Shopping behavior is often exclusively studied through consumer purchases, since they are an easily measurable output. Still, the observation of in-store physical behavior (path, moves and actions) is crucial, as is the quantification of its impact on purchases. Using an innovative PDA tool to precisely record and time stamp consumers' moves and actions, we extend the classical Market Basket Analysis (MBA) by integrating this new information: associations between product categories are measured not only from purchases but also from consumer physical behavior. We compare results of our new method with classical MBA results and show a significant improvement.

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Groundspeak. Available at http://www.geocaching.com


Drawing Association Rules between Purchases and In-Store Behavior: An Extension of the Market Basket Analysis

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Actual observation of shopping behaviors is rarely conducted in marketing research. Behavior is often inferred with a more easily measurable output: purchases. Market Basket Analysis (MBA) is one of many techniques used to study shopping behavior through purchases. It aims to identify the associations between product categories based on purchases performed in these categories. Specifically, it answers the following question: if a consumer buys an item from category A, is he more likely to buy an item from category B?

Though this technique is very popular, it has an important limitation. MBA measures associations between categories by using purchases. However, categories may be too closely related in terms of interest that consumers take in, without exhibiting strong purchase associations. To detect such associations not based on purchases, it is necessary to observe actual in-store behavior: the shoppers’ paths through the store, the way they behave within product categories to observe shelves, handle products and examine them. This may reveal consumers’ interests for product categories.

Using a new data collection allowing to precisely record and time-stamp shoppers’ moves and gestures, we extend the classical MBA by integrating in-store physical behavior in the analysis: we draw associations not only from purchases but also from actual in-store behavior. We compare results of our new method with classical MBA results and show a significant improvement.

From purchase associations to behavioral associations

MBA was at first developed in a brick-and-mortar environment. Associations between categories were computed using panel data. Given that the MBA’s practicality, it has known a rapid development. Managers consider it as a useful tool to manage cross-promotions or to develop loyalty programs. Researchers use this technique to study multi-category purchase decisions.

MBA has then been used to study cross-buying on the Internet. However, Internet data has an important difference from panel data: it is not limited to purchase behavior. Navigation data is also available, such as web-pages that are viewed, products that are examined, or specific attributes that are investigated. Research uses it to make associations between categories not only based on purchases, but also...
based on navigation patterns that reveal consumers’ interest for categories. More accurate associations have been computed using navigation behavior.

If such associations between behavior within one category and purchases within another exist on the Internet, they are likely to exist also in a real context. Indeed, interests for categories are considered a stronger explanation of association than purchases. Thus, we hypothesize that, in a brick-and-mortar environment, adding information about consumer behavior would lead to better associations between categories.

**Research methodology**

**Data collection**

To achieve our research objective, we developed a specially designed program. Implemented with a PDA, this program enables a very accurate data collection: Following the shopper throughout the store, the program user visualizes the store map on a screen and can locate the shopper’s position by pinpointing it. This captures and time stamps the entire shopping path. When the shopper stops in front of a shelf, another screen enables the user to capture each shopper’s action by clicking on different buttons. Thus, the shopping path and actions are time-stamped and automatically entered in a preformatted database.

For this study, we conducted shopper tracking in a medium-sized store specialized in beauty-care products, and we followed a total of 170 shoppers. To avoid bias, we selected shoppers on a random basis. Shoppers were not aware being followed; this allowed for an unobtrusive tracking process.

**Model Development**

To draw our model, we consider the variable $Z_k$ describing the behavior adopted by the shopper in the category $k$. $Z_k$ takes four different values, depending on the interest taken by the shopper at the category $k$. These values are:

- $Z_k=0$: the shopper does not stop in the category $k$. It represents the minimum level of interest.
- $Z_k=\text{Stop}$: the shopper stops within the category $k$ and looks at shelves. It represents the first level of interest.
- $Z_k=\text{Examination}$: the shopper is interested enough to handle a product from category $k$ and investigate it. It represents the second level of interest.
- $Z_k=\text{Purchase}$: the shopper is so interested that he decides to purchase an item. This is the maximum level of interest.

To compare performances between associations based on purchases (classical MBA) and associations based on physical behaviors (Extended MBA), we represent both these models by using $Z_k$.

To represent Classical MBA, we allow $Z_k$ to take only two values: “0” or “Purchase”. Thus we are able to compute the following indicator:

- Confidence $(j;i)=P(Z_i=\text{Purchase} \cap Z_j=\text{Purchase}) / P(Z_i=\text{Purchase})$

To represent Extended MBA principle, we allow $Z_k$ to take all its possible values: “0”, “Stop”, “Examination”, and “Purchase”. It allows the computation of two additional confidence rules:

- Confidence $\text{Stop}(j;i)=P(Z_i=\text{Purchase} \cap Z_j=\text{Stop})/P(Z_j=\text{Stop})$
- Confidence $\text{Examination}(j;i)=P(Z_i=\text{Purchase} \cap Z_j=\text{Examination}) / P(Z_j=\text{Examination})$

We then compare the accuracy of associations between categories issued from each of the models.

