Perceptions and evaluations of assortment variety

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CentER

Perceptions and Evo of Assortment Varie

Erica van Herpen

Stellingen

behorend bij het proefschrift

Perceptions and Evaluations of Assortment Variety

Erica van Herpen

1. Om de waargenomen variëteit van een assortiment te beschrijven is het voldoende om de assortimentsgrootte, de dispersie van attribuutniveaus en de dissociatie tussen attributen te kennen.
   Gebaseerd op hoofdstuk 2 van dit proefschrift

2. Wanneer assortimenten niet hetzelfde aantal producten hebben, worden eventuele variëteitverschillen tussen deze assortimenten beter weergegeven met maten die gebaseerd zijn op de attributen dan met maten die gebaseerd zijn op de producten.
   Gebaseerd op hoofdstuk 2 van dit proefschrift

3. Verwachtingen die consumenten hebben over de moeilijkheid om een keuze te maken uit een assortiment producten stijgen wanneer producten en/of attribuutniveaus aan het assortiment worden toegevoegd, maar niet wanneer de reeds aanwezige attribuutniveaus op een andere manier aan producten toebedeeld worden.
   Gebaseerd op hoofdstuk 3 van dit proefschrift

4. Een grotere expertise in een productcategorie verhoogt de waardering voor de variëteit van een assortiment producten uit deze productcategorie.
   Gebaseerd op hoofdstuk 4 van dit proefschrift

5. Bij consumenten die niet weten welk product ze binnen een categorie willen kopen, leidt een grotere expertise in de productcategorie tot een preferentie voor assortimenten met een hoge variëteit. Bij consumenten die dit wel weten vrijwel niet.
   Gebaseerd op hoofdstuk 4 van dit proefschrift

6. Het advies dat Raftery (1993) geeft aan detaillisten – "trim the dead wood", oftewel, verwijder duplicaat producten uit het assortiment – zal met name een positief effect hebben wanneer klanten weten welk product ze willen kopen zodra ze de winkel binnenkomen, maar tegelijkertijd weinig kennis hebben over de productcategorie.
   Gebaseerd op hoofdstuk 4 van dit proefschrift

7. De mate waarin een consument tevreden is met zijn/haar eigen assortiment van bezittingen, wordt bepaald door zowel de evaluatie van de afzonderlijke producten als de variëteit in het assortiment. Hierdoor hoeft een 'miskoop' niet altijd een negatief effect te hebben op de tevredenheid met het totale assortiment.
   Gebaseerd op hoofdstuk 5 van dit proefschrift

8. Onderzoek met fictieve producten geeft inzicht in fundamentele perceptieprocessen van consumenten, zoals die in de werkelijkheid voorkomen.
Gebaseerd op dit proefschrift

9. Uit het eerste deel van stelling 3 volgt dat partnerkeuze moeilijker lijkt in de stad dan op het platteland.

10. Een belangrijk kenmerk van sociaal vaardige mensen is dat zij kunnen putten uit een gevarieerd assortiment gespreksonderwerpen.

11. Als zowel stelling 4 als de uitspraak "Variety's the very spice of life, /That gives it all its flavour" (William Cowper) waar zijn, leidt kennis niet alleen tot macht, maar ook tot geluk.

12. Je weet pas zeker dat je niet over water kunt lopen als je natte voeten hebt.
Antoon van Herpen

Perceptions and Evaluations of Assortment Variety

Perceptions and Evaluations of Assortment Variety

Proefschrift

ter verkrijging van de graad van doctor aan de Katholieke Universiteit Brabant, op gezag van de rector magnificus, prof. dr. F.A. van der Duyn Schouten, in het openbaar te verdedigen ten overstaan van een door het college voor promoties aangewezen commissie in de aula van de Universiteit op woensdag 19 december 2001 om 14.15 uur door

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geboren op 6 maart 1974 te Heesch.

Promotor: Prof. dr. F.G.M. Pieters

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Introduction

The next frontier in retailing, according to Fox (1995), is the management of product assortments. Through their assortments, retailers differentiate themselves from each other, and attract consumers. By carefully managing their assortments, and offering unique products, stores can attract consumers from a large distance (Tosh 1999b). Assortment management is not an easy task. "Finding the correct product assortment can be tricky", is how Rosendahl (1995) named his paper, to reflect the challenge that retailers face.

The explosive growth in the number of products that are available has undoubtedly complicated the situation. Compared to the 13 items on its menu in the early 70s, McDonalds increased its assortment by over 200% to 43 items in the late 90s (Cox & Alm 1998). The number of stock keeping unites (SKUs) – the smallest units available for keeping inventory control (Levy & Weitz 1998) – gives an impression of the immense size of retail assortments. Recent editions of *Progressive Grocer* describe supermarkets 'of the month' that contain between 25,000 and 88,000 SKUs (Tosh 1999a; Turcsik 2000). Assortments on the Internet can be even larger, since space restrictions are absent. JCPenney for instance offers no less than 200,000 SKUs online (Estienny 2000). With so many products available, retailers find it difficult to decide on the size and composition of their assortments.

The widespread application of category management shows that retailers recognize the importance of retail assortments in their overall strategy. The content of category management, its strategic goals and practical tools, will be discussed in Chapter 1. Consumer perceptions and evaluations need to drive category management. Many retailers are struggling to understand these consumer perceptions and evaluations, and their relation with retail assortment properties (Kahn 1999).

Interestingly, both marketing practice and research have long neglected consumers' assortment perceptions. Retail handbooks generally devote a section to merchandise strategy, but this includes topics such as inventory management, merchandise buying systems, and pricing and promotion decisions. The part that is devoted to the selection of products in an assortment is relatively short and typically focuses on financial objectives and assortment planning. A quick examination of 11 leading retail handbooks[1] shows that the size and composition of assortments is covered in, on average, 15 to 16 pages, while the importance of consumer perceptions of assortments is discussed in roughly 2 pages. Leading retail handbooks, such as Levy and Weitz (1998), briefly mention the use of consumer information in assortment planning, but neither incorporate this as an integral part of the merchandise strategy, nor discuss the evaluation process of retail assortments. Only recently have researchers shown an interest in consumers' evaluation of product assortments (e.g. Broniarczyk, Hoyer & McAlister 1998; Hoch, Bradlow & Wansink 1999; Koelemeijer & Oppewal 1999), and it remains a topic that puzzles both researchers and retailers (Kahn 1999).

Central themes

This dissertation aims to clarify the relation between assortment properties and consumers' perceptions and evaluations of product assortments. It builds on and extends the developing retail assortment literature, as well as literature on set evaluation and variety seeking. In doing so, issues regarding assortment composition and variety, potential success and effort in retail assortments, and ultimate assortment preference will be examined. Both retail and consumers' assortments will be used as applications. Consumers' assortments are sets of substitute products that consumers own themselves. For instance, most consumers will own assortments of trousers, t-shirts, shoes, socks, books, and bags.

There are three central themes in this dissertation that set it apart from previous retail assortment literature. First, throughout the dissertation, the primary focus will be on the consumer. How does the consumer evaluate certain assortments of products? By examining the evaluation process of consumers, conclusions are drawn that enable retailers to better utilize their assortment strategy in attracting customers. As Fox (1995) puts it: "The customer is at the center of any integrated view of assortment management".

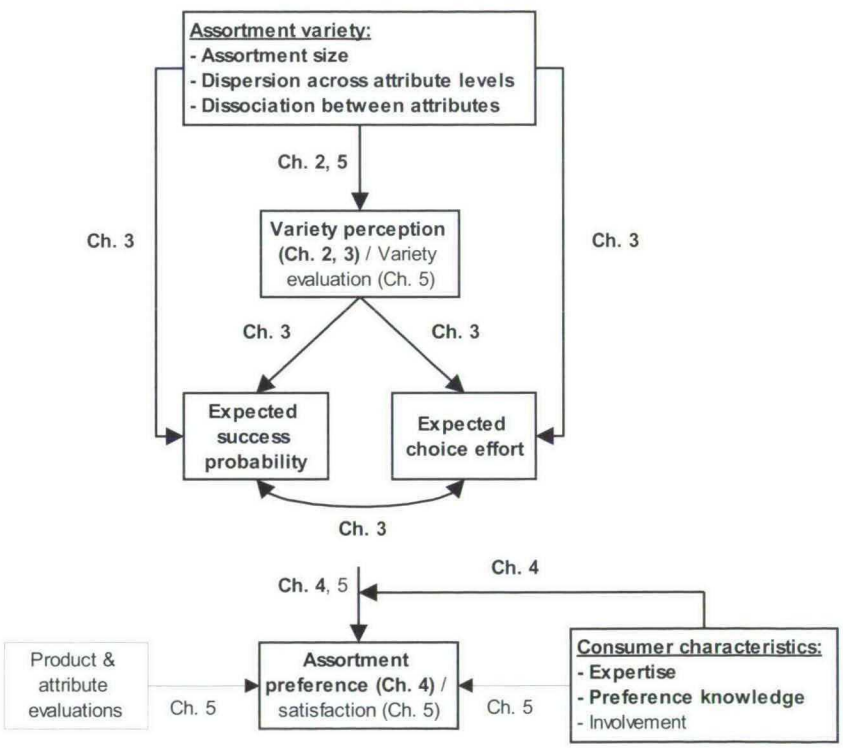
A second central theme is assortment variety. Assortment variety has been called the cornerstone of category management (Raftery 1993), and it is central to this dissertation as

[1] Davidson, Sweeney & Stampfl 1988; Gilbert 1999; Ghosh 1994; Howe 1992; Levy & Weitz 1998; Lewison 1994; Lush, Dunne & Gebhardt 1993; McGoldrick 1990; Omar 1999; Samli 1989; Stern, El-Ansary & Brown 1989.

well. Whereas previous research of assortment variety has considered it a single construct (Hoch, Bradlow & Wansink 1999), we distinguish several variety components. These variety components are important assortment properties that influence consumers' evaluation of the assortment.

The third central theme is the link between assortment size and content on the one hand, and assortment perception and evaluation on the other hand. This dissertation examines in diverse situations how changes in an assortment impact the way consumers view these assortments.

Figure 1 Outline of the dissertation



Outline of the dissertation

The chapters of this dissertation examine different parts from an overall assortment evaluation model, with is represented in Figure 1. Each of the chapters is a separate essay, and can be read in isolation. Central to the model is the variety of product assortments. The

first chapter introduces the concept of product assortments, and its treatment by retail managers and scholars, while subsequent chapters study its influence on assortment perceptions and evaluations, as provided by Figure 1. The numbers by the arrows indicate in which chapters the relations are examined.

In psychological research, perception refers to the way in which an organism transforms, organizes, and structures information from the world (Carterette & Friedman 1974; Rock 1975). This differs from the common use of the word perception, which we will employ. The Oxford dictionary offers a clear distinction in its definition of perception both as "the ability to see, hear, or become aware of something through the senses ▸ the state of being or process of becoming aware of something in such a way" and as "PSYCHOLOGY AND ZOOLOGY the neurophysiological processes, including memory, by which an organism becomes aware of and interprets external stimuli" (Pearsall 1999, p. 1059). This dissertation will use the term perception in the common everyday meaning. Assortment perception refers to the state of being or the process of becoming aware of an assortment through the senses.

This dissertation also distinguishes between perceptions and evaluations. We define a non-evaluative statement as a perception, while an evaluation includes a normative component, which implies a judgment task (cf. Koelemeijer 2000). In other words, 'this assortment has many products' is a perception of assortment size, while 'this assortment has more products than I want' is an evaluation of assortment size. Consumers' evaluations rather than their perceptions will be used when we study the products they own themselves. Since these products form a part of their sense of self (Belk 1988), we believe that they are unable to form non-normative perceptions, and that statements regarding their own assortments are always colored by their subjective evaluations. This leads to several adjustments in the general model, which are indicated by the non-bold parts of Figure 1.

Chapter 1 introduces the general topic of product assortments. It explores the meaning and use of the word assortment, and differentiates assortments from diverse other product sets, leading to a clear conceptualization of product assortments. Recent developments in assortment management practice and research will be discussed, as well as the consumer decision process. The objective is to identify areas of research that need more study. The research questions that Chapter 1 addresses are:

How can product assortments be conceptualized and differentiated from other product sets?

What are recent developments in assortment management practice and research that are relevant for product assortment theory, and what is the role of the consumer in these developments?

What are unresolved issues or under-researched areas in assortment practice and research?

Chapter 2 examines the conceptualization and measurement of assortment variety in more detail. In many diverse product categories, including stationary (Radice 1998), hardware (Progressive Grocer 2000a), women's panty (Discount Store News 1999), and oral care (Progressive Grocer 2000b), retailers have found that assortment variety is a key concern of the consumer. Yet, the concept of assortment variety is not well understood, and no single variety measure has been used consistently. We add to the current state of knowledge about assortment variety by (1) integrating literature regarding variety measurement, (2) comparing diverse variety measures and relating them to underlying components of variety, and (3) determining the appropriateness of these measures to predict consumers' variety perceptions. Chapter 2 distinguishes two different measurement approaches: product-based and attribute-based approaches. For both approaches, several measures can be applied to assortment variety. The chapter compares these measures to each other both theoretically and in two data sets. Based on the results, assortment variety is conceptualized through an attribute-based approach, and three components of variety are identified: assortment size, dispersion across attribute levels, and dissociation between attributes. Research questions of chapter 2 are:

How well do the diverse variety measures that have been proposed in the assortment literature follow theoretical and empirical requirements for assortment variety measures?

Which approach to assortment variety is best able to capture consumers' perceptions of assortment variety?

Chapter 3 applies the attribute-based approach of assortment variety, and examines two metagoals of consumers. These metagoals are based on an accuracy-effort framework: the probability of a successful choice from an assortment, and the choice effort resulting from the assortment. Chapter 3 investigates the impact of assortment variety on consumers' expectations of these two metagoals. Specifically, the effects of the following assortment properties are examined: the number of products in the assortment, the number of, and dispersion across, attribute levels, and the dissociation between attributes. Two empirical studies examine the potential of increasing expected success probability without increasing expected choice effort. Chapter 3 will answer the following research questions:

What is the influence of assortment variety components on consumers' expectations of success probability and choice effort?

Is it possible to increase consumers' expected success probability without affecting expected choice effort?

The accuracy-effort framework implies that there may be situations in which consumers prefer less varied assortments. Chapter 4 focuses on two factors that may influence assortment preference: consumer expertise and preference awareness. In the empirical study of this chapter, consumers rank assortments with diverse levels of variety. Both expertise and preference awareness significantly change these rankings. For instance, novices prefer less varied assortments than experts, possibly because they fear the complexity in more varied assortments. The central research questions are:

When do consumers prefer assortments with less variety to assortments with more variety?

What are the effects of consumer expertise and preference awareness on assortment preference?

Thus far, the focus has been on consumers' evaluation of retail assortments. However, other types of product assortments exist as well. Consumers themselves own assortments of products, such as assortments of sweaters, and assortments of compact disks. These consumers' product assortments have been neglected in the marketing literature. Chapter 5 examines the role of assortment variety for assortments where all products are in the possession of the consumer. The empirical study in this chapter involves data from a consumer panel in the Netherlands, regarding the perception, use, and evaluation of the shoes that these consumers own. This real-life application in another research area explores the suitability of the assortment variety concept across the boundaries of retail assortments. The central research questions of Chapter 5 are:

How can insights from retail assortments be applied to consumers' product assortments to better understand consumers' evaluation of these product assortments?

How do assortment properties and consumers' evaluations of these properties affect overall satisfaction with consumers' product assortments?

The final chapter, Chapter 6, gives implications both for assortment theory and retail practice, that go beyond the conclusions and implications of the individual chapters. It presents a general framework of assortments in which the dissertation is embedded, and provides directions for future research within this framework.

1

Conceptualizing Product Assortments

Throughout the retail literature, the term 'assortment' refers to different concepts, ranging from the number of products in a set, to the variety offered, to the set itself. This chapter conceptualizes assortments by examining the meaning and use of the word 'assortment', and by comparing assortments to alternative product sets. A second objective of this chapter is to investigate current developments in assortment management and theory. It identifies important unresolved issues and under-researched areas in retail assortment management, especially with respect to the role of consumers' perceptions and evaluations of assortments. A consumer perspective of retail assortments is advocated.

1.1 Introduction

Shopping takes an important place in people's life. In 1984, women in the US shopped on average 4.1 hours a week, and men shopped 2.3 hours a week (Hawes 1987; 1988). Shopping not only allows consumers to buy products, but it has become a leisure time activity as well (Babin, Darden & Griffin 1994; Gardner & Sheppard 1989). Consumers shop to get stimulation and diversion from the routine of daily life, to learn about new trends, to command attention and respect, and to enjoy the pleasure of bargaining (Jarratt 1996; Tauber 1972; Westbrook & Black 1985). The shopping mall has evolved into an important source of recreation, were consumers spend a considerable part of their life (Bloch, Ridgway & Nelson 1991; Bloch, Ridgway & Dawson 1994; Feinberg & Meoli 1991; Langrehr 1991; Stedman 1955). Consequently, retail organizations perform an important function in today's society. Not only do they deliver the products that are desired

by consumers, they fulfil other needs of consumers as well, both on a personal and social level (Westbrook & Black 1985).

Many factors influence the shopping experience, such as the salesperson, the design of the store, atmospherics, and other customers. But the most basic factor is the product assortment that the retailer carries. The products and services that are offered fundamentally determine the utility of a retailer for the consumer (Ghosh 1994). Clearly, the product assortment is important for utilitarian shoppers who want to finish their task of buying a certain product. Yet, the product assortment is also vital for the other shopping motives: the product is the subject of comparison-shopping and bargain hunting, the topic of conversations with salespersons, other customers and friends, the reason of being waited on, and a source of stimulation. Consumers who enjoy shopping for these reasons may find the variety of products in a store equally or even more important than consumers who do not enjoy shopping (Bellenger & Korgaonkar 1980; Ohanian & Tashchian 1992).

This illustrates the importance of product assortments in stores. But what exactly constitutes an assortment? The term 'assortment' has been equated with the variety of products (Arnold, Oum & Tigert 1983; Broniarczyk, Hoyer & McAlister 1998), with the number of SKUs that are offered (Levy & Weitz 1998), and with the choice set itself (Seggev 1970; Meyer 1997; Kahn & Lehmann 1991). Different conceptualizations of assortments have been used, and it is not clear how these concepts relate to each other. Therefore, the first objective of this chapter is to conceptualize product assortments[2]. To achieve this objective, we will examine the origins and meanings of the word assortment, and record its use throughout the retail literature. Next, we will distinguish product assortments from other product sets, such as product bundles and market baskets, to define its boundaries.

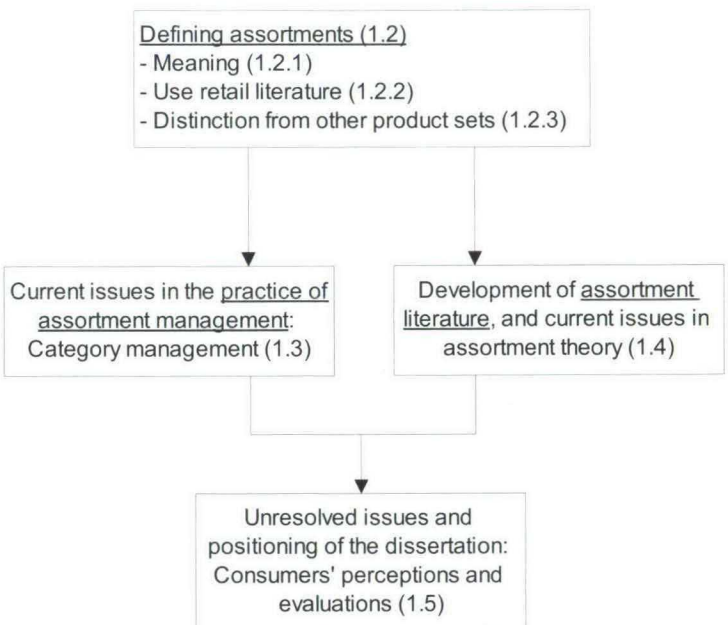
The second objective of this chapter is to review the current knowledge regarding product assortments, in order to identify unresolved issues and under-researched areas, and to position this dissertation. We will start by examining retail management practices. With the arrival of category management, retailers are taking a special interest into the products that they offer. This has led to the insight that retailers lack knowledge about consumers' evaluation of store assortments, and consumer decision processes in the store (Dussart 1998). In order for category management to be effective, such knowledge is indispensable (Johnson 1999; Mathews 1996a; 1996c). After identifying the consumer perspective on retail assortments as an important area into which retailers need to increase their knowledge, we inspect the existing literature in this area. An overview of the literature on

[2] While the discussion focuses on tangibles (goods), it can be readily extended to intangibles (services).

store assortments reveals that especially the link between assortment properties and consumers' perception of assortments deserves further attention.

The next section defines product assortments by examining the meaning and use of the word, and by comparing assortments to other types of product sets. Section 3 provides the retailers' perspective on assortments, and discusses the recent hype in category management. Next, we render an overview of assortment literature in section 4. Finally, section 5 discusses the unresolved issues that become apparent in the retail assortment literature, and the positioning of this dissertation within that literature. Figure 1.1 provides a visual overview of the structure of this chapter.

Figure 1.1 Structure of Chapter 1



1.2 Defining product assortments

1.2.1 The meaning of assortment

The word assortment comes from 15th century France, and is defined in French dictionaries as: 1. manière dont certaines choses sont assorties, 2. série, collection complète de choses formant un ensemble, 3. collection de merchandises de même genre, 4. plat composé de

diverses sortes de mets d'une même catégorie (Guilbert, Langane & Nicobery 1971), and as 1. action d'assortir; manière dont sont assemblées des choses de même sorte ou qui ont entre elles un rapport et qui produisent un effect d'ensemble (par leur ressemblance, leur convenance), 2. marriage, 3. assemblage complet, série complète de choses qui vond ordinairement ensemble (Robert 1985). Assortments are defined as series of products that form a whole, merchandise from the same type, selections of items from the same category. Several aspects of assortments emerge from these definitions: assortments are product sets, products in an assortment 'belong together', and these products are similar to each other.

1.2.2 Use of the term 'assortment' in retail literature

The term 'assortment' has been used in different meanings, or even without a clear definition (e.g. Alderson 1965; Green, Wind & Jain 1972; James, Durand & Dreves 1976; Steenkamp & Wedel 1991). Table 1.1 provides an overview of its use over the years, in studies where the term is defined, or where the meaning is implied. The table focuses on retail assortments, and excludes studies on consumers' choice of product sets. Differences between store assortments and these other product sets are discussed in section 1.2.3. Table 1.1 shows the development of the term assortment over time and in different streams of literature.

The first three columns of Table 1.1 provide details on the studies: (1) the reference, (2) the literal definition of assortment, if provided, and (3) the application area. The latter three columns in the table present three facets of assortments, that together provide the conceptualization of assortments in the study. By introducing facets, a concept can be clearly defined (Brown 1985). The three facets are:

Facet A Construct
- A_1 set of products
- A_2 variety of product set
- A_3 number of products in the set

Facet B Level of categorization
- B_1 product type
- B_2 product category
- B_3 store

Facet C Basis for categorization
- C_1 product referent
- C_2 task or outcome referent
- C_3 user referent
- C_4 location referent

These three facets will be explained in the next sections.

Table 1.1 Use of the word 'assortment'

	Reference	Definition	Application	Construct	Categorization	
					Level	Basis
1	Lindquist (1974-75)	Merchandise selection (p. 31)	-	Variety of the set	Store	Location
2	Schiffman, Dash & Dillon (1977)	Variety of merchandise (p. 8), number of brands/models to choose from (p. 11)	Audio equipment	Variety of the set	Store	Product
3	Pessemier (1980)	Stock of goods (p. 1)	Shoes	Set of products	Category	Product
4	Arnold, Oum & Tigert (1983)	Overall variety of products (p. 153)	Supermarkets	Variety of the set	Store	Location
5	Handelsman & Munson (1985)	-	-	Set of products	Store	Location
6	Davidson, Sweeney & Stampfl (1988)	Range of choice offered within a variety category (p. 141)	-	Number of products in the set	Category	Product
7	Shugan (1988)	-	13 Categories of small durables	Set of products	Category	Product
8	Stern, El-Ansary & Brown (1989)	Depth of product brands or models offered within each generic product category (p. 80)	-	Number of products in the set	Category	Product
9	Mittelstaedt & Stassen (1990)	-	-	Set of products	Store	Task & user
10	Kahn & Lehmann (1991)	Set of options (p. 279)	Snack foods, television shows	Set of products	Category	Product
11	Steenkamp & Wedel (1991)	Choice (p. 310)	Outlets selling meat	Variety of the set	Type	Product
12	Lusch, Dunne & Gebhardt (1993)	Breadth, the number of merchandise brands that are found in the merchandise line (p. 265)	-	Number of products in the set	Category	Product

[Table 1.1 continued]

Reference	Definition	Application	Construct	Categorization	
				Level	Basis
13 Ghosh (1994)	Amount of selection in terms of brands, styles, colors, and sizes that the store offers within each product group (p. 325)	-	Number of products in the set	Category	Product
14 Bultez, Julander & Nisol (1996)	-	-	Set of products	Store	Task
15 Cadeaux (1997)	Range of products (p. 198)	Intimate apparel	Set of products	Category	Product
16 Meyer (1997)	Choice set (p. 131)	Backpacking tents	Set of products	Category	Product
17 Mulhern (1997)	Product lines, brands, styles, services, etc. (p. 63)	-	Set of products	Store	Location
18 Broniarczyk, Hoyer & McAlister (1998)	Number of different items in a merchandise category (cf. Levy & Weitz 1998) (p. 166)	Microwavable popcorn	Variety of the set	Category	Product
19 Huffman & Kahn (1998)	-	Sofas, hotels	Set of products	Category	Product
20 Levy & Weitz (1998)	Depth; number of SKUs within a category (p. 361)	-	Number of products in the set	Category	Product
21 Grewal, Levy, Mehrotra & Sharma (1999)	-	Automobile parts retail chain	Set of products	Store	Location
22 Hoch, Bradlow & Wansink (1999)	-	Imaginary product	Set of products	Category & store	Product
23 Koelemeijer & Oppewal (1999)	Collections of goods and services that allow consumers to fulfill a wide variety of needs at one point in time through one-stop shopping (p. 320)	Florist stores	Set of products	Store	Product

[Table 1.1 continued]

Reference	Definition	Application	Construct	Categorization	
				Level	Basis
24 Kotler, Armstrong, Saunders & Wong (1999)	The set of all product lines and items that a particular seller offers for sale to buyers (p. 591)	-	Set of products	Store	Location
25 McIntyre & Miller (1999)	The number of different items in a merchandise category (cf. Levy & Weitz 1998) (p. 296)	Backpacks	Set of products	Category	Product
26 Simonson (1999)	Total set of items offered by a retailer, reflecting both the breath and depth of offered product lines (p. 347)	-	Set of products	Category & store	Product & task
27 Stassen, Mittelstaedt & Mittelstaedt (1999)	Products carried by a retailer (p. 376)	6 Grocery packaged goods and self-serve beef	Set of products	Category & store	Location
28 Boatwright & Nunes (2001)	-	42 Categories of online grocer	Set of products	Type & category	Product
29 Godek, Yates & Auh (2001)	Number of different items in a merchandise category (cf. Levy & Weitz 1998) and fit of products to consumer needs (cf. Broniarczyk, Hoyer & McAlister 1998) (p. 9)	Sports tickets, personal computers	Number of products in the set	Category	Product
30 Gourville & Soman (2000)	Alignable assortment: set of brand variants that differ along a single continuous dimension. Non-alignable assortment: set of brand variants that simultaneously vary along non-comparable or discrete dimensions (p. 1)	Microwave oven brands, laptop computer brands	Set of products	Type	Product

Facet A: Construct. Three constructs of assortments are distinguished: (1) assortment as the product set itself, (2) assortment as the variety of products that are offered, and (3) assortment as the number of products (depth). The first concept equates the assortment with the set of products as such, while the other two concepts use the term for certain properties of the set (variety/selection and set size).

Early studies on retail image tend to consider 'assortment' as another term for merchandise selection or variety (Arnold, Oum & Tigert 1983; Lindquist 1974-75; Schiffman, Dash & Dillon 1977). Other scholars distinguish assortments as one of the factors that influence store image, without providing a definition or description of the term (James, Durand & Dreves 1976), or use terms as merchandise and selection for such a factor (Louviere & Gaeth 1987; Schiffman, Dash & Dillon 1977). Mostly, the term 'assortment' is used by scholars, while consumers use terms such as 'variety' and 'selection' when asked to verbalize different aspects of store image (Zimmer & Golden 1988). It has been found that consumers more readily understand the term 'variety' than the term 'assortment' (Broniarczyk, Hoyer & McAlister 1998). Therefore, the degree to which a store offers diverse products to choose from can be better labeled 'variety'.

Retail handbooks generally define assortments as the depth or number of different products offered by a retailer (Davidson, Sweeney & Stampfl 1988; Ghosh 1994; Levy & Weitz 1998; Lush, Dunne & Gebhardt 1993), which is a count of the number of products in the set. Lately, a different concept of assortment seems to prevail, however. Assortments are equated with the product set that is offered. For instance, Kotler, Armstrong, Saunders & Wong (1999, p.591) define an assortment as "the set of all product lines and items that a particular seller offers for sale to buyers". 'Assortment' is used as a term for the set of products as a total. By far most of the studies in Table 1.1, and especially the recent studies, use construct A_1, set of products, for the term 'assortment'. We will do so as well.

Categorization

Categorization literature discusses the structure of product sets, based on the observation that the world consists of 'intrinsically separate things', such as trees, houses, birds, and so on (Rosch, Mervis, Gray, Johnson & Boyes-Braem 1976). A category is defined as a set of similar objects. It can be difficult to predict the category structure that consumers use, since many categories have rather fuzzy boundaries (Fiske & Taylor 1991; Viswanathan & Childers 1999). Another way of saying this is that categories have graded structure. Graded structure is "a continuum of category membership, ranging from prototypical members through unclear cases to prototypical nonmembers" (Barsalou 1983, p.211-212). The best description of categories may be that of fuzzy sets centering around a prototype, where products vary in typicality (Fiske & Taylor 1991; Huttenlocher & Hedges 1994).

Although scholars have proposed different categorization processes (Cohen & Basu 1987), the basic idea of a category remains the same across studies. A coherent category is one whose members hang together, a grouping of products that makes sense to the perceiver (Murphy & Medin 1985). Therefore, categorization is based on the similarity between products. But without an understanding of why products are similar to each other, this does not provide insight into which categories consumers will form (Murphy & Medin 1985). The question thus becomes: What makes the products in a category similar to each other?

Table 1.1 examines two facets regarding categorization: the level of categorization (at which level of abstraction are assortments located) and the basis of categorization (why do the products form an assortment).

Facet B: Level of categorization. The level of abstraction of a product set refers to the level of inclusiveness. The result is a hierarchy of categories, ranging from more to less inclusive categories, e.g. transportation modes – vehicles – cars – sports cars. Sets of products can be constructed at each of these levels, and each of the subordinate sets is included in the higher level category. Generally, there exists one level of abstraction at which the most basic category cuts can be made (Rosch et al. 1976). This is the level at which categories carry the most information and are the most differentiated from one another; within-category similarity is maximized relative to between-category similarity (Rosch et al. 1976; Sujan & Dekleva 1987). The basic level categories reflect the way people classify the world around them, and can differ between persons (Alba & Hutchinson 1987; Anderson 1991).

The concept 'assortment' has been defined at several levels. The level of categorization can be (1) product type level (e.g. 35 mm photo camera), (2) product category level (e.g. photo camera), (3) store level (e.g. all products in a photo camera store). This is in line with Sujan and Dekleva (1987). Some studies do not make a clear distinction between product category and store, indicated in Table 1.1 by both elements.

For most studies in Table 1.1, the products in an assortment are alternatives within a product category. Although the term 'assortment' has also been used at the store level – primarily in store image studies – most empirical studies now focus on the product category level, even when the total assortment of a store contains several product categories (e.g. Borin, Farris & Freeland 1994; Broniarczyk, Hoyer & McAlister 1998).

Facet C: Basis of categorization. Product categories are formed because products are similar in their attributes. There are many different attributes that can be used to form categories. For instance, consumers can use the physical features, linguistic labels, or usage function of products to identify meaningful product attributes and to determine product similarity (Anderson 1991).

Table 1.1 distinguishes four bases of categorization: (1) product referent, (2) task or outcome referent, (3) user referent, and (4) location referent. The first three bases have been distinguished by Lefkoff-Hagius and Mason (1993), and Myers and Shocker (1981). Products can form a set because they are share similar physical characteristics, (product referent), because they lead to similar results or outcomes (task or outcome referent), or because they imply a similar imago about the person who is selecting or using the products (user referent). In addition, products may form a set because they are available at the same location, i.e. in the same store (location referent). Every assortment is bounded by a location in time and space: an assortment is offered by a particular store or department at a particular point in time. We use the element 'location referent' for those situations in which location is the *only* reason for grouping products together in a set. Across all studies, the most often used basis for categorization is product referent. Products form a set because they are physically similar to each other.

Depending on the basis of categorization, the assortment concept will differ. For instance, product referent assortments will differ from task / outcome referent assortments, since usage related attributes of products do not necessarily match the physical attributes of the products (Lefkoff-Hagius & Mason 1993; Creusen & Schoormans 1997). Task / outcome referent assortments may depend on consumers' usage situations (Urban, Hulland & Weinberg 1993; Ratneshwar & Shocker 1991), while product referent assortments remain stable over usage situations. Task / outcome referent assortments can be ad hoc categories to achieve goals, such as assortments of 'things to take on a vacation' (Barsalou 1983; Graonic & Shocker 1993). Ad hoc or goal-derived categories violate the correlational structure of the environment, and do not have well established category representations in memory. Rather, they are constructed at the spot.

Considering that consumers can use different category structures at different times, and the fuzzy nature of the categories, it should not be surprising that retailers are still struggling with standard category definitions (Johnson 1999; Mathews 1997a). Just as consumers differ in the categorization structure they use, so do retailers. Retail stores can center their assortments around product referent categories, based on the correlation between physical attributes. Bookstores sell books, whereas shoe-stores sell shoes. Books and shoes are basic level categories (cf. Rosch et al. 1976) that are relatively well defined. Other stores focus on the usage function of products (task / outcome referent), such as stores that sell snack products. There exist stores that offer 'ad hoc' categories of products, that center around a certain goal for which consumers may be shopping. For example, a 'gift store' sells various products that can be bought as gifts for other people, and a 'care store' sells various products related to the tending and nursing of care-needing people. Another example of a store that focuses on an ad hoc category, is the relatively new concept

of a 'travel store', that sells such diverse products as travel books, foreign wines, and olive oil. Since ad hoc categories will be less well represented in consumers' memory structure (Barsalou 1983), the consumer may not have a very clear idea of which products will be available in such a store. Stores can also tailor assortments around user referent bases. This means that the products are presented together because they display the same image or appeal to the same (prototypical) person, like a hypothetical Madonna store, while these products may be very dissimilar in their physical attributes.

In our empirical studies, we will refrain from the categorization process, by focusing on relatively well defined product categories, such as dish washers, photo cameras, and shoes. These categories represent the basic level categories of Rosch and colleagues (1976), and are based on the natural correlational structure of physical attributes in the environment.

Overall, this dissertation uses the following facet levels to conceptualize assortments: A_1 set of products, B_2 product category level, and C_1 product referent. This is consistent with the definition of assortment used by an English dictionary: "a group of similar things that are of different sizes or colours or have different qualities" (Collins Cobuild English Dictionary 1995). The products in an assortment are alternatives from a same product category that are similar to each other (since they belong to the same category) but differ in their individual attribute levels (such as size or color). The products in an assortment are imperfect substitutes. Examples are assortments of books, trousers, shoes, or soft drinks.

Sets and items

Besides the term 'assortment', we also use the terms 'set' and 'item'. In statistics, the term 'set' refers to: "...A well-defined group of things. Events, objects or numbers that are distinguishable from all other events, objects, or numbers on the basis of some specific characteristic or rule..." (Vogt 1993). So, the term 'set' is used very broadly, and indicates some grouping of 'things'. These basic building blocks of sets will be referred to as 'items'. Our discussion focuses on sets of products. A product set can be any grouping of products, for example the products that happen to be lying on a table, or the products someone has in his/her pockets. Not all these sets of products are equally relevant for consumers. The next section will offer an overview of extant literature about product sets, with the objective to distinguish assortments from other types of product sets.

1.2.3 Distinguishing types of product sets

The previous sections examined the meaning and use of the word assortment. This allows us to define assortments as sets of imperfectly substitutable products from the same product category. Product similarity can have different bases, and we will use the physical attributes

of products to define product categories in our studies. To further clarify the definition of product assortment, we now compare assortments with other types of product sets.

Previous research has examined diverse types of product sets that are relevant during the process in which consumers choose, buy, and consume products. We distinguish three basic types of sets, each representative of different stages in the product choice-consumption process. First, there are sets of products that are offered to the consumer, e.g. products offered in a store, or in a restaurant. These retail assortments have been our focus so far. Second, products can form a set because they are bought at the same shopping trip, and the relation between the products is one of purchase timing. Third, products can also be related in usage or consumption. These products are not necessarily bought at the same purchase occasion, but have been compiled over multiple shopping trips. In consumption they complement each other (e.g. pen and paper) or they are substitutable (e.g. soft drinks). The following product sets are examined (Table 1.2 summarizes their characteristics):

Offered sets:	Retail assortment Retail store assortment Retail stock
Chosen sets:	Product bundle Multi-item purchase within a category Shopping basket
Consumption sets:	Consumption system Stock Collection Consumers' assortment

Choosing from assortments: offered sets

We defined the retail assortment as a set of products at the category level. Retail literature has also featured the total assortment at the store level, which we will label the store assortment. When a store offers only products from a single product category, these two assortments fall together. Mostly, however, stores offer products from a diversity of product categories.

Retail assortment. This product set is the focus of our research, and can be defined as a retailer owned set of products from the same product category. Products from the retail assortment are substitutes, and consumers decide which of the products to buy from the assortment.

Table 1.2 A conceptualization of product sets

	Phase in consumption process	Product set	Number of product categories	Composer of the set	Product relation	Dominant objective of set formation
1	Before choice	Retail assortment	One	Retailer	Substitutes	Retail profit
2	Before choice	Retail store assortment	Multiple	Retailer	Offered by same store	Retail profit
3	Before choice	Retail stock	One	Retailer	Identical products	Retail profit
4	Choice	Product bundle	Mostly multiple, sometimes one	Manufacturer / retailer	Part of a bundled offering	Manufacturer / retail profit
5	Choice	Multi-item purchase within a category	One	Consumer	Purchased at same time	Shopping trip efficiency
6	Choice	Shopping basket	Multiple	Consumer	Purchased at same time	Shopping trip efficiency
7	Consumption	Consumption system	Multiple	Consumer	Complementary in use	Perform total task
8	Consumption	Stock	One	Consumer	Identical products	Availability of products
9	Consumption	Collection	One	Consumer	Complementary in possession (form an entity)	Completeness of the set
10	Consumption	Consumers' assortment	One	Consumer	Substitutes	Fulfillment of diverse needs over time

Retail store assortment. The total store can contain an enormous amount of products, sometimes as many as 88,000 (Turcsik 2000), from a diversity of product categories. Consumers' impressions of the total assortment offered have featured in store image research (Arnold, Oum & Tigert 1983; Lindquist 1974-75; Zimmer & Golden 1988). Although consumers' evaluations of the total retail assortment can be helpful for understanding the overall store image, retailers in general will prefer more detailed information to determine their assortment strategy and tactics. In order to make tactical decisions, retailers need information at the product category and individual product levels.

Retail stock. Stores usually carry replicas of each SKU, e.g. a supermarket will have many identical bottles of cola in store, so that consumers can buy multiple units of the same product and multiple consumers can buy the product at the same time. We call this the retail stock.

Figure 1.2 presents a depiction of these three product sets. The store assortment entails multiple product assortments. Stocks can be available for each of the products in an assortment.

Figure 1.2 Product sets in retailing

Buying multiple products at once: chosen sets

Consumers often buy multiple products during a shopping trip (Gupta & Manchanda 1996; Harlam & Lodish 1995; Manchanda, Ansari & Gupta 1997; Russell et al. 1997). Because these products are bought simultaneously, independence among products is an implausible assumption in many multi-item choice situations (Harlam & Lodish 1995). The sets can be composed by the retailer/producer or by the consumer. Product sets that are composed by the retailer/producer are called product bundles. Multiple products are offered to consumers as a single package for a single selling price (Kaicker, Bearden & Manning 1995). Alternatively, product sets that are composed by the consumer have been called an implicit bundle (Mulhern & Leone 1991) or shopping basket (Julander 1992). These product sets may contain products from a single product category (multi-item purchase within a category) or from multiple product categories (shopping basket).

Product bundle. Product bundling has been defined as "the practice of marketing two or more products and/or services in a single "package" for a special price" (Guiltinan 1987, p.74). After its introduction in the marketing literature by Guiltinan (1987), bundling has increasingly been studied. Studies have focused on questions related to bundle pricing and the evaluation of bundle offers by consumers (Guiltinan 1987; Simonin & Ruth 1995; Yadav 1995). Offering products as a bundle is a conventional marketing strategy. A nationwide survey in the US revealed rising interest by consumers in bundled products and services from energy suppliers (Security Distributing & Marketing 1999). According to the survey, consumers expect that bundles will add value and create economies of scale. Consequently, they expect a discount from bundles. An empirical examination of bundled versus separate prices by Estelami (1999) reveals that consumers are correct to expect discounts: on average they can save about 8% of the price by purchasing bundles.

The basic assumption underlying several studies of product bundling is that evaluations of the total bundle are a (weighted) average of the evaluation of the individual products of the bundle (Gaeth, Levin, Chakraborty & Levin 1990; Yadav 1994), or a sum of the gains and losses associated with the individual products (Drumwright 1992; Johnson, Herrmann & Bauer 1999; Kaicker, Bearden & Manning 1995). These studies assume that the products are evaluated independently, and then integrated into an overall bundle evaluation. Yet, products may not be evaluated independently, and complementarity between products in a bundle can influence the overall bundle evaluation (Gröppel 1993; Guiltinan 1987; Harlam, Krishna, Lehmann & Mela 1995; Simonin & Ruth 1995).

We defined assortments of products as sets of substitutable products. Therefore, we would be interested in studies examining product bundles of substitutable rather than complementary products. Contrary to multi-packs, were the products in the bundle are identical, we would be interested in bundles of non-identical substitute products. Product bundles in which products are imperfect substitutes exist in practice, e.g. three pairs of different socks offered at a discount price, but have hardly been studied. In general, the products in the bundle are assumed to be independent in demand or complementary, but not substitutes (Guiltinan 1987; Drumwright 1992).

Multi-item purchase within a category. Consumers can purchase multiple products of the same category at once. Generally, scholars have assumed that consumers want to balance the products in such a set (Farquhar & Rao 1976; McAlister 1979; Bradlow & Rao 2000). Consumers may want similar levels for some of the attributes, but different levels for other attributes (Farquhar & Rao 1976). For instance, a certain consumer may want a package of magazines that all have a high entertainment level, but that differ in their specific content (e.g. sports and gossip).

Direct comparisons of purchasing over time versus purchasing multiple products from a category at once, show that simultaneous purchasing of multiple products leads to more variety seeking (Simonson 1990; Simonson & Winer 1992). Read and Loewenstein (1995) discuss this choice bracketing, "the tendency to tread choices that are framed together differently from those that are framed apart" (p.34). They describe the underlying process as the use of different heuristics. When confronted with a set of products, diversification may be the most straightforward choice heuristic. When confronted with choices one at a time, choosing the most preferred alternative may be the more obvious choice heuristic. This means that set evaluation may evoke its own evaluation heuristics, which differ from the ones used for product evaluation.

Shopping basket. Recently, attention has been directed towards consumer purchase of multiple products on shopping trips (e.g. Gupta & Manchanda 1996; Harlam & Lodish 1995; Julander 1992; Manchanda, Ansari & Gupta 1997; Russell & Kamakura 1997; Russell & Petersen 2000). The widespread availability of retail scanner data has stimulated research into the products that consumers buy on their shopping trips. Market basket models generally assume interdependent choices (Bultez, Julander & Nisol 1996; Russell et al. 1997). For instance, the model developed by Manchanda, Ansari and Gupta (1997) tries to explain product category choice from the direct impact of marketing activities in the category, but also from marketing activities in related categories.

