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A Firm- and Demand-side Perspective on Behavioral Strategy for Value Creation: Insights from the Hearing Aid Industry

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A FIRM- AND DEMAND-SIDE PERSPECTIVE ON BEHAVIORAL STRATEGY FOR VALUE CREATION: INSIGHTS FROM THE HEARING AID INDUSTRY

PhD Series 28-2018

Matilde Fogh Kirkegaard

A FIRM- AND DEMAND-SIDE PERSPECTIVE ON BEHAVIORAL STRATEGY FOR VALUE CREATION

INSIGHTS FROM THE HEARING AID INDUSTRY

PhD School in Economics and Management

PhD Series 28.2018

CBS  **COPENHAGEN BUSINESS SCHOOL**
HANDELSHØJSKOLEN

A firm- and demand-side perspective on behavioral
strategy for value creation: Insights from the hearing aid
industry

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PREFACE

This thesis seeks to answer the overall research question: *To what extent do decision-making heuristics at the individual level affect value creation at the firm-side and the demand-side of the value chain, and what management practices can facilitate decision-making for improved value creation?* The thesis is comprised of an introductory chapter, three articles and a conclusion chapter, which together answer the research question by exploring how individual decision-making behavior links to value creation and innovation performance. The overall empirical setting, the hearing aid industry, spans across the five chapters. The first chapter introduces the theoretical positioning, the empirical context, and the overall research question. Chapter 2 describes how firms often combine modes of ambidexterity within a construct of multidexterity. It proposes how the balance between more structural or contextual modes of ambidexterity affects the motivational behavior of the individual employee and how this motivational behavior affects the novelty and usefulness of innovation outcome. Chapter 3 considers the demand-side perspective on value creation and addresses how a pro-active strategy of sticking to current technology and business models can create the highest value as perceived by consumers in a market with new entrants. Chapter 4 demonstrates how organizations can implement information processing fluency as a profitable management practice in the sales context for increased value creation. The fifth and final chapter summarizes the findings of the three papers in light of the overall research question. These research papers are included in the thesis.

Paper 1: Kirkegaard, M. F. & Foss, N. J. (2018) "The Multidextrous Organization: Combining Modes of Ambidexterity in William Demant Holding"

Paper 2: Kirkegaard, M. F. (2018) "Staying True to What You Are: A Demand-side View on Old Companies Facing New Company Threats"

Paper 3: Kirkegaard, M. F. & Gioia, C. (2018) "Elevating Consumer Value Creation in the Sales Context: The Case of the Hearing Aid Industry"

ABSTRACT

Through an investigation of individual decision-making behavior and the impact it has on the perceived value of innovation, this thesis offers novel perspectives on key strategic management issues. We demonstrate how the value of innovation, when identified as a subjectively realized value by the consumer, specifically, perceived product benefits, can help identify the role of individual decision-making as well as behavioral factors guiding value creation of innovation.

In the intersection between behavioral science and strategic management of innovation, these insights take the perspective of both the firm-side and demand-side of a value chain by identifying innovation performance as value created at the levels of the manufacturer, the salesperson and the consumer. Hence, this thesis contributes to the strategic management literature on innovation and value creation by answering the following research question:

To what extent do decision-making heuristics at the individual level affect value creation at the firm-side and the demand-side of the value chain, and what management practices can facilitate decision-making for improved value creation?

By attending to both the manufacturer and product market, the three papers constituting this thesis identify opportunities to augment value creation by exploring whether systematic behavioral bounds determine the likelihood of innovations to fulfill firms' expectations for innovation performance. The thesis introduces specific behavioral strategies for the decision-making context that are critical to realizing business outcomes and identifying the key observations and challenges that managers face that affect value creation along dimensions of firm activities.

SAMMENFATNING

Ved at undersøge hvordan individual adfærd og beslutninger påvirker innovationsresultater målt som værdiskabelse, giver denne afhandling nye perspektiver på det strategiske ledelsesområde.

For at identificere den rolle individuel beslutningstagning spiller, samt adfærdsmæssige faktorer, som styrker værdiskabelsen af innovation, demonstrerer vi, hvordan værdiskabelse af innovation er identificeret som en subjektivt realiseret værdi af forbrugeren, nemlig som opfattede produktfordele. I skæringspunktet mellem adfærdsvidenskab og strategisk ledelse af innovation repræsenterer perspektiverne her både virksomheds side og efterspørgselssiden, ved at identificere innovationsresultater som værdiskabelse, både på fabrikantens, salgs - og forbrugerniveau. Formålet med denne afhandling er derfor at bidrage til den strategiske ledelseslitteratur om innovation og værdiskabelse ved at besvare følgende forskningsspørgsmål: *I hvilket omfang påvirker beslutningstagerers heuristik på individ niveau værdiskabelsen på firmasiden og efterspørgselssiden af værdikæden, og hvilke ledelsesmæssige fremgangsmåder kan lette beslutningstagningen for forbedret værdiskabelse?*

Ved at være opmærksom på både producentproducenten og produktmarkedet identificerer de tre artikler, der udgør denne afhandling, muligheder for at øge værdiskabelsen ved at undersøge, om systematiske adfærdsmæssige grænser bestemmer sandsynligheden for, at innovationer opfylder virksomhedernes forventninger til innovationsresultater. Afhandlingen introducerer specifikke adfærdsmæssige strategier for beslutningskonteksten, der er kritiske for at realisere forretningsmæssige resultater, samt identificere de vigtigste observationer og udfordringer, som ledere står over for, hvilket påvirker værdiskabelsen langs bestemte dimensioner af virksomhedens aktiviteter.

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CHAPTER 1: BEHAVIORAL FOUNDATIONS FOR VALUE CREATION: A FIRM- AND DEMAND-SIDE PERSPECTIVE

INTRODUCTION

How does individual decision-making behavior by employees at the level of the firm and by salespersons and consumers at the level of the product market impact value creation from innovation? Value creation is a central topic in strategy literature. This thesis offers new perspectives on value creation by integrating behavioral psychology with strategic management innovation theories that attend to both the producer side and product market and to the opportunities to develop value creation through specific behavioral strategies from both a firm- and a demand-side perspective. By exploring systematic behavioral decision outcomes along selected dimensions of firm activities, which affect the value of innovation, the insights gathered here can offer managers ways to better untangle mechanisms by which firm strategies can contribute to innovation performance in the value chain.

Value creation and innovation outcome

Many studies across the strategic management and innovation literatures have defined the firm's innovation performance as the volume of innovation the firm can produce. The ability to continuously push new innovations is measured both by number of patents (Cordero, 1990; Sampson, 2007) and number of new products (Artz et al., 2010). Although compelling, the locus on innovation magnitude establishes an inside-out approach to firm performance that is not without limitations. As an example, not all innovations are patentable (Mansfield, 1986), and patenting may be driven by tactical incentives, like licensing negotiations between companies (Cohen et al., 2006). Another often used measurement of firm innovation is the level of R&D budgets (Levin, 1988; Hal & Bagchi-Sen, 2002). However, the reliance on R&D budget magnitudes does not consider that companies might spend billions in R&D innovating faster, lighter and increasingly personalized products, only to find that consumers reject them. This rejection is seen in the high rate of new product failure, which ranges between 40% and 90%, depending on category (Castellion & Markham, 2013).

There is a long history of studying innovation within strategic management, both as a dependent and independent variable. Most such work, however, takes the product markets' acceptance of innovation for granted. R&D patents and budgets are good indicators of firms' investments in developing innovations in house, but they are limited in capturing innovation

diffusion in the market (Smith, 2005) or the difficulty of increasing consumers' willingness to buy products in the target market (Thomson & Sindha, 2008). Instead, this thesis takes onset in the concept of value creation to broaden the understanding of innovation performance to include these market perspectives.

Value creation is a central concept in the organization and management literature (Lepak, Smith & Taylor, 2007). It has been defined in reference to complete chains of suppliers, firms and buyers as the buyers' willingness to pay minus the producers' opportunity cost (Brandenburger & Stuart, 1996). This definition opens up the inclusion of the demand side. However, relying on willingness to pay (WTP) as a representation of consumer preferences presupposes the existence of market prices. This line of thought has been questioned by behavioral economics research, which has repeatedly shown how psychological underpinnings and decision contexts guide consumers' product preferences, and how loss aversion, framing and complex information affect consumers' product valuation and preferences (Ariely & Wertenbroch, 2002; Kahneman, 2011).

In a special topic forum on value creation of the *Academy of Management Review* (2007), Lepak et al. (2007: 182) suggest that "value creation depends on the relative amount of value that is subjectively realized by target user (or buyer) who is the focus of value creation." Priem (2007: 219) has emphasized how firms have the ability to create value by inducing consumer benefit. These definitions do not rely solely on WTP and allow for the existence of intrinsic values to define product preferences and thereby innovation value (Pitelis, 2009). To identify the role of individual decision-making and the behavioral factors guiding value creation of innovation, this thesis therefore follows the definition of Lepak et al. (2007), identifying innovation value as a subjectively realized value as perceived by the consumer.

Demand-side research

Within the last decade, some strategic scholars have started addressing a more realistic assumption about market behavior in the growing literature on demand-side research in the strategy field, focusing on how strategies can benefit from insights into consumers' preferences from the demand-side of the value chain (Priem, 2007). Strategic focus areas like technological discontinuities (Tripsas, 2008), how interindustry diversification can lead to sustainable value creation for multiple consumer groups (Ye, Priem & Alshwer, 2012), or how consumer heterogeneity can affect the viability of firms' response to radical technology (Adner & Snow, 2010) all acknowledge the role of perceived value by the consumer as a prerequisite for innovation value creation to support firm performance (see Priem et al., 2012 for a review).

The demand-side perspective is not meant to replace or compete with a supply-side perspective; rather, it is an addition to the current literature stream on strategic management of innovation that can strengthen the understanding of value creation in the value chain for value capture at the firm level and link producer strategies with consumer benefits. The role of the individual as a decision-maker is further developed by acknowledging that consumers are not rational economic agents, and consumers' preferences are dynamic and sometimes latent (Priem, Li & Carr, 2012).

Widening the demand-side view through behavioral psychology.

For decades, behavioral scientists have described how human beings are biased in their decision-making. Decision-making is the process by which alternatives are identified and chosen based on the values and preferences of the decision-maker (Kahneman, 2011). Contributions from the field of psychology emphasize how decision-makers systematically violate the basic assumptions of expected utility theory (Tversky & Kahneman, 1981; Wilson & Gilbert, 2005; Thaler, 1980; Plous, 1993). Furthermore, judgment is often prone to errors, even in non-complex choices (Kahneman, 2011; Sunstein & Thaler, 2008; Damasio, 2010; Mlodinow, 2012). Within the last decade, there has been a shift in the way behavioral scientists look at individual decision-making and its consequences. Historically, the focus has been on identifying cognitive biases, which occur when individuals apply heuristics in decision-making, leading to systematic errors in the process (Kahneman, 2011). Lately, the focus of behavioral psychology has moved away from identifying long lists of different biases and how they can be mitigated to attempt rationality toward exploring the ways in which “heuristic mechanisms are constructed, the types of information structure they can be applied to, and how to study the intelligent, adaptive behavior that emerges from the interaction of both mind and world” (Todd & Gigerenzer, 2012: 20). This view, which has been labeled the "ecological rationality approach," looks at both the decision-making tools possessed by the individual and the environment in which these tools are used. Then the tools' performance in the environment is assessed (Goldstein & Gigerenzer, 2002) by examining both the environment and the decision tool to understand the nature of the decision the individual made. This approach will might emerge “biases,” but an ecological rationality approach will allow for an understanding of the basis of the bias (Todd & Gigerenzer, 2012).

Another layer in the decision hierarchy is “evolutionary rationality,” with a focus on human beings as biological creatures and explaining design tools as results of evolved preferences and social norms (Douglas et al., 2009). This deep search within the biology of man

for decision-making explanations will not be the aim of this thesis. Instead, I will use the ecological rationality approach to explore value creation from innovation by considering both the decision-maker and the context for the decision, which offers possibilities for understanding and aiding decision-making from a management strategy perspective. Instead of noting when a poor decision has been made, one can instead identify which decision rules were used and what alternative environments can make those decision rules more effective. The strategic aim is not to remove these behaviors, but instead to design choice environments that take these behaviors into account.

This intersection with human cognition and decision rationality is of growing interest in strategic management literature, both from the view of the firm and from the demand side, to understand and predict how to maximize expected utility. As Agarwal and Hoetker (2007) suggested, using a multidisciplinary approach may uncover unique insights that were not possible from a single discipline view. By complementing strategic management research with behavioral psychology and extending an upstream firm-level view with a downstream demand-side perspective, this dissertation explores the potential benefits of taking a multidisciplinary approach to understanding value creation as a measure of innovation performance, as well as the relationship between firm strategies and the mechanisms that drive consumers' willingness to pay.

Both at supply side, and demand side, there is a growing interest in the role of individual behavior. At the organizational level, there is a growing discussion of the behavioral factors that hinder efficiency (Gavetti, 2012), and the term "behavioral strategy" has gained attention, applying cognitive and social psychology to strategic management theory. Powell, Lovallo and Fox (2011: 1371) define the aim of behavioral strategy as "bringing realistic assumptions about human cognition, emotions, and social behavior to the strategic management of organizations and, thereby, to enrich strategy, theory, empirical research, and real-world practice."

Demand-side research looks downstream from the company side of the value equation toward the product market to propose strategic initiatives for value creation within a value system. Here, the bounded rationality of the consumer plays a vital role in viewing his or her preferences as dynamically changing (Tripsas, 2008), defining value creation through the consumers' willingness to pay decision-making, given their bounded foreknowledge of their own needs (Priem, 2012). However, the dominant assumption in the analysis in demand-side research within the strategy field acknowledges that emotional consumption occurs, but it is still based on utility-maximizing rational consumer assumptions (Priem, 2007).

This thesis therefore focuses on how strategic management of innovation from the firm-side and demand-side research in the intersection with behavioral psychology can offer new perspectives on strategies aimed at improving firm performance, particularly innovation performance. Consequently, the purpose of this study is to investigate decision-making at the level of the individual in three different contexts: at the different entities, from product innovation to product recommendation, and product consumption. The three articles comprising this thesis seek to determine whether systematic behavioral heuristics are at the heart of innovation's failure to live up to companies' expectations and proposes a redesign of the decision-making context to maximize a firm's performance by mitigating the systematic limitations in the firm's innovation activities that are critical to realizing business outcome, as well as outlining key observations and challenges that managers face. Consequently, the thesis poses the following research question.

To what extent do decision-making heuristics at the individual level affect value creation at the firm-side and the demand-side of the value chain, and what management practices can facilitate decision-making for improved value creation?

EMPIRICAL SETTING

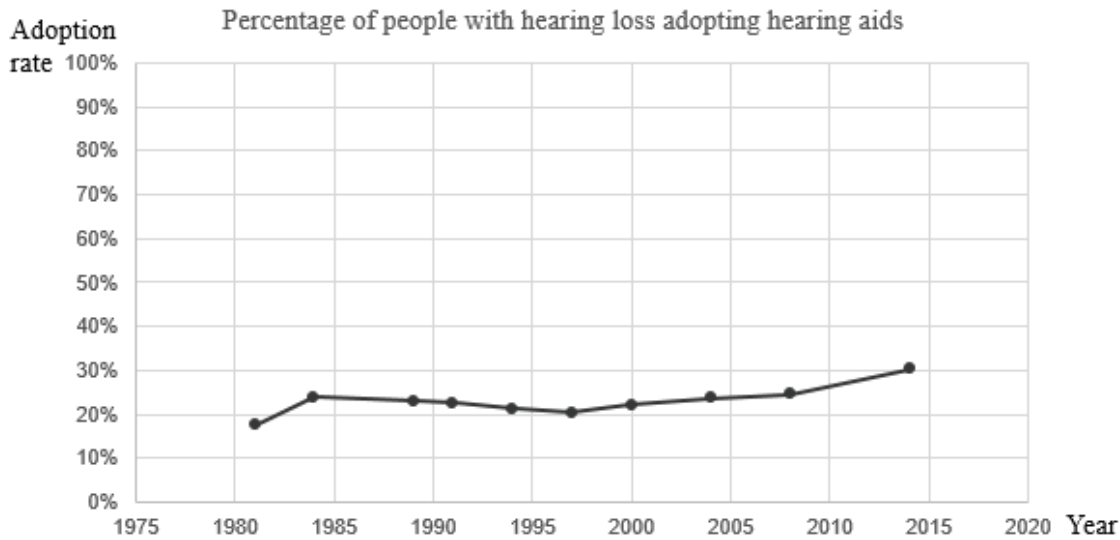
The hearing aid industry is an example of a technology-intensive industry in which the industry measure for successful innovation is driven by the ability to launch new products in short development cycles. The industry illustrates how innovation performance is measured in the form of R&D budgets, patents, and financial performance (www.oticonfonden.dk). It is characterized by the presence of a few large companies within an oligopolistic market structure (Salvatore, 2010), with the six leading players—William Demant Holding (DK), Sonova (CH), Widex (DK), GN Resound (DK), Sivantos (DE) and Starkey (USA)—holding 95% of total market share (Vance, 2013). All these companies are results of various mergers.¹ The global hearing aid market is worth USD 4 billion, with 10-11 million units sold per year (WDH estimates) in the primary markets of the OECD countries. The oligopolistic nature of the hearing aid market, combined with the small number of players, has resulted in tight competition between them. The growth of the market has been driven by demographic changes, and companies fight to gain market share from one other, although very little room for increasing

¹ WDH consolidations since 1994: Oticon, Bernafon, Maico, Bosch, Gfeller/Ascom, and Sonic.

market share exists. Any increases in market share are usually achieved through incremental differentiation of technologies or by lowering prices. At the same time, the industry has felt pressure from the wireless earbud and headphone market, to which over USD 45 million has been pledged as part of crowdfunding campaigns for earbuds and stereo headphones (Hunn, 2016). With consumer technology giants like Apple, Samsung and Bose entering the market of wireless earbuds, the risk of disruption to the hearing aid industry has emerged as a potential threat. Hearing aid manufacturers have responded with technical innovation applications like low-energy Bluetooth, made for iPhone protocols, and 2.4 GHz wireless connectivity. The hearing aids currently on the market share many of the same technologies, even though significant resources continue to be invested in research and development, and product updates are happening at a fast speed. All manufacturers offer hearing aids in many different styles and price points, and there is a high risk that the complexity of product intensity will result in difficulty differentiating between producers in the minds of both the dispenser and consumer.

For cases of mild to moderate hearing loss, hearing aids are the only solution currently on the market. However, approximately one-third of people between the ages of 65 and 74, and almost half of those above 75, experience hearing loss that is severe enough to require hearing aid treatment (NIDCD, 2010). There are many consequences of untreated hearing loss. Apart from the difficulties in understanding spoken language, hearing loss can lead to an increased risk of social isolation (Mick, Kawachi & Lin, 2014), cognitive decline (Lin et al., 2013), dementia (Lin et al., 2011; Gallacher et al., 2012), reduced quality of life (Dalton et al., 2003; Kochkin & Rogin, 2000), and even changes in brain size (Lin, 2014). Nevertheless, only between 15% and 30% of individuals who might benefit from treatment seek help (www.who.com), and there is growing public health concern about the low penetration level and compliance with hearing aids in the population (www.who.com), a situation that has not changed much over the last 50 years (see Figure 1). At the same time, most non-owners of hearing aids are not aware about the enhanced features and benefits available in hearing aids today, which is a radical innovation compared to hearing aids just 15 years ago (Kochkin, 2009).

Figure 1. *Hearing aid adoption rate in the US over time*²



From a gerontological perspective, the motivation factors of the mature consumer segment toward use of medical technology have gained growing scientific attention (Mehlenhorts & Bouwhuis, 2004; Rogers & Fisk, 2010). The fact that the proportion of people aged 60 years and above is approximately 10% today and is projected to increase to 20% by 2050 presents many challenges (Sixsmith & Gutman, 2013), such as the need to improve services and technology in ways that enhance the health and quality of life for all seniors. Within the last decade, the topic of how to organize innovation, production, distribution and marketing to successfully target the growing aging population has seen increased interest in management research (Oppenauer, 2009; Melkas, 2011).

From a business perspective, the continuous low willingness to buy hearing aids in the population represents a large market potential for firm growth and performance. The industry shows 2-4% yearly unit growth, but this is driven by demographic development with higher percentage rates of people over 60 years (WDH estimates). At the same time, prices of hearing aids are declining, and the hearing aid industry faces increasing external pressure that is threatening its profitability: customers and public and private insurance payers are asking for evidence justifying the high cost of hearing aids. The products made by hearing aid manufacturers continue to advance in terms of technology, but dispensers' and consumers' understanding and appreciation of the benefits of these advances are decreasing with the

² Amlani and De Silva (2005) and Kochkin (2007).

growing number of attributes and alternatives. Their ability to differentiate between products is also decreasing (Keller & Staelin, 1987; Schwartz, 2004). This potentially leaves a gap between what hearing aid manufacturers expect is the preferred solution, what salespersons recommend to the mature consumer, and what the mature consumer, in the end, is convinced to buy and will continue to use. Changes in government regulations, an increased focus on the benefits delivered compared to price and discussions about the role of the dispenser versus over-the-counter sales all pressures the hearing aid manufacturers to rethink the strategic management of innovation to ensure that firm growth and performance is maximized in the whole value chain.

The particular challenges of innovation performance in the hearing aid industry support the motivation behind the research question for this thesis. It further advances the need to conduct relevant research in the intersection between strategic management and behavioral science, both at the level of the firm and from a demand-side perspective, bringing more realistic assumptions about human behavior into the world of strategic management practice.

The structural and theoretical challenges in the value chain of the hearing aid industry

To examine the behavioral underpinnings of value creation at the level of the firm and from a demand-side perspective, this thesis focuses on the three entities that drive the market potential of any innovation: the company that invents the product, the dispenser who sells the product to the consumer, and the consumer who must adopt it.

The manufacturer

Strategic management scholars have long stressed the importance of new product innovation as a strategic means to create and appropriate value (Hitt, Keats & DeMarie, 1998; Elenkov & Manev, 2005) and the ability to create value in the product market through adapting their strategy to consumers' demands and changing markets (Amit & Zott, 2001). Hence, the strategic management of innovation is an important aspect of achieving superior business performance (Grimm & Smith, 1997; Zahra, Ireland & Hitt, 2000) and therefore represents an important research subject within the strategic management field (Neg, Coley & Gioia, 2007). Keupp, Palmé and Gassmann (2012: 3) defined the strategic management of innovation as being "concerned with using appropriate strategic management techniques and measures such that the impact of the firm's innovation activities for firm growth and performance is maximized."

Managers in hearing aid firms are very aware of the large untapped market for their products. Oticon has since the 1970s been exploring different strategies for reaching non-adopters, including having an extensive product offering at varying prices and innovations in design and "invisible" in-the-ear styles targeting potential first-time users, for whom the stigma

of wearing a hearing aid is thought to be one of the principal reasons for not seeking treatment (Kochkin, 2007). At Oticon, the goal for innovation performance communicated internally to employees and externally to shareholders (www.wdh.dk) is to increase the level of innovation, which is very often measured in the number of patents, R&D budget compared to product launches, or the ability to compare one's own launches of new technologies to that of one's competitors. This very technology-driven approach to innovation performance is supported through a continuous experimenting with organizational designs in Oticon, with the aim of balancing both exploitation and exploration in different organizational models, changing the focus between lower margin commodity hearing aids and more innovative models (Ravasi & Verona, 2001),

However, the objective advantages of new products over existing alternatives are often not enough for them to succeed, raising several questions. When new products offer clear improvements over current products (in terms of technology and design or business model), why do they fail to succeed in the market, and why do companies have more faith in new products than is warranted? It is a common understanding among innovation management scholars that consumers adopt those new products that deliver more value or utility than the existing ones. Aiming for more consumer utility, however, does not mean that businesses only need to develop innovations that are objectively superior to incumbent products for consumers to have a sufficient incentive to purchase them (Gourville, 2006). On the contrary, when firms seek to make consumers buy new innovations by claiming an objectively higher performance and relative improvement compared to current market offers, consumers are often reluctant to adopt the same innovation due to a lack of perceived benefits (Cooper, 1994; Chandy, Prabhu, & Antia, 2003; Gourville, 2006; Castaño et al., 2008).

Working from the intersection of behavioral science and strategic management, focusing on the ability of the individual employee to empathize with the consumer's actual pain-points rather than focusing on technical product possibilities for innovation could support perceived usefulness and value creation on the demand side. This can help explain why consumers reject new products with objectively higher utility, while at the same time, managers are unable to anticipate such failure. It is therefore important that the organizational structure is not just aimed at pushing innovation newness in a closer and closer technological battle between companies, but also focuses on perceived usefulness to support value creation at the level of the consumer and therefore a willingness to buy a product for an ultimate profit maximization.

The dispenser

The crucial role of consumers' perceptions of product benefits for value creation emphasizes the central role of the dispenser in the value chain. Bringing the decision-making of the dispenser into the value equation offers an alternative mechanism by which to drive firm performance. However, the dispenser as part of the product market has been treated as a rational agent in strategy research who will maximize firm profit by maximizing his or her own utility. Even when including demand-side research, the dispenser has gained little to no attention, which is surprising, since dispensers in many consumption experiences act as experts and are the main validators of value to the consumer (Priem, 2007). The medical device industry is an example of a context in which the communication and recommendation of different product benefit levels strongly influence the consumers' understanding of the product's relevance (Wasuja, Sagal & Sushil, 2012).

In the United States, which is the largest market for hearing aids, the role of the dispenser has developed from a pure expert role to that of both an expert and a salesperson. Until the early 1970s, audiologists were not allowed to sell hearing aids. The hearing-impaired consumer only paid the audiologist for a hearing aid evaluation. In addition to hearing level tests like pure tone and bone conductor tests, this evaluation consisted of speech recognition testing with three or more behind-the-ear hearing aids from a stock of 20 to 40 that were on consignment. The hearing aid rated to perform best in the test would then be selected, with a margin sometimes down to 2-4 percentages. The audiologist would then provide the patient with a list of dispensers in the area where the selected hearing aid type could be purchased. This hybrid dispensing model changed in the mid- 1970s, and the audiologist was now allowed to both recommend and sell the hearing aid. This changed the audiologist's role from one of a medical professional with no monetary incentive in recommending hearing aids HAs to one of both a medical professional and a salesperson with a monetary incentive to recommend premium products.

New HIs are introduced regularly, so dispensers are faced with a substantial amount of information and number of products to consider before making a recommendation. This can be a complex choice, leaving the expectation for consumer value creation to the subjective judgment of the individual dispenser.

