed[2] a small number of perfume salespeople working in specialized perfumeries and asked them to describe the differences they perceived among perfume buyers of different ages.

Interviews of Perfumery Salespeople

According to the salespeople we interviewed, a young buyer (below 30; the youngest autonomous perfume purchasers were 15) is typically "in, very modern, very fashion-oriented, following the last trend in fashion." She "copies what she sees in women's magazines" and looks at new products. She does not know in advance what she will buy, may test as many as ten different perfumes, and ends up buying a rather new perfume (e.g., Lancôme Hypnôse, Lolita Lempicka, Dior Chérie, Gucci Envy me, Cacharel Amor Amor, Angel Lolita, Dior Pure Poison, Yves Saint-Laurent Cinema, Kenzo Flowers). One sales assistant explained that she must restrain young consumers from excessive testing because, after four tests, they simply get confused by the various scents. These indications match the conclusion of Tissier (1982, p. 203) that "Habit is not a key choice criterion for daughters. Teenagers' behaviour is not yet stabilized. They are looking for a personality, and also for a store, a brand, a product that will fit this changing personality."

In contrast, an older customer, aged 70 years or older, typically dresses in an elegant and classical style and comes more often alone (the oldest ladies helped by a personal home

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assistant), avoiding rush hours. Contrary to the youngest buyers, she knows in advance what perfume she will buy: her usual one, which is a traditional and famous perfume produced by a long-established luxury house (e.g., Chanel n°5, l'Air du Temps by Nina Ricci). She keeps buying it because she "adores it" "as a souvenir of beloved ones." She "knows it very well," "has been wearing it for a long time," and "is very loyal to it." This traditional and famous perfume is not necessarily among the most ancient ones available; she may test a new perfume from a great name, "by curiosity, for example Allure Sensuelle of Chanel." If her perfume happens to be unavailable, the older customer typically postpones her purchase; the store will order it, and she comes back later to pick it up. In contrast, a young customer typically buys another perfume: "she's not stubborn, she's open to all suggestions." Older customers do not react well to product changes; indeed, "Changing their product is a tragedy for them, it's so typical of their way of life." Therefore, "If a manufacturer changes the package of a perfume, it appears unfamiliar, some older consumers will say 'Ah … it is no longer the same, it does not smell the same way,' whereas in fact it is still the same juice. Twenty percent of the elderly will believe it is no longer the same perfume."

The salespersons we interviewed also make a clear distinction between mature consumers (50–65 years) and older ones (70 and older): "For me, old starts at 70." Mature consumers "don't have at all the same buying behavior" but rather are "very active … they're going to indulge in last minute purchases … they get their information from magazines, they come and see new products as much as other age categories do." The descriptions of mature women indicate, "She has more time than a 40 year old woman who works a lot," "They are in the prime of life, beautiful and well informed," "They are cunning. They do a lot because they have money, they have time, they shop," and that "One has to know how to attract them because they know everything."

These vignettes derived from our interviews illustrate the age differences in perfume purchasing. Young consumers seek novelty—new scents, new perfume names, new trends. Older consumers are attached to their perfume, which conveys a shared intimacy and memories, even if they are tempted by new perfumes by well-known producers. In between, mature buyers keep themselves informed, are experts, and are interested in testing and buying new products.

Data Set

We analyze data from a large-scale mail survey collected in France in 2002 by Axciom-Consodata, a market research company. Respondents reported their purchases in various product categories, as well as their age and other demographic characteristics. Because the perfumes used by men and women are very different, and female users are far more numerous, we only study women. Among female respondents, 148,537, ranging in age from 19 to 103 years, reported using perfume and indicated which perfume(s) they used. Thus, we analyze a very large sample for each birth year: on average, 3,086 respondents per year for consumers aged 19–103 years. (However, sample sizes become smaller for respondents older than 80 years of age, and there are only four respondents aged 103 years.) To indicate the perfumes they wore at the time, respondents checked the appropriate boxes among 63 possible answers: 39 specific perfumes (e.g., "Poison by Dior") and 24 sets of alternatives produced by the same brands (e.g., "Another perfume by Dior"). Respondents could check a single box or multiple boxes (or no box if they did not wear perfume, which eliminated them from our further analysis). As we illustrate in Figure A1 of Appendix 1, the percentage of female consumers using perfume increases slightly from 90% to 91% between the ages of 19 to 21, remains roughly constant at around 88% from 22 to 47 years of age, and then decreases monotonically to reach 84% around age 60 years and 70% around age 80 years. The exact percentage continues to diminish after age 80, but the smaller sample sizes

make it difficult to evaluate these percentages precisely. In addition, we show in Figure A2 in Appendix 1 that, among perfume users, the average number of perfumes used per person tends to decrease with age. The mean number of perfumes is 3.25 at age 19 years, 2.93 at 25, 3.09 at 47, 2.63 at 60, and 2.05 at 80.

Our focus is consumer choices among perfumes rather than whether they wear a perfume. We cannot however compute the market share of each perfume directly, because respondents did not report how many units of each perfume they bought per year. (In any case, given the relatively low frequency of perfume purchases, their answers likely would not have been reliable.) Although we could study the penetration of each perfume, doing so would create biases related to the age variations in terms of the percentage of perfume users and average number of perfumes used. We therefore choose to analyze shares of choices, defined as follows: For each perfume j and age i (defined by a specific birth year), we compute the penetration Pen_{ji} of j as the percentage of respondents of age i that use it (among those who use at least one perfume). We then compute the share of choices SC_{ji} of perfume j among respondents of age i as the ratio of its penetration to the sum of the penetrations of all N perfumes:

$$SC_{j,i} = \frac{Pen_{j,i}}{\sum_{n=1}^{N} Pen_{n,i}}. \tag{1}$$

Thus, the sum of the shares of choice $SC_{n,i}$ over all N perfumes is 100% for each age i, despite the smaller percentage of perfume users and smaller average number of perfumes for each respondent among older persons. This standardization enables us to perform a more meaningful comparison of perfume choices across consumers of different ages.

Simple Theoretical Models

We wish to assess which of the three theoretical mechanisms (nostalgia, innovativeness, attachment) best predicts consumer choices. Before estimating, in a

subsequent section, a complete conditional logit model on our full sample, we think it useful to first develop deeper insights about each of these mechanisms using simple theoretical models. Such models (Moorthy 1993) offer simplified representations of the possible structures of consumer choice processes and enable the identification of purchase patterns generated by these structures. In the following paragraphs, we develop three successive models based on innovativeness, nostalgia, and attachment using stylized structures and reasonable parameters. We simulate the choice patterns resulting from each model and compare these patterns with actual consumer choices observed in the data set. This approach thus acknowledges the importance of developing insights about the behavioral consequences resulting from each possible system structure before engaging in any statistical estimation of the system (Forrester 1961).