There are several reasons why retailers notice distinct shopping baskets, such as the complementary nature of categories (e.g. cake mix and cake frosting), similarity of purchase cycles (i.e. the convenience of buying multiple products in a single shopping trip), and different mixes of consumers buying at the store (Manchanda, Ansari & Gupta 1997; Russell & Petersen 2000). Disentangling these reasons, together with the large number of product categories and SKU's in a single store, makes research based on the buying patterns of consumers challenging.

Owning multiple products: consumption sets

Consumers own multiple products that are related to each other in consumption or usage. When a particular consumer activity involves using multiple products together, the sets of products have been described as consumption systems (Boyd & Levy 1963; Lai 1994) or consumption constellations (Englis & Solomon 1996; Solomon & Englis 1994). The products in a consumption system are from different product categories, and complement each other in performing a task. Other sets contain products from the same product category. For instance, consumers typically have multiple soft drinks, shoes, and so on. We distinguish three of these product sets: stocks, collections and assortments.

Consumption system. Consumers use the products in such a consumption system to perform a total task, for instance multiple ingredients to make a dish, or multiple furniture items to decorate a room (Boyd & Levy 1963; Russell et al 1997). The products in a consumption system complement each other. This compatibility may result from functional complementarity, aesthetic complementarity, or cultural complementarity (Solomon & Englis 1994; Lai 1994). Research in this area has been mainly descriptive, and the psychological processes of product complementarity and set evaluation have yet to be examined.

Stock. A stock is a quantity of good that has not yet been used (e.g. a stock of sugar, or paperclips). It is a set of products that are, at least from the viewpoint of the consumer, perfect substitutes. Consumers may want to have stocks of products for reasons of comfort (not having to go to the store every time a need for the product arises) and of security (the availability of back-ups). Since the products in a stock are perceived to be identical, it is mainly the quantity in stock that is considered by consumers, while in situations of product decay age can also be important. Recent literature on stockpiling behavior has examined the influence of promotions on quantity in stock (Helsen & Schmittlein 1992; Neslin & Schneider-Stone 1996; Wansink, Kent & Hoch 1998), as well as the effect of quantity in stock on usage quantity (Chandon & Wansink 1996; Folkes, Martin & Gupta 1993; Wansink & Deshpande 1994). As the products in a stock are identical, dependence among products and its effect on set evaluation are not relevant.

Collection. Collecting postage stamps, baseball cards, stones, bottle caps, or similar items is something that most people have done at one point or another in their lives. Children may be avid collectors, but nowadays collecting behavior is gaining in popularity among adults as well (Norton 2000; Prior 2000). A collection is an interrelated set of products that contribute to and derive extraordinary meaning from the entity that the set is perceived to constitute (Belk, Wallendorf, Sherry & Holbrook 1991). The products in the collection are perceived to form a unity, and the collector strives for completeness of this unity. Use of a collection entails enjoying the completeness of the collections and showing it to others. The total collection has a value of its own. From the collector's point of view, the products come from the same category, even though this may not be one of the regular product categories that retailers distinguish. The collector is not so much interested in the individual products themselves as (s)he is in the relations between them (Danet & Katriel 1987). The owner regards the collection as special, unique, and separate from everyday products (Belk, Wallendorf & Sherry 1989). With a possible exception for special occasions, the products are no longer used in their original functional capacity (Belk, Wallendorf, Sherry & Holbrook 1991; Long & Schiffman 1997). Even when products from a collection are used for their intended purposes, e.g. the use of a china dish collection at

Christmas, these products are still regarded as part of the collection, since even in use, they are regarded as more than functional products by their owner, are treated with extreme care, and are often only employed ritually or on special ceremonial occasions (Belk, Wallendorf, Sherry & Holbrook 1991). Products are added to the collection because they contribute to the set, and in this sense have additional significance other than utilitarian or aesthetic appeals (Belk, Wallendorf, Sherry, Holbrook & Roberts 1988).

Consumers' assortment. A consumer's product assortment can be defined as a set of heterogeneous products, which have the same overall usage goal but different specific applications. The products are alternatives from the same product category, such as compact disks or shirts. There are several reasons why a consumer would want to own multiple dissimilar, as opposed to similar, products from a product category. Assortments may be held because different attribute levels are required in different usage situations (Lee & Steckel 1999; Ratneshwar & Shocker 1991). Other reasons could be an internal desire for variety (Van Trijp, Hoyer & Inman 1996), uncertainty about future preferences (Simonson 1990), as well as changes in marketing variables over time, constraints on choice, changing tastes, and affiliation or distinction from others (Kahn 1995; Lattin 1987; McAlister 1982). Pessemier (1985) classifies the diverse reasons for people to consume or use different products over time in two main categories: indirect and direct causes of varied behavior. Among the indirect causes are satiation with attribute levels (e.g. after having the same food for days in a row, you want to switch to something else), multiple conditions (e.g. changing taste or changing constraints), and multiple needs (e.g. multiple usage situations). The direct causes can be interpersonal (affiliation or distinction from groups of people) and intrapersonal (obtaining stimulation and information).

Consumer assortments have as of yet received virtually no attention in the academic literature. This new area of consumer behavior research may benefit greatly from developments in the retail assortment literature.

Consumers' assortments are similar to retail assortments, as they both consist of imperfectly substitutable products from a single product category. Differences between the two product sets concentrate on three aspects: the assortment owner, the evaluation process, and the evaluation goal. First, consumers' product assortments are owned by the consumers themselves, while retail assortments are owned by the retailers. Consumers will therefore be more involved with their own assortments, and incorporate these products in their sense of self (Belk 1988), while they will be less involved with retail assortments. Second, there can be differences in the evaluation process. Retail assortment will generally contain considerably more items than consumers' assortments. Therefore, consumers are more likely to use heuristics when they evaluate the relatively complex and large retail assortments. Another difference in the evaluation process centers on assortment variety. For

consumers' assortments, where all the products will be consumed, variety must be balanced against the possibility of eventually being left with unattractive products (Lee & Steckel 1999). A varied consumers' assortment may cause the consumer to end up with less attractive products in his/her possession after consuming the more attractive products. Since not all products from a retail assortment will be consumed by a single consumers, the possibility of being left with unattractive products does not apply. Third, the two types of assortments are evaluated for different reasons. Retail assortments are evaluated with a view to potential purchases from the assortments. The expected presence or absence of acceptable items is critical, but not all products in a retail assortment have to be acceptable for a consumer to be able to make a purchase. Consumers' assortments will usually be evaluated to check the need to add to or remove products from the assortment. Since all products in a consumer's assortment are in his or her possession, each individual product will have more meaning for the consumer, and be more important for him/her, than the products in a retail assortment.

1.2.4 Dominant issues in product set literature

Assortments have been defined as sets of imperfectly substitutable products from a single product category, and compared with other product sets. What can be gained from the literature in these areas? Several studies have examined sets of products, but many questions regarding the exact process by which sets of products are evaluated remain unanswered (Russell, et al. 1997). Two important research issues become apparent from examining the literature on product sets. First, a central theme that keeps appearing is the relation between the products in the set. Dependence among products in a set is relevant and important. The assumption is that the sum of the individual products does not equal the total set. Yet, the way in which this dependence is examined differs between scholars and types of product sets. Second, the diversity of the product sets hinders the direct application of research across areas. Some product sets contain complementary products, while others contain independent or substitutable products. Some product sets contain products from single product categories, while others contain products from multiple categories. The relevant properties of product sets that can influence consumers' evaluation of these sets are likely to differ as well. For instance, the variety of a product set will be of great importance when the products are substitutes from a single product category (as in an assortment), but will be less meaningful when the products are complements (as in a consumption system). Since we are interested in assortments, which are sets of imperfectly substitutable products from a single product category, literature on bundles of substitutable products and on multi-item purchases within a category will be most relevant.

1.3 Assortment management by retailers

Now that we have defined assortments and compared them to diverse product sets, we want to identify the relevant issues and challenges for retail managers and scholars. This section will therefore examine the assortment management practice of retailers. It will especially focus on category management, one of the most discussed topics worldwide in retailing (Harris & McPartland 1998). Section 1.4 will examine the academic literature regarding product assortments, and section 1.5 will integrate the managerial and academic issues.

1.3.1 The importance of assortments

Retail managers have experienced the importance of having assortments that correspond to consumers' needs and wants. By offering more variety in fabrication options, colors, and prints, retailers saw panty sales rise sharply over the last years (Discount Store News, 1999). Likewise, sales in the plastic storage / home organization category, and in pet food, have flourished when retailers broadened their assortments (Brumback 1999; Facenda 2000). Other retail managers advocate the careful reduction of product variety, as a way to decrease costs, while sales remain high (Raftery 1993; Rosendahl 1995).

Large retailers now systematically review their product assortments (Discount Store News 2000), and make decisions regarding individual products in light of the total assortment to which the product belongs. Managerial decisions, and profit levels, can be improved by considering the total assortment of products in the decision making process, in stead of focusing on the individual products separately. For instance, by moving to category management, manufacturers can eliminate internal price competition between the brands they own, which increases the profits they make (Zenor 1994). Similarly, retailers can gain by considering the assortment in a product category as a whole.

1.3.2 Category management

The realization that products from the same category can influence each other's sales has inspired category management. Category management started in the food industry, and although other retail sectors are joining at a fast pace, grocery stores remain the center of category management activity (Dussart 1998; Szymankiewicz 1998). Category management already has great influence on the assortment management process of retailers, and this influence is only expected to grow (Szymankiewicz 1998). *Progressive Grocer*'s 1998 Annual Report of the Grocery Industry shows that over 75% of the executives in the grocery industry anticipated an unusually high amount of moves to category management.

Category management is part of the Efficient Consumer Response (ECR) program. We will first discuss this ECR program, and establish the role of category management within this larger program. Next, we define category management and discuss its goal, strategy and instruments. Advantages, disadvantages, and frequent recommendations are examined as well, leading to the identification of unresolved issues that are in need of attention.

Efficient Consumer Response

The origins of Efficient Consumer Response (ECR) trace back to a 1993 report of Kurt Salmon Associates titled "Efficient Consumer Response: Enhancing Consumer Value in the Grocery Industry". ECR takes an integral view of the supply chain, from consumer to retailer to manufacturer (Maerschalck & Vanbrabant 1996). It consists of four parts: (1) efficient store assortments, which includes category management, (2) efficient replenishment, (3) efficient promotion, and (4) efficient product introduction (Hennessy 1998; Kahn & McAlister 1997; Kotzab 1999).

The first part, *efficient store assortment* (category management) is becoming an important part of retailing. The potential results of a category management program, both in terms of increased sales and reduced costs, can be substantial (Krum 1994), and the expectation is that retailers without a good category management strategy will fall behind (Radice 1998).

The second part of ECR, *replenishment*, concerns the timely delivery of products to the store. The availability of a variety of products in the assortment is essential to achieve sales. Non-availability of products can have serious consequences, even leading to store switching by consumers (Borin, Farris & Freeland 1994; Campo, Gijsbrechts & Nisol 2000; Emmelhainz, Stock & Emmelhainz 1991; Verbeke, Thurik, Franses & Faris 1997). Efficient replenishment can decrease costs as well as increase sales, and consequently retailers have embraced the concept of continuous replenishment (Kahn & McAlister 1997).

The third part, *promotion*, involves collaboration with producers to provide efficient and effective promotions. The efficient promotions initiative suggests that the structure of promotional offers can be radically simplified if retailers and manufacturers cooperate (Kahn & McAlister 1997).

Product introduction, the fourth part, involves collaboration to develop new products and plan product launches to reduce costs and rate of failure (Munneke 1998). Decisions to introduce new products will affect assortment composition, and retailers more and more take these effects into consideration. When making an adoption decision for new consumer products, retailers name the fit in the assortment as one of the top-10 criteria they use, next to for instance price, quality and margin (Hultink, Thölke & Robben 1999).

Although the latter three aspects of ECR – replenishment, promotion, and product introduction – are important aspects of retail strategy, efficient store assortment (category management) is becoming the most challenging aspect for retailers. Category management has been called the most important and best known business process to emerge from the ECR initiative (Dussart 1998), and retail chain executives said that category management is the ECR aspect which they are most likely to stress (Mathews 1997b). The focus of ECR has mainly been on cost reductions in delivery, promotions, and product introductions, from an internal perspective. Category management is the part of ECR where the consumer perspective becomes important (Johnson 1999). Retailers are beginning to realize that, while the cost-cutting aspects of ECR are important, they need to focus more on the consumer (Hennessy 1998). Illustrative is a quote from Carol Christison, executive director of the International Dairy-Deli-Bakery Association: "ECR is wonderful, except the consumer part has been left out" (Hennessy 1998, p.103).

Defining category management

The Institute of Grocery Distribution defines category management as "... the strategic management of product groups through trade partnerships which aim to maximize sales and profits by satisfying consumer needs" (Qureshi & Baker 1998, p.24). Similar definitions have been offered (Dussart 1998; Verschuur & Hulst 1997), which share several aspects: (1) management of a total product category, (2) joint retailer-supplier process, (3) maximizing sales and profits, and (4) focus on consumer needs.

First, as the name reveals, category management is focused on the category (Munneke 1998; Qureshi & Baker 1998). A category has been defined as a distinct, manageable group of products/services that consumers perceive to be interrelated and/or substitutable in meeting a consumer need (definition of ECR Europe, in Van der Vaart & De Rond 2000). The assumption underlying category management is that consumers make purchase decisions from the products available within a category, so that the product category is the relevant unit to examine (Dussart 1998).

Second, category management is a joint retailer-supplier process (Gruen & Shah 2000; Qureshi & Baker 1998). Although it is a joint process, retailers and manufacturers do not have equal influence in and power over this process. Category management reflects the power of retailers over manufacturers in putting the shelf assortment central instead of suppliers' product lines (Dussart 1998). It puts manufacturers in a rather precarious position. One of the manufacturers becomes a Category Leader (or Category Captain) and manages all the products of a category for the retailer, including the competitors' products (Gruen & Shah 2000; Levy & Weitz 1998). To this end, the retailer provides the Category Leader with sales information at the store level for the entire category. The other

manufacturers thereby lose control over their own products to their direct competitor. At the same time, the Category Leader can be easily replaced by the retailer, leading to enormous pressure on the manufacturer (Dussart 1998).

Third, the aim of category management is to increase sales and profit. Sales are expected to increase by offering more attractive assortments to consumers. Through elimination of non-profitable products, costs can be decreased. Typical goals of category management programs include sales, market share, margin, and market growth, all of which are expected to increase profits (Van der Vaart & De Rond 2000). The specific goal can differ between categories. When the role of a category is to increase traffic to the store, or to obtain an image for the store, the ultimate profit goal may be subordinate to these goals.

Fourth, category management focuses on consumer needs. As Mathews (1996c, p.4) puts it: "Management of individual categories can be profitable, but true profitability will never be achieved until the industry learns to manage consumers". Yet, this focus on consumers tends to be limited. Few retailers actually ask their customers what they think of the products in their stores (Dussart 1998), despite the importance of such consumer data for making correct assortment decisions (Johnson 1999; Mathews 1996a).

Strategy and instruments of category management

The strategic process of category management consists of several stages (Qureshi & Baker 1998; Verschuur & Hulst 1997). First, the category needs to be defined. Given the flexible use of category structure by consumers and the fuzzy nature of many categories, defining the category may not be an easy task. Retailers' inability to agree on standard category definitions illustrates this (Johnson 1999; Mathews 1997a). Next, the role of the category needs to be identified. Categories can have different strategic roles, such as the role to generate traffic or attract customers, to increase transactions, to create a certain price or variety image, and so on (Harris & McPartland 1998). Third, the product category will be reviewed. This requires consumer assessment, and identification of retailer and shopper profiles (Qureshi & Baker 1998). Consumer information is of great importance in this stage (Verschuur & Hulst 1997). Subsequently, the strategy for the product category needs to be determined. Next, the strategy is translated into assortment tactics, and the plan is implemented. Experienced users of the category management process say that the implementation phase of the process is often difficult (PricewaterhouseCoopers 1999), due to differences of opinion and lack of communication between company headquarters and individual stores (Verschuur & Hulst 1997).

The instruments of category management are essentially those of the merchandise assortment planning process in traditional retailing. These involve shelf space, shelf location, amount of inventory, assortment size, amount of variety, and product availability

levels (Levy & Weitz 1998). The recommendations in a category plan typically include adding, deleting, adjusting prices, allocating shelf facings, and shelf-placements of the various SKUs in a category (Gruen & Shah 2000). Most of the attention in category management projects is typically focused on the composition of the assortment in a category (Van der Vaart & De Rond 2000). Yet, clear guidelines for determining assortment composition, or for any of the other instruments of category management, are lacking. Kotzab (1999) therefore concludes that the descriptive approach is dominant in category management, while prescriptive or theory-building approaches are virtually absent. The impression exists that category management is used as a strategic "play-ball" by consultants to introduce their services.

Category management can be seen as a response to brand management and Direct Product Profitability (DPP), which focus on the profitability of the individual product rather than the category (Borin & Farris 1990; Dussart 1998). But consumers do not evaluate products in isolation, and decisions about one product may very well influence the sales of other products. The idea is that retailers should take these cross-effects into consideration. Category management is supposed to accommodate this, but in reality many of the category management practices still concern DPP and individual product analyses.

Advantages and disadvantages of category management

Why do retailers practice category management? Some of the mentioned advantages of category management are that category management (1) constructs a match with consumer needs, (2) leads to effective strategy development, which would be more difficult at the SKU level, (3) leads to effective use of sales expansion possibilities, (4) provides a framework for investments in technology and information, (5) provides the tools to better use category expertise, and (6) provides a basis to assign resources and priorities to categories (Harris & McPartland 1998). Category management matches the buying process of consumers, and thereby leads stores to consider their assortments from a sales perspective. By examining products at the category level, retailers are able to define consumer segments and their needs, determine product positioning, and develop strategies. Retailers themselves say that they primarily use category management to increase profitability (24%), support selling objectives (15%), and to optimize the item mix (15%) (Supermarket Business 1998).

Category management has provided improvements in retail sales and profits (Bishop 1999). Yet, category management does not only have supporters. Some argue that it is nothing more than a buzzword, and whether it is successful in the long run remains yet to be discovered (Dussart 1998).

Practical issues. The disadvantages of category management center both on practical and theoretical issues. Practical problems with category management concern (1) the implementation of the category management process by retailers, (2) lack of cooperation between retailers and producers, (3) applicability to diverse product categories, and (4) the type of data that is currently being used.

Retailers often mention implementation problems. PricewaterhouseCoopers (1999) performed interviews with 30 companies that have been identified as industry experts and early adopters of category management, to examine what these companies have learned, and to make recommendations for improvements. They found that most companies were disappointed by the long turn-around time. After several years of experience, one full cycle of the category management process still took as long as three months, primarily due to the length and complexity of the assessment step. Another problem lies in the implementation of changes and improvements at the store level. These changes were sometimes carried out incorrectly, with long delays, or not at all.

A second disadvantage concern the collaboration between retailers and manufacturers. The power play in category management does not always lead to the best results. For category management to reach its full potential there needs to be more trust in collaborative relationships than is currently present (Johnson & Pinnington 1998; Johnson 1999). Partners in category management will need to share information in order to make the most effective decisions.

Third, category management is difficult to apply to some product categories. It has become common for many of the grocery categories, but still has some obstacles to overcome before it can be applied to categories such as the deli department (Turcsik 1999). Obstacles are the random weights of the products, mislabeling, and the perishable nature of the products. Nonetheless, category management is being attempted for these types of categories as well.

A final practical disadvantage of category management centers on the underlying data that is used to guide the process. Opponents of category management say that it is faulty, since the scanner data on which it is based are prone with error, do not provide delivery costs, and do not provide information on items not carried (Phillips 1999). Therefore, marketing research firms have proposed alternative data collection techniques, such as consumer observation and accompanied shopping (Johnson & Pinnington 1998). Still, only few retailers (<10%) actually use such consumer information for their decisions (Dussart 1998). This means that most assortment decisions are still being made without a good understanding of the consumer decision process.

Theoretical issues. In addition to these practical problems with category management, there are several theoretical problems as well. These theoretical problems address the focal

point of category management: (1) is the category the correct unit of analysis, and (2) what is the theoretical foundation of category management. Whereas the practical issues are concerned with problems surrounding the correct implementation of category management, these theoretical issues criticize the concept of category management itself.

The assumption behind category management, that consumers make their purchase decisions from the products within a product category, may not be flawless. Product categories are chosen as the unit of analysis, since decisions at the store level will often neglect opportunities and threats for individual products or categories, while the enormous amount of products in a store make it almost impossible to make decisions at the product level. Yet, categories do not exist in isolation, and retailers should beware of managing them in isolation (Mathews 1996b). As research on market baskets and product bundles has clearly demonstrated, consumers make purchase decisions across the boundaries of product categories, and these decisions influence each other. This does not imply that category management can not be useful. Compared to individual product analyses, category management can improve retailers' decisions. But the category is not the highest level of analysis, and at the store level the individual categories need to be combined and managed.

The most important disadvantages of category management are its descriptive nature and lack of theoretical foundation. Clear guidelines, tools, and tactics appear to be lacking. Category management affects *who* manages the category, but as yet not *in which way* this is done, or on what basis. The success of category management seems mostly due to its ability to tap the expertise of manufacturers. The appointment of a Category Leader allows in-depth analyses of the categories, which the retailer could not have easily done by itself. These thorough analyses can indeed lead to more profitability. Still, category management as yet appears to offer few, if any, new insights into the analysis process itself.

Recommendations of the category management process

The category management process can result in diverse recommendations for the products. Many of the ECR and category management projects center on decreasing the number of products in a category (Van Vugt 1998). Retail consultants have also been giving out the advice to "trim the dead wood", or reduce the number of products in an assortment (Raftery 1993). Empirical studies confirm that a careful deletion of products from an assortment is often not noticed by consumers (Broniarczyk, Hoyer & McAlister 1998), and can even boost sales (Boatwright & Nunes 2001; Dussart 1998; Harvey 2000; Van Vugt 1998). Reduction of the number of products in an assortment can enhance profitability by eliminating unnecessary variety, and this reduction appears to become an important part of category management (Van der Veen & Robben 1997). It has been called the biggest, most time-consuming task that category managers will have to address (Dussart 1998).

Changes that are based on a category management process are not necessarily good for consumers, as these changes may limit consumers' product choice to the most profitable products, and make it more difficult for consumers to find their favorite products and to make their usual comparisons (Dussart 1998). Projects are developing in several countries to determine how a retail shelf can offer the most variety for the lowest costs, without turning away consumers (Van Vugt 1998). Understanding the consumer is becoming important in category management.

Consumer focus

Retailers need to know why consumers shop in their stores, and what consumers' expectations are, to make correct assortment decisions (Johnson 1999). To say it even more strongly: "a category management system that, in the end, doesn't make a palpable difference in the consumer's experience in the store, at the shelf or in front of the cooler, simply isn't worth the effort" (Mathews 1997a, p.5).

The evolvement of category management has led to the insight that the consumer – not the product, brand, or manufacturer – is the most critical element in determining the retail shelf (Mathews 1996a, 1996c). As a consequence, retailers have begun to focus more on how the consumer can drive tangible results (Mathews 1996b). Many retailers, however, appear to be paying lip service rather than truly focusing on consumer needs (Dussart 1998; Johnson 1999).

The main emergent theme from our discussion of category management, is the gap between the importance of accurate consumer information and the simultaneous lack of this information. Although retailers realize that good consumer information is of the utmost importance, they make relatively little use of such information, and attempts to understand consumers' perception and decision processes at the category level are incidental. There does not appear to be much structural research by retailers to obtain consumer information at the product category level.

In the next section, we will examine the marketing literature on product assortments, to determine if this literature offers guidelines and theories to understand consumers' evaluation of assortments better.

1.4 Research on assortment management

In the academic literature, the choice *from* an assortment of products has typically received much more attention than the choice *between* assortments (Koelemeijer & Oppewal 1999). Attention to the issue of assortment composition and its effect on consumer perception and choice of retail assortments has been relatively scarce until recently. This is surprising,

given that the decision to purchase in a store is often strongly affected by the size and composition of the store assortment (Koelemeijer & Oppewal 1999). By carefully constructing their assortments, retailers can increase sales drastically. For instance, in a natural experiment by an online grocer, Boatwright and Nunes (2001) found that reductions in the number of SKU's led to an increase in sales of on average 11%.

While observing the response of consumers to changes in assortment size and composition is valuable, a more detailed understanding of the reasons for such changes is needed. Retailers and scholars are realizing that consumers' *perceptions* of an assortment are important, not the actual size and composition of the assortment (Kahn 1998). Literature directly focusing on the evaluation of retail assortments is relatively limited, but not absent (Broniarczyk, Hoyer & McAlister 1998; Hoch, Bradlow & Wansink 1999; Koelemeijer 2000). Recent studies have started to examine the effects of assortment size and/or composition on consumers' perceptions and evaluations.

This section will describe the literature on retail assortments from an historical perspective. The main focus is on studies that examine consumers' evaluation of assortments. The development of knowledge in this area will be documented, and under-researched areas will be identified. Section 1.4.1 introduces early studies of product assortments, from the late 19th century until the store image research that developed in the 1970s. These studies generally perceive assortments as one of the elements of a store, and examine store-level constructs without going into details regarding the assortments. Later, under the influence of variety seeking literature, scholars began to realize that the products in an assortment are not independent from each other. The resulting balance models will be discussed in section 1.4.2. Next, section 1.4.3 examines the more recent assortment issues that have been researched. These center on the effects that assortments have on consumers' perceptions and evaluations.

1.4.1 Early examinations of product assortments

Stores as we know them developed in the 19th and 20th century. Jones (1936) describes the retail environment between 1800 and 1860, and the first specialty, department, and chain stores. These changes in the retailing environment inspired scholars. In 1899, MacLean already published a study into the experiences that employees of a large department store had with customers. MacLean spend two weeks working in departments stores to examine the working conditions, and documents the interactions between consumers and sales personnel in her article. The new types of stores also inspired studies that examined trends in retailing (Wingate 1941; Zimmerman 1941), compared different types of stores (Faville, 1936), and investigated the reasons why consumers buy at these stores (Converse &

Spencer 1942; McDermott 1936). 'Quality of goods' and 'selection of goods' were among the reasons why consumers prefer certain stores to others (McDermott 1936). Assortments also appear in these early studies as ways for retailers to differentiate from each other (Bliss 1953; Knauth 1949; McDermott 1936).

Early on, it was clear that retailers needed to understand their customers to maintain profits and prevent losses (Converse & Spencer 1942; Green, 1936; Quenon 1951). Illustrative is the unexpected rise of supermarkets. In the beginning of the 1930's, retailers and scholars alike were convinced that consumers preferred convenience in shopping. The eagerness with which consumers visited supermarkets took many by surprise (Business week 1952; McNair 1953; Zimmerman 1941). The need to understand their consumers, and to improve store operation, led retailers to develop diverse research studies. Applebaum and Spears (1952) provide an overview of marketing research that was generally performed for retailers. Among these are studies into retail management, store development, competition, store location, effectiveness of displays, pricing, and store operations research. Research studies also determined trends in sales and profits of specific products. Consumer behavior studies focused on the identification of customers and their buying behavior patterns (Applebaum 1951). This research is typically concerned with the purchase of a single product, while consumers' evaluation of a total product assortment was not examined.

When studies on store image began to emerge, product assortments were often mentioned as one of the determining factors. Store image is "a composite of dimensions that consumers perceive as the store" (Marks 1976, p.37). In the mid 1970s, Lindquist (1974-1975) examined the meaning of store image by investigating which image attributes were mentioned in the literature. Of the 26 scholars he focused on, 42% mentioned merchandise selection or assortment as an image attribute, making it the response category that was most often mentioned. Different aspects of assortments have been proposed, including composition, quality, and style / fashion (Glerum-Van der Laan 1981). Overall, research has shown that certain aspects of retail assortments, in particular the quality of the products that are provided, have a significant and profound effect on store image and patronage (Louviere & Gaeth 1987; Steenkamp & Wedel 1991). The importance of assortment aspects, such as variety, may further differ between segments of consumers (Schiffman, Dash & Dillon 1977; Steenkamp & Wedel 1991). Studies on store image have shown the relevance of product assortments, without documenting the perception process.

1.4.2 Dependence among products in a set

When scholars became interested in the content of product sets, they focused on the interdependence between the products. They realized that the products are not independent

from each other: how a certain product is valued depends on the other products in the set. This is very evident for the meal selection of consumers. Certain foods 'go together', while others do not. Early studies regarding choice of product sets in the context of menu selection included dependence among items (Green & Devita 1974; 1975; Green, Wind & Jain 1972). These studies examine preference for sets of items from different product categories by including interaction terms between items, without discussing the underlying reasons for dependence and the process by which it affects product set evaluation. Later studies have expanded on the idea of product dependence, and offer theoretical frameworks and more sophisticated modeling approaches to account for these dependencies.

Balance in the set

Building on variety seeking models a stream of literature emerged in which dependency among products in a set (often called balance) is a key aspect. An early example of this approach is the dynamic attribute satiation model of McAlister (1982). The basic assumption of this model is that a consumption history can be represented by attribute 'inventories' which are subject to continuous decay over time. For instance, the attribute satiation model allows for the fact that consumption of multiple different soft drinks that include caffeine will lead to satiation of this attribute, after which consumption of a non-caffeine soft drink would become attractive. When evaluating a set of products for future consumption, consumers will take this expected satiation into account. Some studies have even indicated that consumers are likely to overestimate satiation (Bucklin, Gupta & Siddarth 1998; Simonson 1990; Simonson & Winer 1992). The attribute satiation model has later been extended to include positive choice-event feedback (Lattin 1987). The basic proposition is that "the variability in individual choice stems partly from the need to *balance* current consumption according to the impact of past consumption" (p.49). This impact could be negative (variety seeking), but also positive (loyalty).

Balance models were not only applied for variety seeking over time, but also appeared in studies examining the choice of a product set at one point in time (Farquhar & Rao 1976; McAlister 1979). These studies on multi-item set choice assume that consumers want to balance the products in a set, although the definition of balance differs. Farquhar and Rao (1976) introduced different types of attributes according to the way the attributes are used in balancing decisions. They distinguished (1) equibalancing attributes, for which the consumer strives for similar attribute levels, (2) counterbalancing attributes, for which the consumer strives for different levels, i.e. variety, (3) desirable attributes, and (4) undesirable attributes. They used these attribute types to model set preference. Recently, the attribute distinctions made by Farquhar and Rao were used in a model of product set choice

(Bradlow & Rao 2000). This model is a weighted sum of the means and dispersions of attributes, and accounts for consumers' choice of product sets.

Following the realization that products in an assortment are dependent on each other, the next question concerns the psychological process underlying assortment perceptions. Exactly how are products dependent on each other? How does product dependence influence assortment evaluations and preferences? Current assortment research is only now attempting to answer such questions. Section 1.4.3 provides an overview of this research.

1.4.3 How assortments affect consumer perceptions and evaluations

Recently, scholars have become interested in issues related to retail assortments. For instance, recent studies have examined shelf space allocation (Bultez & Naert 1988; Curhan 1972; Drèze, Hoch & Purk 1994), the effects of stock outs (Campo, Gijsbrechts & Nisol 2000; Verbeke, Thurik, Franses & Faris 1997), assortment presentation effects (Godek, Yates & Auh 2001; Hoch, Bradlow & Wansink 1999; Huffman & Kahn 1998), the attractiveness of product categories within a store (Campo, Gijsbrechts, Goossens, and Verhetsel 2000), and the relation between the products offered by manufacturers to retailers and the assortments that retailers construct from these products (Cadeaux 1997). Other studies examined how retail assortments can drive product choice (Bazerman, Moore, Tenbrunsel, Wade-Benzoni & Blount 1999; Dhar, Nowlis & Sherman 2000; Drolet, Simonson & Tversky 2000; Prelec, Wernerfelt & Zettelmeyer 1997; Quenon 1951; Simonson 1999). Product assortments set the decision context, promote the choice of socially desirable alternatives, and make it possible to use hard-to-evaluate attributes to compare products (Bazerman et al. 1999). Marketing literature provides many examples in which the composition of an assortment influences consumers' choice from that assortment. Consumers are attracted towards dominating products (Dhar & Glazer 1996; Ratneshwar, Shocker & Stewart 1987), influenced by the introduction of a new product that has one extremely good attribute level (Huber & Puto 1983), attracted towards groups of similar products rather than a 'lone alternative' (Glazer, Kahn & Moore 1991), and attracted towards compromise products (Dhar, Nowlis & Sherman 2000; Drolet, Simonson & Tversky 2000; Simonson 1989).

Although these studies examine valid and important retailing issues, they are not equally relevant for the questions we raised at the end of the previous section. For instance, studies on stock outs focus on retail stocks rather than assortments. Studies on the effects of assortment composition on choice share examine individual product choice rather than total assortment perceptions. We want to understand why consumers are attracted to certain store assortments, and not to others. Consequently, there is a need to understand consumers'

perceptions and evaluations of store assortments. This role of assortments has only recently received more attention in the marketing literature. Attention has mainly focused on two determinants of assortment perceptions: assortment size and assortment variety.

The impact of assortment size

Using scanner data, Bawa, Landwehr and Krishna (1989) showed that consumers tend to be less brand loyal when exposed to a larger product assortment. Further, in their study, consumers shopping in stores with larger product assortments appeared to be more sensitive to promotions, to find price more important, and to try more new products. Possibly, consumers used promotions as a heuristic for screening the many products in the assortment. As the size of an assortment influenced consumer buying behavior, it seems likely that it also influenced their perceptions and evaluations of the assortment. Opinions differ as to whether assortments with a larger size are evaluated better than assortments with a small size. Kahn and Lehmann (1991) postulate that the preference for an assortment is enhanced by including additional acceptable products to the assortment. Handelsman and Munson (1985) propose that consumers have an ideal assortment size, as too many products can confuse the consumer. This assumes an inverted U relation. Iyengar and Lepper (2000) show that having more options to choose from may be more appealing initially, but has negative effects as well. Chapter 4 discusses this in more detail.

The impact of assortment variety

Besides assortment size, the variety offered by an assortment is the most researched assortment property. For sets of substitutable products, variety in the set corresponds to product dependence (c.f. McAlister 1979; Simonson 1990). The variety provided by an item only has meaning with respect to the reference set – in this case the assortment of which the item is a part (Pessemier 1985). Therefore, variety has meaning at the assortment level, not at the product level.

The variety that is offered by a retail assortment is important for consumers. Kahn and Lehmann (1991) indicate that uncertainty about future preferences may lead consumers to prefer assortments with more variety. Consumers choose an assortment that offers both preferred products and flexibility, in which flexibility is determined by the number of acceptable products and the variety in the set. If many products are present and these products differ greatly from each other, an assortment is said to offer a high degree of flexibility. Other aspects of assortment composition are employed by Boatwright and Nunes (2001). They focus on the presence or absence of certain attribute levels (e.g. sizes, flavors, or brands). In the next chapter we will show that the relative occurrence of attribute levels is an aspect of variety as well.

The perception of assortment variety has been studied in more detail by Broniarczyk, Hoyer and McAlister (1998) and by Hoch, Bradlow and Wansink (1999). Broniarczyk, Hoyer and McAlister examine heuristics that consumers use in their perceptions of grocery store assortments. Consumers use these heuristics because they do not have the mental capacity to make a detailed variety assessment every time they encounter a product category in the grocery store. The heuristics - availability of favorite product and shelf space - would be less appropriate for shopping goods, where the exact product to be bought is not known beforehand. Then, consumers may form a more detailed examination of assortment variety. Hoch, Bradlow and Wansink attempt to model such a detailed examination of assortment variety. They introduce a general model of assortment variety. This model is based on the dissimilarity between products in an assortment: when products are more dissimilar, variety is higher. Hoch, Bradlow and Wansink show that variety perceptions influence consumer satisfaction and store choice. Consumers in their empirical study are more likely to choose stores that carry high variety assortments.

Overall, knowledge about the way in which variety influences assortment evaluations is scarce, while it has been shown to affect consumer satisfaction and store choice. This makes assortment variety and its determinants and consequences interesting research objects.

1.5 Conclusions

This chapter has conceptualized product assortments, and distinguished assortments from related product sets. An examination of current practices in assortment management by retailers revealed that consumers' perceptions and evaluations of assortments, while needed for a good category management program, are generally not well understood by retailers. The academic literature has only recently been concerned with these perceptions and evaluations. The link between assortment properties and consumers' perceptions needs more study (Kahn 1998).

The introduction to this dissertation mentioned three central themes, which clarify the positioning of the dissertation. First, the consumer and his/her perceptions and evaluation will be central. This essential part of assortment management has often been overlooked by retailers an deserves attention, as evidenced by Mathews (1996a, p. 66): "... it is the consumer – not the product, or the brand, or the distributor or the manufacturer – who is the most critical element in determining what the shelf-level inventory mix should look like". This dissertation will focus on assortment through the eyes of the consumer rather than the

retailer. By focusing on the consumer, we gain more insight into assortment perceptions and evaluations.

The second theme is assortment variety. The examination of literature on diverse product sets consistently showed the occurrence of dependence among products from the set in these streams of literature. For sets of substitute products, such as assortments, this dependency has been called variety. Variety is an important property of assortments that deserves further study into its conceptualization, its measurement, and especially its effect on consumers' perceptions and evaluations.

The third theme is the *link* between assortment variety and consumers' perceptions and evaluations. By examining this link, we can provide guidelines for category managers. In Chapter 6 we will refer back to this chapter, and discuss the implications of this dissertation for category management and assortment research.

2

Assortment Variety: Attribute- versus Product-Based[3]

Retailers need to decide on the size and composition of their product assortments, and thereby on the degree of variety that they offer to their customers. This chapter conceptualizes assortment variety from an attribute-based perspective, compares it with the product-based approach of Hoch, Bradlow and Wansink (1999), and examines the appropriateness of these measures in capturing assortment variety as perceived by consumers. The product-based measures tap the dissimilarity of products in an assortment across attributes. The attribute-based measures tap the dispersion of attribute levels across products, and the dissociation between attributes in an assortment. Study 1, using synthetic data, shows that the attribute-based measures tap specific aspects of assortment variety, and that the attribute-based measures are less sensitive to the size of assortments than product-based measures are. The latter is important when assortments of different sizes are compared. Study 2, a consumer experiment, indicates that the attribute-based approach accounts best for consumers' perceptions of variety. Attribute-based measures significantly add to the prediction of consumers' perceptions of variety, over and above the product-based measures, while the reverse is not the case. In the final section we discuss how attribute-based measures can be used in assortment management, e.g. when assortments of different size are compared, when the impact of adding or dropping products on assortment variety is to be determined, and when diagnostic information about assortment variety is important.

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[3] This chapter is an extended version of Van Herpen and Pieters (2000a). A shortened version has been presented at the 29th EMAC conference, 23-26 May 2000, in Rotterdam, The Netherlands. We would like to express our thanks to Brian Wansink, both for his insightful comments on this research, and for providing us with the stimuli from the Hoch, Bradlow and Wansink (1999) study.

2.1 Introduction

Assortment variety is a key determinant of consumers' store choice, and plays an important role in assortment and category management (Elton & Mercer 1969; Kahn & Lehmann 1991). With today's increasing number of product offerings, it is only gaining in importance (Kahn & McAlister 1997). In a product category such as toothpaste, stores may offer as many as 100 to 150 different variants (Fader & Hardie 1996). In light of this development, there is a growing need for assortment and variety management in the retailing sector (Raftery 1993). An industry expert in the hardware category voiced this as: "Variety, assortment, and product quality are key concerns of the hardware consumer. Catering to those concerns can help a retailer maximize category sales and profits and develop hardware's potential as a destination category" (Progressive Grocer, 2000a).

From a consumer perspective, assortment variety influences factors such as the likelihood that the store has a desired product, flexibility of decision making, and potential confusion and difficulty in the choice task. The likelihood that a store carries the product that a consumer wants increases with the variety that is offered (Kahn 1998). In addition there are many situations where consumers do not have well-developed preferences and the choice process is constructive (Bettman, Luce & Payne 1998). In such cases, stores with a highly varied assortment offer more opportunity for consumers to discover their preferences and find a suitable product. Increased assortment variety can also decrease the cost of searching, by minimizing the number of store visits needed to find a desirable product (Ratchford 1982). When a store offers much variety, more information can be gathered in a single store visit. Of course, the effects of increasing variety will not all be positive, and at some point increasing variety further will lead to confusion and choice difficulty for the consumer (Kahn & McAlister 1997).

To support retailers in managing their assortments, insight is needed into the influence of assortment composition on consumers' variety perceptions, and appropriate measures of assortment variety are required. Recently, Hoch, Bradlow and Wansink (1999; hereafter HBW) proposed a general model of assortment variety, based on the dissimilarity between products in an assortment. At the heart of the model is a product-based conception of variety. This chapter aims to extend the HBW model by advocating an attribute-based conception of variety. It describes attribute-based measures of variety and examines the sensitivity of product-based and attribute-based measures to the size of an assortment, which is relevant when comparing assortments of different sizes. In addition, it examines the ability of product-based and attribute-based measures to predict consumers' perceptions of assortment variety.

Our objectives are to further explicate the concept of variety, to examine and compare measures of assortment variety, and to determine how well they capture consumers' perceptions of variety. To this end, we draw on the literature concerning product similarity and variety seeking behavior by consumers, the literature concerning concentration and inequality in economics, and the literature concerning statistical association. These literatures provide established and widely used measures of similarity, concentration, and association, which can be potentially useful in the context of assortment variety.

First, product-based and attribute-based measurement approaches to assortment variety are introduced. Next, the pattern of correlations between measures is examined in study 1, using synthetic data. In study 2, the ability of product- and attribute-based measures to predict consumers' variety perceptions is examined. The final section offers suggestions for the applications of the variety measures in assortment management and for future research.

2.2 Two approaches to assess assortment variety

According to the Oxford dictionary, variety is "the quality or state of being different or diverse; the absence of uniformity, sameness, or monotony" (Pearsall 1998). It proceeds that "a variety of" is "a number or range of things of the same general class that are different or distinct in character or quality". The variety of an assortment then refers to the degree of differentiation between the individual products.

There are differences in the way assortment variety is conceptualized by diverse scholars. Broniarczyk, Hoyer and McAlister (1998) focus on consumer heuristics for variety, such as the availability of the favorite brand, and the space devoted to the category. When involvement with a product category is low, consumers tend to use these heuristics rather than forming a detailed variety perception. In other situations, consumers will form a more detailed impression of assortment variety. These are the situations that we focus on here. Even when heuristic processing is not assumed, diverse measures of assortment variety have been proposed. Some researchers argue that the number of different products in an assortment captures assortment variety (Chiang & Wilcox 1997; Hoch & Banerji 1993). This measure has been criticized on the ground that it does not incorporate product dissimilarities, which are important for a good understanding of the variety concept (e.g. Hoch, Bradlow & Wansink 1999; Kahn & Lehmann 1991; Pessemier 1985). In retailing handbooks (e.g. Levy & Weitz 1998), the breadth or depth of an assortment are often taken as constituents of variety. This relates assortment variety to the number of different product groups and the number of product variants in each group. Although breath and depth offer

more detail than the sheer number of products in an assortment, they also do not take the degree of similarity between the individual products into consideration.

HBW go beyond previous work by developing and testing a general mathematical model of assortment variety, which focuses on the dissimilarity between products. The model improves existing knowledge of the variety concept and measurement, and provides new insights into the process of variety perception. Being based on the dissimilarity between products in an assortment, the HBW model involves a product-based approach to variety measurement. Since products are bundles of attributes, the variety of an assortment of products can be conceptualized from a product-based perspective (products-across-attributes) and from an attribute-based perspective (attributes-across-products) of the assortment (Bettman, Luce & Payne 1998). To appreciate the distinction, consider the assortment of neckties in Table 2.1. Three different neckties are provided, based on their color, material, and pattern.

Table 2.1 Composition of a hypothetical product assortment of neckties

Attributes	Necktie 1	Necktie 2	Necktie 3
Color	Blue	Blue	Green
Material	Cotton	Cotton	Silk
Pattern	Stripes	Dots	Dots

A product-based approach examines and compares the *products* that are offered, product-by-product. Based on the number of different attributes, neckties 1 and 2 are more similar to each other than neckties 2 and 3 are. The degree of variety in the assortment is reflected in this dissimilarity between products: if all products differ greatly from each other, variety is high. Although the approach uses information provided by the attributes, key is the degree to which products are dissimilar from each other.

