MARIA SÄÄKSJÄRVI

CONSUMER EVALUATION OF HYBRID INNOVATIONS

Helsingfors 2004
Consumer Evaluation of Hybrid Innovations

Key words: Hybrid products, innovations, categorization, consumer evaluation, conceptual combination, analogical learning

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http://www.hanken.fi

ISBN 951-555-809-3 (printed)
ISBN 951-555-810-7 (PDF)
ISSN 0424-7256

Yliopistopaino, Helsingfors 2004
ACKNOWLEDGEMENTS

First of all, I would like to thank my advisors Professor Tore Strandvik and Professor Saeed Samiee. Your guidance throughout this process has been invaluable and inspiring; I would not be sitting with this manuscript in my hand if it were not for you. I would especially like to thank Professor Samiee for providing me with invaluable comments regarding publishing the articles my thesis comprises.

I am honored to have had Professor Pirjo Laaksonen and Professor Malin Brännback as the official examiners of my thesis. Thank you for improving the quality of this manuscript and for providing me with thought-provoking questions that helped me clarify the topic at hand.

Thank you Christian Grönroos for offering me to join the LIIKE-project making it feasible for me to work at CERS. It is a wonderful environment for any researcher to be in. Thank you Veronica Liljander, Carita Ekenstén-Möller, Pia Polsa and Alf-Erik Lerviks for all the help and support you have provided me during the dissertation process. A great thank you to all of my wonderful colleagues at CERS who have been there for me when I have needed them. Thank you Johanna Gummerus for reading my manuscripts time and over again and for providing me with support at times when I needed it. Thank you Pia Polsa and Christina Nordman for providing me with excellent comments when I had my thesis proposal seminar, thank you Gyöngyi Kovacs, Minna Pura, Kristina Heinonen, and Tiina Vihtkari for reading and commenting on my work. I really appreciate your help. Thank you Kirsti Lindberg-Repo for valuable discussions regarding the dissertation process. Thank you also everybody else at CERS.

Thank you Minttu Lampinen and Tuure Tuunanen for reading and commenting on my work. A special thank you to Minttu for all the discussions we have had regarding innovations!

Thank you Ari Seppälä at Accenture for allowing me to keep working for Accenture during the dissertation process and for providing me with support.

Thank you to all of my friends who have been supporting me throughout this process. Thank you all former colleagues at Accenture, all of my high-school friends, and my study friends from Hanken. You know who you are.

I have been fortunate to receive external financial support for my thesis. I would like to thank the Academy of Finland, Liikesivistysrahasto, and Waldemar von Franckells stiftelse for making it financially possible for me to work on this dissertation.
Last but certainly not least, I would like to thank my parents Carola and Juha, my siblings Sanna, Totte and Nelly, my grandparents Karin, Lasse, Taimi and Lauri, and the Bremer family Heinz, Iris, Wolfgang and Gertrud in Germany for always loving and supporting me. And most of all, thank you Oliver, for always being by my side, for believing in me when I didn’t, and for always supporting me.


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1. INTRODUCTION

1.1 Innovation Adoption: Hybrid Products

The increasingly tight competition for consumer dollars forces manufacturers to be simultaneously innovative and cost-effective in their new-product launches. A new kind of product emerging from manufacturer incentives is the hybrid product, a “really new“ product that combine two previously independent product categories into one (Jain and Ziamou 1995). Examples are prolific and include Internet watches, two-in-one shampoo and conditioner, sofa beds, and TV-video sets. What separates the hybrid from other products in the marketplace is their inherent ambiguity (i.e. they can be categorized in multiple ways). They could belong to both product categories of which they are a combination, making them difficult to categorize. Consumers categorize them in four different ways depending on what comparison standard is activated in the memory (Wisniewski 1997). A hybrid product such as a PDA watch could be categorized as a PDA (it belongs to the main category), a watch (it belongs to the modifier category), a PDA watch (it forms a category of its own), or a mini-computer (it belongs to a distant category). Consumer categorization decisions are likely to have a considerable effect on innovation evaluation and are thus of importance to marketers who wish to forecast the take-off of new products.

Forecasting new-product adoption is one of the most difficult management tasks today. Any device that can bring us closer to an accurate adoption curve is of tremendous use. Although previous literature on innovation evaluation has provided us with insights into how consumers evaluate innovation-specific factors such as complexity and relative advantage, the psychological understanding of how they comprehend and evaluate innovations needs profound elaboration (Moreau et al. 2001a). Moreover, several issues deemed relevant in consumer behavior, such as consumer motivation, have seldom been addressed in studies on innovation adoption.

The literature pertaining to the type of innovation addressed in this thesis, hybrid innovations, is scarce. A study identifying factors contributing to the categorization and evaluation of hybrid products would contribute to the current literature by bringing into focus the factors that are pertinent to ambiguous and “interface innovations” that are highly common in the current consumer market, and provide a general insight into the field of innovation adoption by addressing factors previous literature has largely left untouched.

1.2 The Purpose of the Thesis

The purpose of this thesis is to examine consumer evaluation of hybrid innovations. The focus is on consumer categorization of such innovations and on factors contributing positively and negatively to their evaluation. This evaluation then leads to either innovation adoption or rejection (an adoption decision).
This goal is achieved in the presentation of three essays, which are separate entities, and together build up a broader understanding of hybrid innovation evaluation. The essays, as they appear in this thesis, are organized in a specific order. Although they could be read as separate entities, they progress from the first to the third towards more specific evaluation processes.

The first essay examines the basic issues surrounding hybrid innovation evaluation. It examines knowledge, consumer categorization, and its effect on the evaluation of a hybrid product in conjunction with innovation-specific factors. The second essay expands on the framework created in the first essay by examining how motivation impacts consumer evaluation of hybrid innovations as to establish the boundary conditions for it. That is, does motivation change some of the effects found in the first essay. In the third essay, I go to the product-property level, and investigate what product properties matter in the evaluation. As such, the second essay is an extension of the problematization set out in the first one, whereas the third one is a sub-component of the first, a microanalysis of consumer evaluation of hybrid innovations.

The purpose of each essay can be set out as research questions with sub-questions:

1. Consumer categorization and evaluation of hybrid innovations
   a) Do most consumers categorize hybrid innovations as single- or dual-purpose products?
   b) Does consumer knowledge explain consumer categorization of hybrid products?
   c) Do consumers who categorize hybrid products as dual-purpose products find them more attractive than consumers categorizing them as single-purpose products?
   d) Can product categorization be included in a model of innovation adoption?

2. The effect of motivation on innovation evaluation
   a) How and in what ways does motivation affect innovation evaluation?
   b) What is the differential effect of intrinsic (affective factors) and extrinsic (cognitive factors) motivation on innovation evaluation?
   c) What components does a comprehensive model of innovation evaluation have?