Gioia et al. (2015) describe how recommendations in hearing aid sales are based on stereotypes and potentially undersell premium products, leading to decreased average selling prices and reduced firm performance (see Appendix). The paper looks at the decision-making criteria (vertical differentiation) utilized by professionals when recommending hearing aid

technology levels to hearing-impaired individuals. In the experimental design, 21 representative patient cases were generated and tested online with 733 professionals. The study design is based on a contrastive vignette technique. The results show how professionals base their recommendations of hearing aid technology levels on their own perceptions of the patient's activity level, frequency of hearing aid use (for current users), age, and speech discrimination score. The discrepancies in hearing aid technology level recommendations are not justified by academic research, but the use of lifestyle as a significant determinant for the recommendation is apparently deeply anchored in the mind of the dispenser, despite the lack of evidence to support this behavior. Jones et al. (2005) support this finding, stating that the increasing complexity of the sales context and the resulting bounded behavior demand of manufacturers to find strategies that support effective value delivery in the consumption experience.

At the level of the dispenser-consumer relationship, the decision rules in the mind of the dispenser will have a significant impact on the treatment and counseling offered to the individual consumer. This relationship is, therefore, an important area of focus. However, in the management research literature, very few scholars have attempted to understand salespeople's biases toward customers or to determine which management tools can be used to correct for bias in the recommendations and products offered to the customer.

The consumer

The consumers' perceived use value and valuation of the benefits of consuming the product or service are prerequisites for value creation and, by corollary, for value capture at the level of the firm. The decision-making processes at the level of the consumer should therefore be of great interest for strategists.

Consumers' decision-making processes are related to the complexity of the product (Bettman, Luce & Payne, 1991). As complexity increases, consumers are likely to resort to simpler heuristics and selective information processing in their decision, often reducing decision-making effectiveness (Bettman et al., 1991). As the number of attributes and alternatives increases, decision-making effectiveness is reduced (Keller & Staelin, 1987). Effortful processing can lead to mental strain and low information process fluency. More time might be needed to evaluate the input, and the consumer's short-term memory of the attributes' benefits will be non-optimal/impaired. Furthermore, an increased number of alternatives may result in greater cognitive load (Sweller, 1994), affecting behavioral bounds in consumer decision-making processes (Payne, Bettman & Johnson, 1993). Just like dispensers and consumers, executives also fall victim to bias. When innovators have worked on a new product

over a period of time, the innovation becomes their reference point, and they become convinced that the product works, that there is a need for it, and that it addresses the shortcomings of existing alternatives (Gourville, 2006).

When hearing impaired persons decide to visit a professional, they are faced with a situation that they are often not able to navigate. They tend to focus more on the tangible technologies of the hearing aid (e.g., volume control, rechargeable options, different listening program options, remote controls, apps), whereas sound quality benefits (e.g., directional microphones, binaural synchronization, noise compression) are not prioritized in the valuation of the product (Kochkin, 2007). Stigma concerns connected to hearing aids have also been part of the ongoing discussion regarding small penetration rates in the relevant product market (Kochkin, 2007). Repeat purchasers, on the other hand, place a greater emphasis on premium sound quality, and the most common reasons people report for discontinuing use of their hearing aids are that the device is physically uncomfortable or has poor perceived sound quality (Kochkin, 2007).

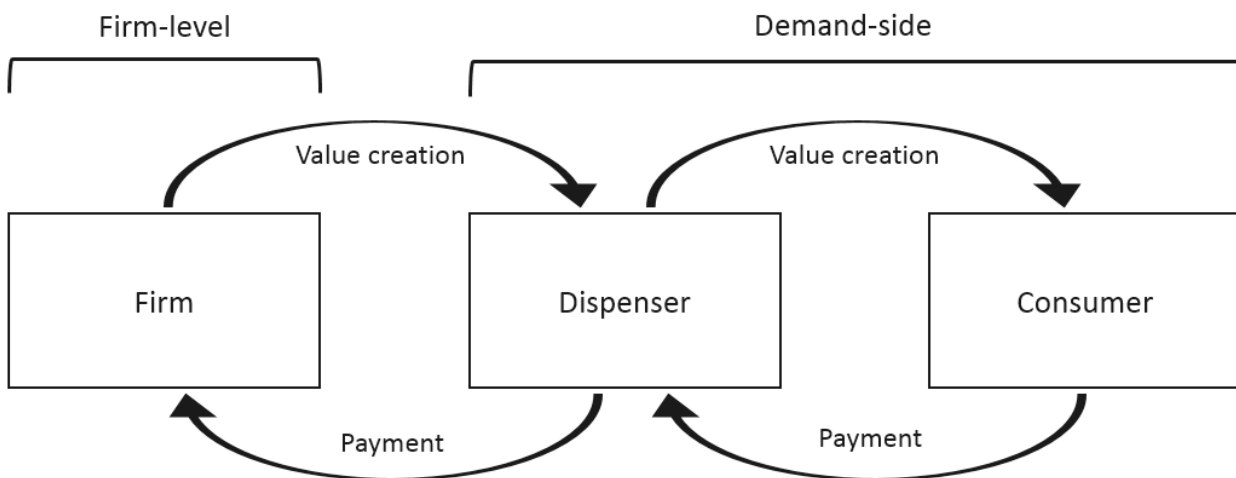
Hearing aid manufacturers offer a broad range of products in different styles and levels of technology sold at different price levels with a dominant vertical differentiation, creating a market in which prices range from \$300 on the internet to \$3,000 per hearing aid for the most advanced technology dispensed in private clinics (Abrams & Kihm, 2015). A higher price can be an indicator of quality, but when a buyer cannot separate the value of high-quality products from those of lower quality, they will tend to discount the role of the purchase price as an indicator of quality (Akerlof, 1970; Hardesty & Bearden, 2003). Research in other technology areas has found that the lack of perceived benefits, and not the perception of cost, seems to motivate negative opinions of new technology (Harit et al., 2004). This phenomenon partly explains why in many purchase situations, consumers are reluctant to pay a premium price for a product, independent of their budget constraints.

The perceived value of a choice depends on consumers' ability to perceive the differences between different options (Iyengar, 2010); however, this perception is challenged by an overwhelming range of products with short lifecycles (Rackham & DeVincentis, 1999) and an overload of "decision-relevant" information (Drummond, 2004). For these reasons, consumers tend to use information-processing shortcuts (heuristics) to reduce cognitive effort (Tversky & Kahneman, 1973). Heuristics thus play a role in the consumer's decision-making process that cannot be ignored because they may result in an inability to weigh the value of product differentiation confidently and efficiently. Ultimately, this could lead consumers to opt

for the cheaper product (Schwartz, 2004). The power of sub-optimal information processing is supported by a study by Freeman and Spenner (2012), who found that for the consumer, the single greatest driver of conversion from buying intention to product purchase and recommendation to others was “decision simplicity” (i.e., “the ease of gathering trustworthy product information and efficiently weighing purchase options”). The solution is therefore not just a matter of providing more information. Studies in health care have shown that more information does not automatically improve patients' decision-making (Slovic, 1982), and consumers who face information overload are likely to experience lower levels of well-being (Iyengar & Lepper, 2000; Payne et al., 1993). However, developers expect consumers’ perception of the value of innovations to match their own. As a result, instead of anticipating a difficult sell, managers are shocked when firm performance rates are not achieved (Gourville, 2006).

Figure 2 presents the different players in the hearing aid industry and their respective representation for innovation performance in the value chain.

Figure 2. Generating value at firm-level and demand-side in the value chain



RESEARCH DESIGN

This thesis sets out to answer the following research question:

To what extent does decision-making behavior at the individual level affect value creation at the firm-side and the demand-side of the value chain, and what management practices can facilitate decision-making for improved value creation?

To understand how value creation is affected by decision behavior and decision context at both supply and demand side, we consider the three levels of players that drive the market potential of any innovation: the company that designs the product, the dispenser who sells the product to the consumer, and the consumer who must finally adopt the product. We also outline key observations and challenges that managers face in this regard. Following Powell (2014: 205), who stated that “A good rule to follow that our methodology should fit the personality of the phenomenon we are trying to explain,” this thesis builds on a set of methodological, theoretical and empirical pillars covering both qualitative interview techniques, online surveys and quasi experiments in the framework of strategy management and behavioral psychology and data collection from different sources. Mixed methods research is the future for behavioral strategy (Powell, Lovallo & Fox, 2011) and demand-side behavior (Priem, 2007) and thus contributes to our understanding of such complex phenomena as value creation through a behavioral lens.

Establishing innovation outcome and product adoption research in a cognitive bias framework can be done using a set of well-tested research methodologies. Combining such research tools will help us describe the empirical world of phenomena on the one hand, and on the other hand utilize the scholarly world of theoretical literature that attempts to explain the practical world (Shepherd & Suddaby, 2017). Through systematic fieldwork that explores value creation in practice, and by linking the findings to existing research on organizational innovation strategy, demand-side strategy and behavioral science, this research seeks to identify why consumers fail to buy new products, even when those products offer distinct improvements over existing alternatives (in terms of technology and/or design, or business model), and why companies invariably have more faith in new products than is warranted (Gourville, 2006). This research intends to identify the theoretical contribution that the behavioral literature can make toward organizational strategies for increasing innovation success through product value creation by exploring the psychological underpinnings of the organizational effect on innovation outcome from supply side and perceived value creation in the product market.

This thesis consists of three research papers, each of which explores individual research questions. The papers can be considered individually, but together, they answer to the research question (see Table 1) by exploring individual decision behavior in the decision context of the manufacturer, the context of the industry category, and the sales context.

Table 1. Overview of research papers

	Study 1	Study 2	Study 3
Title	The Multidextrous Organization: Combining Modes of Ambidexterity in William Demant Holding	Stay True to What You Are: A Demand-side View on Old Companies Facing New Company Threats	Elevating Consumer Value Creation in the Sales Context: The Case of the Hearing Aid Industry
Co-authors	Nicolai J. Foss	None	Carminio Gioia
Research question	<i>How do companies combine different modes of ambidexterity, and what are the implications for innovation outcome?</i>	<i>Which novel insights can a behavioral view on demand-side view offer incumbent firms facing new challenging market entrants to create value in the market for superior performance?</i>	<i>What management tools can be used to facilitate an increased value creation in the sales context to maximize firms' performance?</i>
Methods	Case study (qualitative interviews, observations and company documents)	Experimental design in an online survey	Test and control-group field test and focus group
Findings	Organizations balance between contextual and structural modes of ambidexterity in a multidextrous construct. This balance affects employee motivation, and through that, the value creation on innovation by a novelty and usefulness dimension.	Gaining insights from the demand side of the value chain, I find how incumbent companies facing new market entrants can drive value creation by maximizing consumers' psychological attachment rather than chasing new technology and business models.	Through strategic implementation of information process fluency in the sales situation, we show that when behavioral bounds are considered in the decision context, firms can increase perceived value creation through higher consumer payments.

Summary of the research papers

Study 1: The Multidextrous Organization: Combining Modes of Ambidexterity in William Demant Holding

In the first paper, we develop a theory for how companies can combine different modes of ambidexterity. We also identify how microfoundations moderate the balance between contextual and structural modes and how a change in balance shifts the decision context and thereby the individual behavior in the form of motivation between a high level of intrinsic motivation and pro-social motivation. We propose that this shift affects the novelty and usefulness aspects of product innovations, thus generating either higher objective performance or more accessible product benefits. The difference in motivation can thereby explain the psychological underpinnings of the value creation in innovation at the manufacturer level. The findings of this study also lead to a proposal for how informal social networks can moderate low levels of pro-social motivation via higher levels of perspective-taking at the level of the individual employee to guide a shift in innovation focus toward a usefulness perspective.

This is based on an extensive study of William Demant Holding, which has, over a long period of time, engaged in continuous experimentation with its approaches to organizational ambidexterity. Firms are increasingly being advised to adopt ambidextrous modes of organizing (Tushman & O'Reilly, 1996; Adler, Goldoftas & Levine, 1999; Caspin-Wagner, Ellis & Tishler, 2012), that is, organizational forms and management models that balance exploitative with explorative activities (March, 1991). So far, the literature has identified three modes of ambidexterity, with scholars implicitly positing that ambidextrous firms will adopt one of these modes. However, this assumption neglects the fact that firms often combine different approaches to ambidexterity—in what we call “multidexterity”—and that such a combination introduces distinct management and organizational challenges.

Study 2: Stay True to What You Are: A Demand-based View on Value Creation for Old Companies Facing New Company Threats

In the intersection between strategic management and behavioral science, this paper explores how a demand-side approach can create novel insights for incumbent firms facing new challenging market entrants. The results of this study contrast with traditional strategy literature, which defines long-term viability for incumbent firms through fast responses to technological and business model changes. Instead, this paper proposes for incumbent firms to retreat to strategies prioritizing the current technology and business model. By exploring value creation through consumer behavior, this study explores the mechanisms that drive consumers' value

creation. Results find a higher value for hearing aid companies in the current context of medical devices. This value is both in the form of use value in a stated higher intended use and as exchange value measured in willingness to pay and willingness to accept. Results also support the effect of individual behavior because value creation is mediated by emotional attachment measured as psychological ownership and the role of a specialist sales context. This implies a different strategy for resource allocation in R&D, marketing, and sales departments for incumbent firms with a retreat strategy, compared to a strategy seeking to commercialize new products.

Study 3: Elevating Consumer Value Creation in the Sales Context: The Case of the Hearing Aid Industry

As Jones, Brown, Zoltners, and Weitz (2005) pointed out, the increasing complexity of the sales environment and the resulting increase in cognitive demand requires an understanding of how retail organizations can provide more easy-to-process product and market information. This would help managers evaluate where resources are needed to reduce the negative impact of information complexity in vertically differentiated markets.

The third and final research paper in this thesis provides empirical evidence that supports information processing fluency as a valuable management practice in the sales context through a strategic implementation at the level of the dispenser and the consumer. Building a decision context that supports the psychological mechanism that guide dispensers' recommendation of targeted high value product benefits, as well as the consumers' perceived value of the same product benefits, this study finds an increased willingness to pay, and thereby increased payment to the value system.

The findings of our study indicate that retail companies can address the existing information complexity of the sales environment. The results further suggest that companies may have a substantial incentive to set up strategies to ease the understanding and appreciation of the vertical differentiation between products to support an increased value creation in the consumption experience of current products for a higher business outcome.

FINAL REMARKS

All too often, consumers decline to purchase products that companies expect them to buy. Until organizations can understand, anticipate and respond to the psychological underpinnings that consumers, dispensers and managers bring into their decision-making, success in value creation of innovations will remain elusive.

Keupp et al. (2012) defined strategic management of innovation as the use of appropriate strategic management techniques and measures to impact the firm's innovation activities for firm growth and maximized performance. We add the perspective of demand-side research (Priem & Butler, 2001), as well as an understanding of the behavioral factors that bound firms' ability to pursue opportunities (Gavetti, 2012). This approach extends the understanding of those managerial decisions that increase innovation performance in a value chain.

In the case of hearing aids, the percentage of consumers who choose to purchase hearing aids has not increased over the last 50 years, despite the constant introduction of new technical innovations into the market. At the level of the manufacturer, the focus of innovation is to develop a continuous flow of products at several price points with multiple features and to introduce new technologies in the consumer electronics domain. Staying in an internal firm framework focusing solely on technology will not change innovation performance in the hearing aid industry if it has not done so over the last 50 years. Instead, recognizing that human behavior is at the core of the solution and that people might act in ways contrary to their or the companies' best interests can help develop strategies that support companies in value creation through organizational design and by creating decision context solutions that support consumers and dispensers in evaluating products through a careful structuring of how information and options are presented (Beshears & Gino, 2015). The next chapters present the three papers constituting this thesis, and the final chapter provides the concluding discussion regarding the implications of this research.

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CHAPTER 2: THE MULTIDEXTROUS ORGANIZATION: COMBINING MODES OF AMBIDEXTERITY IN WILLIAM DEMANT HOLDING

Abstract

Research has identified three modes of ambidexterity, the implicit assumption being that ambidextrous firms employ only one of these modes. However, firms often combine different approaches to ambidexterity—what we call “multidexterity”—which introduces distinct management and organizational challenges. To gain insight into 1) how firms can deploy the administrative apparatus to best facilitate a multidextrous approach and 2) the consequences of multidexterity for employees' behavior and innovation outcome, we undertook a detailed, mainly interview-based study of William Demant Holding, a global leader in the hearing aid, hearing implant, and diagnostic instrument industries. Based on the case data, we identify important factors that enable different combinations of ambidexterity within the same firm, the most important of which are particular types and constellations of employee cognition, work motivation and informal networks. Based on the identification of these factors, we then offer propositions that link the balance between structural and contextual modes of multidexterity to employees' behavior and innovation outcomes.

INTRODUCTION

Firms are increasingly advised to adopt ambidextrous modes of organizing and managing their activities (Tushman & O'Reilly, 1996; Adler, Goldoftas, & Levine, 1999; Raisch & Birkinshaw, 2008), that is, adopt organizational forms and management models that balance exploitative and explorative activities (March, 1991; Lavie, Stettner, & Tushman, 2010). The literature identifies three modes of ambidexterity, implicitly positing that ambidextrous firms will utilize only one of these modes at a time. However, in actuality, firms often *combine* different approaches to ambidexterity (sometimes within the same business unit)—what we call “multidexterity.” Multidexterity may be a product of a firm’s historical development, in which one particular approach to ambidexterity has been only partially supplanted by another. Alternatively, multidexterity may be a more deliberate strategic choice. In any case, multidexterity introduces distinct management and organizational challenges because it allows for the co-existence of very different forms of logic concerning how firms can best balance exploitative and explorative efforts over time.

The first notion of ambidexterity to appear in the literature is sequential (or “vacillating”) ambidexterity, that is, the notion that organizations can achieve balance between exploitation and exploration by sequentially changing from exploitative to explorative modes and *vice versa* (Duncan, 1976; Nickerson & Zenger, 2002). However, ambidexterity may fall prey to competence traps—in particular, the firm may become virtually incapable of changing to an explorative mode (March, 1991)—which may threaten sequential ambidexterity. Partly in recognition of this, scholars subsequently introduced “structural” approaches to ambidexterity (Tushman & O'Reilly, 1996), which posit an internal division of labor between organizational units that engage in exploitation and those that engage in exploration (Jansen et al., 2009; Hill & Birkinshaw, 2014). The most recent addition to the ambidexterity literature is the notion of “contextual ambidexterity,” which posits that ambidexterity should be located at the level of individual organizational members, supported by appropriate management models (Gibson & Birkinshaw, 2004).

These notions are, of course, ideal types. As such, they do not necessarily imply that any real-world firms have adopted only one particular mode of ambidexterity. In fact, firms often mix elements of all three modes in a multidextrous manner, potentially because there are distinct benefits of combining modes that cannot be reached within any single mode and which

outweigh the additional management associated with multidexterity. To develop an understanding of these benefits and challenges, we engage in an in-depth qualitative field study, answering specific calls in the literature for such studies in the context of ambidexterity (cf. Birkinshaw & Gupta, 2013; Gupta et al., 2006; Raisch et al., 2009). We specifically study Danish medical device producer William Demant Holding (“WDH”), a firm that has often been discussed in the strategy and organizational change literature (typically with reference to its Oticon unit) (e.g., Peters, 2010; Lovas & Ghoshal, 2000; Verona & Ravasi, 2003; Foss, 2003; Birkinshaw & Mol, 2006). However, virtually all of this research focuses on a relatively small slice of Oticon/WDH history, namely the so-called “Spaghetti Organization” that was adopted at the beginning-to-mid-90s, and therefore does not account for the fact that Oticon/WDH has engaged in continuous experimentation with different approaches to ambidexterity over a longer stretch of time. In the 1980s, a strong structural division between exploitative and explorative activities characterized the firm, resulting in a strong disconnect from customer preferences and a heavy loss of market share. The Spaghetti Organization was fundamentally an attempt to bring back innovativeness and market orientation by adopting a strongly contextually ambidextrous management model, based on bottom-up initiative, a high degree of decentralization, informal networks, and a culture that valued trust and the right to voice one’s opinions. At the same time, some of the structural features of the older organization remained (e.g., the company’s independent research center, Eriksholm). The Spaghetti Organization was abandoned in the mid-1990s in favor of a matrix organization, and much of WDH’s subsequent organizational development has revolved around experimenting with different kinds of matrix structures. Sometimes the basic matrix structure is loosened a bit, and sometimes it is tightened, suggesting a sequential approach to ambidexterity. More recently, the organization has, partially due to the impact of development methodologies such as the Agile Scrum approach, returned to a more structurally oriented approach to ambidexterity, and generally more exploitative approach in its R&D organization (Stranne & Maier, 2014).

Because of its more than three-decades-long history of deliberately engaging a multidextrous innovation management model, WDH is particularly well suited as a unit of analysis. We specifically argue that the WDH case helps us to better address questions that are currently ill-understood in the literature, such as, How do different combinations of modes of ambidexterity affect performance (e.g., innovation performance)? How do managerial influences at different organizational levels as well as individual behavior support the choice

and maintenance of a mix of modes of ambidexterity? What is the microfoundational underpinnings of ambidexterity in terms of employee motivation and cognition and informal social relations?

To address these questions, we undertook a major study of WDH over several months in 2016, combining participant observation, the study of archival documents, and 25 interviews.³ The study makes two central theoretical contributions. First, we illustrate how an organization can implement different combinations of structural and contextual modes of ambidexterity over time. Third, we discuss certain microfoundational features that may be prerequisites for such combinations, in particular, certain types of employee cognition, work motivation and social informal networks (Felin, Foss, Heimeriks, & Madsen, 2012). Third, we link the balance between structural and contextual modes of multidexterity to the novelty and (immediate) usefulness dimension of innovation, proposing that contextual dominance drives innovation usefulness and that structural dominance drives innovation novelty.

In sum, we explore a novel theme within the ambidexterity literature to a perspective, namely how firms mix different modes of ambidexterity to engage in multidexterity. At the same time, we provide insights into what is arguably the “soft underbelly” of the ambidexterity literature, namely its microfoundations, and we discuss the effect that different combinations of modes of ambidexterity may have on innovation outcomes.

FROM ORGANIZATIONAL AMBIDEXTERITY TO MULTIDEXTERITY

Organizational ambidexterity

The term “ambidexterity,” that is, the “power of using both hands alike” (Nosella, Cantarello & Filippini, 2012), is used metaphorically within organization theory to capture the idea that managers may need to succeed in managing conflicting activities (Duncan, 1976), particularly routine versus more innovative activities (or, incremental and radical innovation). In his seminal work, March (1991) posited the existence of inherent tradeoffs between exploitation (used to ensure the organization’s current viability) and exploration (used to ensure viability)—tradeoffs that can be influenced via organizational and leadership means. Such tradeoffs emerge because exploitation and exploration refer to essentially different activities, requiring different

³ In the interest of full disclosure, one of the authors was employed at WDH from 2010 to 2016.

management approaches. Often firms will favor one of these over the other, exploitation being the dominant attractor as firms (and relevant stakeholders) seek the certainty of short-term successes (O'Reilly & Tushman, 2013).

Over its decades-long history, the concept of ambidexterity has been used to describe many different phenomena (Lavie, Stettner, & Tushman, 2010; Tushman & O'Reilly, 2013). Different literature streams present different contexts for examining the effect of organizational ambidexterity, ranging from learning activities (Duncan, 1976; Vasollo, Anand & Folta, 2004; Gupta, Smith & Shalley, 2006) over organizational adaption (Miller & Friesen, 1984; Tushman & O'Reilly, 1996) and organizational design (Duncan, 1976; Tushman & O'Reilly, 1996; Lewis, 2000) to innovation. (Abernathy & Clark, 1985; Tushman & Anderson, 1986; Tushman & Smith, 2002).

Much of the literature focuses on the effect of organizational ambidexterity on firm performance, arguing that ambidexterity is positively associated with sales growth, innovation, and firm survival at the firm, business unit, project and individual levels across industries (Floyd & Lane, 2000; Gibson & Birkinshaw, 2004; He & Wong, 2004; Lubatkin et al., 2006; O'Reilly & Tushman, 2013). Ambidexterity is more valuable under conditions of environmental uncertainty (Goosen & Bazazzian, 2012) and high competition (Caspin-Wagner, Ellis & Tishler, 2012), and when a firm has more resources (Goosen & Bazazzian, 2012), has stronger technological capabilities (Goosen & Bazazzian, 2012), and is larger (Cao, Gedajlovic & Zang, 2009). Studies have also proposed a number of antecedents and potential moderators, such as organizational structure, behavioral context, and leadership style (see Raisch & Birkinshaw, 2008, for a review).

Duncan's (1976) original proposition was that organizations could achieve ambidexterity by sequentially shifting between structures that pursue exploitation and exploration. In contrast, Tushman and O'Reilly (1996) argue that in rapidly changing environments, sequential ambidexterity is ineffective and a simultaneous approach is necessary. The concepts of structural ambidexterity and contextual ambidexterity capture the simultaneity of the exploitative and explorative approaches, and although they both define ambidexterity, the two concepts differ strongly in their configuration (see Table 1).

----- *Insert Table 1 here* -----

Challenges of organizational ambidexterity

Each of the three modes of ambidexterity are associated with different benefits and challenges. For example, contextual ambidexterity is seen being ill-fitted for both high levels of exploration and exploitation (Gibson & Birkinshaw, 2004) as this approach relies on autonomously acting individuals, who may face difficulties implementing in a decentralized fashion the coordinated actions and major resource commitments that are usually necessary for high levels of exploration or exploitation (March, 2006; Kauppila, 2010). At the same time, radical exploration and exploitation are argued to be mutually exclusive within a single structure (Gupta et al., 2006). Kauppila (2010) describes the structural separation as a necessary but not sufficient condition for ambidexterity, due to the need for integration tactics, which in turn call for the contextual integration of the different structures. Birkinshaw and Gibson (2004) propose that structural separation may be needed intermittently to give new ideas space and allow the use of needed resources to get started, and they emphasize that the goal should always be to reintegrate the units as quickly as possible, and thus to change back to contextual ambidexterity. O'Reilly, Harreld and Tushman (2009) also see structural ambidexterity as a means to gain traction for exploratory innovation, with subsequent integration into a more contextually ambidextrous mode. O'Reilly and Tushman (2013) conclude that the most successful firms initiated via structural ambidexterity will switch to contextual ambidexterity and then switch back over time, but also argue that the difficulties in terms of mental change and contextual change that these temporal shifts impose are highly challenging (O'Reilly & Tushman, 2013).