**Results and discussion**

Our results show that association rules are stronger when physical behaviors are taken into account simultaneously with purchases. In some cases, associations based on physical behaviors alone are stronger than associations based on purchases. This may be explained by the fact that physical behaviors represent consumers’ express interests for product categories that are not taken into account by classical MBA. The better performance of the Extended MBA may also be explained by the fact that it takes into account non-buyers. Indeed, a non-negligible proportion of shoppers leaves the store without buying anything and is therefore not taken into account by classical MBA. However, non-buyers have visited the store, handled some products in different categories, which is valuable information to understand associations between categories.

Our results provide a better understanding of the influence of in-store consumer actions on cross-category decisions: some actions performed in a category may influence a purchase in another category.

**References**


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**For a Deeper Understanding of the Sociality that Emanates from Virtual Communities of Consumption**

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At a time when the project of reflexive modernization (Beck, Bonss, and Lau 2003) radicalizes modern societies by disembedding the individual from even these “primordial social relations” (Knorr Cetina 2001) which are religious worldviews, previously stable and stratified social hierarchies, and social institutions, consumer researchers have stated that gatherings around specific objects or consumption activities become essential for social ties.

Thus, over the last 15 years, much effort has been dedicated to exploration of various forms and displays of common consumption interests (e.g., Belk and Costa 1998; Cova 1997; Kozinets 2001; McAlexander, Schouten, and Koenig 2002; Muniz and O’Guinn 2001; Schouten and McAlexander 1995; Thompson and Troester 2002). Some authors have strongly advocated that these consumption communities, (sub)cultures, and tribes represent a response to the erosion of traditional forms of sociality (Cova 1997; Firat and Dholakia 1997; Firat and Venkatesh 1995) in which sociality represents “the ways through which actors relate to each other to organise their practices and construe their identities” (Fiske 1998). Whereas more recently some researchers have analyzed deeply the practices of a given tribe (Hewer and Brownlie 2007), strangely enough it has to be acknowledged that very few papers published in consumer research have focused on the social construction of identities of selves in social interaction contexts (Reed 2002), or more specifically on sociality in virtual environments. An attempt to bridge these two gaps has been recently made by Schau and Gilly (2003), but the investigations of these researchers on the different aspects of sociality has not gone beyond revealing the existence of multiple social roles and the self presentations by consumers in cyberspace. I argue that the sociality emanating from Internet deserves to be better understood by considering social sites such as online discussion forums, wherein we get deeper insights into the structural elements that determine consumer identity constructions.

The sociality conveyed by consumption has mainly been conceptualized over the past decades on the individual level through extended self (Belk, 1988) and self presentation (cf. Schau and Gilly 2003), and on the collective level through social practices (Warde, 2005). As Reed (2002) I argue that, although social identity is a rarely used paradigm in consumer research, it is meaningful to conceptualize the role of relations with others and with artefacts in self-conception. I should add that this paradigm can be successfully applied to identity construction processes emanating from technology (Internet) that has a structural potential (DeSanctis and Poole 1994). Following some consumer researchers (Holt and Thompson 2004) and some structuration researchers in Information systems (Whitman and Wosczynski 2003), I chose to direct this paper on the structural focus on the role of agency in social effects. More specifically, this paper is based on traditional “social scientists methods” (Penaloza and Venkatesh 2006) in order to grasp the different ways consumers (as agents) appropriate the online discussion forums of a given virtual community, considered as consumption object and social site (Maignan and Lukas 1997; Presi and al 2006) in which sociality can be investigated. Following Schultz Kleine, Kleine, and Allen (1995), I adopt life narratives to enlighten the importance of others, and the results of personal progression in self-conception.

In order to strengthen the internal validity of the research, I have chosen to investigate forums of one particular virtual community of consumption, www.jeuxvideo.com. It concerns video game players. This website was created in 1997, and members of the community connect on the second most important French Internet forum in terms of volume of activity (measured by posts exchanged). The study proposes a hermeneutical approach applied to consumer experience of discussion forums. The research is inductive and is built upon existential-phenomenological interviews of different forumer at different times.

More specifically, I answer this main research question: “How do consumers appropriate forums of virtual communities of consumption in a sustainable way?” Relationships to forums are the focus of this research, because they constitute the most important part of consumer experience in virtual communities of consumption.

Preliminary results established from interviews of 8 regular members of the community show that, beyond the diversity of perceptions, most consumers agree on the ability of the forums to fulfill evolving needs. Nevertheless, a more precise constitutive analysis reveals elements around which consumer appropriations differ significantly. These are based on routines at the intersection between virtual and real environments, more precisely connexions to the forum, posting activity per se, and socializing from outside (but thanks to) the forums. Interrelationships between these dimensions sustain idiosyncratic knowledge projects (Zwick and Dholakia 2006) that are more or less actively sought by consumers. These knowledge projects are experienced throughout different subject positions related to different practices. Consumers build more or less salient social identities around these positions.

Two fundamental dimensions tend to influence a main “consumption logic” adopted by a given forumer: the degree to which the forum is associated to the knowledge project on a) consumption objects (here, video games) and b) other consumers. According to her/