3. The effect of product categorization on subsequent evaluation
   a) Does categorization have an effect on subsequent product evaluation?
   b) Does single-versus dual-purpose categorization lead to differing utilization of main and modifier category alignments?
   c) Does single-versus dual-purpose categorization lead to differing utilization of commonalities, alignable and nonalignable differences?
   d) Does single-versus dual-purpose categorization lead to differing amounts of inference generation?
1.3 Terminology

This thesis utilizes a range of terms, many of which originate from psychology and thus might be unknown to marketers. An outline of the key terms used in this thesis is provided below. The purpose of this list is to help the reader understand the summary part of this thesis before reading the essays, and is by no means exhaustive. All terms used in the specific essays are elaborated on within each essay.

An innovation is a product that is perceived as new by an individual (Rogers, 1995), and is used interchangeably with new product.

A really new product is a product that defies traditional category boundaries and is placed in a category by itself if accurately categorized (Moreau et al. 2001b). Hybrid products are really new products.

Product properties are product features, attributes, and relations (Gentner 1989).

Commonalities are shared product properties with the same value (Gentner and Markman 1994).

Alignable differences are shared product properties with different values (Gentner and Markman 1994).

Nonalignable differences are unique product properties (Gentner and Markman 1994).

1.4 Structure

The structure of the thesis is depicted in Figure 1. First, I will introduce its subject and purpose. Then, I will explain the theoretical background and elaborate on the content of each of the three essays. The essays are placed in the middle of the thesis in order to invite the reader to assess the contribution of the thesis that is presented after the essays. Finally, I offer my recommendations for future research.

Figure 1: The Structure of the Thesis
2. THEORETICAL BACKGROUND

This thesis is built upon several streams of literature and is multi-disciplinary in nature; it combines psychology and marketing to create a deeper understanding of consumer evaluation of hybrid innovations. The main theoretical streams within psychology are analogical learning and conceptual combination (e.g. Gentner and Markman 1994; Wisniewski 1996; Wisniewski 1997; Wisniewski and Love 1998), and within marketing are innovation adoption (Rogers 1995; Rogers 1962) and consumer evaluation of new products (Sujan 1985; Sujan and Bettman 1989). I will briefly outline prior literature with a focus on these specific lines of research.

2.1 Consumer Categorization of New Products: An Analogical Learning/Conceptual Combination Perspective

Categorization involves treating two or more distinct products as belonging together (Medin 1989) by placing them in a joint category representation. This category contains besides the products themselves information about what features are typical, essential, and important for it, but also what separates it from others. Categorization is essential for dealing with the large number of items consumers encounter in their daily lives (Ross 1997). Once a product has been categorized, we can use our knowledge of its category to make predictions about it. Categorization, in essence, involves comparison between a target (e.g., a new product) and categorical knowledge (a base) (Basu 1993). That is, a new product is compared to a schema to see if it is similar enough to other products to be included in it. Of the many categorization theories suggested in the literature (classic theory, similarity-to-exemplar theory, prototype theory), one of the more recent ones to emerge is analogical learning theory. Since it is the only theory that addresses alignments on both attributal and relational levels, it is the categorization theory that is used as a base for the current thesis.

According to analogical learning theory, consumers faced with something unfamiliar use their existing knowledge to comprehend and categorize the new phenomenon (Gentner 1983; Gregan-Paxton and John 1997; Roehm and Sternthal 2001). More specifically, consumers use information from a familiar domain (a base) and transfer it to the novel domain (the target) (Gentner 1989; Gentner 1983). This transfer occurs in three stages: Access, mapping, and transfer (i.e. alignment, and inference projection, Markman and Gentner 2001), and the logic through which information is aligned from the base to the target is the ease by which the new product is recognized as being something similar to what the consumer has been exposed to before (Gentner and Markman 1994; Gentner and Markman 1997). Alignment involves the placement of matching product properties into one-to-one correspondence. Matching product properties means that the screen of a camera cellphone is aligned with the screen or a regular cellphone, and not with its keypad or color, and one-to-one correspondence means that one product property from the base is compared with one product property in the target. The more alignments we can make from base to target the more similar the product is to others in the category and the higher the likelihood that it will be included in it. New products that are similar to products seen before are easy to categorize,
whereas innovations that have profound differences from already existing products requires more effort. Inferences involves filling out missing product information in the target by using knowledge in the base for predicting what other properties the product might possess.

The alignment and inference generation stages in the new product learning process can be achieved through both relational and attribute-based alignments depending on the knowledge a consumer possesses in the base (Gentner and Toupin 1986; Medin et al. 1993). Consumer knowledge has been proposed to consist of two elements: familiarity, the product-related experiences that have been accumulated, and expertise, the ability to perform product-related tasks successfully (Alba and Hutchinson 1987). Experts are primarily relation-driven (e.g., regarding a computer, press ctrl + x to cut and ctrl + v to paste), whereas novices are often attribute-driven (e.g., a computer has a metal color, a big screen, and is quite large) (Gregan-Paxton and John 1997; McKeithen et al. 1981; Novick 1988). Attributes are easier to align than relations since they do not require knowledge of product functionality (Gentner 1983).

Conceptual combination theory is a special case of analogical learning that applies to product combinations (dual-process theory, Wisniewski 1996; Wisniewski 1997). It is special in the sense that consumers can use both product categories the hybrid product combines when learning about it (in contrast to analogical learning theory where consumers are assumed to access one product category as a base). Without knowledge of both of these categories, consumers might consider it to be a regular product. This entails a number of implications about consumer learning of new products. First, consumers must combine their knowledge of different product categories to fully comprehend the new product (Moreau et al. 2001a). Accessing knowledge from multiple product categories is more effortful than using one product category as a base. Second, consumers are likely to be more selective in their processing of product information: they might only transfer a small number of product properties from their existing knowledge to the new product (Wisniewski 1997).

Knowledge plays a pivotal role in consumer learning, and should be included as a determinant in models of consumer adoption. The current thesis positions knowledge as a multi-dimensional concept. Consumers may possess it in multiple product categories when evaluating hybrid innovations. Consumer knowledge is particularly in focus in the first essay, but is also present throughout the thesis. The alignments consumers make are the focus of essay three.