An attribute-based approach examines and compares the *attributes* that are offered, by focusing on the marginal and joint distributions of the attributes themselves. We believe that an attribute-based approach may complement the product-based approach and offer additional insights. Previous research has indicated the importance of attributes in assortment evaluations. When confronted with large and varied assortments, consumers tend to emphasize attribute information (Bettman, Luce & Payne 1998), to find information on attribute levels more helpful than information on individual products (Huffman & Kahn 1998), and to respond to changes in the availability of attribute levels (Boatwright & Nunes 2001). Hence, an attribute-based approach may be more consistent with the process of assortment evaluation.

Product- and attribute-based approaches differ conceptually. Note e.g. that not all entries in Table 2.1 can be compared. For instance, the color 'blue' can not be compared to the material 'cotton'. This implies that product-based measures, which compare products with each other by their attributes, can not be applied at the attribute level, and vice versa. The question is if product-based and attribute-based conceptualizations of assortment variety yield the same results, and, if they diverge, which approach captures consumers' perceptions of assortment variety best.

Following previous research (e.g. Fader & Hardie 1996; Garner 1978; Hoch, Bradlow & Wansink 1999), the variety measures are applied to categorical attributes or features. Yet, attributes can also be continuous (Myers & Shocker 1981). Extensions of the approach to continuous attributes are relatively straightforward, and variety measures that assume continuous attributes will be briefly mentioned. These measures are based on well-known statistical properties (such as standard deviation, correlation), and will mainly serve to illustrate the different types of measures that can be applied.

2.2.1 Product-based approach to assortment variety

First, this chapter focuses on product-based measures of variety. The emphasis lies on the variety model proposed by HBW (1999). HBW show that the product-based measure captures a significant portion of the variance in consumers' perceptions of variety. While other product-based measures of assortment variety are feasible, we focus on this one in the sequel because of its proven validity. The general product-based model of assortment variety provided by HBW is:

$$V_k(A) = \alpha_k + \sum_u \psi_k(u) n_u + \beta_k X_{kA}, \qquad (1)$$

where $V_k(A)$ is the perceived variety of assortment A to person k. Perceived assortment variety is based on a person-specific intercept (α_k), reflecting baseline variety perceptions, a generalized (psychological) distance function (ψ_k), the possible distinction pattern between two products (u), the number of product pairs (n_u) with a particular distinction pattern, a vector of covariate slopes (β_k), and a set of covariates for assortment A (X_{kA}). The covariates can account for aspects of the task and assortment, such as presentation format (e.g. organized versus random display), and will not be considered in the empirical illustrations that follow.

Product (dis)similarity

The model specifies perceived assortment variety as a function of the dissimilarity between product pairs, and consequently assortment variety depends on the number of product pairs with specific distinction patterns. HBW use the Hamming measure (HM) as a measure of

product dissimilarity to operationalize the distance function ψ. This measure is based on a count of the number of different attributes between two products. It ranges between 0 (when the two products are identical) and the number of attributes M (when the two products differ on all attributes), and is given by:

$$HM_{ij} = \sum_{m=1}^{M} d_{ijm} \qquad (2)$$

where: d_{ijm} = score for attribute m; equals 1 when attribute levels differ for products i and j, and 0 when the attribute levels for products i and j are identical
M = total number of attributes

The Hamming measure can be determined for each pair of products in an assortment. For instance, products 1 and 2 in the assortment of Table 2.1 have a Hamming measure of 1 (they differ on 1 attribute). A distinction pattern is given by one of the possible outcomes of the Hamming measure, e.g. product pair (1-2) in Table 2.1 has a HM of 1, while both product pairs (1-3) and (2-3) have a HM of 2. In other words, n_1 equals the number of product pairs that differ on 1 attribute, which is 1 in the table, n_2 the number of product pairs that differ on 2 attributes, which is 2 here, and so on.

In order for our results to be consistent and comparable with previous research, especially with HBW, we focus on categorical attributes. For a given number of attributes M, the Hamming measure is perfectly negatively correlated with the often-used similarity coefficient for categorical data, that computes the relative number of identical attribute levels (Everitt 1993; Gower 1971). This type of measure has been applied in the marketing literature, for instance to examine similarity judgments (Bijmolt, Wedel, Pieters & DeSarbo 1998). Related (dis)similarity measures for both categorical and continuous attributes can be found in overviews of cluster analysis and other areas (e.g. Everitt 1993; Sarker 1996; Seifoddini 1990). For continuous attributes, the Euclidean distance (ED) is probably the most well known measure of product dissimilarity (Cronbach & Gleser 1953; Everitt & Rabe-Hesketh 1997; Wedel & Kamakura 1998).

Distance function

When the distance function ψ is unrestricted, a model with fitted regression weights can be estimated, based on the number of product pairs in the assortment with distinction patterns of 1 to U. Alternatively, several *a priori* specifications for ψ can be considered as well. The best fitting *a priori* model for the majority of subjects in HBW's study has diminishing returns to multiple distinctions, where $\psi(u) = u^{1/2}$. This means that a product pair differing on u attributes, i.e. with a Hamming measure of u, is converted into a distance of $\sqrt{u}$. Conversion of dissimilarities into distances is common in other applications as well (Gower and Ross 1969), and this particular conversion has been advocated (Gower 1971).

Integration of product (dis)similarities

The (dis)similarity measures compare two products to each other. An assortment consists of N products, leading to $N \cdot (N-1)/2$ product pair (dis)similarities that need to be integrated into an overall variety measure. The general model (1) applies a summed measure. Alternatively, product dissimilarities could also be integrated into a single measure by applying a mean (Tversky 1977). Variety in an assortment can be conceptualized as the summed dissimilarities between the products in the assortment, or as the average dissimilarity. Average dissimilarity has been used in the context of variety seeking by Gijsbrechts, Campo and Nisol (2000).

Model (1) can be restricted to obtain more specific models. For the empirical illustrations in the sequel, the model that fitted best for most of the respondents in HBW's study is selected. It assumes equal importance of attributes, attribute levels, and spatial positions. We will extend on the general model by also considering integration of product dissimilarities by averaging.

2.2.2 Attribute-based approach to assortment variety

An attribute-based approach to variety focuses on the patterns of attribute levels in an assortment. Previous research (Bradlow & Rao 2000; Farquhar & Rao 1976; Harlam & Lodish 1995) has applied this approach to model preferences for subsets of products from a larger assortment, using variety as a predictor. Conversely, we will show the implications of an attribute-based approach for the variety of an assortment as a whole. We argue that an assortment is varied to the extent that the levels of the attributes are highly dispersed, and the dissociation between the attributes is high. We propose the following basic attribute-based model:

$$V_k(A) = \alpha_k + \beta_1 \sum_{m=1}^{M} f\left(n_1,...,n_{L_m}\right) + \beta_2 \sum_{m_1<m_2}^{M} f\left(n_{11},...,n_{L_{m_1}L_{m_2}}\right), \tag{3}$$

where m is the number of attributes (1,…, M) with attribute levels l (1,…, L_m); $n_1,...,n_{L_m}$ are marginal frequencies of attribute levels 1 to L_m for attribute m, and $n_{11},...,n_{L_{m_1}L_{m_2}}$ are joint frequencies of attribute levels for each pair of attributes (m_1, m_2), and other symbols are the same as in equation (1).

The attribute-based model specifies perceived assortment variety as a function of a person-specific intercept, the dispersion of attribute levels (marginal frequencies) and the dissociation between all unique pairs of attributes (joint frequencies). To illustrate this, consider the cross-tabulation of the attributes color and material from the assortment in Table 2.1:

		Attribute m_2: material	
		Cotton ($n_1 = 2$)	Silk ($n_2 = 1$)
Attribute m_1: color	Blue ($n_1 = 2$)	$n_{11} = 2$	$n_{12} = 0$
	Green ($n_2 = 1$)	$n_{21} = 0$	$n_{22} = 1$

An assortment is varied to the extent that the attribute levels are dispersed. In the example two of the shirts are blue and one is green. This assortment is more varied than an assortment with only blue shirts. An assortment is also more varied to the extent that the association between each pair of attributes is lower (i.e., the dissociation is higher). In the example, all cotton shirts are blue and all silk shirts are green. This assortment is less varied than one that contains all four possible combinations of the attribute levels.

Specific measures of attribute dispersion and dissociation are needed to operationalize the model.

Attribute dispersion

Measures of concentration as used in industrial economics are inverse measures of attribute dispersion. The more concentrated attributes are on certain levels, the less the attributes are dispersed. Two often-used concentration measures are the *Hirschman-Herfindahl index* (*HH-index*) and *Entropy* (e.g. Deutsch & Silber 1995; Jacquemin & Berry 1979; Theil & Finke 1983; Vanlommel, De Brabander & Liebaers 1977; Waterson 1984). Both measure the marginal distribution of attribute levels, and they are given by:

$$HH_m = -\sum_{l=1}^{L} (p_l)^2 \quad \text{and} \quad Entropy_m = \sum_{l=1}^{L} (-p_l \ln(p_l)) \tag{4}$$

where: p_l = relative number of products with attribute level l for attribute m
L = *number of different attribute levels for attribute* m

Both measures have been used in a context of variety seeking over time, and are reviewed by Van Trijp and Steenkamp (1990; see also Van Trijp 1995). In variety seeking literature, the measures assess dispersion among different brands or types of products, ignoring the degree of (dis)similarity between these products. Instead, we propose to use concentration measures at the *attribute* level, in line with Pessemier (1985), as this uses the attribute level information that is present.

The measures decrease when the number of products increases in one of the groups. Theil (1967) reasons that this is a desirable feature, and the same reasoning also applies to assortments: an assortment with one red sweater and one blue sweater can be considered more dispersed than an assortment with one red sweater and ten blue sweaters. The *HH-index* has its maximum level of $-1/M$ when the products are equally divided over the

attribute levels, and its minimum of -1 when only one attribute level is present. *Entropy* increases with increasing attribute dispersion, and ranges between 0 and a maximum value of $-\sum_{l=1}^{L}\left(\frac{1}{L^*}\right)\ln\left(\frac{1}{L^*}\right)$, where: L^* = the lesser of L and N, with L being the number of attribute levels, and N being the number of products.[4] The dispersion can be determined for each product attribute separately. For instance, the assortment in Table 2.1 contains one green product and two blue products. Therefore, the dispersion across colors is given by an *Entropy* of: $-1/3(\ln 1/3) - 2/3(\ln 2/3) = 0.64$.

While both the *HH-index* and *Entropy* can be used, *Entropy* has been more prevalent as a measure of variety seeking (e.g. Mitchell, Kahn & Knasko 1995). The empirical part of this chapter will therefore report results for *Entropy*. For a review of the similarities and differences between the two measures, we refer to Jacquemin and Berry (1979). The main difference between the two measures is that, compared to the *HH-index*, *Entropy* is slightly more sensitive to small proportions, and less to large proportions. So adding a product with a scarce attribute level will affect *Entropy* more than the *HH-index*. One may argue that the dispersion over the most common attribute levels in the assortment is more important for variety, which favors the *HH-index*. Alternatively, one may argue that the presence of products with less common attribute levels in an assortment is quite informative, which favors *Entropy*. Therefore, the choice of a dispersion measure depends on the specific task at hand and on the goal of the researcher. In general, we expect that the inclusion of any one measure of attribute dispersion is likely to improve our understanding of variety perception, and consider the choice for a particular dispersion measure to be less crucial.

For continuous attributes, variance based measures could be used (Bradlow & Rao 2000; McAlister & Pessemier 1982). The coefficient of variation, which divides the standard deviation by the mean, is a scale invariant form that can be used to compare attributes (Allison 1978).

Dissociation between attributes

HBW indicate that permutations of attribute levels can affect variety perceptions. As the dispersion across attribute levels does not respond to permutations of attribute levels, another measure is needed to account for these links between attributes. Dissociation measures directly tap into the issue of attribute permutations, by considering the joint frequencies of the attributes. These joint frequencies provide additional information on

[4] In most practical applications, the number of attribute levels will be smaller than the number of products. *Relative Entropy* (*Entropy* divided by $Entropy_{max}$) is an alternative measure of attribute dispersion (Vanlommel, De Brabander & Liebaers 1977). In the two data sets in this chapter, $Entropy_{max}$ is constant, and results for *Entropy* and *Relative Entropy* are identical.

assortment composition, regarding the dependency relations between product attributes (Pessemier 1980).

Previous research has indicated that consumers can be sensitive to systematic links between attributes, and may have intuitive beliefs of links between for instance price and quality / warranty (Broniarczyk & Alba 1994; Johnson & Levin 1985). *Lambda* is a general measure of the association between nominal variables, with a simple probabilistic interpretation, which operates on the bivariate table of two attributes (Goodman & Kruskal 1954). It focuses on the mutual predictability between two variables, and results from dividing the amount of reduction in error in both variables by the amount of original error in these variables. The *Lambda* for attributes m_1 and m_2 is given in equation (5). To facilitate interpretation, assume attribute levels $m_1 = 1,..., L$ and $m_2 = 1,..., C$.

$$Lambda_{m_1 m_2} = \frac{\sum_{l=1}^{L} \max_c(n_{lc}) + \sum_{c=1}^{C} \max_l(n_{lc}) - \max_c(n_{\cdot c}) - \max_l(n_{l\cdot})}{2N - \max_c(n_{\cdot c}) - \max_l(n_{l\cdot})}, \quad (5)$$

where n_{lc} is the number of products with attribute levels l and c for attributes m_1 and m_2, $n_{l\cdot}$ is the number of products with attribute level l for attribute m_1 (marginal count), $n_{\cdot c}$ is the number of products with attribute level c for attribute m_2 (marginal count), and N is the number of products in the assortment. *Lambda* lies between 0 (no association) and 1 (perfect association). In the sample assortment *Lambda* is 1.0. In the sequel, we use (1 – *Lambda*) as a measure of dissociation, which increases when variety increases. The assortment of Table 2.1 contains 2 blue cotton neckties, 0 green cotton neckties, 0 blue silk neckties, and 1 green silk necktie. Therefore, the dissociation between color and material as given by (1 – *Lambda*) is $1-((2+1)+(2+1)-2-2)/(2*3-2-2)=0$. Color and material have no predictive dissociation.

Alternative association measures have been proposed (overviews are given by e.g. Bakeman, McArthur and Quera 1996; Reynolds 1984), but *Lambda* is frequently preferred for its interpretability (Bishop, Fienberg & Holland 1975; Leach 1979). Attribute dissociation measures the link between two attributes, but links can also exist at higher levels, between combinations of attributes. This leads to more complex, but potentially insightful, tables of attribute combinations (Pessemier 1980). *Lambda* can be applied to these combinations of attributes (e.g. how a color/pattern combination is linked to material), but we focus on the bivariate case for convenience here.

For continuous attributes, a scale invariant version of the association between two attributes is given by the correlation coefficient, which is the covariance between two attributes divided by the variances of these attributes.

Integration of attribute-based measures

Attribute-based measures need to be integrated across the attributes to obtain a measure at the assortment level. *Entropy* can be summed or averaged over the attributes, and (1 – *Lambda*) can be summed or averaged over the attribute pairs. In most practical implications, assortments of comparable products will be examined, and the number of attributes will be constant. Hence, using either the sum or the mean does not change the results. We will consider averaged attribute-based measures for convenience.

Product- and attribute-based measures should be correlated as both are based on the same information. To examine the extent to which they are correlated, and how well they capture consumers' perceptions of assortment variety, two studies are performed. Study 1 examines correlations between the variety measures in a well-behaved environment, using synthetic data. Study 2 is a consumer experiment examining the predictive validity of the measures with respect to perceptions of variety.

2.3 Study 1: Relationship between variety measures using synthetic data

Correlations between the product-based and attribute-based measures were examines across a large number of assortments (synthetic data). The fitted regression weights model of HBW will be used in the consumer data set, where a dependent variable is available to estimate the weights. Here, we use HBW's perferred a-priori model $\psi(u) = u^{1/2}$, as well as the classic Hamming measure. We investigate both the sum and average integration rule, resulting in: (1) the summed Hamming measures (*SumHM*), (2) the average Hamming measure (*MeanHM*), (3) the sum of the square roots of the Hamming measures (*SumSRHM*), and (4) the average of the square roots of the Hamming measures (*MeanSRHM*). In addition to the four product-based measures, we consider average *Entropy* and average (1 – *Lambda*) as attribute-based measures. Finally, we consider the number of products in the assortment (*Size*), which has been used as a global indication of assortment variety (Chiang & Wilcox 1997; Hoch & Banerji 1993), to identify the extent to which product- and attribute-based measures capture more information than is contained in the sheer size of the assortment.

The attribute-based approach focuses on specific components of variety (attribute dispersion and attribute dissociation). In the area of consumers' variety seeking over time, the use of multiple measures for different components is common (e.g. Handelsman 1987; Menon & Kahn 1995; Gijsbrechts, Campo & Nisol 2000; Pessemier & Handelsman 1984). Meulenberg (1989) even argues that variety may be a conceptually non-measurable multi-dimensional construct, and that different measures for its components need to be used.

When variety has multiple components, *SumSRHM*, the overall measure of variety, should correlate with the variety components (attribute dispersion and dissociation), and with assortment size, but only to a moderate extent. In addition, the intercorrelation of the variety components should be relatively low to support that they are separate components. To the extent that the variety measures capture more information than is contained in assortment size, their correlation with the latter should be modest only.

Synthetic assortments were constructed that consisted of products with three attributes. Each attribute could have four different levels, which in total led to 64 different products. With these products, 64^N possible assortments of size N can be constructed. Assortments with 8, 12 or 16 products were considered to allow sufficient size variation. A random sample of 3000 product assortments was drawn from the population of $64^8 + 64^{12} + 64^{16} = 7.9 \cdot 10^{28}$ possible assortments, allowing for duplication of products. Of these assortments, 1000 consisted of 8 products, 1000 of 12 products, and 1000 of 16 products.

2.3.1 Findings

Table 2.2 presents the correlations between the measures, and shows distinct differences in the size of the correlations. The product-based measures that employ an average as integration rule have a low correlation with the other variety measures. They correlate only little with the summed product-based measures (between .04 and .07) and not at all with assortment size. In addition, the averaged product-based measures correlate negatively with (1 – *Lambda*), which measures the dissociation between attributes. Since attribute dissociation is a component of variety, such a negative correlation is unwanted.

Table 2.2 Correlations between the variety measures in study 1

	MeanHM	*MeanSRHM*	*SumHM*	*SumSRHM*	*Entropy*	(1 – *Lambda*)
MeanSRHM	.97					
SumHM	.07	.06				
SumSRHM	.04	.04	1.00			
Entropy	.79	.77	.59	.57		
(1 – *Lambda*)	-.28	-.10	.45	.47	.06	
Size	.00 (n.s.)	.00 (n.s.)	.99	.99	.55	.48

n=3000; correlations higher than .06 are significant at $p < .001$

The summed product-based measures have a moderately high correlation with the attribute-based measures (between .45 and .59), but they have a near perfect correlation with assortment size (.99), which is undesirable. It suggests modest unique contribution of

the product-based measures over and above the assortment size[5]. The high correlation between the summed product-dissimilarities and assortment size is due to the fact that adding one additional product to an assortment of N products leads to the addition of N product pairs in the summed measure. Especially when assortment size is large, this effect may dominate changes in assortment composition. Using *averaged* product-based measures instead does not alleviate this, considering the problems associated with these measures.[6]

Table 2.2 indicates that the two attribute-based measures, *Entropy* and (1 – *Lambda*) have a low intercorrelation (.06), which suggests that they tap different components of assortment variety. Correlations with assortment size are substantial (.55 and .48), but much lower than between the summed product-based measures and size. The findings that the two attribute-based measures correlate moderately, and are less correlated with assortment size than the product-based measures, are reassuring. They suggest that the attribute-based measures capture different components of assortment variety. But how well do the measures capture consumers' perceptions of variety?

2.4 Study 2: Consumers' perception of assortment variety

A consumer study was conducted to assess the predictive validity of product-based and attribute-based measures for consumers' perceptions of assortment variety.

2.4.1 Method

Participants and design. Participants were 62 undergraduate students from a university in the Netherlands, who each evaluated twelve product assortments. The setup of the assortments was a 2 (assortment size) x 2 (dispersion level) x 3 (dissociation level) within-subjects design, to ensure that the assortments differed sufficiently.

Stimuli. To facilitate comparison with the results of HBW, the same stimuli were used.[7] Using non-existing products ensures that participants of the study are not influenced

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[5] The near perfect correlation between the product-based measures and assortment size is not due to the relatively large steps in which assortment size was increased in the data set. Follow-up analyses with assortments differing less in size (8, 9 and 10 products) revealed a similarly high correlation between *SumSRHM* and *Size* of .98.

[6] Table 4 shows a negative correlation between averaged product-based measures and the measure for dissociation between attributes. In addition, averaged product-based measures can decrease when products are added to an assortment, which is undesirable. For instance, consider an assortment with a blue cotton shirt and a green silk shirt, giving an average Hamming measure of 2. Adding a blue silk shirt would increase assortment variety, but decrease the average Hamming measure to 1.33.

[7] We thank the authors for access to the stimuli. Two of the original product names were slightly changed, as one refers to a meaningful object and the other is a slang word in Dutch.

by characteristics of the product category, or by their prior preferences, and make variety judgments based on all the products in an assortment. The products were characterized by three attributes, each with four levels:

- color (red, blue, yellow, green)
- shape (square, rectangle, circle, triangle)
- name (CAM, NUX, ZOL, VIK)

In total, 64 different products can be constructed from these attributes. Each assortment contained 8 or 16 products arrayed in two or four rows, each with four products. The specific attribute levels (e.g. whether the first product is red, blue, yellow or green) were randomized. The products were presented in an organized manner, to simulate a store shelf. Products were grouped by color and within color by form. Presentation format was not manipulated. Since similar products and attributes were in close proximity, both product-based and attribute-based processing strategies should be relatively easy to use.

Product assortments. Table 2.3 summarizes the product assortments and variety measures, and examples of the computer screen are provided in Appendix A at the end of this dissertation. Assortments consisted of either 8 or 16 products. Attributes were either equally dispersed (all levels occurred in equal proportions), or two of the levels dominated the other two (in proportion 3 to 1). When attribute dissociation was absent, the assortment contained replicas. Attribute dissociation was manipulated in three levels: (1) high dissociation, (2) low dissociation, which introduced replicas, and (3) partial dissociation, in which all but one assortment (number 12) had no replicas. In the third case, color and form had zero dissociation, while brand name was dissociated from color and form.

Procedure. The study was administered on personal computers using the program Authorware (Macromedia 1997). Instructions were similar to the HBW study. Participants were told that the purpose of the study was to investigate variety perceptions. The instruction mentioned a visit to a number (not specified) of different stores, and asked participants to answer questions about assortments of an imaginary product called 'jinko'. The instruction explained that jinkos are comparable to other product categories, where products can differ on characteristics such as name, taste, size, color, and so on. Next, participants were shown all possible types of jinkos (64), which appeared one after the other on the computer screen for 2 seconds each, as in the HBW study.

After training, participants were exposed to the assortments of jinkos in random order, and were asked the following questions (each with a ten point scale, with endpoints labeled 'not at all' and 'very much'):

- Does this assortment of jinkos offer a lot of variety?
- Does this store offer a dull assortment of jinkos?
- Does this store offer a diverse assortment of jinkos?

Table 2.3 Product assortments, variety measures and perception in study 2

Assortment number	Differences between product assortments				Mean variety perception	Measures of assortment variety [1]						
	Number of products	Number of different products	Attribute dispersion	Attribute dissociation		*Size*	*Sum SRHM*	n_1	n_2	n_3	*Entropy*	(1-*Lambda*)
1	8	4	1:1:1:1	All low	3.85	8	41.57	0	0	24	1.39	0.00
2	8	8	1:1:1:1	All high	7.18	8	44.68	0	12	16	1.39	0.67
3	8	4	1:1:3:3	All low	3.01	8	38.11	0	0	22	1.26	0.00
4	8	8	1:1:3:3	All high	6.51	8	42.78	0	18	10	1.26	0.80
5	16	4	1:1:1:1	All low	3.51	16	166.28	0	0	96	1.39	0.00
6	16	16	1:1:1:1	All high	8.90	16	184.96	0	72	48	1.39	1.00
7	16	4	1:1:3:3	All low	3.48	16	152.42	0	0	88	1.26	0.00
8	16	16	1:1:3:3	All high	7.46	16	176.18	12	72	36	1.26	1.00
9	8	8	1:1:1:1	1 low, 2 high	6.19	8	44.30	4	4	20	1.39	0.44
10	8	8	1:1:3:3	1 low, 2 high	5.37	8	42.20	6	6	16	1.26	0.53
11	16	16	1:1:1:1	1 low, 2 high	7.81	16	182.65	24	24	72	1.39	0.67
12	16	12	1:1:3:3	1 low, 2 high	6.06	16	171.52	28	28	60	1.26	0.67

[1] n_u provides the number of products with u different attributes, as used in HBW and in equation 2 here

Cronbach's alpha, calculated across participants for each of the assortments, lies between .70 and .89, with an average of .77. Scores across the three items were averaged after reverse coding the negatively worded item. The overall mean across participants and assortments was 5.78. Participants proceeded at a self-determined pace, and product assortments remained visible during the task. Participants took about 20 minutes to complete the total study, and received the equivalent of $5 for their participation.

2.4.2 Findings

The last column of the upper part of Table 2.3 provides the mean variety perception of each assortment. The main question of the study is how well the HBW and attribute-based approach capture consumers' perceptions of assortment variety. Multilevel linear regression models, using MLwiN (Rasbash et al. 2000), were estimated to account for the fact that each participant in the study judged multiple assortments (Bryk & Raudenbush 1992; Goldstein 1995). The models predict variety perceptions from the product- and attribute-based measures and assortment size, while accounting for individual heterogeneity in mean perceived variety, through a random-intercept. The following general regression model was estimated:

$$V_k(A) = \beta_0 + \beta_1 n_{1_A} + \beta_2 n_{2_A} + \beta_3 n_{3_A} + \beta_4 Size_A + \beta_5 Disp_A + \beta_6 Dissoc_A + u_{0k} + e_{0Ak}, \quad (6)$$

where $n_{1_A}, n_{2_A}, n_{3_A}$ are the number of product pairs in assortment A with respectively 1, 2, and 3 different attributes levels, $Size_A$ is the size of assortment A, $Disp_A$ is attribute dispersion of assortment A (i.e., *Entropy*), $Dissoc_A$ is attribute dissociation of assortment A (i.e., *1-Lambda*), β_0 is the overall mean, β_q are regression weights, u_{0k} is the estimated participant-level residual, and e_{0Ak} is the estimated assortment-level residual.

Restricted versions of equation (6) were compared through nested model testing, to determine the incremental contribution of attribute- and product-based measures, and assortment size. We used the general model of HBW with fitted regression weights as the benchmark, since this should provide a stronger test than the *SumSRHM* variety measure, which is based on a predefined distance function ψ. Table 2.4 provides an overview of model estimations.

Table 2.4 Model estimates and comparisons in study 2

Model	Coefficient	*t*-ratio	*p*-value [1]	-2LL	#par.	VAF [2]
0. *constant*	5.777	53.365	<.001	3452.2	3	-
1. *constant*	5.171	33.247	<.001	3068.2	6	43.1
n_1	0.043	5.695	<.001			
n_2	0.052	18.755	<.001			
n_3	-0.016	6.667	<.001			
2. *constant*	4.499	15.900	<.001	3428.8	4	3.4
size	0.107	4.864	<.001			
3. *constant*	15.908	15.191	<.001	2968.5	7	50.8
n_1	0.139	11.952	<.001			
n_2	0.205	13.686	<.001			
n_3	0.210	9.567	<.001			
size	-1.991	10.360	<.001			
4. *constant*	-7.674	6.914	<.001	2782.9	5	62.5
entropy	8.449	10.155	<.001			
(1 – *Lambda*)	4.756	32.575	<.001			
5. *constant*	-7.869	7.038	<.001	2781.0	6	62.6
size	0.019	1.387	.171			
entropy	8.437	10.154	<.001			
(1 – *lambda)*	4.715	31.749	<.001			
6. *constant*	-8.683	2.314	.024	2778.8	9	62.7
n_1	0.004	0.221	.826			
n_2	-0.008	0.316	.753			
n_3	-0.006	0.159	.874			
size	0.074	0.230	.819			
entropy	8.774	5.418	<.001			
(1 – *lambda*)	4.893	14.262	<.001			

Model comparisons		L^2	df.	*p*-value
1 – 3	adding size to product-based measures	99.7	1	<.001
2 – 3	adding product-based measures to size	460.3	3	<.001
2 – 5	adding attribute-based measures to size	647.8	1	<.001
4 – 5	adding size to attribute-based measures	1.9	1	.168
3 – 6	adding attribute-based measures to product-based measures & size	189.7	2	<.001
4 – 6	adding product-based measures & size to attribute-based measures	4.1	4	.393

[1] *p*-values are based on approximate standard errors provided by MlwiN
[2] VAF = variance accounted for (assortment level)

Product-based model. Model 1 in Table 2.4 is the fitted regression weights model of HBW, and it accounts for a sizable 43.1 % of the variance in perceived assortment variety. The negative coefficient for n_3 is unexpected, since it differs from the (positive) coefficients found by HBW. The explanation lies in the impact of assortment size in the current dataset. If we consider only assortments of equal sizes, the coefficients become 0.49, 0.73 and 0.76 (n_1, n_2, and n_3) for assortments with 8 products, and 0.13, 0.18 and 0.19 for assortments with 16 products, which matches the findings of HBW. When assortment size increases, the number of product pairs increases even more rapidly. This will affect the product-based measures. By including *Size* (model 3) we adjust for the inflation of the measures due to differences in assortment size, hence its negative coefficient of –1.99.[8]

Assortment size model. Model 2 contains only *Size* as a predictor. By itself, *Size* accounts for only 3.4 percent of the total variance in perceived variety. Assortment size does not appear to be a good overall proxy for assortment variety in this study.

Product-based and assortment size model. Model 3 contains both the product-based measures and assortment size. Despite the large correlation between the two in the previous synthetic data-set, the results show that empirically weighted HBW measures capture a significant portion of variance in variety perceptions over and above the variance accounted for by assortment size. Each of the three product-based measures, n_1 to n_3, is significant ($p < .001$), and hence the difference between models 3 and 2 is significant as well ($p < .001$).

Attribute-based model. Model 4 is the attribute-based model of assortment variety. The results are as we expected: both increases in attribute dispersion (coefficient = 8.44; *t*-ratio = 10.16) and dissociation (coefficient = 4.72; *t*-ratio = 32.58) lead to higher perceived variety. Model 4 is also performs best in predicting consumers' perceptions of assortment variety in this study. The model comparisons in the lower part of Table 2.4 show that the attribute-based variety model can not be significantly improved by adding the product-based measures and assortment size (comparison of models 4 and 6: $L^2 = 4.1$, $df = 4$, $p = .393$). However, the reverse is not the case: the attribute-based measures improve the prediction of variety perceptions over and above the product-based measures and assortment size (model 3 versus 6: $L^2 = 189.7$, $df = 2$, $p < .001$).

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[8] Dividing each of the measures n_1 to n_3 by *Size* does not improve their predictive power. A model of n_1/*size*, n_2/*size*, and n_3/*size* (-2 LL = 3006.2; #par = 6) still has a negative coefficient for the latter variable, and adding *Size* significantly improves it ($L^2 = 134.3$, $p < .005$). Other results are similar to Table 2.4 as well.

2.5 Conclusion

The findings illustrate the contribution of an attribute-based conceptualization and measurement of assortment variety. Compared to product-based measures, our attribute-based measures correlated less with assortment size than product-based measures did, and they were sufficient to predict perceived assortment variety.

The attribute- and product-based approaches reflect basic conceptualizations of assortment variety. These conceptualizations assume substantively different perception processes: a consumer comparing products one-by-one versus a consumer examining attributes across products in the assortment. Since the perception process itself was not examined, we can not be sure that consumers formed their variety perceptions through the attributes. However, it predicted consumers' variety perceptions better even for the relatively small assortments of study 2. Moreover, the attribute-based approach is consistent with evidence that for large assortments, consumers emphasize and prefer attribute information (Huffman & Kahn 1998). The literature on information search shows that consumers emphasize attribute information when they are exposed to product sets through information boards (Bettman, Luce & Payne 1998). Also intuitively, it is not unlikely that consumers focus on the attributes when they form a variety judgment. Imagine walking into a clothing store to discover the latest fashion. One of the first things that may stand out is the color of the clothes, and maybe the cut or material: looking around one easily forms a perception of variety based on these attributes, and perhaps not by comparing every single clothing item with the other items. Comparing each of the available products may be beyond the cognitive capacity of most consumers.

Implications for retailers and manufacturers. Our findings show the usefulness to retail management of the attribute-based approach. It identifies distinct components of variety, and has a systematic empirical relationship with the variety perceptions of consumers. A detailed analysis of attribute dispersion and dissociation can offer directions for category management. The attribute-based approach is less prone to assign a systematically higher variety to larger assortments, which may lead to different managerial decisions than the HBW approach. Retailers seeking to increase the variety offered by their product assortment will find that an overall measure, such as *SumSRHM*, increases most when products are added to the assortment. By using attribute-based measures of variety components, alternative routes to increase assortment variety may open up. The attribute-based approach allows retailers to examine if the variety in an assortment is low because it has few different attribute levels, or because it does not have diverse combinations of attribute levels. An analysis into why, e.g., low dissociation between product attributes exists, may provide opportunities for introducing combinations of attribute levels that

increase dissociation and thereby increase perceived variety. A more detailed analysis of attributes with low levels of dispersion can point out attribute levels that occur in relatively low numbers.

Despite its limitations, the product-based approach has important merits as well. By carefully examining the pattern of product dissimilarities, it offers opportunities to find influential products, as HBW show. It is good to note that the attribute-based approach can accomplish this as well for specific attributes. Attributes with a low level of dispersion may require additional attention. Low dispersion may be a sign that specific attribute levels are not well represented in the products contained in the assortment. A particularly low level of dissociation between two specific attributes is an indication that some of the possible combinations between the attributes are not well represented by the products in the assortment.

Because of their unique strengths, we believe that a combination of product- and attribute-based measures provides retailers superior diagnostic information about their assortment. A product-based approach can identify specific products with a disproportionately high or low influence on assortment variety. Knowing which products drive perceived assortment variety is crucial information for retailers, especially when they want to drop products from their assortment. An attribute-based approach can identify attributes and attribute pairs with a disproportionately high or low influence on perceived assortment variety. It can also identify opportunities in the attribute-space for new products that may increase variety.

Limitations, extensions, and future research. There are several limitations of our research and several points of discussion. First, assortment size and attribute dispersion were only presented to the participants at two different levels, which is not a natural situation. Given the results of the synthetic data study, we do not believe, however, that the limited range explains the superior performance of the attribute-based measures. The analyses of the synthetic data clearly indicated that the product-based approach is sensitive to assortment size. Manipulating assortment size further in the consumer study by including larger assortments would likely strengthen our results, as assortment size would dominate even more. In addition, we conjecture that consumers' perception of large assortments will be based on the attributes, as suggested by information processing research (Stone & Schkade 1991), and we expect that larger differences in assortment size will favor the attribute-based measures even more.

Second, the synthetic data set showed that the attribute-based measures were correlated, albeit not very high. Examining the correlation between variety components may prove an interesting avenue for future research. In some situations, a degree of correlation between components can not be avoided due to statistical properties. More

interestingly, consumers may expect a certain amount of correlation between variety components. Consumer perceptions of assortment size may influence their perceptions of product similarity (Wood, Swain & Wadden 2001), and their perceptions of attribute dispersion and dissociation.

An extension of the model is to capture the influence of individual differences and task factors. In study 2, consumer heterogeneity was accounted for by allowing the constant in the regression equation to vary randomly across participants. Allowing the regression weights for the variety measures to vary randomly or systematically across participants further extends the model. Such slopes-as-outcomes models (Bryk & Raudenbush 1992) can test whether the regression weights for the variety measures are constant across participants and if not, which factors account for systematic differences.

In addition, we did not apply attribute salience weights, although this would be a straightforward extension that our attribute-based approach can easily accommodate. This extension helps retailers to make decisions about assortment ranges, such as whether to vary color, fabric, style, or a combination to increase perceived assortment variety. Since the HBW study points out that a simple global model (without differential attribute salience) has a good fit, we refrained from using attribute weights for clarity reasons.

The attribute-based model could also be extended to account for dissociation between 3 to *m* attributes, instead of between pairs of attributes only. This enables retailers to gain more insight into the composition of their assortment and to make more fine-grained adaptations to it. Processing these higher-order dissociations may become progressively taxing to consumers, and only future research can establish when which consumers are sensitive to them.

Although we closely followed the procedures in previous research, an additional point of discussion is our use of laboratory settings and hypothetical products in a relatively high involvement context. Follow-up research in real market situations is desirable. Examining evaluations of more complex assortments, with more attributes and attribute levels, or with more complex links between multiple attributes, could provide interesting avenues for future research. The perception of variety and assortment evaluation in situations where motivation and/or ability to process all assortment information is low is needed. In real life consumers have prior knowledge, product preferences, and experience with different store formats. All these could potentially influence the evaluation process, but were not considered in this research. By using hypothetical products, we focus more exclusively on assortment variety. The current measures of assortment variety are probably best suited for products where consumers do not have clear prior product preferences. If clear product preferences exist, consumers may focus more on the availability of the preferred product or on shelf space, and less on assortment variety (Broniarczyk, Hoyer & McAlister 1998).

Future research could identify when attribute- and product-based measures are more predictive of consumers' variety perceptions. One set of potential moderators concerns the level of information processing, e.g., involvement, expertise and time pressure. The level of information processing may determine which variety component is more predictive. Perhaps under low levels of information processing attribute dispersion is more predictive than attribute dissociation, since the former is typically easier to determine than the latter. The level of information processing might also determine if attribute- or product-based processing is more likely. Perhaps under high levels of information processing, product-based measures are more predictive than attribute-based measures. Information display board studies on brand choice suggest this, but only future research can determine whether the findings generalize to variety perceptions (Bettman, Luce & Payne 1998).

More attention to the effects of assortment appears fruitful as well. Consumers in the current study evaluated an organized display of the assortment, as is common in retailing. Stores often organize their assortment on attributes such as brand (soups), product form (liquid detergents), size (television sets), or occasion (greeting cards). To the extent that the assortment presentation is hierarchical (brands, flavors within brands, sizes within flavors), some attributes may affect perceptions of variety more than others, and attribute dispersion may dominate attribute dissociation (as the former may be more readily assessable).

In the current study, assortment sizes were small enough to present the complete assortment simultaneously. In practice, assortments may become so large that they are offered sequentially (as in web-based applications) or that consumers move through them sequentially (as in a store aisle). Will consumers use the first products in such sequential presentations to form an initial impression of assortment variety, which is updated by the subsequent products presented? If so, product-based measures more so than attribute-based measures would be predictive of perceived assortment variety.

Another avenue for future research is consumers' preference for specific assortments. One question is, e.g., in which situation consumers prefer assortments with high or low variety. When variety is high, consumers may perceive a higher likelihood that the assortment contains a desired product, but the potential confusion resulting from such an assortment can also increase. The assortment that is preferred may depend on the specific search and purchase goals (e.g. time pressure), and consumer characteristics (e.g. expertise). It seems worthwhile to link the attribute-based conceptualization of variety to consumers' preference for different assortments.

3

Is More Variety Always More Difficult? Consumers' Expectations of Choice Success and Effort in Retail Assortments[9]

The difficulty in life is the choice
George Moore, Bending of the Bough, Act iv
Decisions are easier, you know, when there are no choices left
PV Narasimha Rao, Observer, 1991

Consumers regularly form an impression of assortments, before making an actual choice. For instance, when walking into a store, they form expectations about the likelihood that they will find a desired product and the effort it may take to choose it. Using an accuracy-effort framework, we examine the impact of assortment variety increases on these expectations. Generally, retailers expect that raising the variety of their assortments will increase success probabilities, at the expense of increasing choice effort for consumers. We distinguish several components of assortment variety, i.e. the number of products in the assortment, the number of and dispersion across attribute levels, and the dissociation between attributes. Two studies show that increases in these assortment variety components indeed increase expected success probabilities. However, increases in the number of attribute levels or the dissociation between attributes do not necessarily increase expected choice effort. Implications for retail management are discussed.

[9] Part of this chapter has been presented at the special session "New Insights about Consumers' Perception and Evaluation of Product Assortments", Association for Consumer Research Conference, 29-22 October 2000, Salt Lake City, Utah.

3.1 Introduction

In a shopping mall or shopping street, you can see consumers who walk by the stores, occasionally stopping to look at the window display, and sometimes walking into a store, but disappearing after a quick look around. These consumers assess what a store has to offer, and decide whether they want to shop at that particular store. In part, the decision whether or not to shop there, will be based on the product assortment that is offered. A first inspection of an assortment may send a message to the consumer, such as 'you will find what you want here', or 'it is easy to decide at this store'.

Two key expectations that consumers form of retail assortments are (1) the probability that the store has what they are looking for, and (2) the effort it will take to choose a product from the assortment. Both the size and composition of an assortment can affect these expectations. So far, research has not focused on these types of consumer expectations, although they can have a large impact on store choice. This chapter examines success and effort expectations through the accuracy-effort framework. We investigate the effects of assortment variety on these expectations.

Assortment variety has reached high levels. In a product category such as toothpaste, stores may offer as many as 100 to 150 different variants (Fader & Hardie 1996). Internet has the potential to increase choice options even further (Alba et al. 1997; McDonald 2000). As shelf space restrictions disappear, it becomes possible to offer large assortments through the internet at relatively low additional costs. For instance, JCPenney, a general merchandiser and cataloger in the US, now has "a whopping 200,000 SKUs available online" (Estienny 2000, p.37). Considering the assortments that are available, it seems justified to ask if the variety provided by so many different products does not make it increasingly difficult for the consumer to choose.

In the early forties, supermarkets offered far less products to their customers than the supermarkets nowadays do. Still, Converse and Spencer (1942) describe consumers who complain that products are hard to find, since the supermarkets are "so large and the piles of cans and boxes are so numerous" (p.372). These types of responses are also common now. In their consumer interviews concerning internet shopping, Wood, Swain and Wadden (2001) report several consumer responses regarding assortment size. These range from extremely positive ("The selection was great. If you wanted something they had it", "I felt amazed with all the different products on the Internet. I felt fine that I got what I needed") to extremely negative ("The amount of options were mind bobbling. I felt overwhelmed as I began my search, because of the variety of options. I felt confused at the end, because I didn't know what I wanted to do"). The size and composition of the assortment influence feelings of success likelihood and choice effort.

The contribution of this study is threefold. First, we contribute to the literature on assortment evaluation by examining consumers' assessments of store assortments before they choose a product. Previous research has examined consumers' experiences of accuracy and effort when making a choice (e.g. Klein & Yadav 1989), but not the expectations beforehand. Yet, consumers' expectations of the effort it will take them to choose from an assortment will affect their decision strategy, and the amount of effort they will actually put into the decision process. Our studies indicate that results of previous research, regarding the choice effort encountered by consumers in various choice situations, may not be directly applicable to consumers' expectations of choice effort.

Second, we examine how product similarity affects expected choice effort. Previous research has proposed conflicting effects. When products are more similar to each other, it is more difficult to differentiate products from each other. This increases choice effort. But, when products are more similar to each other, tradeoffs between attribute levels are less large, as well as the consequences of making a wrong choice. This decreases choice effort.

Third, we provide insight into the impact of changes in assortment properties on consumers' evaluations of an assortment. In a recent overview of management literature on assortment planning, Kahn (1999) concluded that this influence is not well understood. This study attempts to uncover the link between assortment properties and subjective assortment evaluations. In addition, it has been generally assumed that increases in assortment variety will lead to increases in success likelihood (Hoch, Bradlow & Wansink 1999), but also to increases in choice effort (Kahn & McAlister 1997). This chapter will indicate possibilities to increase assortment variety while expectations of choice effort remain the same.

The next section presents an accuracy-effort framework for evaluations of product assortments, and integrates literature on retail assortment evaluation into this framework. Section 3 introduces variety components. Following sections construct hypotheses on how variety components affect consumers' expectations of success likelihood (section 4) and choice effort (section 5). Subsequently, two studies test these hypotheses. We discuss implications for retailers who want to provide attractive assortments to consumers, both in terms of expected success likelihood and expected choice effort.

