



Unclarity confusion and expiration date labels in the United States: A consumer perspective



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ABSTRACT

This paper discusses findings from a qualitative study about the role played by unclarity confusion related to expiration dates in the purchase of perishable grocery products from the perspective of consumers in the United States. Participants emphasized that expiration dates provide important point-of-purchase information that facilitates consumer decision-making at the shelf when tasting or smelling the product for freshness is not an option. Issues related to understanding the meaning of expiration dates, confusion caused by varying formats and how this confusion produces affective, cognitive, and behavioral consequences are also highlighted. Based on these findings, this paper presents a conceptual framework explicating the role of unclarity confusion surrounding expiration dates on the consumers' path to purchasing perishable grocery products. We expect that our findings and proposed framework will allow for more exploration of the use of expiration dates, highlight the consequences faced because of unclarity confusion caused by expiration dates, and call attention to opportunities for retailers and manufacturers to play a larger role in ensuring consumers can make better informed decisions at the grocery shelf.

Labels can help some people sometimes in some cases, if they have the knowledge or motivation to use the information, which may or may not be in a format they can understand (Rotfeld, 2009, p. 375).

1. Introduction

The Food and Drug Administration (FDA) holds the responsibility to ensure that food sold in the United States is safe, wholesome, and appropriately labeled to guide consumers while making purchase and consumption decisions. Food Policy in the United States includes several rules and guidelines about different types of food labeling requirements such as net quantity of contents, ingredients, food allergens, nutrition labeling, manufacturer/distributor information, country of origin, flavors, colors, and nutrition claims that influence food well-being (Block et al., 2011). Nonetheless, food policy mandated by the FDA does not include universal regulations for date labels

signaling the freshness of perishable grocery products.

An expiration date ² label provides valuable information for consumers by serving as a freshness indicator. Consumers feel safe consuming fresh products that do not contain disease-inducing microorganisms and other pathogens (Fortin et al., 2009). Checking expiration dates reduces the risk of purchasing a stale, degraded product, which could potentially affect a consumer's health negatively. For retailers and marketers, expiration dates can influence product acceptability (Wansink and Wright, 2006), inventory management, store image, and the consumer's confidence in the brand (Harcar and Karakaya, 2005). However, there is unclarity around expiration date labels, due to a lack of uniform display and format ³ from manufacturers and marketers (Harcar and Karakaya, 2005; Tsiros and Heilman, 2005).

Further, food policy in the United States governs food production and pricing systems (agricultural policy), food production, storage, and transportation systems (food safety policy), and information about nutrients that contribute to a healthy diet (nutrition labeling policy)

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² According to the United States Department of Agriculture (USDA, 2015), expiration dates "refer to best quality and are not safety dates. Even if the date expires during home storage, a product should be safe, wholesome, and of good quality if handled properly".

³ The USDA also provides the following definitions for various types of expiration date formats: sell by (date tells the store how long to display the product for sale. You should buy the product before the date expires); best before (date is recommended for best flavor or quality. It is not a purchase or safety date); use by (date is the last date recommended for the use of the product while at peak quality. The date has been determined by the manufacturer of the product) (USDA, 2015).

(Block et al., 2011). However, there is no federal food policy related to expiration dates of perishable grocery products (except for infant formula) in the United States. On the other hand, the key European Union (EU) legislation for food date labeling (Directive 2000/13/EC) defines two types of durability indicators: (1) best before, i.e., the period within which the food will not be stale, which signifies freshness or quality of the food, and (2) use by, i.e., the period within which the food will not have harmful microbiological activity that could lead to food poisoning, which signifies safety (DEFRA, 2011). The EU also has mandatory labeling requirements such as making labels clear, conspicuous, legible, and indelible.

Further, a product cannot be sold after its use by date has passed, whereas a food past its best before date is considered safe to consume, but might not be at its best quality. In the EU, the manufacturer is responsible for setting the appropriate dates along with proper storage instructions. Altering or removing a date label or selling food after its use by date is an offense. The EU directive also requires manufacturers to follow a date format, i.e., best before day/month/year or use by day/month/year. Moreover, the date label should appear within the same field of vision as that of other legally required information. Overall, unlike the United States, the EU directive provides a very clear and systematic legal approach to date labeling. This can reduce confusion around it and allow for more informed decision-making at the shelf, minimizing uninformed decisions and potential risks that come with lack of information or clarity.

Despite the lack of a federal food policy in the U.S. specifically related to expiration dates on perishable products and the confusion surrounding freshness and safety of food products, few scholarly attempts have tried to explain how this can impact a consumer's grocery shopping experience. Many questions remain unanswered. The purpose of this research is to fill one such research gap, that is, to understand inconsistencies of the expiration date labeling in the United States, the confusion it can cause, and the consequences of this confusion based on consumer experiences with expiration dates. By using Pluzinski and Qualls's (1986) dynamic consumer response framework and unclarity confusion literature as a guide, we propose a generative conceptual framework that explains the challenges associated with expiration date labels in the U.S., the confusion they cause, and the resulting consequences. We believe the findings will draw the attention of policy makers to the importance of uniformity in food date labeling and consumer education about the role of expiration dates in the purchase, consumption, and proper storage and handling of perishable grocery products. This can eliminate or reduce confusion, help consumers to make informed decisions when it comes to purchasing perishable grocery products, and, as a result, alleviate dissonance and dissatisfaction. In short, the study highlights that existing expiration date labels can impede the decision-making process at the grocery retail shelf, largely due to unclear meanings of freshness and food safety. This further causes consumer confusion and unfavorable consequences. This qualitative study also extends consumer confusion literature into the grocery shopping context and confirms arguments from previous quantitative research that expiration dates pose issues to consumers.

2. Literature review

2.1. Perishable grocery products and expiration dates

There is a small, emerging field of research that aims at understanding the role of expiration dates in consumer behavior. Few studies (Cardello and Schutz, 2003; Harcar and Karakaya, 2005; Miranda and Kónya, 2006; Wansink and Wright, 2006) have focused attention on consumers' awareness and perceptions of expiration dates. One significant contribution, from Tsiros and Heilman (2005), investigates the consumers' frequency of checking expiration dates and their willingness to pay (WTP) for perishable grocery products as they

approach their expiration dates. They found that consumers' date-checking frequency increases with an increase in the functional, performance, and physical risks associated with purchasing that product. That is, WTP varies with the product category and the consumers' experience with it. In addition, consumers' WTP also depends on consumers' demographic factors and post-purchase efforts to slow down the food aging process. Thus, Tsiros and Heilman developed a base for future research in this field by investigating consumers' WTP for an aging perishable product and the impact of perceived risk on this behavior. Likewise, Sen and Block (2009) went a step further by examining the role of endowment in the consumption of products past their freshness dates. They posited that holding the differential costs implicit in ownership constant, consumers are more likely to consume a product past its freshness date when they own it and thereby provide an insight into why people consume expired products. These contributions helped to extend expiration dates from a purely purchase behavior role to one of importance in overall consumer behavior.