2.2 Consumer Evaluation of New Products: Processing, Cognition, and Affect

The aim of this discussion is to illuminate the factors incorporated into the current thesis - consumer processing of new information and the interplay with cognition and affect. The literature on consumer evaluation in consumer behavior relates to consumer decision-making, choice, information processing, retrieval of product information, and inference generation, among other things (e.g., Campbell and Goodstein 2001; Mukherjee and Hoyer 2001; Peracchio and Tybout 1996; Roehm and Sternthal 2001; Sujan 1985; Sujan and Bettman 1989; Sujan and Dekleva 1987; Ziamou and
Ratneshwar 2003). It draws from literature in cognitive psychology and social cognition, and suggests that a number of factors affect consumer evaluation of new products. Several studies have demonstrated that consumer processing is dependent on certain characteristics inherent (may also be temporal) in consumers, which are linked to both left-brain and right-brain activities (Cacioppo et al. 1984; Celsi and Olson 1988; Levin et al. 2000; MacInnis et al. 1991; Meyers-Levy and Malaviya 1999; Petty and Cacioppo 1984; Petty et al. 1983). For example, consumers who differ in their level of need for cognition engage in different kinds of information processing (Mantel and Kardes 1999). Recent literature has also started addressing affective components as motivators of consumer information processing. For example, Roehm and Sternthal (2001) demonstrate that positive mood influences consumer processing and the subsequent evaluation of new products. Different processing strategies are hence linked to consumer motivation to engage in learning activities.

Cognitive and affective variables represent consumer motivation (Hirschman and Holbrook 1982). Motivation in this context is the incentive to perform a particular behavior or engage in a specific action. It is linked to both consumer logic and feelings, or what in the literature has been called extrinsic and intrinsic motivation (Holbrook et al. 1984; Holbrook and Hirschman 1982). Extrinsic motivation involves actions that consumers take to achieve rewards such as monetary incentives, stock options, or other benefits. Intrinsic motivation is related to the fun and the pleasure consumers feel while performing a task, such as surfing on the Internet and playing with cellphones. Naturally, consumer motivation may also be related to avoidance: Consumers might perform tasks not to gain more money, but to avoid losing the money they already have. There is evidence that both extrinsic and intrinsic motivation affect consumer behavior, and that the level of both types differs among individuals (Meuter 1999).

The strong body of research showing that motivation influences consumer processing demonstrates that it cannot be ignored if we are to fully comprehend consumer evaluation of new products. The current thesis uses need for cognition and product involvement to depict extrinsic motivation, and playfulness and anxiety to capture intrinsic motivation. The motivational factors are in focus in essay 2.

2.3 Literature on Innovation Adoption

Researchers have traditionally analyzed consumer innovation evaluation using Rogers’ (1962) five categories of adopters: Innovators, early adopters, early majority, late majority, and laggards. This distinction, which is built on innovativeness, suggests targeting new products and services to innovators who start the diffusion process by communicating its benefits to other adopter segments. Research on Rogers’ (1962) adopter segments has to a large extent concentrated on using personal characteristics: Innovators are described as venturesome, young, having more cosmopolite social relationships, and having a high degree of innovativeness (Rogers 1962).

Rogers’ view has been challenged in recent years. Boyd and Mason (1999) and Mahajan and Muller (1998) have suggested that that targeting the majority might be more fruitful than targeting innovators. Further, Goldsmith and Hofacker (1991) argue that the time-
of adoption method used by Rogers (1962) for measuring innovativeness is a temporal concept that cannot be used for predicting future behavior. Moreover, Venkatraman (1991) showed that innovativeness in fact consists of several sub-components such as product involvement, making it difficult to operationalize and measure. Besides innovativeness, personal characteristics of different adopter groups have received considerable attention in academia. They have mostly been researched from an innovator perspective (Boone 1970; Darden and Reynolds 1974; Ostlund 1972; Robertson 1967; Robertson 1968; Uhl et al. 1970). Despite this attention, several studies have documented that their effect on adoption is weak (Holak 1988; Labay and Kinnear 1981; Lockett and Littler 1997).

The perceived innovation attributes (innovation-specific factors) proposed by Rogers in 1962 are still deemed relevant today. From the original five – relative advantage, compatibility, complexity, triability and observability – researchers nowadays incorporate relative advantage and complexity into their models. A meta-analysis by Tornatzky and Klein (1982) eliminated observability and triability as significant predictors of innovation adoption, and Gatignon and Robertson (1985) suggested that compatibility is evident in complexity (see also Moreau et al. 2001). Other innovation-specific factors used in combination with those of Rogers are product newness (Robertson 1971) and perceived risk (Bauer 1960), used together with relative advantages to form net benefits (relative advantages – perceived risk = net benefits) (Moreau et al. 2001; Rogers 1995).

Due to the criticism innovativeness and personal characteristics have received in academia, the current thesis focuses on perceived innovation attributes in the form of net benefits, complexity, product newness, and the adoption decision - whether to adopt or reject an innovation.

A synthesis of these different streams of literature is presented in Figure 1.

**Figure 2: The Theoretical Positioning of the Thesis**
3. A DESCRIPTION OF THE ESSAYS

The thesis comprises three essays. I will now elaborate on the purpose and content of each one.

Essay 1: Consumer Categorization and Evaluation of Hybrid Innovations: Is the Sum Worth More than the Parts?

The first essay examines consumer categorization and evaluation of hybrid innovations, and focuses on three issues. First, are most hybrid products categorized as single- or dual-purpose? It is hypothesized that the majority of consumers categorize the hybrid product as single-purpose in that they place unequal weight on the product categories it combines: It is less effortful to include it in an existing product category and a suitable category match is easy to find since it highly resembles the products in question. The second issue is whether consumers who categorize the hybrid product as dual-purpose (rather than single-purpose) find it more attractive. Third, the essay investigates what role consumer knowledge plays in the categorization of hybrid products. The prediction is that consumers are heavily constrained by their previous knowledge. A further aim is to examine whether categorization could be included in a model of innovation adoption, and to test a framework of consumer evaluation of hybrid products (see Figure 3) that includes knowledge in the main and the modifier product categories, categorization, net benefits, product newness, complexity, and the adoption decision. The essay combines product categorization and evaluation, which few previous studies have done. Although recent literature addresses the possibility of consumers having multiple categorization options, it has often been assumed that they categorize a product according to its label. Marketers have long recognized that consumers utilize different strategies (e.g., assimilation versus contrast) for categorizing new products, but have seldom extended the discussion to include multiple categorization options.