3.2 Accuracy and effort

Frequently, consumers first choose which store to visit, deciding between retail assortments of products, before choosing a specific brand. The choice between specific product forms and brands is made after the consumer has chosen and entered the store. This type of purchase situation, where the choice process is constructive, is quite common (Bettman,

Luce & Payne 1998; Bettman & Zins 1977; Drolet, Simonson & Tversky 2000; Simonson 1999), and many researchers have assumed a hierarchical choice process in which store choice precedes product choice (Fotheringham 1988; Kahn & Lehmann 1991; Shugan 1988; Wrigley & Dunn 1984). For instance, a consumer may want to buy a pair of shoes, and decide in the store which specific pair of shoes (s)he will buy by comparing the shoes that are offered. Notwithstanding that in other buying situations consumers may know exactly which brand and variant they want, in many occasions they do not have such a detailed preference (Dupont 1954; Dussart 1998). Rather, consumer's preferences are often fuzzy and inconsistent (March, 1978). This is when expectations of success likelihood and choice effort become important. After making an assessment of the assortment that is offered by a store, consumers may decide to either leave the store or to start the product choice process.

3.2.1 The ups and downs of assortment variety

There are several reasons why consumers may prefer assortments with a high level of variety (Baumol & Ide 1956; Hoch, Bradlow & Wansink 1999; Kahn 1998). More variety makes it more likely for each consumer to find exactly the option that (s)he wants, allows each consumer to choose a diversity of options over time, and offers flexibility when tastes are not well-formed or change over time. In addition, there is recent evidence from the variety-seeking literature that people may have an inherent preference for variety, even when this means the inclusion of lesser-preferred alternatives (Ratner, Kahn & Kahneman 1999). Overall, variety is desirable as it increases the probability of a successful shopping trip. When variety increases the degree to which products match the diverse desires of consumers, society as a whole is said to be better off (Cox & Alm 1998).

Nevertheless, offering a high degree of variety can have adverse consequences as well. Variety has not only been associated with benefits, but also with costs for consumers (De Clerck, Gijsbrechts, Steenkamp & Dekimpe 2001). Too much variety can potentially confuse the consumer, and lead to more choice effort (Handelsman & Munson 1985; Iyengar & Lepper 2000; Kahn & McAlister 1997). Variety can increase the required effort of considering all the options fully, which may lead to the use of simplifying heuristics and perhaps to less than optimal decisions (Kahn 1998; Lehmann 1998). Consumers sometimes find it difficult to choose among the abundance of products in stores. Overwhelmed by the amount of products that are available, they may even defer from choosing at all (Dhar 1997; Tversky & Shafir 1992; Simonson 1999). Choice behavior implies that a consumer uses monetary and behavioral resources. These behavioral resources comprise time, physical and mental energy (Pieters 1989). Loewenstein (1999) discusses three types of

variety costs for consumers: (1) time costs, the opportunity costs of spending time on a decision, (2) error cost, the consequences of making a wrong choice, and (3) psychic costs, the anxiety about making decisions under uncertainty, and potential regret.

Why should retailers worry about consumers' expectations of effort? First, it can influence consumers' store choice. One of the functions of retailers is reducing effort for consumers. Retailers act as links between manufacturers and consumers, and overcome discrepancies in assortment, quantity, space and time between them (Lewison 1994). They offer value to consumers by providing them with an assortment of products and by reducing the costs associated with product purchase (Koelemeijer 2000; Levy & Weitz 1998). In a US survey of consumers' shopping behavior, one of the most often mentioned requests for retail stores is that the products are easy to find (Kurt Salmon Associates 1996). Certain retail formats, such as supermarkets, flourish because they offer consumers the possibility of one-stop shopping and decreased shopping time (Dellaert, Arentze, Bierlaire, Borgers & Timmermans 1998; Messinger & Narasimhan 1997; Zimmerman 1941). Reducing the effort associated with shopping can provide a tremendous attraction to consumers. If consumers expect that choice will be easy in a store, this can persuade them to buy there. In contrast, consumers may avoid stores where it is difficult to make a decision. Choice effort can lead to negative emotions, such as frustration or uncertainty, and consumers may want to avoid these. A second reason for retailers to worry about choice effort, is the detrimental effects it can have on consumers' choice process once they are in the store. When consumers find it difficult to choose, they may decide not to buy a product. Choice difficulty can defer choices. Also, when consumers find it difficult to choose they probably need more time to compare options. When this occurs in the store, it may lead to crowding.

Table 3.1 provides an overview of the benefits and costs of assortment variety for a consumer. The main benefit of assortment variety is that it increases the likelihood of finding a suitable product. A consumer is more likely to *find* a suitable product in the store, and the product is more likely to *match* with consumers' preferences. In addition, assortment variety offers flexibility to consumers. Consumers can delay their final decision until they are in the store. Finally, assortment variety offers consumers the opportunity to learn about a product category, and to explore this category. Examining an assortment for recreational or informational purposes has been called browsing (Bloch & Richins, 1983), and is a prevalent consumer activity. Shopping can be an enjoyable leisure-time activity, that provides diversion and stimulation (Babin, Darden & Griffin 1994; Bellenger & Korgaonkar 1980; Tauber 1972). Stores with varied assortments may be better able to provide consumers with such diversion, as well as with the opportunity to learn about a product category.

For the consumer, the main cost of high assortment variety is the effort that (s)he needs to put in the decision making process. This can be both cognitive effort and time. In addition, high assortment variety may lead to an increase in regret after the decision has been made, or dissatisfaction with the chosen product (Iyengar & Lepper 2000). Decision making can be influenced by the anticipated regret of the options (Cooke, Meyvis & Schwartz 2001; Zeelenberg 1999; Zeelenberg, Beattie, Van der Pligt & De Vries 1996; Zeelenberg, Van Dijk, Manstead & Van der Pligt 2000). If consumers anticipate a higher regret from assortments with high variety, this anticipated regret may influence their store choice. Zeelenberg (1999) discusses several conditions which may determine when anticipated regret is likely to have a large impact: (1) when there is no dominant alternative, (2) when outcomes of the decision materialize almost immediately after choice, (3) when significant persons in the decision maker's social network view the decision as important, (4) when new information about gains and losses can be obtained, and (5) when delay of the decision does not cause problems. For store assortments, these conditions need not be met. Especially, outcomes of store choice do not always materialize immediately after choice, and feedback about unchosen (i.e. not visited) stores is usually not easily obtained.

Table 3.1 Benefits and costs of assortment variety

Benefits of high assortment variety	Costs of high assortment variety

- Increased likelihood and accuracy of product choice	- Cognitive effort
	  - distinguishing between products
	  - deciding which product to choose

- Flexibility in choosing	- Time
- Learning about the product category	- Anticipated regret
- Exploration of the product category	

This chapter will focus specifically on accuracy and effort, although other benefits and costs of assortment variety exist. Accuracy and effort have been considered the more important aspects of decision making (Bettman, Luce & Payne 1998). The next section will introduce an accuracy-effort approach to retail assortments.

3.2.2 An accuracy-effort approach to retail assortments

Accuracy-effort frameworks have often been used for product choice (Böckenholt, Albert, Aschenbrenner & Schmalhofer 1991; Hoyer 1984; Klein & Yadav 1989; Payne 1982; Payne, Bettman & Johnson 1988; Ratchford 1982; Tyszka 1998). The basic assumption of this approach is that consumers have bounded rationality (Simon 1955), which means that their capacity for processing information is limited. Therefore, consumers consider the

tradeoff between effort and accuracy, and compromise between the desire to make a correct decision and the desire to minimize effort (Payne 1982). In general, they will only invest more effort into a choice task when it is considered to increase the likelihood of making an accurate choice (Moorthy, Ratchford & Talukdar 1997).

Maximizing accuracy and minimizing cognitive effort are metagoals of consumers for choice processing. Such metagoals are said to "capture many of the most important motivational aspects relevant to decision making" (Bettman, Luce & Payne 1998, p.192-193), with accuracy and effort being the two preeminent goals for many consumer choices. The relative importance of these goals can differ across situations. In addition, the importance of the goals may reflect consumers' ability to obtain feedback on the level of goal-achievement (Bettman, Luce & Payne 1998). It has been proposed, and also empirically found, that effort feedback is much easier to obtain for consumers than accuracy feedback (Bettman, Luce & Payne 1998; Klein & Yadav 1989), and minimizing effort may therefore be a relatively strong goal (Payne 1982; Bettman, Luce & Payne 1998).

To examine the accuracy and effort tradeoffs in choice tasks, previous research has simulated this task on a computer (Payne, Bettman & Johnson 1988), or asked consumers, after the choice task, how they perceived the accuracy and effort (e.g. Klein & Yadav 1989). Another often-used method is to examine the decision time that consumers put into choices from different assortments of products (Hendrick, Mills & Kiesler 1968; Kiesler 1966). This all focuses on accuracy and effort during or after the choice task. What has been neglected, though, is consumers' prior assessment of accuracy and effort.

In reality, consumers may decide which choice situations they place themselves in, based on a first impression of the accuracy obtainable in and the effort required for each of these choice situations (Pollay 1970). Such an evaluation of the assortment lets the consumer decide which retail assortments are worthy of further investigation. Consumers want to visit stores where the probability of a successful choice is high, and the effort to make that choice is low. Therefore, the accuracy-effort framework, applied to consumers' first impressions of retail assortments entails expectations of success likelihood and choice effort. The expectation of choice effort will be based on the choice difficulty that is inherent to the product assortment, and is an antecedent for the actual choice effort that consumers will put in. It does not equal the actual effort spent. Rather, consumers may decide to use simplifying heuristics when their first impression of the required choice effort is high (Hendrick, Mills & Kiesler 1968).

Applications of the framework to decision strategies for product choice have presented accuracy and effort as a trade-off that needs to be made (Payne 1982; Payne, Bettman & Johnson 1988). Beach and Mitchell (1978, p.447) state that "... strategy selection is viewed

as a compromise between the press for more decision accuracy as the demands of the decision task increase and the decision maker's resistance to the expenditure of his or her personal resources". Although there is evidence that increases in effort do not always guarantee an increase in choice accuracy (Dhar, Nowlis & Sherman 2000), mostly a tradeoff between the two is assumed. In retailing as well, it is generally assumed that the downsides of offering more variety are inevitable: increasing variety increases the potential confusion of the consumer (Kahn & McAlister 1997). But do assortments where choices can be made with a high level of accuracy always require more effort from the consumer? To examine this, the next section introduces several variety components that can influence consumers' expectations of success likelihood and choice effort.

3.3 The size and composition of assortments

Assortment evaluation has only recently received attention in the marketing literature (Boatwright & Nunes 2001; Broniarczyk, Hoyer & McAlister 1998; Gourville & Soman 2000; Hoch, Bradlow & Wansink 1999; Kahn & Lehmann 1991). More insight into consumers' evaluation of product assortments is needed (Kahn 1999), since the assortment evaluation will impact if, how much, and how fast consumers will buy products from the assortment. Therefore, a good understanding of how assortment properties influence assortment evaluations is essential for retail management (Raftery 1993).

3.3.1 Assortment size

Which assortment properties relate to the amount of variety that an assortment offers? First, assortment size is a relevant property to examine. Assortment size equals the number of products in the assortment (Elton & Mercer 1969; Kahn 1998). Increasing assortment size generally leads to an increase in assortment variety: large assortments offer more variety than small assortments (Chian & Wilcox 1997; Hoch & Banerji 1993; Kahn & Lehmann 1991).

The composition of an assortment will influence assortment variety as well: when products are very similar to each other, variety will be lower than when products are dissimilar (Hoch, Bradlow & Wansink 1999; Pessemier 1985).

3.3.2 Assortment composition

Products have attributes. To examine assortment composition, we could examine the products that the assortment consists of, or alternatively we could examine the attribute levels that are present in the assortment. Previous research showed that in large assortments

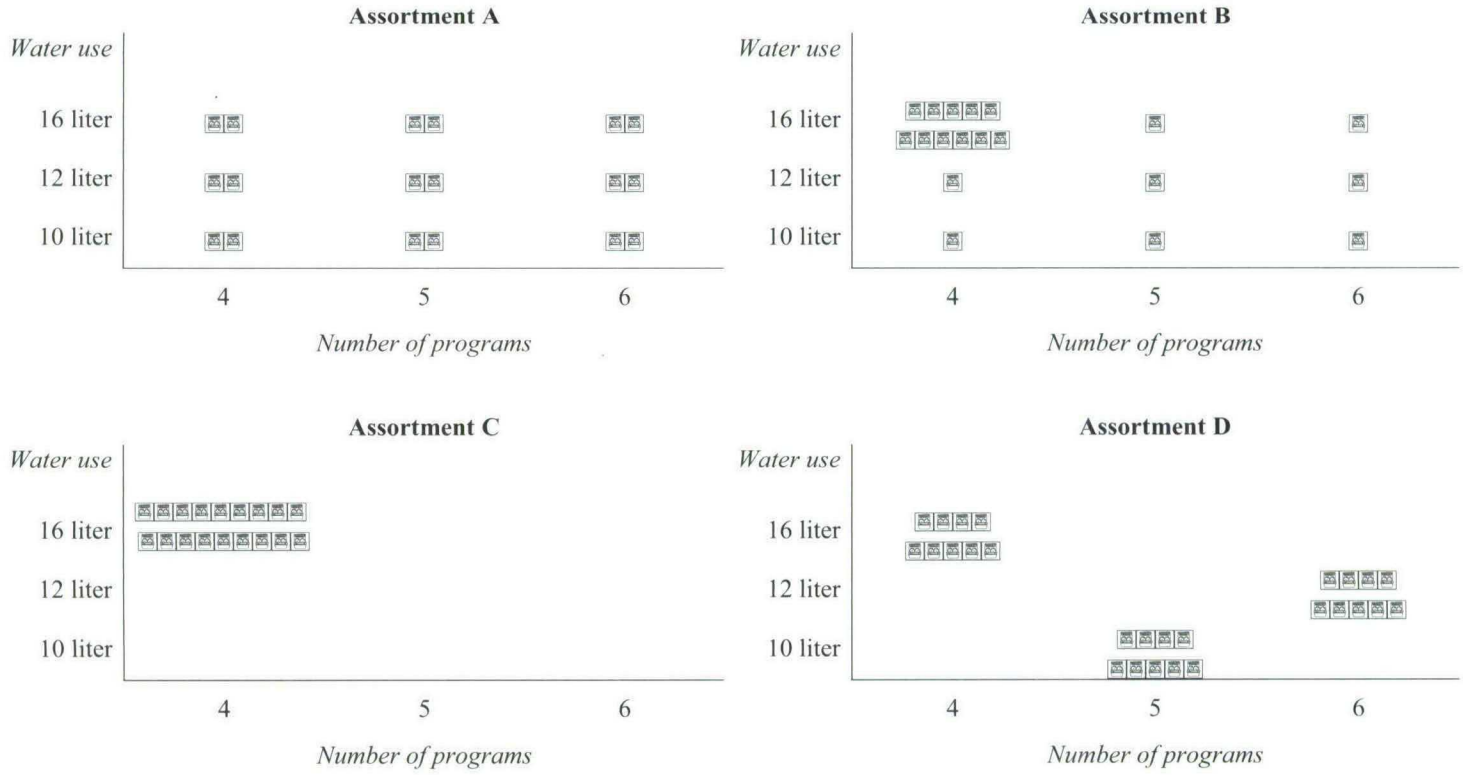
consumers tend to emphasize attribute information (Bettman, Luce & Payne 1998), and to find information on attribute levels more helpful in making their choice than information on individual products (Huffman & Kahn 1998). In addition, changes in the availability of attribute levels impact sales more than changes in other product offerings (Boatwright & Nunes 2001). Chapter 2 showed that attribute-based measures of assortment variety predict consumers' variety perceptions better than product-based measures of assortment variety. Therefore, we focus on the dispersion across attribute levels and the dissociation between attributes as important variety components.

Dispersion across attribute levels. Attribute dispersion relates to the relative degree with which attribute levels occur in an assortment. Attribute dispersion is increased by making the proportions in which the attribute levels occur more equal. For instance, a shoe store with 99% black shoes and only 1% brown shoes has less attribute dispersion than a shoe store with 50% black shoes and 50% brown shoes. Stores that specialize on certain attribute levels (e.g. certain 'types' of products) have assortments with low attribute dispersion. Assortments with a low level of attribute dispersion offer less variety than assortments with a high level of attribute dispersion.

To illustrate the effect of changing the dispersion across attribute levels, Figure 3.1 introduces assortments of dishwashers, with differing degrees of attribute dispersion across two of the relevant attributes: water use and number of programs. Assortment A has maximum dispersion across both of the attributes: all attribute levels occur in equal proportions. Assortment B has less dispersion: a relatively high proportion of dishwashers has 4 programs and uses 16 liters of water. Assortment C has minimum dispersion: only dishwashers with 4 programs and 16 liters water-use are present. This assortment is a special case: the dispersion across attribute levels has been decreased in such a degree that several of the attribute levels no longer appear. Since previous research indicates that consumers may perceive such assortments differently (Boatwright & Nunes 2001), we will treat them separately.

Number of attribute levels. Assortment C has such a low degree of dispersion that some of the attribute levels are absent. Such unavailability of product attributes has been shown to highly affect category sales (Boatwright & Nunes 2001), and may have a strong impact on consumers' evaluations of assortments. The study by Hoch, Bradlow and Wansink (1999) also shows relatively low average variety perceptions by consumers when attribute levels are missing. Therefore, we will examine both cases separately: changes in the number of attribute levels, and changes in the dispersion across an equal number of attribute levels. We will refer to the former as 'number of attribute levels', and to the latter as 'dispersion across attribute levels'.

Figure 3.1 Assortments with different attribute dispersion and dissociation



Dissociation between attributes. Assortment D in Figure 3.1 demonstrates the effect of lowering attribute dissociation. Attribute dissociation refers to the degree to which products with a certain attribute level (e.g. a certain degree of water use) also have another attribute level (e.g. a certain number of programs). It concerns the systematic links that can be made between attributes, and for which consumers can be sensitive, especially when these links relate to their intuitive beliefs (Johnson & Levin 1985; Broniarczyk & Alba 1994). So, for instance, in assortment D all dishwashers with 16 liters of water use have 4 different programs, all dishwashers with 12 liters of water use have 6 programs, and so on, providing a strong link between water use and number of programs. Decreased attribute dissociation leads to decreased variety: assortment D in Figure 3.1 is less varied than assortment A.

Attribute dispersion and dissociation can not always be manipulated independently. For instance, consider assortment C, an assortment with no attribute dispersion at all (i.e. all products have the same number of programs and water use). The dissociation between attributes is at its minimum, as the link between number of programs and water use is perfect. Therefore, a certain degree of correlation between attribute dispersion and dissociation can not always be avoided.

3.4 Likelihood of success

The variety components identified in the previous section are expected to influence the expected success likelihood.

Assortment size. Larger assortments have been equated with more 'decision freedom' (Reibstein, Youngblood & Fromkin 1975), and with a higher likelihood that the shopping trip is successful (Baumol & Ide 1956). Consumers are attracted to these large assortments (Bliss 1953; Knauth 1949). When more products are available, chances of finding an acceptable product are higher (Koelemijer & Oppewal 1999). Therefore, consumers will expect a higher degree of success likelihood from assortments with many products.

H1: Consumers' expectation of the success likelihood of an assortment increases when more products are offered.

Number of attribute levels and dispersion across attribute levels. We conjecture that high attribute dispersion leads to high expectations of success likelihood. When attribute levels are highly dispersed, and products of all different colors, sizes, and so on, are available, the likelihood that the assortment contains a desired product increases. We expect this effect to occur both when dispersion across existing attribute levels increases, and when new attribute levels are introduced.

H2: Consumers' expectation of the success likelihood of an assortment increases when the dispersion across attribute levels increases.

H3: Consumers' expectation of the success likelihood of an assortment increases when the number of attribute levels increases.

Dissociation between attributes. When dissociation between attributes is low, a choice on one attribute will restrict the possible choices along another attribute. When all dishwashers with a water use of 16 liters have 4 programs, the choice for a dishwasher with 16 liters of water use already implies the number of programs. Therefore, we speculate that low dissociation between attributes will lower consumers' expected success likelihood, as this effectively restricts the choice options for the consumers.

H4: Consumers' expectation of the success likelihood of an assortment increases when the dissociation between attributes increases.

3.5 Choice effort

This section will offer hypotheses regarding the effect of the variety components on expected choice effort.

Assortment size. There is general agreement that increasing the number of products in an assortment increases choice effort, as it leads to an increased complexity of the decision task (Bawa, Landwehr & Krishna 1989; Bettman, Luce & Payne 1998; Fitzsimons 2000; Malhotra 1982; Payne, Bettman & Johnson 1993; Tyebjee 1979). Large assortments are considered to be inherently more complex (Huffman & Kahn 1998). More products need to be examined and compared, and more time is necessary to find a desirable product (Kahn 1998). Empirical research has indicated that, although they may find the choice process in a large assortment enjoyable, consumers find it difficult to choose in a large assortment (Iyengar & Leppar 2000). Consumers expect that large assortments require more effort.

H5: Consumers' expectation of the choice effort of an assortment increases when more products are offered.

Dispersion across attribute levels. Although attribute dispersion has not been the focus of attention in research on choice effort, a related concept, product similarity, has received attention. Product similarity has been defined as the attribute overlap between products. High product similarity usually implies a low level of attribute dispersion.

Both positive and negative effects of product similarity have been hypothesized in previous research. These are related to the costs of distinguishing products and the costs of choosing a product. In the first line of reasoning, high degrees of product similarity in an assortment lead to redundancy and duplication, which is expected to increase choice effort

(Kahn & McAlister 1997). This has also been found empirically. Product similarity increases the effort of distinguishing the products (Glazer, Kahn & Moore 1991; Kahn 1998), and therefore leads to an increase in decision-making time, more information search, and explicit experiences of problem difficulty (Biggs, Bedard, Gaber & Linsmeier 1985; Stone & Schkade 1991).

In the second line of reasoning, product similarity decreases choice effort. Product similarity decreases the tradeoffs that need to be made, as well as the consequences of making a wrong choice. According to this view, choices become more difficult when the number and/or size of attribute level differences between the products increases (Shugan 1980; Dellaert, Brazell & Louviere 1999). When each product has both advantages and disadvantages, consumers experience conflict that makes choice more difficult or even aversive (Payne, Bettman & Johnson 1992; Shugan 1980; Tversky & Shafir 1992). A study by Chatterjee and Heath (1996) indicates that increasing the number of trade-offs promotes choice effort. They manipulated the extremeness of the tradeoffs between two products, effectively changing the level of dispersion (attribute range) in a very small assortment. More extreme tradeoffs in their study lead to more choice effort.

Dhar (1997) offers yet another viewpoint. He proposes that differences in product attractiveness (evaluative similarity), rather than difference in product similarity (perceptual similarity), result in choice difficulty. The studies by Dhar (1997) show that consumers experience choice difficulty when they are uncertain about which product they prefer. Consumers opt to defer their decisions, which is a signal of choice difficulty, when the difference in attractiveness between the products is low. They do not want to commit to a product, since the small difference in attractiveness is potentially reversible. A difference in attractiveness between products is not related to product similarity. Products can be very similar, and still one may offer a clear advantage (e.g. choice between a trip to Paris, and a trip to Paris plus a dollar). Products that are very different can both be equally attractive or they can differ greatly in attractiveness.

The empirical research discussed so far has focused on the choice difficulty of consumers *while* they are *making their decision*. In addition, the number of products in the assortments is not very high – the studies of Dhar (1997) involve assortments of two products only. This means that consumers are evaluating and comparing the products when they give their choice difficulty statements. But we are interested here in consumers' *expectations* of choice difficulty, in retail assortments with many more than two products, when they do not have clear prior preferences, and before they engage in the choice process. It seems reasonable to assume that consumers will not form an evaluation of each product in such a situation. Rather, they will form an overall impression of the assortment, based on its size and general composition.

Since we do not expect consumers to construct product evaluations, the attractiveness reasoning of Dhar (1997) does not seem appropriate here. Consumers may however be influenced by the degree of product similarity in the assortment. A high degree of product similarity may lead them to believe that it will be difficult to distinguish the products and make their choice, since the products are all so much alike. It may also lead them to believe that the trade-offs they will have to make are less severe. Although they will not actually make these trade-offs yet, the range and dispersion of attribute levels can give them an impression of the trade-offs that they are likely to encounter.

High attribute dispersion implies that many different attribute levels are being offered in equal proportions, as in assortment A in Figure 3.1. Products differ from each other, thereby making it less difficult to distinguish them, and decreasing choice effort. If this reasoning is correct, an increase in attribute dispersion would decrease expected choice effort, which would be a very interesting result for retailers. But attribute dispersion may also affect the trade-offs that need to be made. Although the attribute range is constant, and trade-offs remain present (i.e. assortment A versus B in Figure 3.1), these trade-offs may seem larger when attribute dispersion is high. Since essentially the same trade-off area remains when attribute dispersion is changed, we do not expect this effect to dominate:

H6: Consumers' expectation of the choice effort of an assortment does not increase when the dispersion across attribute levels increases.

Number of attribute levels. When an assortment offers more attribute levels, products become more distinct from each other. However, expanding the number of attribute levels also increases the tradeoffs that need to be made. Retailers should be most interested when this second effect does not dominate, so that increasing variety through the number of attribute levels does not increase choice effort:

H7: Consumers' expectation of the choice effort of an assortment does not increase when the number of attribute levels increases.

Dissociation between attributes. Attribute dissociation represents the correlational structure of attributes, which has been shown to affect choice effort (Swait & Adamowicz 1996). Assortment D in Figure 3.1 shows how products tend to cluster together when attribute dissociation decreases. When dissociation between attributes is low, some attribute combinations are not offered. Consumers who would prefer a dishwasher with 10 liter water use and 6 programs have to trade off water use and number of programs, as their most preferred item is not available. Previous research has found that increased tradeoffs cause choice conflict to rise (Bettman, Johnson, Luce & Payne 1993; Bettman, Luce & Payne 1998). This seems to imply that a decrease in attribute dissociation leads to more choice effort. However, we are considering consumers who form their first impression of a

retail assortment, and who have not yet constructed their preferences. Since preferences have not been formed, it is very unlikely that consumers are searching for specific attribute combinations that are not present. Rather, they may think that an assortment with low attribute dissociation is easier to choose from: they just need to choose the level of one of the two attributes, and the other one will be implied. Once they have chosen the number of programs, the water use of the dishwasher is implied, and does not require effort.

H8: Consumers' expectation of the choice effort of an assortment increases when the dissociation between attributes increases.

Table 3.2 Overview of the hypotheses

Variety component	Hypothesized effect on expected success likelihood	Hypothesized effect on expected choice effort
Assortment size	+ (H1)	+ (H5)
Dispersion across attribute levels	+ (H2)	0 (H6)
Number of attribute levels	+ (H3)	0 (H7)
Dissociation between attributes	+ (H4)	+ (H8)

Table 3.2 provides an overview of the hypotheses. Study 1 will test all hypotheses except 2 and 6 for assortments of hypothetical products with visual attributes. Hypotheses 2 and 6 will be tested in study 2, as well as the other hypotheses, for assortments of dishwashers with textual attributes. By varying the realism of the task and the manner of attribute presentation (visual or textual), we increase the validity of our findings.

3.6 Study 1: A first test of success and effort expectations

This study considers a hypothetical product category, which has the advantages that effects of prior experiences and preferences are absent, and differences in variety components are highly visible and clear. Participants of the study are not influenced by characteristics of the product category, and form their expectations of success likelihood and choice effort based on all the products in an assortment

3.6.1 Method

Participants and design. Participants were 110 undergraduate students from a university in the Netherlands, who each evaluated eight product assortments. Assortments were constructed following a 2 (assortment size) x 2 (dispersion level) x 2 (dissociation level)

within-subjects design. Assortments consisted of either 8 or 16 products. Attributes were either equally dispersed (all levels occur in equal proportions) or two of the levels dominated the other two (in proportion 3 to 1). When all attributes pairs would have no dissociation, the assortments would contain replicas. No dissociation means that all products with attribute x_1 (e.g. blue color) also have attribute y_1 (e.g. triangle shape), and products are the same. This then leads to inventory effects, which is not the focus of this research. Dissociation was therefore manipulated in two levels: (1) high dissociation, and (2) partial dissociation. In the second case, color and form were perfectly associated, while name was not associated with either one.

Stimuli. Stimuli were comparable to those used in recent research on assortment variety by Hoch, Bradlow & Wansink (1999)[10] and Van Herpen and Pieters (2000a). The products had three attributes, each with four levels:

- color (red, blue, yellow, green)
- shape (square, rectangle, circle, triangle)
- name (CAM, NUX, ZOL, VIK)

In total, 64 different products can be constructed from these attributes. Each assortment contained 8 or 16 products arrayed in two or four rows, each with four products. They were presented in an organized manner, to simulate a store shelf. Products were grouped by color and within color by form. The specific attribute levels (e.g. whether the first product is red, blue, yellow or green) were randomized.

Procedure. The study was administered on personal computers using the program Authorware (Macromedia 1997). Examples of the computer screen are provided in Appendix A. The instruction mentioned that participants would visit an unspecified number of different stores, and would be asked to answer questions about the assortments of an imaginary product called 'jinko'. The instruction also mentioned that jinkos are comparable to other product categories, where products can differ on characteristics such as taste, size, color, form, and so on. Next, participants were shown all possible types of jinkos (64), which appeared on the screen for 2 seconds each, in random order. Afterwards, participants were exposed to the assortments of jinkos in random order. Dependent measures for assessments of success likelihood were '*Suppose that you want to buy a jinko. Is it likely that this assortment contains an appropriate jinko*?' and '*Suppose that you want to buy a jinko. Does this assortment offer enough flexibility in your decision?'*. Assessments of choice effort were measured by '*Suppose that you want to buy a jinko. Would it be difficult to choose between the jinkos in this assortment?'*. Variety perceptions were measured by

[10] We thank the authors for access to the stimuli. Two product names from the Hoch, Bradlow and Wansink study were changed, as these refer to a meaningful object and a slang word in Dutch.

'Does this assortment of jinkos offer a lot of variety?' and *'Does this store offer a diverse assortment of jinkos?'*. All measures had a ten point scale, with endpoints labeled 'not at all' and 'very much'. Pearson's correlations between the items for success likelihood, calculated separately for each of the assortments, are between .66 and .81, with an average of .73, and for variety perception between .50 and .83, with an average of .63 (all significant at $p < .001$).

Participants proceeded at a self-determined pace, and assortments remained visible during the task. They took on average about 25 minutes to complete the study and received the equivalent of $5 as payment. An analysis of the time during which participants examined an assortment before answering questions, shows averages between 5 and 10 seconds. This seems too short a time for participants to have closely evaluated and compared all products in the assortment. Empirical research on decision times with comparable or less numbers of alternatives and attributes has resulted in decision times of several minutes instead of seconds (Klein & Yadav 1989; Pollay 1970). We can assume that participants have not completed a decision process, and are providing their expectations of success likelihood and choice effort based on the first impression of the assortment.

3.6.2 Results

Assortment evaluations are provided in the last columns of Table 3.3. To examine the relation between variety components and assortment evaluations, the data were analyzed with repeated measures ANOVA's, and Table 3.4 provides the results[11].

Perceived variety. First, we checked if the changes in variety components were indeed associated with changes in variety perceptions. As expected, there were significant effects of all three variety components: size ($F = 264.2$; $p < .001$), attribute dispersion ($F = 129.7$; $p < .001$), and attribute dissociation ($F = 117.3$; $p < .001$) on perceived variety. Consumers perceived more variety when assortments were large (mean = 5.3 for small assortment versus mean = 7.3 for large assortments), attributes were dispersed (mean = 5.6 versus mean = 7.0) and dissociation between attributes was high (mean = 5.8 versus mean = 6.8).

Expected success likelihood. There were significant effects of size ($F = 425.9$; $p < .001$), attribute dispersion ($F = 97.8$; $p < .001$), and attribute dissociation ($F = 71.3$; $p < .001$). All effects were in the desired direction, indicating that expectations of success likelihood increase with increases in the variety components, supporting hypotheses 1, 2 and 4.

[11] We present the results of the main effects, as these test our hypotheses. There were significant interaction effects of size*dispersion ($F = 17.3$; $p < .001$) and dispersion*dissociation ($F = 4.1$; $p = .044$) for expected success. No other interactions were significant.

Table 3.3 Summary information of the evaluations of jinko assortments (n = 110)

No.	Variety components			Assortment evaluations	
	Size	Attribute dispersion	Attribute dissociation	Mean expected success (*sd*)	Mean expected effort (*sd*)
1	8	1:1:3:3	2 attributes linked	4.19 (1.58)	5.09 (1.99)
2	8	1:1:3:3	All high (no links)	5.15 (1.68)	5.25 (1.91)
3	8	1:1:1:1	2 attributes linked	5.10 (1.76)	5.17 (1.82)
4	8	1:1:1:1	All high (no links)	5.75 (1.88)	5.55 (2.00)
5	16	1:1:3:3	2 attributes linked	5.87 (1.67)	5.95 (1.82)
6	16	1:1:3:3	All high (no links)	7.00 (1.56)	6.77 (1.76)
7	16	1:1:1:1	2 attributes linked	7.59 (1.92)	6.32 (2.28)
8	16	1:1:1:1	All high (no links)	8.43 (1.50)	6.75 (2.51)

Table 3.4 Results of ANOVA's for assortment evaluations of jinko assortments

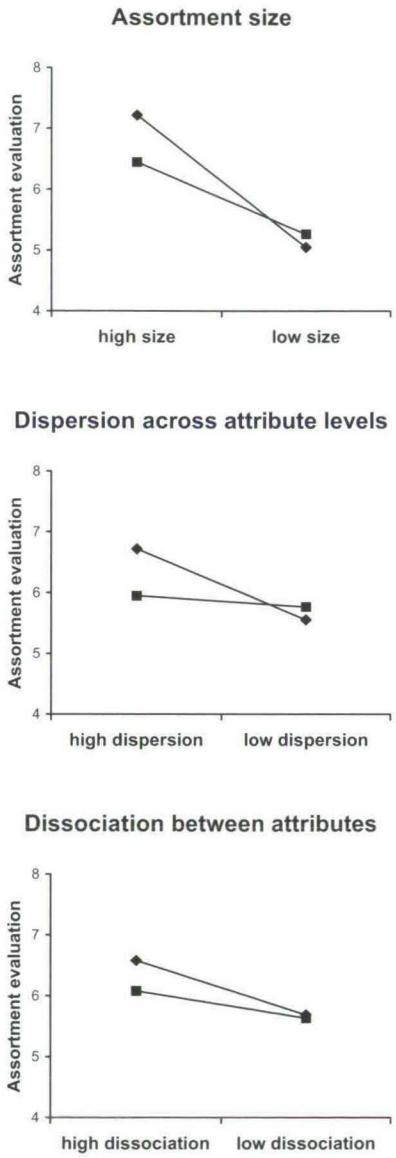
	Expected success		Expected effort	
	F-value[1]	p-value	F-value	p-value
Size	425.9	<.001	66.4	<.001
Dispersion	97.8	<.001	1.9	.172
Dissociation	71.3	<.001	8.9	.004

[1] Df is 1;109 in all cases.

Expected choice effort. There was a significant effect of size (F = 66.4; p < .001), with larger assortments having a higher choice effort than smaller assortments (mean = 6.4 versus mean = 5.3 respectively), supporting hypothesis 5. Adding products to an assortment leads to higher expectations of choice effort. Attribute dispersion did not have a significant effect on choice effort (F = 1.9; p = .172), in support of hypothesis 6. Dissociation between attributes was found to have a positive effect on choice effort (F = 8.9; p < .005), supporting hypothesis 8. Assortments where attributes have high dissociation, and the choice of one attribute level has little implications for the potential choice on other attributes, have a higher expected choice effort than assortments with low levels of dissociation (mean = 6.1 versus mean = 5.6).

Success likelihood versus choice effort. Figure 3.2 provides a graphical picture of the results. It indicates that the effects for success likelihood may be larger than those for choice effort.

Figure 3.2 The effect of variety on assortment evaluation in study 1



Legend: ■ = expected choice effort
◆ = expected success likelihood

Table 3.3 also shows that the range of average assortment evaluations is larger for success likelihood (4.19 – 8.43) than for choice effort (5.09 – 6.77). Perhaps expected success likelihood responds more strongly to changes in assortment variety than expected choice effort. To test this, we performed a repeated analysis ANOVA across both types of assortment evaluations[12].

Results show significant interactions for evaluation type (success or effort) and size ($F = 40.6$; $p < .001$), for evaluation type and attribute dispersion ($F = 52.0$; $p < .001$), and for evaluation type and attribute dissociation ($F = 8.6$; $p = .004$)[13]. An increase in assortment variety appears to result in a larger increase in expected success likelihood than in expected choice effort. Whether this means that assortments with higher variety will also be preferred more will be addressed in the next chapter.

3.6.3 Discussion

The results show that expectations of success likelihood are positively influenced by assortment size, attribute dispersion, and attribute dissociation, consistent with our hypotheses. When these variety components increase, consumers report a higher likelihood that the assortment contains a product they desire.

Do increases in variety also lead to increases in expected choice effort? For assortment size and attribute dissociation these increases were found, consistent with hypotheses 5 and 8. The study also showed that increases in attribute dispersion do not lead to increases in expected choice effort, consistent with hypothesis 6 and our intuition on product similarity effects. This is good news for retailers: it is possible to increase assortment variety, and expected success likelihood, without increasing expected choice effort.

3.7 Study 2: Extension to assortments with absent attribute levels and less distinct products

While the findings from study 1 support our hypotheses, there are two potential problems with the results obtained. First, the product category consists of hypothetical, non-real

[12] Since the endpoints for the scales for success and effort are not the same, differences could result from a difference in scale use by respondents. We also performed the analysis after standardizing the answers for both scales with their respective general means and standard deviations. Results are similar to those obtained without standardization, so we only report the latter results.

[13] There is a significant three way interaction between evaluation type * size * dispersion ($F = 10.3$; $p = .002$). None of the other three or four way interactions with evaluation type were significant.

products. Although the same stimuli have been used in previous research (Hoch, Bradlow & Wansink 1999; Van Herpen & Pieters 2000a), consumers may have found it difficult to examine such assortments. Second, the products in study 1 had very distinct differences in color and shape, which may have influenced the results. Since the products are distinct, participants may not have considered the effort of distinguishing products, but rather the effort of making trade-offs when they gave their expected choice effort. When product differences are less distinct, expected choice effort might be more based on the ability to distinguish products and relatively less on the perceived trade-offs that need to be made. This would imply that assortments with less similar products (higher dispersion and dissociation) have a relatively lower expected choice effort than assortments with more similar products. The effects of attribute dispersion and dissociation become less positive.

Using verbal, as opposed to visual, stimuli can influence the distinctiveness of products. Literature on picture-word effects has consistently found that pictures are more memorable and easier to recognize than their verbal counterparts (Gardner & Houston 1986; Stenberg, Radeborg & Hedman 1995), and that pictures facilitate comprehension (Goolkasian 1996). Information is more accessible from pictures than from words. One of the potential causes is stimulus differentiation (Childers & Houston 1984; Mintzer & Snodgrass 1999; Stenberg, Radeborg & Hedman 1995). Pictures stimulate imagery, which results in more distinctive and isolated memory code. Pictures are inherently endowed with sensory and semantic features that allow them to be encoded at the sensory level of processing, and to be more easily discriminated from each other than words (Childers & Houston 1984; Mintzer & Snodgrass 1999). Words, on the other hand, are more difficult to integrate into an overall judgment (Gardner & Houston 1986). Therefore, products described by words may be less easily distinguishable from each other than products presented as pictures.

Study 2 was designed to address both these concerns. First, this second study generalizes the results of the first study by using assortments of real-life products. It examines a more realistic situation, where the environment closely mirrors that of a catalogue or internet retailer. A complex product is chosen: the dishwasher. Second, study 2 considers stimuli that differ on textual attributes, as opposed to visual information. By providing written information and using more attributes, we make it more difficult to distinguish products from each other. This will lessen the distinctiveness of the products, and may make people less aware of the potential choice effort associated with this factor. In addition, the second study examines the effects of changes in the number of attribute levels and tests hypotheses 3 and 6.

3.7.1 Method

Participants and design. Participants were 62 undergraduate students in business administration at a university in the Netherlands, who each evaluated twelve assortments. The setup of the study was a 2 (assortment size) x 3 (dispersion level) x 2 (dissociation level) within-subjects design. The assortments consisted of either 12 or 18 products, well within the normal assortment range. Dispersion across attribute levels includes high dispersion (equal proportions), low dispersion (unequal proportions), and absent attribute levels (cf. assortments A, B and C in Figure 3.1). Dissociation between attributes was either as high or as low as possible, given the number of products and dispersion across attribute levels, and without introducing replicas. The design is (Table 3.5 provides the specifics):

Assortment size:	high – 18 products low – 12 products
Attribute dispersion:	high – equal proportions of the attribute levels low – several attribute levels occur only once several attribute levels are absent from the assortment
Attribute dissociation:	high Low

Stimuli and presentation format. The product category of dishwashers was selected as it constitutes a relatively important choice, with a reasonably high level of complexity. The relevant attributes were determined by considering a pretest among 36 students who listed important attributes of dishwashers. Information that is generally provided by manufacturers, and information provided by the Dutch consumer organization was also considered. This ensures that the attributes are both complete from the perspective of the participants, and representative for the information in the market. The following attributes were chosen: brand[14], energy use, water use, number of programs, and time of programs. Attribute levels were based on the standards in the market, and brand names were real. Stimuli were descriptions of dishwashers, consisting of a listing of the attribute levels. Products were presented in three columns with an equal number of products in each column. Products were grouped by brand name, as is the custom in stores. The study was administered on personal computers using the program Authorware (Macromedia 1997). A sample assortment is provided in Appendix B.

[14] Brand is not always considered an attribute, but could be seen to expresses overall product image. This may result in high attention or alternatively disregard from participants. Since our manipulations of attribute dispersion and dissociation were constructed across all attributes in the assortment, the relative weight of brand name does not affect our results.

Table 3.5 Attributes of dishwashers in study 2

Attribute	Attribute levels	Levels of dispersion		
		Attribute levels absent	All attribute levels present in the assortment	
			Low dispersion	High dispersion
Brand	AEG; Bauknecht; Zanussi; Siemens; Bosch; Whirlpool	3 levels in equal proportions	3 levels occur once, other in equal proportions	6 levels; equal proportions
Energy use	0.9 kWh; 1.05 kWh; 1.25 kWh	1 level only	2 levels occur only once	3 levels; equal proportions
Water use	10 liter; 12 liter; 16 liter	1 level only	2 levels occur only once	3 levels; equal proportions
Number of programs	4; 5; 6	1 level only	2 levels occur only once	3 levels; equal proportions
Time of programs	120 min.; 91 min.; 86 min.	1 level only	2 levels occur only once	3 levels; equal proportions

Procedure. Participants were informed that the purpose of the experiment was to investigate internet retail assortments and that they would be asked to answer questions about the assortments of dishwashers in twelve different internet stores. In addition they received a small booklet with additional information on dishwashers to make them more familiar with the product category. The booklet contained general information on dishwashers from the 'Consumentengids', the monthly magazine of the Dutch consumer organization, and a table containing the attributes and attribute levels in the study.

Dependent measures were taken on 10-point scales, with two items per construct. Expected choice effort was measured by *'Choosing between the dishwashers in this store is (very difficult – very easy)'*, and *'When I would be asked to make a choice in this store, I would need to think (much – little)'*, with an average correlation across assortments of .80. Variety perceptions were measured by *'This assortment of dishwashers offers (little variety – a lot of variety)'* and *'The assortment of dishwashers in this store is (not diverse – very diverse)'*, with an average correlation across assortments of .67. Expected success likelihood was measured by *'The chance that this assortment has a suitable dishwasher is (very small – very large)'* and *'How likely is it that you can find a good dishwasher in this assortment (not likely at all – very likely)'*, with an average correlation across assortments of .82. Participants took on average about 20 minutes to complete the study, and received the equivalent of $4 as payment.

3.7.2 Results

The assortment evaluations are provided in the last columns of Table 3.6. The data were analyzed with repeated measures ANOVAs, of which Table 3.7 gives the results. Helmert contrasts were used to examine the effect of excluding attribute levels versus no exclusion of attribute levels (low / high dispersion)[15].

Perceived variety. As in the first study, significant main effects for assortment size (F = 160.2; $p < .001$), attribute dispersion (F = 133.0; $p < .001$), and attribute dissociation (F = 23.8; $p < .001$) emerge. All are in the expected direction: assortments with more products, more dispersion, and more dissociation have a higher perceived variety.