Towards an understanding of multidexterity

As indicated, the literature suggests that the management challenges of achieving ambidexterity are considerable (Lavie et al., 2010). Perhaps for this reason, the possibility that different modes of ambidexterity can co-exist in a given firm has been given little attention. However, companies do in fact intentionally combine modes of ambidexterity. For example, the Swedish networking and telecommunications equipment and services company Ericsson has adopted a contextual approach, centered on the use of a Scrum team, that seeks to include both the explorative and exploitative modes (though with an overall learning towards the exploitative mode) (Annosi et al., 2017). At the same time, the company has dedicated research units that are highly explorative. Companies like Philips and Apple simultaneously combine high exploitative

contextual modes based on Agile development methods with centralized, highly explorative R&D.

Thus, we can imagine various configurations of the three modes of ambidexterity. Specifically, firms can combine contextual and structural ambidexterity. To the extent that this combination changes over time, this introduces an element of temporal ambidexterity. In other words, all three kinds of ambidexterity can be present.

As informally stated above, there is nothing particularly esoteric about multidexterity. However, there is a gap in knowledge about how firms can mix different modes of ambidexterity at the same time, as well as the distinct benefits and challenges associated with a “multidexteritrous” approach, which motivates our investigation of two cases from the same company, WDH, that can help us to better understand multidexterity as a phenomenon, as well as the management challenges it introduces.

METHOD AND DATA

Research design

To produce empirical insight into multidexterity, we conducted a qualitative, in-depth case study. This approach is appropriate due to the highly exploratory nature of this research (Stake, 1995; Creswell et al., 2003). By allowing for the collection of rich qualitative data within a specific organizational context (Stake, 1995, this methodological approach potentially offers a deep understanding of the complexity of management challenges and the drivers, systems and processes behind multidexterity. By also adopting a long-term historical perspective, we seek to gain a deeper understanding of the mechanisms and dynamics that influence the choice of modes of ambidexterity and their co-existence over time, both at the firm and individual levels. We specifically focus on Oticon and Oticon Medical, two companies under the WDH corporate umbrella. This allows us to compare different ways of combining approaches to ambidexterity within the same industry, and even within the same external environment (see Table 2).

----- Insert Table 2 here -----

We collected qualitative data using semi-structured interviews. The interviews were conducted using a set of specific questions that addressed the themes of the study but at the

same time gave the participants room to express their views in their own words. Such a research design allows for structured, but still open, data collection and analysis, which is particularly apt to generate rich and varied information (Sixsmith, 1986). The data collection also consisted of archival data collection based on corporate publications, early reports, financial statements, internal documents, and other written materials as sources. Documents complement interviews, and are a means of tracking changes and developments covering a long span of time, many events and many settings (Stake, 1995). Accordingly, the document reviews were designed to collect knowledge about the William Demant organization and its history in order to achieve richer description in the study cases, and to identify the relevant subjects with regards to Oticon and Oticon Medical for the semi-structured interviews (Goldstein & Reiboldt, 2004).

We also engaged in direct observation at WDH headquarters (where the central administrative functions for both Oticon and Oticon Medical are carried out). The direct observation along with the document reviews were aimed at gathering data on the context within which the interview participants were operating (Bowen, 2009), generating relevant interview questions (Goldstein & Reiboldt, 2004), and collecting supplementary details that subjects may have forgotten (Coffey & Atkinson, 1997). The use of multiple data sources allows for data triangulation (Yin, 1994), by which different documents can help verify findings from interviews using data that is not affected by the investigator's presence (Merriam, 1988).

Data collection

The document sample comprised nineteen documents including development strategies, organizational strategies, organizational charts and job role descriptions. These were reviewed and analyzed along with five external company presentations. The study was conducted at the William Demant headquarters in Denmark. R&D and Sales & Marketing for both Oticon and Oticon Medical are housed within this building, and all representative interview subjects could therefore be found at headquarters. Having both companies present in the same office building gave us a unique opportunity to explore and compare different ways to operationalize a balance between different modes of ambidexterity in comparable environments. Our sample of interviewees was selected from both Oticon Medical and Oticon in a way that balanced different professional areas, levels of responsibility and seniority (Flyvbjerg, 2006). Interview subjects representing top management, middle management and lower-level employees from both R&D and Sales & Marketing were selected. Organizational charts and job role descriptions helped us

identify representative interview subjects. There were eight interviewees in Oticon Medical and fifteen in Oticon. The interviewees were distributed across the hierarchy, including three top managers, eight middle managers, and twelve lower-level employees. No further interviews were conducted once the saturation point of data was reached (Aberbach & Rockman, 2002). The sample consisted of seventeen males and six females, corresponding to the gender composition of William Demant Holding. The age of the interviewees ranged between thirty-two and sixty years, and their work experience at Oticon or Oticon Medical was between six months and nineteen years.

Data analysis

Before starting the interviews, company documents were analyzed using a thematic analysis method. This form of analysis uses pattern recognition for the data, and we used this process both to allow emerging themes to become categories for analysis (Fereday & Muir-Cochrane, 2006), and to predefine codes to supplement and verify interview data. Such an approach also allows for the integration of data gathered using different methods (Bowen, 2009). All documents were evaluated for their purpose, target audience, and original source(s) of information (Webb et al., 1966).

The interviews were transcribed verbatim and analyzed using the software NVivo 10. The research focus guided the areas of relevance, and allowed for exclusion of transcript content not related to that focus. Based on the need we identified in the literature for a deeper understanding of the nature of multidexterity and the management and organizational challenges it gives rise to, we selected the following content areas: (1) organizational level multidexterity, and (2) microfoundations. The sections of interview transcripts and documents relevant to the areas of defined content were divided into units of meaning, and each were assigned a code. Open coding was used to generate as many codes as necessary to describe the content, and meaning units could be coded as many times as needed to capture all of the concepts conveyed (Douglas, 2003). The emerging codes were then clustered into coherent sub-categories (groups of content sharing a commonality) and headlines by two coders (Rugg & McGeorge, 1997). Any disagreements between the two coders were solved through discussion.

A key purpose of the empirical inquiry is to examine (mainly relying on document data) whether there is a tendency for one mode to dominate another over time. Combining document and interview data, we study which mechanisms can help explain the organizational change

process between the co-existence of ambidextrous modes. We also use the interview responses to gain insight into how the informal dimensions of the organization, such as various dimensions of individual behavior, support the choice and maintenance of a mix of modes of ambidexterity. We therefore address the following pre-defined content areas: organizational context and microfoundations. Oticon and Oticon Medical utilize different business strategies and processes to organize and manage innovation processes, and the organizational outcome in terms of innovation performance is therefore also included as a pre-defined content area.

All codes that emerged from the interviews and documents were merged into two data sets, namely an Oticon dataset and an Oticon Medical dataset. For each dataset, the codes were clustered into categories. The authors reviewed results from both datasets and discussed the emerging conceptual commonalities and differences between categories and between sets of results. Ten percent of the codes from the Oticon dataset and 10% of the codes from the Oticon Medical dataset were selected to assess saturation. Saturation is reached when the categorization of new codes does not result in the generation of new categories (Morse, 1995). Saturation was found to be reached for these datasets, in the sense that the collection of additional data would be unlikely to generate different results.

In total, the interviews and documents generated 1,172 meaning units referring to the defined content areas, and the document reviews generated 1,502 meaning units. This produced 22 codes linked to either organizational multidexterity or the microfoundations thereof. The codes linked to microfoundations were clustered into six categories and three main categories. The density was then evaluated for each category, addressing the number of subcategories that described complementary aspects of the same concept (Glaser & Strauss, 1967). Only the dense categories emerging from the data sets are described in the following sections, where we report the empirical findings.

FINDINGS

Organizational level multidexterity

Starting from the proposed preliminary conceptualization of multidexterity as the simultaneous use of at least two modes of ambidexterity, we use the Oticon and Oticon Medical cases to understand how multidexterity is achieved, maintained and possibly changed, as well as the organizational and management challenges arising from it. We next provide a detailed

historical description of the manifestation of multidexterity in the two company cases, Oticon and Oticon Medical.

Multidexterity at Oticon

Traditional R&D development. Like many other European companies, Oticon was founded (in 1904) based on the import of a US product, namely hearing aids. The second World War made importat impossible, and by 1946, the first Danish-produced hearing aid was introduced. In 1954, the founder's son donated his shares in the company, then employing 155 people, to the Oticon Foundation, the largest current shareholder of William Demant Holding A/S.

Up until the mid-1970s, research and technology development at Oticon took place solely within a designated, traditional R&D department. However, top management recognized a need to prioritize longer-term innovations, prompting the establishment in 1975 of the stand-alone Eriksholm Research Center, situated about 50 miles from headquarters. The choice of a relatively distant location was deliberate, as the stated purpose of Eriksholm was to facilitate a combination of fundamental and applied research, independently of the more directly product-based research done at R&D at headquarters (Verona & Ravasi, 2003). This approach, of course, represents basic structural ambidexterity, as the introduction of the Eriksholm unit was a structural separation of a unit solely focused on exploration. Note that the Eriksholm unit is still in existence, and maintains its relative independence. This structurally ambidextrous approach is, however, combined with the stated emphasis of WDH headquarters on contextual ambidexterity, where employees are urged to engage simultaneously in explorative and exploitative activities (Verona & Ravasi, 2003). One reason these approaches can co-exist and complement one another is partly physical separation, and partly differences of the time horizon of the relevant activities (long for the Eriksholm unit, shorter for the individual employees' ambidextrous activities).

The Spaghetti Organization. By 1979, Oticon had become one of the leading manufacturers worldwide of hearing aids. However, the beginning of the 1980s marked a change in consumer demand from behind-the-ear style hearing aids to the more discrete in-the-ear designs aggressively marketed by the US firm Starkey. While Oticon had in fact developed a basic in-the-ear design around 1980, "not invented here" attitudes suppressed development

efforts, and this was one of the factors contributing to the company's drastically declining market shares throughout the 1980s (Foss, 2003).

In 1986, Oticon suffered its first financial loss of a series of such losses. The new managing director, Lars Kolind, appointed as CEO in 1988, held that Oticon should move away from low-margin, commodity-like hearing aids, and shift from "technology-based" to "knowledge-based" products (Stranne & Maier, 2014). The appointment of Kolind as CEO led to drastic cost cutting measures, but also to the introduction of a breakthrough product called Multifocus. This hearing aid had essentially been developed several years earlier, but had been shelved. When it was introduced to the market at a very high price point, it immediately boosted sales and profits, effectively saving Oticon from an impending bankruptcy. The development and commercialization of Multifocus was enabled by the introduction in 1991 of the Spaghetti Organization (Foss, 2003), which was a highly deliberate attempt to inject contextual ambidexterity, supported by a radical organizational design, into the Oticon organization. Thus, the earlier hierarchical job and task structure was replaced by a project-based organization that mobilized a bottom-up approach that was enabled by a massive delegation of decision rights to employees. Thus, any employee could propose a new marketing or innovation project, build a project group around it using Oticon's open internal labor market, present it to a Products and Projects Committee, and manage the project in case of approval, all having a significant effect on remuneration (Larsen, 2002; Foss, 2003).

There is agreement in the literature regarding Oticon's Spaghetti Organization that this new organizational design did indeed unleash significant innovative initiative (Gould, 1999; Larsen, 2002). Until then, Oticon's product portfolio had been mainly based on incremental innovation, but with the Spaghetti Organization, Lars Kolind changed the focus to highly innovative products. However, after only five years, the Spaghetti Organization foundered due to its own internal contradictions (Foss, 2003). Thus, the management style characterized by frequent, erratic intervention clashed with the espoused culture of empowerment and responsibility.

The matrix organization. Niels Jacobsen, who had joined the company in 1992 as executive vice-president, was appointed CEO in 1998, after Lars Kolind left the company. With Jacobsen, the focus shifted towards the volume segment of the market, and towards the manufacture of low-end products to compete in all market segments based on economies of

scale in production. As part of the new focus on the volume segment, Oticon Holding acquired the Swiss hearing aid company Bernafon in 1997 to support a multi-brand strategy, and Oticon Holding changed its name to William Demant Holding.

Under the leadership of Niels Jacobsen (1998 – 2008), Oticon became a full-line supplier, with a single software platform serving different market segments, rather than using separate platforms. To support the volume business, marketing and R&D activities were divided between three teams, with a focus on the value-market, called “Team Design Value”, the premium market, called “Team Premium Solution,” or the Pediatric and Severe hearing loss markets, called “Team Special Care Performance” (Stranne & Maier, 2014). All teams still worked in a project-based manner, with sales, marketing and R&D all represented within each team.

In 2006, WDH moved to new, larger location close to Copenhagen.⁴ The internal architecture and office layout of WDH headquarters is designed to support informal knowledge sharing, allow the initiation of new contacts, and ease the mobilization and use of existing contacts within advice, trust and communication networks (Stranne & Maier, 2014). To this end, there are big staircases going down the middle of the buildings, where people can “bump into each other,” many coffee machines next to tables and chairs, where employees can sit and talk, and an innovation area on each floor, featuring boards to draw on, sofas and flexible meeting areas for quick talks and a flexible working context. At Oticon, anyone can access another person’s e-mails. These artifactual manifestations of WDH culture are just one indication of what was clearly brought out in the interviews: the organizational logics launched by Lars Kolind with the Spaghetti Organization—a culture of bottom-up initiative, informal knowledge sharing, and individual pro-activeness and accountability—are in many ways still very much alive at WDH.

While many of the structures supporting employees in balancing their time between explorative and exploitative tasks that were implemented under the Spaghetti Organization were still at work after the change to a more formal matrix structure in 1996, there was a shift to a

⁴ In addition to the main headquarters in Copenhagen, Denmark, WDH has local headquarters in Bernafon, Bern (Switzerland), and in Sonic, New Jersey (US), with production housed in Thisted (Denmark) and Szczecin (Poland). The company has sales offices in 24 countries and approximately 85 independent distributors worldwide. Wholesale customers range from small family-owned shops to large transnational chains and government contracts. When combined, the group’s three hearing aid brands hold about one fifth of the total market (Stranne & Maier, 2014).

more rigid and formalized organization in a number of respects. One of the challenges of the project-based teams was retaining knowledge, in particular for those multi-year projects, where R&D employees would often change between projects, depending on the development status. A central document system was thus introduced to substitute for informal knowledge sharing (Stranne & Meier, 2014) and to ensure knowledge access between projects.

The modular matrix organization. The next major organizational change inflection point took place with the 2008 appointment of Søren Nielsen as president of Oticon. Nielsen was explicitly tasked with securing the growth of profitability. This led to a focus on improving R&D efficiency, as WDH leadership recognized that R&D expenses had exploded (Stranne & Maier, 2014), the organization was plagued by continuing product launch problems, and profit margins were declining (Stranne & Maier, 2014).

Nielsen focused on increasing efficiency in development and changing the approach to innovation by means of organizational redesign (Stranne & Maier, 2014). The lack of a well-defined hierarchy was seen as a cause of wasteful consensus-oriented decision-making, with many meetings, unclear responsibility, and slow processes. The culture of informal information flow at the coffee machine had produced the unintended effect that employees were not accustomed to sharing information if it did not happen face-to-face. Therefore, it was decided by top management that the organization needed a more formal structure, supported by a culture change, and more formalized processes of knowledge sharing.

A new organizational structure was implemented accordingly in April 2010 (called project “Dawn”). The new structure amounted to a platform-based, modular product development system based on the development of key parts called “core assets” that could be combined across many different products. This mode of product development is not fundamentally different from the modes implemented in, for example, contemporary automobile production (e.g., Muffato, 1999). At WDH, core assets and the product development efforts they are based upon utilize user and system requirements generated by specific teams and formulated such that each requirement is testable. Domain teams formed based on expertise and specialization deliver different parts to increase efficiency, and a group of system engineers work to make sure that the combination of different parts is optimized between products and brands.

Placed in the R&D department the so-called “Discovery Team” is tasked with engaging in product innovation that is explicit high-risk and has a multidisciplinary basis. Thus, the team’s stated purpose is to scout for new technologies and deliver prototypes, demos, and mature concepts to the organization. Thus, it functions as a gatekeeping unit that maintains the absorptive capacity of WDH. This role is complementary to the still-existing Eriksholm research center, the mission of which continues to be long-term R&D, specifically pursuing audiological discoveries that have the potential to significantly enhance end-user benefits in future hearing care in collaboration with academic research institutions, clinicians and end-users. In all, the implementation of the new modular matrix has marked a move towards more structural ambidexterity and a further move away from the heavy emphasis on contextual ambidexterity that characterized the Spaghetti Organization.

Changing employee roles. Under the Spaghetti Organization, employees were engaged in heavy multi-tasking, often performing three to five different job descriptions, and were basically free to decide what they did and when. They could also freely choose working hours and training needs, with the company encouraging the development of employee skills that lay outside current competence fields. In the subsequent matrix organization and up until 2010, much of this flexible culture continued. However, WDH and Oticon management reasoned that for complex technology projects, a high degree of complementary, but highly specialized knowledge must often be applied (Kogut & Zander, 1992).

The high demand for specialized knowledge was also driven by intense technological competition in the hearing aid industry. Thus, the close competition between the six big players⁵ has resulted in a high rate of rapid competitive imitation. Thus, new features and services quickly become “hygiene factors” in a competitive environment in which the customers and consumers have a hard time differentiating between the different products. New products are introduced with increasingly short development times.⁶ Accordingly, WDH’s 2010 organizational change ushered in a higher degree of specialization, with very clear roles and

⁵ The “Big Six,” namely Sonova, William Demant, Sivantos (Siemens), Widex and Starkey, account for approximately 98% of the global market share for hearing aids.

⁶ The latest competitive battle has been over 2.4 GHz wireless connection, which three of the six dominant companies have now introduced to the market, and which is quickly becoming an industry standard. This has driven a massive pull for rapid technology development in the hearing aid companies.

responsibilities for each employee (as manifested in a highly detailed 2011 organizational chart that defines roles and responsibilities of all employees).

The focus on effective innovation at Oticon also affects the innovation goals for the individual employee. As one Oticon employee explained, the “good solution is not just the one that performs best. You quickly learn that the good solution is the one that is cheapest and good enough. That is the art when you are an engineer.” In general, the focus on effectiveness seems to threaten contextual ambidexterity, as employees are encouraged to deliver new technology at a fast pace to support the current market, and the opportunity to start different explorative projects outside the unique explorative units is limited. Furthermore, the development model at Oticon leaves little room for introducing products that are even somewhat different from those normally developed by the company. The emphasis is on extreme incrementalism in development efforts, supported by a high degree of specialization at the employee level. As an Oticon manager explains: “Today we sit in different functions and make partial deliveries. That works fine for the sausage factory, but if you want to develop something new, it is very difficult to fit the puzzle pieces together.”

Perhaps as an attempt to counteract the potentially stifling consequences for innovation of the new modular matrix, top management has introduced various initiatives that support and celebrate employee innovations. Thus, once a year, all employees of Oticon who have submitted an invention disclosure (alone or as a team) that may eventually may become a patent are rewarded with the “Inventors Cube.” The cube is 10x10 cm and black, with an inscription of the person’s name and the patent headline. The cube event also signals an acceptance and encouragement of employees using work time to engage in innovation. As stated by an Oticon employee: “I also think that the managers see this as an opportunity to prioritize some time for more explorative activities than before the cubes.”⁷ As an additional way to support innovation, Demo Day is a three-hours event that occurs twice a year, where engineers demo what they are

⁷ However, the focus on patents in the yearly Cube celebration is not seen by all employees as motivational, especially those who do not work with technical development (e.g. hardware, e-software, and digital processing). An Oticon employee expressed the following frustration about the Cube event: “Cubes? Yeah, that was actually quite demotivating. It was mainly for engineers and very technical. It would be nice if there were challenges for people who are not engineers, or less technical. The focus is all about technical advancements and not about the person wearing the hearing aid or the audiologist fitting it.” The Cube event was started in order to support innovative behaviors that result in patents. This is seen by team managers as an advantage, but from an employee perspective, the Cube motivational scheme is heavily biased towards the technical and engineering sides of things, leaving little room for non-technical innovations and improvements.

working on to everyone inside the company; all employees are welcome to visit the approximately twenty booths to discuss on-going projects and pre-projects.

The 2010 organizational changes were implemented as a deliberate break with earlier, deep-seated organizational assumptions and practices. The nature of the changes was clearly understood by the employees, for whom the new organizational design implied a very different way of working. As an Oticon employee explained: “Specialization can be good, but it is also fun to try something else – to get the overview but also have the freedom to say that ‘now I think it would make sense if I helped over here.’ You become very focused on your own work, and are not really aware of what others are doing anymore.” In other words, this employee worries that excessive specialization, role definition and formalization will lead to a loss of transactive memory (Wegner, 1987) in the organization at large, that is, employees are increasingly losing their knowledge of the expertise of others, knowledge that is very useful for the purposes of horizontal coordination in organizations.

Explorative activities in the current organization design. In the current modular matrix design, exploration is narrowly circumscribed by a host of factors, notably, the R&D budget and its effective allocation to the Discovery Team, the emphasis on innovation as strictly technological innovation, increased formalization and an increasing use of Scrum methods in product development. In turn, these changes in resource allocation and formal organization have implications for important aspects of informal organization, specifically helping behaviors and culture, that are detrimental to exploration.

First, exploration at Oticon is directly budgeted for, specifically, it is estimated to be 2-5% of the entire R&D budget, and most of it is allocated to the activities of the Discovery Team. Second, the emphasis on exploration and innovation is almost entirely seen from the perspective of *technological* innovation within an R&D framework. Innovation in marketing, service, or administration were not brought up in any of the interviews, or mentioned explicitly in any of the documents reviewed, and was not perceived to be a part of the management’s strategic explorative activities. Third, to support a more effective exploitative innovation process at Oticon, the level of formalization has been increased. Thus, a large set of documentation processes have been implemented in many teams, alongside a Scrum-like work process. However, none of the interviewed employees felt that they use a pure Scrum format, either because their work is too specialized to be able to take over for one another, or because they

simply regard it as a tool for planning their time. Fourth, it was emphasized that Scrum demands time for planning from both the employee and manager, which leaves less time for explorative activities not directly linked to specific product deliveries, between the very tightly planned daily activities. The employees also highlighted some negative consequences of using Scrum, in particular that the time allocation implied in the Scrum model makes it difficult to prioritize time for exploratory activities, and that it has become much more difficult to help colleagues from different teams or receive help from these; in the words of an Oticon employee:

We were better at helping each other before. Now that we are increasingly using Scrum, other employees are more locked [into their own work]. When I come and ask them [for help], I am told to talk to their project manager, even though [the task] might only take that person two hours, and it would take me four days. Then I have to go to the project manager and argue why it makes sense to help me. Sometimes they just help anyway because they can see that they can hold their sprint.

Helping behaviors within and between teams has been a strong part of the culture at Oticon for many years. Different scholars have suggested that a culture that stresses general helpfulness has played an important role in the company's various attempts to implement ambidextrous designs (Chatman et al., 2014; Schultz & Hernes, 2013). The introduction of the Spaghetti Organization in 1991 changed the culture at Oticon towards one that encouraged flexibility and risk-taking, and one in which the non-hierarchical organization made personal networks necessary to succeed (Stranne & Maier, 2014). However, as mentioned above, the organizational changes implemented in 2010 broke with these cultural assumptions in key ways.⁸ As an Oticon manager explains: "It is still okay to ask questions about everything in this culture and have an opinion about everything. When you then make an organization that is divided into silos, it suddenly becomes okay to veto everything. It quickly becomes an 'us and them' organization." An Oticon employee added: "The organization is more divided, so it is more difficult to help across teams, but I have never experienced that anyone says 'no' to

⁸ To change the culture to better fit the new Modular Matrix, employees and managers participated in several "culture workshops. One highly important, symbolic change was the introduction of "core business hours": All employees must now be present at the company between the hours of 9:00 and 15:00. This was a big difference from before, when employees did not even need to report when they were present at the company or for how long. This previous behavior was not optimal in a business culture of many meetings and direct person-to-person information sharing.

helping me.” Thus, residues of the older helpfulness culture appears to survive under the new organizational design.

In sum, the above account of the history of Oticon’s organizational design, in particular with respect to its R&D activity, supports our descriptive claim that structural and contextual ambidexterity can co-exist (see Table 3).

----- *Insert Table 3 here* -----

Multidexterity at Oticon Medical

Another example of a co-existence of structural and contextual ambidexterity is to be found within WDH, namely, Oticon Medical. However, this company represents a different organizational and managerial approach to the balance between structural and contextual ambidexterity, which makes it pertinent to compare to Oticon

Oticon Medical was established in 2007⁹ with Jes Olsen as CEO. Olsen started at Oticon in 1986, and therefore has a long history with WDH. The company was founded with an explicit focus on bone-anchored implants, and launched its first product in 2009. In 2013, the cochlear implant company Neurelec was acquired, and merged under the brand of Oticon Medical, and the first cochlear implant was marketed under the Oticon Medical brand in 2013.

Like hearing aids, the implant business is characterized by few players.¹⁰ While tight competition has led to a rapid technology race in the hearing aids industry, the development cycles for implants are longer, and not only are products part of the development scope, but also surgery techniques. The invasive implantation of a product in customers place Oticon Medical products in a medical regulation class 3 with very high demands for documentation and time-consuming product tests compared class 2a, where hearing aids are categorized. The long development cycles and need for specialized employees, and development facilities also affect the price of the product, where devices like cochlear implants are sold at 20 to 25,000 euro a piece compared to the hearing aid products produced in Oticon, which are sold at between 1,000 and 3,000 euro.

⁹ Oticon Medical is a young company, and employees have not been exposed to a sequence of different organizational and strategic initiatives, as at Oticon (i.e., Spaghetti, Dawn, Daylight, etc.)

¹⁰ Cochlear, MedEl, AB bionics, Oticon Medical.

As a small player entering the hearing implant domain, Oticon Medical is relentlessly chasing new customer segments from the dominant players, while Oticon being a dominant player prioritizes the need to continuously maintain their strong position in the hearing aid domain. This creates very different innovation strategies comparing an incumbent firm to an entrant player on a market, leading Oticon Medical to pursue innovations that may be characterized fairly radical,¹¹ while Oticon prioritizes incremental changes to their extensive portfolio of products. As an Oticon Medical manager stated: “Hearing aids are more evolution, while we are revolution. There is a difference between making a Tesla and ‘just another Volkswagen.’ Nothing wrong with the latter, but we are dealing with a market in which we are the smallest, and we have to get in and grow.” This focus on growth by stealing market shares through “revolution” thus demands a different R&D budget for exploration. As stated by an Oticon Medical manager: “We are not coming with another hearing aid, like one is used to in a well-driven machine. We make new prototypes that we have never made before. There are a lot of things we do not know, and there are fewer of us to solve it.” The company estimates it uses 25% of its R&D budget for explorative activities, as compared to 5-6% at Oticon, allowing the individual employee to use more of own resources on explorative activities, and every employee is encouraged to engage in innovative behaviors. This explicit emphasis on contextual ambidexterity is actively communicated at Oticon Medical to be the mindset that governs work. At the same time as there is a strong presence of contextual ambidexterity strategy at Oticon Medical, there is also a presence of structural separate innovation projects represented by the approximately 100 different research and development projects at varying stages of maturity pursued through external cooperation with research units in hospitals, focus groups with users, and by the individual employee, which Oticon Medical is involved in around the world at universities and hospitals.