Figure 3: The Framework of Essay 1
Essay 2: The Effect of Motivation on Innovation Evaluation

The second essay elaborates on the framework established in the first one by examining the effect of motivation on the evaluation of hybrid innovations. Motivation can be classified as extrinsic or intrinsic motivation. It is argued that both are needed to accurately assess consumer motivation. The cognitive factors (extrinsic motivation) the study focuses on are involvement and need for cognition, whereas the affective factors (intrinsic motivation) chosen are anxiety and playfulness. It is hypothesized that, by virtue of being related to consumer logic, cognitive factors promote an emphasis on product net benefits. Affective factors, on the other hand, induce consumers to consider product meaning, and are thus related to categorization and perceived product complexity. Specifically, I hypothesize that need for cognition interacts with consumer knowledge so as to either increase (in combination with main category knowledge) or inhibit (in relation to modifier category knowledge) product involvement. As far as the affective factors are concerned, playfulness is proposed to influence accurate categorization of the hybrid product. Anxiety is suggested to interact with complexity in such a way that anxious consumers perceive the hybrid product to be more complex, which lowers their product evaluation, whereas non-anxious consumers enjoy the complexity and subsequently find the product more attractive. Motivation has seldom been a topic of interest to researchers on innovation. The study builds a comprehensive framework of innovation evaluation that includes motivational factors.

Figure 4: The Framework of Essay 2
Essay 3: Consumer Evaluation of Hybrid Innovations: Categorization and Utilization of Product Properties

The third essay examines the alignments consumers make when evaluating hybrid innovations. More specifically, this study examines if single- versus dual-purpose categorization leads to differing utilization of product properties, in terms of both what product category is used, and whether commonalities or alignable and nonalignable differences are aligned. Consumers who categorize the hybrid product as single-purpose include it into existing schemata, whereas those who categorize it as dual-purpose create a new knowledge structure for it. The former group is likely to be difference-oriented; they want to know what separates the hybrid product from others in the schema. In contrast, the latter group is likely to focus on general characteristics of a category since they want the new knowledge structure to be representational of the category. Although previous studies emphasize the importance of alignable differences, this study hypothesizes that, regarding innovations that have a dual purpose, consumers that categorize the hybrid product as dual-purpose will consider commonalities important in category construction. In general, alignable differences are likely to be utilized the most, and nonalignable differences the least. This study considers consumer utilization of product properties regarding both explicit product information and inference generation, and hypothesizes that single-purpose categorization induces the generation of fewer inferences than those who categorize it as dual-purpose.

Figure 5: The Framework of Essay 3
By way of synthesis, a framework binding together all three essays presented in the current thesis is presented in Figure 4.

Figure 6: The Framework of the Thesis
4. METHODOLOGY

The purpose of this section is to inform the reader about the methodological choices made in the study. I will elaborate on the data collection, and describe the data analysis methods I have used.

4.1 Philosophy of Science

My view on the philosophy of science could best be described as a combination of scientific realism, critical pluralism, interpretivism, and logical empiricism, with a focus on the first one. I believe that this view has guided me in many ways throughout my research process, and that all of the choices I have made (theoretical and empirical) reflect it. It is close to the view postulated by Hunt (2002), which differs from those expressed by researchers interested in naturalistic inquiry (e.g., Bhaskar 1989; Lincoln and Guba 1985). Since the purpose of this chapter is not to compare different views on scientific realism or any other school in the philosophy of science, but rather to express the viewpoint I have taken and how it has affected my work, readers who are interested in this comparison are directed to other sources (Boyd 1984; Hunt 2002; Leplin 1997; Putnam 1984).

4.1.1 The Goal of Science and the Notion of Truth

The goal of my study, and of all science according to the realist worldview, is to establish the truth: to produce knowledge about the world (Hunt 1990). The world exists independently of its being perceived, there is something “out there” to theorize about (Leplin 1984). This does not mean, however, that we can accumulate accurate or absolute knowledge about the external world and its objects (Hunt 1990). In effect, the goal of science is to accurately measure the external world, albeit that it will never be achieved (Boyd 1984) (not even on the “probably” level, Black 1967). Truth becomes evident in theory acceptance. To accept a theory as a basis of action is to accept that it describes a phenomenon, and that is to accept the theory as more or less true (Hunt 1990). Indeed, what we can achieve is a good explanation of the phenomena we are observing. There are nevertheless ways of being more or less accurate in one’s measurements and statements about the world. We can be closer or further away from the truth.

In order to get “closer to the truth”, we should expose our results to other scientists in the field to see if they agree with our interpretation, or if they could present us with an alterative view that would complement and enhance our own findings. Scientists should be humble in their pursuit of truth. If we have noble goals (Peter and Olson 1983), we should accept an alternative explanation that could bring us “closer to the truth” in terms of providing explanations that will be more acceptable to the research community in which we operate, that could solve major problems in the community, and that could be beneficial to society as a whole. The truth of an assertion can be evaluated against the collective evidence in the domain (Cooper 1987). Theories become evidence and scientific knowledge when they have yielded enough support. Reference is not
sufficient for successful theories - society changes and the knowledge we gain is increasing. We seldom refer to marketing theories from the 1960s and the 1970s in their original form although they were very influential at the time when they were introduced. New, more powerful theories have refined the original ones or replaced them and so will the theories presented at the present time be replaced. As such, no number of empirical tests can ever guarantee the TRUTH of universal statements (i.e. the problem of induction, Black 1967).

The exposure of a theory for falsification is not the goal of a realist researcher. Complete falsification is impossible – new theories will always replace older ones as our knowledge about the world becomes increasingly sophisticated. If our goal is falsification, in most cases we cannot falsify a whole theory but only parts of it, and the separation of a theory into bits and pieces is usually problematic since they are interrelated. Moreover, we should choose between rejecting the theory and rejecting the empirical evidence we have collected for it. Data that conflict with theory should be reasoned about as “puzzles to be solved” within the existing (Kuhn 1970) or a related paradigm. I do not believe that data is always sufficient to adjudicate among competing research programs and data (Anderson 1988). Theories that are logically, mentally, and emotionally appealing can talk to us in the same way as powerful data does.

I believe that the things we observe in our studies exist in the real world, and that we can capture part of this reality by conducting good, honest, clear, and transparent research. Theories touch base with some “external reality”, which means that some theories accomplish this task better than others (Hunt 1990). Moreover, there are certain methods that are better suited to certain issues than others, and the researcher’s job is to try to capture as accurately as possible the phenomena of interest. This requires a great deal of consideration when setting up experiments, sending out questionnaires, and conducting interviews. We want to make sure we elicit the subjects’ honest opinions about matters without influencing the results ourselves (unless we are interested in researching how experimenter involvement affects subject responses).

4.1.2 The Comparability of Paradigms (Incommensurability)

Care has to be taken in choosing a suitable method for analyzing the collected data. We want the method to be suitable for the kind of data we have gathered, and we do not want the data to violate any of the assumptions inherent in the method. We also seek to conduct tests that capture what we are trying to measure, and respondents who are appropriate considering the questions we are trying to answer. Naturally, after we have carefully selected our stimulus, respondents, and methods, we then want to compare our results to those of others. How good a job did I do? What kind of results did other researchers using different methods obtain? What does that tell me about my approach?