Attractiveness-Based Model

Because we analyze each perfume's share of choices, we model each consumer's probability of choosing a specific perfume as proportional to the attractiveness of the perfume for that consumer, which leads us to define the probability π_{ij} that a consumer of age i will choose perfume j as follows:

$$\pi_{ij} = \frac{\alpha_{ij}}{\sum_{n=1}^{N} \alpha_{in}}, \tag{2}$$

where α_{in} is the attractiveness of perfume n for a consumer of age i, $\alpha_{in} > 0$, and N is the number of perfumes among which a choice must be made.

Furthermore, we model the attractiveness α_{in} of perfume n for a consumer of age i as the product of two terms:

$$\alpha_{in} = \beta_n \psi_{in}. \tag{3}$$

β_n is a constant that measures the intrinsic attractiveness of perfume n, $\beta_n > 0$, and is assumed

to be the same for all consumers; ψ_{in} is an age-related factor that varies across consumers

depending on their age i and the date when perfume n was launched in France, the country of

the respondent. The specific definition of ψ_{in} is what differentiates our three models based on

innovativeness, nostalgia, and attachment.

Innovativeness

According to H_2, compared with older consumers, younger consumers have a higher

preference for perfumes recently introduced in France. To implement this hypothesis in the

model, we assume that ψ_{in} is equal to an innovativeness multiplier τ_{in}, which, for a recent

perfume, is at its maximum when consumers are young and declines as they get older. In the

tradition of theoretical models (Moorthy 1993), we use a simple representation of this decline:

We assume that recent perfumes are twice as attractive for young consumers (below 30 years

of age) than for consumers aged 80 years. In practice, we set the multiplier at 2 when

consumers are young (up to 30 years of age) and then have it decline slowly and

monotonously toward a minimum value of 1 that indicates the absence of innovativeness. To

keep the model simple, we model this decline as exponential (the innovation multiplier

declining by the same percentage every year), such that the innovativeness premium reaches

its minimum value of 1 at age 80. Figure 1, Part a, plots this variation of ψ_{in} (for a recent

perfume) as a function of consumer age. For established perfumes (introduced more than 10

years ago), innovativeness makes no difference by definition, and ψ_{in} takes the same value (1)

for all consumers.

Nostalgia

H_1 states that, in later periods of their lives, consumers maintain their preferences for

perfumes imprinted when they were in their sensitive period. To implement this proposition

in the model, we assume that ψ_{in} is equal to a nostalgia multiplier ν_{in}. This multiplier remains

at its minimum value ($v_{in} = 1$) as long as consumers are young (again, up to 30), because they cannot yet feel nostalgia. For consumers 30 years of age and older, we assume that there is no nostalgia effect ($v_{in} = 1$) for perfumes launched when the consumer was not in her sensitive period at the perfume launch. To take into account the uncertainty about the bounds of the sensitive period, v_{in} takes its maximum value (again arbitrarily set to 2) if perfume n was launched when consumer i was between 15 and 25 years of age. If perfume n was launched when consumer i was between 10 and 15 or 25 and 30 years of age, the multiplier takes a linearly interpolated value between 2 and 1. The multiplier v_{in} takes values 1 if a perfume n was launched when the consumer of age i was younger than 10 or older than 30 years of age at perfume launch. Figure 1, Part b, plots this variation of v_{in} (for a consumer aged 30 years and older) as a function of the age the consumer was when the perfume was launched.

Attachment

In H_3, we state that, over time, consumers accumulate an emotionally laden attachment to perfumes with which they have been in contact. The longer the contact, the stronger the attachment and the higher the preference is. To implement this conceptualization in the model, we assume that ψ_{in} is proportional to λ_{in}, the number of years of contact between a consumer of age i and perfume n. In practice, this value will be equal the smaller of two numbers, the number of years since the perfume was launched or the number of years since the consumer turned 15 years of age. Figure 1, Part c, displays how attractiveness increases with the number of years of contact.

Aggregating Perfumes

To remain in the tradition of theoretical models (Moorthy 1993), we need to keep the model simple. We cannot consider the full list of 63 perfume choices proposed in the questionnaire but rather must analyze aggregates of several perfumes. How should we build such aggregates? A preliminary analysis, at the level of individual perfumes, indicates that

perfumes launched at about the same time have similar patterns of variations in their choice shares as a function of consumer age. We therefore decide to aggregate perfumes launched around the same dates. To keep the model simple, we assume that there are only three hypothetical perfumes competing in the market: one launched 5 years before our 2002 survey (i.e., in 1997), one launched 25 years before (1977), and one launched 75 years before (1927). For validation purpose, we compare the predicted behavior of these three hypothetical perfumes to three real-world aggregates: (1) all perfumes launched between 1992 and 2002 (the average between 2002 and 1992 being 1997), (2) all perfumes launched between 1962 and 1991 (average of 1977), and (3) all perfumes launched before 1961.[3] Working on these aggregates enables us, in addition, to fulfill a requirement of the data providers, namely, that we do not publish data or results on individual perfumes for confidentiality reasons.

Finally, we display choice shares for these aggregates, birth year by birth year, only up to age 80, because the small sample sizes make the estimations unreliable after that point.

Comparing Analytical Model Predictions

As we discussed previously, the mechanisms at work in our hypotheses depend on consumer age. Nostalgia can occur only for consumers older than 30 years who may feel nostalgic about their youth (before 30, they acquire the bases for future nostalgia). Therefore, we analyze the predictions of the models separately for consumers older than and younger than that age.

Young Consumers

Among young consumers, we can ignore nostalgia as a possible underlying mechanism, which leaves two possible mechanisms, innovativeness (H_2) and attachment (H_3), that make opposite predictions.

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[3] When computing these three aggregates, we include all specific perfumes (e.g., "Poison by Dior"), because each has a precise launch date. However, we include a set of brand-specific perfumes (e.g., "Another perfume by Dior") only if all the perfumes within it had been launched at similar dates, such as between 1992 and 2002. Only four such sets could be included.

According to the attachment model, the age-related factor ψ_{in} is proportional to the number of years of contact between a consumer of age i and perfume n. For a long-established perfume, 30-year-old consumers should feel more attachment than 20-year-old consumers and have a higher ψ_{in}, because they have accumulated more years of contact since the beginning of their sensitive period, when they turned 15. In contrast, for a perfume introduced, say, three years ago, both 20- and 30-year-old consumers have accumulated the same three years of contact, so our attachment-based model predicts a similar value for ψ_{in}. As a consequence, the key insight is that long-established perfumes should have a higher market share among consumers 30 years of age than among those 19 years of age.

The innovativeness model calls for the opposite. For recently introduced perfumes, the age-related factor ψ_{in} takes the same maximal value (2) for all consumers 19–30 years of age. In contrast, long-established perfumes have lost the part of their appeal based on innovativeness, and the age-related factor ψ_{in} takes the same minimal value (1) for all consumers between 19 and 30 years of age. Thus, the key insight is that, when consumer age varies between 19 and 30, the attractiveness of a perfume should be constant, and therefore, its market share should be stable.