At Oticon, by choosing an organizational structure with dedicated units for exploration, and at the same time encouraging innovation to take place at the individual level for all employees through different innovation reward initiatives, Oticon aims to pursue a high level of structural ambidexterity combined with a contextual mode of ambidexterity. At Oticon Medical, in contrast, a number of external research partners function as structurally separate exploration

¹¹ Including new surgical procedures, brainstem implants, and electrode arrays on implants (see i.e. Johansson, Holmberg & Hultcrantz, 2014; Dupont Hougard et al., 2015).

units, combined with a high degree of contextual support for the individual employees to balance their own time between exploration and exploitation tasks.

Multisite company structure as moderator of contextual ambidexterity. Oticon Medical is currently situated in Gothenburg (development of the bone-anchored implant), Nice (development of the cochlear implant) and Copenhagen (development of the processor for both bone-anchored and cochlear implants). The Copenhagen headquarters is located in the same building as WDH and Oticon, and access to operation and distribution functions, as well as to the Eriksholm research center, are shared with the other WDH companies. Working in a multisite company was seen by interviewees as a moderator on the individual's ability to explore new ideas. Working across different sites was experienced as giving a fragmented overview of the product development and a reduced access to specialists with specific product knowledge. In the mind of the interviewees, this reduces the feeling of having an overview of current company activities across business units, and the lack of an overview and access to specialist knowledge, to affect the ability to innovate by seeking new opportunities and ideas outside daily tasks. As an Oticon employee explains, "It is much more difficult to run with an idea. Who do I contact, and where? The people I need to ask for things in order to work on a new and different project might sit in Poland, and that is not so easy."

The awareness of company culture. Many of the employees of Oticon Medical are former Oticon employees, and the current Oticon culture is something the management is very aware of when hiring new employees: "It is not an automatic qualification to come from Oticon. Things are different here, so we need a different culture, to do it the way we do. If we get too many from Oticon, we could take in too much Oticon culture." At the same time organizational design of Oticon Medical is a clear remnant of the Spaghetti Organization of the 1990s. Like that organizational design, the current setup of Oticon Medical was explicitly chosen to support contextual ambidexterity, while at the same time working with structurally-separate, external explorative unit, and when referring to bringing too much Oticon culture into Oticon Medical it seems that it is the "new" Oticon culture that is not wanted within the Oticon Medical doors. A manager of Oticon Medical explained that such a balance is a strategic managerial aim: "I hope and believe that every person can innovate often – and not just for new products; it has to be a mindset in the way we work." The different cultures at the two companies support the different innovation strategies pursued by each.

Empowerment of the employee. The organizational designs of the two companies also differ, reflecting their different cultures and innovations strategies. Within each project at Oticon Medical, employees often juggle many different types of tasks, with the individual employee making the decision of how to divide their work effort. One employee remarked: “I discuss everything from the color of the product to the statistics of the results. I like the diversity. It is inspiring.” There is a short distance from employees to top management, and employees described how transparent communication about future roadmaps and strategies makes it easy to prioritize between decisions and motivate employees to take responsibility and make decisions. An Oticon Medical manager describes it thusly: “In the end it is a question about empowerment – empowerment to make the right decisions. I must have a large degree of trust [for my employees] because I give a large amount of freedom. That is an important element, the trust element.” Regarding trust, an Oticon Medical employee stated: “I feel that I am trusted when the top management informs me about future plans. That makes a difference in the decisions I make.” This is a very different statement than that of Oticon employees, where interviewees described how they feel distant from top management and not clear on the company’s roadmap.

MICROFOUNDATIONS OF THE MULTIDEXTROUS ORGANIZATION: THE WDH EXPERIENCE

What Are Microfoundations?

Felin, Foss, Heimeriks and Madsen (2012: 1354) define “micro-foundations” as the “... theoretical explanation, possibly backed up by empirical examination, of a phenomenon placed at analytical level N, in terms of variables and the mechanisms linking these variables at level N-1 (and possibly lower).” Less abstractly and in the present context, understanding the microfoundations of multidexterity means accounting for how “variables and mechanisms” placed at a lower level than (organization-level) ambidexterity produce such ambidexterity, such as employees’ characteristics, but also the social processes through which interaction in organization play out. As little is known about organizational multidexterity, the same goes for the microfoundations of such multidexterity. Felin et al. (2012: 1355) further explain that providing such “micro-foundations will often involve a causal-genetic explanation, that is, a time-dimensioned account of how events at different levels subsequently cause events at other levels,” and that micro-foundations “are highly compatible with longitudinal research designs and small-n inquiry into process, that is, the approach we have adopted in this article.

Drawing on the documents, observations, and interviews in this study, we sought to empirically ground the microfoundations of multidexterity. In particular, we examined the evidence searching for differences in the microfoundations that are compatible with structural and contextual modes of ambidexterity. We were also interested in ascertaining how the microfoundations and the mode of ambidexterity they are compatible with are linked to outcomes, in particular innovation outcomes. Our interview evidence in particular points to three main categories of microfoundational factors, namely employee cognition, work motivation, and informal social networks (see Table 4).

Employee cognition

Balancing exploration and exploitation through team composition demands a trust in the employee's ability to make good use of company resources. Birkinshaw and Gibson (2004) argue that ambidexterity can be achieved through the creation of a supportive context in which individuals can make their own choices about how and where to focus their energies. We identified three main qualitative data categories of individual cognition that guide contextual behavior: the effect of firm size on task transparency, individual perceptions about innovation ability, and ability to absorb new initiatives.

Effects of firm size. One of the mechanisms for balancing exploration and exploitation that was addressed by many of the Oticon interview respondents was the role of company size. In the literature, larger firms have been found to be more capable of managing ambidexterity, and have the resources necessary to succeed in it, by structurally dividing the focuses of exploitation and exploration into different domains (O'Reilly, Harreld & Tushman, 2009). Smaller firms, on the other hand, have been found to manage ambidexterity better through leadership within a contextually ambidextrous strategy (Lubatkin et al., 2006). A possible reason may be that there is a higher degree of task transparency in smaller units, the level of "cross-understanding" i.e., employees' ability to understand the mental representations of others (Huber & Lewis, 2010) is higher. Work on transactive memory systems (Brandon and Hollingshead, 2004), shared cognition (Healey et al., 2015), and collective interpretation (Gavetti and Warglien, 2015) have offered explanations of how teams and networks of interdependent individuals may over time come to develop and exploit shared representations of where and through which interfaces relevant information resides. As team members become familiar with the abilities, work constraints, and behavioral patterns of their peers, a cognitive division of labour may arise so as to improve team functioning and streamline the identification, retrieval, and application of available knowledge (Hollingshead, 2001). Team members are said to

develop meta-knowledge (i.e. knowing who knows what). An immediate implication of this is a reduction in the social and structural complexity perceived by team members, as the effort associated with locating and communicating with others that hold specialized stocks of relevant knowledge is decreased. Similarly, the development of mutual knowledge is expected to improve the ability of team members to perceive and understand the causes of heterogeneity in peer contributions (e.g. other commitments) (Hartig et al., 2015; Van den Berg et al., 2015).

The interview evidence suggests that structural separation is perceived to be more of a basic necessity that results from firm growth, rather than a goal to be achieved. Our interviewees also clearly indicated that an effect of increasing firm size and the differentiation and formalization that have accompanied these (in particular, in Oticon) is that task transparency, cross-understanding and transactive memory decline.

Oticon Medical is the smaller company of the two studied, and the employees see this as positive factor that allows them to work in way that is characterized by less formalization, fewer rules and more initiative and accountability. As one Oticon Medical employee stated: “Oticon is a much bigger organization. I think it would take me 15 years to develop the products I develop here in two years because of all the processes. Things move faster at Oticon Medical and I have more room to decide for myself.” In the ambidexterity literature, contextual ambidexterity is often described as a strategy that is introduced if the firm does not have the size to support a structurally ambidextrous setup, or when the firm is in need of innovation traction (O’Reilly & Tushman, 2011). It has also been suggested, as an interface at the firm level, to combine what is gained from a structural mode using external partnerships (Kauppila, 2010). Thereby the structural mode is framed as an ultimate goal for a growing company. What we found among WDH employees instead was a perception that the structurally ambidextrous approach must be accepted by employees as something that accompanies company growth. Oticon managers described exploitation and exploration as co-existing both at the level of the individual and in a structurally separate model. They see a structural separation as necessary to reduce the risk of introducing new technologies, which might not be realized or meet deadlines. At the same time, the individual employee is still expected to contribute to the organization’s innovation pool. In the words of an Oticon manager,

You might say that we try to institutionalize it. If you look at the Discovery team, that is very defined. But good ideas can come from anywhere. I think we are good at communicating this with Demo Days and the cube celebration. Everybody can bring in innovation. That being said, it is important to remember that if we have to be true

to delivery times and plans, there is not much “freedom to operate.” That is why we have concept projects and the Discovery team. The Discovery team is not a completely closed team, and sometimes employees are moved in and out so that some of the engineers can get a break from the hardcore deliveries.

Perceptions about innovation ability. The lower in the hierarchy an individual employee is, the less he or she will perceive the ambidexterity characteristics of the organization, what Gibson and Birkinshaw (2004) call the erosion effect. The same phenomenon is discernible at Oticon. Lower-ranking employees clearly articulated their inability to find the time and organizational support to engage in innovative behaviors in their everyday work. However, there is clearly a desire to engage in such behaviors. As one Oticon employee stated: “I would like to have more time or more of my role to be more innovative. I would like to be able to express my ideas more. Sometimes because of all the processes and all the people involved, you often use more time agreeing than exploring.” Another Oticon employee stated: “I think that this is an innovative place. I do not think that I am innovative. I do not have the possibilities for that in my work. My work is more making smaller adjustments in what we do... not inventing things.”

Contextual ambidexterity has also been described at the level of the individual employee, specifically referring to how employees allocate time and attention to exploitation and exploration activities (Gibson & Birkinshaw, 2004), as well as the extent to which balancing behaviors are supported by the managerial and organizational context (Ghoshal & Bartlett, 1997). The interview data from Oticon indicate that the managerial context is not seen as supportive of explorative activities at the individual level, and that when such activities do take place, they are driven bottom-up by individual curiosity, not by managerial support, unless the activities fit into the system of innovation rewards defined by top management. At Oticon Medical, the data point to the opposite. As one manager stated: “I hope and believe that every person can innovate often – and not just for new products; it is a mindset in the way we work.”

Ability to absorb new initiatives. For an organizational context to be effective in creating ambidexterity, its message needs to be disseminated clearly and consistently throughout the organization; unless lower-level employees genuinely understand and internalize the initiatives of top management, the initiatives will have minimal impact on individuals’ capacity for ambidexterity (Birkinshaw & Gibson, 2004). Company leaders therefore need to develop a clear vision and common identity (O’Reilly & Tushman, 2011). At Oticon, the introduction of new

initiatives was also focused on a change in work culture. This included numerous workshops and company presentations, as well as materials (booklets and posters), all designed to make sure that employees understood and implemented the new way of working in more structurally separated units, with a primary focus on exploitation in the larger the organization. Based on individuals' responses regarding their understanding of the different initiatives, however, the communication does not seem to have diffused effectively through the management layers. One Oticon employee stated: "There are a lot of names for new initiatives flying around in this organization. To be honest, I do not really focus on that very much." Another Oticon employee followed up along similar lines: "How things are done here is not so clearly explained, or how processes are run. I try to search on the intranet, but I struggle to find information easily in this organization."

The low level of absorption of initiatives by the employees can also be explained by a low sense of consistency; both employees and managers do not want to invest their energy in implementing initiatives because they expect the direction to change again within a short time. At the same time there is a feeling that the initiatives that have been started are never used to gain new learning, so that new initiatives could be built on the advantages and disadvantages of earlier models. As stated by an Oticon employee: "We change around a bit. There are only so many ways to divide people. Most things have been tried out before. Then you find out that there are advantages and disadvantages. Then some years pass and we change around again." An Oticon manager described his perception about initiative absorption in the following way: "We have all these initiatives. I think we are really good at starting them, but we are not good at running them, or taking stock of them and trying to change what does not work. We kind of just let them die. We should go back and learn whether we really changed anything. It is the same with all the matrix stuff going on at the moment. I do not really see what it achieves. I am not sure how it is winning hearts and minds every day."

----- *Insert Table 4 here* -----

Summary. The main categories of cognition that emerged from the data as guiding contextual behavior are all linked to the individual's understanding of the initiatives coming from the top management. This understanding of initiatives is grounded in the motivation to have more structural separation, the individual employees' own ability to innovate, and the transparency in communicating new initiatives. According to Gibson and Birkinshaw (2004), to support

contextual ambidexterity at the individual level, management should establish a shared organizational ambition that give personal meaning to the individual. In the case of Oticon, there is a discrepancy between managers and employees' perception about how company size affect the balance between structural and contextual ambidextrous behavior, as in managers see structural overweight as a goal, which can be obtained within larger firms, where employees see structural overweight as a necessity for larger firms, not a desired goal. This indicates that there is a high need for managers to understand the perspectives of employees. Furthermore, whether employee cognitions can be aligned with initiatives determines the employee's ability to be a contextually ambidextrous individual. In that way, employee cognitions can moderate the multidextrous balance between structural and contextual modes.

Work Motivation

Scholars have long stressed that work motivation influences organizational performance outcomes through multiple channels (Bolino & Grant, 2016). When collecting the data from interviews, we did not find any major differences between employees at Oticon and those at Oticon Medical with respect to the perceived importance of having good colleagues, an appreciation of the company and work environment, a good manager, and flexible work hours. Interestingly, however, we did find a marked difference in motivation, namely with respect to the balance of intrinsic and pro-social motivation. Intrinsic motivation is defined as having a task-focused emphasis on carrying out work in the present, based on one's own interests in and enjoyment of the tasks that are being performed (Amabile, 1996). Intrinsically motivated employees are motivated by curiosity, genuine, interest and a desire to learn (Ryan & Deci, 2000). Pro-social motivation is defined as the motivation that encourages employees to focus on information about the perspectives of others, based on a concern for helping other people and producing beneficial outcomes in the future (Grant & Berry, 2011). Although pro-social motivation might be thought of as a form of intrinsic motivation, different studies have demonstrated that it is defined on a "continuum from the more intrinsic, self-determined, to the more extrinsic, obligation-driven" (Bolino & Grant, 2016: 616). Intrinsic and pro-social motivation also differ in terms of goal directedness and temporal focus, where "intrinsic motivation involves a primarily task-focused emphasis on the process of completing work in the present, whereas pro-social motivation involves a primarily other-focused emphasis on producing beneficial outcomes in the future" (Grant & Berry, 2011: 78).

At Oticon Medical, the interview evidence clearly brought out that helping people with hearing loss by developing hearing implants is a powerful work motivation across the majority of employees at all levels of the organization. A manager at Oticon Medical stated: “I can see myself burning for the product we develop, the difference it makes.” An employee explained his motivation in the following way: “It is a big burden that we are developing something that is operated into peoples’ skulls. If something goes wrong, it is serious business. But it is also a great motivation.”

At Oticon, a few interviewees described their work motivation in relation to a desire to benefit the users of their products. One employee described pro-social motivation as follows: “It is about doing something good with what I can do. It is about helping people. There is a reason why I do not work with developing missiles.” From the perspective of the employees, especially at Oticon, there is a feeling that with the high focus on new technology developments, the hearing aid user is now further away than before. An Oticon employee stated the following: “The user will get these products. They do not care about all the details. But the focus is on all the gadgets and features. It is still a person using the product.” Another employee’s comment followed the same line of thought: “We have forgotten the user in all the technology. Stop up and think... what would I do if I were wearing a hearing aid? We are really good when it comes to technical innovations. We think very traditionally when it comes to innovation. Hearing aids need to be smaller and faster.”

Our findings suggest that the level of pro-social motivation is overall higher at Oticon Medical than at Oticon. The opposite seems to be the case, however, in the case of intrinsic motivation. Oticon employees display a high degree of focus on their own tasks and on having clear goals. An Oticon employee explained: “I like to do a good job. I see myself as hardworking. Having clear tasks and knowing what I am supposed to do is important.” Another Oticon employee stated: “I like to immerse myself in my work, when I have the possibility. If there is a problem, sitting down and using the time to calculate all the possibilities, and showing that something works... that is motivating. You can make many things, but if you cannot show that it works it does not matter.” Based on the findings on individual motivation at the two companies, which represent different multidexterity balances between structural and contextual modes, with a higher degree pro-social motivation among Oticon Medical employees, and a higher degree of intrinsic motivation among Oticon employees, we offer the following propositions (see Figure 1):

Proposition 1: *In a multidextrous organization where contextual ambidexterity is relatively more present than structural ambidexterity, it drives pro-social motivation*

Proposition 2: *In a multidextrous organization, whereas where structural ambidexterity is relatively more present than contextual ambidexterity drives intrinsic motivation.*

Intrinsic motivation has long been described as an enabler of innovation success by means of creativity (Grant & Berry, 2011). However, while intrinsic motivation may be an enabler, it is not a guarantee that creativity will lead to innovation (Grant, 2008). In particular, innovators often need an understanding that others' decision-making might be different from their own (Krippendorff, 2011). In that way, they will include others' perspectives on what is useful, thereby increasing the success of an innovation (Grant, 2008). Intrinsically motivated employees, however, use own interests to determine which innovative ideas to pursue (Ryan & Deci, 2000); this drives the creation of novel ideas versus ideas that are both novel and useful (Grant & Berry, 2011). In contrast, the perspectives of others – which pro-socially motivated individuals take into account – will help employees to “select and develop the most useful of their novel ideas” (Bolino & Grant, 2016: 617).

Building on Proposition 2, and based on the above arguments, we make the following propositions (see Figure 1):

Proposition 3: *Multidextrous organizational designs that are skewed towards a structural mode will produce innovation outcomes characterized by high technology novelty, by enhancing intrinsic employee motivation*

Proposition 4: *Multidextrous organizational design that are skewed towards a contextual mode will generate innovation outcomes that are high in immediate consumer usefulness, by enhancing pro-social employee motivation.*

Summing up Propositions 1, 2,3, and 4, balancing structural and contextual modes will balance novelty and usefulness in innovation outcomes. From a management perspective, the introduction of structurally separate units of exploration to secure novelty in innovation requires support from contextually ambidextrous behavior at the individual level in order to foster usefulness

in innovation, and thereby the level of perceived user benefits from at the level of the consumer.

The multidexterity construct offers the possibility of balancing these types of innovation outcomes. Nevertheless, the benefits that can be gained from such a coupled innovation focus introduce management challenges with regards to creating support for the ambidextrous individual. Here, the communication of new initiatives, and innovation ability of all individuals in the organization, offer managers the possibility to drive either novelty or usefulness by influencing the balance of multidexterity.

Informal social networks

Integrative efforts are vital to ambidextrous organizations (Postrel, 2002), and two organizational mechanisms that have been associated with integration are formal cross-functional networks (Martinez & Jarillo, 1991) and informal social networks (Jansen et al., 2006, Tsai & Ghoshal, 1998). Several studies have argued that ambidextrous organizations need both formal and informal integration mechanisms to increase knowledge sharing (Gilbert, 2006; Westerman et al., 2006). Organizations need to set up formal integration mechanisms to coordinate and integrate knowledge between individuals in spatially dispersed groups (Adler, 1989; Nickerson & Zenger, 2004). The results of our data analysis show strong interaction occurring between individual employees through informal social networks. This form of interaction is recognized in strategic management theory as an important microfoundation of the integration of different knowledge sources and domains across functions, with networks serving as knowledge conduits across units and individuals (Tsai & Ghoshal, 1998). As such, they may help mediate ambidextrous behaviors (Jansen et al., 2009).

With the organizational change in 2010, employees at Oticon were not used to sharing knowledge by other means than in person. This demanded new processes to structure the delivery of knowledge. A series of documents and templates was therefore introduced to replace some of numerous meetings previously conducted, and to help employees gain more time at their desks. At Oticon, placement within informal networks is generally seen as crucial to staying informed and being “in the know.” As an Oticon employee put it: “Networks are very important. Personal relations are good for getting quick answers. But sadly, they are also important for being informed. If you do not rub noses with the right people at the coffee machine, it is not certain that you will get the information you need to do your job.”

Most studies centering around knowledge sharing and ambidexterity (He & Wong, 2004; Birkinshaw & Gupta, 2013; Benner & Tushman, 2015) have focused on the necessity of

integrating information between explorative and exploitative structures. However, individuals in teams that are predominantly exploitative, but separated into specialized functions, also need to integrate knowledge to support ambidexterity at the individual level. A second perspective on informal social networks is the possibility of introducing perspective-taking processes.

Perspective taking is an other-focused psychological process in which “individuals adopt others’ viewpoints in an attempt to understand their preferences, values, and needs” (Parker & Axtell, 2001). This skill is described by cognitive researchers as generating a positive effect on new ideas (Galinsky et al., 2008) along the usefulness versus novelty dimension (Mohrman et al., 2001), and strengthening the relationship of creativity and intrinsic motivation (Galinsky et al., 2008) through an increase in the usefulness of ideas (Mohrman et al., 2001).

Grant and Berry (2011) introduce perspective taking as a moderating effect on pro-social motivation, and Madjar, Oldham and Pratt (2002) stress how exposing individuals to the perspectives and preferences of others through work on multidisciplinary teams offers a contrast to their own perspectives and reduces their reliance on their own perspective only. Team composition has been suggested by Beckman (2006) to be an important antecedent of firm ambidexterity; shared or diverse prior company affiliations on a team will affect ambidexterity, such that teams with common prior affiliation will engage in exploitation, and teams with different prior affiliations will engage in exploration. Balancing team composition can thus be an important antecedent to multidexterity. Our findings indicate that perspective taking in a group where others are like oneself is redundant, while perspective taking in multidisciplinary teams is creative. Interaction with others from diverse backgrounds improves creativity of individual responses (Madjar et al., 2002), and we will argue that informal social networks that span functions, as found in the Oticon case, offer interaction across disciplines. We therefore offer the following proposition (see Figure 1):

Proposition 5: In multidextrous companies that are skewed towards structural ambidexterity, informal social networks moderates immediate usefulness in innovation outcome, by enhancing employee perspective taking. .

Through the use of informal social networks, management is proposed to moderate levels of perspective taking to increase or reduce pro-social motivation and thus usefulness in innovation. A more tangible strategy to introduce this could be multidisciplinary teams, which can also increase the perspective taking skills of the individual employee. This requires a careful balance, by which pro-social motivation must not overtake intrinsic motivation, especially since the

greater persistence, performance and productivity that result from pro-social motivation only occur when intrinsic motivation is also present (Grant, 2008).

CONCLUDING DISCUSSION

Theoretical Implications

Going back to at least Schumpeter (1942), the importance of balancing explorative and exploitative activities has long been acknowledged (Abernathy & Clark, 1985; March, 1991). Research has identified three different modes of ambidexterity (i.e., sequential, structural and contextual ambidexterity) (Lavie, Stettner, & Tushman, 2010), scholars implicitly asserting that only one of these three modes are adopted at any time by an ambidextrous organization. However, in actuality firms do not necessarily stick to one mode of ambidexterity. How firms may balance different modes of ambidexterity thus represents a major gap in the literature.

This article contributes ambidexterity literature. First, by means of a study of the recent history of WDH, we empirically support our basic claim that firms may combine different approaches to ambidexterity—that is, multidexterity. Second, the WDH case allows us to proffer tentative insight regarding how firms can facilitate a multidextrous approach and what are potential microfoundations of such an approach. Third, we argue that not only the balance between exploitation and exploration, but also the balance between different modes of ambidexterity influences innovation outcomes (specifically, innovations that differ in terms of novelty and immediate usefulness).

Limitations and Future Research

This study contributes to the existing ambidexterity literature by offering propositions that link the balance between contextual and structural modes, using the construct of multidexterity, to the novelty and usefulness dimensions of innovation. However, these findings should be qualified in light of their limitations. As we investigated multidexterity and its associated management challenges in the context of a high technology company using an in-depth case study, future researchers should be cautious to generalize these findings in dissimilar industries without further studies conducted on a wider scale. Nevertheless, we expect multidexterity to take many different shapes in different companies, and the propositions set forward here should apply not only to managers of technology firms, but may also be useful to managers in other industries who are juggling the development strategies of their companies.

The concept of multidexterity advances the current theories of ambidexterity by offering a perspective in which the balance between exploitation and exploration is not placed at either a structural/organizational or an individual level, but is within a continuum of balance points between the two unique ambidexterity modes. Surprisingly little attention has been given to how the balance between exploration and exploitation through structural or contextual ambidexterity interacts with important microfoundations, and how this affects not just innovation in a broad sense, but also the novelty and usefulness dimensions of innovation. Moving forward, it will be important to further explore the propositions proffered in this study.

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Table 1. Characteristics of Structural and Contextual Ambidexterity.

	Structural ambidexterity	Contextual ambidexterity
Characteristics	Structural ambidexterity research posits that ambidexterity can be achieved by structural separation of exploration and exploitation into different units (Tushman & O'Reilly, 1996).	Occurs at the level of individual employees and how they allocate time and attention to exploitation and exploration activities (Gibson & Birkinshaw, 2004).
Role of top management	Structural ambidexterity is top-down and relies on business managers to define how to best divide employees' time between exploitation and exploration. This is done not only through separate structures, but also separate competencies, systems, incentives, processes and cultures (O'Reilly & Tushman, 2008), with an underlying set of values and leadership that can managing the paradoxical tensions (Jansen et al., 2009; Hill & Birkinshaw, 2009)	Managers focus on behaviors and the extent to which the balance of behaviors is supported by the managerial and organizational context, which is defined as an often invisible set of stimuli and pressures that will motivate individuals to act in a specific way (Ghoshal & Bartlett, 1997).
Point of integration between exploitation and exploration	Information exchange and joint decision making between the top management team (Lubatkin, 2006) and middle management is highlighted as an integrative mechanism between the units (Taylor & Helfat, 2009)	To achieve ambidextrous behavior, the individual employee needs to be able to understand the demands of both exploration and exploitation and meaningfully implement this understanding in her own work context such that that ambidexterity is facilitated by the employee's

		behaviors (O'Reilly & Tushman, 2004).
Nature of the units	Units that pursue exploration are expected to be smaller, decentralized, and have flexible processes, whereas units that pursue exploitation are expected to be larger, with more stable processes (Tushman & O'Reilly, 1996).	NA
Skills of employees	More specialized	Behavior of an ambidextrous employee is characterized by the ability to seek out cooperation, hold multiple roles, identify potential synergies, take initiative, and have the overview to see opportunities outside own field of expertise (Birkinshaw & Gibson, 2004). ¹²

¹² Results show that non-management employees feel they have a low-level understanding of strategic initiatives compared to top management. This has, in earlier studies, been found to impact the individuals' capacity for ambidexterity (Birkinshaw & Gibson, 2004). At the same time, it was found that the lower the person is in the corporate hierarchy, the lower his or her rating of the organization's ambidextrous characteristics will be – this is called the erosion effect (Birkinshaw & Gibson, 2004).