Comparing research results across different paradigms and settings helps us to “rank” different methods and theories. This ranking has to be performed on whatever criteria we apply for a successful theory. Some researchers choose to follow a paradigm because of the hard evidence it presents in terms of empirical evidence (Calder and Tybout 1987), others choose it for its future potential (Kuhn 1970), and still others
because it appeals to them logically, mentally or emotionally (Holbrook and O'Shaughnessy 1988). Numerous competing paradigms can co-exist (Laudan 1977), and we follow the one that suits our purpose. No one paradigm is “unique” in the sense that we could not learn from and expand on those other than our own. Paradigms should be compared if we are to obtain a multifaceted picture of the phenomena we are researching, and expand on our views regarding how to conceptualize, measure, and test theories (Hunt 1990). Comparison is an inherent human process, and to detach it from the building of scientific knowledge seems arbitrary. We compare products when we are learning about them, making a choice; we compare ourselves to other people, we compare the different standards of living in different countries, and much more. Naturally, true objectivity in terms of which paradigm is “the best one” cannot be reached. If a large number of researchers accept a theory, it has reached “consensus” among the research community, and could thus be seen as a closer approximation of the external world, or as a fuller body of knowledge than other theories that have yet to gain such widespread acceptance. A theory’s contribution (problem-solving capabilities) (Laudan 1977; Popper 1962) is dependent upon this acceptance not just within its own field but within society as a whole (Anderson 1983).

4.1.3 Causality/Non-Observables

Causality (not in its strictest sense) is important to realists. Causal explanations employ non-spurious, theoretically supported, sequential laws. A causal claim without theoretical support is not warranted. Strict causality is hard to prove; even if we observe that A affects B, we cannot conclude that A causes B (Hunt 1991). Hence, it is more useful to talk about relationships between different variables (Falk and Miller 1992). I believe that scientific explanations can be applied to non-observables, contra the logical positivist view (Boyd 1984). For example, within marketing, attitude and emotion have successfully been measured as unobservable variables. A method often associated with the notion of causality is structural equation modeling. When employing such modeling, we often have a great deal of information we are interested in. We want to know more than just that A affects B. We want to know if D and E affect A, if C moderates the effect of A on B, and whether B is a mediator between F and G. If we wish to know what variables to collect data about, we should be theoretically informed (Hunt 2002).

4.1.4 Objectivity/Subjectivity

Researchers are human, and are influenced by their senses and perceptions, by information processing, by feelings, and by actions in their claims of knowledge of the world (Cooper 1987; Hunt 1992; Peter and Olson 1983). “Data do not speak for themselves” and therefore have to be interpreted to achieve meaning (Peter and Olson 1983). As human beings, we cannot detach our subjective evaluation from the research setting we are interested in (Anderson 1993). People are shaped by their experiences (Peter and Olson 1983), and all data are thus theory-laden (Kuhn 1970). Observations are always interpreted on the basis of a priori knowledge (Anderson 1983; Kuhn 1970).

Being informed about theory enables us to better capture the phenomena we are interested in, and to collect data about specific variables of interest without neglecting
important pieces of information that we should have included but did not due to a lack of theoretical knowledge. Researcher objectivity implies that we should be neutral to the particular explanatory theories being evaluated (Hunt 1993), but it does not mean that we should not possess any information about the phenomena of interest. Rather, the data collection procedure should not steer respondents towards certain results or answers, and we should not prime consumers to tell us what we want to hear. In order to know what not to prime, we should be sensitive towards the data collected and try to ensure objectivity by virtue of being knowledgeable about what might affect consumer response tendencies. Hence, being informed about theories does not necessarily compromise objectivity. Rather, good measurement theory, or “theory infomity”, enables science to be objective (Hunt 1993). The pursuit of objectivity implies that researchers exercise quality control over their production (Hunt 1993).

After the data has been collected, we have to interpret it in order to give meaning to it, and we do so within a theory. Consumer behaviorists need interpretative research (Holbrook and O'Shaughnessy 1988), since multiple meanings of the same finding can exist. This does not necessarily mean that we can choose among competing interpretations. The following quotation is used here as an illustrative example (Gentner and Toupin 1986, p. 297-298):

“…If indeed young children are deficient in their ability to benefit from systematicity, there are at least two different extreme interpretations…from what we know so far, either account or a combination could be correct”.

We choose a certain topic, a method, a research setting, and our subjects, and thereby limit what we will be able to find (Peter and Olson 1983). We should therefore be careful in generalizing our findings (Peter and Olson 1983), unless other researchers have obtained similar empirical support, which gives us confidence to believe that the entities we have specified do exist. We should nevertheless be critical of our own preconceptions, and strive towards objectivity by reporting all of the results obtained - even those that are surprising or contrary to our hypothesis. In other words, neither our study design and implementation nor the design and interpretation of our experiments, should be conducted with an eye to the acceptability of the findings (Peter and Olson 1983). Observations are always subject to measurement error, which we can never completely eliminate (Anderson 1993).

4.1.5 The Effects of My Philosophy of Science View on the Present Work

The worldview I adhere to is evident throughout this thesis. Categorization itself is an act of comparison and of naming objects. This is in direct contrast to what relativists who are against comparison maintain, that “the labels we use to identify objects are not the objects themselves”, and that there is no theory-independent way of knowing what an object is or whether it actually is an object (Hunt 1992).

The choice of topic itself – innovations - was derived from an empirical context. While working for a consultancy company, I was involved in several projects concerning the development of innovative services, and I became interested in their special
characteristics – newness - and in how consumers react to it. Hence, my project started as an empirical observation about issues associated with innovations (not about the topic itself, hybrid innovations): how they are marketed, and how consumers react to them. By producing this thesis I believe I have touched base with an external reality, innovations and consumer reactions to them. The existence of an external truth with which we as researchers can touch base implies that everything is not socially constructed - we can elicit a subject’s opinion about a matter using different methods if that is really the subject’s opinion. Fragile opinions that change depending on the context are valuable, but do not compromise us in our search for more stable consumer preferences.

My view has also affected my methodological choices. Causality (and scientific realism) is often associated with structural equation modeling, the method used in this thesis. I also use unobservable constructs such as need for cognition and playfulness, since they have been successfully modeled as such in the past.

4.2 The Study

All three essays presented in the current thesis use the same data. Advertisements were used as experimental stimuli, and the data was analyzed using partial least squares modeling (essays 1 and 2) and discriminant analysis (essay 3).