Furthermore, Gruber et al. (2016) recently offered a holistic understanding of the phenomenon of food waste and the role of expiration dates therein from the store manager's perspective, mainly in the European context. They found that managers experience a moral burden and discomfort when food is wasted and that autonomy and flexibility could be solutions to this issue. They also found that managers' struggles with food waste arise not only from the retail environment, but also from the larger regulatory and societal environment, of which, the legal aspects related to food date labeling are crucial. Nevertheless, there is still a gap in the literature about understanding consumer experiences with the ambiguity associated with expiration dates, the confusion it causes, the associated consequences, and the resulting policy implications in the context of the United States. Accordingly, the present research uses qualitative interpretive research to explore consumer experiences, perspectives, and opinions about expiration dates and the confusion surrounding them.

2.2. Consumer confusion

Consumer confusion is an "uncomfortable state of mind that primarily arises in the pre-purchase phase and which negatively affects consumers' information processing and decision making abilities and can lead to consumers making sub-optimal decisions" (Walsh, 1999, p. 24). Consumer confusion has been investigated in several areas and markets such as, telecommunications (Leek and Chansawatkit, 2006; Turnbull et al., 2000), personal computers (Leek and Kun, 2006), wine (Casini et al., 2008; Drummond and Rule, 2005), watches (Mitchell and Papavassiliou, 1997), higher education (Drummond, 2004), online hotel booking (Matzler and Waiguny, 2005), and nutrition labels (Spiteri Cornish and Moraes, 2015). However, the role of consumer confusion has not been investigated in the context of expiration dates and grocery shopping.

Further, consumer confusion is driven by similarity confusion, overchoice or overload confusion, and unclarity confusion (Mitchell and Papavassiliou, 1999; Mitchell et al., 2005; Walsh and Mitchell, 2010). Similarity confusion is caused by similar brand or product attributes, whereas overload confusion is caused by overly information-rich environments or the availability of a wide choice of alternatives (Mitchell et al., 2005). Unclarity confusion is caused by ambiguous, complex, and conflicting information (Mitchell et al., 2005). Several researchers have investigated the role of confusion caused by similarity, overload, and/or overchoice of products and information (for example, Casini et al., 2008; Drummond, 2004; Drummond and Rule, 2005; Mitchell and Papavassiliou, 1997; Turnbull et al., 2000); however, there is still a need for more research in the area of unclarity confusion.

Expiration date labels on perishable grocery products are indepen-

dent of brand attributes and of the range of product alternatives. Therefore, similarity confusion and overload confusion do not play a role in the expiration date context. However, expiration date labels serve as the main source of information for product freshness when tasting or smelling the products at the retail shelf is not an option. The absence of clear and comprehensive information proves to be an obstacle to consumers obtaining the necessary information prior to making a consumption decision. So although similarity and overload confusion do not seem to play a crucial role in the context of expiration dates, unclarity confusion is particularly challenging in this context because of the conflicting and ambiguous formats, types, and varying package locations of expiration date labels. Therefore, the focus of this research is to understand the role played by unclarity confusion related to expiration dates in the context of shopping for perishable groceries. Understanding this not only adds value by advancing the current knowledge of expiration dates and unclarity confusion literature in the grocery shopping context, but also enables consumers to make better purchase decisions, save time, effort, and money, and avoid food wastage. For retailers and marketers, this means lower customer dissatisfaction, better inventory management, enhanced customer loyalty, and improved store image. For policy makers, this offers an opportunity for food date label regulation and consumer education.

2.3. The dynamic consumer response framework

A tripartite framework consisting of affect (feeling), cognition (thinking), and conation (behavior) is accepted as the foundation of consumer response models (Lavidge and Steiner, 1961; Zajonc and Markus, 1982), and many such models explain consumer behavior systematically, suggesting that consumers must have some awareness of a product prior to making a favorable assessment that could lead to a purchase (Agarwal and Malhotra, 2005; Guo and Wang, 2009; Homburg et al., 2006; Guo and Wang, 2009). Pluzinski and Qualls's (1986) dynamic consumer response framework proposes that three processes (iteration, parallelism, and complementarity) define the interaction between the three response components (affect, cognition, and conation). Iterative processing involves sequential movement between two or more components. Parallel processing involves simultaneous activation of two or more components. Complementary processing involves strengthening of one component by another, and thus affects its impact on the third component. In this framework, affect is "a form of experiential feeling or emotional response" (p. 232), while cognition represents "conscious and preconscious" thoughts or beliefs (p. 233). The third component, behavior (conation) is a "purposive action" (p. 233).

For example, consumers may like a product (affect), encounter product information that provides some type of knowledge of the product (cognition) and then choose to purchase that product (behavior). Information at the cognition stage can be confusing or lacking, causing an absence of knowledge (Nord and Peter, 1980), leading to a change in feelings and/or a negative behavior (i.e., no purchase). In the case of expiration dates, consumers are looking for information on the package that could indicate freshness, safety, and/or viability, all of which have an impact on the decision to purchase. Using the dynamic consumer response framework, this study explains this changing role of affect, cognition, and behavior, which fluctuates due to the confusion presented by expiration date labels while shopping for perishable grocery products.

3. Method

In this research, we used a qualitative, hermeneutic, interpretive approach. First, the use of qualitative data allows for a richer description and enables an initial exploration to develop a theoretical framework (Creswell, 2012; Marshall and Rossman, 2014) of consumer confusion related to expiration dates in the grocery purchase decision.

Second, hermeneutical interpretation involves a person's understanding of the meaning of his/her life experiences and how these general viewpoints can be applied to unique contexts and situations in his/her life. Researchers use this iterative interpretation-reinterpretation process to analyze parts of qualitative textual data and to acquire a meaning of the whole (Arnold and Fischer, 1994; Gadamer, 2004; Heidegger, 1976). There is a lack of clear understanding of the role played by consumer confusion related to expiration dates in the context of grocery shopping decisions, and also its cognitive, affective, and behavioral consequences. Therefore, based on our *preunderstanding* (Arnold and Fischer, 1994; Heidegger, 1976), i.e., our experience as consumers and researchers, and our knowledge about the consumer confusion literature and the dynamic consumer response framework, we interpret participant viewpoints and make sense of these phenomena in the context of expiration dates.