Table 2. Comparative Unit Characteristics

	Oticon	Oticon Medical
Year founded	1904	2009
Employees (as of 2016)	1072	278
R&D employees	630	83
S&M employees	145	36
FDA medical regulation class	2a	3
Innovation in R&D budget	2-5%	25%
Patents filed 2015/2016	45/16	9/5
Revenue in millions DKK (2015)	9213	380

Table 3. Oticon Multidexterity from a Historical Perspective.

Period	1950-1975	1975-1990	1991-1996	1997-2008	2008-2017
Multi-dexterity	The structural mode is represented by a few explorative external partnerships	An internal explorative unit defines the structural mode	One internal explorative unit continuously represents a structural mode	The structural mode is still defined by one explorative unit	Two internal explorative units now characterize the structural mode
	The contextual mode prevails, with predominantly exploitative activities	Contextual mode is still present through predominantly exploitative activities	Contextual mode is now dominated by explorative activities	Contextual mode is now characterized by a higher degree of exploitative activities	Exploitative activities now dominate the contextual mode

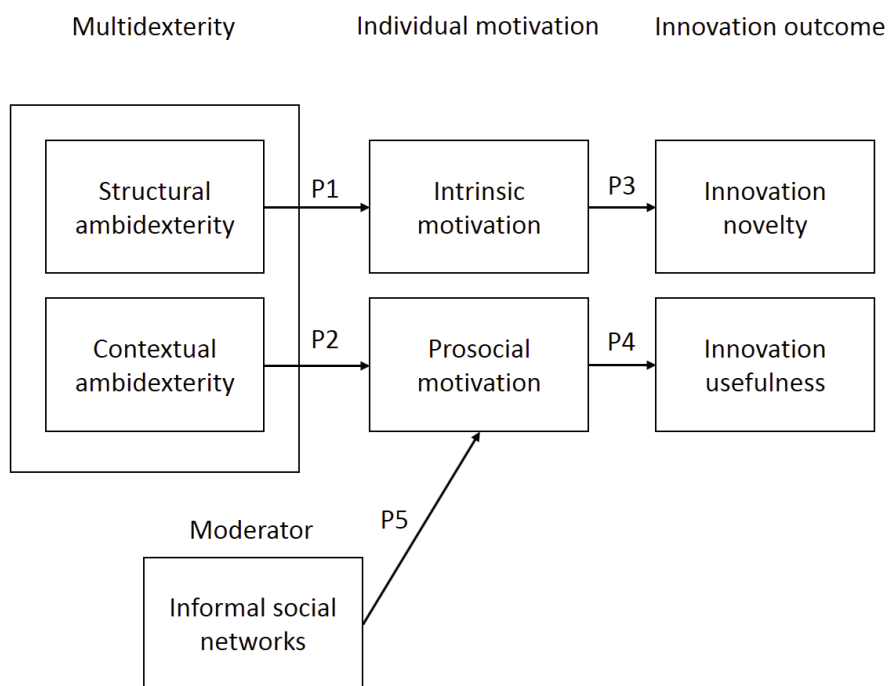
Events	<p>Traditional R&D department.</p> <p>Predominantly exploitative development in the contextual mode.</p> <p>External explorative activities at hospitals and universities.</p>	<p>Eriksholm is established as an explorative organizational unit.</p> <p>R&D continues with predominantly exploitative development.</p>	<p>Introduction of the Spaghetti Organization, a pre-dominantly explorative contextual development mode.</p> <p>Eriksholm continues as an explorative unit.</p>	<p>Introduction of a matrix organization with a higher degree of exploitative focus in the contextual mode.</p> <p>Eriksholm continues as an explorative unit.</p>	<p>Introduction of a modular matrix organization with a high exploitative focus.</p> <p>“Discovery” introduced as an explorative unit in R&D.</p> <p>Eriksholm continues as an explorative unit.</p>
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Table 4. Analysis of Qualitative Data.

Category/Codes	Representative Quotes
Cognition	
- Perceived size effect	“I took organizational theory in school, and I understand that when the company grows you have to change the way we work together.” (Oticon employee)
- Ability to innovate	“I think that this is an innovative company. I do not think that I am innovative. I do not have the possibilities for that in my work. My work is more making smaller adjustments in what we do... not inventing things.” (Oticon employee)
	“We are more entrepreneurial in our approach. We take some blows for that, and we may be on a journey in which we are too much on the non-structured side.” (Oticon Medical employee)
- Absorbing new initiatives	“There are a lot of names flying around in this organization. To be honest, I do not really focus on that much.” (Oticon employee)
Motivation	
- Pro-social	“I could not make a cooler product. I help deaf people get their hearing back, achieve a different life.” (Oticon Medical employee)
- Intrinsic	“Solving problems. That is what I enjoy, the challenge. Solving the difficult cases – that gives respect.” (Oticon employee)
- Informal social networks	“I think that some of what has survived from the old organization is the way people help one another. The organization is more divided, so it is a bit more difficult to help across teams, but I have never experienced that anyone says ‘no’ to helping me.” (Oticon employee)
	“Networks are very important. Personal relations are good for getting quick answers. But sadly, they are also important for being informed. If you do not rub noses with the right people at the coffee machine, it

is not certain that you will get the information you need to do your job.” (Oticon employee)

Figure 1. A model of Multidexterity.



CHAPTER 3: STAYING TRUE TO WHAT YOU ARE: A DEMAND-SIDE VIEW ON OLD COMPANIES FACING NEW COMPANY THREATS

Abstract

This paper explores individual decision-making behavior in consumers' product preferences between new and current technologies and business models, showing how behavioral science combined with a demand-side approach to strategic management theory can create novel insights for how old companies can create value in the market when facing new challenging market entrants. Using the hearing aid industry as a case, the insights collected in this study contrast with traditional strategy literature, which states that to secure long-term viability, incumbent firms must respond to technological and business model changes by jumping from the old technology to the new. Instead, the results in this paper propose a strategy by which incumbent firms create value by deciding to stay with the current technology and business model as a proactive choice, rather than a failure to make the jump to the new. This study makes an important contribution to the strategic management of innovation, stressing the need for strategists to look toward the demand-side of the value equation to learn when to chase new technology or new business models and when proactively sticking to the current technology and business model creates the highest value in the market.

INTRODUCTION

Explaining performance differences between firms over time is an area of great interest in the management strategy field (Bryson & Bromiley, 1993), and one of the important topics to address in this aspect are the strategies of incumbent firms toward the entrance of new players in the market. These new players often come in offering new technologies, often at lower prices, threatening the performance of the incumbent firms (Christensen, 1997), and traditionally it has been stated within strategy literature that to secure long-term viability, incumbent firms must respond to technological and business model change by jumping from old technology to the new (REF).

Innovation scholars have long argued that innovation is driven by either technology push or by demand pull, with the argument that innovation is mainly driven by technology push, and per implication the firm's internal technological resources, long being the dominant point of view (Hoskisson, Hitt, Wan & Yiu, 1999). Technology-push perspectives (i.e. Cooper & Smith, 1992; Rosenbloom, 2000) address how incumbent firms must transform themselves, and embrace new technology, to capture value from consumers. However, this technology-based innovation research does not address how the product will be purchased in the market, and assumes consumer needs as certain. In contrast, demand pull research does not assume consumer needs to be given, but emphasize market change and heterogeneity (von Hippel, 2005).

A move away from the traditional producer-driven innovation model towards a greater emphasis on demand-pull innovation has attracted a considerable amount of attention over the years (i. e. von Hippel, 1976; Moverly & Rosenberg, 1979; Baldwin & von Hippel, 2011; see Stefano, Gambardella & Verona, 2012), showing how technological transitions are triggered by consumer preferences rather than technological developments (Tripsas, 2008). What is instead a given is that for firms to capture value, such value must be created "by offering benefits that induce payments from willing consumers, which is a precondition for value capture" (Priem, 2007:219). Consumers are arbiters of value (Drucker, 1954), and despite their critical role, consumers have received surprisingly little attention in the strategic management literature. We suggest that strategy scholars should move from a view where demand is a given, to include an analysis of demand side factors and how understanding these through a behavioral lens provides

novel insight into value creation and appropriation. Seeking to explore how demand-side research can enrich the strategic management of incumbent firms facing new market entrants.

CONCEPTUAL FRAMEWORK: DEMAND SIDE RESEARCH AND VALUE CREATION

Demand-side research looks downstream from the firm towards the demand side, to identify how consumer preferences can be useful in guiding managerial decisions that will boost value creation within for a higher business performance (Priem, Li & Carr, 2012). According to Priem (2007), value creation involves innovation that establishes or increases the consumers valuation of the benefits of consumption. Brandenburger and Stuart (1996) define value creation as the buyers' willingness-to-pay minus the producers' opportunity cost. The difference between these definitions represents differences in value defined by presupposed existence of market prices, and value defined by the existence of intrinsic preferences (Pistelis, 2009). This paper position value creation as a subjectively realized value by the consumer following the definition by Lepak, Smith & Taylor (2007). Thus, exploring individual decision-making mechanisms and behavioral factors guiding value creation of innovation is the focus guiding this study.

Subjectively realized value is a perceived measure, and is defined by consumers, based on their perceptions of the usefulness or quality of the product on offer. This perception is highly subjective. It is thereby dependent on the decision behavior of the individual consumer, and is subject to change at any time (Lepak, Smith & Taylor, 2007). The subjective value realization must then transform into a monetary amount that consumers are willing to pay for the benefits an innovation can offer, for the company to realize value capture (Priem, 2007).

The relationship between company strategies and the mechanisms that drive consumers' perceived value creation, can complement existing perspectives by linking firm actions, such as strategic positioning or resource re-combinations, to consumer value and ultimately to business outcome. In the case of incumbents' strategy towards new potentially disruptive market entrants, a behavioral framework which examine both the individual's decision making tools, as well as the decision context (Gigerenzer, 2008) for understanding consumers perceived product value will add substantially to the current literature. As such, this study aims to contribute not only by offering the view of demand-side value creation for incumbent firms' response to new technology threats, but also by acknowledging the bounded rationality of human beings and the consequences for individual preferences. Using this multidisciplinary approach can offer new

perspectives and thereby new insights not previously suggested (Argawal & Hoetker, 2007), to support the development of firm level strategies for incumbent firms toward new disruptive entrants in the market. By adding a behavioral framework to demand-side research and strategic management literature, we offer insights into the incumbent firms demand environment through the behavioral decision-making lens of the consumer.

VALUE CREATION: THE CASE OF THE HEARING AID INDUSTRY

Consumer electronic companies have identified growing opportunities to cross the line separating them from the health care industry. Wearable consumer electronic devices that allow monitoring of health at home, chronic condition management, personal fitness tracking and remote patient monitoring are all part of a growing industry known as the eHealth market, which is expected to grow to \$308 billion by 2022 (www.globalnewswire.com). Medical device companies are currently being squeezed by the rapidly developing consumer electronic market and are slowly transforming their products to be comparable to wireless consumer electronic systems, apps, and smartphone connectivity, further blurring the lines between the two industries. The hearing aid industry is a particularly illustrative example of this trend.

The hearing aid industry is an oligopoly structure where six companies with long histories in technological innovation control approximately 94% of the market share. Hearing aids are registered as medical devices, and their development and sale are therefore highly regulated, making it difficult for new players to enter the market, due to high demands on documentation and test results to apply to the defined regulation. The close competition among the main players has led to a dramatic development in new hearing aid technologies, like advanced sound compression systems, wireless connections, 3D scanned earmolds and waterproof hardware. However, the adoption rate of hearing aids among individuals exhibiting hearing loss, who require hearing aid treatment, is estimated to be only 14–30% (Abrams & Kihm, 2015), and has not changed significantly over the last fifty years. This continuously low adoption rate does not only represent large unused market potentials for the companies, it is also a major concern from a governmental perspective, since untreated hearing loss has many social and economic side-effects, like an increased likelihood of social isolation (Mick, Kawachi & Lin, 2014), reduced quality of life (Dalton et al., 2003), and dementia (Albers et al., 2015). The complexity of these grand challenges imposes on manufacturers to search for strategic solutions (Ørding Olsen, Sofka & Grimpe, 2016).

Newly proposed changes in regulations has opened the market for new players who are not obliged to follow the same strict regulations as the incumbent hearing aid manufacturers. A category of devices called personal sound amplification products (PSAPs) has emerged; these are devices that are sold directly to the consumer at a much lower cost than hearing aids (HAs). PSAPs are primarily sold under names such as wireless earbuds or hearing amplifiers, and challenge hearing aid manufacturers by opening the market for cheaper, non-regulated, and over-the-counter devices (Blazer, Domnitz & Liverman, 2016). This industry therefore offers a highly relevant case for the study of how a behavioral framework on demand side research can contribute to the innovation management strategies for incumbent firms facing new disruptive market entrants.

Value creation in the hearing aid industry

Product benefits. HA manufacturers have been very eager to move HAs in the direction of consumer electronics, hoping that this will improve adoption rates. The baby-boomer generation is thought to be more tech-savvy than previous generations. To attract more consumers, the HA industry is therefore introducing wireless Bluetooth communication and made-for-iPhone products, providing a crossover between health care technology and consumer electronics, in the attempt to encourage non-consumers to buy hearing aids. The likelihood of purchase has long been a focus area for hearing aids companies, and different studies have found latency times of several years for a large population of consumers from the consumer discovering a hearing loss until the actual purchase situation (Kochkin, 2007). The introduction of new and more consumer electronic-like products with hearing benefits on the market is thought to increase the purchase-likelihood for reluctant consumers with hearing loss (FDA report, 2017).

Many recent studies have performed technical comparisons between HAs and PSAPs (Smith, Wilber & Caritt, 2016), with a focus on product performance. However, product performance alone does not compensate for age-related changes in the brain (Davis et al. 2016). People must also use the product as instructed, and continue to do so, in order to gain the intended benefits. Continuous use is an important factor in order to achieve the benefits of HAs in terms of addressing the users' communication needs (Preminger, 2003). From a company perspective, the continued use is also vital. Having more people purchase a solution for their problem is not enough. If consumers are happy with and using their products, they will come

back to buy new products when the warranty runs out or their hearing needs change. These “sticky consumers” are important in the value chain.

Moving beyond Willingness-To-Pay. To estimate how much an individual value a product, contingent valuation (CV) measuring willingness to pay (WTP) has been the preferred measure. This approach, with a single focus on WTP assumes that costs and benefits are directly comparable, and it is to be expected that a person will be willing to pay the same monetary value to gain product benefits as the monetary value he or she would accept as compensation for losing the same benefits (Willig, 1976; Glimcher, 2008). Conversely, the behavioral economic literature strongly asserts that preferences change across contexts and that “a good” cannot be associated with a single value. Instead, preference is highly dependent on the goals, experiences, and cognitive constraints of the individual making the WTA/WTP choice (Kahneman, 2011; Warren, McGraw & VanBoven, 2011). Extensive empirical results from three decades of research have found there to be a WTA/WTP disparity, with WTA values considerably exceeding WTP values for the same good or welfare benefit (for a review, see Hammack & Brown, 1974; Horowitz & McConnell, 2002). The asymmetry resulting from the consistent tendency of WTA to surpass WTP has attracted attention from different research fields in economics (Kovalchik et al., 2004). In most WTA/WTP studies, economic theory has been used to explain the WTP–WTA gap in terms of an income effect (Willig, 1976; Randall & Stoll, 1980); a substitution effect, whereby the presence of substitutes for the valued good will reduce the WTA/WTP difference (Hanemann, 1991; Adamowicz, Bharwaj & Macnab, 1993); or transaction costs (Brown & Gregory, 1999). In the behavioral economics literature, the WTA/WTP disparity has been explained in terms of the change in an individual’s evaluation based on the question being framed as a gain or a loss (Tversky & Kahneman, 1981). According to the endowment effect theory, which is linked to loss aversion, people perceive losses as having higher utility than equally sized gains, relative to an arbitrary reference, which can lead to framing effects whereby decision-makers’ responses may vary with how the choice is presented, worded, or described (Glimcher, 2008). The point of reference in contingent valuation (CV) studies is often the status quo or initial endowment compared to an alternative (loss or gain). Unlike WTP, WTA is infinite, since it is not constrained by the individuals’ wealth. For example, the WTP of being cured from a deadly disease can only be as high as the individuals’ wealth, while the WTA compensation for accepting not being cured would be an infinitely higher number (Whynes & Sach, 2007). The consistent findings of WTA/WTP

disparity have revealed the high likelihood that excluding WTA will result in an underestimation of the perceived value of a good or welfare benefit (Martin-Fernandez et al., 2010).

Studies investigating WTA/WTP disparity have often found a higher endowment for health care than consumer products. In such studies, it has not been possible to detach the value of the benefits that the product or solution offers from the context of the product or solution. The present study therefore explores the relationship between, and drivers of, WTA and WTP, in order to estimate the perceived value of hearing devices as medical and consumer electronic products, and to estimate whether losses or gains in this value affect the adoption rate. Psychologists Peters, Slovic, and Gregory (2003) found that WTA/WTP gaps are guided by emotions and feelings, and that identifying individual differences in emotions and perceptions is very valuable for gaining insight into the consequences of communicating products with hearing benefits as medical devices or consumer electronic products. Few studies have examined the WTA/WTP disparity in health care; however, the literature demonstrates that the WTA/WTP disparity should be expected to be higher for health-related transactions, indicating that an endowment effect is present, with ratios between 1.3 and 4 having been found (Horowitz & McConnell, 2002; Tuncel & Hammitt, 2014). Other health-related studies have found ratios between 1.3 and 3.6 (Borisova & Goodman, 2003; Whynes & Sach, 2007; Martin-Fernandez et al., 2010), and a review by O'Brien et al. (2002) found ratios ranging from 3.2 to 89.4 for environmental studies, 1.3 to 2.6 for safety studies, and 1.3 to 2.6 for experimental studies, supporting the existence of an endowment effect.

The effect of the individuals perceived value as described by WTA/WTP disparity, has in the behavioral science literature been found to vary dependent on the industry context, with a high disparity in health-related studies. Based on these findings, the present study makes the following hypothesis:

H1: A medical device will generate a higher perceived value (WTA/WTP disparity) than a consumer electronic product.

Drivers of value creation in the hearing aid industry

Psychological ownership. The reference point in the traditional endowment literature is manipulated through the individuals' legal ownership of a product. Ownership is an important aspect when questioning WTA, for without ownership there would be no loss. The endowment effect has been found to occur almost immediately and to increase over time (Strahilevitz & Loewenstein, 1998). In recent endowment literature, results have shown that legal ownership

need not be present to have an effect (Ariely & Simonson, 2003). A study by Shu and Peck (2011) found that psychological ownership is a consistent mediator of the endowment effect, and that it quantifies a person's level of product attachment. In other studies, psychological ownership or attachment has been described as an emotional bond that affects the likeliness of using the product (Desmet & Hekkert, 2002; Schifferstein and Zwartkruis-Pelgrim, 2008). Psychological ownership is therefore introduced as a concept capable of explaining mature consumers' intended product use.

Psychological ownership is defined as the feeling that "it is mine," and can develop in the

sense that ownership of an organization develops among employees (Pierce, Kostova & Dirks, 2001) or a child's sense of ownership of a song develops if they hear it first (Isaacs, 1933). Even imagining touch can generate psychological ownership compared to actually touching an object (Peck, Barger & Webb, 2013), linking psychological ownership to hypothetical ownership. This emotional bond has been linked to an individual's likelihood of using a product (Desmet & Hekkert, 2002; Schifferstein & Zwartkruis-Pelgrim, 2008). Within the endowment literature the psychological ownership has been linked to increased WTA (Reb & Connolly, 2007), and several authors have pointed out that in order to create a sense of identity with a product, it must remind the individual of who they would like to be and enhance their self-concept (e.g., Ball & Tasaki, 1992; Blasi, 1988). Based on the strong link between psychological ownership, emotional attachment and WTA, I propose the following:

H2: Psychological ownership will positively affect value creation for a product with hearing benefits.

The role of the dispenser. Hearing loss is a chronic health condition, and the role of the hearing aid dispenser has traditionally been to conduct an audiological evaluation to provide an accurate diagnosis and an optimal treatment plan. The hearing aid dispenser plays an important role in terms of the assessment and diagnosis of an individual's hearing loss. The related counseling and evaluation of treatment and service needs, as well as guidance on effective communication skills (Preminger, 2003) and perceptual training (Davis et al., 2016), will help the individual gain the intended benefits from the hearing device. However, according to report by Blazer et al. (2016) "*such treatments are often expensive and difficult to access, and many in the general public report dissatisfaction with hearing health care in the United States.* Furthermore, hearing health care does not reach many of the underserved populations who

need it.” Based on this report the recommendation to the Food and Drug Administration (FDA) is to remove regulation for medical evaluation or waive the need to such evaluation prior to HA purchase (ibid, 2016).

Following research with a demand-side perspective on value creation (i.e. Priem, 2007), the important role of perceived product benefits for of the consumer, emphasizes the central role of the dispenser, through the translation of innovation benefits in the sales situation. Especially the expert role of the dispenser in many consumption experiences make them the main validators of value towards the consumer (Priem et al., 2012). I therefore propose the following:

H3: A specialist sales channel will have a positive effect on value creation compared to a non-specialist sales channel.

The role of stigma. While most research on decision-making tends to focus on individuals’ choices outside of a social context, it is also important to consider decisions involving social interactions. The reluctance to acknowledge impairment often stems from the negative consequences of disclosing that status (Hetu, 1996). Hearing loss-related stigma has been identified as being related to alterations in self-perception, ageism, and vanity, and the stigmatization related to HA use prevents the individual from normalizing his or her identity by treating the impairment (Wallhagen, 2010). Stigma in the audiological world has been related to ageism and vanity. The term “ageism” has been defined as “a process of systematic stereotyping of and discrimination against people because they are old” (Butler, 1975: 894), and for many, hearing loss is associated with being very old, Martens et al. (2006) argue that because aging and older individuals raise our awareness of our own mortality, we often attempt to distance ourselves from them. A report from the National Academy of Science (2016) stresses how the appearance of PSAPs can potentially increase adoption by removing the stigma associated with HAs. HAs have been around for decades, and their physical aesthetics have evolved over time. Now, they are offered in many styles and varieties. Modern HAs are smaller and more discrete than ever before. This, however, has not had a dramatic impact on adoption rates. I therefore propose the following:

H4: Stigma concerns will negatively influence value creation.

METHODS

To investigate the effect of medical device and consumer electronic product, respondents were shown one of four constructed products shown in a 2×2 design combining the label

“hearing aids” or “wireless earbuds” with pictures of either hearing aids or wireless earbuds. The four products had the same short description of usage and benefits (see Appendix), and by using the 2x2 design, the effect of the product label and product look could be introduced as separate variables.

Dependent variables: Perceived benefit value

The two dependent variables introduced to test perceived benefit value were the respondents’ intended use of the product, and likelihood of purchasing the product. The respondents were asked about their *likelihood of purchasing* a product with hearing benefits within the next 6 months on a 10-point scale. For *intended use*, the respondents were asked to imagine having bought the product they valued and then to estimate how often they would use it (all day long; in specific situations, every day; in specific situations, several times per week; in specific situations, several times per month; other).

Dependent variables: Monetary value in loss and gain

To assess the effect of *price* on adoption rate, all of the respondents were presented one of the four products and were asked to state their WTP using the Iterative Bidding Method. Seven prices were constructed, ranging from US\$1,000–7,000. Each price appeared randomly to the respondent, who was then asked if he or she would purchase the product at the displayed price. If yes, the respondent moved up the scale to the maximum price. If the answer was no, the respondent moved downwards to the lowest price. If the respondent answered ‘no’ to \$1000 or ‘yes’ to \$7000, they were asked to indicate what their maximum WTP would be; this ensured that all respondents would provide their WTP.

To explore the respondents’ WTA, the following text was shown in the online survey:

“Imagine you have now used your [product] for three days and you have experienced a great benefit. What is the minimum price you will be willing to accept to give up your [product] and not have the possibility of using any [product] for the next 4 years?”

Respondents were asked to insert their best estimate of an amount in an open text box. After stating their WTA, the respondents were asked to explain why they chose that WTA in an open comment box.

Measuring WTP and WTA

The test set-up proposed in this paper is based on a CV method called an Iterative Bidding Game (IBG). CV is a method for measuring a stated preference for a monetary value on a good or welfare benefit. It is a stated preference because it aims to measure the value that individuals place on the good in question without any transaction taking place. The CV approach is therefore well suited for the valuation of non-market private goods, such as health care (Martin-Fernandez et al. 2010). The WTA is the minimum economic value required for an individual as compensation to forgo “a good” or benefit. WTP, on the other hand, is the maximum economic value an individual is willing to give up gaining a good or benefiting (Hanemann, 1991).

An IBG elicits the value by presenting an explicit price for WTA or WTP to the respondents, and letting them accept or reject it. Depending on whether the respondent answers “yes” or “no” to the presented amount, a lower or higher amount will be presented until the respondent accepts the maximum defined value or rejects the minimum defined value (Davis, 1964; Randall, Ives & Estman, 1974). This iterative technique extends the time the respondent will spend valuing the WTA or WTP, and therefore improves the quality of the response (Hoehn and Randall, 1983), while the explicit price information narrows ambiguity. Conversely, a disadvantage of stating an initial price can be a psychological anchoring effect, where the individual tends to bias the final value estimation toward the initial value when the value is arbitrary (Kahneman et al., 1999). Another disadvantage of the initial stated value can be that the respondent will regard this value as the actual market value of the good or benefit. Several studies have found that iterative bidding reduces WTA/WTP disparity (Horowitz & McConnell, 2002), implying that open-ended questions may lead to overestimation of the minimum WTA and underestimation of the maximum WTP of a good (Sayman & Öncüler, 2005).