Because attachment and innovativeness lead to contradictory insights, we compare their predictions against the variations in choice shares actually observed in the market. As we indicated previously, we compare the predicted performance of the hypothetical 1997 perfume against the actual performance of the 1992–2002 aggregate; the predicted performance of the hypothetical 1977 perfume against the actual performance of the 1962–1991 aggregate; and the predicted performance of the hypothetical 1927 perfume against the actual performance of the aggregate of perfumes launched before 1962.

In Figure 2, we provide the values of choice shares for consumers aged 19–30 years (Part a) as predicted by the attachment model, (Part b) as predicted by the innovativeness

model, and (Part c) as observed in the market. For both models, we choose the coefficient β_n (reflecting the intrinsic attractiveness of perfume n, assumed to be the same for all consumers), so that the predicted choice shares equal the observed choice shares for 30-year-old consumers. Thus, both models predict perfectly the choice shares for consumers of age 30, and we must assess the models on the basis of their predictions for other consumers.

The results in Figure 2 clearly indicate that the attachment model predicts the actual choices observed in the market well, whereas the innovativeness model does not. We consider first the overall measures of fit. The average absolute difference between the observed and predicted shares is only 1.45% for the attachment model, compared with 8.11% for the innovativeness model. More important, the gradient of the observed variations corresponds to the key insight derived from the attachment model, not to that derived from the innovativeness model. The attachment model correctly predicts that the choice share of the recent perfume (launched in 1997) decreases regularly when consumer age varies from 19 to 30 years and that those of older perfumes increase, whereas the innovativeness model incorrectly predicts that the choice shares of the three perfumes should be constant. Furthermore, the order of magnitudes of the changes in perfume shares predicted by the attachment model are correct: an increase in the share of the 1927 perfume from 6% among consumers aged 19 up to 11% among consumers aged 29 years (actual observed values: 6% to 11%), an increase in the share of the 1977 perfume from 22% among consumers aged 19 up to 40% among consumers aged 29 (actual observed values: 27% to 41%), and a decrease in the share of the 1997 perfume from 73% among consumers aged 19 to 49% among consumers aged 29 (actual observed values: 67% to 48%). Thus, for consumers below 30, the attachment model leads to better predictions than the innovativeness model.

Older Consumers

We now consider the predictions of the simple analytical model for consumers aged 30 years and older. For them, the sensitive period is over, and nostalgia predicts they should prefer perfumes they encountered during that period. We now contrast predictions based on the attachment model with those based on the nostalgia model, taking into account in both cases the diminishing effect of innovativeness.

Again, according to the attachment model, the age-related factor ψ_{in} is proportional to the number of years of contact between a consumer of age i and perfume n. Because of the age range we consider, this number of years λ_{in} can include very high values, such as 60 years for a perfume launched in the 1920s and a consumer in her 80s, which leads us to predict high market shares for ancient perfumes among older consumers. In addition, because attachment predicts that ψ_{in} is proportional to the number of years of contact, a consumer's attachment to a perfume can be initiated at any age. Thus, a 70-year-old consumer may have developed a strong attachment to a perfume introduced when she was 50 on the basis of her 20 years of contact. In contrast, the nostalgia model posits that a consumer's attachment to a perfume is built during the sensitive period when she is younger than 30 years of age. Thus, a 70-year-old consumer should feel no nostalgia for a perfume introduced when she was 50.

Again, we assess the two models on the basis of their predictions and compare their predictions with the actual variations in choice shares observed in the market, computed as indicated previously. (We perform this comparison only up to age 80 years, because the small sample sizes make the estimations unreliable after that point.) Again, for both models, we choose the coefficient β_n (reflecting the intrinsic attractiveness of perfume n, assumed to be the same for all consumers), so that the predicted choice shares equal the observed choice shares for consumers aged 30. Thus, both models predict perfectly choice shares for

consumers of age 30, and we assess the models on the basis of their predictions for other consumers.

In Figure 3, we display the values of choice shares for consumer aged 30 to 80 years, (Part a) as predicted by the attachment theoretical model, (Part b) as predicted by the nostalgia theoretical model, and (Part c) as observed in the market.

Overall, the predictions based on attachment are much better than those based on nostalgia. Again, this better performance can be assessed by a simple measure, the average absolute difference between observed shares and predicted shares, which takes a value of 3.90% for the attachment model and 12.23% for the nostalgia model. The gradient of the observed variations corresponds to the key insights derived from the attachment model, not to those derived from the nostalgia model.

The nostalgia model (Figure 3, Part b) does not provide satisfactory predictions. Consider the magnitude of the predicted shares for consumers aged 80 years: 18% for the 1927 perfume, 64% for the 1977 perfume, and 18% for the 1997 perfume versus the actual figures of 37%, 47%, and 16%. The model also predicts that older consumers (60–80 years of age) will feel no nostalgia for the 1927 perfume, because they were not yet in their sensitive period when it was introduced (i.e., they were 5 years of age or younger, or not born). However, the observed choice shares show that these older consumers are very attracted to this long-established perfume. More important, the patterns of variation of the shares across age are inadequate. The model based on the nostalgia hypothesis predicts maximal shares for the 1977 perfume among consumers aged 40–50 years, because these consumers were between 15 and 25 years of age when the perfume was introduced (it therefore also predicts lower choice shares for the two other perfumes among those consumers). Specifically, the predictions suggest a strong increase in choice share between the ages of 30 and 40, a slowly increasing plateau at high values from the ages of 40 to 50, and a strong decrease during the

ages of 50 to 55. These predictions completely contradict the pattern observed in the real data, in which no such bump occurs (Figure 3, Part b). Therefore, the predictions based on the nostalgia model do not fit with the observed choice shares.

In contrast, the predictions of the attachment model (Figure 3, Part a) are more satisfying, if not perfect. The order of magnitude of choice shares among the consumers aged 80 years is much closer to the actual figures: 35% for the 1927 perfume, 49% for the 1977 perfume, and 16% for the 1997 perfume versus actual figures of 37%, 47%, and 16%. More importantly, the predicted patterns of variation across age fit well with the real patterns. The predicted choice share of the 1927 perfume increases monotonically, at about a constant rate, from 30 to 80 years of age, exactly as the actual share does. Similarly, the predicted choice share of the 1997 perfume decreases monotonically, as does the actual share, with the exception of a brief plateau between 35 and 45 years of age in the actual data, which is not predicted by the model. The 1977 perfume obtains the least satisfying prediction, with a predicted brief increase to age 40, followed by a long, slow decrease; the actual data show a very slight increase across the whole period. For all three perfumes, the predictions vary smoothly with consumer age, in accordance with the smoothness of changes observed in actual data and unlike the large bumps predicted by the nostalgia model.