We used a purposive convenience sample of 19 consumers from the United States, who regularly shop for groceries for their respective households. These participants were easily accessible and appropriately represented the nature of this study. The sample was composed of 11 women and eight men. The participants' ages ranged from 29 to 61 years of age (mean age = 43 years; standard deviation = 11 years). A sample size of 19 might appear to be small, but it proved adequate as the study moved forward and theoretical saturation was reached (Marshall and Rossman, 2014; Patton, 1990). Furthermore, according to McCracken (1988, p. 17), "for many research projects, eight respondents will be perfectly sufficient." Likewise, several successful research studies have used fewer interviews to understand and interpret different phenomena (e.g., Fournier, 1998; Levy, 1981; Mick and Buhl, 1992; Schouten, 1991; Thompson, 1996). A detailed sample description is provided in Table 1.

Using a semi-structured interview protocol, we asked participants a series of open-ended questions relating to lifestyle, eating habits, and grocery shopping behavior. Next, we asked participants several questions that explored their understanding of what expiration dates mean, the level of confusion caused by variations in label formats and locations, and the consequences of this confusion. Two interviewers trained in qualitative, in-depth interviewing techniques conducted interviews with participants face to face, over the telephone, or via Skype over a period of three months. These in-depth discovery-oriented interviews, which averaged 40 min in length, were audio recorded and then transcribed verbatim, resulting in 178 single-spaced pages of transcripts that served as the basis for the analysis.

We applied a thematic analysis approach (Boyatzis, 1998; Braun and Clarke, 2006) to organize and analyze the transcripts in NVivo 10, which is qualitative data analysis software. We sorted, labeled, coded, and classified the data in various themes (Sayre, 2001). We simultaneously analyzed new data in the context of the previously collected data, which in turn led to a continuous comparison and contrast following the iterative process of hermeneutical interpretation (Thompson, 1997). "The movement of understanding always runs from the whole to part and back to the whole. The task is to expand in concentric circles the unity of the understood meaning." (Gadamer, 1988, p. 68). Meaningful relationships between the categories and subcategories were constructed. This process yielded broad categories, which were further reduced to fundamental themes. The appendix outlines examples of how categories and themes developed from constant comparative analysis. Next, these themes were arranged in a thematic map to understand how the themes are related to one another. The conceptual framework of unclarity confusion and expiration date labels emerged from this process.

We ascertained the quality of data and findings by using criteria for ensuring trustworthiness of data in terms of (1) credibility, (2) transferability, (3) dependability, and (4) confirmability (Guba, 1981; Maxwell, 1992). For example, we collected data using appropriate interviewing techniques from a diverse group of individuals who regularly shopped for groceries for their households and thus could

Table 1
Sample Description.

Name	Age group	Gender	Race	Marital status	Household size
Adam	36 years	Male	Black/African American	Married	2
Adi	29 years	Male	Asian	Single	1
Connie	60 years	Female	Black/African American	Married	2
Emily	39 years	Female	White/not Hispanic	Married	5
Irene	50 years	Female	Black/African American	Married	4
Jane	32 years	Female	White/not Hispanic	Married	2
Jing	46 years	Male	Asian	Married	4
Lori	30 years	Female	Black/African American	Single	1
Linda	54 years	Female	White/not Hispanic	Married	2
Liz	54 years	Female	Black/African American	Divorced	3
Mary	34 years	Female	Black/African American	Married	5
Nitin	32 years	Male	Asian	Married	2
Pete	58 years	Male	White/not Hispanic	Married	2
Rachel	39 years	Female	White/not Hispanic	Married	4
Saba	37 years	Female	Asian	Married	2
Sam	54 years	Male	White/not Hispanic	Married	2
Tia	29 years	Female	Black/African American	Single	1
Victor	61 years	Male	White/not Hispanic	Married	1
Wade	54 years	Male	White/not Hispanic	Married	2

provide deep insights about their experiences with expiration dates. Systematic data collection was accomplished through written protocols, diagrams, and memos. Researchers' interpretations were also reviewed by participants through member checks. The coding process involved examination of agreements and disagreements between the coders as highlighted by NVivo 10, followed by a discussion about the disagreements, and ultimately coming to a consensus about the final codes and themes.

4. Findings

This study focuses on the consumer confusion surrounding expiration dates in the United States and their cognitive, affective, and behavioral consequences in the context of shopping for perishable grocery products. The findings focus on ideas that are insightful, that are repeatedly mentioned by participants, and that span across varied shopping experiences. Based on the hermeneutic view, the findings from these in-depth interviews reflect a *fusion of horizons* (Arnold and Fischer, 1994; Gadamer, 2004; Thompson, 1997), i.e., an amalgamation of interpretive perspectives and understanding among the researchers and the participants. Participants' responses and researchers' interpretation guided by the consumer confusion model (Mitchell et al., 2005) and the dynamic consumer response framework (Pluzinski and Qualls, 1986), together enabled the development of a conceptual framework (Fig. 1).

4.1. Meaning of expiration date labels

The interviews began by inquiring about participants' general grocery shopping behaviors and whether they have ever noticed dates on perishable grocery products. All participants responded that they

have noticed expiration dates on frequently purchased products such as milk, bread, and yogurt. Next, participants were asked to elucidate the meaning of those dates. No clear, single meaning of expiration dates emerged, since several participants referred to the expiration dates as having arbitrary meanings. Participants also had differing perspectives about what expiration dates signify. Age, gender, and marital status had no effect on these different perspectives. At some points in the interviews, participants stated that expiration dates indicated “freshness,” and at other times during the interviews, they said that expiration dates signified the “safety” of the food item and when it should or should not be consumed. There was no clear pattern of when they used these two terms; they just used them interchangeably in the context of expiration dates. However, from the interview data and the interpretation of the literature, freshness in the context of expiration dates, though subjective, could mean that the product is at its best quality (Wansink and Wright, 2006), while safety could mean the absence of any harmful bacteria that could negatively impact the health of a consumer (Mitchell, 1998; Yeung and Morris, 2001).