Expected success likelihood. Again, the expected main effects for the variety components were found. The assessment of success likelihood increases with assortment size (F = 36.2; $p < .001$), attribute dispersion (F = 26.2; $p < .001$), and attribute dissociation (F = 20.8; $p < .001$). The Helmert contrasts for attribute dispersion show that both including additional attribute levels and equaling dispersion across attribute levels significantly increase the success likelihood (F = 17.8; $p < .001$ and F = 21.2; $p < .001$ respectively).

[15] As in the first study, we present main effects only. Interaction effects were not significant.

Average expected success likelihood equals 4.7 for assortments where attribute levels were absent, 5.1 for assortments with low dispersion, and 5.5 for assortments with high dispersion. These findings support hypotheses 1 through 4.

Table 3.6 Evaluations of the dishwasher assortments (n = 62)

No.	Variety components			Assortment evaluations	
	Size	Attribute dispersion	Attribute dissociation	Mean expected success (*sd*)	Mean expected effort (*sd*) [1]
1	12	levels absent	low	4.43 (1.09)	6.77 (1.50)
2	12	levels absent	high	4.52 (1.33)	6.78 (1.55)
3	12	low	low	4.72 (1.14)	7.07 (1.33)
4	12	low	high	5.09 (1.23)	7.26 (1.35)
5	12	high	low	4.90 (1.31)	6.92 (1.33)
6	12	high	high	5.44 (1.07)	7.23 (1.44)
7	18	levels absent	low	4.80 (1.33)	7.63 (1.53)
8	18	levels absent	high	5.05 (1.36)	7.44 (1.48)
9	18	low	low	5.26 (1.07)	7.61 (1.45)
10	18	low	high	5.49 (1.08)	7.76 (1.38)
11	18	high	low	5.62 (1.19)	7.91 (1.57)
12	18	high	high	6.07 (0.96)	7.88 (1.63)

[1] Reverse coded

Table 3.7 Results of ANOVA's for assortment evaluations of dishwasher assortments

	Expected success			Expected effort		
	F-value	*df*	*p*-value	*F*-value	*df*	*p*-value
Size	36.2	1	<.001	36.5	1	<.001
Dispersion	26.1	2	<.001	3.0	2	.053
absent levels [1]	27.8	1	<.001	4.3	1	.042
low vs. high [1]	21.2	1	<.001	.3	1	.604
Dissociation	20.8	1	<.001	.6	1	.443

[1] Helmert contrasts were used to test assortment where attribute levels are absent against the average of the other assortments, and assortments with low dispersion against assortments with high dispersion.

Expected choice effort. Hypothesis 5 is supported again: size has a significant positive effect on the expected choice effort (F = 36.5; p < .001), with small assortments receiving a

score of 7.0 and large assortments a score of 7.8. ANOVA's also indicated that the overall impact of attribute dispersion approaches significance (F = 3.0; p = .053). The Helmert contrasts showed that this was due to differences between assortments where attribute levels are excluded versus assortments were all attribute levels occur (F = 4.3; p = .042). By excluding attribute levels from the assortment the expected choice effort decreased, in line with the trade-off theory. The effect of equaling the dispersion in assortments (low versus high dispersion) was not significant (F = 0.3; p = .604), supporting the results of the first study. Graphical displays of these results are provided by Figure 3.2. This figure shows that when fewer attributes are included in an assortment, expected choice effort is lower, consistent with the trade-off theory. No significant effect of the dissociation between attributes was found.

Success likelihood versus choice effort. As in the first study, we examined if effects of assortment variety were larger for expected success likelihood than for expected choice effort[16]. Results show no significant effect for the evaluation type * size interaction (F = 1.0; p = .317). This means that assortment size has the same effect on both evaluations. There are significant interactions for evaluation type and attribute dispersion (F = 4.3; p = .018) and for evaluation type and attribute dissociation (F = 4.4; p = .040)[17]. Changes in attribute dispersion and dissociation affect expected success likelihood more than expected choice effort. These results should be interpreted with care, since the response scales differed between the constructs.

3.7.3 Discussion

The results of the variety components on expected success likelihood all support our hypotheses, as in the first study. Consumers expect a higher success likelihood in larger assortments, with more attribute levels, a higher dispersion across the attribute levels, and a higher dissociation between the attributes.

As expected, increasing the number of products in an assortment increases the expected effort of choosing from the assortment. This effect has been found in both studies, and appears robust. When there are more products to choose from, consumers expect a more difficult choice.

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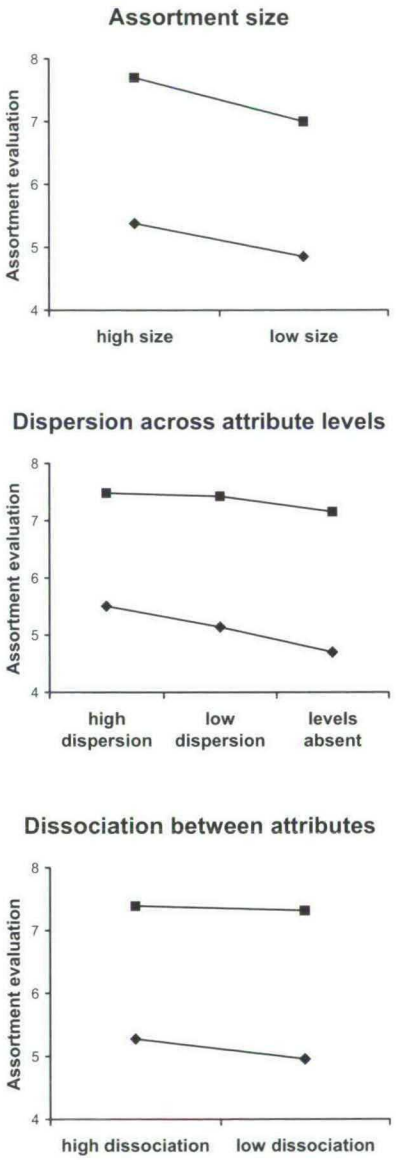
[16] We present results of the raw data. Results after standardizing the success and effort answers with their respective general means and standard deviations are similar.

[17] None of the other interactions with evaluation type were significant.

Figure 3.3 The effect of variety on assortment evaluation in study 2



Legend: ■ = expected choice effort
◆ = expected success likelihood

The second study offers more insight into the effect of the dispersion of attribute levels. When the number of attribute levels increases, expected choice effort increases as well. While forming the hypotheses on choice effort, two lines of thought were discussed regarding the potential effect of dispersion. The first one focused on the effort of distinguishing among products, while the second one focused on the effort of making tradeoffs. Our results are consistent with this second line of thought. When fewer attribute levels are present, potential tradeoffs for this attribute are less, and choice requires less effort. A decrease in the number of attribute levels leads to a decrease in expected choice effort. Alternatively, when dispersion changes among a fixed number of attribute levels, consumers do not expect a difference in choice effort. This means that retailers can change the dispersion level, and increase consumers' expectations of success, without inducing the negative effect of a higher expected choice effort.

A significant effect for attribute dissociation was found in the first study, but it is absent in the second study. People seem to notice the dissociation, since it affects expected success likelihood, but do not incorporate it in their expectations of choice effort in the second study. This might be due to the type of stimulus, although we can not directly test this between studies. In the first study, stimuli were visually oriented: products differed in shape and color. The second study included only textual information about the products. Since products are less distinct, participants may focus more on the effort of distinguishing between products. In assortments with low attribute dissociation, products are less distinct, and the effort to distinguish products will be higher. This may offset the higher trade-off effort in these assortments. The message for retailers is positive: it may be possible to increase expected success likelihood without increasing expected choice effort through changes in the level of attribute dissociation.

3.8 Conclusions

This chapter examined the effect of variety components (assortment size, number of attribute levels, dispersion across attribute levels, and dissociation between attributes) on expected success likelihood and choice effort. Increases in these variety components lead to increases in the expected success likelihood, but not necessarily to increases in expected choice effort. Combined, the two studies indicate that consumers' expectations of choice effort are primarily determined by the number of products and attribute levels in the assortment. Expected choice effort increases when assortments are extended with either additional products or additional attribute levels. Changes in attribute dispersion (without changing the number of attribute levels) and in attribute dissociation do not seem to lead to

changes in the expected choice effort, at least in the second study. Therefore, the two studies combined indicate that expectations in success likelihood can be increased without affecting expectations of choice effort, which is the main conclusion of this chapter.

In retailing, increasing the variety in an assortment has generally been associated with increasing the difficulty for consumers in making a choice (Kahn & McAlister 1997). Similarly, most studies in the accuracy-effort tradition have focused on a tradeoff between the two components (Beach & Mitchell 1978; Payne 1982; Payne, Bettman & Johnson 1988). This chapter has shown that at least for consumers' expectations of success and effort there need not always be a tradeoff. Increased expected success can be provided without an increase in expected effort. Both accuracy and effort are important metagoals for consumers, but they are not necessarily each other's opposites.

With respect to choice effort, two conflicting theories exist regarding the effect of product similarity. When products are similar to each other, the effort of distinguishing them increases, but the effort of making tradeoffs decreases. Our results are consistent with the theory of tradeoffs: when potential tradeoffs are larger, consumers expect more choice effort. Yet, results of the second study for attribute dissociation indicate that the effort of distinguishing products may become more important when products are less distinct.

Implications for retailers. This chapter provides guidelines for retailers who want to offer high levels of variety, without increasing choice effort. Increasing variety by dispersing the existing attribute levels more equally, or by increasing the dissociation between attributes, will do this. Through clever category management, levels of expected success and choice effort can be influenced. A detailed analysis of the attribute structure of an assortment can be very insightful for retailers.

Our results also have implications for the positioning of retail stores. Suppose that for a certain product category there are stores that offer a large variety of products, and there are stores that do not have full coverage of all potential attribute combinations, perhaps due to limited access to producers. This is a relatively common situation in many markets. Given a fixed number of products, will the second store be better off by exclusively offering a small fragment of the attribute levels available, or by trying to offer a full range on the product attributes, even though the store can only offer a limited number of products with certain attribute levels? In other words, if attribute dispersion can not be optimal, is it better to cut attribute levels, or to provide unequally dispersed attribute levels, given that competitors offer high levels of dispersion? According to our result, the perceived variety and the expected success likelihood will be lower in both situations. But only a cut in attribute levels will result in lower expected choice effort. Therefore, we would advise the store not to be afraid to cut the number of attribute levels that are offered.

Assortment advice for retailers often emphasizes the need for duplication reduction as part of the assortment management process (Rosendahl 1995; Raftery 1993). Reducing the number of similar products can be excellent advice for several reasons, including lowering costs of stockpiling, store image, and perhaps lowering actual choice effort. However, retailers should know that consumers' expected choice effort is only reduced by cutting the number of products or attribute levels. Our results indicate that providing less similar products in itself does not reduce expectations of choice effort.

Limitations and future research. There are several important limitations of our research and several points of discussion. This chapter examined situations where consumers do not have a clear preference for a certain product, but use the assortment to construct their preferences. In other types of buying situations the expectation of choice effort may be different. People in our studies had ample opportunity to examine the assortment, which may affect the results. Follow-up research should examine situations where the motivation and/or ability to process all assortment information are low.

In addition, we examined assortments as if they are random draws from the total population of products. In reality, assortments are not random draws. Rather, the retailer selects the products in the assortment carefully, to obtain a certain store image. Effects of store image were not examined here. In addition, certain combinations of attribute levels may not be feasible in reality, which restricts the variety that is attainable.

This chapter focused on choice success and effort as the main benefits and costs associated with assortment variety, but these are not the only benefits and costs. For instance, assortment variety may increase the hedonic value of shopping. Shopping has become a leisure time activity (Barbin, Darden & Griffin 1994), and product purchase is not the only reason for shopping (Tauber 1972; Westbrook & Black 1985). Future research could examine the impact of assortment variety on the other reasons for shopping.

Another limitation is the absence of factors such as displays, lay outs, sales persons, and shelf space. These factors may give opportunities for decreasing the choice effort in an assortment. For instance, presenting assortments by their attributes, rather than presenting full products, lowers consumers' perceptions of assortment size (Godek, Yates & Auh 2001). Huffman and Kahn (1998) show that asking consumers to indicate their attribute level preferences sequentially for the attributes, as opposed to showing them different products, decreases the expected complexity of an assortment. By learning their preferences for the attributes, consumers perceive less effort in making a choice. Such retailer strategies are left for future research.

Future research can also examine the effect of product expertise on the expectation of choice effort, or other assortment evaluations. Product familiarity gives experienced consumers several advantages over novices: (1) superior knowledge of existing alternatives,

(2) knowledge about plausible relationships among the attributes in the product category, and (3) ability to distinguish between relevant and irrelevant information (Johnson & Russo 1984). Experts will know more about the different products, as well as the attributes and attribute levels (Mitchell & Dacin 1996). Therefore, experts can make quicker and more informed evaluations of an assortment. Novices experience more difficulty when attempting to evaluate large sets of products. They can not easily evaluate all attributes of a single product, let alone a total assortment. Therefore, novices may be more likely to use heuristics such as assortment size. When asked to evaluate an assortment, the number of products can be easily assessed, while attribute dispersion and dissociation require more processing. Hence, we may expect that novices base their assortment expectations more on assortment size than experts do.

Previous research on experienced choice effort indicated different effects of attribute dispersion and dissociation than were found in this study. Although these two assortment properties were not distinguished explicitly in these previous studies, especially the effect of dissociation seemed clear (e.g. Bettman, Johnson, Luce & Payne 1993). Less dissociation means higher tradeoffs and more effort. In study 1, we found the opposite effect: less dissociation means less effort, since the choice of one attribute levels limits the options on other attributes. This means that consumers' expectations of choice effort may not always match the actual choice effort. Consumers may not be able to accurately estimate choice effort before they are involved in the choice process itself. An example of this process is provided by tourists who have to choose between restaurants. As they walk by the restaurants, they compare menu cards (overall assortment evaluation), typically on such properties as assortment variety (does this restaurant have many diverse meals to choose from), success likelihood (how likely is it that this restaurant has meals that I like), and choice effort (will it be difficult to choose between meals). An inaccurate expectation of choice effort can occur: once the consumer is sitting at the table, trying to decide, (s)he discovers many meals that appear good, and can not make an easy choice any more. But this occurs once the consumer is already captive in the restaurant. While researchers have proposed that consumers can easily obtain feedback regarding choice effort from the choice process (Bettman, Luce & Payne 1998; Klein & Yadav 1989), this does not mean that they can accurately anticipate effort. A direct examination of consumers' expectations and experiences of choice effort is an interesting path for future research.

Assessing the impact on assortment preference of diverse assortment evaluations, such as the expected success likelihood and the choice effort, is another avenue for future research. This chapter examined the antecedents of expected success and effort in terms of assortment size and composition. Its consequences for store preference are examined in the next chapter.

4

When Less Variety is Better; The Influence of Preference Awareness and Expertise on Preferred Assortment Variety

This chapter examines when consumers prefer assortments with lower levels of variety, and introduces consumer expertise and preference awareness as moderating variables for the relation between assortment variety and assortment preference. Especially the effect of expertise has not been well understood so far. On the one hand, novices may prefer assortments with little variety, as these are easier to evaluate. On the other hand, novices have more to learn, and may therefore prefer highly varied assortments. An empirical study, in which 116 respondents ranked assortments, examines consumers' preference for assortments that differed in three variety components: assortment size, dispersion across attribute levels, and dissociation between attributes. Scenarios were used to manipulate preference awareness and expertise. Both expertise and preference awareness significantly change assortment preferences. When consumers know which product they want to buy (have a preference for a specific bundle of attribute levels), and know that it is in store, they prefer smaller assortments, and do not seem to care about attribute dispersion. Apparently, assortment size is a strong cue for search costs, contrary to attribute dispersion and dissociation. Experts prefer large assortments with high attribute dispersion. Novices, on the other hand, prefer small assortments. They still prefer assortments with more attribute dispersion, although to a lesser degree than experts do. Overall, novices do not seem too concerned about getting to know the product category. Rather, they prefer assortments with few products that are very diverse, presumably because the decision process in these assortments is easy. We discuss implications for assortment research and retail management.

4.1 Introduction

Assortment variety may have positive and negative effects on consumers' assortment preferences, which poses a dilemma to retailers. Raftery (1993) formulates it as follows:

> *"When it comes to product variety, shoppers tend to send out mixed signals. They like supermarkets to offer a wide variety of products. At the same time, they think that stores carry too many items".*

The key question of this chapter is: When are (stores that offer) assortments with low levels of variety preferred over (stores that offer) assortments with high levels of variety? Although potential negative consequences of assortment variety have been mentioned (Kahn & McAlister 1997; Lehmann 1998), several empirical studies indicate that consumers' perception of variety is a good predictor of store preference (Broniarczyk, Hoyer & McAlister 1998; Hoch, Bradlow & Wansink 1999). Empirical studies of Iyengar and Lepper (2000) show that consumers have an initial preference for high variety assortments, even when this leads to choice difficulty and frustration. Given that there are diverse propelling reasons why consumers prefer more varied assortments, such as a higher probability of finding a preferred product, possibilities for choice of different products over time, and flexibility (Hoch, Bradlow & Wansink 1999; Kahn 1998; Kahn & Lehmann 1991), consumers may favor high variety assortments in general. The aim of this chapter is to identify how preference awareness and expertise impact consumers' preference for assortment variety. We show that situations arise where consumers prefer assortments with low variety to assortments with high variety, i.e. where 'less is better'.

Offering an optimal level of variety is of great importance to retailers. Not only may consumers prefer to go to competing stores if the level of variety is too high or too low, offering excessive variety also leads manufacturers and retailers to incur extra costs, such as inventory costs, production cost, costs of displaying and selling products, and administrative costs (Fisher & Ittner 1999; Knauth 1949; Pessemier 1980). Therefore, offering unwanted variety means unnecessary costs (Elton & Mercer 1969; Van Ryzin & Mahajan 1999). A better understanding of the factors that determine consumers' preference for assortment variety can be very helpful for retailers.

The main contribution of this chapter is the identification of conditions in which consumers prefer assortments with lower levels of variety. We show how two potential moderating variables, expertise and preference awareness, influence the relation between assortment variety and assortment preference. Retail literature has examined potential positive and negative consequences of assortment variety for consumers (Kahn 1998), but not the effect of moderating variables such as preference awareness and expertise.

The next section summarizes the retailing literature concerning consumers' preference for assortment variety. Subsequently, preference awareness and consumer expertise are examined, and hypotheses regarding their effect on the relation between assortment variety and assortment preference are formulated. A study, in which consumers rank diverse types of assortments, tests these hypotheses.

4.2 Assortment evaluation and preference

The issue of assortment composition and its effects on consumer choice of and preference for assortments as a whole has seen relatively little research until recently (Koelemeijer & Oppewal 1999). Yet, retail assortments form an important part of store image. Consumers care about the selection and variety offered by stores, and they consider the products and total assortment of stores important for store image (James, Durand & Dreves 1976; Lindquist 1974-75; Zimmer & Golden 1988). Several of the top-ten important attributes of stores relate to the product assortment that is offered (Hansen & Deutscher 1977-78).

Recently, studies appeared that examine the influence of assortment variety on consumers' preference for assortments (e.g. Broniarczyk, Hoyer & McAlister 1998; Kahn & Lehmann 1991). Scholars have posited positive, negative, and curvilinear relations between assortment variety and assortment preference. Table 4.1 provides an overview. The studies in the table all examine assortment variety or a variety-related construct such as assortment size, and its impact on store preference or related constructs. Studies that examine product choice but not assortment / store choice were not included. In addition, studies examining consumers' preference for sets that are purchased in their entirety, such as sets of magazines to which a consumer subscribes (e.g. Bradlow and Rao 2000; Farquhar & Rao 1976), were not included. Although assortment variety is an important construct for those product sets, there are two important differences with retail assortments. First, since all products will eventually be consumed, a negatively evaluated product can seriously impact the preference for the set. For retail assortments, even an extreme negative evaluation of one of the products does not necessarily imply a negative evaluation of the total assortment. Second, variety in a purchase set may be less valued than variety in a retail assortment. Consumers may prefer a high degree of variety in a retail assortment, even when they will purchase less varied products, for instance because high variety in retail assortments makes it more likely that the shopping trip is successful.

Table 4.1 The influence of assortment variety on store preference – literature overview

Reference	Variety-related construct (independent variable)	Dependent variable	Direction of effect	Empirical test	Dataset	Product category
Bliss 1953	Variety of products	Demand for the services of a store	Positive	No		
Baumol & Ide 1956	Number of products	Decision to shop	Inverted U	No		
Boatwright & Nunes 2001	Number of SKU's	Sales	Negative	Yes	710 customers of online grocer	42 categories of grocery store
Broniarczyk, Hoyer & McAlister 1998	Variety perception	Store choice	Positive	Yes	212 students and 229 spectators in volleyball tournament	Microwavable popcorn
Gourville & Soman 2000	Assortment size (brand line)	Brand share	Dependent on type of attribute	Yes	300 shoppers, 320 students and staff, 280 shoppers	Microwave ovens, laptop computers
Handelsman & Munson 1985	Assortment size	Store preference	Inverted U	No		
Hoch, Bradlow & Wansink 1999	Variety perception	Satisfaction and store choice	Positive	Yes	177 students	Hypothetical products (jinkos)
Huffman & Kahn 1998	Variety perception	Satisfaction with choice process	Negative	Yes	78 students, 65 students	Hotels and sofas

[Table 4.1 continued]

Reference	Variety-related construct (independent variable)	Dependent variable	Direction of effect	Empirical test	Dataset	Product category
Iyengar & Lepper 2000	Number of products	-Assortment attraction -Purchase -Joy in decision process -Choice difficulty -Frustration	-Positive -Negative -Positive -Negative -Negative	Yes	754 shoppers at grocery store, 197 students, 134 students	Exotic jams, essays, chocolates
Kahn 1998	Variety perception	Satisfaction and loyalty	Inverted U	No		
Kahn & Lehmann 1991	Number and uniqueness of products	Assortment choice	Positive	Yes	Students and 7^{th}-grade girls	Snack foods, television shows
Kahn & McAlister 1997	Variety perception	Store preference	Positive or Negative	No		
Koelemeijer & Oppewal 1999	Number of products	Store attraction	Positive	Yes	741 consumers from a panel	Cut flowers
Lehmann 1998	Assortment variety	Consumer benefits / social welfare	Negative	No		
Meyer 1997	Assortment size	Decision to stop searching new assortments	Positive	Yes	60 students	Backpacking tents
Van Herpen & Pieters 2000b	Assortment variety	Expected success probability Expected choice effort	Positive Negative	Yes	110 and 62 students	Hypothetical products (jinkos), dishwashers

4.2.1 Variety enhances preference

Several of the studies summarized in Table 4.1 assume that more variety will generally be beneficial to consumers (Hoch, Bradlow & Wansink 1999; Kahn & Lehmann 1991), because variety increases the probability of a successful shopping trip (Baumol & Ide 1956). Chapter 3 also indicated that effects of variety on expected success likelihood are relatively large, compared to its effects on expected choice effort. Furthermore, variety has the added benefits of offering consumers the possibility of variety seeking over time, and the flexibility in making the product choice. A highly varied assortment allows consumers to make a more accurate choice, i.e. a choice that is closer to their individual product preference. Varied assortments will also offer dissimilar products to consumers, which can be preferable to them. There is evidence that consumers prefer products that are differentiated from other products, even when this differentiation is based on trivial attributes (Broniarczyk & Gershoff 1997; Carpenter, Glazer & Nakamoto 1994).

4.2.2 Variety reduces preference

Assortment variety can have negative consequences for consumers as well. These negative effects of variety include increased confusion over what is the better product and increased choice effort for the consumer (Handelsman & Munson 1985; Kahn & McAlister 1997; Lehmann 1998). Consumers may only prefer varied assortments with differentiated products when the product differentiation helps them in resolving their choice conflict. Consumers prefer a differentiated product because the differentiation provides them a reason to choose and start the consumption process (Brown & Carpenter 2000). Highly varied assortments, that provide many different products, may instead increase the difficulty of making a decision. All products differ from each other, and give reasons for choice. These assortments may require more time and cognitive effort in the choice process, give a higher chance of choosing a sub-optimal product, or present more anxiety and potential regret to the consumer. When confronted with such difficult choices, consumers may choose from a less varied product line instead (Gourville & Soman 2000), or they may even defer from choosing at all (Tversky & Shafir 1992). Research has found that when the perceived complexity in an assortment can be diminished by presenting the information differently, consumers' satisfaction with the chosen product and with the decision process increases (Huffman & Kahn 1998). Although studies have found negative effects of assortment size and variety on choice difficulty, initial assortment preference may be in favor of high variety assortments.

4.2.3 Components of assortment variety

Before discussing the evaluation process, we will focus on the components of assortment variety that become apparent from Table 4.1. Many of the studies of Table 4.1 have examined the size of an assortment as the independent variable affecting assortment evaluation and preference. Although this is a relevant and important variable, the concept of assortment variety is broader. Variety not only consists of assortment size, but the uniqueness of the products also needs to be considered (Pessemier 1985; Kahn & Lehmann 1991). Product uniqueness can be considered by taking product dissimilarity into account, or by considering the diversity of attribute levels that occur in the assortment. Focusing on the attribute levels has specific advantages. First, it is more consistent with information processing research that showed consumers' tendency to use attribute information in large assortments (Bettman, Luce & Payne 1998), and with assortment research that showed consumers' preference for attribute information over product information (Huffman & Kahn 1998). Second, the availability of attribute levels has been shown to have a large impact on sales (Boatwright & Nunes 2001), thereby indicating its relevance for assortment preferences. Third, an attribute-based conceptualization of variety offers a good prediction of consumers' perceptions of variety (Van Herpen & Pieters 2000a).

The attribute-based approach from Chapter 2 distinguishes three components of variety: (1) total size of the assortment, (2) dispersion across attribute levels, and (3) dissociation between attributes. The total size of an assortment is a simple count of the number of products in the assortment. It is an evident assortment property, which has been studied on its own regard, as becomes clear from Table 4.1. It is also a component of assortment variety: when an assortment contains more products, it offers more variety (Kahn & Lehmann 1991).

Assortment size has been used as a proxy for variety (e.g. Chiang & Wilcox 1997), but it does not consider the degree to which the products differ from each other. Therefore, two other aspects of variety are added. The degree of dispersion across attribute levels refers to the proportion of products with certain attribute levels. Are all products red, or are some of the products blue? Attribute dispersion increases when attribute levels are more equally dispersed. The third aspect measures whether the different attributes are dissociated from each other. For instance, when size and form have a low dissociation, we might find several large red products and small blue products, but no small red products. When the dissociation is high, we might find all possible color-size combinations. Therefore, dissociation is positively related with assortment variety.

4.2.4 The importance of accuracy versus effort

Consumers' evaluations of retail assortments can be placed in an accuracy-effort framework, conform Chapter 3. Accuracy and effort are metagoals of consumers, which capture the most important motivational aspects of decision making (Bettman, Luce & Payne 1998). The accuracy of a retail assortment refers to the likelihood that a consumer can make a successful purchase from the assortment, while the effort refers to the costs (mental, time, money) of the consumer in choosing.

The potential negative effects of assortment variety, in terms of choice difficulty, frustration with the choice process, increased mental costs, and less accurate choices due to a use of choice heuristics, have all been mentioned frequently (Baumol & Ide 1956; Handelsman & Munson 1985; Kahn 1998; Kahn & McAlister 1997; Lehmann 1998). Especially extremely high levels of variety have been associated with these negative effects, leading some researchers to propose an inverted U relation (see Table 4.1). Assortment variety may be beneficial up to a point only, after which the negative effects become overwhelming. Studies have also empirically found negative effects of assortment size and variety on choice difficulty (Iyengar & Lepper 2000; Van Herpen & Pieters 2000b). Yet, most empirical results to date indicate that consumers' perception of variety is a good predictor of store satisfaction and store choice (Broniarczyk, Hoyer & McAlister 1998; Hoch, Bradlow & Wansink 1999), and that consumers are attracted to larger assortments (Iyengar & Lepper 2000; Koelemeijer & Oppewal 1999).

The most compelling evidence of consumers' preference for high variety assortments comes from a set of studies by Iyengar and Lepper (2000). Their studies provide evidence that consumers prefer assortments of larger size even when this proves detrimental to their subsequent satisfaction with the chosen product. In large assortments, their participants reported the decision-making process as more enjoyable, more difficult, and more frustrating. Iyengar and Lepper propose choice overload and an increased sense of responsibility as potential reasons for their results. Despite the increase in choice difficulty and frustration, participants were attracted to the larger assortments. This raises the issue if and when the potential negative effects of assortment variety can induce consumers to shift their preferences towards assortments with less variety.

In spite of the potential negative consequences, consumers may generally prefer more varied assortments. The positive consequences of assortment variety may be too large to be overcome by potential choice difficulty. Varied assortments provide a higher probability that a desired product is available – thereby decreasing the potential need for another shopping trip. Perhaps consumers are willing to trade off an increased probability of needing another shopping trip for the extra difficulty in making their choice. In addition,

consumers inherently like variety. Research on variety seeking has found that consumers prefer variety, even when they would have enjoyed an item set with less variety better (Ratner, Kahn & Kahneman 1999). When consumers also have an inherent preference for assortments that offer high degrees of variety, the potential negative effects of assortment variety may not be sufficient to change these preferences. Therefore, we expect that, on average, increased assortment variety leads to increased store preference:

H1: Consumers prefer assortments of large size, with high dispersion across attribute levels, and high dissociation between attributes to assortments of low size, with low dispersion across attribute levels, and low dissociation between attributes.

4.3 Preference awareness

Consumers make at least two basic decisions before they purchase a product: they decide in which store they will buy, and they decide which product they will buy. The order of these choices is not fixed. Store choice may precede or follow product choice. When a consumer enters a store, his/her purchase plans can range from planned beforehand to unplanned or impulse buying behavior (Kollat & Willett 1967). Consumers may know exactly which product and brand they want to buy, or, on the other extreme, they may not have considered buying the product at all until they see it in the store. This latter stage is not relevant for our discussion: when a consumer does not expect to make a purchase in a category, assortment variety in that category is not likely to influence store preference. Therefore, we focus on two typical examples of planned purchases: (1) the consumer knows both the product and brand to buy (high preference awareness), and (2) the consumer knows the product category to buy, but not the product or brand (low preference awareness). In the first situation, the consumer is completely aware of his/her preference, and has chosen which specific product (bundle of specific attribute levels) (s)he wants to buy. In the second situation, preference awareness is low, and the consumer will make his/her product choice in the store (cf. Simonson 1999). The consumers knows the product category in which (s)he want to buy, but not the specific attribute levels. These two situations are similar to the 'extensive problem solving' and 'routinized response behavior' decision processes, which depend on the strength of the attitude toward specific products (Howard & Sheth 1969).

4.3.1 High preference awareness

The situation where consumers know beforehand the brand and variant to buy has been described, and called the preprocessed choice (Bettman & Zins 1977). This situation is becoming more common. As consumers are becoming pressed with time, they want to find

the product they need fast, without spending time and effort on shopping around (Kurt Salmon Associates 1996).

When a consumer knows which products (s)he wants, the absence or presence of other products in the retail assortment may become less relevant for this consumer. This is supported by the study of Broniarczyk, Hoyer and McAlister (1998). When consumers had a preferred product, they found no effect of the number of different products offered on perceived assortment variety, given that the preferred product was present in the assortment. Essentially, the consumer is not extremely interested in what other products are offered, as long as the preferred alternative is there. Kahn and Lehmann (1991) make a similar proposition when they state: "in some product classes, where brand loyalty is extremely high (and preference for a single item dominates all others) ... we would expect the value of the most-preferred brand to contribute very heavily, perhaps exclusively, to the value of the assortment" (p. 297). Yet, assortment variety can affect the ease with which a product can be located in the store. Time costs, the opportunity costs of spending time on the decision, will rise, since it will take more effort to find the preferred product in the assortment (Loewenstein 1999).

High numbers of products can be inconvenient and distracting to consumers who know what they want and whose favorite product is present (Oppewal & Koelemeijer 2000). When the number of products in a store is low, and the products themselves are diversified (low attribute dispersion and dissociation), it will be easier to find a specific product. The products differ more from each other, so the preferred product should stand out more.

4.3.2 Low preference awareness

Rather than retrieving preferences from memory, consumers often construct their preferences at the moment of product choice, (Lehmann 1998; Simonson 1999). For most food and drink products, the percentage of specifically planned purchases (either brand or SKU is known) can be 15% to 20%, depending on the category, leaving a great amount of purchase decisions that are made in-store (Qureshi & Baker 1998). Other research mentions no less than 60% of purchase decisions being made in the store (Dussart 1998). This is likely to happen for infrequent purchases, such as washing machines, and for purchases where fashion styles are important, such as clothes. In constructive choice processes, consumers make up the choice rules in the store, when they are confronted with the alternative options (Bettman & Zins 1977). They use the assortment in a store to determine the attractiveness of the products, and which product they may want to buy (Prelec, Wernerfelt & Zettelmeyer 1997; Simonson 1999).

When consumers expect to make their choice in-store, and need to learn their preferences from the assortment of products, variety becomes important. Variety increases the likelihood that the assortment has an appropriate product. In addition, assortments with very diverse products provide a better spectrum of what is available, and offer a greater opportunity for consumers to learn their preferences.

4.3.3 The influence of preference awareness on assortment preference

For both high and low preference awareness, we expect consumers to prefer assortments with high attribute dispersion and dissociation to assortments with low attribute dispersion and dissociation. Consumers with high preference awareness appreciate the differentiation because it decreases the time effort of finding their preferred product. Consumers with low preference awareness appreciate the differentiation because it provides an overview of the products that are available. We expect differences for assortment size. We expect consumers to prefer small assortments when preferences are known, while we expect consumers to prefer large assortments when preferences are unknown:

H2: Consumers with high preference awareness prefer smaller assortments than consumers with low preference awareness do.

4.4 Expertise

Product familiarity gives experienced consumers several advantages over novices: superior knowledge of existing alternatives, knowledge about the plausible relationships among attributes in a product category, and ability to distinguish between relevant and irrelevant information (Johnson & Russo 1984). Experts will know more about the alternatives in the market, as well as about the attributes and attribute levels (Mitchell & Dacin 1996), and they will be able to rapidly recognize standard categories (Sujan 1985). This means that experts can make quicker and more informed evaluations of an assortment than novices.

Consumers' skill in shopping for a particular product category may have an effect on variety and assortment preference (Tatzel 1982). In her discussion of assortment variety, Kahn (1998) distinguishes processing ability as a potential moderator of the relation between assortment variety and preference, and Gourville and Soman (2000) mention it as an interesting avenue for future research. However, no empirical research has yet examined the relation between expertise, variety, and assortment preference.

4.4.1 Experts

If consumers are experts in the product category, they can probably handle high levels of variety (Iyengar & Lepper 2000). An increase in the number of products will present experts with minor difficulty and perhaps more pleasure. In addition, experts are expected to prefer assortments with diverse products, since these provide them with a better overview of the product category. They like stores that offer them many diverse products. Schiffman, Dash and Dillon (1977) found that specialty store consumers prefer large assortments, which they attribute to the "more sophisticated shopper, who not only can cope with, but actually prefers a store which offers a wide assortment of ... products and brands" (p. 9-10).

Some support comes from a study by Huffman and Kahn (1998). They showed that consumers are more satisfied with the choice process in a complex assortment when they are confronted with the attribute levels in the assortment. The participants who were shown the attribute levels were able to absorb more of the information provided, and remembered more attribute levels, leading Huffman and Kahn to conclude that this condition facilitated learning the attributes. The construction of the choice process in their study gave participants in this condition more expertise in the product category. Participants with higher expertise perceived the assortment as marginally less complex than participants without this expertise, and were more satisfied with the decision process.

4.4.2 Novices

Do novices prefer increases in assortment variety or not? On the one hand, novices need to learn more, and assortments with high variety can offer them the opportunity to do so. On the other hand, novices may be overwhelmed with the options in assortments with high variety. We examine both possibilities.

Novices have more to learn in the product category than experts. Varied assortments can provide them with the opportunity to learn across a broad range of brands and variants. By providing relevant information, varied assortments may reduce decision uncertainty (Oppewal & Koelemeijer 2000). As they are unfamiliar with the product category, they may want to examine many different items before they make their choice. Highly familiar consumers may search less information before making a choice (Johnson & Russo 1984).

However, there are several reasons why novices may prefer less varied assortments despite the lower learning opportunities. Research has indicated that prior knowledge can facilitate the acquisition of new information (Brucks 1985). This is a cognitive reason for novices to dislike variety: novices may not be able to incorporate the information provided by varied assortments. They may also dislike variety for affective reasons, as it overwhelms

them with options, making their decision difficult. In addition, novices may prefer lesser-varied assortments when they trust the store to make a relevant selection for them. From this point of view, a store with less variety is better at limiting the overwhelming diversity of options into a smaller choice set, and thereby helping the novice consumer in his or her decision process. Overall, we expect this effect to outweigh the learning-effect.

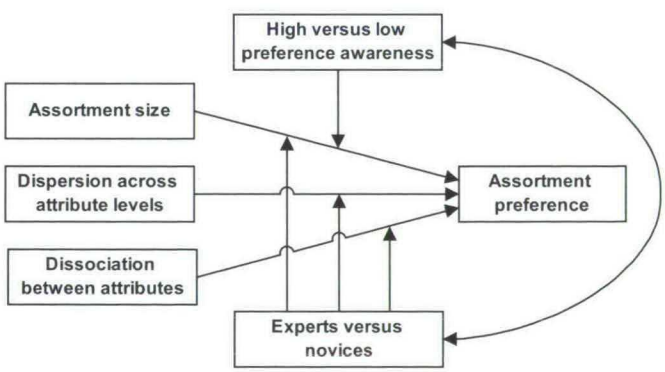
4.4.3 The influence of expertise on assortment preference

We expect the relation between assortment variety and assortment preference to depend on the expertise of the consumer. Experts will prefer more varied assortments than novices:

H3: Novices prefer smaller assortments, assortments with less dispersion of attribute levels, and assortments with less attribute dissociation, than experts do.

Figure 4.1 provides an overview of the expected relations between the variety components, preference awareness, expertise, and assortment preference. We expect positive main effects for all three variety components (Hypothesis 1), and positive interaction effects between the variety components and expertise (Hypothesis 3). In addition, the interaction between preference awareness and assortment size is expected to be negative (Hypothesis 2). The hypotheses concern main effects and interaction effects. We have not formulated hypotheses about potential three-way interactions, but we will explore these empirically.

Figure 4.1 Conceptual model



4.5 Study of assortment preference

To examine the relation between preference awareness, expertise, and assortment preference, a study was conducted for assortments of photo cameras.

4.5.1 Method

Participants and Design. Participants were 116 undergraduate students at a university in the Netherlands. Each participant was shown four short scenarios in terms of expertise and preference awareness. For each of these four scenarios, the participant ranked eight assortments according to preference. The experimental setup was a 2 (preference awareness: low versus high) by 2 (expertise: low versus high) within-subjects design for the scenarios, and a 2 (assortment size) by 2 (dispersion across attribute levels) by 2 (dissociation between attributes) design for the assortments. Instructions to the participants mentioned that different stores have different assortments of photo cameras, and that no store has all the variants that exist. Instructions also indicated that photo cameras can differ on a number of characteristics, such as ease of operation, size, lenses, shutter speed. Participants were instructed that they would read descriptions of persons wanting to buy a photo camera, and asked to rank different stores that this person can visit, from best-to-visit to worst-to-visit.

Design of the scenarios. The scenarios included statements of expertise and preference awareness (person names varied). Expertise was manipulated by describing the person as somebody who either "*knows much about photo cameras. He knows which are the important characteristics of photo cameras*" (high expertise), or "*knows little about photo cameras. He does not know which are the important characteristics of photo cameras*" (low expertise). Preference awareness was manipulated by describing the person as somebody who either "*knows exactly which brand and type of photo camera he wants to buy. He also knows that all stores have the camera of his preference in their assortment*" (high preference awareness), or "*has not yet decided which photo camera he wants to buy, but expects to make this decision in the store*" (low preference awareness).

Short descriptions of persons have been used in psychological research on the polarization and dilution of attitudes towards these persons (Nisbett, Zukier & Lemley 1981; Tesser 1978). These studies indicate that consumers are responsive to descriptions of persons, and can form impressions of persons based on only a few descriptive statements.

Design of the assortments. For each scenario, the participant ranked the same eight assortments according to preference. The store assortments differed on the three variety components: size, attribute dispersion, and attribute dissociation. Instructions to the participants explained that prices, service, warranties, and other conditions were the same for the stores, so that stores only differed with respect to the number and types of cameras in their assortment. The assortment properties were described as follows:

Assortment size: Number of cameras

Dispersion: Differences of the cameras on features. Many differences: e.g. cameras of different sizes. Few differences: e.g. only cameras of about the same size.

Dissociation: Connection between the features. High connection: e.g. cameras of a certain size have the same lens. Low connection: e.g. cameras of a certain size have a different lens.

Procedure. The study was administered on personal computers using the program Authorware (Macromedia 1997). An example of a scenario with assortments to be ranked is provided in Appendix C. Participants took about 10 minutes to complete the study and received the equivalent of $ 2.50 as payment.

4.5.2 Analytic approach

There are 116 participants who rank 8 assortments in four different scenarios. Let Y_{ij} be the rank given to assortment j (j = 1, ..., 8) by participant i (i = 1, ..., 116). We assume that a participant i has an unobserved utility U_{ij} for each assortment j, which is the sum of a systematic component μ_{ij} and a random component ε_{ij}. The μ_{ij}'s reflect the degree to which participant i prefers assortment j to other assortments. We assume that the stochastic components ε_{ij} are independent and identically distributed, with extreme value distributions, which leads to an exploded logit formulation (Allison & Christakis 1994; Kamakura & Mazzon 1991; Lareau & Rae 1989). Let $\delta_{ijk} = 1$ if $Y_{ik} \geq Y_{ij}$, and 0 otherwise. The model implies the following likelihood L_i for a single participant (Allison & Christakis 1994):

$$L_i = \prod_{j=1}^{J} \left[\frac{\exp\{\mu_{ij}\}}{\sum_{k=1}^{J} \delta_{ijk} \exp\{\mu_{ik}\}} \right] \tag{1}$$

To test the hypotheses, the following model will be estimated:

$$\begin{aligned} \mu_{ij} = {} & \gamma_1 Size_j + \gamma_2 Disp_j + \gamma_3 Dissoc_j + \beta_1 Size_j * PA_i + \beta_2 Disp_j * PA_i + \beta_3 Dissoc_j * PA_i \\ & + \beta_4 Size_j * Exp_i + \beta_5 Disp_j * Exp_i + \beta_6 Dissoc_j * Exp_i + \beta_7 Size_j * PA_i * Exp_i \\ & + \beta_8 Disp_j * PA_i * Exp_i + \beta_9 Dissoc_j * PA_i * Exp_i \end{aligned} \tag{2}$$

where: *Size* = Assortment size (high size = 1, low size = 0)
Disp = Dispersion across attribute levels (high dispersion = 1, low dispersion = 0)
Dissoc = Dissociation between attributes (high dissociation = 1, low dissociation = 0)
PA = Preference awareness (high preference awareness = 1, low preference awareness = 0)
Exp = Expertise (expert = 1, novice = 0)

The model in (2) includes three dummies for the variety components, as well as interaction terms between scenario dummies and variety components. Main effects for preference awareness and expertise can not be included, as the average rank order is fixed across person characteristics. The model was estimated using special routines in STATA 7.0 (Stata Corporation 2001; Weesie 1999).

4.5.3 Results

Table 4.2 provides the resulting mean rank numbers for each of the eight assortments in each of the four conditions, and in Figure 4.2 and Figure 4.3 these mean ranks are graphically depicted. In these figures, higher inversed average rankings refer to higher assortment preference. Results of the model estimation are provided in Table 4.3. This model includes main effects for assortment size, attribute dispersion, and attribute dissociation, and the interaction effects of these variety components with preference awareness and expertise. Results for the main effects show a positive effect for assortment size (coefficient = .23; p = .006) and attribute dispersion (coefficient = .52; p < .001), supporting hypothesis 1, but a non-significant effect for attribute dissociation (coefficient = -.15; p = .059). Overall, assortments of large size and high attribute dispersion are preferred.