Conclusions

The analysis of these simple models leads to clear conclusions. For both age ranges under study (19–30 and 30–80), the attachment model provides a better numerical fit. Indeed, this fit is surprisingly good, considering that the model, in line with the theoretical tradition, is extremely simple and that only one coefficient (β_n) is estimated from the data. Moreover, attachment provides insights into the variations of choice shares that match the observed variations. Among consumers younger than 30 years of age, it predicts that long-established perfumes should see their share increase slowly with consumer age, which is what we

observe, whereas innovativeness alone would predict that perfumes should have constant shares within that age range. Among consumers older than 30, attachment predicts that established perfumes should see their shares increase monotonically with consumer age, which is what we observe, whereas nostalgia predicts a bump in shares among generations who were in their sensitive period when the perfume was introduced, which is not what we observe.

<div align="center">**Conditional Logit Analysis of Consumer Choices**</div>

Theoretical models that contain stylized representations of a real system enable analysts to develop insights into the mechanisms that underlie their behavior (Moorthy 1993). In the preceding section, we used such models to identify the consequences of alternative hypotheses based on innovativeness, nostalgia, and attachment and compared these predicted consequences to the actual behavior of the real system. The main drawback of these models is their oversimplification of the system of interest: Very simple equations describe perfume attractiveness, numerical coefficients such as the maximum multiplier are set arbitrarily at some value like 2, only one coefficient (β_n) is estimated from data for each model, and actual perfumes are aggregated into only three (hypothetical) perfumes. This simplicity does not allow us to take full advantage of our large data set.

In this section, we report the results of a full-scale statistical analysis of consumer choices. Because we wish to explain a perfume choice by explanatory variables that vary, for the same perfume, across consumers, the appropriate statistical method is conditional logit analysis. We first describe the dependent variable, then the equation for attractiveness.

Dependent Variable

We cannot use choice data at the level of individual perfumes as the dependent variable, both for confidentiality reasons and because the list of possible choices is very long (i.e., more than 40). A statistical analysis of a qualitative choice among so many options

would lead to estimation problems. However, because perfumes launched at around the same time experience similar variations in their choice shares with consumer age, we again define aggregates of perfumes composed of those launched around the same time and analyze the choices made by consumers among these aggregates. The number of aggregates must represent a compromise. Using very few aggregates, as in our theoretical models, would reduce the degrees of freedom, but too many aggregates would pose estimation problems and lead to several aggregates being composed of a single perfume. As a compromise, we use six aggregates, defined on the basis of launch dates. We chose the precise limits (Table 1) so that each aggregate represents roughly 20% of the choice shares, with the exception of old perfumes, among which it seemed logical, given our focus, to separate the old (launched 40– 60 years ago) from the very old (launched more than 60 years ago). For each observation (a perfume choice by a consumer), the dependent variable is a nominal variable that can take six possible values (the six aggregates listed in Table 1).

Attractiveness Model

Our conditional logit model (McFadden 1974) analyzes the choice among these six aggregates using explanatory variables linked to consumer age. The equation used to model this qualitative choice is as follows:

$$\pi_{ij} = \frac{\alpha_{ij}}{\sum_{k=1}^{K} \alpha_{ik}}, \tag{4}$$

where π_{ij} is the probability that a consumer of age i (i = 19–103) chooses a perfume belonging to aggregate j (j = 1–6), and α_{ik} is the attractiveness of aggregate k for a consumer of age i, $\alpha_{ik} > 0$. Given that α_{ik} is strictly positive, we further define

$$\alpha_{ik} = e^{U_{ik}}, \tag{5}$$

where U_{ik} is the utility attached by a consumer of age i to a perfume belonging to aggregate k. We now present the definition of U_{ik} for the null and full models.

Null Model

Because we study the impact of age on consumer choices, we define the null model as one in which age has no impact. The attractiveness of an aggregate of k perfumes is then defined as a constant, whatever the age i of a consumer. This approach amounts to predicting the same choice shares for an aggregate, whatever the age of the consumer:

$$U_{ik} = \beta_k \qquad\qquad i = 1, I, \qquad\qquad (6)$$

where β_k is the basic attractiveness of aggregate k (identical for all consumers and estimated statistically).

Full Model

In the full model, we introduce explanatory variables associated with all three theoretical mechanisms, nostalgia, innovativeness, and attachment, as follows:

$$U_{ik} = \beta_k + \rho\delta_{ik} + \gamma \ln(\lambda_{ik}) + \nu\tau_{ik} , \qquad\qquad (7)$$

where:

β_k is the basic attractiveness of aggregate k (identical for all consumers);

δ_{ik} is a variable indicating a nostalgia effect that takes a value of 1 if consumer i was 15–25 years of age when the perfumes in the aggregate were launched in France, 0 if the consumer was younger than 10 or older than 30, and an intermediate (linearly interpolated) value if the consumer was between 10 and 15 or 25 and 30 years of age; this approach replicates the formulation of the analytical model, except we let the maximum nostalgia multiplier take any value ρ estimated by the statistical algorithm rather than imposing a maximum of 2;

λ_{ik} is a variable indicating an attachment effect, which is equal to the number of years during which a consumer of age i has been in contact with the perfumes in aggregate k since she was 15; this replicates the formulation of the analytical model, in that we take the logarithm of λ_{ik} to ensure that the exponential of U will be proportional to the number of years of contact, as in the theoretical model;

τ_{ik} is a variable indicating an innovativeness effect, which takes a maximum value of 1 if the perfumes in aggregate k were launched in France less than 10 years ago (10 years prior to 2002, when the data were collected) and consumer i is currently between 19 to 30 years of age; a minimum value of 0 if the consumer is above 80 or if the perfumes were launched more than 10 years ago; an exponentially declining value between 1 and 0, as a function of consumer age, if the perfumes were launched less than 10 years ago and the consumer is between 30 and 80 years of age; and

β_k, ρ, γ, and ν are constants, to be estimated statistically.

In Table 2, we present the results of the conditional logit estimation for eight models: the null model, partial models including only one of the three mechanisms (nostalgia, innovativeness, or attachment), partial models including two of the mechanisms, and the full model including all three mechanisms. To evaluate the quality of the results, we offer two indicators. The first is a likelihood ratio test that compares each model with the null model. Given the very large sample size, we expect, and find, very significant results for all models. The likelihood ratio test for the best model produces a χ^2 of 15,840 with 3 degrees of freedom (d.f.); for the worst model, it is 6,300 with 1 d.f. We therefore also use a second indicator that captures how well the conditional logit model predicts the observed choice shares. We compute, for each birth year, the observed choice shares for each of the six aggregates; then we compute, for each model, the predicted choice shares. We next compute R^2s on the basis of the squared discrepancies between the predicted and observed choice shares for each birth

year and each model, using as a reference the null model. Thus, the null model has, by definition, $R^2 = 0$, whereas $R^2 = 100\%$ corresponds to perfect predictions of the actual choice shares. We weight the squared discrepancies of each birth year by the number of observations for that year. As additional evidence of the quality of the predictions, we plot in Figure 4 the observed choice shares and the choice shares predicted by each of the seven models.