CV methods are quite flexible in the sense that they can be used to value a wide array of goods. The use of contingent valuation is not without problems, however, as it might present respondents with goods with which they are unfamiliar and choices they would not normally face. It is therefore important that the goods or benefits be described appropriately and in a realistic manner to the individuals being surveyed. WTA/WTP CV studies can be set up using a between-subject design, where different respondent groups make value estimates for either WTA or WTP, or with a within-subject design, where the same respondent provides both WTA and WTP. Study results have indicated that a within-subject design produces a lower WTA/WTP disparity (Horowitz & McConnell, 2002). The present study was therefore designed

such that the same person was asked to value both WTP and WTA for the product.

Independent variables

The independent variables hypothesized to affect adoption rate were psychological ownership, sales channel and stigma.

To measure *psychological ownership*, a 3-question scale was constructed based on the psychological ownership measure used by Pierce et al. (2001) to measure attachment to physical and non-physical objects. The three questions were “*I feel a high degree of personal ownership of these [product],*” “*I feel like these [product] are mine,*” and “*It is hard for me to think about these [product] as mine*” (Cronbach’s alpha = 0.85).

Sales channel was tested by asking respondents where they would go to buy the product they have been valuing (Hospital, Audiologist, Dispenser, Drugstore, Big box retailer, Online order, Other). A variable was then created that divided those answers into specialist (hospital, audiologist, dispenser) and non-specialist sales (drugstore, big box retailer and online order).

The effect of *Stigma* was investigated by creating a variable representing the picture of the product. The 2x2 design allowed for a separation of the label effect from the picture effect. Stigma was also estimated by asking respondents to select between eight statements describing their worries or concerns regarding HAs, with stigma concerns included among the eight. These eight concerns were based on studies that gained deep customer insights about hearing aids using the Zaltman elicitation technique (Olson, Waltensdorff & Zaltman, 2009).

Control variables

A set of control variables were included in the study. To be able to test for level of product relevance in the respondent group, all respondents were asked whether they experience difficulties due to hearing loss. If yes, they were asked to indicate the degree that best matched their experience. If no, they were asked to imagine that they were experiencing a set of hearing difficulties. The following text then appeared for all respondents:

“Imagine that because of your hearing loss you often feel left out of conversations and you therefore dread going to family get-togethers and restaurants. Other people find it irritating when you have to turn up the volume

on the TV or car radio. You have therefore decided to do something to improve your hearing. Imagine that you have now been offered the chance to buy the following product to improve your hearing:”

As the literature indicates that age (Kovalchik et al., 2004), gender (Martin-Fernandez et al., 2010) and income level (Hanemann, 1991) affect WTP and WTA levels, the respondents were asked to provide descriptive background information (age, gender, employment status, income). Nine questions concerning personality traits such as “I like to try new and different things,” and “I follow the latest trends and fashion” (Sidin & Manrai, 1997) were included to identify the individual personality characteristics of the mature consumer market and assess the heterogeneity of the respondent group. The respondents were also asked about their familiarity with HAs and wireless earbuds, and whether they perceive a HA or wireless earbud to be a medical device or more of a consumer electronic item.

Survey procedure

Data were collected through an online survey via a panel provider. An online survey format was chosen in order to avoid respondent confusion and interviewer impact (Kovalchik et al., 2004; Plott & Zeiler, 2005). Responses were also kept anonymous by using a panel provider. A pilot study with the same design as the main study was conducted with 100 respondents, using the same filter criteria as the main study. The pilot examined whether the respondents understood the questions, whether the length of the survey allowed respondents to complete the entire survey within the dedicated time, and that the instructions were clear enough. Based on the results from the pilot tests, the sentence construction was changed slightly for some questions. Special attention was given to the WTA question, which has been found to be a difficult question for respondents to answer in the body of WTP–WTA literature. The updated version of the survey was used for the main study.

RESULTS

Sample characteristics

The panel was recruited in the US using filter criteria that respondents needed to be 55 years of age or older, and half of them needed to indicate having experienced hearing loss. A total of 641 respondents completed the survey (317 females, 324 males), with the mean age of respondent being 66.54 years (SD 7.84). Of those who completed the survey, 52.89% indicated that they experienced challenges due to hearing loss. Of those, 23.30% rated their hearing loss as mild, 50.74% as moderate, 23.89% as severe, and 2.06% as profound. Regarding

employment, 22.05% were employed full-time, 9.26% part-time, 6.57% unemployed, 58.08% retired, and 4.04% on disability leave. Annual personal income was such that 16.07% earned less than \$25,000, 25.23% between \$25,000 and 49,999, 22% between \$50,000 and 74,999, 14.51% between \$75,000 and 99,999, and 16.69% more than \$100,000, with 5.30% preferring not to answer. The following responses were collected regarding the use of technical health trackers: 7.33% answered that they use a wristband to track their health, 3.59% use a watch, 6.08% an app, 22.62% a blood pressure device, and 4.68% “other,” which primarily represented pedometers and glucose monitors (answer provided in open comments).

Perceived Benefit Value

Purchase likelihood. Respondents who did not respond to whether or not they own a hearing aid or wireless earbud were asked about their likelihood of purchasing the product they had been shown. Following the prediction made earlier, we expected the purchase likelihood to be driven by price, access and stigma. Purchase likelihood was measured on a 10-point likelihood scale, with five labels from “very unlikely” to “very likely.” Purchase likelihood was measured using a set of categories, each category having a meaningful sequential order, and each value higher than the previous. The ordinal logit model was therefore selected to explore factors driving purchase likelihood. To test the effect of price, the variable of income was included in the model. Access was assessed using different sales channels, and stigma was measured using the variables “I will be stigmatized as being less able” and “Hearing aids will make me feel as though I’m much older than I actually am.” The theory in the industry has been that people from the more tech-savvy baby-boomer generation will be more likely to find a solution to their hearing problems, and therefore the attitude “I like to try new and different things” as well as ownership of health-tracking devices were included. To explore the effect of psychological ownership on purchase likelihood, all of the above variables were included. The model for purchase likelihood also includes the socio-economic variables of gender and age. Results are illustrated in Table 1.

Table 1. Drivers of purchase likelihood.

Explanatory variables for Purchase likelihood	Coefficient	P > t 	Eta²
Sales channel (1 = specialist, 0 = direct-to-consumer)	-0.3849	0.153	0.006
Feel stigmatized (1 = yes)	0.2389	0.540	0.001
Product label (1 = hearing aid)	-0.0550	0.831	0.000
Product picture (1 = hearing aid)	-0.1100	0.672	0.001

Psychological ownership	0.2310	0.007*	0.022
Hearing loss (1 = yes)	3.1207	0.000**	0.274
WTP	0.0002	0.052	0.011
WTA (log)	-0.0465	0.476	0.002
Age (continuous)	0.0195	0.381	0.002
Gender (1 = female)	-0.2792	0.315	0.003
Employment (1 = employed, 0 = not employed)	0.4785	0.116	0.008
Owns health-tracking device (1 = yes)	1.3545	0.001**	0.034
I like to try new and different things (1 = yes)	0.1316	0.221	0.005
I follow the latest trends and fashion (1 = yes)	0.2128	0.008*	0.021
Constant	-1.2356	0.465	
Number of observations	341		

(OLS, *p < 0.05; **p < 0.01)

Neither the product label, nor product picture had a significant effect on purchase likelihood. Gender, employment and age had no effect on purchase likelihood. The value in gain (WTP) and the value in loss (WTA) did not have a significant effect either, indicating that price does not drive individuals' willingness to purchase a hearing solution within the next 6 months. Psychological ownership, and the implied feeling of attachment to a product, has a significant, positive effect on purchase likelihood, which supports the concept of attachment as an important psychological value (H2). No effect was found for stigma, the product label, or the product picture, and the prediction that stigma would have a negative effect on purchase likelihood (H4) is therefore not supported. The type of sales channel did not have an effect, and the prediction (H3) that a specialist sales channel would have an effect on purchase likelihood is therefore not supported for purchases within the next 6 months. This trend is also supported by the fact that access to HAs have improved in recent years, with HAs now being available at big box retailers. This change has also been reflected in HA cost – but with little or no impact on the percentage of potential consumers, who buy a product (Abrams & Kihm, 2015). In Japan, 41% of all HAs are sold online or through electronic stores, but the adoption rate is only 14.1%. At the same time, only 36% of users are satisfied with their HAs – an extremely low number compared to the satisfaction rates measured in European countries (Hearing Instrument Manufacturers Organization, 2015). Regarding the suggestion that baby-boomers' greater openness to technology and eagerness to manage health problems should improve the uptake of hearing devices, this study found that those who already own health-tracking devices (apps, wristbands, watches), and those who are generally open to new possibilities, are more likely to purchase. As

would be expected, the results also show that respondents with HL are more likely to purchase a hearing device within the next 6 months.

Intended use. The issue of the adoption of hearing devices is communicated like an epidemiological problem, where the success criteria includes getting the products to as many people as possible. Nevertheless, buying a product is only a prerequisite to obtaining the benefits of the solution; the product must also be used consistently in order to fully avoid the risks of untreated hearing loss. Consumer electronics are called fast-moving consumer electronics for a reason, and the suggested solution of changing the medical context of hearing devices and supporting cheaper, direct-to-consumer products can have consequences for the intended consumers.

To explore the motivating factors behind the responses to the question “Imagine you bought the (product), how often would you use them/it?” answers were assigned to one of two categories: “daily use” or “less than daily use.” A logistic regression was estimated with intended use as the dependent variable. Socio-economic variables (income, employment, gender, and age), hearing loss, the possession of health-tracking devices, stigma concerns (stated stigma concerns and the picture of the product), sales channel type, and level of psychological ownership were introduced into the regression as explanatory variables. The results are presented in Table 2.

Table 2. Drivers of intended use.

Explanatory variables for Intended use	Coefficient	P > t 	Eta²
Sales channel (1 = specialist, 0 = direct-to-consumer)	0.2387	0.013*	0.012
Feel stigmatized (1 = yes)	0.2790	0.051	0.007
Product label (1 = hearing aid)	0.6163	0.505	0.001
Product picture (1 = hearing aid)	0.0380	0.683	0.000
Psychological ownership	0.1382	0.000**	0.041
Hearing loss (1 = yes)	0.5752	0.033*	0.015
Age (continuous)	0.0032	0.648	0.000
Gender (1 = female)	-0.0995	0.311	0.002
Income	0.0933	0.131	0.004
Employment (1 = employed, 0 = not employed)	0.0732	0.520	0.001
Owns health-tracking device (1 = yes)	-0.0394	0.802	0.000
Likes to try new and different things (1 = yes)	-0.0034	0.926	0.000
Follows the latest trends and fashion (1 = yes)	-0.0116	0.704	0.000

Constant	-3.8449	0.000
Number of observations	526	

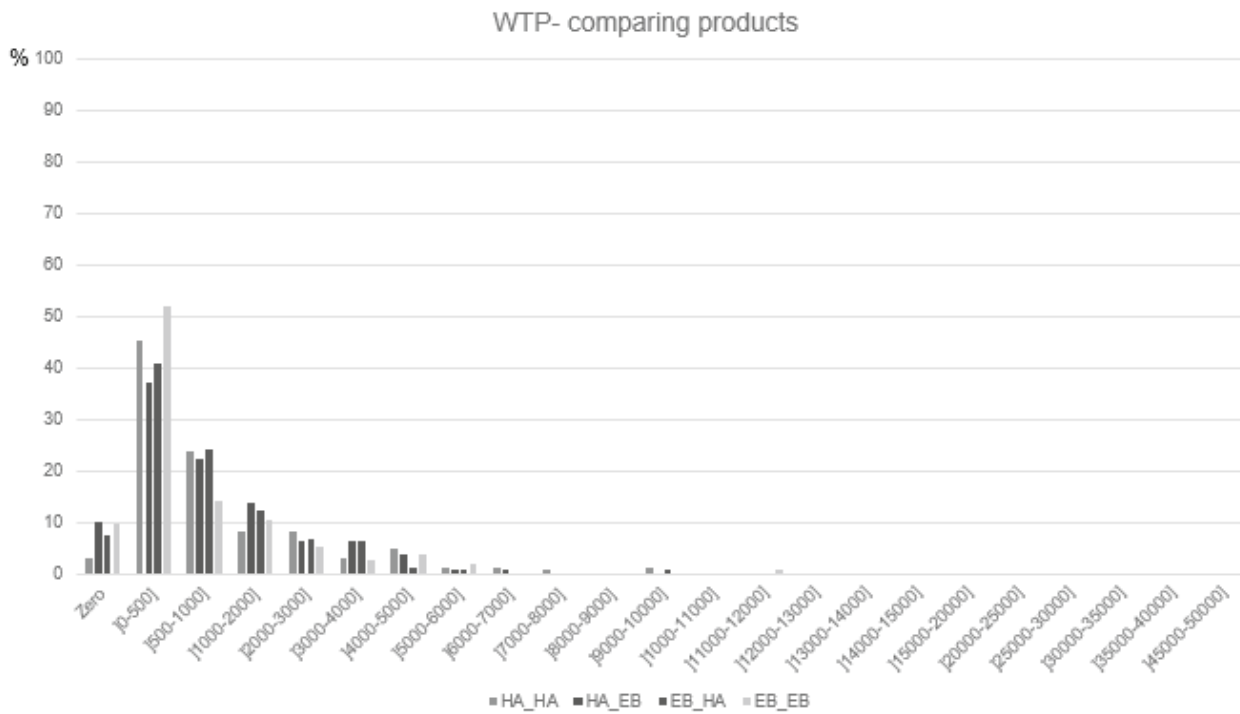
(Logistic regression, log likelihood = -208.8591, *p < 0.05; **p < 0.01)

Having experienced hearing loss was a positively associated with intended use. This should be expected, since the use of a hearing device is more relevant to this group than the group with no hearing loss. Neither the product label, nor product picture had a significant effect on intended use. The specialist sales channel was also shown to have a positive effect on intended use. This indicates that consumers seeking to find a solution to their problem from a specialist are also those who have the greatest intention of using their hearing device daily, which confirms the fourth hypothesis (H4). Psychological ownership was also found to have a significant, positive effect on intended use. This supports the hypothesis (H2) that the sense of attachment to a product is an important factor in consumer compliance with product use. Socio-economic factors, stigma concerns (H4), and already owning health tracking devices did not significantly affect intended use.

WTP and WTA results

The WTP distributions for the four constructed products are illustrated in Figure 1. The products are called HA_HA (hearing aid label, hearing aid picture), HA_EB (hearing aid label, wireless earbud picture), EB_HA (wireless earbud label, hearing aid picture), and EB_EB (wireless earbud label, wireless earbud picture).

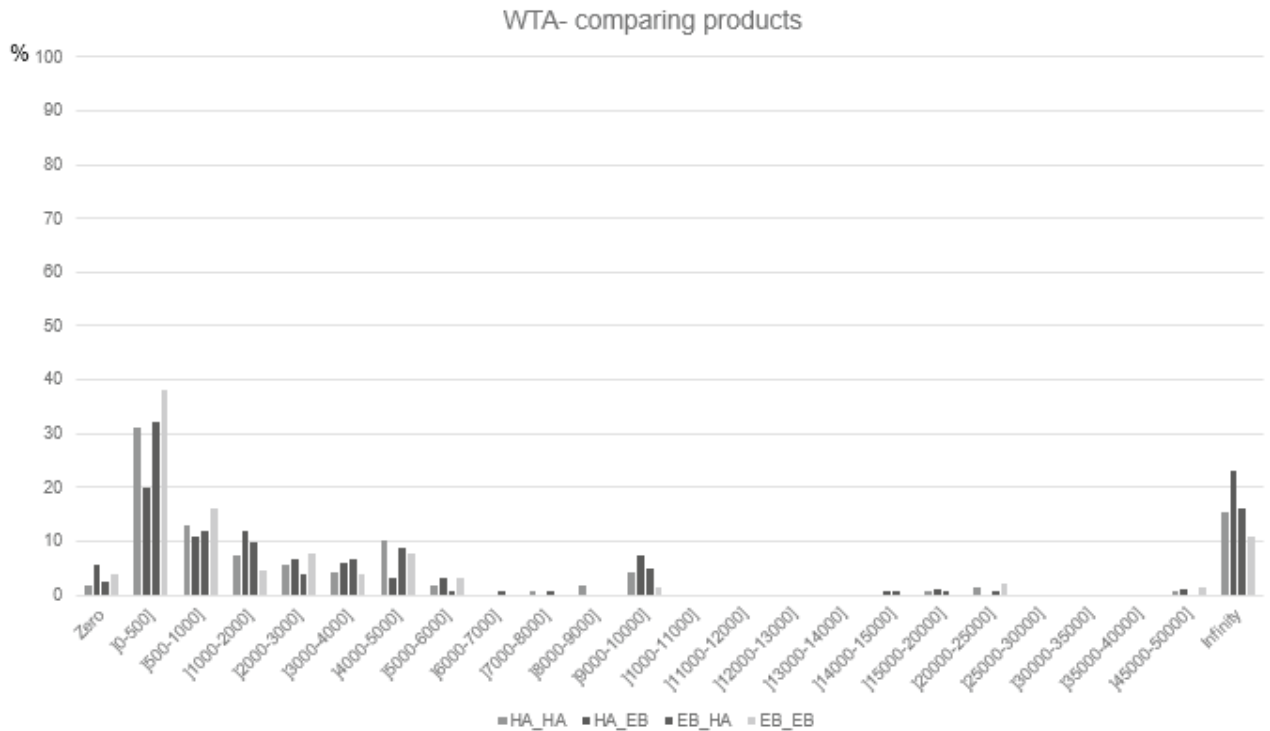
Figure 1. WTP distribution for the four constructed products.



(HA_HA: Hearing aid label and Hearing aid picture. HA_EB: Hearing aid label and Wireless earbud picture. EB_HA: Wireless earbud label and Hearing aid picture. EB_EB: Wireless earbud label and Wireless earbud picture)

For all four products, the WTP distributions are skewed and concentrated below \$3000. The WTP results for all four products contain a high proportion of zeros (HA_HA = 3.11%, HA_EB = 9.88%, EB_HA = 7.40% and EB_EB = 9.00%). This distribution is a typical pattern for WTP studies using open-ended questions or a bidding process (Donaldsen et al., 1998; Jorgensen et al., 1999). Using open comments in the survey following the selection of WTP values allowed me to understand individual motivations for providing a zero response. The dominant reason for answering zero was an unwillingness to buy the product under any circumstance. The number of zeros for HA_HA was significantly lower than for the other three products, indicating a higher adoption rate for a product labeled “hearing aid” that also looks like a hearing aid. The WTA distribution for the four constructed products is illustrated in Figure 2.

Figure 2. WTA distribution for the four constructed products.



(HA_HA: Hearing aid label and Hearing aid picture. HA_EB: Hearing aid label and Wireless earbud picture. EB_HA: Wireless earbud label and Hearing aid picture. EB_EB: Wireless earbud label and Wireless earbud picture)

The WTA responses were concentrated below \$20,000 for all four products. The distributions contained a large proportion of zeros. A large group of zero values requires special attention in the statistical analysis of WTP and WTA results. For WTA, the zeros represented a significant part of the responses and the reasoning behind the zero values was not the same for all respondents; zeros can represent economic constraints, emotional constraints, true zeros and infinite values (Havet et al., 2012). The open comments made it possible to learn the motivation behind the zero values. Most were “protest” zeros, with respondents claiming to have answered zero because no amount would be big enough to compensate for giving up the product and the opportunity to use any such product for the next 4 years. Other respondents justified the zero as a true economic value. A small number of outliers above \$50,000, with values as high as \$1,000,000, also showed up in the open comments as having the same protest motivation as for some of the zero values. Since the motivation behind these “protest answers” was the inability to give a true value for compensation, these values were combined into a category labeled “Infinite.”

Based on the high number of infinite WTA values, it is not possible to measure an exact WTA/WTP gap. As an approximation, the WTA/WTP gap can be calculated by excluding the protest answers for either WTA or WTP. To assess the implications of excluding these from the calculated WTA/WTP ratios, the proportion of infinite values between products needed to be explored. All of the infinite responses were calculated to check for differences in protest answers and infinite answers between the four products presented. The results showed the following distribution of infinite answers: HA_HA = 15.53%, HA_EB = 23.46%, EB_HA = 22.22% and EB_EB = 10.90%.

As shown in Table 1, there was a difference in the proportion of infinite answers between the products. Removing the infinite values from the results would therefore bias the results greatly when comparing WTA values and WTA/WTP disparities between products, which was one of the purposes of this study. To include the infinite values in a comparison of WTA, and thus the WTA/WTP disparities, between the four products, I replaced the infinite values with a value of \$50,000, which was the highest true WTA value reported by the respondents. This is a very low approximation of the true (but incalculable) WTA, since the infinite WTA responses can represent much greater values.

The descriptive statistics for the WTP and WTA responses for the four products are presented in Table 1. Due to the skewed distributions of WTP and WTA for the four products, the most representative value to compare is the median. To narrow down the results to a respondent group that is closer to searching for a solution to a hearing problem, respondents were divided into two groups: those with self-perceived hearing problems and those with no self-perceived hearing problems. The descriptive statistics for the WTP and WTA of the group with perceived hearing problems are presented in Table 3.

Table 3. Descriptive statistics for WTP and WTA—respondents with hearing loss.

Product	HA_HA		HA_EB		EB_HA		EB_EB	
	WTP	WTA	WTP	WTA	WTP	WTA	WTP	WTA
Observations	82	82	82	82	85	85	90	90
Mean	1667	11236	1500	13696	1337	8595	1302	5860
Median	1000	3000	1000	3000	750	1200	500	1000
WTA/WTP (medians)	3.00		3.00		1.60		2.00	

If the products were valued solely based on the hearing benefits and not on the label or picture of the product, we should observe no difference in WTP or WTA between the four products. However, the results instead show that the label “HA” increases both the WTP and WTA for the product. The lowest WTP and WTA are found for the product that fully represented a consumer electronic item (label and picture) (Wilcoxon rank-sum test, $p < 0.5$). High R&D costs, heavy government regulations, and fewer and more specialized players characterize the medical device industry, and the HA industry is no exception. The consumer electronics industry, on the other hand, is a market with many substitutes, low regulation and rapidly changing product cycles. The resulting difference in development costs generally results in higher average sales prices for medical devices than consumer electronics. The consumers’ higher willingness to pay for a product labeled hearing aid gives support to the current business model of the hearing aid industry and to the price levels present in the market.

Another part of the price comparison between HAs and PSAPs is linked to the role of the hearing care professional. The results of the present study show that the mature consumer segment values the medical context of HAs, both in terms of WTP and WTA. One can argue that the WTA will naturally increase when the WTP increases, and *that* is why the disparity between the two is an interesting measure. The results indicate that the WTA/WTP disparity for products labeled “HAs” is higher than that of products labeled “wireless earbuds” by a factor of approximately 0.5. This not only supports the prediction that the industry frame of a product with the same health-related benefits would affect the WTA/WTP gap (endowment), such that a hearing product presented as a HA would generate a higher endowment effect than the same product presented as a wireless earbud. The findings also support the prediction that the “hearing aid” label would be closely attached to a medical context in the mind of the consumer. This was seen in the higher endowment ratio, which has also been a consistent finding in other health care studies.

We explored the role of individual socioeconomic variables (i.e. gender and income). Earlier studies have found the concerns regarding hearing loss and attitudes toward the treatment possibility (HA) to be dependent on income, gender, stigma concerns and ease of access through sales channels (Abrams & Kihm, 2015). To identify the individual characteristics that may account for the observed differences between WTA and WTP values and for the differences between the four products, we ran tobit regressions. Due to the infinite values, the true WTA/WTP gap is incalculable. The aim was therefore to find the drivers of WTP and WTA in

separate regressions and draw comparisons between the two and between the products. Based on earlier studies' findings that socio-economic variables, psychological ownership, sales channel, concerns about stigma, and aging affect a person's willingness to seek treatment, as well as the baby-boomer generation's positive attitudes toward technology, these variables were included in the regression models.

Drivers of WTP

The observed data for WTP is generally censored in other studies and does not take values below zero. While the tobit model is the model proposed for use with censored data in contingent valuation (Donaldsen et al., 1995), the model assumes that the same specification is used for both continuous and zero decision processes. It therefore only applies if all responses represent a true economic decision (Hartman, Doane & Woo, 1991). The WTP values in our study included many zeros, and based on the open comments, these zeros were found to represent true economic values. The tobit regression model (left-censoring at zero) was therefore used to identify individual characteristics that could account for the observed WTP for the four different products. Table 4 reports the results of the Tobit regression of the WTP data.

The health economics literature suggests that income positively affects WTP values (Donaldson et al., 1998; Drummond et al., 2005), and is considered a guarantee of the construct and validity of a CV survey. This was confirmed in the present study. Psychological ownership was a significant driver of WTP, and the subjective feeling of attachment thereby proved an important factor when valuing a product. The decision to buy a product from a specialist also had a positive effect on WTP, keeping everything else constant. However, neither age nor being "tech-savvy" (owning tracking devices) seemed to influence WTP. Stigma concerns (through neither the variable "Stigma" nor the look of the product), were found to have an effect. The "hearing aid" label had a significantly positive effect on WTP compared to "wireless earbud."

Table 4. Drivers of WTP.

Explanatory variables for WTP	Coefficient	P > t 	Average margin effect
Sales channel (1 = specialist, 0 = direct-to-consumer)	482.88	0.001**	369.19
Feel stigmatized (1 = yes)	-63.82	0.771	-48.79
Product label (1 = hearing aid)	129.35	0.361	98.89
Product picture (1 = hearing aid)	138.85	0.330	106.16

Psychological ownership	316.42	0.000**	241.92
Hearing loss (1 = yes)	307.16	0.043*	234.84
Age (continuous)	7.06	0.510	5.40
Gender (1 = female)	-0.74	0.996	-0.57
Income (continuous)	222.76	0.020*	170.31
Employment (1 = employed, 0 = not employed)	112.04	0.519	85.66
Owns a health-tracking device (1 = yes)	-238.62	0.319	-182.44
Likes to try new and different things (1 = yes)	144.52	0.011*	110.49
Follows the latest trends and fashion (1 = yes)	74.41	0.111	56.89
Constant	-4515.23	0.000	
Sigma	1590.56		
Number of observations	526		
Log likelihood	-4369.46		

(32 left-censored at WTA (log) < 0; 494 uncensored. *p < 0.05; **p < 0.01)

Results show that the sales channel of a specialist has a positive effect on WTP, and that stigma concerns (perceived concern and product picture) does not have any effect. These results do not support the hypotheses about drivers of value creation (H3 and H4). Psychological ownership has a positive effect, which confirms the second hypothesis.