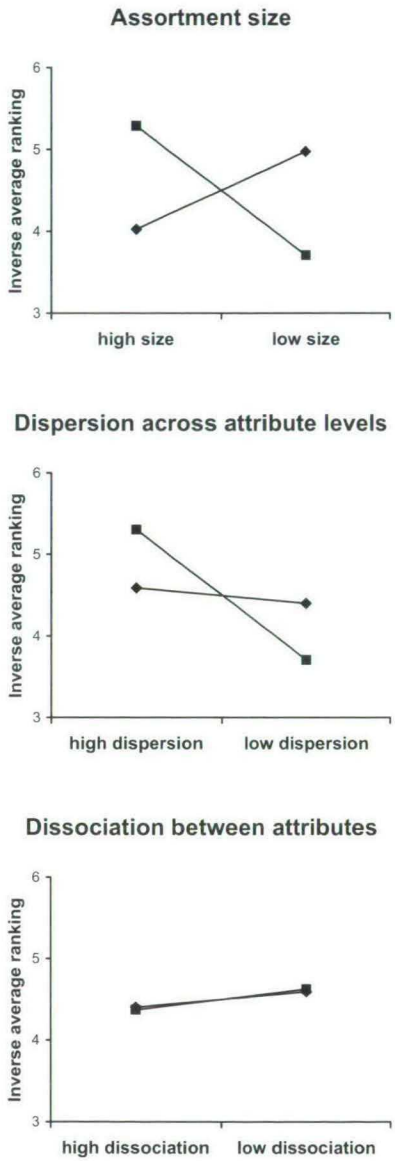
Preference awareness. The interaction effects of preference awareness with assortment size and attribute dispersion are both significant. Hypothesis 2 proposed a negative interaction effect for assortment size, which is indeed supported (coefficient = -.98; p < .001), but no other interaction effect. The results indicate that consumers with low preference awareness, i.e. who expect to make their choice in the store, prefer not only assortments with more products, but also assortments with more dispersion of the attribute levels, than consumers with high preference awareness (coefficient = -.58; p < .001). Subsequently, we estimated separate models for high and low preference awareness (Table 4.4). The table shows that only consumers with low preference awareness care about attribute dispersion. Attribute dispersion has no significant effect in conditions with high preference awareness (p = .649), while it has a significant positive effect in conditions with low preference awareness (coefficient = .92; p < .001). Consumers who know what they want to buy, and are sure that this product is in store, do not seem to care about the degree of product diversity. They only care about the number of products in the assortment (coefficient = -.49; p < .001), presumably because less products means lower search costs.

Table 4.2 Mean rank numbers for the assortments [1]

Assortment	Assortment size	Attribute dispersion	Attribute dissociation	High preference awareness		Low preference awareness	
				Expert Mean ranking (*se*)	Novice Mean ranking (*se*)	Expert Mean ranking (*se*)	Novice Mean ranking (*se*)
1.	High	High	Low	4.63 (2.86)	5.28 (2.64)	2.10 (1.33)	3.84 (2.69)
2.	High	High	High	4.60 (2.57)	5.24 (2.35)	1.98 (1.36)	4.04 (2.51)
3.	High	Low	Low	4.72 (1.65)	5.03 (1.80)	3.94 (1.57)	4.45 (1.78)
4.	High	Low	High	5.09 (1.72)	5.20 (1.63)	4.34 (1.54)	4.97 (1.92)
5.	Low	High	Low	3.95 (1.88)	3.72 (1.83)	4.86 (1.64)	3.85 (2.02)
6.	Low	High	High	4.08 (1.86)	3.71 (1.82)	4.92 (1.59)	4.05 (1.81)
7.	Low	Low	Low	4.23 (2.46)	3.67 (2.29)	6.73 (1.46)	5.21 (2.39)
8.	Low	Low	High	4.69 (2.81)	4.16 (2.83)	7.11 (1.34)	5.59 (2.39)

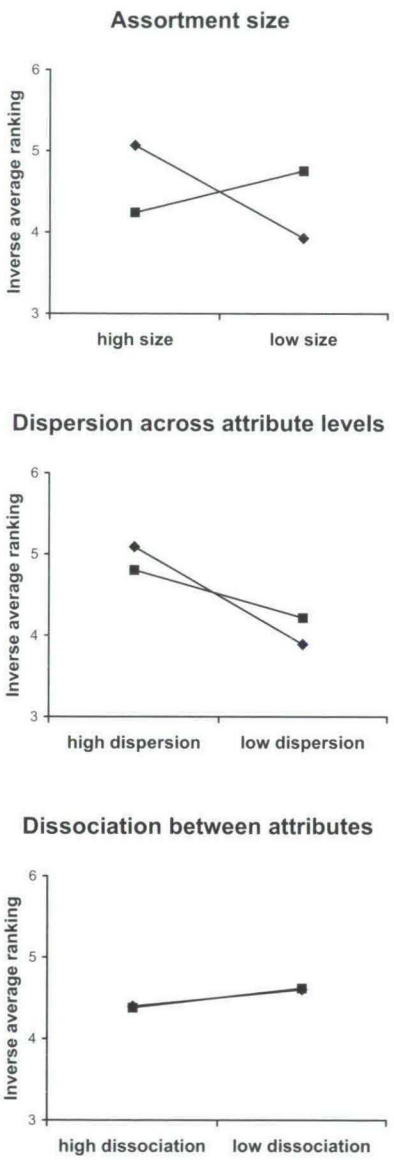
[1] Higher values indicate a lower preference for the assortment. Overall mean is 4.5. Means and standard deviations provided.

Figure 4.2 The effect of preference awareness on assortment ranks



Legend: ■ = low preference awareness
◆ = high preference awareness

Figure 4.3 The effect of expertise on assortment ranks



Legend: ■ = novice
◆ = expert

Table 4.3 Estimates of the overall model of assortment preference

Variety aspects and interactions with scenarios	Coefficient (*se*)	*z*-value	*p*-value
Assortment size	.23 (.09)	2.75	.006
Dispersion across attribute levels	.52 (.08)	6.47	<.001
Dissociation between attributes	-.15 (.08)	-1.89	.059
Preference awareness * assortment size	-.98 (.12)	-7.88	<.001
Preference awareness * attribute dispersion	-.58 (.11)	-5.10	<.001
Preference awareness * attribute dissociation	.08 (.11)	0.77	.439
Expertise * assortment size	1.97 (.14)	13.80	<.001
Expertise * attribute dispersion	1.08 (.13)	8.48	<.001
Expertise * attribute dissociation	-.01 (.11)	-0.07	.947
Preference awareness * expertise * assortment size	-1.47 (.19)	-7.74	<.001
Preference awareness * expertise * attribute dispersion	-.92 (.17)	-5.41	<.001
Preference awareness * expertise * attribute dissociation	-.04 (.15)	-0.24	.808
LR Chi^2 803.5 ($p < .001$)			

Expertise. Table 4.3 shows that experts prefer larger assortments than novices, supporting hypothesis 3 (coefficient = 1.97; $p < .001$). Additional separate analyses of conditions with high and low expertise (Table 4.4) show that experts prefer large assortments to small assortments (coefficient = .80; $p < .001$), while novices prefer small assortments to large assortments (coefficient = -.23; $p < .001$). Hypothesis 3 also predicted a positive interaction term between expertise and attribute dispersion. This is indeed supported by our results (coefficient = 1.08; $p < .001$). Table 4.4 shows that in both situations assortments with high dispersion are preferred over assortments with low dispersion ($p < .001$), but this effect apparently is larger in conditions with high expertise. Experts prefer assortments with a high dispersion of attribute levels more than novices do. The expected effect for dissociation between attributes was not found.

Three-way interactions. Significant three-way interactions were found for assortment size and dispersion (coefficient = -1.47; $p < .001$ and coefficient = -.92; $p < .001$ respectively). In situations of low preference awareness, expertise has a larger effect on the preferred size and dispersion of an assortment than in situation of high preference awareness. In other words, when a consumer knows what (s)he wants to buy, it matters less if (s)he is an expert or a novice. When a consumer does not know which product (s)he wants, expertise has a larger effect on the type of assortment that is preferred.

Table 4.4 Model estimates for the scenarios

	High preference awareness		Low preference awareness		Expert		Novice	
	coeff. (*se*)	*p*	coeff. (*se*)	*p*	coeff. (*se*)	*p*	coeff. (*se*)	*p*
Size	-.49 (.06)	.000	1.05 (.07)	.000	.80 (.06)	.000	-.23 (.06)	.000
Dispersion	.03 (.06)	.649	.92 (.06)	.000	.69 (.06)	.000	.24 (.06)	.000
Dissociation	-.08 (.05)	.115	-.15 (.06)	.006	-.13 (.05)	.016	-.10 (.05)	.066
LR Chi^2		66.89		475.74		273.80		38.24
p-value		<.001		<.001		<.001		<.001

4.6 Conclusion

Consumers send out mixed signals about assortment variety. They say they like varied assortments, but complain about choice difficulty in these assortments (Raftery 1993). In this study, we examined when consumers prefer assortments with high versus low levels for three variety components. We examined two moderating variables: preference awareness and expertise. The results of our study indicate that consumers with high preference awareness only care about assortment size, not about the attribute levels in the assortment. Consumers who know the product they want to buy, and know that it is in store, prefer an assortment to have little products. They do not care about the diversity of these products. Apparently, assortment size is a clear indicator of search costs, contrary to attribute dispersion and dissociation. Consumers with low preference awareness care about product diversity. They want retail assortments to carry many products and they want these products to have a high dispersion across attribute levels.

Expertise also affects variety preferences. As expected, experts prefer large assortments with a high degree of attribute dispersion. Novices, on the other hand, prefer small assortments. Novices also want the retail assortment to offer a high degree of attribute dispersion. Although they do not want to be overwhelmed by too many options, they still want to have a broad spectrum of options to choose from. Our analysis of the interaction effects shows that experts care more about attribute dispersion than novices. Novices appear less concerned with the range of the options than experts are. Overall, novices do not seem too concerned about getting to know the product category. Rather, they prefer assortments with few products that are very diverse, presumably because the decision process in these assortments is easy.

Limitations. There are several limitations of this study. First of all, preference awareness and expertise were presented as scenarios. Research in psychology indicates that participants can interpret such textual person descriptions (Nisbett, Zukier & Lemley 1981; Tesser 1978), and we also find that participants to such descriptions respond by expressing different store preferences. Still, future research in naturally occurring situations can build on this to provide additional insight into assortment preferences.

Second, subjective consumer expertise may affect store preference, rather than objective consumer expertise. Although subjective and objective expertise are likely to be correlated, they are not necessarily the same. Sometimes, novices can consider themselves experts. This will affect the type of store they want to visit, but was not considered here.

Third, we did not find the expected results for attribute dissociation. Attribute dissociation is a relatively complex concept, and participants may have been unable to grasp the concept of dissociation clearly. Future research is well advised to carefully describe attribute dissociation so that the meaning is clear to participants, or, better yet, to present assortments with differing levels of dissociation directly. Previous studies in Chapters 2 and 3 showed clear and univocal effects of attribute dissociation when it was presented directly in the form of assortments, as opposed to verbally described.

Fourth, the study only considered 'high' and 'low' levels for the three variety aspects. Individuals may have a different perception of what constitutes a small or large assortment. This does not influence our results, but it does complicate matters when we try to advise retailers on the amount of variety that they should offer. Future research should investigate the exact amounts of variety that consumers prefer. In addition, the treatment of the variety aspects in two levels prevents the examination of potential non-linear relations between the variety aspects and assortment preference. For instance, novices may prefer smaller assortments only up to a point. When assortments become very small, even novices may become concerned with the possibility that the assortment does not have a suitable choice.

Theoretical implications. The main theoretical implication of this study is that consumers can and will adjust their store preferences, depending on the situation they face. Our study identifies conditions where consumers prefer less varied assortments. This can help explain the response in sales when products are eliminated from an assortment. Boatwright & Nunes (2001) found both increases and decreases in sales across product categories when the number of products was reduced. They explained these differences in terms of the type of product reductions, i.e. whether the reductions excluded attribute levels or attribute combinations from the assortment. Differences in average preference awareness and expertise may be other possible explanations. For instance, if most customers are experts for a product category, sales in that category are more likely to decrease with assortment reductions. If most customers are novices, sales may increase instead.

Consumer expertise has been proposed as a potentially interesting factor in assortment research (Gourville & Soman 2000; Kahn 1998). Expertise has been shown to affect the choice process itself (Bettman & Park 1980; Sujan 1985), and the amount of information search within an assortment (Brucks 1985; Johnson & Russo 1984). Our study shows that expertise also affects which stores that a consumer prefers. Novices prefer assortments of lower size. This may make their choices easier, but it also lowers the amount of information from the marketplace that they are confronted with. The store preferences of novices may prevent them from becoming experts, as they are only confronted with a limited proportion of the products that are available.

Managerial implications. Both the effects of preference awareness and expertise have implications for retailers. In a product category where most purchases occur under high levels of *preference awareness*, the specific products that are available may be less relevant. As long as the preferred product is available, consumers do not seem to care about which other products are in store (cf. Broniarczyk, Hoyer & McAlister). Assuming that the level of preference strength is equal for the products, this means that retailers have more opportunities of eliminating low selling products in such product categories. Our results imply that for product categories where consumers generally know which product they want to buy, offering variety beyond this preferred product may actually decrease the attractiveness of the assortment. Retailers and manufacturers are well advised to limit the assortment variety for these types of product categories, especially when product preferences are relatively homogeneous across consumers. By eliminating products, sales may go up (Boatwright & Nunes 2001).

Retailers should also be concerned about the level of *expertise* of their customers, as this will affect their assortment preference. Novices do not appear to be very concerned with learning about the options in a product category. They prefer small store assortments, and although they have a preference for high attribute dispersion, it is not as strong as the preference of experts. Retail stores that cater to novices can meet these preferences by offering selective products of a broad spectrum. Rather than presenting novices with all the products that are available, they can present them with a few distinct product alternatives from the segments in the market. This will make it easier for the consumers to choose among the products, and it will increase store preference.

The apparently low concern with learning about the product category among novices places a great responsibility at the retail stores. When novices prefer to visit stores with fewer products, the assortments in such stores determine the products that novices are exposed to. The assortment of these retail stores can greatly affect the decision process of novices. Since these novices are not exposed to the total spectrum of products in the market, and do not know this spectrum themselves, the retail assortment may lead to biases

in the decision process. This will especially occur when a retail assortment provides a biased sample of the market, and leaves out certain types of products. Retail stores that take their responsibility will have to offer a good but limited selection of all the different products and attribute levels in the market. Since novices prefer assortments with a high dispersion of attribute levels, retailers can use these assortments to attract novices.

Our results provide implications for the *positioning of stores*. Given the results, small stores could position themselves as stores 'where you can easily find your preferred product', or as stores for novices. The ease of choosing or finding the product is the core of such a positioning strategy. Larger and more varied stores could position themselves for consumers who prefer to postpone their choice until they are in the store and faced with the choice process. By offering high variety, these stores offer flexibility to consumers. Large stores can also position themselves as stores where the expert can find all the variety (s)he wants. Alternatively, large stores have the opportunity to attract novices by offering smaller assortments of 'best options'. A 'shop inside the shop' principle can help tailor the store for both experts and novices. Experts are provided with a wide range of products, while novices are presented with a smaller set of products. This can limit the consideration set for novices, and help them make a decision.

Future research. The study was set in a situation where consumers want to buy a single, durable product. When consumers want to buy multiple products at once, variety may be more important. In addition, when consumers expect to make the choice decision more often, they may want to invest more time and effort in the choice process, and they may have a higher preference for assortment variety. Future research could examine this.

The result that novices prefer small assortments may depend on the importance of the purchase. When a purchase is very important, e.g. when the product is expensive or subject to social approval, novices may decide to put in extra effort and learn about the product category. Consequently, they will show a higher preference for large assortments when the purchase is important. This may be examined by future research.

There can be several underlying reasons why novices prefer assortments with less products. They may just not be interested in the product category, and therefore prefer to encounter as little of these products as possible. Alternatively, they may be concerned with coping instead of learning. Small assortments can accommodate this. Another reason may be that novices assume that the retail store has a higher level of expertise than they themselves have. Retail stores act as the 'experts' who limit the choice set for their customers. Retail assortments that contain fewer products are better at their job of limiting all the products into a manageable set for their customers. Future research could examine which of these reasons applies.

5

The Evaluation of Consumers' Product Assortments; A Photographic Exploration of the Consumer's Closet[18]

Consumers' product assortments are assortments of imperfectly substitutable products, such as c.d.'s, shoes or hats, that are owned by consumers. This chapter provides a first exploration into this relatively underexplored field of study. It demonstrates the applicability of retail assortment knowledge to consumers' product assortments, and places assortment variety in a broader context. We examine which assortment properties can predict consumers' satisfaction with their assortments. Whereas the previous chapters focused on assortment variety, this chapter also takes product and attribute evaluations into consideration. A conceptual model of assortment satisfaction for consumers' assortments is introduced, and an empirical study of consumers' assortments of shoes is used to test this model. Results indicate that especially negative evaluations of assortment variety, i.e. the owner considers the number of different shoes in the assortment as (too) low, are predictive of assortment satisfaction. In addition, product evaluations affect satisfaction with consumers' assortments. Implications for assortment theory are discussed.

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[18] Parts of this chapter appeared in: Van Herpen, Erica, en Rik Pieters, 1999, "The Evaluation of Consumers' Product Assortments", *European Advances in Consumer Research*, Vol. 4, 89-96. This chapter has also been the basis for a presentation at the 27th EMAC Conference, May 20-23 1998, Stockholm, Sweden. We are thankful to Hoogenbosch Retail Group, I.P.M., E.I.M. and NIPO for their help in the data collection. We also thank Nathalie Smeets for her help in coding photographs.

5.1 Introduction

Consumers own various assortments of products, i.e. sets of items that satisfy a similar need. The products are distinct alternatives from a single product category. Examples of such assortments are sets of c.d.'s, books, trousers, or shirts. Products in these assortments have the same usage goal, but are imperfect substitutes of each other (Walsh 1995). Usage situation can have a sizable influence on which product from a category is preferred (Belk 1974; 1975; Warlop & Ratneshwar 1993). For example, a consumer may listen to a different c.d. when she is home alone, than when she is giving a party for friends. The c.d.'s provide the same general usage goal – musical entertainment – but which specific c.d. is picked from the total assortment depends on the usage situation. Consumers build their assortments with products that are suitable for many anticipated usage situations (Green, Wind and Jain 1972). They actively attempt to balance the attributes in the consumers' assortments (Farquhar & Rao 1976), in order to compose a total assortment that contains the specific attribute combinations required for the various usage situations they encounter.

Marketing interest stems from an expected effect of consumers' assortments on satisfaction and subsequent buying decisions. In an early study, Alderson (1965) already points out that "the emphasis is no longer on the cost benefit ratio for the single item but on the assortment into which the item will fit" (p.144). A consumer may buy a lesser preferred product, if it fits better in the total assortment than a more preferred product. Green, Wind and Jain (1972) also argue that: "... The purchase of many products is conditioned, to some extent, by ... what products she [the purchaser] currently has in inventory...".

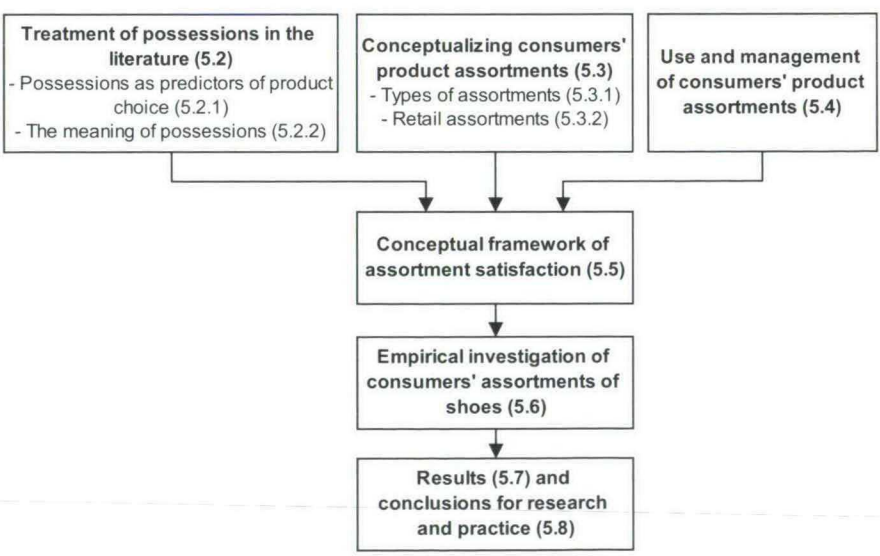
Consumers' assortments are not only an interesting topic for their expected effect on future purchase behavior, but they form an interesting area of research in and of themselves. The way in which consumers use and manage their products can provide valuable information for manufacturers (Boyd & McConocha 1996). For instance, previous research has assessed the influence of product supply and package size on usage behavior by consumers (Folkes, Marin & Gupta 1993; Wansink 1996), which has implications for package size decisions. Similarly, an investigation of consumers' use and satisfaction with their product assortments can provide additional insights, and offer guidelines for marketing practice. For instance, if consumers appreciate variety in their own assortments, this may have implications for the variety decisions of manufacturers and retailers.

While consumers' product assortments are claimed to be important for understanding consumer behavior, they have rarely been studied. There are related areas of study, such as stockpiling behavior, but while assortments and stocks share characteristics they are quite different, as was discussed in Chapter 1. By examining consumers' product assortments, this chapter provides a first exploration in this underexplored area of research.

Consumers' product assortments differ from retail assortments. The main difference is that in retail assortments a subset of the n products in the assortment is chosen by the consumer. Often, this subset contains only one product. Conversely, consumers own all the n products in consumers' product assortments. This has several implications. In retail assortments, the most preferred product from the assortment may have a large impact on consumer satisfaction with the assortment, since only this most preferred product will be chosen. For consumers' product assortments, the evaluation of each and every product may have a large impact, since all products are in the possession of the consumer, the assortment is relatively small, and consumers have more experience with the products.

Given these differences between retail assortments and consumers' product assortments, it is not evident if knowledge from retail assortment studies is directly applicable to consumers' assortments. The previous chapters in this dissertation identified assortment variety as a key variable in assortment research. This chapter examines if variety plays a similar role in consumers' product assortments, and if the measures and conceptual relations found for retail assortments can be transferred to these assortments. In addition, this chapter will extend the assortment variety framework by also examining other assortment properties, such as the evaluation of products and attributes, that may influence assortment satisfaction. It will provide a conceptual model of the relationship between assortment properties and satisfaction, and a first empirical test of this model for consumers' assortments.

Figure 5.1 Structure of Chapter 5



Section 2 introduces literature on consumers' possessions. Next, section 3 conceptualized consumers' product assortments, and compares them to retail assortments. Section 4 discusses the use and management of consumers' product assortments by their owners. Next, diverse assortment properties are identified, and a conceptual model of assortment satisfaction is provided. This model is tested for assortments of shoes. Implications for both assortment theory and practice are discussed. Figure 5.1 provides an overview of the chapter.

5.2 Consumers' possessions

Consumers' possessions have been a topic of research in two ways: to predict future choice behavior, and to gain insight in the meaning and role of products in everyday life.

5.2.1 Possessions as predictors of product choice

Historically, economic theory has been primarily concerned with consumer's choice of products, while the consumption process, i.e. what consumers do with products once they have bought them, has received considerably less attention (Solomon 1983). When possessions were examined, the main thrust of the investigation was on their ability to help in predicting future choice.

Quenon (1951) was one of the first to advocate an examination of the products in the possession of consumers. By asking which products a consumer likes best and which products (s)he likes least, and examining the attributes of these products, he distills which attribute levels determine a products' liking. Quenon demonstrates the application of this method to consumers' preferences for children's boxer shorts. Housewives were contacted, and each woman was asked to show the one pair of children's boxer shorts that she liked the best of all those in her possession, and the one pair of boxer shorts that she liked least. These products were consequently examined on a list of quality and style attributes. By examining and comparing the attribute levels of the products in both groups, consumers' preferences were mapped and used to predict product choice.

The idea that current possessions reveal consumers' preferences has also featured in more recent research (Allen & Ng 1999). Possessions have been used to predict future choices. For instance, the ownership of durable products has been used to predict replacement intentions (Bayus & Gupta 1992), replacement timing (Tippett, Magrabi & Gray 1978), and the purchase of other durables (Pickering 1977; Winer 1985). In addition, the effect of past behavior on future behavior has been examined in attitude-behavior research (see Eagly & Chaiken 1993 for an overview). Consumers are creatures of habit:

the behavior that consumers have exhibited in the past, can predict how they will behave in the future (Albarracín & Wyer 2000; Kokkinaki 1999). Ouellette and Wood (1998) provide a meta-analysis of this relationship, and show that past behavior is an important predictor of future behavior.

Studies that focus on predicting future product choices have generally not considered product sets that are possessed by consumers. Single instances of past behavior have been examined, but not total sets of products. The influence of product assortments on future choice behavior will differ from the influence of past behavior in attitude-behavior studies. There, past behavior influences future choices through habit formation: once a product has been consumed, the consumer buys the same product again out of habit. For consumers' product assortments, a consumer buys a product to complement a set of related products that (s)he already owns. Therefore, a future product choice will generally not be identical to the previous product choice, but still, these choices will be related to each other.

5.2.2 The meaning of possessions

In the 1980's and 1990's, a separate stream of research emerged, in which consumers' possessions were examined for their ability to provide information on consumer behavior, without an explicit link to future purchases. Belk (1988, p. 139) states that "we cannot hope to understand consumer behavior without first gaining some understanding of the meanings that consumers attach to possessions", as e.g. is frequently done in anthropology.

Anthropologists show how possessions form the building stones of a society. Products let consumers make sense of their environment. In some cultures, such as the pastoral people of the Sudan, cattle is used in many different ways: the members of such cultures eat cattle, drink the milk, marry and pay debts with cattle (Douglas 1979). Cattle forms the basis of their culture, whereas other types of possessions form the basis of other cultures. The insights given by the anthropologist examination of other cultures, have been used to understand our own use of possessions in providing meaning to the world around us. As McCracken (1988, p. 581) states: "Consumer goods have a significance that goes beyond their utilitarian character and commercial value. This significance rests largely in their ability to carry and communicate cultural meaning".

Scholars in the area of consumer research also became aware of the social aspect of possessions. Products can be used to convey self-concepts to others, and act as socially significant symbols (Solomon 1983; Wallendorf & Arnould 1988). For instance, within a culture, clothing style can signal a person's social class and personality. In this sense, products are the basis of social life. Solomon (1983) argues that the symbolism embedded in many products is a major reason for their purchase and use, and that the social evaluation

of individuals is largely based on their possessions. Belk (1988) takes this a step further, and proclaims that "we are what we have" (p. 139). He discusses how possessions are an important part of a consumer's sense of self. The products we own contribute to who we are. Consumers are more likely to be satisfied with the possessions that are part of their extended self (Sivadas & Venkatesh 1995). Especially the owners' personal history with a product can add to the product's meaning. Hence, possessions have both a social or public meaning and a private meaning (Richins 1994a).

What does this imply for consumers' product assortments? In general, studies in this stream of research acknowledge the importance of product interactions and product sets. Products do not make a statement by themselves, but in relation with other products (Douglas 1979; Solomon 1983). The studies focus on single favorite possessions of consumers (Richins 1994a; 1994b; Wallendorf & Arnould 1988), or special product sets such as collections (Belk 1988), and not on assortments. Yet, the main conclusion, that possessions have a special meaning and value for their owners, has implications for consumers' product assortments. If consumers attach meaning to individual products, product evaluations may have a relatively large impact on the evaluation of an assortment. Since product evaluations are readily available in memory or can be easily constructed from experience, consumers may prefer a product-based approach to assortment evaluations.

5.3 Conceptualizing consumers' product assortments

Our possessions do not stand alone, but are interrelated with each other, and form product sets. The consumer's product assortment is one example of such a set, but a consumer also possesses other types of product sets. We refer back to Chapter 1, where four product sets that are owned by consumers were distinguished: consumption systems, collections, stocks, and consumers' assortments. Here, we examine consumers' product assortments in more detail, and distinguish types of product assortments. Next, differences and similarities with retail assortments are highlighted.

5.3.1 Types of consumers' assortments

The products in consumers' assortments may be durables or nondurables, i.e. the same product can be used in multiple usage situations (books, trousers), or the product is gone after consumption (soft drinks, biscuits). Consumers may find it easier to adjust nondurable product assortments to changes in preferences. Since products are gone after consumption, nondurable consumers' product assortments will generally be updated in relatively shorter time intervals than durable consumers' product assortments. In addition, nondurable

product assortments are more likely to contain replicas in addition to the differentiated items. Individual products from the total assortment can be stockpiled. This chapter focuses on durable product assortments, since these are in all probability more stable over time, and will not contain replicas.

Implicit assumptions so far have been that the physical location of the products is not relevant for their usage (often the products in consumers' assortments are physically close, when not in use), and that products are not used simultaneously. At discrete moments in time the consumer chooses a product from the assortment, uses this product, and places it back in the assortment after use. In addition to this, consumers can own multiple products from the same product category, which are simultaneously in use at different locations. Examples are clocks, paintings and plants. Use of these products is location based. This chapter focuses on the first type of consumers' assortments, however, and does not consider the location-based assortments.

5.3.2 Consumers' product assortments versus retail assortments

Consumers' product assortments and retail assortments both consist of imperfectly substitutable products from a single product category. Therefore, basic assortment properties that have been defined in the area of retail assortments may also apply for consumers' product assortments. But there are also differences between the two types of assortments, as was briefly mentioned in Chapter 1.

First, consumers are involved with the products they own. The possession of a product can lead to an instantaneous increase in preference for the product, the so-called mere-possession or endowment effect (Sen & Johnson 1997). Consumers are reluctant to give up a product that they own, and this feeling intensifies with the duration of ownership (Strahilevitz & Loewenstein 1998). Therefore, consumers will feel a stronger tie with their own possession than with the products offered by a retail store. Belk (1988) describes a study, which examines the degree to which possessions are part of a consumers' self concept. Participants judge items on a 0-3 not-self to self scale. Possessions and productions (e.g. watch, perspiration, toilet articles) receive a higher self-score (1.57) than objects in the close physical environment (e.g. dirt on the hands, furniture in this room; 0.64). The higher involvement of consumers with the products in their possession can affect the ability of consumers to provide non-evaluative consumers' assortment perceptions. Whereas consumers are able to provide assortment perceptions for retail assortments, their evaluations may influence the perceptions of their own possessions. Perceptions such as 'this assortment has a low level of variety' may become blurred with evaluations such as

'my assortment has less variety than I want'. Therefore, this chapter will focus on evaluations rather than perceptions.

The second difference between consumers' product assortments and retail assortments concerns the importance of variety. When consumers evaluate a retail assortment, they consider the likelihood that it contains a suitable product. Variety is desirable since it increases this likelihood. For consumers' own product assortments, where *all* the products of the assortment are eventually consumed, flexibility must be balanced against the possibility of eventually being left with unattractive options (Lee & Steckel 1999). Therefore, variety may play a different role for consumers' product assortments than for retail assortments.

Third, since all products from consumers' product assortments will be consumed, the individual products are also likely to be more important than in retail assortments. A negatively evaluated product may have more impact in a consumer's assortment than in a retail assortment.

Despite these differences between retail assortments and consumers' product assortments, insights from the retailing literature may apply to consumers' assortments as well. Before constructing a conceptual framework based on retail assortments, the next section will discuss how consumers use and manage their assortments.

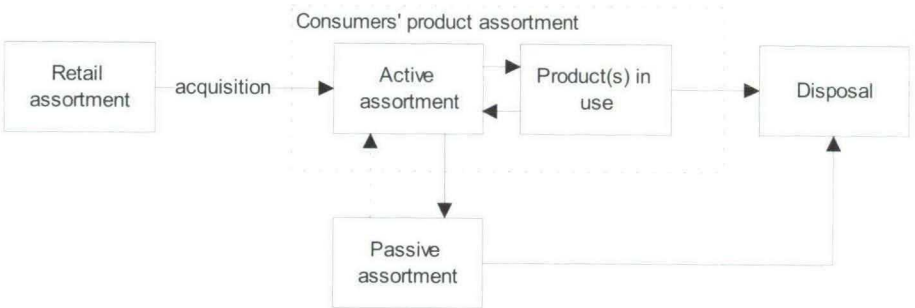
5.4 Use and management of consumers' assortments

A household manages a 'life-support' operation through the acquisition, use, storage, transportation, and disposition of products. Boyd and McConocha (1996) present a framework of inventory ownership for consumers, which depicts the stages in consumers' management of physical goods and materials. A comparable model can be constructed for consumers' product assortments. Figure 5.2 introduces a model with respect to the use of product assortments, based on an inventory model for blood (Jagannathan & Sen 1991), and on the inventory ownership model of Boyd and McConocha (1996). In the model, the total consumer's assortment is divided into two parts: (1) an active part, consisting of products in inventory (awaiting use), and (2) products in use. Products remain in the assortment after, but also during use. Consumers generally consider the products they currently use as part of the consumers' assortment - the trousers I am wearing right now are part of my assortment of trousers.

There is also a passive consumers' assortment, consisting of products in inventory that are not considered for usage, but which are still in the possession of consumers. These products are not part of the overall assortment. Active and passive assortments are

sometimes also physically divided. For instance, clothes can be kept in the back of closets, or in a different closet altogether, if they are no longer considered for usage. Products in the passive consumers' assortment are awaiting their disposition, or, in a very rare occasion, may at some point be re-instated as part of the active assortment.

Figure 5.2 Use of consumers' product assortments



A consumer will generally observe constraints for the minimum and maximum size that his/her product assortment can have. The minimum size of an assortment is determined by the number of items needed for the (expected) usage situations. The maximum constraint may depend on space restrictions, financial budget, availability, and 'obsolescence costs', for instance the possibility of fashion changes (Naddor 1961). Consumers need to manage their assortments to stay within these boundaries.

Consumers have several ways in which they can manage their assortments. First of all, a new product can be added to the assortment to replace another product, which is then removed. Replacement purchases have attracted attention of scholars (Bayus 1991; Bayus & Mehta 1995), who have examined replacement behavior for durable products that are generally bought as single units for a household (e.g. refrigerator, clothes washer, vacuum cleaner, car), and are not part of product assortments. Replacement purchases in the context of assortments have not been considered.

Second, a product can be added to the assortment as an extension. An extension of the assortment could mean that the original products in the assortment are now used in different usage situations. For instance, due to the addition of a new pair of jeans, another pair from the assortment may now be degraded, and only used for odd jobs around the house.

Besides adding products, consumers can also remove products from their assortments. Withdrawal from a consumers' assortment can be either physical (product is removed) or mental (product is kept in the passive assortment but is no longer used).

These acquisitions and removals from consumers' assortments are actions that a consumer will undertake to increase the overall satisfaction with the assortment. Overall assortment satisfaction is a central concept for assortment management.

5.5 A framework for assortment satisfaction

This section will introduce a conceptual model of assortment satisfaction for consumers' assortments, based on what we know from retail assortments. We start with assortment variety, and then build towards a more general model of assortment satisfaction.

5.5.1 Assortment variety

The central theme of this dissertation is assortment variety. Chapter 2 identified three components of variety: assortment size, dispersion across attribute levels, and dissociation between attributes. Attribute dispersion determines the specialization in an assortment. The higher the disproportion in favor of one of the attribute levels, the more specialized the assortment becomes. For instance, a consumer can have a specialized compact disk assortment with only jazz music. The music type is not dispersed, but is concentrated on jazz music. The dissociation between attributes relates to the absence or presence of product clusters within an assortment. When attributes are linked together, i.e. one attribute level implies the other (all red sweaters are small, and all blue sweaters are large), subgroups of products appear. We want to examine if these variety components can explain consumers' evaluations of variety.

Overall, we would expect that high levels of the variety measures are associated with higher variety evaluations. So, consistent with the previous chapters, where similar relations were found for retail assortment, we hypothesize for consumers' product assortments:

H1: Higher levels of assortment size, dispersion across attribute levels, and dissociation between attributes in a consumer's product assortment, imply higher variety evaluations by the owner of this assortment.

5.5.2 Assortment satisfaction

Although consumers have chosen the products in their assortment themselves, they may not be satisfied with them at a particular point in time. When some product attributes are not known before use, products can turn out differently than consumers anticipated when they bought them. Products may not have the expected level of quality, resulting in consumer dissatisfaction with the assortment. Consumer preferences may also be inconsistent with the

products that are offered, i.e. desired attribute combinations may not be available. For instance, a consumer may want a certain type of black leather jacket, but (s)he may be unable to find this particular jacket that (s)he has in mind. This may reflect negatively on the satisfaction with the consumer's assortment of jackets. Alternatively, the product that a consumer wants may be available, but budget constraints may prevent the consumer from buying the product. A final reason why consumers may be dissatisfied with their own assortment is a change in preferences.

This raises the question how consumers evaluate their assortments, and which factors impact on the process. Assortment variety is only one of the assortment properties that can influence satisfaction. Therefore, we extend the framework to include other properties. Previous literature on set evaluation, primarily in the context of product bundling, considered the integration of item evaluations (e.g. Yadav 1994). Consistent with Chapter 2, assortments can be described from a product-based and from an attribute-based approach. All the information from an assortment can be introduced in a table such as Table 5.1.

Table 5.1 Content of consumer's product assortment

Attributes	Product 1	Product 2	...	Product *n*
Concrete attributes, e.g.				
- color	brown	Red	...	black
- size	small	Small	...	large
Abstract attributes, e.g.				
- quality	high	Low	...	high
- fashionability	high	High	...	medium

Product evaluations

Assortments are composed of products. In Table 5.1 these products are provided in the columns. If the evaluation of the products in the assortment on average is high, satisfaction with the total assortment is likely to be high as well:

H2a: Higher average evaluation of the products in a consumer's product assortment leads to higher assortment satisfaction for the owner of this assortment.

Not only the average product evaluations are expected to influence assortment satisfaction, but also the variance in these evaluations. One can imagine that an assortment in which all products receive a medium evaluation leads to a different degree of satisfaction than an assortment in which half of the products is evaluated positively and the other half

negatively, even when the average product evaluation is the same. Controlling for the average product evaluation, variance in evaluations may lead to lower satisfaction, since the perceived loss of a negatively evaluated product may not compensate the gain of a positively evaluated product.

H2b: Higher variance in product evaluations in a consumer's product assortment leads to lower assortment satisfaction for the owner of this assortment.

Previous chapters focused on assortment variety rather than assortment satisfaction. Therefore, product evaluations have not been considered so far. Product evaluations as such will not influence variety perceptions, but they will influence assortment satisfaction.

Attribute evaluations

In chapter 2, we used an attribute-based approach to better understand assortment variety. But attribute evaluations can also directly influence assortment satisfaction. Overall assortment satisfaction may be based on both product evaluations and attribute evaluations, as well as variety considerations.

In Table 5.1, attributes are provided in the rows. Each of these attributes can be evaluated, i.e. a consumer can evaluate the color of an assortment, and the product size. As shown in the table, different types of attributes exists. Product attributes vary from the concrete to the abstract (Johnson, Lehmann, Fornell & Horne 1992). Abstract attributes, such as quality and fashionability, need to be inferred from concrete attribute information, while concrete, perceptual, attributes such as color and size, are directly associated with the product (Bettman & Sujan 1987).

By integrating the attribute evaluations across all attributes, an overall assortment evaluation can be formed. We conjecture that consumers who give higher evaluations to the product attributes in their assortment will be more satisfied with this assortment:

H3: Higher evaluations of the attributes in a consumer's product assortment lead to higher assortment satisfaction for the owner of this assortment.

Assortment variety

The idea that assortment evaluation is based on more than only product or attribute evaluations has been introduced in different contexts. For gambles and medical diagnoses, Redelmeier and Tversky (1992) showed that people make different choices when they consider each prospect as a separate event (segregation) versus when they consider the overall distribution of outcomes (aggregation). With respect to products, a study by Simonson (1990) indicates that consumers exhibit more variety-seeking when they choose

the total set at once, rather than each product separately. This means that the evaluation of a set of products is different from the evaluation of the same products in a sequence.

Also intuitively, assortment evaluations are based on more than only the evaluations of the products in the assortment. Consider a consumer who likes black and white shirts equally well. Based only on these product evaluations, it appears that this consumer would evaluate any set of a fixed number of these shirts the same. However, the assortments may differ in variety. Based on this assortment level property the consumer may express very different evaluations of the assortments: (s)he may prefer an assortment of both black and white shirts over an assortment of only black shirts, since the first provides him/her with the opportunity of wearing a different shirt over time.

Balance or variety in an assortment can be an important assortment property (McAlister 1979; Kahn 1995; Kahn & Lehmann 1991). A priori, it is not obvious whether more variety is always better. Chapter 4 indicated that assortment variety is not always preferred in the context of retail assortments. For consumers' product assortments, high variety may not be desirable as it means that there are few alternatives in the assortment in case of product breakdown. Very low product variety on the other hand means low differentiation between the products, which makes them less suitable in case of diverse usage situation requirements. Therefore, objective assortment variety may not have a univocal relation with assortment satisfaction. Variety evaluations, i.e. whether the assortment has 'too little', 'exactly right', or 'too much' variety in the eyes of its owner, should have a stronger relation with assortment satisfaction. Thus, evaluations are not made in absolute terms, but by comparison to a standard or norm (Kahneman & Miller 1986), as is often modeled in service quality and satisfaction literature (Cadotte, Woodruff & Jenkins 1987; Parasuraman, Zeithaml & Berry 1994). The closer assortment variety is to the ideal level of the assortment owner, the more satisfied this owner will be:

H4a: More positive evaluations of assortment variety (more close to the individual ideal level) in a consumer's product assortment lead to higher assortment satisfaction for the owner of this assortment.

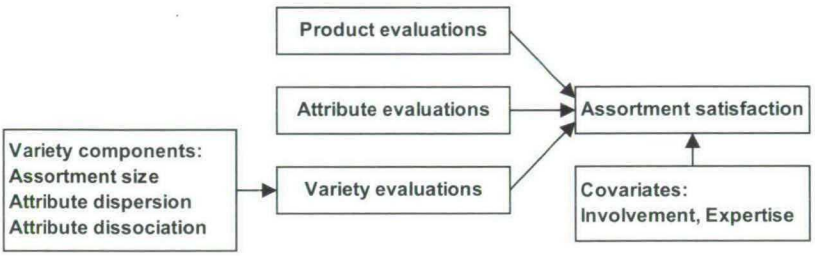
Another property is assortment size, i.e. the number of products in an assortment. Chapters 3 and 4 have argued and shown that assortment size is a component of assortment variety. Given a certain assortment content, the size of the assortment should, and has been shown to, affect assortment variety. Therefore, we propose that evaluations of assortment size will not affect assortment satisfaction once evaluations of assortment variety have been taken into consideration:

H4b: Evaluations of assortment size in a consumer's product assortment will not have an additional influence above that of variety evaluations on assortment satisfaction for the owner of this assortment.

Assortment size is likely to be relatively important for consumers' product assortments, since all the products are in the possession of the consumer. When size evaluations indeed do not have an impact above that of variety evaluations for these assortments, this is a strong indication that assortment size is a component of variety.

Figure 5.3 provides the conceptual model of assortment satisfaction. It also contains involvement and expertise as covariates, which will be discussed in the methods section.

Figure 5.3 Conceptual model of satisfaction for consumers' product assortments



5.6 Empirical exploration into the consumer's closet

An empirical investigation was set up to test the hypotheses and the conceptual model of Figure 5.3.

5.6.1 Choice of product category

A product category needed to be chosen that could provide meaningful data regarding consumers' assortments. Preferably this should be a product category in which many individual product differences occur, so that stockpiling of identical items is not likely. Since durable product assortments were expected to be more stable, durables were preferred over nondurables. After considering these conditions, the product category of footwear was chosen. Shoes are differentiated durable products that are owned by most consumers. Stockpiling of a specific type of shoe can occur, but can be regarded as exceptional.

Shoes have been selected in previous research for the relatively inexpensiveness compared to other durables, and the personal nature of this product (Newman & Lockeman 1975). Shoes are part of clothing, and as such are a means for communicating and enhancing personality, attractiveness, and social roles (Tatzel 1982). It has long been realized that clothing can carry many functions, including functional (protect the body), aesthetic, and social functions (Sanborn 1927). Shoes can contribute to a person's own sense of self, and his/her social identity. Therefore, shoes are believed to be relatively

important products for a consumer, and consumers are likely to manage their assortments of shoes with care and interest. Sometimes, shoes can even become extremely important for consumers, as evidenced by the shoe collection of Imelda Marcos. Mrs. Marcos left 1,220 pairs of shoes behind at the presidential palace when she hastily left the Philippines in 1986. Yet, her collection is growing rapidly again, and, according to an article by CNN in 1999, now exceeds 3,000 pairs. Most consumers will be less involved than this, and own assortments of shoes rather than collections.