Experimental Stimuli. Advertisements for three hybrid innovations (the Cellphone PDA, the PDA Watch, and Cellphone Internet, a service) were chosen as experimental stimuli for the studies. The products were chosen on the basis of three criteria: they had to be new to the market to prevent familiarity with the hybrid innovation (Olshavsky and Spreng 1996), they had to represent category combinations that differed in their level of similarity (e.g. the cellphone category is more similar to a PDA than a watch), and they had to represent product combinations in which the target population was likely to have differing expertise/familiarity (e.g., regarding the cellphone PDA, one might expect consumers to be more familiar with cellphones than with PDAs).

All advertisements used in the current study were similar in layout. They had boldface labels on the top to indicate the hybrid product name, and color pictures of the product with the brand markings removed (since brand and product markings reduce consumer processing and may cue categories). The product descriptions appeared underneath each picture with the headline “Loaded with an impressive range of features”. Nine product attributes were listed, of which three were main category attributes (e.g., 16 MB RAM and 8 MB Flash for the category PDAs), three were modifier category attributes (e.g., GSM 1800/900 for the category cellphone), and three were shared attributes between both categories (e.g., lithium-ion batteries). The number of attributes from each product category was controlled for in order to avoid directing consumer attention towards either one. Following the product attributes, body copy briefly described each product.

Design and Procedure. Young professionals (aged 25 to 35) were chosen as respondents for this study, being the target group for many hybrid innovations. No naïve subjects were used (Spence and Brucks, 1997): For knowledge transfer to occur,
subjects should comprehend the products at least on a basic level. Thus, every subject recruited owned a cellphone, had access to a computer, and used the Internet.

Forty-two subjects participated in this study. Two were excluded from the sample: One was too young to participate (24 years old) and the other one did not have any experience of the Internet. The final sample size comprised 120 usable product evaluations (40 protocols). The subjects were recruited on the following basis. In order to include consumers with differing amounts of knowledge, consumers that could be considered more knowledgeable about technology (Technology Expert, Technology Specialist, Solution Developer, Technology Consultant, and Product Manager) were contacted and recruited mainly from Nokia, Sony-Ericsson and Accenture. Consumers that could be considered less knowledgeable about technology, but still possess it, were recruited from companies such as IBM, Accenture, 3M, Ernst & Young, and PriceWaterHouseCoopers. These subjects were in CRM, Accounting, Sales, or Marketing. At the time of recruitment, the subjects were assured that the researcher was interested in individual impressions about the products. Two full-time doctoral students were also tested. Their responses did not differ significantly from those of the other respondents and were included in the final sample.

Method. The subjects were studied individually in a laboratory setting, one subject at a time. Each experiment lasted on average one hour and forty minutes (the shortest lasted one hour and the longest two hours and ten minutes). The subjects were told that the researcher was interested in consumer reactions to new products, and that three products would be presented to them. They were asked to first think out loud all the thoughts they had related to the product, and then to verbally answer a questionnaire relating to it.

The subjects were first presented with a trial advertisement of an unrelated product (cookies) to familiarize them with the procedure, and to address any concerns that might arise. They were then shown the first advertisement (counterbalanced over subjects). Researcher involvement was kept to a minimum. If the subject asked questions during the experiment, he or she was given a non-committal answer (e.g., “What is the product class for this product?” “It is whatever you perceive it to be”). After verbalizing all of their thoughts related to the advertisements, the subjects were given a questionnaire. They were allowed to refer back to the advertisements when answering the scale measures and open-ended questions.
4.2.1 A Combined Protocol Analysis (Thought Listing) and Questionnaire Approach

I will now elaborate on the use of protocol analysis (used interchangeably with thought listing), and then comment on the questionnaire approach. In general, a combination of protocol analysis with a survey design potentially provides the researcher with many benefits. First, consumers elaborate on scale numbers, thereby revealing to the researcher why they chose to assign a certain number to a certain question. Second, they are required to be attentive with the questionnaire when the researcher is present: In other words, they cannot answer it hastily.

4.2.1.1 Protocol Analysis (Thought Listing)

Protocol analysis was used to capture consumer categorization, and in general to entice the subjects to elaborate on given product information. This method is used to capture the sequence of events that occur between the introduction of a stimulus and the decision outcome (Ericsson and Simon 1984). Subjects are usually instructed to think out loud during the session, that is, to report all of their thoughts verbally. Protocol analysis may be concurrent (talk while you think/complete the task) or retrospective (talk after the task is completed). Concurrent protocol analysis has been found to be more reliable than retrospective analysis (Ericsson and Simon 1984), and was used for the current study. Traditionally, the protocols generated are analyzed as a sequence of tasks. In this study, the focus was not on analyzing each protocol generated by the subject, but rather on examining consumer categorizations and comparisons. Naturally, protocols also play a significant role in understanding consumer evaluations. The subjects were also asked to verbalize all the thoughts they had when responding to the scale items. That is, to provide an explanation for why they gave six out of seven when rating the product instead of some other number. They were asked to do so to ensure they elaborated on the scales given and did not respond to them hastily.

The thought listing task in the experiment served many purposes. First, it was a way to encourage the subjects to think about and elaborate on given product information. I wanted to obtain a product categorization that reflected their own sentiments about the product. Second, including a thought listing task allowed me to track the alignments the subjects made to the hybrid product’s source categories. Without this task, essay 3 would have been largely impossible to write, since it analyzes each comparison the subjects made between the hybrid innovation and their existing knowledge.

The protocols generated by the subjects (120 product impressions, 40 protocols) could have been analyzed both quantitatively and qualitatively. For the purpose of the current thesis, I chose to do quantitative analysis, since there were specific pre-determined factors I was interested in.
4.2.1.2 Questionnaire

A questionnaire was chosen to accompany the protocol method so that the data could be analyzed statistically. It provided the researcher with the opportunity to use existing scales to measure the constructs of interest and gave robustness to the study in terms of generalizability. Questionnaires are also effective in measuring a large number of variables. The drawback mostly associated with them, the fact that they may cause the researcher to miss what is important to the respondent, is minimized when they are combined with protocol analysis.

4.3 Data Analysis

This chapter has two purposes. First, to recount what analysis techniques were used before a suitable one was found, and second, to report on the method chosen for the thesis.