We first compare the predictions that use a single explanatory variable: nostalgia, attachment, or innovativeness. The lowest fit is obtained with nostalgia alone ($R^2 = 38.38\%$), and as we show in Figure 4, Part b, the predictions err on two key structural features. Compared with observed data, the nostalgia model tends to predict overly small variations in choice shares across ages, particularly for the perfume aggregates launched in 1997–2001 and 1992–1996 (i.e., more recent perfumes), though also for the older perfumes. In the former case, the nostalgia hypothesis cannot predict the strong performance of recent perfumes among younger consumers; in the latter case, it cannot predict the strongly increasing performance of old perfumes among generations that are older but not old enough to have been in their sensitive period when the perfumes appeared. Furthermore, the nostalgia hypothesis predicts a large bump for each perfume aggregate among consumers who were in their sensitive period when the perfumes appeared (i.e., consumers aged 65–85 years for perfumes launched in 1942–1961, those aged 40–60 for perfumes launched in 1962–1981, and those 25–45 years for perfumes launched in 1982–1991). Such bumps do not appear in the observed data, as the nostalgia predictions in Figure 4, Part b, show in comparison with the observed values in Figure 4, Part a. Overall, the poor R^2 obtained on the sole basis of the nostalgia variable appears associated with the structural inadequacies in the predicted patterns of variations of choice shares across age.

We obtain a better fit with innovativeness as the sole explanatory variable ($R^2 =$ 49.35%). In addition, we show in Figure 4, Part d, that our predicted tendencies for the

different perfume aggregates are appropriate, with the exception of perfumes launched between 1982 and 1991 (for which the model predicts a monotonous increase in choice shares with consumer age, though the observed data show a marked increase among consumers aged 19–40 years and a subsequent slow decline). However, the magnitude of the predicted changes is smaller than reality: Among young consumers, recent perfumes have greater choice shares than predicted, whereas among older consumers, older perfumes have greater actual choice shares than predicted. In qualitative terms, innovativeness predicts that recent perfumes will perform better among younger consumers and long-established perfumes will do better among older consumers, but it does not predict the full extent of the difference.

Of the predictions based on a single explanatory variable, we obtain the best fit with the attachment variable ($R^2 = 85.63\%$). Moreover, the predicted patterns of variation in the choice shares closely match the observed patterns (Figure 4, Part c). The main discrepancies pertain to the predicted values for the youngest consumers, which include some numerical discrepancies (e.g., perfumes launched between 1982 and 1991 have a predicted choice share above 20%, whereas the actual figure is below 20%). But overall, the simple conditional logit prediction based on attachment alone, which merely hypothesizes that perfume attractiveness is proportional to the number of years during which a consumer has been in contact with the perfume since she turned 15, predicts well the structural patterns observed in the market. This finding reinforces the diagnoses based on the R^2 value.

In Figure 4, Parts e–g, we display the predictions obtained when we include two explanatory variables in the model. Without entering again into a detailed analysis of the predicted choice shares, we note that the best combination involves the attachment and innovativeness variables, in terms of both R^2 values (89.42%) and the adequacy of the predicted and observed patterns of choice shares (Figure 4, Part f). The prediction with nostalgia and innovativeness does not perform as well, in terms of either R^2 (61.73%) or

patterns, and indicates limited variations in choice shares across consumer ages (Figure 4, Part g). Finally, the prediction associating attachment and nostalgia achieves a slightly lower R^2 of 85.62% (Figure 4, Part e).

The full model that includes all three explanatory variables (Figure 4, Part h) leads to an R^2 of 89.44% and performs only slightly better than the model limited to attachment and innovativeness, with similar predicted patterns. Thus, the marginal improvement associated with the addition of nostalgia to the two other explanatory variables is limited.

These findings correspond to our diagnostic of variable importance according to the values of the Wald test in the full model (Table 3). These values clearly confirm that attachment (beta coefficient of .942 and Wald χ^2 of 4,600 with 1 d.f.) and, to a lesser degree, innovativeness (beta coefficient of .594 and Wald χ^2 of 664 with 1 d.f.) have the strongest predictive power. For nostalgia, the sign is not as expected, and though a χ^2 of 28.6 with 1 d.f. is highly significant, it is much smaller than those related to the two other variables. When we take into account the very large sample size (148,537), we confidently confirm that the predictive power of nostalgia is much weaker than that of attachment or innovativeness.

Discussion

Contributions

Our first objective with this research was to confirm that older consumers tend to prefer long-established brands. We confirm this claim. The R^2 obtained with the best model is 89.4%, which demonstrates that consumer age has a very significant impact on the choice shares obtained by perfumes. Unlike many studies of older consumers, through our large sample size, we provide data and predictions for all age ranges above the age of 18 and thereby are able to analyze consumers of intermediate age.

Our second objective was to assess which mechanisms could explain this preference. We examine three possibilities and, using both a stylized theoretical model and a conditional

logit analysis, show that the best predictive mechanism—in terms of both its R^2 and its reproduction of observed patterns of product choice—is that based on attachment. That is, the attractiveness of a perfume for a consumer is proportional to the number of years during which the consumer has known the perfume since she turned 15. In addition, there is a sizeable, though smaller, contribution of the innovativeness variable, such that recently introduced perfumes are more attractive to younger consumers.

The comparisons between the attachment and the nostalgia hypotheses always fall strongly in favor of the former. Whereas the nostalgia approach asserts that consumers develop lifelong preferences during an early sensitive period, the attachment approach argues that preferences depend mainly on the length of contact between a person and an object and therefore can be acquired at any age. A typical contrasted example might involve the preferences of a 70-year-old woman for a perfume introduced when she was 50. Nostalgia predicts the consumer will build no attachment, because the perfume was not introduced when the consumer was in her sensitive period, whereas attachment predicts that the consumer might develop a strong attachment over these 20 years, even though she was no longer in her sensitive period at the perfume launch.

We recognize the structural difference between our study and previous research based on nostalgia (e.g., Holbrook and Schindler 1989, 1991, 1994, 1996; Schindler and Holbrook 1993, 2003). In prior articles, consumers expressed their preferences among car styles, movie stars, or music styles in a rather timeless and market-free manner. They responded to stimuli, ancient and recent, in a standardized way, even if the items were no longer available in the market. In contrast, our survey asked respondents not about their hypothetical preferences among past and present perfumes but about their present use of perfumes currently available on the market. As a consequence, respondents could mention ancient perfumes only if they were still offered for sale. Although a supply-based bias in the real-life process of choosing a

perfume occurs, in that many ancient perfumes (e.g., those introduced before 1960) are no longer available but recent perfumes launched after 2000 mostly remain available, this bias expresses the truth of the market. Moreover, the bias would have been even stronger in any other product category, because some ancient perfumes remain available, whereas old car models are no longer manufactured, and new car buyers must choose among only recent models. Similarly, movie stars who were popular decades ago, even if they are not deceased, cannot play the same parts any more. Lauren Bacall or Ingrid Bergman may have been nominated for Academy Awards for their later performances, but they did not play the same roles they would have when they were younger.