5.6.2 Method

Sample. The data for this study were collected through a subsample of a computerized consumer panel (NIPO), that is representative of the Dutch population[19]. A panel consists of consumers who have agreed to provide information at specified intervals over an extended period (Malhotra & Birks 2000). The total panel consists of approximately 1000 households, or 1700 individuals of 18 years or older. Participants answer questions about a diversity of topics every weekend by computer. Several socio-economic characteristics of the panel members are known, such as gender, age, income, and family size.

Data collection took place over 4 consecutive weekends in june 1996, and was part of a larger study with respect to shoes. As part of the study, participants were asked to make photographs of their shoes. In week 1, panel members were asked for their willingness to photograph their shoes. Of the 1167 members that were asked, 234 (20.1%) responded positively. Of these, 160 panel members were asked to photograph their shoes and answer a computerized questionnaire. After providing the participants with enough time to develop the photographs, the photographs themselves were used to acquire additional information. Participants were asked in week 4 to send the photographs to the NIPO.

The photographs needed to be detailed and sharp, all shoes needed to be photographed, and the photographs needed to be numbered in accordance to specific instructions. In addition, participants who had bought shoes in the time period of the data collection were excluded from the analyses, since inclusion of newly bought shoes for part of the measures, but not all, may influence our results. After excluding non-response (25), non-usable photographs (29), and persons who bought shoes during the data-collection period (25)[20], the final sample size was 81 participants. Sample characteristics are provided in Table 5.2.

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[19] We would like to express our thanks to NIPO for their help in data collection.

[20] Compared to the 81 participants in the sample, this group of 25 participants consists of more women (75% versus 47%; $\chi^2 = 8.4$; $p = .003$) and owns larger assortments of shoes (8.4 versus 5.8 pairs of shoes; $F = 20.2$; $p = .000$). The groups do not differ in involvement ($F = 1.9$; $p = .171$), expertise ($F = 1.3$; $p = .253$), size evaluation ($F < 1$; $p = .832$), variety evaluation ($F < 1$; $p = .740$), and assortment satisfaction ($F < 1$; $p = .822$).

Table 5.2 Sample characteristics (n = 81)

	Category	Number of participants	Percentage in sample
Gender	Male	43	53 %
	Female	38	47 %
Gross income	*f* 12.000 – *f* 30.000	12	15 %
	f 30.000 – *f* 51.000	24	30 %
	f 51.000 – *f* 75.000	25	31 %
	f 75.000 – *f* 99.000	13	16 %
	f 99.000 or more	7	9 %
	Average (st.dev.)	Minimum	Maximum
Age	44.79 (12.25)	18	77
Family size	3.22 (1.45)	1	7

Timing of questions. Questions regarding the shoe assortments were asked to the owners in four consecutive weekends. Not all participants answered each question (either due to absence in a weekend, or a "don't know" answer). Table 5.3 provides an overview of the data collection.

Table 5.3 Data collection

Data	Timing	Method
Assortment satisfaction	Week 1	Single item rating scale
Size evaluation	Week 1	Single item rating scale
Variety evaluation	Week 1	Single item rating scale
Involvement	Week 1	Multiple item rating scale (4 items)
Expertise	Week 1	Multiple item rating scale (4 items)
Request to make photographs	Week 2	
Assortment size (estimated by participant)	Week 2	Open ended question
Attribute importance	Week 3	Paired comparisons
Attribute evaluation	Week 4	Sorting task of photographs
Assortment size	Week 4	Number of shoes on the photographs
Attribute dispersion	After week 4	Content analysis of photographs
Attribute dissociation	After week 4	Content analysis of photographs

Procedure: the use of photographs. In order to gain more insight into the shoes in their assortments, participants were asked to take photographs. This has the advantage that independent judges can examine the concrete shoe attributes from these photographs, which will lessen the burden for participants. Photographs have been used in social science research, among others, as a way in which accurate measuring, counting and tracking can be achieved (Collier 1967; 1979a; 1979b; Heisley & Levy 1991). Photographs are a close replica of reality and capable of offering insights that are difficult to find in another way (Collier 1979a). The image that the photograph represents remains detailed, allowing the observer to 'see without fatigue', and insuring complete notation (Collier 1967). Previous research has used photographs to examine consumers' favorite products (Wallendorf & Arnould 1988), by examining the physical closeness of consumers to these favorite possessions. Here, emphasis lies on the products themselves, not on the relation with the owner. Participants were asked to take photographs of each shoe. Examples of photographs are provided in Appendix F.

A pretest among 30 separate participants from the panel was conducted to test the ability of participants to photograph their shoes themselves. Based on this pretest, the instructions were slightly modified, and the ability of participants to make clear and interpretable photographs appeared sufficient. The participants used their own camera and film to make the photographs. As payment for their expenses and effort, they received the equivalence of US $15. Participants were instructed to photograph their shoes, up to a maximum of the 11 most frequently used shoes, and make one photograph of the remaining shoes if they had more than 11 pairs. They were asked not to include shoes that they wore only when engaging in sports, or shoes that they had not worn during the past year. This excludes the passive assortment.

5.6.3 Measures

Participants viewed questions and numbered response categories on their computer screen. To answer questions, they typed in the number of their response, at which time the next question appeared. Exact wording of the questions is provided in Appendix E.

Assortment satisfaction. Overall satisfaction with the assortment was tapped with a single question, as was also done by Hoch, Bradlow and Wansink (1999). The question was worded: "*To what degree are you overall satisfied with the shoes that you own*?". Answers were given on a five-point scale ranging from "totally not satisfied" to "very satisfied".

Attribute evaluation. Four attributes are used that are important for shoes: quality, comfort, fashionability, and price. These abstract attributes were determined on the basis of in-depth interviews with consumers and focus groups, conducted separately by a market

research firm[21]. Similar results have been found in other studies: for female apparel shoppers, Kopp, Eng and Tigert (1989) found fashion, price, and quality to be important product attributes.

Attribute evaluations were measured by having participants sort their shoe photographs into piles. The participants numbered the photographs beforehand, and they typed in the numbers of the photographs that were placed in each of the piles. For instance, participants would put the photographs into three piles representing low quality, neither low nor high quality, and high quality, and type in the numbers of the photographs in each of the piles. For each of the attributes, shoes were sorted into a negative, neutral, and positive pile. This procedure is comparable to Q-sort scaling, with two exceptions: the number of objects (photographs) is smaller than in a typical Q-sort, and the number of objects to be placed in each pile is not prespecified (Malhotra 1999). By using a sorting task, the burden on participants is kept low. For similarity data, sorting tasks have been found to give relatively low fatigue and boredom to participants, while the method is relatively fast (Bijmolt & Wedel 1995).

Product evaluation. Product evaluations were calculated as a composite measure for each product. This composite measure was a weighted average of the attribute evaluations. Attributes are weighted by their importance. This provides a product evaluation measure for each product in the assortment.

Attribute importances. Attribute importances were acquired by letting the participants choose between pairs of attributes. Paired comparisons are an example of ordering methods, which are one of the most popular procedures for obtaining preference data (Green, Carmone & Smith 1989). A prime advantage of this method is that it reduces halo effects, in which all aspects are indicated as being important. To make the comparisons concrete for the participants, they were formulated as sentences (Appendix E). As an example, the participant would see the following two sentences on the computer screen: "*(1) My shoes have to be of good quality, even if this means that they are not completely in fashion*" and "*(2) It is important for me that my shoes are in fashion, even if the quality is a little less*". By typing in the number 1 or 2, the participant would indicate which description resembles his/her preference. A complete design was used for the paired comparisons and the answer was a forced choice.

Evaluations of assortment size and variety. Both evaluations of assortment size and variety were included in the questionnaire of week 1. Participants were asked: "*When you give a close look to the shoes you own, then the number of shoes you own is ...*", and "*When you give a close look to the shoes you own, then the number of different kind of shoes you*

[21] We thank IPM for conducting these interviews and focus groups.

own is ...". Answers were provided on a five-point scale, featuring: (1) too low, (2) low, but not too low, (3) exactly right, (4) high, but not too high, (5) too high. A "no response" option was also available.

Variety components. Assortment size was obtained by counting the number of shoes on the photographs provided by the participants. For attribute dispersion and dissociation the measures of Chapter 2, *Entropy* and *(1 – Lambda)* respectively, were applied to the concrete attributes of the shoes (e.g. color, material). A content analysis of the photographs was performed to obtain these concrete attributes. Content analysis is widely used for evaluating various communication forms, such as advertisements (Kassarjian 1977; Kolbe & Burnett 1991). Here, content analysis is not applied to communication forms that already exist, but we specifically ask our participants to communicate with us in the form of photographs.

Appendix D lists the attributes of the content analysis. To enhance objectivity, multiple independent judges were used (Kolbe & Burnett 1991). Judges received a detailed list of attributes and attribute levels, with pictures to enhance understanding. They received extensive training. Four judges coded the photographs, and each shoe was coded by two different judges. Interjudge reliability averaged 0,88. Following the coding, differences between the two judges that coded the same shoes were discussed. If necessary, a third judge resolved problems.

Involvement and expertise. Especially for consumers' product assortments, the meaning and importance of a product category can influence assortment satisfaction. Therefore, involvement and a related consumer characteristic, expertise, are used as covariates. Both are considered to be important determinants of consumer behavior (Mittal & Lee 1989; Sujan 1985; Traylor 1981). They are closely related but distinct constructs (Beatty & Smith 1987; Sujan 1985; Zaichkowsky 1985a). A consumer does not necessarily have to be an expert in order to be involved with a product, and an expert does not need to be psychologically involved in the product, although in the field a correlation between the two is likely. Involved consumers are generally more interested in information about the product category (Zaichkowsky 1985b) and therefore they will, over time, tend to become experts as their knowledge of the product category increases.

This study focuses on enduring involvement, which reflects a general and permanent concern with the product category (Bloch 1982; Laurent & Kapferer 1985; Richins & Bloch 1986; Traylor 1981). Involvement and expertise were measured by four items each, which are presented in Appendix E. The items are similar to those used in previous research regarding (enduring) product involvement (Mittal & Lee 1989; Bruner & Hensel 1992). Cronbach's alpha for involvement was .78, and for expertise .64.

5.7 Results

This section discusses how attribute importances are distracted from the paired comparison data. The attribute importances are used to calculate product evaluations. Next, the total data set is examined, and the conceptual model of Figure 5.3 tested.

5.7.1 Attribute importances

The paired comparisons can be converted into attribute rankings. Three participants provided intransitive choices and seven participants did not answer the questions of week 3, leaving a total of 71 participants with ordered preferences for the attributes. These $n = 71$ participants ranked $k = 4$ product attributes (quality, comfort, fashionability, and price) on importance. We assume that the attributes can be located on a single joint scale across participants. Preferences are indicated by the individual ideal point on this joint scale. Persons most prefer the attributes that are closest to their own position on the scale. Unfolding was used to identify the underlying joint scale (Coombs 1964; Davison 1979; Van Blokland-Vogelesang 1990).

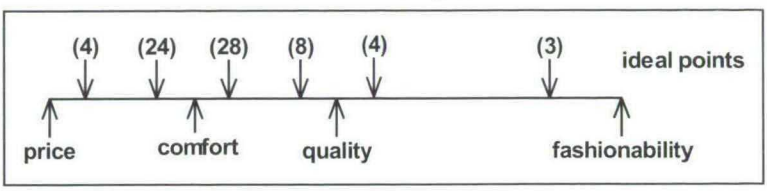
A joint scale has a certain number of admissible patterns for the product attributes. For instance, if the ordering of the attributes on the joint scale is price-comfort-quality-fashionability, an individual who ranks price first, and fashionability second, reveals an inadmissible pattern for this joint scale. There is no ideal point on the scale that can represent this ranking of attributes exactly. We assume that the latent pattern of rankings for each individual is an admissible pattern, but that there are errors in reporting that lead individuals to reveal inadmissible patterns.

The most basic criterion for the appropriateness of a joint scale, is the number of inversions needed to obtain admissible patterns from individuals' rankings. The best quantitative joint scale would then be the set of $\binom{k}{2}+1$ admissible patterns for which the total number of inversions from individuals' rankings is at a minimum. Based on this criterion alone, without any other assumptions, the best underlying joint scales can be determined by the program UNFOLD (Van Blokland-Vogelesang & Van Blokland 1989; Van Blokland-Vogelesang 1990). Scale values can be obtained by posing equality constraints on the distances between the midpoints of the joint scale, and solving the resulting system of linear equations, under the constraints that the distances between successive midpoints are larger than zero and that the sum of these distances is at a minimum (Van Blokland-Vogelesang 1990).

Figure 5.4 presents the best quantitative joint scale of the attribute importances. The scale that was selected has the highest number of perfectly fitted individual rankings (54 out of 71, or 76%), and a Chi-square value of 0.16 ($df = 2$, $p = .923$), which is an almost

perfect fit. The Feigin and Cohen probabilistic model for agreement between individuals is used to derive this goodness-of-fit test for the total model (Van Blokland-Vogelesang 1990).

Figure 5.4 Unidimensional scale for attribute importances[1]



[1] The positions of the attributes are indicated below the line. The positions of the ideal points are indicated above the line. Numbers between brackets represent the number of individuals with a particular ideal point.

The scale in Figure 5.4 indicates the position of the abstract attributes and the ideal points. Six different ideal points are present, and the number of participants located at a specific ideal point are presented between brackets. For instance, the four participants with the ideal point located most to the left, consider price the most important attribute, followed by comfort, quality, and finally fashionability. The distances between ideal points and abstract attributes represent the importance of the attributes: large distances refer to low importance. Distances are therefore transformed into measures of attribute importance for comfort, quality and fashionability. The importance of attribute a (I_a) is given by:

$$I_a = \frac{(d_{tot(i)} - d_{ia})}{2 \cdot d_{tot(i)}} \qquad (1)$$

The summed distances from an ideal point i to the three attributes (comfort, quality, and fashionability) is represented by $d_{tot(i)}$, and the distance between this ideal point i and a single abstract attribute a is given by d_{ia}.

5.7.2 Assortment properties

Before testing the conceptual model of assortment satisfaction for consumers' assortments, this section examines the data set in more detail. Table 5.4 provides an overview of assortment properties. Consumers own on average 6.4 pairs of shoes. With an average assortment satisfaction of 3.81, consumers are satisfied with their assortment of shoes.

Most of the shoes in the assortments are evaluated positively. To rule out that participants only photographed their 'best' shoes, we compared the number of shoes that participants reported in week 2 with the number of shoes on the photographs. Most respondents (45.7%) were accurate about the number of products in their assortments,

while only 19.8% presented one (17.3%) or two (2.5%) fewer pairs of shoes than they had previously mentioned to own. Combined with a high correlation of .80 between the two measures, the conclusion is that participants photographed their shoes accurately.

Table 5.4 Overview of assortment properties (n = 81)

Variable (range)	Overall mean	Standard deviation
Overall assortment satisfaction	3.81	0.70
Product evaluations		
Number of positively evaluated shoes	4.73	1.72
Number of negatively evaluated shoes	1.20	1.27
Mean product evaluation (-1,..., 1)	0.41	0.25
Variance in product evaluations	0.19	0.19
Attribute evaluations		
Number of comfortable shoes	4.11	1.69
Number of high quality shoes	2.54	1.88
Number of fashionable shoes	2.04	1.54
Number of inexpensive shoes	2.22	1.82
Comfort evaluation (-1,..., 1) [1]	0.61	0.31
Quality evaluation (-1,..., 1) [1]	0.28	0.38
Fashion evaluation (-1,..., 1) [1]	0.13	0.35
Price evaluation (-1,..., 1) [1]	0.11	0.41
Size and variety evaluations		
Size evaluation (1,..., 5)	2.92	1.82
Variety evaluation (1,..., 5)	2.82	1.67
Consumer characteristics		
Involvement (1,..., 5)	2.78	0.79
Expertise (1,..., 5)	2.84	0.71
Variety components		
Assortment size	6.40	3.11
Attribute dispersion (*Entropy*)	0.44	0.18
Attribute dissociation (*1 – Lambda*)	0.70	0.16

[1] Scores are calculated from the sorting task by subtracting the proportion of shoes on the negative pile from the proportion of shoes on the positive pile for each of the attributes.

Consumers consider most of their shoes as comfortable, fashionable, high quality, yet inexpensive shoes. This could be due to a mere possession effect: ownership of the shoes leads to a more positive evaluation of these shoes (Sen & Johnson 1997). Furthermore, consumers are free to dispose of any shoes that they do not like. They may also feel responsible for their choices, and concerned that giving a negative evaluation of the shoes

makes them appear to be bad decision makers. By asking for attribute evaluations separately, rather than overall product evaluations, we tried to minimize this effect.

The averages for the scales of size and variety evaluations are just below the midpoint (2.92 and 2.82). Only very few participants answered that their assortment contained too many, or too many different kinds of products.

5.7.3 Variety evaluation

First, we examine the ability of the three variety components, size, dispersion, and dissociation, to predict consumers' evaluations of assortment variety. The measures for the variety components are based on concrete product attributes, and do not entail consumer evaluations. Rather, judges coded the concrete product attributes by examining the photographs provided by the consumers. Table 5.5 shows the correlations between the three variety components. All correlations are positive and significant at the 0.01 level. Although previous chapters manipulated the three variety components independently, in consumers' own product assortments they are correlated with each other. In a larger assortment of shoes, the products will be less concentrated on some of the attribute levels, and attribute combinations will vary more[22].

Table 5.5 Correlations between variety components (n = 81)[1]

	Assortment size	Dispersion across attribute levels	Dissociation between attributes
Assortment size	1.00		
Dispersion across attribute levels	.52	1.00	
Dissociation between attributes	.49	.78	1.00

[1] All correlation are significant at the .01 level.

The measures for the variety components can be used to explain consumer variety evaluations. Table 5.6 presents the model of variety evaluation. As the consumer evaluations of variety are based on deviations from the individual ideal, and the model does not incorporate this ideal, the result is rather good.

[22] The correlations are higher for men (between .49 and .87) than for women (between .32 and .38). Inherent to the product category, shoes for women vary more on attribute levels than shoes for men. Several attribute levels, such as certain colors or heel height, are generally not found in shoes for men. Both dispersion (mean = .33 versus .57; F = 71.1; df = 1;79; p < .001) and dissociation (mean = .62 versus .78; F = 25.8; df = 1;79; p < .001) are smaller for men. The implication is that in situations where products vary little on attribute levels, correlations between variety components can be relatively high. Studies that want to examine assortment variety in such a situation need to take this into account.

Positive effects for assortment size, dispersion across attribute levels, and dissociation between attributes were expected (hypothesis 4). In support of hypothesis 1, a positive significant effect was found for assortment size (coefficient = 3.63; p = .026), but attribute dissociation does not have a significant effect on variety evaluations (coefficient = -1.44; p = .140), and attribute dispersion has a negative effect (coefficient = -2.00; p = .020). This latter, negative, effect is in the opposite direction of hypothesis 1. Since the VIF values in the model are all well below the threshold level of 10, multicollinearity can not be the reason that this effect is found.[23] This unexpected result will be further discussed in the conclusion section.

Table 5.6 The variety evaluation model

Predictor	Coefficient	*t*-value	*p*-value	R^2	model *F*-value	*df*	*p*-value
(constant)	3.63	5.63	<.001	.11	3.03	3;73	.035
Size	0.08	2.28	.026				
Dispersion across attribute levels (*Entropy*)	-2.00	-2.37	.020				
Dissociation between attributes (*1-Lambda*)	-1.44	-1.49	.140				

5.7.4 Assortment satisfaction

The conceptual model in Figure 5.3 shows a mediating role of variety evaluations. We will first test this, and, next, we place assortment variety in the broader framework of assortment satisfaction for consumers' product assortments.

The mediating role of variety evaluations

The previous section showed that the variety components have a significant effect on variety evaluations. If variety evaluations mediate the relation between variety components and assortment satisfaction, the following should be true: (1) variety components by themselves have a significant influence on satisfaction, (2) variety evaluation by itself has a significant influence on satisfaction, and (3) the influence of the variety components is no longer significant when variety evaluations are included. Unfortunately, the first relation does not hold. There is no direct relation between the variety components and assortment satisfaction (F = 0.6; df = 3;58; p = .604). Therefore, we can not say that variety evaluations

[23] Given the differences between shoes for men and women, a moderating effect of gender on the relation between attribute dispersion and variety evaluation was examined, but this was not significant (F = .462; df = 1;71; p =.499).

mediate this relation. Although the variety measures that were coded from the photographs are not related to assortment satisfaction, the variety evaluations of the consumers' themselves are, as the next section will show.

Predicting assortment satisfaction

Three groups of variables were identified that can influence assortment satisfaction: product evaluations, attribute evaluations, and variety evaluations. We will examine to which extent these groups of variables are capable of accounting for assortment satisfaction, by themselves and in combination with each other. To this end, multiple regression analyses were used. Since evaluations of products and attributes covary, multicollinearity between explanatory variables may be present, which may cause unreliable regression estimates (Dougherty 1992). Therefore, a comparison of nested models is used to test the effects of each group of variables on the overall assortment satisfaction. Table 5.7 presents the models and results. First, we will examine to what extent (1) product evaluations, (2) attribute evaluations, and (3) size and variety evaluations, can explain assortment satisfaction by themselves. Next, we examine the overall model, which combines these groups of variables. All models contain expertise and involvement as covariates.

Product evaluations. Model 1 in Table 5.7 is the product-based model of assortment satisfaction. As predicted by hypothesis 2a, a significant positive effect is found for average product evaluation (coefficient = .96; $t = 2.66$; $p = .010$)[24]. When a consumer evaluates the products in an assortment more positively, (s)he is more satisfied with this assortment. Hypothesis 2b is not supported, as the effect of the variance in product evaluations only approaches significance (coefficient = .88; $t = 1.93$; $p = .058$).

Attribute evaluations. The model of attribute evaluations (model 2 in Table 5.7) does not explain assortment satisfaction well. The model is not significant ($F = 1.80$; $df = 6,73$; $p = .111$), and neither are the coefficients for any of the explanatory variables, which means that hypothesis 3 is not supported. Given that model 1, the model of product evaluations, was significant, this is a rather surprising finding. After all, the product evaluations are composite measures, constructed from attribute evaluations and importances. It might imply that consumers do not use an attribute-based approach towards their own assortments. The conclusions section will discuss this in more detail.

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[24] By averaging the product evaluations, a compensatory relation is assumed. A low evaluation for one of the shoes can be compensated by high evaluations for other shoes. We examined if a non-compensatory relation would be more plausible by multiplying individual product evaluations (after transformation to a 0-1 range), and using the resulting measure as a predictor for assortment satisfaction. This measure dose not add to model 3b ($F = 3.3$; $df = 1;62$; $p = .073$), and neither do separate measures for each of the shoe evaluations (ordered by level of the evaluation) ($F = 0.7$; $df = 11;52$; $p = .700$).

Table 5.7 Regression models of antecedents of assortment satisfaction for consumers' product assortments

Model			Coefficient	*t*-ratio	*p*-value	R^2	model *F*-value	*df*	*p*-value
1.		Constant	2.99	8.5	<.001	.19	3.88	4;65	.007
		Involvement (1 – 5)	-.29	-2.2	.026				
		Expertise (1 – 5)	.39	2.7	.010				
	Product evaluations:	Average product evaluation (-1 – 1)	.96	2.7	.010				
		Variance in product evaluations	.88	2.9	.058				
2.		Constant	3.54	8.6	<.001	.13	1.80	6;73	.111
		Involvement (1 – 5)	-.24	-1.8	.078				
		Expertise (1 – 5)	.25	1.7	.083				
	Attribute evaluations:	Comfort evaluation (-1 – 1)	.15	.6	.577				
		Quality evaluation (-1 – 1)	.30	1.2	.231				
		Fashion evaluation (-1 – 1)	.41	1.6	.106				
		Price evaluation (-1 – 1)	.30	1.4	.161				
3a.		Constant	3.90	11.8	<.001	.15	2.84	6;70	.015
		Involvement (1 – 5)	-.22	-1.8	.074				
		Expertise (1 – 5)	.27	2.0	.049				
	Variety evaluations:	Smaller variety than ideal $(0 - 2)^2$	-.25	-1.6	.101				
		Larger variety than ideal $(0 - 2)^1$	.13	.6	.570				
	Size evaluations:	Smaller size than ideal $(0 - 2)^2$	-.26	-1.7	.087				
		Larger size than ideal $(0 - 2)^1$	-.18	-1.2	.237				
3b.		Constant	3.84	11.5	<.001	.15	3.17	4;72	.019
		Involvement (1 – 5)	-.21	-1.7	.100				
		Expertise (1 – 5)	.24	1.8	.080				
	Variety evaluations:	Smaller variety than ideal $(0 - 2)^2$	-.36	-2.9	.005				
		Larger variety than ideal $(0 - 2)^1$	-.00	-.0	.994				

Model			Coefficient	*t*-ratio	*p*-value	R^2	model *F*-value	*df*	*p*-value
4a.		Constant	3.36	7.0	<.001	.39	3.64	10;57	.001
		Involvement (1 – 5)	-.34	-2.6	.013				
		Expertise (1 – 5)	.36	2.6	.013				
	Product evaluations:	Average product evaluation (-1 – 1)	-2.55	-1.0	.312				
		Variance in product evaluations	.72	1.5	.127				
	Attribute evaluations:	Comfort evaluation (-1 – 1)	1.67	1.5	.151				
		Fashion evaluation (-1 – 1)	.79	1.8	.073				
		Quality evaluation (-1 – 1)	1.27	1.3	.211				
		Price evaluation (-1 – 1)	.06	.3	.747				
	Variety evaluations:	Smaller variety than ideal (0 – 2)[2]	-.43	-3.6	.001				
		Larger variety than ideal (0 – 2)[1]	-.04	-.3	.789				
4b.		Constant	3.33	9.5	<.001	.35	5.47	6;61	<.001
		Involvement (1 – 5)	-.28	-2.3	.023				
		Expertise (1 – 5)	.34	2.5	.016				
	Product evaluations:	Average product evaluation (-1 – 1)	1.00	2.9	.005				
		Variance in product evaluations	.78	1.8	.073				
	Variety evaluations:	Larger variety than ideal (0 – 2)[1]	-.05	-.3	.775				
		Smaller variety than ideal (0 – 2)[2]	-.43	-3.8	<.001				

Model comparisons		*F*-change	*df*	*p*-value
3a – 3b	Including size evaluations in model with variety evaluations	2.01	2;70	.142
4a – 4b	Including attribute evaluations in the overall model	.93	4;57	.451
1 – 4b	Including variety evaluations in model with product evaluations	7.17	2;61	.002
3b – 4b	Including product evaluations in model with variety evaluations	4.46	2;61	.016

[1] Coding for larger than ideal: 1 = high; 2 = too high, 0 = other
[2] Coding for smaller than ideal: 1 = low; 2 = too low, 0 = other.

Size and variety evaluations. Assortment size is considered to be a component of variety, and size evaluations should therefore not add to a model that includes variety evaluations. Evaluations of size, as opposed to the objective number of products, are comparable to the other evaluation measures. If no additional explanation is provided by introducing size evaluations, this can not be due to differences in measurement method. Comparison of models 3a and 3b in Table 5.7 shows that size evaluations indeed do not add to the variety evaluations ($F = 2.01$; $df = 2;70$; $p = .142$), supporting hypothesis 4b.

Variety evaluations by themselves explain 15% of the variance in assortment satisfaction (model 3b in Table 5.7). As deviations on the positive side were expected to differ from deviations on the negative side, the variable was split in two. When variety is evaluated as being below the ideal, i.e. (too) few different products in the assortment, this has a large effect on consumers' satisfaction with the assortment (coefficient = -.36; t = -2.87; p = .005). Evaluations of variety as being above the ideal, i.e. (too) many different products, do not affect assortment satisfaction (coefficient = -.001; t = -.007; p = .994). When variety evaluations differ further from the ideal to the negative side (too little), the overall assortment satisfaction decreases, consistent with hypothesis 4a. Yet, deviations on the positive side do not lead to decreases in satisfaction. It should be noted that only two participants considered their assortment to have "too many different kinds of products". This in itself already indicates that deviations on the positive side may not be as important to consumers as deviations on the negative side. If an assortment contains too much variety, the solution would be to exclude products. A product can be easily excluded from the (active) assortment by placing it in the passive assortment, i.e. by not wearing it any more. Exclusion of products is therefore easier than finding and adding differentiated products to the assortment, to obtain a higher level of variety. There, consumers actually have to go out, visit a store, and find a product that will increase the variety in their assortment.

Overall model of assortment satisfaction. Model 4a in Table 5.7 contains all three groups of variables: product evaluations, attribute evaluations, and variety evaluations. This model has considerable multicollinearity, with VIF values as high as 68, far above the common threshold value of 10 (Hair, Anderson, Tatham & Black 1992). Multicollinearity is likely to bias the regression estimates (Dougherty 1992). Therefore, the coefficients of model 4a can not be interpreted. Rather, we will examine whether excluding groups of variables from the model will change the satisfaction predictions.

First, we excluded the attribute evaluations from the overall model, since the attribute evaluations by themselves already had low predictive value for assortment satisfaction. Comparison of models 4a and 4b in the lower part of Table 5.7 shows that the exclusion of attribute evaluations does not significantly deteriorate the model (F = .93; df = 4;57; p = .451). Next, we examined if the product evaluations can also be dropped. This is not the

case: dropping product evaluations from a model with product and variety evaluations significantly decreases the predictions of assortment satisfaction (model 3b versus model 4b; $F = 4.46$; $df = 2;61$; $p = .016$). Alternatively, dropping variety evaluations also decreases the predictive power of the model (model 1 versus model 4b; $F = 7.17$; $df = 2;61$; $p = .002$).

In other words, the best overall model is model 4b. The VIF values for this model are all below 2, which means that multicollinearity is not a problem, and the model estimates can be interpreted.

Involvement and expertise. All models in Table 5.7 contain two covariates: involvement and expertise. These constructs have a significant positive correlation of .632 ($p < .01$). In the final model, involvement has a significant negative effect on assortment satisfaction (coefficient = -.28; $t = -2.3$; $p = .023$) while expertise has a significant positive effect (coefficient = .34; $t = 2.5$; $p = .016$). A consumer who is involved with the product category is less satisfied with his/her assortment, presumably because (s)he is more aware of and affected by any imperfections in the assortment. Whereas involvement hinders satisfaction, our results indicate that expertise increases satisfaction. Experts are more satisfied with their assortments than novices, perhaps because the formers' higher knowledge enables them to construct assortments closer to their preferences. This has implications for the treatment of involvement and expertise. Involvement and expertise have generally been considered as related constructs and expertise has even been regarded as a component of involvement (Bloch 1982). Despite the correlation between involvement and expertise, our results show the importance of distinguishing between these two constructs.

5.8 Discussion and conclusion

Given the central role of assortment variety in this dissertation, this chapter examined the ability of the variety components from previous chapters to explain evaluations of variety for consumers' product assortments. A positive effect is found only for assortment size, while attribute dissociation does not affect variety evaluations in our data set. The dispersion across attribute levels has a negative effect on variety evaluations. In the study, high levels of attribute dispersion lead the owners of such assortments to state that their assortment contained (too) few different types of products, rather than (too) many. An explanation may be that different segments of consumers prefer different levels of assortment variety. Future research is needed to examine potential explanations.

This chapter placed assortment variety in a broader satisfaction framework. It showed that consumers' satisfaction with their own assortment depends on average product evaluations, variety evaluations, involvement, and expertise. It examined real products in a naturally occurring situation, by having consumers provide photographs of their own products.

Average product evaluations are positively related to satisfaction: when the products in a consumer's assortment are evaluated more positively, the owner is more satisfied with the assortment.

Interestingly, attribute evaluations do not affect assortment satisfaction for the consumers' assortments. Since product and attribute evaluations were partly based on the same data (consumer judgements of the attributes), this is surprising. In the previous chapters concerning retail assortments, the attribute-based approach predicted better than the product-based approach. The opposite seems to happen for consumers' product assortments. The reason may be related to the differences between retail and consumers' assortments. Consumers' assortments are in general smaller than retail assortments, and consumers have extensive experience with their own assortments, which they lack for the retail assortments. Previous studies found that consumers emphasize attribute information, and find it helpful in making decisions, in larger assortments (Bettman, Luce & Payne 1998; Huffman & Kahn 1998). An attribute-based approach may be more applicable to large assortments, where consumers may feel overwhelmed, or incapable of evaluating each product separately. For consumers' product assortments, the owner has considerable experience with each individual product. Therefore, product evaluations will be more easily available. The average assortment size of 6.4 in our empirical study is also lower than the assortment sizes used in the previous chapters. Both the lower assortment size and the extensive experience with the products can enhance the use of product evaluations in consumers' satisfaction judgements, at the expense of attribute evaluations.

For variety, the results show that negative evaluations of variety, i.e. (too) little variety, impact assortment satisfaction for consumers' product assortments, whereas deviations on the positive side, i.e. (too) much variety, do not impact assortment satisfaction. Having not enough variety affects satisfaction more than having more than enough. Presumably, it is easier for consumers to lower the variety in their assortments if needed (e.g. by not using some of the products any more) than it is to increase the variety. Adjusting for more than the ideal level of variety can be easily done mentally by setting products aside from consideration, without the need for physical change of the assortment. If an assortment has not enough variety, the solution takes more effort, as products will need to be added to the assortment.

Limitations. There are several limitations of the study. First, no direct measures of the evaluation process are taken. This study posits that individual ideal points are important, especially for variety. Deviations from the ideal point can affect assortment satisfaction, depending on the direction of the deviation. However, these ideal points are not measured directly. The absolute value of the ideal point may differ substantially between consumers. Examination of these absolute values and their determinants is left for future research.

Second, various factors, such as mood and personality, have been shown to affect consumers' evaluations of their possessions (Ciarrochi & Forgas 2000; Forgas & Ciarrochi 2001). We examined two consumer characteristics, involvement and expertise, since these are considered to be important determinant of consumer behavior (Mittal & Lee 1989; Sujan 1985). Yet, there may be other individual differences that can influence consumers' evaluations, such as materialism or mood, which were not examined here.

The ability of consumers to correctly identify their assortment of shoes is another point of consideration. In the study, consumers themselves established what they consider to be their assortment of shoes. Although it is possible that some participants forgot to photograph a pair of shoes, these are not likely to be the more prominent ones in the assortment. Participants can be expected to have photographed at least the most 'active' part of their assortment, being the shoes that they use relatively often. These are also the products on which assortment satisfaction is likely to be based.

Theoretical implications. The evaluation process regarding consumers' product assortments has received little research attention. This study is a first exploration into this new research area. It shows that product and variety evaluations both are predictors of assortment satisfaction. To explain assortment satisfaction, product evaluations alone are insufficient, and the variety between the products needs to be taken into consideration. Evidently, the assortment is more than the sum of its parts.

Another finding is that variety evaluations are based on individual ideal points. Not the variety as such determines assortment satisfaction, but the evaluation of variety by the consumer. Especially levels of variety lower than the individual ideal can seriously impact assortment satisfaction. Future research is well advised to take these individual ideal points into account in future studies on consumers' product assortments.

An examination of the impact of the variety components on variety evaluations shows a negative coefficient for attribute dispersion, which can not easily be explained. Further research is needed. Possibly, consumers have different views of the potential degree of attribute dispersion, which may have affected their variety evaluations. Consumers with high levels of attribute dispersion in their assortment may also perceive more potential dispersion in general, i.e. may be more aware of the diversity of attribute levels that exist. This may lower their variety evaluations as they believe that the degree of attribute

dispersion in their assortment is low relative to the possible degree of attribute dispersion, even when it may be high in comparison with other consumers.

Managerial implications. Maintaining ideally balanced retail assortments is extremely important for retailing profit (Taylor 1970). Knowledge of consumers' assortments can provide assistance in building a retail assortment strategy. This is not to say that retail assortments should match consumers' assortments. For instance, retail assortments could focus on specific parts of consumers' assortments (e.g. related to a specific usage situation). In order to develop such a retail assortment strategy, an understanding of consumers' product assortments is needed.

Manufacturers and retailers can attempt to market products that take a central place in consumers' product assortments. Such products would complement the other products in the assortment. In addition, manufacturers and retailers can encourage the purchase of products tailored for specific usage situations, to motivate consumers to enlarge their assortments without a loss of satisfaction with these assortment. Consumers are more likely to consider their assortment as having (too) little variety than as having (too) much variety, and managers can take advantage of this situation by promoting differentiated products.

It can be useful for manufacturers and retailers to stimulate the satisfaction with consumers' assortments. Consumers who are satisfied with their assortment, may be more likely to be satisfied with the company that provided the products in the assortment as well, and may be more likely to provide positive word-of-mouth effects. Increased satisfaction with the assortment can be obtained by increased average product evaluation. Providing consumers with better products can have both a direct positive effect on company image and an indirect effect through the assortment into which the product falls. Alternatively, by educating consumers, and providing them with more expertise, assortment satisfaction can be increased as well.

Yet, manufacturers and retailers may also profit from decreased consumer satisfaction with their own assortment, as this may trigger new purchase intentions. Of course, when decreased satisfaction is the result of decreased average product evaluations, i.e. products are evaluated low, this will generally drive customers away. But there are other ways in which assortment satisfaction is affected.

First, assortment variety affects consumers' assortment satisfaction. Marketing efforts could focus on making consumers aware of the variety in their assortment, and could stimulate consumers to critically evaluate their assortment in this respect. When this is coupled with products that are tailored towards specific usage situations, such a strategy may induce consumers to increase their assortment variety by adding products. This could be a successful strategy when the products that are offered are indeed better able to meet the needs of consumers on specific usage situations.

Second, assortment satisfaction is influenced by individual differences, such as involvement, and consumers' ideal levels of variety. Consumers with high ideal levels of variety may prove to be a profitable target group. These consumers are less satisfied with their own assortment, and are most likely willing to add new products to their assortment, if suitable products are available.

Extensions and future research. Ours is a first exploration of the evaluation process regarding consumers' product assortments, an area that has received little research attention. One possible extension is to examine the consequences of assortment (dis)satisfaction. Potential consequences are the addition or removal of products, but adjusting the usage situations for products is also possible. How does assortment satisfaction influence buying intentions and purchases in the category? To what extent do people consider their current product assortment when they make a new purchase?

Another possible extension is to investigate assortment management when the assortment is owned by more than one individual. The present study was conducted for a product category in which a single consumer owns the items. There are many situations in which assortments are not owned by single consumers, but rather by a household as a whole (e.g. videotapes, books, soft drinks). Individual preferences of different household members will influence the content and structure of such an assortment. An extension of the study would be to include these consumer interactions.

Future research can also examine the substitutability between products in more detail. Products in an assortment are likely to differ in their substitutability: some products can substitute and be substituted by many other products in the assortment, while other products are used in very specific usage situations only, and are hardly substitutable. Within the larger assortment, subgroups of products may exits, related to the diverse usage situations. Future research may examine how the presence and size of such usage related subgroups influences overall assortment satisfaction.

There might also be a link between the amount of variety in a person's own assortment, and the amount of variety (s)he prefers in a store. Gutman and Mills (1982) propose a scale of general shopping behavior where one of its dimensions – variety – is measured by the following items: "Amount of variety desired in wardrobe", "Variety needs in terms of matching clothing to situation occasions", "Desire for an extensive wardrobe collection", "Need to see a wide variety in clothing selections", and "Desire to shop in many different stores". Clearly, they equate the amount of variety desired in consumers' product assortments with the variety desired in retail assortments. Our findings suggest that these two types of variety evaluations may actually diverge significantly for consumers. Future research could examine this further.

A final avenue for future research has been mentioned before. Our results suggest that product-based evaluations are important for consumers' product assortments, while attribute-based approaches have been shown to be influential for retail assortments. Future research could further investigate our proposition that for large assortments with little consumer experience, attribute-based approaches can best describe evaluation processes, while for small assortments with extensive consumer experience, product-based approaches can best describe these processes.

6

Towards a General Framework of Assortments

This chapter summarizes the main conclusions, and discusses implications for category management practice. It presents a more general framework in which the dissertation is embedded. In addition, it offers an overview of retail assortment aspects and provides directions for future research, within this framework.

6.1 Introduction

Retail assortments are abounding with products, and, consequently, retailers are challenged to construct successful assortments for the product categories in their store. Influenced by ECR and category management, many retailers are currently reviewing their product assortments. A key construct for product assortments is the variety they provide. Four related topics were examined in this dissertation: (1) assortment variety as a construct, (2) consumers' expectations that result from variety, (3) consumer preferences for assortment variety, and (4) the relevance of assortment variety for consumers' own assortments of products.

This chapter summarizes the main conclusions of the dissertation, provides implications for retail managers, and offers a first step towards a general framework of retail assortments that can be used to guide future research in this area. The next section presents an overview of the results and conclusions from this dissertation. Section 3

introduces the managerial implications in two main areas: (1) store positioning, and (2) assortment modification. Subsequently, section 4 will introduce a general framework of retail assortments. The framework exceeds the boundaries of this dissertation, and identifies possible directions for future research.

6.2 Summary and theoretical implications

The studies in this dissertation gave insight in consumers' perceptions and evaluations of assortment variety. Table 6.1 provides an overview of our main results. We showed that an attribute-based approach to assortment variety can predict consumers' perceptions of variety well (Chapter 2). A multi-dimensional construct of assortment variety emerged, composed of assortment size, dispersion across attribute levels and dissociation between attributes. Increases in these components resulted in increases in assortment variety. Later chapters applied this conceptualization of variety, and examined consumers' responses for two basic expectations: for the success likelihood and the choice effort that they can expect from the assortment. Chapter 3 showed that increases in the variety components lead to increases in expectations of success likelihood, but not necessarily to increases in expectations of choice effort. Overall, assortment variety seemed to increase assortment preference. Chapter 4 refined this by specifying conditions when consumers prefer lower levels of variety. Table 6.1 shows these moderating effects for expertise and preference awareness. When expertise was low and when preference awareness was high, consumers showed less preference for variety in store assortments. Finally, in Chapter 5, we tested the applicability of the variety concept for consumers' product assortments. Results indicated that assortment variety is important in this application as well. If an assortment owner considered the variety in the assortment to be low, (s)he was less satisfied.

The main theoretical implication from this dissertation is that assortment variety consists of distinct components with different consequences for success and effort expectations, and for assortment preferences. This, and other contributions for assortment literature have been discussed in previous chapters and need not be repeated here. Yet, there are implications for other research areas that have not received attention so far in this dissertation.

6.2.1 Implications beyond assortment literature

The theoretical contribution of this dissertation is not limited to assortment literature. Our findings have implications for product bundling and variety seeking as well.

Table 6.1 Summary of the main results

Variety components (independent variables)	Dependent variable					Moderating effects on assortment preference	
	Variety perception (Ch.2,3)	Expected success likelihood (Ch.3)	Expected choice effort (Ch.3)	Assortment preference (Ch.4)	Variety evaluations for consumers' product assortments (Ch.5)	Expertise[3] (Ch.4)	Preference awareness[4] (Ch.4)
Assortment size	+	+	+	+	+	+	-
Dispersion across attribute levels	+	+	+ / 0 [1]	+	-	+	-
Dissociation between attributes	+	+	+ / 0 [2]	0	0	0	0

[1] A zero effect was found for changes in dispersion across a fixed number of attribute levels, while a positive effect was found for changes in the number of attribute levels.

[2] A positive effect was found for visually distinct products, while less easily distinguishable products gave a zero effect.

[3] A plus sign indicates that an increase in the variety component has a more positive effect on assortment preference for experts than for novices.

[4] A minus sign indicates that an increase in the variety component has a less positive effect on assortment preference for high preference awareness than for low preference awareness.

Studies on product bundling mostly focus on bundles of unrelated or complementary products (Guiltinan 1987; Drumwright 1992). Yet, product bundles can also consist of substitutable products from the same product category, such as bundles of differently colored socks. When the products in a bundle are imperfectly substitutable products, the bundle can be viewed as an assortment. Bundling research focuses on the integration of the individual product evaluations (Gaeth, Levin, Chakraborty & Levin 1990; Yadav 1994), or the fit between complementary products (Simonin & Ruth 1995). Given that a bundle contains only a limited number of products, and all of these products will typically be consumed, individual product evaluations are likely to influence consumers' evaluations of bundles of substitutable products. This dissertation suggests that consumers will base their bundle evaluation at least partly on the variety in the bundle, a factor that has generally not been considered in bundling studies. Consideration of bundles of substitutable products, and the variety in such bundles, can extend the bundling literature.