Irene: To me it means how long the item is fit to eat. If it has expired, then to me it means the food is not safe to consume. So, at that point, it needs to be discarded. And I honestly try to, when it comes to dairy products ... you just have to be so careful because the bacteria and all of that stuff sets in. You can become so ill ... those dates mean safety to me.... The word safe comes to mind, it's just that I can consume it and not get sick.

Lori: So I guess what the date is supposed to mean is that we guarantee that this is fresh until this date. But after that, you're on your own. That's how I interpret it.

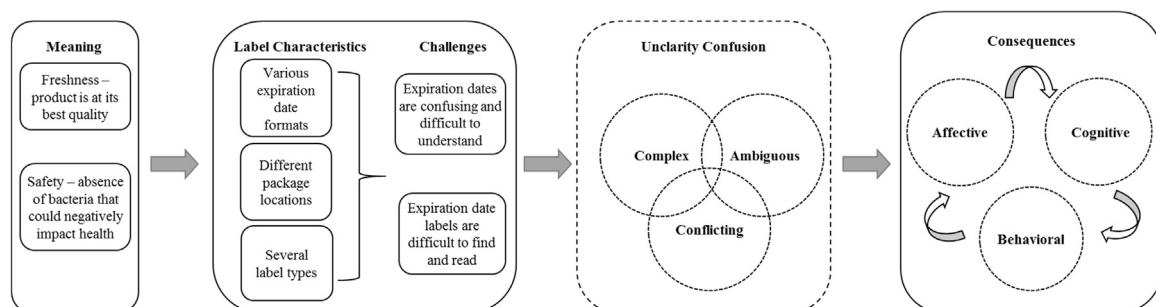


Fig. 1. A conceptual framework of unclarity confusion and expiration date labels in the United States.

4.2. Challenges posed by expiration date label characteristics

Expiration date labels play an important role during the perishable grocery shopping process by facilitating consumer decision making at the shelf when tasting or smelling the product for freshness is not an option. Although participants stated that expiration dates play an important role in their grocery purchase decisions, they also expressed concerns about understanding and finding expiration dates on packages. According to the participants, these challenges are caused by the various formats, different package locations, and several types of expiration date labels.

4.2.1. Challenge 1: confusing and difficult to understand

Participants expressed seeing expiration dates that had *only numbers* representing a date, as well as dates with prefix language like *sell by*, *use by*, and *best before*. Currently, in the United States it is up to a manufacturer's own discretion where to place the expiration date label and what format to use (Leib et al., 2013). The ambiguity of and related frustration with these dates was expressed explicitly by several of the participants. One participant explained,

Saba: I mean, it's something written, but you don't know.... The year is not clear, the month is not clear, the day is not clear. So you don't even know if you are reading an expired date or it's something else or a stock number or something.

On further inquiry about the various date formats, participants linked *sell by* to the store, as a way to indicate freshness, how long it had been at the grocery store, or how quickly the retailer should sell the product. Few participants equated *sell by* to being acceptable to purchase before this date, but that it should be consumed as quickly as possible once the product reaches home. The *use by* date does not allow for much misinterpretation as compared to *sell by*. It is also considered a format that is intended for the consumer and not the retailer, as it provides an estimate of a consumption window. Participants explained that they still use their own discretion when determining until when to consume products that have an expiration date with a *use by* prefix, but that they feel more comfortable with this type of format than with some of the others. Participants revealed that the *best before* format also creates confusion around when to consume the products. Most equated the format to signal freshness, exclaiming that consumption after that date meant the product might not taste as good, but that it will not necessarily be bad or unsafe to eat. Some expressed distress and frustration over the *only a date* format, because they have to figure out what the numbers mean. Unfortunately, this type of conjecture can lead to throwing away perfectly good food that is still viable and safe to eat. For example,

Irene: Hmmm, I don't know how I feel about that one [*sell by* prefix]. As a consumer, I think it's more about moving it off the shelf ... you know for the vendor to get [the product] off the shelf by this time. But for me as the consumer ... when they say *sell by*, I try to make my own *use by* date based on their *sell by* date.

Linda: like I said, in my mind ... I always say it's the *use by* date when I look at it. So I'm not really thinking, oh is this the *sell by* date or is this ... what is this? To me it's always *use by*, the date that I want to use it by.

Emily: It says the word *best*, so if I use it a little bit longer, am I going to get sick? Is something going to happen? Or is it just going to be less flavorful, because that's fine. But I don't really know what the problem is. Then I'm afraid of what to do and I end up throwing it out.

Rachel: If I just see the date [*only a date* format], I usually think that's the worst-case scenario. Like this will go bad on this date.

Overall, most participants found the *use by* prefix to expiration dates a more favorable and clearer format to understand than *sell by*, *only a date*, and *best before* formats.

4.2.2. Challenge 2: difficult to find and read

Another issue expressed by participants is the difficulty of reading expiration date labels and how challenging it can be to locate them on the package. For example, several participants expressed similar experiences to Emily.

Emily: What's challenging is that it's not in the same location every time.... Even if I buy the same yogurts every time, I feel like it's always on the same part of the yogurt and sometimes on the foil tops it is very hard to find ... sometimes you feel like it's getting rubbed out. It's kind of hard to see ... it's like, searching and searching for where the date is listed.

Other issues described by the participants include expiration date labels not being easily visible, labels with faded ink, and above all the inconsistency of label types. Many of the participants expressed similar experiences, like Pete.

Pete: I don't find it to be that easy to find that information. So, sometimes it's on a little tag on the bread. Or it's on the egg container. You got to look for it. It's not easily visible. That would be my only complaint – is that it's not really easily visible.

Participants mentioned that they struggle to find these labels because they are placed on different locations on different packaging such as on the bottom of a carton, around the cover, on the rear-side of the bag, on the seam of a package, or on a closing clip. Along with this, it is also difficult to read these labels because the date is blurred, ink is smudged, or printing is unclear. Some labels have such tiny fonts and faded ink that some participants felt this was done on purpose. They expressed their preference for expiration date labels in obvious locations where they are easy to find, such as the front or top of a package or near the nutritional information. Similarly, participants emphasized that labels should be printed in a way that is very visible and easy to read.

4.3. Unclear confusion

Consumer confusion is a conscious state of mind that has affective, cognitive, and behavioral dimensions in pre or post purchase situations (Mitchell et al., 2005). Consumer confusion can occur when consumers encounter very similar, too many, or unclear and ambiguous stimuli. Similarity confusion is caused by the perceived physical similarity amongst brands and products, while overload confusion is the lack of understanding caused by a consumer facing excessive amounts of information (Mitchell et al., 2005). Unclear confusion is defined as the miscomprehension caused by complex and ambiguous information (Jacoby and Hoyer, 1989; Mitchell et al., 2005).