Drivers of WTA

Discarding protest responses, even in limited numbers, could produce biased results (Havet et al., 2012). According to the literature, the most appropriate econometric approach for zero and protest responses is the double-hurdle model (Dalmau-Matarrodona, 2001). This model, however, cannot be used when the number of protest responses is too small, as was the case in this study. Thus, the most appropriate model is a truncated regression model (Mahmud, 2005). Due to the distribution of WTA values with a left censoring at zero and a group of infinite values constituting a right censoring, a tobit model was estimated based on a truncated sample. Protest responses do not represent a true economic decision (Lindsey, 1994). By assigning the value of \$50,000 to the infinite responses for WTA, they could be included in the model, and the tobit model was run with left-censoring at zero and right-censoring at 50,000 (see Table 5).

Table 5. Drivers of WTA.

Explanatory variables for WTA (log)	Coefficient	P > t 	Average margin effect
Sales channel (1 = specialist, 0 = direct-to-consumer)	0.5432	0.005*	0.5431
Feel stigmatized (1 = yes)	0.0600	0.835	0.0600
Product label (1 = hearing aid)	0.5320	0.004*	0.5320
Product picture (1 = hearing aid)	-0.1828	0.330	-0.1828
Psychological ownership	0.2288	0.000**	0.2287
Hearing loss (1 = yes)	-0.1050	0.599	-0.1049
Age (continuous)	0.0098	0.487	0.0098
Gender (1 = female)	0.7000	0.000**	0.7000
Income (continuous)	0.2160	0.087	0.2158
Employment (1 = employed, 0 = not employed)	-0.0474	0.835	-0.0473
Owns a health-tracking device (1 = yes)	-0.2943	0.353	-0.2942
Likes to try new and different things (1 = yes)	0.0871	0.244	0.0871
Follows the latest trends and fashion (1 = yes)	0.0000	0.999	0.000
Constant	2.4164	0.158	
Sigma	2.0898		
Number of observations	514		
Log likelihood	-1106.35		

(5 left-censored observations at WTA < 0; 0 right-censored observations. *p < 0.05; **p < 0.01)

Results show that income, and the decision to buy the product from a specialist are significant drivers of WTA. This does not support my hypothesis (H3) that a specialist sales channel will negatively affect value creation. The feeling of psychological ownership shows a positive effect on WTA, supporting my hypothesis (H2). The “hearing aid” label also had a positive effect on WTA compared to “wireless earbud.” This stresses the higher perceived value carried by the label “hearing aid,” which is also found in the higher psychological ownership and the endowment effect.

The consumer group finds perceived value in products when they can see those products as parts of themselves (psychological ownership), or as an important solution to a hearing problem. This is supported by the effect on both WTP and WTA of the choice to purchase a solution from a specialist, where (as expressed by respondents in open comments) trust plays a vital role. Products labeled “hearing aids” carry a higher perceived value than those labeled

“wireless earbuds.” This is an important aspect in an industry, where incumbent hearing aid producing firms are supposedly threatened by new wireless earbud companies, who offer both new technology, designs and sales channels. Taking a demand-side perspective on value creation and the drivers of this, instead indicates that the value lies within the being a hearing aid manufacturer, and in the sale through a specialist channel. This is supported by a feeling of psychological ownership towards the hearing aid product, and the stigma concern, which has identified as a dominant problem for reluctant consumers to buy hearing aids is not found to have any significant effect on value creation.

THEORETICAL, METHODOLOGICAL AND MANAGERIAL IMPLICATIONS

Theoretical contribution

Scholars have started using demand-side approaches to examine consumer-focused strategies for value creation (Adner & Snow, 2010; Gruber, MacMillan & Thompson, 2008) and on the influence of consumer demand on technology innovation (Adner & Levinthal, 2001; Adner & Zemsky, 2006), often demonstrating surprising insights. In the context of old companies’ reaction to new market entrant threats, demand-side research offers an important complement to the dominant technology-driven lens for innovation. The traditional advice from an upstream and technology push perspective is that for incumbent firms to compete with new innovative entrants to the market scene, it is important to develop new innovations to secure firm performance (Cordero, 1990; Sampson, 2007). However, many old companies have over time “soldiered on with an old technology long after the rise of dominant substitutes” (Adner & Snow, 2010: 1656). Instead, by cross-fertilizing the strategic management field with that of behavioral science, and taking a demand side perspective on value creation can substantially contribute to the development of novel insights, which contradicts the current assumptions.

Psychological research has shown the powerful effect of context on decision-making (Goldstein & Weber, 1995; Lowenstein, 2001), and given the effect of context, the question therefore becomes whether it should be treated as a nuisance variable, or instead as a variable of interest. Addressing the mental and emotional processes of the consumer when estimating value, both through an extension of demand-side research, but also through a focus on individual cognition, can facilitate the development of our understanding for managers to focus on the cognitive architecture of the decision-making context for the consumer.

Taking a demand-side approach reveals an alternative strategy for incumbent firms to address the entrance of new potentially disruptive technology. By exploring value creation through consumer behavior, this paper shows that there is a higher value for hearing aid

companies to stay in the context of a medical device regulation, and in the sale through specialists in clinics. This value is found both as use value in a stated higher intended use, and exchange value in willingness to pay, and willingness to accept. These values are mediated by the emotional attachment measured as psychological ownership and the role of the specialist.

The findings in this paper are in line with Adner and Snow (2010), who explore the implications of maintaining focus on old technology versus transformation to new technology. They conclude that a repositioning of old technology in the demand space, either by retrenching into a niche position or by relocation into new market applications function as two distinct “retreat” strategies. They further argue that the extant literature explores ways in which firms preserve their market positions by reinventing their capabilities, thus ignoring the ways in which firms can reinvent their market position to preserve the value of existing capabilities.

These findings have important implications for strategic management. Firms that do not race to innovate and stretch to reinforce a dominant position are often labeled inactive and dormant. On the contrary, this study encourages the decision to stay within known territory and stick with current business cases as a proactive strategy. This strategy implies a different view on resource allocation in R&D, marketing, and sales departments, compared to a company seeking to commercialize new products. With regard to innovation theory, this also implies that traditional firm objectives with innovation performance being measured by R&D budgets or number of patents will not support a strategy of deliberate retreat to current development strategy.

Methodological implications

The results of this study clearly indicate that measuring consumer utility by focusing solely on WTP might result in an underestimation of the individual’s perceived value of the product. In the present study, the experiment was set up according to current best practices for the experimental design of WTP and WTA elicitation (CV study using IBM, intra-personal ratings, vignette design) to reduce any WTA/WTP disparity resulting from the experiment itself. Regarding consumer goods, which were expected to have very low endowment compared to non-market goods such as health, a WTP/WTA gap was indeed found to be present, with a higher ratio for hearing aids than wireless earbuds, but with the wireless earbud still showing higher levels of endowment than found in studies of other consumer goods. The endowment level for the wireless earbud can be explained by its associated hearing benefits, which provide a level of health care. Still, the hearing aid provides a much larger endowment effect. The measurement of psychological ownership supports the existence of greater value through

emotional attachment, and indicates that gaps are not solely due to the experiment or an unclear preference.

In the literature, studies on WTP and WTA in the health care area have consistently found a disparity between the two; this gap has been linked to health being a non-market good and therefore leading to higher emotional attachment (for a review, see O'Brien et al., 2002). To the best of my knowledge, none of the studies claiming endowment to be a result of experimental design have tested non-consumer goods. The nature of the good in question has therefore not been brought into this debate.

By testing the WTP and WTA for hearing aids and wireless earbuds using the same experimental setup, this study allows for comparison between medical and non-medical devices, thereby excluding the experimental set-up as the causal factor for WTA/WTP disparities. I have not come across any other studies that combine these different kinds of goods in a single study. Based on the unique approach of comparing products using the same experimental setup, I can conclude that, in the context of a health care or medical device, an individual's emotional attachment to the product is an important factor to consider when evaluating utility.

Managerial implications

The medical device industry is under constant attack from different stakeholders for raising prices and reducing access to treatment, which is said to lead to the exclusion of potential consumer. However, cost has been shown not to be a dominant barrier in England, where HAs are provided by NHS at low or no cost. The rate for HA use in England is approximately 17.3%, compared to 14.2% in US, where HAs are typically paid out of pocket (Taylor & Paisley, 2000; Mener et al., 2013). Innovation pace has also been highlighted as being harmed by regulation (Blazer et al., 2016). Furthermore, chasing technical innovation has not proven effective in increasing the adoption rate. In fact, the HA adoption rate has remained stable in the US since the 1980s, at 15–25% (Kochkin et al., 2014). The question becomes, would the entrance to the market of a new device sold over-the-counter, at a lower price, and with new technology lead to higher value creation for the consumer? Moreover, how should hearing aid manufacturers respond to this new entrant to secure firm performance?

The entrant of PSAP products in the market has forced the hearing aid industry to evaluate the need to modify its current assumptions, since the entrance of non-regulated devices into the medical device domain will change the environment within which the companies have operated for many years. Medical regulation is a dominant factor in the organizational

development model, and competition in a new domain will demand a different development model from that used by the established industry players.

This study provides an understanding of perceived value in the consumer segment, both in terms of loss and gain of products with health benefits, as they navigate the blurring of the line between medical devices and consumer electronics. The results of this study do not support price, access to a specialist, or stigma concerns as barriers to the adoption of hearing devices in the mature consumer segment. Instead, purchase likelihood in this segment is defined more by emotional factors such as psychological ownership. These insights can help policymakers, as well as managers in the medical device industry, as they define the future of medical devices, which are moving rapidly toward the world of consumer electronics. To stop and adjust the aim, to avoid a blind race to into the land of consumer electronics, where giant players like Apple and Samsung are throwing new products on the market at high pace and low cost.

Inertia can be highlighted as playing a role in aging consumers' decision-making process. *Ceteris paribus*, consumers will be more apt to trust products they are familiar with over new products (Robertson & Yu, 2001). In the medical device domain, one might argue that the strong emotional attachment present will result in even stronger inertia. This supports the notion that the HA industry should consider the organizational fit with the external environment and remain true to their medical identity. They should draw a clearer distinction between medical devices and consumer electronics in order to help consumers continue to appreciate the difference between the two industries. This is not to say that there should not be continuous technical development; it is likely worth striving for the development of hearing aids that can connect to consumer electronic platforms via 2.4 GHz wireless, apps and the Internet of Things. However, these technologies should be only considered as part of catering to the developing market and supporting the hearing-impaired consumer in remaining mentally, physically and socially active; they should not be considered the core identity of the industry.

The results of this study imply that chasing business performance by moving away from the medical context can instead have negative consequences for value creation from the side of the consumer. The question then becomes one that is not only about price and potential stigma issues; it also becomes a question of how the blurring line between consumer electronics and medical devices is changing the levels value creation in the market. If the goal is to withhold consumers' perceived value of, and trust, in a product that treats hearing loss, the focus should be on working to keep the medical devices' identity intact, showing how consumers' preference functions can be useful in guiding management strategies.

Limitations and future research

This study is a hypothetical experiment exploring the perceived value and preferences between products with hearing benefits for people with hearing difficulties in a medical domain compared to a consumer electronics domain. The products were all introduced as having hearing benefits to solve hearing loss. However, this is not totally realistic, as wireless earbuds cannot claim to have benefits for people with hearing loss. This study therefore provides an indication of the consumer's likely reaction to a change in regulation, and considers the future effects of price, access and stigma on the adoption and use of hearing devices. If a class of over-the-counter (OTC) HAs is to be introduced, further research should address the more long-term effects, and the true revealed preferences of consumers. Long-term effects of interest could include consumer satisfaction, compliance and the role of the hearing professional.

Numerous studies have questioned the existence of a WTA/WTP gap, explaining it as respondent misinterpretation of the study or faulty study design, or suggesting that the disparity decreases (or even disappears) with experience (Knez, Smith & Williams, 1985; Brookshire, Coursey & Schulze, 1990; Shogren et al., 1999; List, 2004; Plott & Zeiler, 2005). Others have found that the disparity does not decrease over repeated trials (Kahneman et al., 1990; Morrison, 2000; Horowitz & McConnell, 2002). However, Plott and Zeiler (2005) argue that any gap detected is a result of the test subject's misconceptions due to faulty research design, where the respondent was not familiar with estimating WTA and not trained to recognize his to her own preferences.

A group of studies have questioned the existence of a WTA-WTP gap, arguing that any such findings could be a result of the experimental setup. Plott and Zeiler (2005) conclude, based on a repetition of Kahneman's (1999) test of WTA and WTP for a coffee mug, that the endowment effect theory and prospect theory most likely do not explain the observed WTA–WTP gap, but rather that it is based on the experimental design used in the study. The arguments for WTA–WTP gaps being a result of experimental design are based on lower priced consumer goods, which are also generally found to carry the lowest difference ratios compared with, for example, health and environmental transactions. The limitations of WTP/WTA studies should be taken into account as a limitation of this study.

The study draws conclusions based on a single industry. Other medical device industries might be facing similar challenges and changing regulatory environments. It would therefore be

relevant to extend the focus of this study to other medical device industries to determine whether the findings can be applied more broadly. I leave these questions for further research.

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CHAPTER 4: ELEVATING CONSUMER VALUE CREATION IN THE SALES CONTEXT: THE CASE OF THE HEARING AID INDUSTRY

Abstract

Taking a demand-side approach to value creation, this paper explores the development of specific strategies for value creation from a behavioral perspective to help untangle the mechanisms through which specific company resources contribute to product value creation. By conducting an online study and a controlled experiment in retail shops, we demonstrate how organizations can implement information processing fluency as a profitable management practice in the sales context. This increases firm performance, not by pushing new products with new features, but by changing the perceived relevance of existing products. The results of this study support the gain from complementing firm-level research with a demand-side perspective to link firm strategies with consumer benefits and thereby contribute to unveiling how companies can strategically aid consumers in their value experience by building a decision environment that supports the psychological mechanisms guiding dispensers' and consumers' perceived value of the same product.

INTRODUCTION

Management strategy emphasizes topline growth through value capture (Peteraf & Barney, 2003). However, value capture is predicated on value being created; specifically, the creation of value by offering consumer product benefits, which motivate payment from willing consumers (Priem, 2007), and the role of the dispenser in translating value of product benefits from the firm to the consumer as well as aiding the consumers consumption experience for maximizing value creation, should be of interests for strategic managers.

It is generally accepted in the behavioral science literature that people often construct their preferences when making a purchase decision (Ariely, 2012). Consumer are therefore exposed to external influence, both by the context wherein the consumption choice is made, but also decision-making rules (Gigerenzer, 2008), which are highly dominated by the cognitive effort required for decision making (Bettman, Luce, & Payne, 1998). Research in behavioral decision science has revealed how individuals lack the cognitive capacity to make fully informed and unbiased decisions in complex environments (Kahneman, Slovic & Tversky, 1982). The complexity of both the sales environment and available information may render consumers' choices and their final consumption decisions suboptimal for firm profit (Hunter, 2004). Given the importance of the consumption experience for consumers value creation, it is therefore not only the firms' ability to aid consumers in their value experience, but also the ability of dispensers to communicate and recommend the benefits associated with different products in the sales situation, which is crucial to helping consumers perceive and understand the quality differences between the available products when deciding on a purchase.

Strategic management scholars are increasingly focusing on the demand-side (Priem & Butler, 2001; Priem, Li & Carr, 2012.). This focus adds new insight into the determinants of value creation, and it helps explaining and predicting managerial decisions, which can improve value creation in a value system (Priem, 2012). Demand-side research is not contrary to a firm level perspective, but rather recognizes that the perceived value from the product market side of a specific product or service is not a given. Instead, the baseline in demand-side research is that perceived value creation will be based on subjective specific judgements (Bowman & Ambrosini, 2000), which recognizes consumer heterogeneity (Adner & Snow, 2010). Here, consumer preferences are dynamically changing and frequently latent (Kirzner, 1997). Demand-side research treats the subjective human consumer as bounded in their preferences, drawing on

consistent findings in behavioral research as to how human agents -at both as consumers and within the firm - do not behave like rational economic agents (Kahneman, 2011).

When companies develop new products, their market success is highly dependent on their ability to maximize consumers' perceived value during consumption. However, the growing complexity of sales environments and associated cognitive demands makes it difficult for dispensers to manage and convey product benefits. This has resulted in a higher risk of bounded behavior with stereotypes dominating and guiding the decision-making process of dispensers (Gioia et al., 2015). This impacts the dispensers' ability to differentiate between product benefits, convincingly recommend products, and sell the product that generates highest profit (Wasuja, Sagar, and Sushil, 2012). Therefore, when companies seek to generate value for the consumer, the dispenser cannot be considered a rational agent, who will consistently recommend and sell products at a price that will maximize firm profit.

The behavioral science offers more realistic assumptions about market behavior. However, even among strategic management scholars focusing on the demand side of the value equation, the main focus has been on identifying the role of the consumer in value creation. Little has been done with regard to the development of strategies improving value creation in the market through a behavioral lens. Establishing what causes violations of value creation identifies what causes opportunities to exist, and "following this logic, the behavioral roots of superior opportunities can be understood in terms of behavioral factors that hinder efficiency" (Gavetti, 2012: 268). Overcoming the effect of bounded behavior and contextual factors on the decision-making processes of both the dispenser and the consumer requires managers to develop strategies for firms' activities, which systematically target behavioral aspects in the product market for increased value creation and firm profit.

The decision architecture of the sales context

Bringing in the individual decision-making of the consumer into the value creation strategy offers an alternative view of the drivers of firm performance. To date, demand-side research has introduced a product market perspective to strategic management with a strong emphasis on the perceived value from a consumer perspective. However, an important actor in the product market has not gained much focus, namely the dispenser. As experts, dispensers "validate value to allow consumers an easier consumption experience, or at least to allow them to select effectively" (Priem, 2007: 226) with less cognitive effort. In some industries, the

dispenser is a vital player in translating value from the company to the consumer. In banking, for instance, the advisor is an important guide in complex choice situations of buying a house or managing investments. In the medical industry the pharmacist serves a similar role as a specialist advisor in the sales situation.

Online retailers use counselors to help consumers find a particular attribute or eliminate undesired alternatives (Lurie & Wen, 2014); in face-to-face sales situations, the salesperson has a similar function of filtering the amount of information given to the consumer and disclosing what is most relevant for the individual consumers' situation (Williams, Spiro & Fine, 1990). Examples of such an approach include salesperson specialization (Johnston & Marshall, 2003), spending time to gather information about possible choices (Weitz, 1978), creating sales teams (Weitz & Bradford, 1999), using incentives (Mullins & Syam 2014; Wasuja et al. 2012), and utilizing coping strategies (Hunter & Goebel, 2008). Despite the aim of the salesperson to help the consumer find the appropriate product, errors and biases influence this process. In the medical literature, for example, cognitive forcing strategies – which require self-monitoring by the expert in the decision-making process (Croskerry, 2003) – have been proposed in order to reduce the negative effect of biased decision making. However, such strategies are costly in terms of effort and time (Johnston & Marshall, 2003; Weitz & Bradford, 1999) and are difficult to manage (Dixon & Tanner, 2012).

Various circumstances may affect the ability of dispensers to sell the products that will generate the highest margin and improve performance. Wasuja, Sagar & Sushil (2012), for example, describe factors such as information processing shortcuts (heuristics), motivational factors, and social influence as crucial determinants of a recommendation. Currently, dispensers must deal with multiple products being introduced faster, with shorter life cycles and less competitive differentiation (Rackham & DeVencentis, 1999; Jones et al., 2005). As a consequence, understanding, managing, and disclosing the practical benefits of hearing products has become very difficult for dispensers. This affects their self-efficacy in the sales process (Fu et al., 2010; Wasuja et al., 2012) and bound both their evaluation of alternatives and the associated communication with consumers (Homburg, Bornemann & Kretzer, 2014; Hunter & Goebel, 2008; Vosgereau, Anderson & Ross, 2008). Gioia et al. (2015), for example, found that stereotype heuristics and confirmation bias dominate hearing aid recommendations. In particular, the authors reported that the consumers' lifestyle, as perceived by the dispenser, and speech discrimination (the measured ability of the consumer to distinguish between speech

sounds), were the strongest factors explaining treatment recommendation, with no evidence of this approach being optimal for either customer value or business performance. The bounded behavior thus impairs the dispensers' ability to differentiate benefit value between product price-levels, and to convincingly recommend and sell the product to the consumer (Wasuja et al., 2012). Consumers may in turn be unable to discern product benefits effectively, and may eventually choose a product that does not correspond to their needs (Akerlof, 1970). As pointed out by Jones and colleagues (2005), the increasing complexity of the sales environment and the resulting increase in cognitive demand requires an understanding of how manufacturers can provide product and market information that can be more easily processed, to help managers develop and deliver effective value creation in the consumption experience.

Linking value creation to the behavioral science literature

The value of a choice depends on consumers' ability to perceive the differences between different options (Iyengar, 2010), which constitutes a constant challenge given the overwhelming range of products with short lifecycles (Rackham & DeVincentis, 1999) and the overload of "decision-relevant" information (Drummond, 2004). For these reasons, consumers tend to use information-processing shortcuts (heuristics) in order to reduce cognitive effort (Tversky & Kahneman, 1973). Heuristics therefore come to play a non-negligible role in the consumers' decision-making process, as they may skew the consumers' ability to weigh the value of different products confidently and efficiently. At the same time, one cannot rely solely on the salesperson's ability to convey the exact information necessary to make the correct purchase decision. Complex product differentiation, information overload (Hunter, 2004), and the increasing push to enhance profitability – both in terms of boosting sales revenues and improving productivity (Ingram et al., 2008) – create a sales environment in which heuristics will play a considerable role in the salesperson's behavior (Vosgerau, Anderson & Ross, 2008). Such a situation may lead to (1) misperceptions regarding consumer commitment (Homburg, Bornemann & Kretzer, 2014); (2) misclassification of consumers (Vosgerau et al., 2008); or (3) incorrect statements made during the sales process (Hunter & Goebel, 2008). Furthermore, a lack of confidence that the product's benefits justify the high price, an inability to transfer knowledge to the consumer, and an unwillingness to discuss the product in detail would introduce decision heuristics into the sales context (Wasuja et al., 2012). This would in turn lead to fewer recommendations of higher quality products than should be (Gioia et al., 2015; Wasuja et al., 2012).

The ability to build customer relationships is part of a salesperson's job; the job also requires processing a large amount of information (Weitz & Bradford, 1999). The evidence of a negative association between sales performance and information overload found in the sales management literature (Hunter, 2004) thus needs to be acknowledged, as the increasing complexity may reduce sales. At the same time, the salesperson's ability to identify the consumer's product preference will likely be reflected in his or her efforts to recommend the product best suited to increase consumer's perceived value. Consumers often do not have well-defined product preferences before being confronted with a purchase decision – their preferences are therefore formulated during the decision process (Slovic, 1995) and are highly dependent on context, goals, experience, and cognitive constraints (Arvai et al., 2006; Dhar, Nowlis & Sherman, 2000; Hoeffler & Ariely, 1999). Payne, Bettman, and Johnson (1993), for example, argue that preferences are constructed like “architecture,” where a set of acceptable values are built up, rather than “archeology,” where already-existing values are uncovered. Preferences will be based on items of information integrated from memory or the environment, and these inputs will be weighted, valued, and incorporated into the decision-making process (Warren, McGraw & Boven, 2011), and strategies, which understand how to guide consumers preferences may increase value creation for increased business outcome.

When deciding between products, consumers' preferences depend also on the complexity of product ranges and attributes (Bettman et al., 1998). As the complexity of product range increases, consumers are more likely to resort to simplifying heuristics and selective information processing, often leading to reduced decision effectiveness (Bettman et al., 1998) and the creation of biases (Payne, Bettman & Johnson, 1993). In a complex sales context, consumers may improperly opt for the cheaper product (Schwartz, 2004). The power of sub-optimal information processing is supported by Spenner and Freeman (2012), who found that the single greatest factor in whether consumers followed up on an intended purchase with an actual purchase and recommendation to others was “decision simplicity” (i.e. “the ease of gathering trustworthy product information and efficiently weighing purchase options”).

Taking a behavioral science perspective on decision simplicity, introducing more effort on knowledge building into the sales process could instead create an environment in which the salesperson's use of heuristics will increasingly dominate his or her ability to filter out irrelevant information, thereby affecting the decision simplicity (Kahneman, 2011). Priem (2007:227) has also proposed that a strategy for increasing consumers payment to a value system is to “provide

venues for consumers to increase their stock of human capital, thereby improving their consumption experience”. He further proposes that the level of product specific human capital can be built by offering user groups, consumer training classes, or through experts validating value, which allows consumers to select effectively with less human capital (Priem, 2007). These approaches all rely on effortful information gathering and communication, and assume a rational behavior from consumers after knowledge building. More information does not necessarily enhance the decision-making process, and might actually lead to mental strain and low fluency (Schwartz & Klivan, 2004). In the context of the sales situation, underlying preferences may not exist, and the decision maker must then form a preference based on relevant, accessible information (Warren, McGraw & Van Boven, 2011). Information will therefore only change consumers’ beliefs when the new elements provided are better than previous ones or when the information is easier to access/process (Swaminathan, 2003). Thus, instead of trying to repair the hardwired errors in the individual’s cognition, researchers should acknowledge decision makers as ordinary human beings with bounded behavior and poor self-control, and focus on managing the behavioral architecture of the choice environment (Thaler and Sunstein, 2008).

Process fluency in the sales situation

In the behavioral psychology literature, process fluency is identified as a context through which heuristics become less dominant in decision-making processes. Process fluency relates to “how easily something can be made sense of” (Alter & Oppenheimer, 2009). In this respect, fluency relates to speed of, and mental effort involved in, information processing (Winkielman et al., 2003). The information available to the consumer and salesperson is either available in memory or can be found in the external environment. The consistency of the information available for use in making a choice is an important determinant of cognitive fluency (Morewedge & Kahneman, 2010).

Solving the problem of sub-optimal choices in sales is not simply about providing more information or making information available; information must also be easy to process to be utilized (Russo, Krieser & Miyashita, 1975). Following the logic that consumers’ assessment and weighing of benefits will be grounded on facts retrieved from memory or from the external environment that forms the context of the choice, we propose that by presenting easily processed and coherent information regarding the benefits of higher quality products before the sale, the

consumers will be better prepared to process the information related to the recommended products. Knowing the information readily available in the consumer's memory, this will in turn guide communication focus and create a more coherent, simpler process, making it easier for the dispenser to match the consumer's needs and expectations to higher quality products (Bandura, Georgas & Manthouli, 1996). This facilitates decision simplicity in the consumption experience and enables increased value creation and a maximized firm performance.