The proposed conceptualization of assortment variety can contribute to the variety seeking literature as well. The concept of variety seeking has often been split into separate components (Gijsbrechts, Campo & Nisol 2000; Menon & Kahn 1995; Pessemier & Handelsman 1984). One of these components is the so-called 'structural variety' (Pessemier 1985), which is equal to assortment variety. It is the variety that is inherent in the products themselves. The other components of variety seeking are related to the temporal aspects of the concept. Variety seeking is higher when the consumed products form a more varied set (structural variety), and when the variation over time is higher (temporal variety). After all, a consumption sequence of A-A-B-B will have the same structural variety as a sequence of A-B-A-B, but less temporal variety. Our results have implications for the structural variety component of variety seeking. Studies on variety seeking have generally applied a product-based approach to measure structural variety, e.g. by using the Euclidean distances between products. The proposed attribute-based approach towards variety may improve the measurement of structural variety, and hence enrich the variety seeking literature.

6.3 Managerial implications

This section will first discuss the managerial implications for store positioning by distinguishing several types of assortments based on the variety components, and next the implications for the addition or removal of specific products from an assortment.

6.3.1 Store positioning

The assortment of products offered by a retailer is an important aspect of store positioning (James, Durand & Dreves 1976; Lindquist 1974-75; Zimmer & Golden 1988). It has long been known that assortments offer ways for retailers to differentiate themselves (Bliss 1953; Knauth 1949; McDermott 1936). More recent studies have also found that the importance of assortment variety can differ between consumer segments (Steenkamp & Wedel 1991).

Based upon the assortment that a store offers, different types of store positionings can be identified. We can construct eight different types of assortments from the three variety components that were used throughout this dissertation. Figure 6.1 provides an overview. In our discussion of these assortment types, we will focus on the assortment *composition*. This leads to the four different types of assortments that are presented in italics in Figure 6.1: the variety assortment, the specialty assortment, the scrambled assortment, and the limited assortment. These four types of assortments can occur in both small and large stores. Of course, when the store is larger, i.e. when the number of products in the assortment is higher, variety in general is higher as well.

Based on the results of the previous chapters, the diverse store positionings can be further examined. Consumers' success and effort expectations, and the effectiveness of assortments in attracting consumers with high or low expertise and preference awareness, are inferred from the results of chapters 3 and 4. We will discuss each of the four store positionings of Figure 6.1 in turn.

Variety assortment

The products in a variety assortment are very diverse. A store with this type of assortment has something for everybody, and tries to be all things to all people. For instance, a book store may offer many different types of books, fiction, non-fiction, scientific, and so on, in many languages and writing styles. Such a variety strategy can be followed by both retailers with large assortments and retailers with small assortments. However, depending on assortment size, the type of consumer who is attracted to the store can differ.

In stores with a large assortment size, a variety assortment will lead to high expectations of both success likelihood and choice effort. The store is appropriate for consumers who do not have prior product preferences, and who want to make their choice in the store. Experts will also be attracted to such a store, since they appreciate the large amount of variety, and can handle it. Novices, on the other hand, may feel overwhelmed by the variety, and may avoid this type of store.

For smaller assortments, a variety strategy is likely to attract very different consumers than for larger assortments. Consumers will expect medium accuracy in a small store with a

variety assortment. The assortment is small, which lowers accuracy expectations, but this is ameliorated by the assortment content with very diverse products. Since there are only few products, and these products are very diverse, consumers expect to experience low choice effort in this type of store. The store is most appropriate for novices. It offers a broad spectrum of products, but not too many, so that novices do not feel overwhelmed. Since the assortment is small, consumers who have a favorite product that is available in the store will also find this type of store attractive.

Figure 6.1 Potential store positioning based on assortment variety

Assortment composition		Assortment size		
Dissociation	Dispersion	Small	Large	
High	High	Small number of very diverse products	Large number of very diverse products	*Variety assortment*
High	Low	Small number of diverse products in a small range	Large number of diverse products in a small range	*Specialty assortment*
Low	High	Small number of products in clusters across a large range	Large number of products in clusters across a large range	*Scrambled assortment*
Low	Low	Small number of very similar products	Large number of very similar products	*Limited assortment*

Specialty assortment

In a specialty assortment, products do not equally cover all the attribute levels that are available in the market. Yet, within the limited range that is covered, products are diverse. An example would be a book store that offers only scientific books, at the exclusion of other types of books, but that has all different sorts and types of scientific books (very diverse attribute combinations).

Compared to a variety assortment of the same size, general success likelihood will be lower in a specialty assortment, but choice effort is also lower (when the number of attribute levels is less for the specialty assortment than for the variety assortment). This type of assortment will be attractive to the segment of consumers who are interested in the attribute range of the store's focus. Specialty assortments appear most appropriate when there are clear consumer segments in the market, which prefer different types of products.

Scrambled assortment

In a scrambled assortment, the total range of attribute levels is available, but the products are clustered together along the range. For the bookstore example, a scrambled assortment implies a store in which all the individual attribute levels (i.e. all book types, languages, writing styles, and so on) are available, but not all combinations. So, for instance, the science fiction books would be in one particular language and writing style, while the novels would be in another language and writing style. Compared to a variety assortment of the same size, a scrambled assortment results in lower expectations of success likelihood and choice effort, especially when products are easily distinguishable.

A scrambled assortment differs from variety assortments and specialty assortments in other respects as well. Consumers may find it more difficult to anticipate which products they will find in scrambled assortments. Variety assortments contain diverse products from the total range that is available, while specialty assortments are focused on a specific part of the attribute range. Consumers can expect to find 'examples of everything that is available' in a varied assortment and 'everything that is available within a specific area' in a specialty assortment. Yet, a scrambled assortment does not focus on a specific area, nor does it have all attribute combinations. It may be more difficult for consumers to anticipate the products that can be found here. The scrambled assortment seems to offer 'specific bits of everything': all attribute levels are available, but a consumer who wants a specific combination of attribute levels may find no supply of products with such a combination.

If it is indeed more difficult for consumers to anticipate which products are available in a store with a scrambled assortment, such a store may appeal to a specific segment of consumers, who like to be surprised and stimulated. One of the reasons why consumers like to shop, is for the stimulation it provides (Tauber 1972; Westbrook & Black 1985). Not all consumers like to shop for such a reason. There are consumers who mainly shop for utilitarian reasons, i.e. to buy products, and who dislike the shopping process altogether (Babin, Darden & Griffin 1994; Bellenger & Korgaonkar 1980; Reid & Brown 1996). The degree to which a consumer appreciates stimulation from the environment depends on his/her optimal stimulation level (Jarratt 1996). Consumers with a high optimal stimulation level will appreciate stimulation from the environment more than consumers with a low optimal stimulation level. Stores with scrambled assortments may attract these consumers, since they offer relatively more stimulation and surprise than stores with other types of assortments. The influence of optimal stimulation levels on variety preference was not examined in this dissertation, but is an interesting avenue for future research.

Limited assortment

The products in a limited assortment are very similar to each other: the range of attribute levels is small, and attribute combinations are similar to each other. The store has a highly focused assortment, which may be relevant only for a niche in the market. An example is a university book store that sells only specific academic books relevant for the particular studies that can be attended. The assortment may attract consumers with high preference awareness, who know that their favorite product is available in the store.

6.3.2 Fine-tuning an assortment

Chapter 1 discussed the current trend in retailing: category management. Generally, the objective of a category management process will not be to completely change the positioning of a store, but rather to fine-tune the assortment by adding or removing individual products. Especially the elimination of products from an assortment has received attention in category management. Important questions for the retailer are: 'Will consumers still come to my store when products are dropped from the assortment?' and: 'Which products should I drop, and which products should I add?'. The results from this dissertation provide a first indication to answer such questions.

Our results from chapter 4 describe how expertise and preference awareness influence the variety preferences of consumers. Depending on the profile of the specific target group, assortment reduction may or may not be advisable. Assortment reductions are a good course of action when the target group consists of novices, and when the target group contains many consumers that have a clear preference for a particular product in the assortment. When many of the customers of a store are experts, or consumers who decide in-store which product they will buy, assortment reductions may instead drive customers away. For these target groups, revising the product assortment so that it contains more dispersed attribute levels should be more successful.

In addition, the components of assortment variety can provide insights into the product category. Chapter 2 already discussed how an attribute-based analysis of the product category may identify opportunities for introducing new (combinations of) attribute levels, and how a product-based approach can identify those products in a category that have a large (or small) influence on assortment variety. Especially a combination of product- and attribute-based analyses of a product category can provide a retailer with superior diagnostic information. Retailers can decide which product to drop or add based not only on individual product sales, but also based on the impact that the product has on assortment variety. A product may contribute to consumers' variety perceptions, attract people to the store and stimulate overall sales, even when the product itself does not sell well.

6.4 A conceptual framework of assortments

Figure 6.2 displays a general conceptual framework of retail assortments, in which this dissertation is embedded. We will discuss each of the building blocks of Figure 6.2 in turn. This will provide potential directions for future research. Table 6.2 presents an overview of propositions resulting from the discussion in this chapter.

Table 6.2 Propositions for future research

Area	Propositions
Assortment properties	- Consideration of subgroup structure and potential influential products can further improve predictions of assortment evaluation
Relation between assortment properties and assortment evaluation	- When assortments are large and product experience is low, consumers will apply attribute-based approaches more than when assortments are small and product experience is high.
Assortment presentation	- A display in which products are ordered according to the consumers' decision making process leads to lower perceptions of variety, and lower expectations of choice effort, than an alternative display. - An attribute-based display leads to lower perceptions of variety than a product-based display, but this effect decreases when the number of attribute levels increases.
Consumer characteristics	- Experts give a higher weight to attribute dispersion and dissociation in variety perceptions than novices. - Experts focus more on subcategories in their variety perceptions than novices.
Product category	- Consumers will use a product-based approach of assortment perception more often for an assortment with non-comparable products than for an assortment with comparable products.
Related product categories	- When related product categories are more appealing, consumers will also evaluate the focal category more positively.
Product choice consequences	- Consumers wait longer before purchasing a product when they expect a higher degree of choice effort in an assortment. - Consumers form larger consideration sets when they are confronted with more varied assortments.

6.4.1 Antecedents and main focus

We will first discuss (1) the content and structure properties that influence assortment perceptions and evaluations, (2) the main perceptions and evaluations that can be useful for assortment research, and (3) the relationship between the two.

Assortment properties

The central focus of this dissertation is assortment variety. Chapter 5 extended this by including product evaluations and attribute evaluations in consumers' product assortments. In retail assortments, product and attribute evaluations may affect assortment evaluations as well, especially when preference awareness is high. For instance, the presence or absence of a favorite product can be influential. In future research, we advocate the addition of these factors, since they can further improve predictions of assortment evaluation.

Assortment perceptions and evaluations

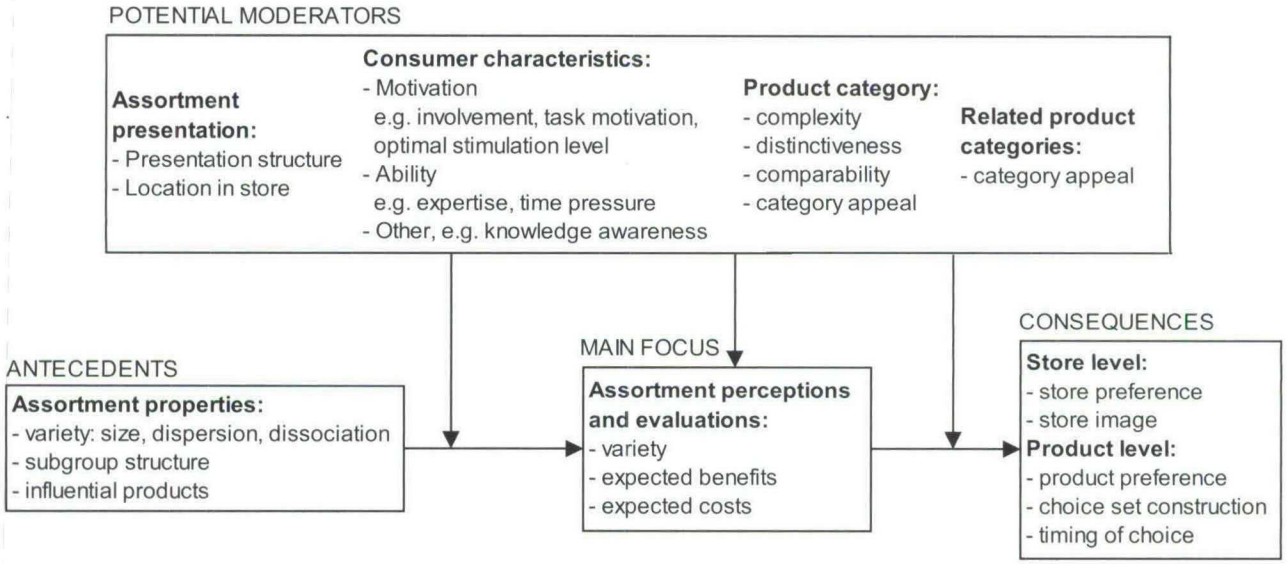
The main benefits and costs that consumers obtain from assortments are success likelihood and choice effort. Therefore, we examined consumers' expectations of success likelihood and choice effort as assortment evaluations in chapter 3. Although these have been identified as the most important aspects in a decision making context, chapter 3 described other benefits and costs as well, such as the opportunity to learn the category, or the potential regret that may result after choosing a product from an assortment.

Relationship between assortment properties and assortment evaluation

The relation between assortment properties and consumers' perceptions and evaluations received considerable attention in this dissertation. Our studies did not contain direct process measures, but inferred these processes from consumers' responses to diverse assortments. Results were consistent across the experiments, in which assortments ranged between depictions of assortments with hypothetical and visually oriented products, depictions with textually described products, and descriptions of variety components.

For retail assortments, we found that an attribute-based process could predict consumers' variety perceptions. This is consistent with previous literature (Bettman, Luce & Payne 1998; Huffman & Kahn 1998), which suggests an attribute-based approach for larger assortments. Results from the diverse data sets point in the same direction regarding the underlying perception process, but this needs to be confirmed in future research with the use of process measures.

Figure 6.2 General framework of retail assortments



Our results indicate that attribute-based approaches are particularly applicable to larger assortments, in which consumers do not have extensive product experience, such as large retail assortments for infrequently bought products. Product-based approaches may be more applicable to small assortments, where consumers have extensive product experience, such as consumers' product assortments. Future research could test this proposition.

6.4.2 Potential moderators

Several factors can influence the relation between assortment properties and assortment evaluation, and also the relation with assortment preference. Some of these factors may also have a direct influence on assortment evaluations. We explore four groups of factors: (1) assortment presentation, (2) consumer characteristics, (3) product category, and (4) related product categories.

Assortment presentation

The dissertation focused on the variety that is inherent to the products of an assortment. Yet, the way in which these products are presented will also affect consumers' variety perceptions and evaluations. Hoch, Bradlow and Wansink (1999) show that consumers' variety perceptions are influenced more by adjacent products than by products that are further away. In addition, their results reveal that organized displays appear to offer more variety than random displays when consumers engage in analytic processing, but less variety when processing is holistic. Future research could take this one step further, and examine the influence of different ways in which assortments can be organized. The effects of assortment presentation are not well understood, as evidenced by the results of Drèze, Hoch and Purk (1994). They change the presentation format in product categories to make shopping easier, e.g. by alphabetizing soups and by presenting cereals in blocks of subcategories rather than in blocks of brands, but find reduced sales as a result. It is unclear how the different presentation formats affect consumers' perceptions and evaluations of the assortments in their study. Simonson (1999) distinguishes between brand-based and model-based presentations of assortments, and offers propositions for how these presentations might effect product choice. Such a presentation format could be based on consumers' decision process, i.e. when consumers first decide on the brand, the assortment would be ordered by brand. In general, we would expect that a presentation format in which products are ordered according to the consumers' decision making process would lower consumers' choice effort (it becomes easier to choose, as product are ordered in a logical way for the consumer), yet also lower consumers' perception of variety. Conform the results of Hoch, Bradlow and Wansink (1999), an organized display may lower consumers' overall perception of variety, especially when consumers do not carefully examine the assortment.

Assortment presentation can also be used as a strategy to help consumers handle assortment variety. Huffman and Kahn (1998) show that satisfaction with the choice process increases when consumers are presented with attribute levels rather than with individual products. An attribute-based presentation of an assortment can increase consumers' ability to handle a highly varied assortment. Yet, it may also lower consumers' perceptions of assortment variety, as suggested by Godek, Yates and Auh (2001): consumers not only think that the variety is easier to handle, but also that the assortment variety as such is lower. This affects expectations of effort and success, leading to new research questions. Will attribute-based presentations always lower effort, or does this only occur when the number of product attributes is low? What happens when interactions between attributes are important, e.g. for food dishes, where certain combinations of ingredients go together extremely well, while other combinations taste terribly? We propose to put a more profound analysis of the effects of assortment presentation on success and effort expectations on the agenda for future research.

Consumer characteristics

Several consumer characteristics, i.e. involvement, expertise, and preference awareness, were examined in this dissertation, but other characteristics may be influential as well. Figure 6.1 distinguishes between motivation and ability factors. Motivation and ability factors, such as task motivation and time pressure, influence the information acquisition behavior of consumers (Pieters & Warlop 1999), and may also influence consumers' perception processes. Chapter 4 already showed how expertise (an ability factor) influences variety *preference*, but did not examine the effect of expertise on variety *perceptions*. Perhaps experts perceive variety differently from novices, for instance because they give more weight to certain variety components, such as attribute dispersion and dissociation, because they distinguish more subgroups of products within a category, or because they focus less on heuristics.

In a similar way, motivation factors, such as involvement, may influence the perception process. When consumers are not motivated to carefully examine assortment variety, they may not use an attribute- or product-based approach to assortment variety, but resort to heuristics of assortment variety instead, such as the availability of a favorite product or the shelf space devoted to the category (Broniarczyk, Hoyer & McAlister 1998).

The level of categorization, and thereby the assortment itself, may also be affected by motivation and ability factors (Anderson 1991). Many product categories are not well-defined, but fuzzy in nature (Fiske & Taylor 1991). Retailers often experience problems when attempting to define these product categories (Johnson 1999; Mathews 1997a). Since the studies in this dissertation were well-defined, we have not examined product category

structures. Before assortment variety and its consequences can be examined in fuzzy product categories, however, the category boundaries need to be clear. When a consumer is more involved with and has more knowledge of a category, (s)he will be able to make more detailed distinctions and define less inclusive categories (Alba & Hutchinson 1987). For instance, a gardener will not think in terms of trees, but will distinguish oaks, beech trees, birch trees, and so on. If the category is defined at a higher level, these consumers may focus on a sub-category only. This can have implications for their perception of variety. For example, novices might examine the variety in the total assortment, while experts only focus on a particular subcategory that is relevant for their current situation.

Product category

In Chapter 3, we proposed that the complexity and distinctiveness of products can influence consumers' expectations of success and effort. Product complexity and distinctiveness are inherent to the product category. Another product category aspect is the comparability of the products. This is related to the basis of product categorization. We used a product-referent basis of categorization, in which products form a set because they share similar physical characteristics. Chapter 1 identified three other possible bases of categorization: task / outcome referent, user referent, and location referent bases. Our use of product referent categorization bases resulted in assortment of comparable products, where the same attributes apply to all products. Other bases of categorization can result in assortments of products which are noncomparable. Johnson (1984; 1988) shows that the comparability of products influences consumers' choice process. It may also influence assortment perceptions. When products in an assortment are relatively incomparable to each other, attribute-based perceptions of variety may shift from concrete to abstract attributes. In addition, as attribute-based perceptions may become more difficult to construct, consumers can shift more towards a product-based approach.

Product category aspects not only influence assortment perception processes, but they can also influence assortment preferences. Product categories within a store can be more or less appealing to consumer groups (Campo, Gijsbrechts, Goossens & Verhetsel 2000). A favorable evaluation of an appealing product category may increase store preference.

Related product categories

Consumers often buy products from diverse product categories in a single shopping trip. This has been the topic of market basket studies (Gupta & Manchanda 1996; Julander 1992; Manchanda, Ansari & Gupta 1997; Russell & Kamakura 1997; Russell & Petersen 2000). When related product categories are appealing, this may not only directly influence

store preference. It may have a framing effect, through which consumers evaluate the focal category more positively as well.

6.4.3 Consequences

Assortment evaluations have consequences at both the store level and the product level.

Store level consequences

Chapter 4 focused on store level consequences of assortment variety. In general consumers appear to appreciate assortment variety, but this is tempered by several consumer characteristics, as discussed in chapter 4. Obviously, store preference and image are not only influenced by the assortment. Other factors have been identified, such as price level, store atmosphere, communication, services, location, physical facilities, and personnel (Bowersox & Cooper 1992; James, Durand & Dreves 1976; Lindquist 1974-75; Steenkamp & Wedel 1991). Together with characteristics of the trading area, such as competition, sociodemographics of the inhabitants, and urbanization, the store image can affect store sales value (Campo, Gijsbrechts, Goossens & Verhetsel 2000).

Product choice consequences

Chapter 1 described research into the effect of assortment properties on consumers' product choice. For instance, studies have shown that in assortments with a dominating alternative, this dominating product has a higher choice probability (Dhar & Glazer 1996; Ratneshwar, Shocker & Stewart 1987), and that compromise products also have a higher choice probability (Dhar, Nowlis & Sherman 2000; Drolet, Simonson & Tversky 2000; Simonson 1989). Yet, consumers' perceptions and evaluations of an assortment can also affect purchase timing, and the construction of the consideration set.

When consumers are confronted with a difficult decision, they are more likely to postpone the decision. Hence, consumers may wait longer before purchasing a product when they expect a higher degree of choice effort in an assortment.

A consumer usually considers a subset of the total product category only: the consideration set. Studies by Godek, Yates, and Auh (2001) show that presentation format can influence the size of the consideration set. A presentation by attribute levels rather than by individual products decreases the consideration set size. Not only presentation format may influence the consideration set size. Larger, or more varied, assortments may induce consumers to form larger consideration sets as well. Since consideration set size negatively affects the confidence a consumer has in the intention to choose a particular product from the set, and the consistency between intentions and behavior (Pieters & Verplanken 1995), this may influence choice and consumption behavior. Examining effects of assortment

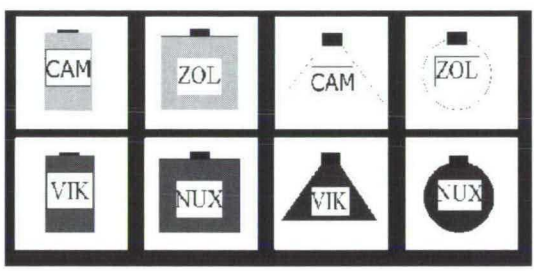
properties on consideration set size and composition may be an interesting avenue for future research.

This dissertation started with a description of product assortment management as the 'next frontier in retailing'. Product assortments are not only a frontier in retail management, but also in retail theory. After having been neglected in the marketing literature, retail assortments have received increasing attention from scholars over the past few year. Hopefully this dissertation can inspire additional research into this fascinating area.

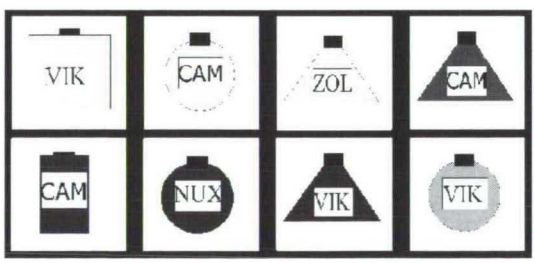
Appendices

Appendix A Sample assortments of jinkos

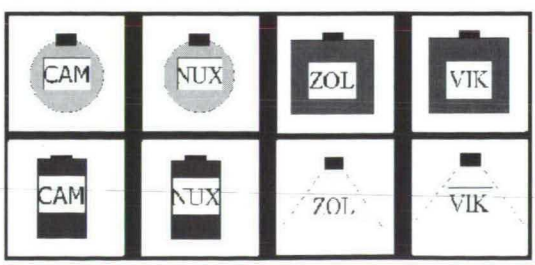
Low size,
high dispersion,
high dissociation:



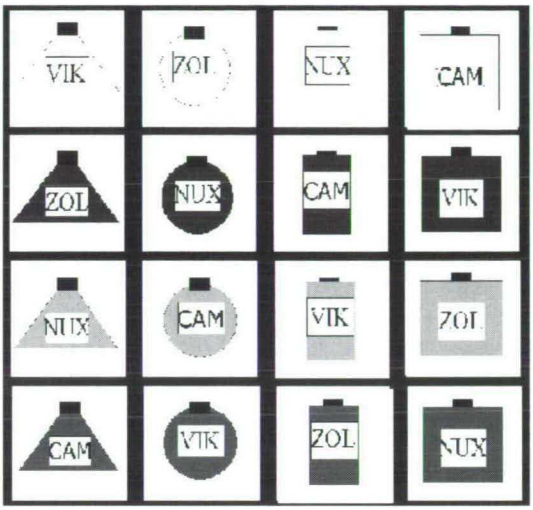
Low size,
low dispersion,
high dissociation:



Low size,
high dispersion,
medium dissociation:

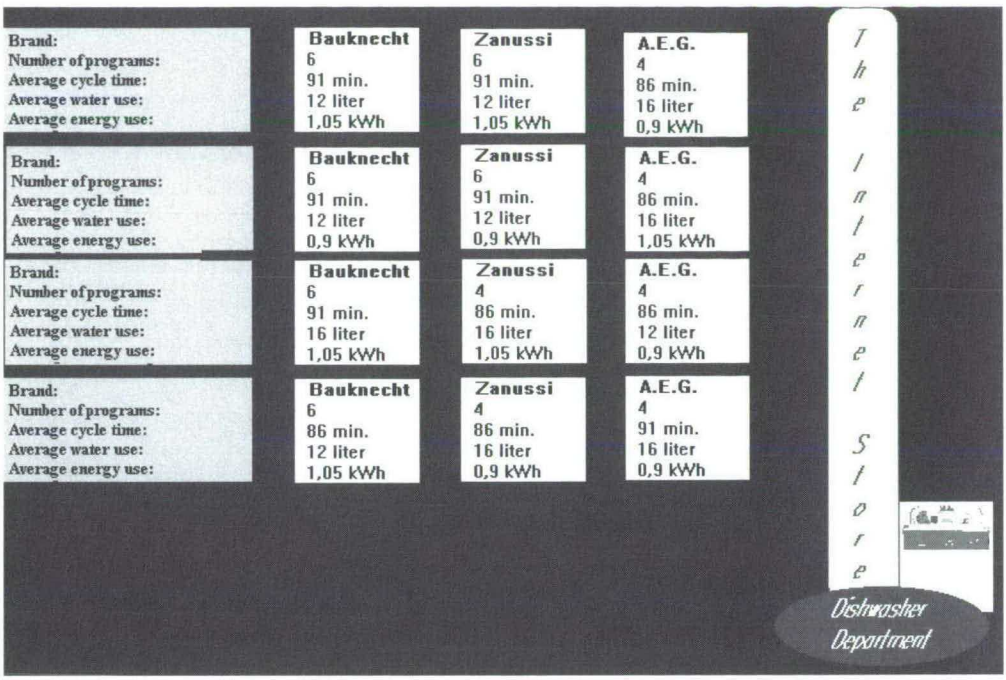


High size,
high dispersion,
high dissociation:



Appendix B Sample assortments of dishwashers

Brand:	Bauknecht	Zanussi	A.E.G.
Number of programs:	6	6	4
Average cycle time:	91 min.	91 min.	86 min.
Average water use:	12 liter	12 liter	16 liter
Average energy use:	1,05 kWh	1,05 kWh	0,9 kWh
Brand:	**Bauknecht**	**Zanussi**	**A.E.G.**
Number of programs:	6	6	4
Average cycle time:	91 min.	91 min.	86 min.
Average water use:	12 liter	12 liter	16 liter
Average energy use:	0,9 kWh	0,9 kWh	1,05 kWh
Brand:	**Bauknecht**	**Zanussi**	**A.E.G.**
Number of programs:	6	4	4
Average cycle time:	91 min.	86 min.	86 min.
Average water use:	16 liter	16 liter	12 liter
Average energy use:	1,05 kWh	1,05 kWh	0,9 kWh
Brand:	**Bauknecht**	**Zanussi**	**A.E.G.**
Number of programs:	6	4	4
Average cycle time:	86 min.	86 min.	91 min.
Average water use:	12 liter	16 liter	16 liter
Average energy use:	1,05 kWh	0,9 kWh	0,9 kWh



Appendix C Sample scenario and assortments of photo cameras

Meet Mr. White:
Mr. White knows a lot about photo cameras. He knows which are the important characteristics of photo cameras, and what to look for.
Mr. White knows exactly which brand and type of photo camera he wants to buy. He also knows that all stores have the camera of his preference in their assortment.

Enter your scores of the best store (1) for Mr. White to the worst store (8) by clicking on the spaces before the stores. You can change your answer by clicking again.

Score	Number of cameras	Differences of the cameras on characteristics. *Many differences* : e.g. cameras of different sizes. *Few differences* : e.g. only cameras of about the same size.	Connection between the characteristics. *High connection* : e.g. cameras of a certain size have the same lens. *Low connection* : e.g. cameras of a certain size have a different lens.
_	Many	Many	High
_	Many	Many	Low
_	Many	Few	High
_	Many	Few	Low
_	Few	Many	High
_	Few	Many	Low
_	Few	Few	High
_	Few	Few	Low

OK

Appendix D List of concrete attributes of shoes

Attributes	Description	Coding categories
Shoe type	What is the type of shoe [1]	pump, loafer, lace shoe, sports shoe, summer shoe, ankle boot, other
Primary color	What is the main color of the shoe (if no main color was present, "multiple" was used)	black, brown, blue, other dark, white/beige, other light, bright, multiple
Primary material	What is the main material of which the shoe is made (if no main material was present, "multiple" was used)	leather, suede, plastic, fabric, lacquer, multiple, other
Shoe fastening	Which type of fastening is used in the shoe	none, laces, buckle, elastic band, other
Stitching	Are stitches for connecting shoe parts visible	yes, no
Shoe height	How high is the shoe	low, ankle height, above ankle, calf height
Openness shoe	Are there open areas in the shoe, e.g. an open nose	open, not open
Prints	Are prints present on the shoe, e.g. printed brand name or symbol	yes, no
Accessories	Does the shoe have accessories, i.e. little things attached to the shoe	yes, no
Heel height & type	How high is the heel of the shoe, and how is it formed	low, high spike, high curved, other
Sole height	How high is the sole of the shoe	low, high

[1] Shoe types were described in detail to the judges.

Appendix E Question wording

Original questions were in Dutch; translations of the questions are provided. Sentences in italics appeared on participants' computer screens.

Assortment satisfaction

To which degree are you overall satisfied with the shoes that you own?
Five-point scale: (1) totally not satisfied, (2) not satisfied, (3) neither satisfied nor unsatisfied, (4) satisfied, (5) very satisfied. A 'no response' answer was also included.

Attribute evaluation

For the following questions you are asked to sort all photographs into different piles. Each photograph has to be put in one of the piles. It is possible that a pile remains empty.

Please put the photographs of the shoes together. Now make the following piles of photographs: (each photograph has to be put on one of the piles)

The following sorting tasks were given:
- *shoes that you think are fashionable*
- *shoes that you think are neither fashionable nor unfashionable*
- *shoes that you think are unfashionable*

- *shoes that you find comfortable*
- *shoes that you find neither comfortable nor uncomfortable*
- *shoes that you find uncomfortable*

- *shoes that you think have high quality*
- *shoes that you think have average quality*
- *shoes that you think have low quality*

Product evaluation

Product evaluations was constructed as a weighted average of attribute evaluations. Based on attribute importances and evaluations, for the three abstract attributes fashionability, comfort, and quality.

Attribute importance

This questionnaire starts with a few general questions regarding the quality, price, comfort, and fashion of shoes. You will be given two statements at a time. Please indicate with which statement you agree the most.

Two different statements were shown on the computer screen consecutively:

1. *I do not mind buying slightly more expensive shoes, as long as they are in fashion.*
2. *My shoes do not have to be in accordance with the latest fashion, as long as they remain payable.*

1. *My shoes have to be of good quality, even if this means that they are not completely in fashion.*
2. *It is important for me that my shoes are in fashion, even if the quality is a little less.*

1. *If I have to choose between shoes that are in fashion and shoes that are comfortable, most of the time I choose shoes that are in fashion.*
2. *It is more important for me that my shoes are comfortable, than that they are in fashion.*

1. *My shoes do not need to be of a high quality, as long as they remain payable.*
2. *For a high quality shoe I am willing to pay more.*

1. *A shoe can be very comfortable, but if it is not of good quality, I will not buy it.*
2. *It is important for me that my shoes are comfortable, even if that means that the quality is less.*

1. *I do not mind paying a little more for shoes that are comfortable.*
2. *My shoes do not have to fit perfectly, as long as they remain payable.*

Assortment size evaluation

When you give a close look to the shoes you own, then is the number of shoes that you own ...
Five-point scale, featuring: (1) too low, (2) low, but not too low, (3) exactly right, (4) high, but not too high, (5) too high. A "no response" option was also included.

Assortment variety evaluation

When you give a close look to the shoes you own, then is the number of different kind of shoes that you own ...
Five-point scale, featuring: (1) too low, (2) low, but not too low, (3) exactly right, (4) high, but not too high, (5) too high. A "no response" option was also included.

Variety components (objective)

Assortment size: open ended question:
How many pairs of shoes do you own at the moment? We only mean the shoes which you wore at least ones during the past year. (sporting shoes which you only wear when sporting not counted)

Attribute dispersion and dissociation were constructed on the basis of a content analysis of the concrete attributes (Appendix D).

Expertise

I am knowledgeable with regard to shoes
It is hard for me to determine if a shoes has a low or high quality
I know exactly which shoes are in fashion
I can easily mention three brands of shoes (not sports shoes)
Five point scale, featuring: (1) totally disagree, (2) disagree, (3) neither disagree nor agree, (4) agree, (5) totally agree. A "no response" option was also included.

Involvement

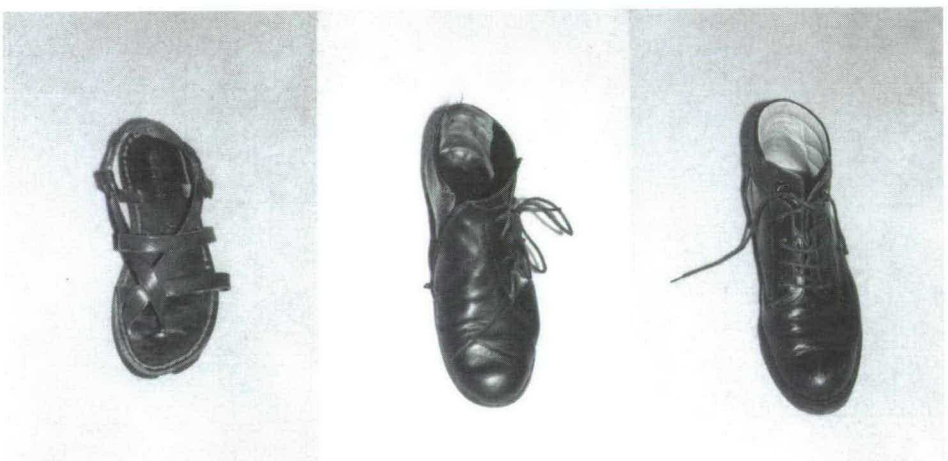
Compared to other people, I am not very interested in shoes
I am very involved with shoes
Shoes are very important to me
My shoes say something about who I am
Five point scale, featuring: (1) totally disagree, (2) disagree, (3) neither disagree nor agree, (4) agree, (5) totally agree. A "no response" option was also included.

Appendix F Examples of photographs provided by the participants

Assortment of respondent 65101:
Man, 41 years old, 4 persons in the household, gross annual household income between 75.000 and 99.000 guilders, HBO/WO education

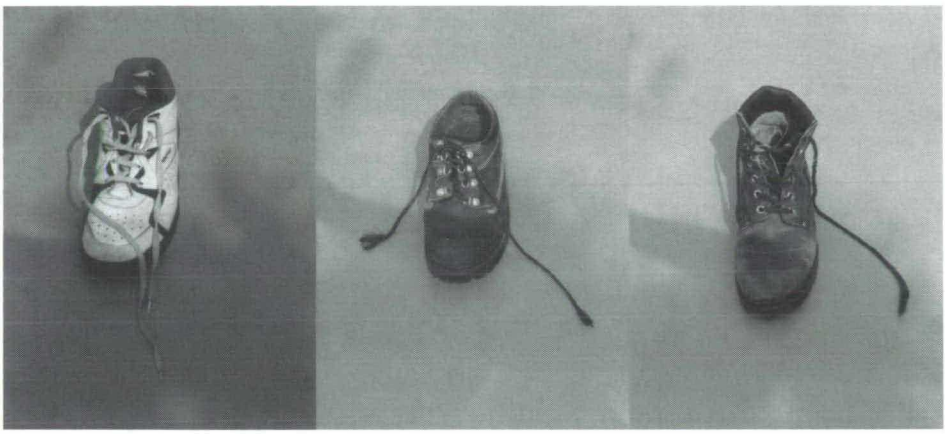
Assortment of respondent 620201:
Man, 27 years old, 2 persons in the household, gross annual household income between 51.000 and 63.000 guilders, WO education

Assortment of respondent 620202:
Partner of previous respondent



Assortment of respondent 1320402:
Woman, 37 years old, 5 persons in the household, gross annual household income between 99.000 and 123.000 guilders, MBO education

Assortment of respondent 797901:
Man, 34 years old, 4 persons in the household, gross annual household income between 27.000 and 30.000 guilders, LBO education



Samenvatting
(Summary in Dutch)

Percepties en evaluaties van assortimentsvariëteit

Door de explosieve groei van het aantal producten op de markt wordt het steeds moeilijker voor detaillisten om hun assortiment optimaal samen te stellen. Assortimenten verschillen dan ook in grootte en samenstelling. Deze grootte en samenstelling van assortimenten hebben invloed op de winkel evaluatie van consumenten. Detaillisten hebben steeds meer behoefte aan inzicht in deze relatie tussen assortimentsgrootte en –samenstelling aan de ene kant, en winkel evaluaties aan de andere kant. Ook in de recente marketing literatuur begint dit onderwerp belangstelling te wekken.

Allereerst dient de term 'assortiment' gedefinieerd te worden. Het gebruik van de term in de literatuur kan geclassificeerd worden aan de hand van drie facetten: het construct waarvoor de term gebruikt wordt, het niveau van categorisatie, en de basis van categorisatie. Dit proefschrift definieert assortimenten als sets van producten uit dezelfde product categorie.

Om inzicht te krijgen in de huidige ontwikkelingen in assortiment management en theorie, besteedt hoofdstuk 1 aandacht aan de opkomst van category management, en de recente literatuurvorming op dit gebied. Hierbij komen een aantal interessante thema's naar voren. Ten eerste, managers hebben behoefte aan meer inzicht over consumentpercepties en

evaluaties. Ten tweede, op verschillende punten komt het begrip variëteit naar voren. En tenslotte, de link tussen consumentpercepties en variëteit is belangrijk voor detaillisten, en tevens een interessant onderzoeksgebied.

Om deze link te kunnen onderzoeken, is allereerst een goede conceptualisatie en meting van variëteit nodig. In hoofdstuk 2 worden, vanuit de attributen van de producten, maten beschreven voor assortimentsvariëteit. Deze maten worden vergeleken met een bestaand model dat variëteit bekijkt vanuit de producten. Een eerste, synthetische, data set laat zien dat maten, die gebaseerd zijn op attributen, specifieke componenten van assortimentsvariëteit onderscheiden, en dat deze maten meer omvatten dan enkel assortimentsgrootte. Een experiment onder consumenten laat vervolgens zien dat deze maten tevens de percepties van variëteit door consumenten het beste verklaren.

Vanuit de attributen worden twee componenten van assortimentsvariëteit naar voren gebracht: dispersie en dissociatie. Een hoge dispersie van attribuut niveaus houdt in dat alle niveaus in gelijke proporties aanwezig zijn. Dus, bijvoorbeeld, een assortiment truien heeft truien in allerlei verschillende kleuren, en richt zich niet om één of enkele kleuren. Een hoge dissociatie van attributen houdt in dat de attributen geen sterke link met elkaar hebben. Bijvoorbeeld, de kleur van een trui hangt niet samen met het materiaal waarvan deze gemaakt is. De twee componenten geven een beeld van de samenstelling van een assortiment. Tezamen met assortimentsgrootte brengen ze de variëteit van een assortiment in kaart.

Assortimentsvariëteit kan een belangrijke rol spelen in winkelkeuze. De eerste indruk van een assortiment leidt tot verwachtingen bij de consument, op basis waarvan deze consument besluit om een winkel al dan niet te bezoeken. Een 'accuracy-effort framework' onderscheid twee verschillende soorten consument verwachtingen die vanuit het assortiment naar voren komen: de waarschijnlijkheid dat het assortiment een gewenst product bevat, en de moeite die het zal kosten om dat product te kiezen. Aan de hand van dit framework onderzoekt hoofdstuk 3 de invloed van assortimentsvariëteit op consument verwachtingen. Verwachtingen over de kans dat een assortiment een gewenst product bevat blijken te stijgen bij stijgende assortimentsvariëteit. Over het algemeen wordt aangenomen dat de keuzemoeilijkheid ook zal toenemen, maar twee studies tonen aan dat dit niet altijd het geval hoeft te zijn. Bij een toename in het aantal attribuut niveaus en bij een toename in dissociatie nemen verwachtingen van keuzemoeilijkheid niet altijd toe.

Variëteit zal niet alleen een effect hebben op consument verwachtingen, maar ook op de winkel preferentie van consumenten. Of een hogere variëteit leidt tot een hogere preferentie voor een winkel kan van andere factoren afhangen. Twee van zulke modererende factoren, expertise en kennis van product preferentie, worden bekeken in hoofdstuk 4. Beschrijvingen van expertise en kennis van product preferentie worden als

scenario's aan respondenten voorgelegd. Bij hoge expertise blijken respondenten grote assortimenten met meer dispersie te prefereren dan bij lage expertise. Bij hoge kennis van product preferentie worden juist kleinere assortimenten geprefereerd.

Tot dusverre lag de focus van het proefschrift op winkelassortimenten. Er bestaan echter andere soorten assortimenten, zoals de product assortimenten die in het bezit zijn van consumenten. Consumenten hebben bijvoorbeeld sets van schoenen, broeken, c.d.'s, boeken, etc. Het belangrijkste verschil met een winkelassortiment is dat de consument elk product in deze assortimenten gekozen heeft. Hoofdstuk 5 introduceert een conceptueel model van assortimentstevredenheid voor deze assortimenten van consumenten, waarbij tevredenheid bepaald wordt door evaluaties van producten, attributen, en variëteit. Een eerste test van dit model wordt verkregen door assortimenten van schoenen te bekijken. Resultaten geven aan dat variëteit ook voor deze assortimenten een belangrijk begrip is.

Dit proefschrift geeft inzicht over consument percepties en evaluaties van assortimentsvariëteit. De belangrijkste resultaten zijn: (1) een benadering vanuit de attributen kan de consument percepties van variëteit goed verklaren, (2) verhoging van variëteit leidt tot een hogere verwachting van de kans dat het assortiment een geschikt product bevat, maar niet altijd tot een hogere verwachting van keuzemoeilijkheid, en (3) expertise en kennis van product preferenties modereren de relatie tussen assortimentsvariëteit en assortimentsvoorkeur. Deze resultaten hebben gevolgen voor detaillisten: de samenstelling van hun assortiment beïnvloedt de percepties van de consument, zijn/haar verwachtingen van de winkel, en winkelvoorkeur.

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ERICA VAN HERPEN (1974) studied Business Administration at Tilburg University. In January 1997, she started her PhD research at the Marketing Department of this university. During her second year as a PhD student, she spent the spring semester at the University of Florida. Currently, she is working as an assistant professor at Wageningen University. Her main research interests are assortment perceptions, retail strategy, and choice and evaluation processes.

Given the explosive growth in the number of products, managing their assortments is a challenging task for retailers. An understanding of consumer responses to changes in assortment size and composition is required. This dissertation examines consumers' perceptions and evaluations of product assortments, with a focus on assortment variety. It investigates diverse measures of assortment variety, the influence of variety aspects on consumers' expectations of choice success and effort, and the combined influence of variety aspects, expertise, and preference awareness on store preference. In addition, a first exploration of consumers' product assortments, i.e. assortments that are owned by consumers, is provided.

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