In the context of expiration date labels, similarity or overload of information is not involved. Instead, our findings clearly show that participants experienced confusion because of the unclear and complex information they encountered while checking expiration date labels. Unclear stimuli can cause partial miscomprehension (Jacoby and Hoyer, 1989) whereby consumers who draw more than one logical meaning of the date, realize this, and yet cannot discern which meaning is correct. According to participants, not being able to anticipate the type of label to look for adds to the confusion, inconvenience, time, and effort it takes for consumers to find the expiration date. These feelings of frustration associated with expiration date labels being difficult to find and read exacerbate the unclear confusion experienced by them. For example, one participant expresses her frustration with a label format causing unclear confusion.

Lori: I hate just the *all numbers* format. Sometimes they're not even separated by a slash or a dash, just a ... conglomerate of numbers and ... that's confusing to me and I have to step back and be like, OK is this saying November? Is this saying March? Like, let me make sure that I'm interpreting this the right way.

The ambiguous, unclear, and conflicting information, caused by the complexity of inconsistent formats and package locations can lead to a number of unfavorable consequences.

4.4. Consequences of unclarity confusion

Participants emphasized that the challenge of understanding and finding the expiration date labels can have a negative effect on the shopping experience due to the inconvenience and time spent on searching for and trying to understand the expiration date information, which can lead to the purchase of an undesirable product or no purchase at all. Further, in the literature, confusion has also been considered as a hygiene factor in decision-making, because its presence causes dissatisfaction but its absence does not lead to purchase or satisfaction (Mitchell et al., 2005). Confusion has been linked to several adverse consequences, such as dissatisfaction (Foxall, 1993; Zaichkowsky, 1995), dissonance (Mitchell and Papavassiliou, 1999), decision deferment (Dhar, 1997; Huffman and Kahn, 1998; Jacoby and Morrin, 1998), negative word of mouth (Turnbull et al., 2000), shopping fatigue (Mitchell and Papavassiliou, 1997), and reduced loyalty and trust (Foxman et al., 1992; Foxman et al., 1990). These consequences can be classified into cognitive, affective, and behavioral components.

In the dynamic consumer response framework, Pluzinski and Qualls, (1986, p. 232) propose that consumers iteratively think, feel, and behave simultaneously such that they can “move throughout the tripartite process in either direction.” They propose that, “iterative, parallel, and complementary processes function alternately” connecting affective, cognitive, and conative components. They also state that an individual might only move back and forth between two components, and might not essentially pass through all three components. From our data, several participants voiced affective, cognitive, and behavioral reactions to unclarity confusion surrounding expiration dates. They repeatedly used terms such as “upset,” “disturbed,” “disappointed,” “irritated,” “frustrated,” and “angry” to express their feelings about challenging and confusing expiration date labels. These participant reactions or consequences (Fig. 1) can be classified into affective, cognitive, and behavioral elements. For example one participant explains how a friend checks the date and thinks it is bad because it is past the expiration date (cognition) and therefore throws the food away (behavior),

Jane: I have this friend ... if the date is one day past, he wouldn't eat it, he would throw it out. The label says it's bad, so it's bad. I feel that's the reason why Americans waste a lot of their total food source since they throw or waste it.

When faced with a variety of unclear and ambiguous expiration date labels at the retail shelf, a consumer may cycle between cognition (think that the store is not trustworthy, experience shopping fatigue, increased risk in decision making, and reduced loyalty for the retailer) and affect (feel upset and frustrated due to dissatisfaction and/or dissonance) while deciding what to do (purchase an undesirable product, return the product to the retailer, abandon or defer the purchase, or even throw away and waste good food). An example of iterative processing in the context of expiration dates would be when the unclarity confusion increases the purchase risk in the consumer's mind (cognition) and makes him/her feel anxiety, uncertainty, or fear of financial loss or negative health effects on consumption (affect). In this process of moving back and forth between cognition and affect, the consumer might not buy the product at all (behavior). And even if the consumer buys it, he/she might either return it to store on the realization that it is expired or might not consume it and dispose of it (behavior). For example, two participants stated,

Tia: I don't like to buy things that I think put me in an unnecessary risk. So I don't want to take the chance.

Rachel: Health-wise, yes, that's a bigger risk. I don't want to risk getting sick – it is no help at all.... I probably have thrown food out when it's still good, just because I was afraid of getting sick.

Further, unclarity confusion can simultaneously cause shopping fatigue (cognition) and make consumers feel dissatisfied with the shopping experience (affect) or influence their shopping behavior. This is an example of parallel processing due to which a consumer might not check the expiration date and buy an undesirable product, might defer the purchase, or might not buy the product at all. For instance, one participant described this parallel processing experience as,

Victor: Well they are sometimes a little difficult to find, but my approach would be if I can't find it immediately, I would just quit looking because that is too much of inconvenience to me. Or I might just put the package back on the shelf.

Finally, complementary processing also plays a role in the context of expiration dates. For example, the dissatisfaction with the shopping experience felt by the consumer due to unclarity confusion (affect) strengthens the consumer's judgment that the retailer is not trustworthy (cognition) and therefore he/she will not shop with the retailer any more (behavior). For example, Irene describes being upset with the retailer due to unclarity confusion.

Irene: Like I said, some of them, it's in plain sight. It's very easy to see. Sometimes you have to pull the package apart, you have to look for it. And when I have to look hard for it, it makes me think, I don't really want to purchase this item.... That's something that I even said [to the store manager], “you need to rethink how you place your dates on the package because I wasn't going to purchase it.”

These above narratives from participants clearly highlight the consequences of unclarity confusion surrounding expiration dates, and how these impact their decision making at the retail shelf.

5. Discussion and implications

The findings suggest that expiration dates are challenging to understand, and at the same time they can be difficult to locate due to the lack of consistency and the resulting ambiguity surrounding the various label formats (i.e., *best by*, *best before*, *sell by*), or simply where the label is displayed on the package. These issues lead to consumer confusion, which makes consumers ill equipped to make informed purchase decisions, thus leading to several unfavorable consequences. These consequences arising due to unclarity confusion include the purchase of an undesirable product and then the return of that product to the retailer, purchase deferral or no purchase at all, food wastage, dissatisfaction, dissonance, shopping fatigue, increased risk in decision making, and reduced trust and loyalty in the retailer. Although this study was exploratory in nature, the findings are robust enough to provide several theoretical and practical implications.