In terms of modeling, in the absence of existing mathematical models of attachment, we propose a simple formulation, according to which the attractiveness of a product for a consumer is proportional to the number of years of contact between the consumer and the product, starting with the time the consumer became interested in the category (for perfume, since she turned 15 years of age). This simple approach leads us to excellent predictions and is therefore well supported empirically.

Limits

There are limits to our approach. Our statistical analysis is based on cross-sectional data, collected in 2002, whereas the mechanisms under study (nostalgia, declining innovativeness, and attachment) refer to longitudinal effects. It would be interesting to analyze multiple data sets collected at long intervals (5–10 years apart), which would provide a broader basis for comparing nostalgia and attachment effects (Kleine and Baker 2004). However, it would not be reasonable to try to survey the same consumers at such intervals. At best, we might hope to survey representative samples of the same cohorts at different dates and analyze how choice shares evolve as a function of aging and cohorts. For example, what

are the differences in brand choices between consumers of age 30 in 2002 and consumers of age 40 in 2012?

In addition, we ask our respondents to indicate which perfumes they use today. This wording limits their choice to perfumes currently available and reflects the market's reality. It could be interesting to study consumer attitudes toward perfumes that are no longer on sale as well and compare them to attitudes toward available perfumes.

Further Research

Additional investigations must replicate our findings in other product categories. Perfume is a highly involving, emotional, symbolic product category. The very strong attachment that consumers develop toward perfumes over years or decades may be much stronger than one that exists toward more functional, less involving product categories. It would be interesting to assess whether our results can be replicated in such categories.

Furthermore, we investigate female perfume users. It would be interesting to investigate whether male consumers behave differently. Equally, are there differences across other demographic variables such as level of education or income? Are there differences across levels of materialism, involvement in the product category, and so forth?

We analyze consumers in France, a country where perfume has been used for decades, or centuries, and where girls begin using perfume early, around 15. What happens in countries where perfume is a relatively new category? What happens in countries where women start using perfume at a later age?

Managerial Implications

Our results have multiple managerial implications. First, manufacturers are right to launch many new perfumes continuously (about 100 per year in France, 400 worldwide), because younger consumers are eager for novelty. However, the initial high penetration of a new perfume among younger consumers should be interpreted with care, because they may

not remain loyal to it. After a few years, it will lose its innovative appeal as even newer perfumes will appear.

Second, because older users have built an attachment to options they have known for a long time and may not be willing to try or buy new products, manufacturers can benefit from keeping older options available, or even bringing some back. Radio networks that specialize in broadcasting songs of a specific period take a similar approach, as do concert organizers who promote older rock groups. Even car manufacturers can exploit this concept: Brown, Kozinets, and Sherry (2003) analyze the success of certain "retro brands" (relaunched historical brands with updated features), including Volkswagen's New Beetle.

Third, even if consumers are no longer in their sensitive period, and even if they are much older than 30 years of age, it remains possible to attract them to a new perfume, to which they may develop a strong, durable attachment. For example, the target segment of women in their 40s and 50s should be very attractive to perfume manufacturers, as they have a high income and still a very long life expectancy.

Fourth, building attachment to a brand entails a long-term process, and such an attachment is a precious asset. Thus, changes in brand names should be considered with great care. In the past two decades, the fashion has been to delete established brands, introduce new brands, and modify the contents of remaining brands, such as through brand extensions or intense rejuvenating or repackaging of ancient brands. What happens to those consumers who have developed a lifelong attachment to brands that no longer exist or have been significantly modified? Isn't it dangerous? Relying on umbrella brands, which keep the attractiveness of a long-established name when introducing a new brand, may offer an effective solution.

Fifth, when evaluating the market position and value of a brand, marketers should take into account the pattern of preferences across consumer ages. Two brands with the same

current market shares may have very different futures because of age differences among their buyers. Simple indices of a brand's age position, such as the ratio of its choice share among consumers aged 60 years and older divided by that among consumers younger than 30 years, can offer key information. In our data set, values of this index reach higher than 300% for certain perfumes and as low as 5% for others, which complements Uncles and Lee's (2006) work showing that BP retail fuel in Australia receives a 28% share in the under-40 age group, 20% in the 40–59 group, and 18% in the 60–74 year group. Another possible index simply uses the average age of the brand's consumers. In our data set, we observe values as high as 46 and as low as 30 years for specific brands. Such indices could be useful to help target communication (of course, taking into account that the subjective age of the target may be much younger than its objective age); to assess, at regular intervals, whether a brand's constituency becomes older and at what speed and then compare level to benchmarks based on other brands (i.e., can we say that a brand ages more or less quickly than normal?); and to analyze the overall content of a manufacturer's perfume portfolio (how many young and how many old perfumes?).

Of course, we recognize that all our findings are not completely deterministic: In other categories, some long-established brands manage to maintain a very young clientele, and a very young image—Coca-Cola is a superb example.

Furthermore, the same perfumes are sold in many countries, some with very long perfume traditions and others relatively new to perfume. A specific perfume may have been introduced long ago in some countries but very recently in others. Therefore, the mechanisms described herein likely lead to clienteles of very different ages in different countries. How then can the perfume manage its international communication, given that perfumes typically use a global communication policy, with the same ads everywhere?

In summary, we show that the probability of choosing a long-established perfume, rather than a recently introduced one, increases enormously with consumer age. This trend can be explained better by attachment, based on the length of a consumer's exposure to a perfume, and innovativeness than by nostalgia for perfumes encountered during an early sensitive period of life. This finding has major implications for marketing strategies targeted at younger consumers, older consumers, and, interestingly, mature consumers who can develop new attachments.