4.3.1 Alternative Methods

After the data collection was concluded, the data was first analyzed using ordinary least squares regression. Since OLS regression does not support the utilization of different levels of factors (except for independent - dependent), all variables used in the analysis had to be averaged. Alternatively, factor scores could have been used, since all variables used loaded on their respective factors, but this procedure would also have involved a reduction in the information the data contained. Full model testing had to be done in several steps. Following an outline by Baron and Kenny (1986), the model for the first essay was estimated via a two-step regression procedure. However, since a great deal of information was lost by first averaging all variables used, and second by not being able to estimate the full model simultaneously, I started looking for another method that would be more suitable. The group of methods that can handle complex models and take into account both indicator and latent variable loadings is structural equation modeling. There are a number of them available nowadays, LISREL and AMOS to name a few. The only method that can take into account categorical variables and deal with small sample sizes is partial least squares modeling. It was thus chosen as the method that should be used to estimate the models presented in this thesis.

4.3.2 Partial Least Squares Modeling (PLS)

Partial Least Squares Modeling is a structural equation technique that is used in the current thesis to analyze the data in essays 1 and 2. PLS was preferred to LISREL and AMOS, since it places less stringent conditions on sample size and data distribution (Chin 2000) i.e. it allows for small sample sizes (as in my case, N = 120), for categorical data to be included in the models, and is not sensitive to the distribution of the variables used (Falk and Miller 1992). It is also more flexible in terms of the indicators used to measure a latent construct since they can be specified as either
formative or reflective (Chin et al. 1996). Reflective indicators are correlated with each other (e.g., most attitude measurement scales), whereas formative indicators do not share a dependency relationship (e.g., the different marketing mix variables) (Chin 1998). PLS avoids problems often associated with LISREL (inadmissible solutions and factor indeterminacy) by being flexible in its requirements (Fornell and Bookstein 1982). Moreover, it is unaffected by multicollinearity among reflective indicators, since it estimates them via simple regression (i.e. each indicator is separately regressed on the proxy created for the latent variable). However, for formative indicators that it estimates via multiple regression analyses, multicollinearity is an issue that should be measured (Jarvis et al. 2003).

PLS uses a three-step ordinary least squares algorithm to obtain path loadings and weights. In the first step, an iterative scheme of simple and/or multiple regressions is performed until the solution converges on a set of weights used for estimating the latent variable scores. Stages two and three are non-iterative applications of OLS regressions for obtaining path loadings for the latent variable and its indicators. The weights can be interpreted as principal component loadings within the context of the model, and path loadings as OLS regression weights (Falk and Miller 1992).

The PLS analyses were run twice, first excluding the adoption decision as a consequence of product evaluation, and then by including it. The results did not differ significantly, so the model that included the adoption decision was chosen since it gives a more inclusive picture of the adoption process consumers go through when deciding whether they like a product or not. In the same way, the PLS analysis results obtained for the first article were similar in magnitude as those obtained in the regression analysis.

There are several ways of estimating the significance of parameter estimates in PLS (e.g., bootstrapping and jack-knifing). A bootstrapping re-sampling method was chosen for the current study. It is especially useful in cases in which there exists no or only weak statistical theory about the distribution of a statistic, and in which the distributional assumptions necessary for valid parameter inference are violated (Mooney 1996). It is also recommended by Chin (1998) as being more suitable for PLS analyses than jack-knifing. It represents a nonparametric approach to statistical inference that relies on large amounts of computation (Mooney 1996). It has been available for a long period of time (100 years), but has only recently been developed in detail, due to the technological advances that make it possible to perform advanced calculations. While the bootstrap has been widely used in disciplines such as economics, biology, and medicine, it has not often been used in marketing (for an exception see Brown et al. 1998).
6. GENERAL DISCUSSION

The rapid development of hybrid products is likely to change the way consumers view new products. In the future, we might no longer use single products such as cameras, cellphones, or game consoles, but use hybrid products such as camera cellphones, camera camcorders, game console DVD players and so forth. This reality is happening now. One can only imagine where this development will lead. We already see three-in-one and four-in-one products. Hybrid products, especially when becoming increasingly diffused in the marketplace, might place more stringent requirements on regular products. Regular products are likely to have to increase the functions they perform in order to compete with the hybrid products. Simple products will be viewed as stripped-down versions from the dinosaur age when people only used a product for a single function. Children will look at their parents in dismay if the latest addition to the household, a microwave oven, does not have a built-in toaster, a grill, and a remote-controlled heating system. And what on earth are you supposed to do with a play console that does not have a built-in DVD CD CD-RW picture editing system? In terms of manufacturing requirements, the sky is the limit for what can be included in one product. What is less certain is how consumers will react to these hybrid products.

The current thesis opened an avenue for studying not only hybrid products, but also multi-function products that are rapidly infiltrating consumer markets. What I have shown in the three essays included in my thesis is that consumers do evaluate hybrid innovations differently than regular products, and that reliance on traditional methods for assessing their adoption might be strongly misleading. By virtue of their combinatory nature, hybrid products require consumers to combine their knowledge in order to fully comprehend them. If consumers do not possess knowledge about both product categories, they are likely to view the hybrid product as something different than intended in the company communications.

One can only imagine what strategies companies are currently using to estimate the take-off of hybrid products. The market conditions, particularly in the consumer electronics market, are currently so unstable that it would not be surprising if companies were to write off the fluctuations to sales curves instead of considering the particular problems each product might encounter in the market. It is my guess that many companies trying to estimate how their new hybrid product will sell, analyze it like any other new product on the market without regard to its differentiating characteristic - the fact that it combines two products in one. This is not a long-term solution, however. If a new product beats the competition, it will sell well, and if it is poor, its sales will be affected. Hybridness in itself will not save a poor product, and it is not a requirement for a good product. It may, however, bring additional value to a product if it is correctly communicated to consumers.

Alongside product categorization, product newness, net benefits, complexity and consumer motivation all affect how hybrid products are evaluated. Motivation, in fact, affects how consumers view the hybrid product’s characteristics. By considering these factors in combination with categorization, we can estimate consumer adoption propensity. Although there are other factors affecting consumer evaluation of new
products, such as time pressure, this thesis has mostly emphasized those that are believed to have the greatest impact on innovation adoption. Although a consumer under time pressure might not thoroughly read an advertisement in a magazine s/he happened to buy, if it was interesting enough, he or she would get back to it later when the time pressure is eased.

Consumers compare hybrid products differently depending on whether they categorize them as single- or dual-purpose. Those who categorize them as single-purpose do not utilize main category alignments or commonalities in their evaluations, but rather focus on alignable differences. In contrast, those who categorize the hybrid product as dual-purpose focus on both main and modifier category alignments, and utilize both commonalities and alignable differences in their evaluations. Nonalignable differences are only utilized by individuals high in need for cognition, who are motivated to process novel information.
7. CONTRIBUTION

The primary contribution of this thesis is in the choice of topic itself. Little research has been carried out on hybrid products despite their proliferation in the marketplace. This investigation of consumer categorization and evaluation has given some insight into how consumers react to new hybrid product launches. How new products are evaluated is a fundamental issue in consumer behavior, and this thesis expands on previous research both by examining a product type that has not been widely addressed before, and by utilizing conceptual combination theory in combination with literature on consumer behavior and innovation adoption.