5.1. Theoretical implications

The findings of this study make several important contributions to the growing body of grocery shopping literature. First, despite the important role played by expiration dates in purchase decisions, this area has been relatively under-researched with few important quantitative inquiries (e.g., Cardello and Schutz, 2003; Harcar and Karakaya, 2005; Miranda and Kónya, 2006; Sen and Block, 2009; Shah and Hall-Phillips, 2017; Tsiros and Heilman, 2005; Wansink and Wright, 2006). The findings from this qualitative, interpretive study provide deeper insights in the area of expiration date labeling, where there has been a dearth of qualitative inquiries as compared to quantitative ones. Further, the findings also fill this research gap by highlighting the role of expiration dates as an important point-of-purchase information that

could aid consumers' decision-making at the retail shelf, the inconsistencies of expiration date labeling in the United States, the unclarity confusion it can cause, and the resulting negative consequences.

Second, this study, through its conceptual framework, confirms the assertions of previous research that expiration dates have issues (Leib et al., 2013) and further highlights two challenges that lead to unclarity confusion in consumers' minds. Moreover, this research also supports the consumer response framework presented by Pluzinski and Qualls (1986), in that the participants' experiences related to unclarity confusion with respect to expiration dates, demonstrate that expiration dates impact how consumers iteratively think, feel, and act on the path to purchase. This research also extends the consumer confusion literature (see Mitchell et al., 2005) in the context of expiration dates and grocery shopping.

Furthermore, this research provides enough support for future research to continue examining how consumers deal with the confusion associated with expiration dates and what further changes could be made to decrease this unclarity confusion, thus facilitating informed decision making while grocery shopping.

5.2. Practical implications

The findings of this study have several implications for consumers, public policy makers, manufacturers, and retailers. First, the current expiration date system is ambiguous and it has led consumers to depend on a system of labels that does not have any real meaning. Although the intention is to help convey freshness, it fails to do so because some consumers think it is indicating safety (Leib et al., 2013). Because of this misunderstanding, consumers throw away edible food past its expiration dates and consequently waste food and money. Therefore, shedding light on the unclarity confusion related to expiration dates highlights the fact that consumers need education on food safety information and freshness characteristics that will enable proper handling and safe food storage at the consumers' end. Consumers need to be made aware of the meaning and nature of different date formats, how to evaluate the freshness and edibility of food products, proper food storage and handling procedures, resources that go into food production, and how to avoid food wastage more effectively. This area of consumer education is a task in which policy makers, as well as retailers and manufacturers, should play a part, and ensure that consumers are equipped with the necessary tools to make informed choices when purchasing perishable grocery products.

Second, the study provides clear feedback on the issues experienced by consumers when encountering expiration dates during grocery shopping. Understanding how consumers use expiration dates while shopping is vital for helping consumers to make purchase decisions that are not harmful and do not negatively impact their well-being in any way (Tsiros and Heilman, 2005). Manufacturers can aid in this decision-making process by including more comprehensible and consumer-friendly point-of-purchase information on food packages, such as consistent expiration date labels that can provide consumers with additional product freshness and/or quality information. Steps can be taken to improve a consumer's interaction with an expiration date by providing better and clearer label formats across brands and/or products. This could in turn reduce consumers' unclarity confusion, provide an increased sense of security for consumers, and enhanced confidence and credibility for grocery stores.

Third, the findings suggest that when consumers experience difficulty in understanding and/or finding expiration date labels while grocery shopping, it can be very frustrating and can lead to dissatisfaction, dissonance, or shopping fatigue. Therefore, it becomes imperative for retailers to understand the unclarity confusion consumers experience while checking expiration dates on perishable grocery products, along with its causes and consequences, so that they can provide better and clearer information that will facilitate informed decision making at the retail shelf.

Finally, although expiration date labels are mainly designed and posted on the package by manufacturers, consumers tend to blame the retail store first (Tsiros and Heilman, 2005) when expired products are found on the retail shelf, considering it the retailer's responsibility to remove expired products and replenish the shelves with fresh products. Consumers feel, think, and make alternative decisions (e.g., do not purchase that product at all, defer the purchase, or return expired products) that could impact the store's top line and inventory. With this in mind, retailers can attempt to diminish the chance of a negative customer experience by removing expired products from the shelf and reducing food wastage by disposing of them in a more usable way, like donating them to social and charitable organizations.

6. Limitations and future research

Several avenues for future research emerge from the limitations and findings of this study. Since the findings are based on interviews involving self-reports instead of observations of real grocery shopping experiences in-store, conducting a field observation study in the future might provide direct access to and more accurate and deeper insights into consumers' decision-making behavior in the grocery shopping context. Future empirical studies could enhance the findings and improve the generalizability through a more robust quantitative examination of the conceptual framework explaining the role of consumer confusion in the context of expiration dates and grocery purchase decision-making. The qualitative findings from this study, coupled with a larger diverse random sample, would provide a better understanding of this research area.

Future studies could examine consumers in different geographic locations or from various cultural backgrounds, in order to understand expiration date labeling across borders. Expiration dates can also be explored in areas of consumption and product disposal stages, beyond purchase. Experiments can be conducted to test ideal locations and appearances for expiration date labels within different product categories and how this can reduce consumer confusion and improve consumer decision-making. Public policy research can investigate the effectiveness of different consumer education programs, technologies, and platforms that empower consumers to make improved food choices and practice safe food handling. Future studies could further investigate the interaction between expiration date labels and nutritional labels on food packages and their influence on healthy food choices. Furthermore, collecting observational data might provide valuable insights about how consumers interact with expiration date labels during grocery shopping.

Unfortunately, in the United States, there is no federal law that regulates expiration dates, except for baby food products. Therefore, different states and counties have different regulations, if any exist (Leib et al., 2013). For example, the state of New Jersey "only requires that bottled water and fluid milk products (milk, flavored milks, creams, yogurt, etc.) have a shelf-life expiration date on the package" (New Jersey Department of Health, 2015). Similarly, according to section 40–7–1–.02 of the rules and regulations of the state of Georgia (Lieb et al., 2013), the sale of certain product categories at the retail shelf are prohibited after the defined expiration date. Therefore, future research can investigate how the differences in laws and expiration date labeling policies and practices in various American states can influence expiration date checking behavior among their respective consumers.