APPENDIX 1

FIGURE A1

Perfume penetration decreases with age

FIGURE A2

With age, consumers wear a smaller number of perfumes
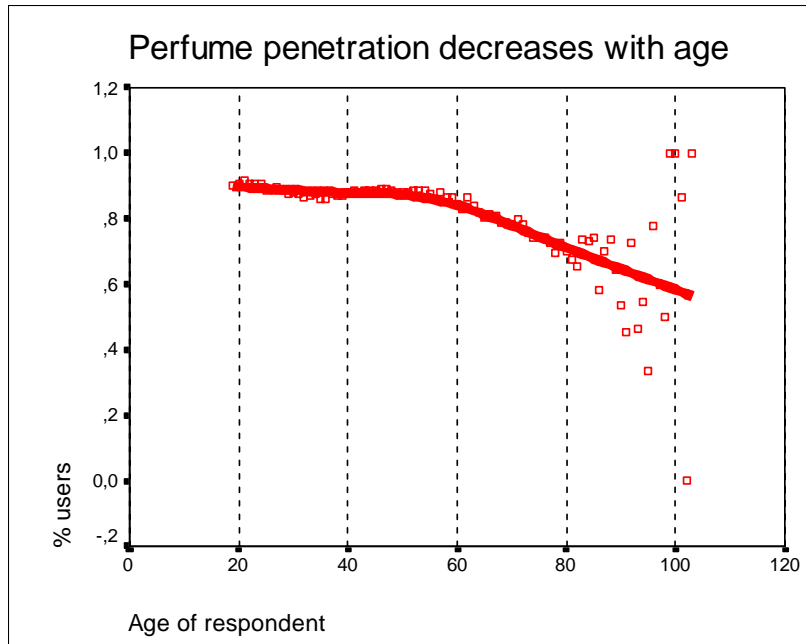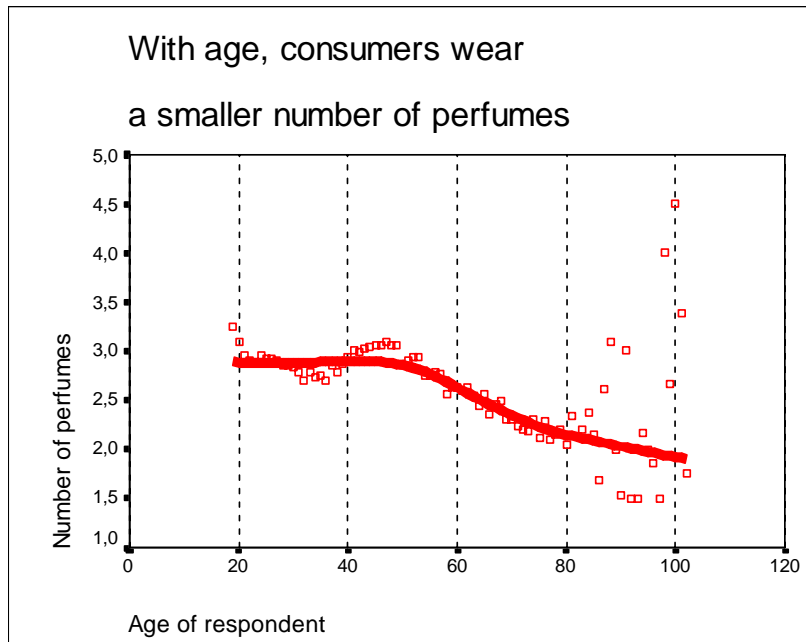
FIGURE 1

(a) Evolution of the Innovativeness Multiplier
as a Function of Consumer Age
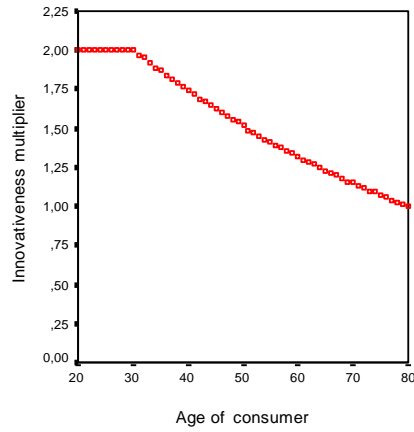
(b) Evolution of the Nostalgia Multiplier
as a Function of Consumer Age at Product Launch
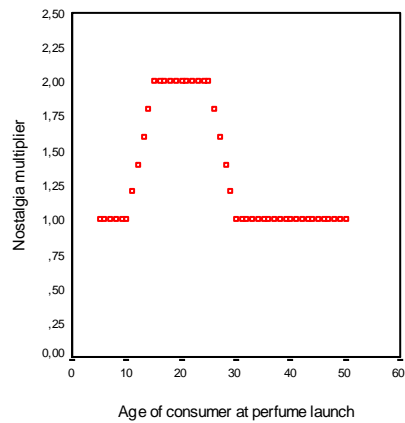
(c) Evolution of the Attachment Multiplier as a Function of the Number
of Years of Contact Between the Perfume and the Consumer
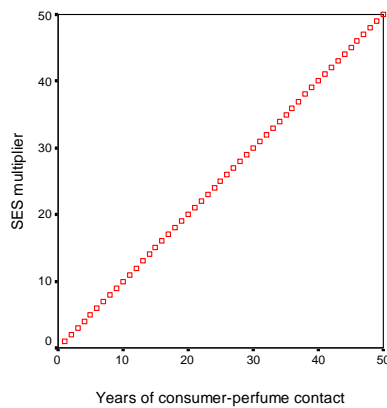
FIGURE 2
Values of Choice Shares for Consumers Aged 19–30 Years

(a) As Predicted by Attachment Model
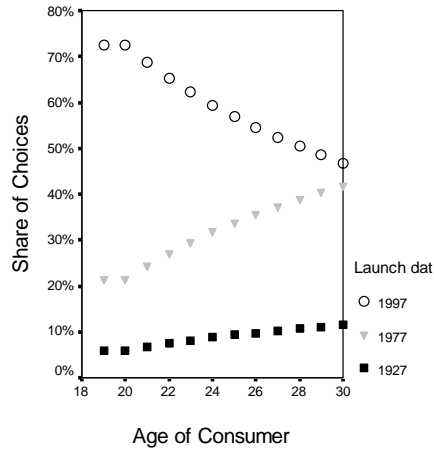
(b) As Predicted by Innovativeness Model
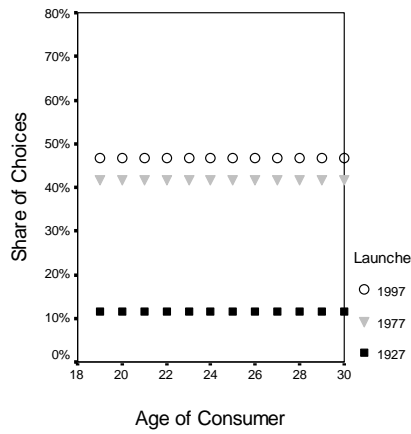
(c) As Observed in the Market
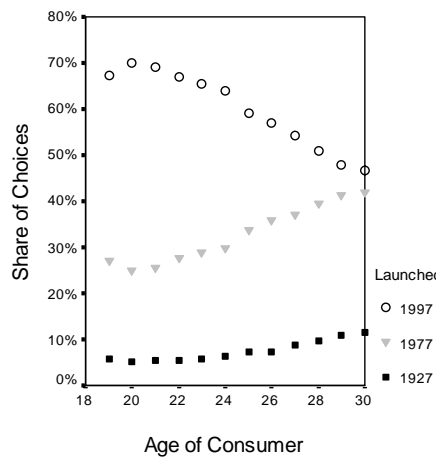
FIGURE 3
Values of Choice Shares for Consumers Aged 30–80 Years