7.1 Contribution to Psychology: Analogical Learning - Conceptual Combination

Although conceptual combination in psychology had established what kind of interpretations consumers reach, psychologists (the dual-process theory, see Wisniweski 1996; 1997) had postulated the interpretation process to be dependent on similarities and differences in the form of commonalities, alignable, and nonalignable differences between the main and the modifier categories. This notion stands, but does not often incorporate a discussion of what commonalities, alignable, and nonalignable differences, in turn, are comprised of. Consequently, despite awareness in the literature of directionality effects and distant alignments (construals), there is no explanation as to why they occur. In fact, Costello and Keane (2000, p. 303) state that resolving why consumers engage in reverse property alignment and distant alignments is “a challenge for theories of combination”. This study shows that consumer knowledge determines what similarities and differences they focus on (for additional support, see Lin and Murphy 1997), leading to an explanation for reverse property and distant alignments. Consumers possessing significantly more knowledge in the modifier than the main product category are likely to engage in reverse property alignment, whereas those lacking both main and modifier category knowledge are likely to utilize distant alignments.

7.2 Contribution to Marketing: Consumer Behavior

The thesis contributes to current literature in its different theoretical approach to those adopted in previous studies. Although marketers have studied products that combine product properties from multiple product categories, (Moreau et al. 2001a; Roehm and Sternthal 2001), they have not addressed products that combine two categories into one. The theoretical underpinning of this thesis also differs. It uses literature on conceptual combination, not previously addressed in marketing, from the field of cognitive psychology to explain consumer categorization of hybrid innovations.

This work also contributes to our understanding of what factors affect the evaluation of hybrid products. In the first essay, I theorized that categorization would affect it, together with complexity, net benefits, and product newness. I showed that categorization does have an effect on evaluation, which has been implied but not proved in previous studies. Indeed, it has been assumed that all consumers reach the same
categorization, or that they either assimilate or subtype the product. Categorization should affect product evaluation, and hence consequent purchase intentions, to be of full use to marketers. Moreover, the current thesis includes consumer adoption decisions in the innovation evaluation model, which few studies have done.

In the second essay, I extended the framework to include motivational factors. Many studies on consumer behavior test the effect of one motivational factor (e.g., need for cognition, mood) in isolation from other factors. A comprehensive model such as the one presented in the second essay helps researchers to assess the effect of multiple simultaneous factors intervening in consumer decision making. Measuring the effect of one specific factor is also limited in usefulness in terms of the generalizability of the results. Moreover, few studies have simultaneously addressed the effects of many cognitive and affective factors as I did in the second essay (need for cognition and involvement, anxiety and playfulness).

Another contribution of the thesis is its examination of product properties that consumers use in their evaluation of hybrid products. Although numerous studies have established that consumers are differently drawn to common and unique product properties, few have analyzed them in the presence of multiple product categories. Categorization itself has often been studied as unrelated to a higher end goal, such as product evaluation. The framework presented in the third essay joins these streams of literature by pointing out that categorization steers the utilization of product properties and thus guides subsequent evaluation.

7.3 Contribution to Marketing: Innovation Adoption

Literature on motivation has seldom been used in the context of innovations, although consumer behaviorists have long used cognitive factors, and lately also affective factors, in order to better comprehend consumer decision making that innovation adoption also represents (Rogers 1995). The results of this thesis showed that both cognitive and affective factors influence the evaluation of hybrid products, expanding on previous research that tested the effect of either cognitive or affective factors on product evaluation.

The thesis builds on a knowledge-based approach to innovation evaluation by including consumer categorization decisions as a variable, which has not previously been used in combination with innovation adoption. Moreover, it elaborates on the psychological understanding of innovation adoption - how consumers comprehend and consequently evaluate innovations. Although the literature on innovation adoption has a rich history behind it, it appears to have suffered from stagnation in the 1980s: Most studies conducted in the field were replications or minor modifications of earlier studies. The late 1990s (from 1997 onward) and the beginning of the 2000s saw the beginning of a new era: One that focused on psychological determinants of innovation adoption using analogical learning theory as a basis for understanding consumer adoption decisions, in contrast to Rogers’ theories. This development paved the way for new ways to model consumer adoption, and a differing explanation as to why consumers adopt or reject innovations.
Although there is a great deal of literature in the field consumer behavior that concerns new products, it has diverged from the literature on innovation adoption, despite the fact that an innovation, per se, is something perceived as new by an individual. The current thesis readily embraces the literature on innovation adoption by including Rogers’, Robertson’s and Bauer’s contributions in a model of hybrid innovation evaluation.
8. FUTURE RESEARCH

Current literature on hybrid innovation is scarce, and there are many avenues for researchers to further explore the notions brought forward in this thesis. Some suggestions are provided below.

1. What is the effect of the brand on the categorization and evaluation of hybrid products? Brands might guide consumer categorization and constrain evaluation, as demonstrated by the following example. Consider a consumer who has never been exposed to camera cellphones before. S/he sees a camera cellphone with the brand name Nokia, and another one with the brand name Kodak. It is very likely that s/he will associate camera-related features in the camera cellphone with the label Kodak, and the cellphone-related features with the label Nokia, since his/her previous experience recalls the knowledge structures associated with each brand. Is s/he more inclined to categorize the Kodak camera cellphone as a camera and the Nokia camera cellphone as a cellphone? Or will the joint experience of both brands bring her to the conclusion that the product is indeed a camera cellphone? Or would that be the case only if the product were jointly branded by Nokia and Kodak?

2. What is the effect of hybrid products over time? Consumers are extremely resistant towards changing their initial product categorizations (Moreau et al. 2001b), but Morel (2000) shows preliminary evidence of hybrid product re-assessment over time. Initially, a consumer might categorize a product such as a PDA watch as a PDA watch. Over time, however, s/he might come to use only the watch related features. Will this change his/her assumption about the hybrid product, i.e. will s/he re-categorize it as a watch?

3. What happens to product categorization and evaluation if one of the product categories combined in the hybrid product is given prominence over the other in marketing communications? Will the consumer be more inclined to categorize a hybrid product such as a combined printer-copying machine as a printer if the features emphasized in the marketing communications are printer features that have low cue and category validity, or if the number of printer features is high but their cue and category validity are low and the number of copying features emphasized are few but have high cue and category validity?

In general, there are many research opportunities in the area of hybrid innovations. This thesis provides an initial assessment of the categorization and evaluation of hybrid products that could encourage other researchers to continue the investigation.
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