This study sheds light on how unclarity confusion surrounding expiration dates in the United States can impede the decision-making process at the retail shelf in grocery stores. The confusion associated with ambiguous expiration dates can be taxing on consumers. Moreover, the considerable amount of good food that is wasted due to a misconception that foods past the expiration date are inedible and unsuitable for consumption can also be reduced if marketers and policy makers play a significant role in empowering, educating, and enabling consumers to make better-informed food choices.

Appendix

Examples of categories and themes developed through constant comparison analysis.

Initial Codes/ Categories	Examples	Final Themes
Safety	<i>"To me it means how long the item is fit to eat. If it has expired, then to me it means the food is not safe to consume."</i>	Meaning
Freshness	<i>"So I guess what the date is supposed to mean is that we guarantee that this is fresh until this date. But after that, you're on your own. That's how I interpret it."</i>	
Challenging to find and read	<i>"I don't find it to be that easy to find that information. So, sometimes it's on a little tag on the bread. Or it's on the egg container. You got to look for it. It's not easily visible. That would be my only complaint – is that it's not really easily visible."</i>	
Confusing and difficult to understand	<i>"I mean, it's something written, but you don't know.... The year is not clear, the month is not clear, the day is not clear. So you don't even know if you are reading an expired date or it's something else or a stock number or something."</i>	Challenges
Affective response	<i>"So it makes me a little anxious..."</i> <i>"I would still also feel disturbed."</i> <i>"I would feel disappointed."</i>	
Cognitive response	<i>"I don't like to buy things that I think put me in an unnecessary risk. So I don't want to take the chance."</i>	
Behavioral response	<i>"Well they are sometimes a little difficult to find, but my approach would be if I can't find it immediately, I would just quit looking because that is too much of inconvenience to me. Or I might just put the package back on the shelf."</i>	
		Consequences

References

- Agarwal, J., Malhotra, N.K., 2005. An integrated model of attitude and affect: theoretical foundation and an empirical investigation. *J. Bus. Res.* 58 (4), 483–493.
- Arnold, S.J., Fischer, E., 1994. Hermeneutics and consumer research. *J. Consum. Res.* 21 (1), 55–70.
- Block, L.G., Grier, S.A., Childers, T.L., Davis, B., Ebert, J.E., Kumanyika, S., Laczniak, R.N., Machin, J.E., Motley, C.M., Peracchio, L., 2011. From nutrients to nurturance: a conceptual introduction to food well-being. *J. Public Policy Mark.* 30 (1), 5–13.
- Boyatzis, R.E., 1998. *Transforming Qualitative Information: Thematic Analysis and Code Development*. Sage, Thousand Oaks, CA.
- Braun, V., Clarke, V., 2006. Using thematic analysis in psychology. *Qual. Res. Psychol.* 3 (2), 77–101.
- Cardello, A.V., Schutz, H.G., 2003. The concept of food freshness: uncovering its meaning and importance to consumers. In: Weenen, H., Cadwallader, K.R. (Eds.), *Freshness and Shelf Life of Foods*. American Chemical Society, Washington, DC, 22–41.
- Casini, L., Cavicchi, A., Corsi, A.M., 2008. Trends in the British wine market and consumer confusion. *Br. Food J.* 110 (6), 545–558.
- Creswell, J.W., 2012. *Qualitative Inquiry and Research Design: Choosing Among Five Approaches*. Sage, Thousand Oaks, CA.
- Department for Environment, Food and Rural Affairs (DEFRA), 2011. *Guidance on the application of date labels to food*. (<https://www.gov.uk/government/publications/guidance-on-the-application-of-date-labels-to-food>) (accessed 25.06.16).
- Dhar, R., 1997. Consumer preference for a no-choice option. *J. Consum. Res.* 24 (2), 215–231.
- Drummond, G., 2004. Consumer confusion: reduction strategies in higher education. *Int. J. Educ. Manag.* 18 (5), 317–323.
- Drummond, G., Rule, G., 2005. Consumer confusion in the UK wine industry. *J. Wine Res.* 16 (1), 55–64.
- Fortin, C., Goodwin, H.L., Thomsen, M., 2009. Consumer attitudes toward freshness indicators on perishable food products. *J. Food Distrib. Res.* 40 (3), 1–15.
- Fournier, S., 1998. Consumers and their brands: developing relationship theory in consumer research. *J. Consum. Res.* 24 (4), 343–353.
- Foxall, G.R., 1993. A behaviourist perspective on purchase and consumption. *Eur. J. Mark.* 27 (8), 7–16.
- Foxman, E.R., Muehling, D.D., Berger, P.W., 1990. An investigation of factors contributing to consumer brand confusion. *J. Consum. Aff.* 24 (1), 170–189.
- Foxman, E.R., Berger, P.W., Cote, J.A., 1992. Consumer brand confusion: a conceptual framework. *Psychol. Mark.* 9 (2), 123–141.
- Gadamer, H.-G., 1988. On the circle of understanding. In: Conolly, J.M., Keutner, T. (Eds.), *Hermeneutics Versus Science? Three German Views*. University of Notre Dame Press, 68–78.
- Gadamer, H.-G., 2004. *Truth and Method revised second ed.*. Continuum Books, New York.
- Gruber, V., Holweg, C., Teller, C., 2016. What a waste! Exploring the human reality of food waste from the store manager's perspective. *J. Public Policy Mark.* 35 (1), 3–25.
- Guba, E.G., 1981. Criteria for assessing the trustworthiness of naturalistic inquiries. *Educ. Commun. Technol. J.* 29 (2), 75–91.
- Guo, C., Wang, Y.J., 2009. A study of cross-border outshopping determinants: mediating effect of outshopping enjoyment. *Int. J. Consum. Stud.* 33 (6), 644–651.
- Harcare, T., Karakaya, F., 2005. A cross-cultural exploration of attitudes toward product expiration dates. *Psychol. Mark.* 22 (4), 353–371.
- Heidegger, M., 1976. *Being and Time*. Harper and Row, New York, NY.
- Homburg, C., Koschate, N., Hoyer, W.D., 2006. The role of cognition and affect in the formation of customer satisfaction: a dynamic perspective. *J. Mark.* 70 (3), 21–31.
- Huffman, C., Kahn, B.E., 1998. Variety for sale: mass customization or Mass confusion? *J. Retail.* 74 (4), 491–513.
- Jacoby, J., Hoyer, W.D., 1989. The comprehension/miscomprehension of print communication: selected findings. *J. Consum. Res.* 15 (4), 434–443.
- Jacoby, J., Morrin, M., 1998. Not manufactured or authorized by: recent federal cases involving trademark disclaimers. *J. Public Policy Mark.* 17 (1), 97–107.
- Lavidge, R.J., Steiner, G.A., 1961. A model for predictive measurements of advertising effectiveness. *J. Mark.* 25 (6), 59–62.
- Leek, S., Kun, D., 2006. Consumer confusion in the Chinese personal computer market. *J. Prod. Brand Manag.* 15 (3), 184–193.
- Leek, S., Chansawatkit, S., 2006. Consumer confusion in the Thai mobile phone market. *J. Consum. Behav.* 5 (6), 518–532.
- Leib, E.B., Gunders, D., Ferro, J., Nielsen, A., Nosek, G., Qu, J., 2013. The dating game: How confusing food date labels lead to food waste in America. *Nat. Resour. Def. Counc.* (<http://www.nrdc.org/food/files/dating-game-report.pdf>).
- Levy, S.J., 1981. Interpreting consumer mythology: a structural approach to consumer behavior. *J. Mark.* 45 (3), 49–61.
- Marshall, C., Rossman, G.B., 2014. *Designing Qualitative Research*. Sage, Thousand Oaks, CA.
- Matzler, K., Waiguny, M., 2005. Consequences of customer confusion in online hotel booking. In: Frew, A. (Ed.), *Proceedings from the Information and Communication Technologies in Tourism Conference*. Springer Vienna, New York, 306–317.
- Maxwell, J., 1992. Understanding and validity in qualitative research. *Harv. Educ. Rev.* 62 (3), 279–301.
- McCracken, G., 1988. *The Long Interview*. Sage, Thousand Oaks, CA.
- Mick, D.G., Buhl, C., 1992. A meaning-based model of advertising experiences. *J. Consum. Res.* 19 (3), 317–338.
- Miranda, M.J., Könyö, L., 2006. Promoting brands of perishable items on the promise of generous availability of consumption time. *J. Target. Meas. Anal. Mark.* 14 (3), 238–248.
- Mitchell, V.-W., 1998. A role for consumer risk perceptions in grocery retailing. *Br. Food J.* 100 (4), 171–183.
- Mitchell, V.-W., Papavassiliou, V., 1997. Exploring consumer confusion in the watch market. *Mark. Intell. Plan.* 15 (4), 164–172.