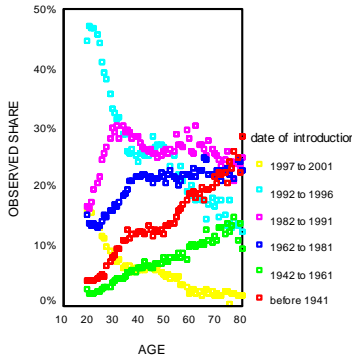(a) As Predicted by Attachment Model
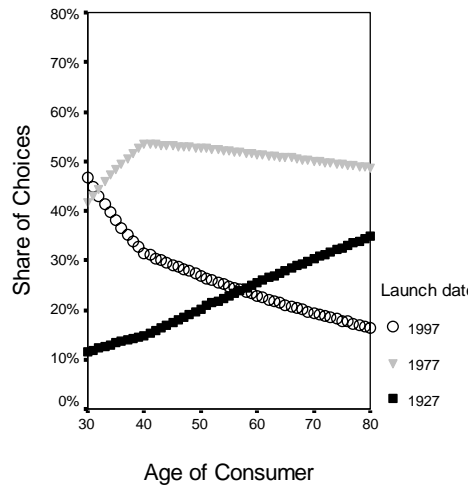
(b) As Predicted by Nostalgia Model
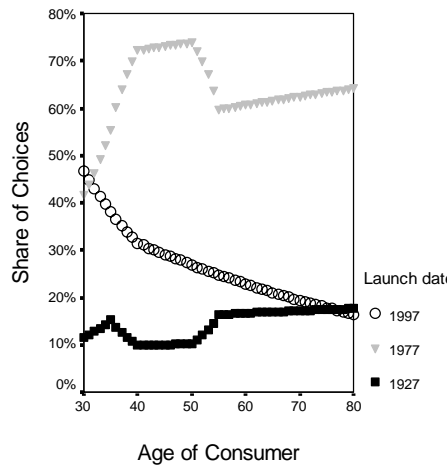
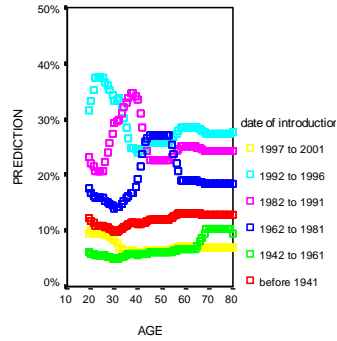

(c) As Observed in the Market
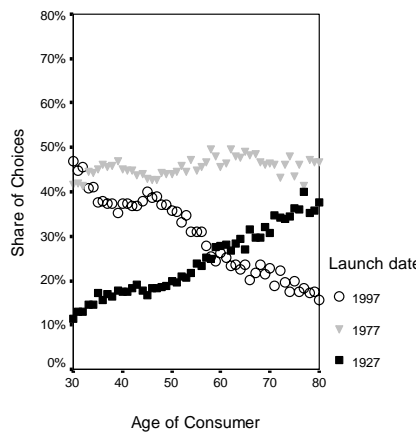
(d) FIGURE 4
Observed Choice Shares versus Choice Shares Predicted by Different Models
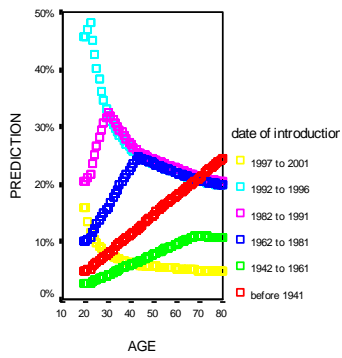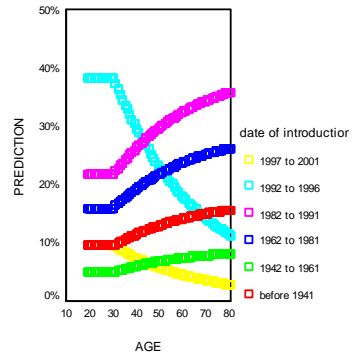

(a) Observed Shares

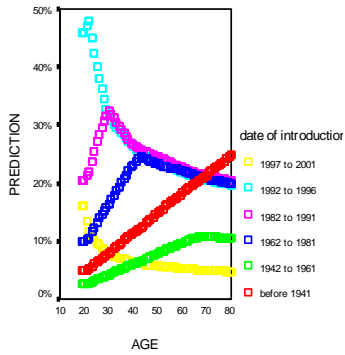(b) Nostalgia Predictions
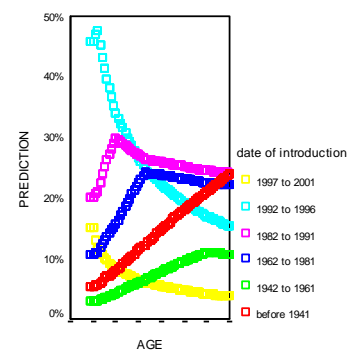
(c) Attachment Predictions

(d) Innovativeness Predictions

(e) Attachment and Nostalgia Predictions

(f) Attachment and Innovativeness Predictions

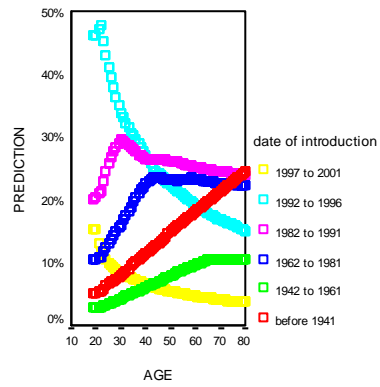(g) Innovation and Nostalgia Predictions

(h) Full Model

TABLE 1

Conditional Logit Analysis:
Clusters of Perfumes Defined on the Basis of Introduction Dates

Cluster	Date of Introduction	Number of Perfumes in Cluster	Choice Share in 2002
A	Before 1942	2	12.0%
B	1942–1961	2	6.3%
C	1962–1981	5	20.2%
D	1982–1991	8	27.6%
E	1992–1995	10	17.6%
F	1996–1999	16	16.2%

TABLE 2

Conditional Logit Analysis:
Goodness-of-Fit for Different Models

Model	-2 log-likelihood	χ^2 (compared with null model)	(d.f.)	R^2 for Predicted Choice Shares (compared with null model)
Null model: 5 Aggregate Indicators (AI)	4,159,402	-------	---	0.00 %
5 AI + Attachment	4,144,247	15,155	(1)	85.63 %
5 AI + Nostalgia	4,153,102	6,300	(1)	38.38 %
5 AI + Innovativeness	4,149,825	9,577	(1)	49.35 %
5 AI + Attachment and Nostalgia	4,144,235	15,167	(1)	85.62 %
5 AI + Attachment and Innovativeness	4,143,591	15,811	(2)	89.42 %
5 AI + Nostalgia & Innovativeness	4,148,319	11,083	(2)	61.73 %
5 AI + Attachment, Innovativeness & Nostalgia	4,143,562	15,840	(3)	89.44 %

TABLE 3

Conditional Logit Estimates for the Full Model

Independent Variable	Beta Coefficient	Wald test (χ^2 with 1 d.f.)
Attachment [Ln(contact)]	.942	4,600.4
Innovativeness	.594	663.6
Nostalgia	-.042	28.6

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