- Mitchell, V.-W., Papavassiliou, V., 1999. Marketing causes and implications of consumer confusion. *J. Prod. Brand Manag.* 8 (4), 319–342.
- Mitchell, V.-W., Walsh, G., Yamin, M., 2005. Towards a conceptual model of consumer confusion. In: Menon, G., Rao, A.R. (Eds.), *Proceedings from the NA – Advances in Consumer Research*. Association for Consumer Research, Duluth, MN, 143–150.
- New Jersey Department of Health, 2015. Frequently asked questions. (<http://www.nj.gov/health/foodanddrugsafety/faq.shtml>) (accessed 28.08.15).
- Nord, W.R., Peter, J.P., 1980. A behavior modification perspective on marketing. *J. Mark.* 44 (2), 36–47.
- Patton, M.Q., 1990. *Qualitative Evaluation and Research Methods* third ed.. Sage, Thousand Oaks, CA.
- Pluzinski, C., Qualls, W.J., 1986. Consumer response to marketing stimuli: the relationship between affect, cognition, and behavior. *Adv. Consum. Res.* 13 (1), 231–234.
- Rotfeld, H.J., 2009. Health information consumers can't or don't want to use. *J. Consum. Aff.* 43 (2), 373–377.
- Sayre, S., 2001. *Qualitative Methods for Marketplace Research*. Sage, Thousand Oaks, CA.
- Schouten, J.W., 1991. Selves in transition: symbolic consumption in personal rites of passage and identity reconstruction. *J. Consum. Res.* 17 (4), 412–425.
- Sen, S., Block, L.G., 2009. Why my mother never threw anything out: the effect of product freshness on consumption. *J. Consum. Res.* 36 (1), 47–55.
- Shah, P., Hall-Phillips, A., 2017. Antecedents and implications of expiration date search effort. forthcoming *J. Consum. Aff.*.
- Spiteri Cornish, L., Moraes, C., 2015. The impact of consumer confusion on nutrition literacy and subsequent dietary behavior. *Psychol. Mark.* 32 (5), 558–574.
- Thompson, C.J., 1996. Caring consumers: gendered consumption meanings and the juggling lifestyle. *J. Consum. Res.* 22 (4), 388–407.
- Thompson, C.J., 1997. Interpreting consumers: a hermeneutical framework for deriving marketing insights from the texts of consumers consumption stories. *J. Mark. Res.* 34 (4), 438–455.
- Tsiros, M., Heilman, C.M., 2005. The effect of expiration dates and perceived risk on purchasing behavior in grocery store perishable categories. *J. Mark.* 69 (2), 114–129.
- Turnbull, P.W., Leek, S., Ying, G., 2000. Customer confusion: the mobile phone market. *J. Mark. Manag.* 16 (1–3), 143–163.
- USDA, 2015. Food product dating. (<http://www.fsis.usda.gov/wps/portal/fsis/topics/food-safety-education/get-answers/food-safety-fact-sheets/food-labeling/food-product-dating/food-product-dating>) (accessed 21.08.15).
- Walsh, G., 1999. *German Consumer Decision-Making Styles with an Emphasis on Consumer Confusion*. University of Hanover Press, Hanover.
- Walsh, G., Mitchell, V.-W., 2010. The effect of consumer confusion proneness on word of mouth, trust, and customer satisfaction. *Eur. J. Mark.* 44 (6), 838–859.
- Wansink, B., Wright, A.O., 2006. Best if used by.. How freshness dating influences food acceptance. *J. Food Sci.* 71 (4), S354–S357.
- Yeung, R.M.W., Morris, J., 2001. Food safety risk: consumer perception and purchase behaviour. *Br. Food J.* 103 (3), 170–187.
- Zaichkowsky, J.L., 1995. *Defending Your Brand against Imitation: consumer Behavior, Marketing Strategies, and Legal Issues*. Quorum Books, Westport, CT.
- Zajonc, R.B., Markus, H., 1982. Affective and cognitive factors in preferences. *J. Consum. Res.* 9 (2), 123–131.