This study proposes and provide empirical evidence to support the strategic implementation of the construct of "processing fluency" (Schwarz & Kliban, 2004) in the sales context as a psychological mechanism that guide the dispenser's recommendation of targeted product benefits, and the consumers' perceived value of the product benefits to increase willingness to pay, and thereby the payment to the value system. This leads to our key hypothesis:

Strategic implementation of information process fluency in the sales context will increase value creation for current products, leading to higher consumer payments.

The sales context for hearing aids illustrates the important role of dispenser behavior in the value chain, and the potential for companies to enhance strategic thinking by including a demand-side perspective in a behavioral framework. Taking onset in the hearing aid industry we set out to explore how a strategic implementation of process fluency in benefit communication in the sales context, can increase value creation for the consumer leading to higher ASP in sales.

METHODS AND DATA

Empirical Setting

The hearing aid industry represents a case where the in-store sales context is vital for value creation. Hearing aids are not sold over the counter, but must be recommended and sold by authorized dispensers (audiologists), and the dispenser as a sales person and advisor therefore is an important actor for generating perceived value creation for the consumer.

In the hearing aid industry, which has global wholesale revenue of \$4 billion, with 10 to 11 million units sold annually, falling average selling prices (ASP) have been observed in recent years. This means that the percentage of hearing aids sold in the highest price is decreasing. Falling ASPs are often associated with changes in macro-economic factors, like the purchasing

power in the market, or new market entries. However, contrary to other industries, the falling ASP in the hearing aid industry is not due to new market entries or disruptive technology. Lower ASPs have instead been linked to salespersons underselling higher quality products based on incorrect stereotypes and confirmation bias (Gioia et al., 2015), as well as consumers buying lower quality hearing aids due to an inability to recognize the value of benefits offered from hearing aids in the highest price categories compared to lower level price categories (Kochkin, 2007).

To study the effect of information process fluency on value creation in the context of the hearing aid industry, we designed a study in two steps. First, we created an online study to test the effect of easily processed information on increasing consumers perceived value of targeted hearing aid benefits. Then, using a treatment and a control group set-up in actual retail shops, we used the results from the online study to implement information process fluency in the consumption experience to improve consumers perceived benefit value and revealed consumer payment for increasing company top-line performance.

Online Study

The core objective of the online study was to test whether information that is easily processed and targeted can be used to shift the weights of consumers perceived benefit value for targeted premium hearing aid product benefits.

Method

A sample of 227 individuals aged 55+ with (self-assessed) hearing difficulties was randomly selected in the US for participation in an online survey. The survey protocol was as follows:

1. Set the respondent in the hypothetical situation of having visited a hearing care professional and having had a hearing loss diagnosed after a hearing test.
2. Inform respondents that they would benefit from the use of hearing instruments.
3. Randomly assign respondents to one of four groups. Each of the three treatment groups receives a set of two or three specific sentences linked to higher quality hearing aid benefits (such as “You will hear more details in the sound,” and “You will feel less exhausted at the end of the day”). These are administered before the visit as general, short, and easy-to-process pieces of information. No information is provided before the visit to the control group.

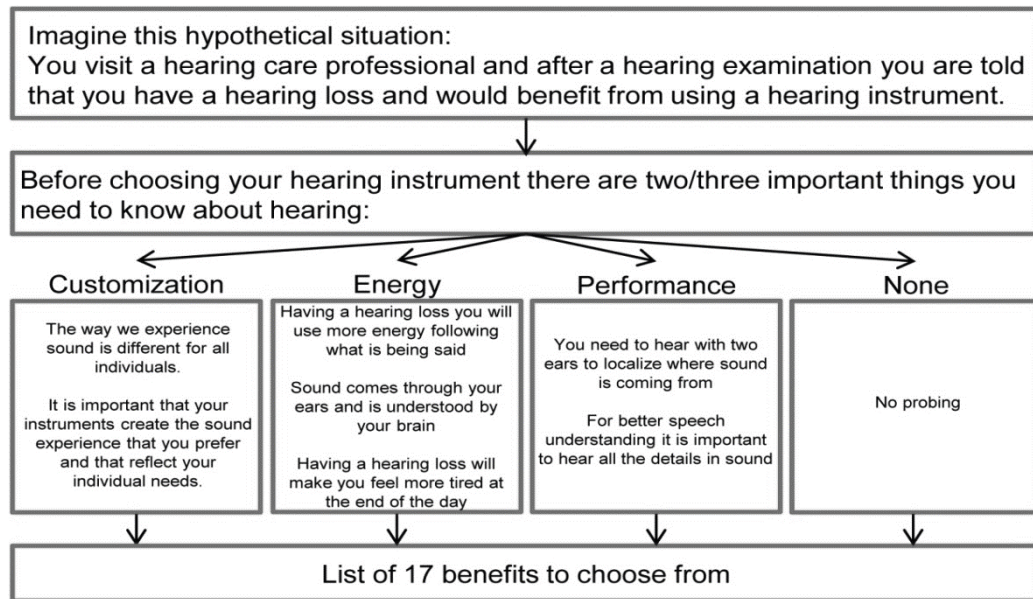
4. All four respondent groups are then shown an identical list of 17 benefits related to high quality hearing aid products (e.g. “*You will hear more details in the sound,*” and “*You will feel less exhausted at the end of the day*”). All respondents are then asked to select the most important benefits when purchasing a hearing instrument (minimum six).

The idea behind the test was the notion that information about complex products like hearing aids should be organized to enhance the customer’s ability to focus on the attributes that are most likely to maximize utility (Swaminathan, 2003).¹³ The information statements delivered to respondents before the visit were therefore designed accordingly, as suggested, for example, by Swick (1998). All information statements were also designed after the principals that to improve ease of processing, information must be concrete and come in the form of everyday language, with no use of concepts, abstracts or negatives (Swick, 1998).

Concerning Step 3 above in particular, it should be highlighted that the information statements given were specific to one category of benefits (i.e. Customization, Energy, and Performance), which was not made known to the consumer. For each of the categories, the statements were directly linked to a specific set of benefits and were presented in random order to the respondents. The statements underwent multiple iterations during study design; Figure 1 illustrates the test protocol.

¹³ The literature suggests that choice is affected by the presence of dominant alternatives (Huber, Payne, and Puto, 1982), where “strongly activated information” is likely to be given more weight than it deserves. Conversely, relevant knowledge that is not activated by the associative context will be underweighted and neglected (Morewedge and Kahneman, 2010).

Figure 1. Test protocol.



Results

Table 1 presents the percentage of respondents who selected specific benefits of hearing aid products. These results are also shown in Figure 2. As mentioned above, the respondents were asked to select at least six benefits, as some attribute dominance was expected. The “preferences” revealed by the three treatment groups receiving pre-information before the visit are shown in the different columns named by the relevant label, i.e. Customization (column 2), Performance (column 3) and Energy (column 4). The benefits chosen by the group that received no information are shown in the column labeled “None” (column 1). The figures in the tables are ranked according to the answers given in column 1, and the percentages in columns 2 through to 4 are the differences with respect to column 1. As shown under “None,” four benefits were chosen by at least 60% of the non-treatment respondents. These benefits can therefore be considered “dominant” for the group that received no information prior to the visit. Comparing the answers given by the treatment groups to those given by the “none” group, several points can be noted. First, 28% more respondents in the “Customization” group selected the benefit “*You will get a listening experience customized to your individual needs,*” ($z = 2.948$, $p\text{-value} = 0.002$). Second, a 27% increase in the share of respondents selecting the benefit “*You will be helped in the way two ears naturally work together*” was observed for the “Performance” group ($z = 3.309$, $p\text{-value} = 0.000$). Third, a 36% increase in the share of respondents who selected the

benefit “*You will feel less exhausted at the end of the day*” was observed in the “Energy” group ($z = 4.417$, $p\text{-value} = 0.000$).

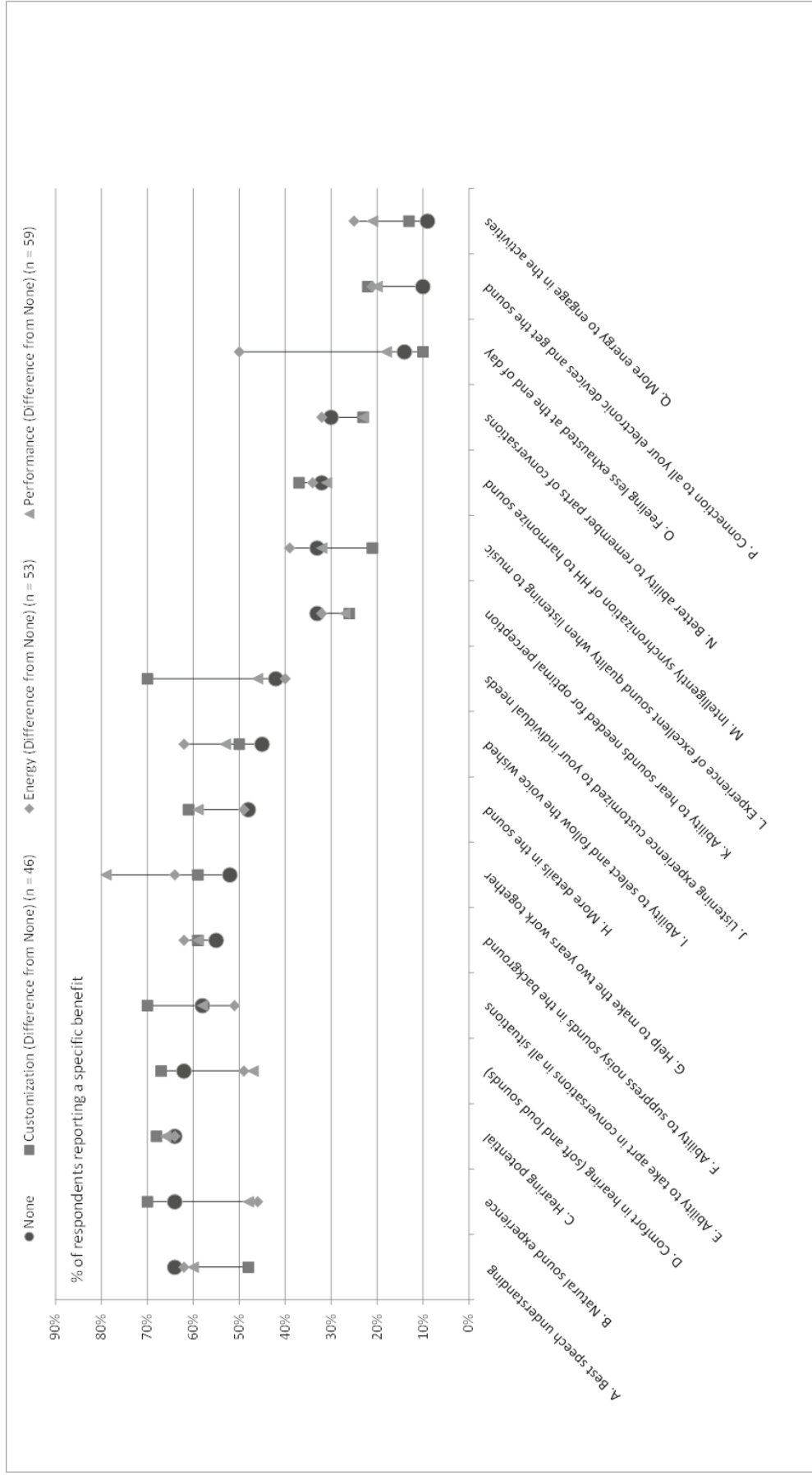
Table 1. Respondents’ Selection of Benefits from Hearing Aids.

Benefits of hearing aids	1. None	2.	3.	4. Energy
	(n = 69)	Customization (n = 46)	Performance (n = 59)	(n = 53)
		(Difference from None)	(Difference from None)	(Difference from None)
A. You will get the best speech understanding	64%	-16%	-4%	-2%
B. You will get natural sound experience in all listening situations	64%	6%	-16%	-18%
C. You will reach as much of your hearing potential as possible	64%	4%	2%	0%
D. You will hear soft sounds without loud sounds becoming too uncomfortable	62%	5%	-15%	-13%
E. You will be able to participate in conversation even in situations where many sounds are competing for your attention	58%	12%	0%	-7%
F. You will be able to focus on the conversation partner in front of you while intelligently suppressing noise from behind	55%	4%	4%	7%
G. You will be helped in the way the two ears naturally work together	52%	7%	27%***	12%
H. You will hear more details in the sound	48%	13%	11%	1%
I. You will be able to select and follow the voice you wish	45%	5%	8%	17%
J. You will get a listening experience customized to your individual needs	42%	28%***	4%	-2%

K. You will hear important sound cues for optimal perception	33%	-7%	-6%	-1%
L. You will experience excellent sound quality when listening to music	33%	-12%	-1%	6%
M. Your hearing aids will intelligently synchronize to harmonize sound	32%	5%	-1%	2%
N. You will be able to more easily remember parts of conversations	30%	-7%	-7%	2%
O. You will feel less exhausted at the end of day	14%	-4%	4%	36%***
P. You will get connection to all your electronic devices and get the sound	10%	12%	10%	11%
Q. You will have more energy to engage in the activities	9%	4%	12%	16%***

Note: the benefits are sorted by the ranking obtained from the “None” sample. For, two-sample test of differences, *** = significance level below 1%, ** = significance level below 5%, and * = significance level below 10%.

Figure 2. Respondents' Selection of Benefits from Hearing Aids.



The results of the online study suggest that the use of targeted information that can easily be processed may allow companies to change how consumers weigh use value for more premium product benefits before a purchase decision. It is interesting to note that in all the situations examined, the greatest increase in benefits chosen as important matched the information that was targeted to the particular treatment group, and the shift in preferences was systematic, confirming learning from behavioral psychology that perceived benefit value at the level of the consumer is not a given.

In the case of the hearing aid industry, no informational influence resulted in a lower perceived value for premium benefits than if information process fluency was introduced targeting the same benefits. This implies that introducing premium products to the hearing aid market will not by itself drive a higher exchange value (average selling price) and thereby higher company margins. Instead, a strategy aimed at creating process fluency for selected benefits linked to premium products can help increase perceived use value for these benefits, and help generate a higher consumer payment.

These results confirm that consumers perceived value can be altered through process fluency. However, they are not created in a true sales context, but only tested in a hypothetical online context. The focus of this study is to test the effect of process fluency in the sales context, where not only the consumer, but also the dispenser plays an important role in the value chain. Building on the results from the first part of the study, the next part of the study was designed to test the effect of information process fluency in an actual sales situation in a set of retail clinics.

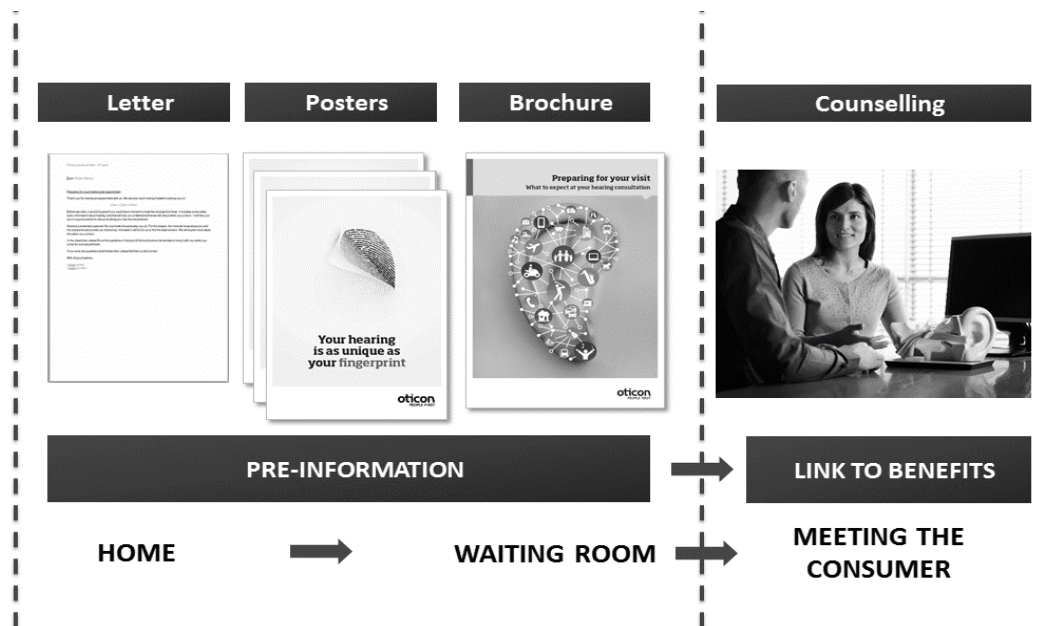
Study in the sales context

The formation of consumer preferences through the disclosure of information tailored to consumers' needs does not solve the complexity embedded in this kind of sale; thus, the salesperson's recommendation/counseling is equally important. For example, an important aspect of any new sales strategy is how it is introduced to the sales personnel. The literature on behavioral change has found that to ease introduction of new routines, habits and routines can be modified by increasing people's abilities or by rendering something easier to do (Tombari, Fitzpatrick & Childress 1985).

The retail clinic study was conducted to test the impact of process fluency in the sales context on consumers' preference-building process and related value creation realized as sales

outcome. To support the construct of process fluency, the study was designed to be accepted, and implemented by salespersons, using a simple, guided process for implementation that was aimed at reducing cognitive effort and the time needed for the salesperson to change routines and optimize decision-making behavior. Figure 3 illustrates the practical implementation in retail hearing aid shops.

Figure 3. Implementation of the information fluency strategy in a retail clinic.



(See full letter, posters and brochure in Appendix)

The test took place in a particular context in which both consumers and salespersons have a history of decision-making processes that result in sub-optimal sales outcomes – the sales environment of hearing aid shops (Gioia et al. 2015).

Method

Taking the results of the online study as a starting point, this study was conducted with two groups. The first group (treatment group) consisted 13 salespersons who sell hearing aids in private retail clinics (the treatment group). The second group of 15 peers (the control group) was selected to match the treatment group with respect to geographical location, professional

experience and performance on a set of key performance indicators (KPIs), including ASP, net sales, number of instruments sold, and binaural rate percentage.¹⁴

The treatment group (test group) was invited to attend a training session. The salespersons belonging to the group were introduced to the concepts and results obtained in the online study. A set of videos was produced to train the treatment group on how to use the information tested in the online study in a counseling situation. Posters and brochures with the information disclosed to the respondents prior to visiting a hearing care professional were prepared for use in the treatment group clinics (test clinics) (see poster and brochures in the appendix). When hearing-impaired consumers came to the test clinics for their appointment, they were greeted and asked whether they had read the brochure. If they had not, the salesperson presented the brochure and discussed it with the consumer. The idea behind the study to provide the consumers with specific (accurate and well-documented) information about hearing/hearing loss.

Both the treatment and control groups were observed over a 120-day period before implementing the study, and again 90 days after. The training took place in the United States in randomly selected clinics. The treatment group saw 858 patients in the pre-training period, while the control group saw 890 consumers during the same period. In the post-training period, the treatment group saw 530 consumers, while the control group saw 624 consumers.

Objective performance data with which to evaluate the effect on sales outcome were collected. In addition, qualitative data derived from a 5-hour roundtable feedback meeting with the salespersons from the treatment groups were obtained to gain insight into their subjective experience while using the strategy in their daily work.

Perceived process fluency at the level of the dispenser

Focus groups are useful for generating a rich understanding of participants' experiences and beliefs (Morgan, 1998), and, compared to individual interviews, focus groups better contrast participant's viewpoints and reduce potential social desirability bias (Morgan, 1996).

¹⁴ The binaural rate percentage is the percentage of sales of two hearing aids rather than one unique (monaural) HA to a patient. A percentage of 100% means that all patients purchased two hearing instruments.

The focus group format was therefore chosen in order to maximize the advantages of the method when giving feedback on results, as well as to clarify, extend, qualify or challenge data collected through other methods (Bloor et al., 2001). The focus group took the form of a round-table discussion in order to facilitate the exchange between participants and “encourage a range of responses which provide a greater understanding of the attitudes, behavior, opinions and perceptions of participants on the research issues” (Hennink, 2007: 6).

One moderator, one note-taker, and two observers were also present. The moderator asked questions drawn from a pre-defined list and the note-takers documented non-verbal cues and interactions. The focus group was audio-recorded and the 5-hour recording was later transcribed verbatim and analyzed. Inductive content analysis was used for data analysis (Graneheim & Lundman, 2004).

Results from focus group

The aim of the research guided the definition of content areas and allowed exclusion of transcript sections that were not related to that aim. The content area used in the analysis was “the perceived effect of introducing the new strategy on the part of the salesperson.” The transcript sections relevant to the chosen content area were divided into meaning units and each meaning unit was given a code.¹⁵ Open coding was used to generate as many codes as necessary to describe the content of the selected parts of the transcript. The codes were then clustered into categories. In total, the focus group generated 103 meaning units referring to the defined content area. This produced 11 codes clustered into three main categories.

Table 2 shows the codes and categories identified in the selected transcript that described the sales person’s perceived effect of implementing the new strategy.

Table 2. *Comments from the Salesperson Focus Group.*

Categories	Codes
Perceived effect on own abilities	Creating results
	Ease of recommendation
	Perception of own role
	Change in communication

¹⁵ A meaning unit could be coded as many times as needed to capture all of the concepts it conveyed.

Perceived effect on the consumer	Asking more questions Understanding what I say Receptive Recall information
Perceived ease of implementation	Materials Ease of use Feels natural

Some selected direct quotes used are presented below (after editing the speech for any disfluencies).

The salespersons found the implementation of the new strategy to be easy and natural: *“As part of what we do, it didn’t feel unnatural; and it was easy to use in the counseling.”* *“You know when you try something for the first time you feel like you stumble through it. I never felt that using this. I felt that this is just part of what we do.”* The only negative comments were related to finding space to fit the posters.

The salespersons also perceived the effect that consumers were better prepared to understand what they needed and ask relevant questions: *“It wasn’t just me trying to pull information from them. They were ready and had questions to ask.”* *“I felt that they were more prepared to understand the reason why they were there. I felt the same way.”* Two test group members commented that they were worried that the consumer would get suspicious if the message was repeated too many times. However, no salesperson in the treatment group received a comment from a consumer about the repeated information.

All participants in the treatment group agreed that the patients were more receptive: *“I felt that it did help them appreciate the more advanced technology and understand what we are trying to tell them.”* *“I was surprised when I heard a lot of patients saying, ‘Yeah that makes sense. I know what you’re saying,’ agreeing with me the whole way. That made it a lot easier.”* The method was also found to reduce information asymmetry, making it easier for the treatment group to recommend higher-level technologies: *“It was easy to make the leap between price points.”* *“The recommendation you make has a better chance of being accepted.”*

The hearing care professionals in the treatment group generally saw an increase in their sales: *“My sales went up, and the technology level went up, so I’m going to continue doing this.”* *“I’ve never sold premium, and I sold three last month. I’m so good!”*

Using the strategy of increased process fluency by preparing the consumer with targeted and simple information made the salespersons feel as if they did not have to focus on the complex details of the products: *“I’m really enjoying utilizing the concepts. This takes the focus off the hearing instruments themselves and puts it more on a solution focused discussion.”* *“This brings the conversation to a higher level, so that it is not so focused on the details.”*

Another result was the change in how the salespersons felt they were perceived by patients/customers: *“They’re more involved and it makes us look more professional.”* *“You’re more in control when giving information to them than when drawing information from them.”* *“Having this information on the front end – whether it was in the brochure or the posters –that was huge, because we’re the experts and we’re the ones making the recommendations.”* *“It gives us more credibility. We are more the experts.”* The qualitative data also suggest that the self-perception of the salespersons was enhanced, as they felt more like experts in the eyes of the patient.

Based on the qualitative data collected, we found that the salespersons’ perception of their own ability to convincingly recommend higher quality products was enhanced. The salesperson test group found that the consumers were better prepared to learn about and accept higher quality products. Recommending of higher quality levels was also reported to be easier, as the hearing care professional did not have to focus so much on the complex details of the products. Furthermore, they felt more like experts and professionals in the eyes of the consumers. This findings support the notion of perceived process fluency in the sales context as perceived by both the dispenser and the consumer.

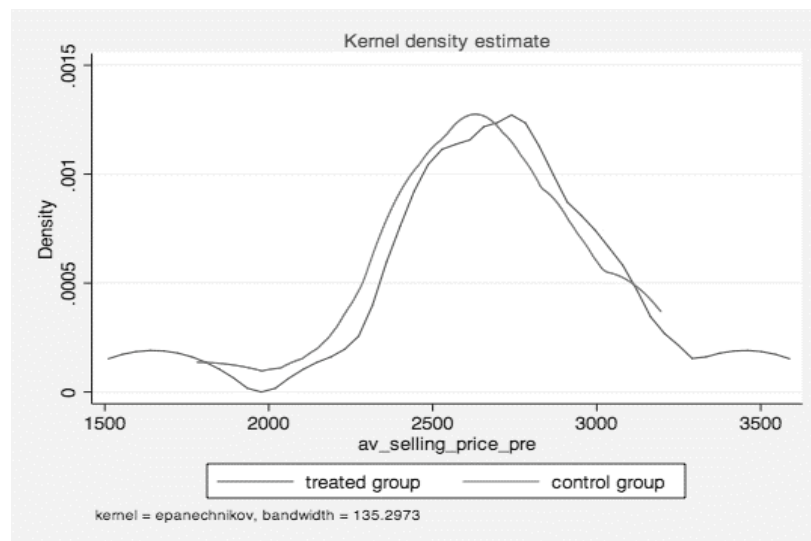
Quantitative data and analysis

To test the effect on value creation by implementing a process fluency strategy in the sales context, three variables of interest were retained: ASPs, net sales, and binaural rate. The assessment was based on the comparison of the outcome variables before and after treatment between the treatment and control groups. Both the control and treatment groups were selected randomly. After selection, the groups were checked for major differences in their KPIs. This

was done because low performers might benefit more from training than high performers, in which case the average impact of treatment would be overstated. The same might also have happened if individuals were given the option of enrolling themselves in the study, as such self-selection mechanism could bias the results.

Figure 4 illustrates the kernel density of ASP between the test and control groups in the pre-training period. The two distributions do not differ statistically (K-S test, $D = 0.1744$, $p\text{-value} = 0.984$) and the ASP is similar in the two groups.

Figure 4. Kernel Density.



The challenge of estimating treatment effect models is well-known in the labor economics literature (Heckman, LaLonde & Smith, 1999). One might think that a simple solution would be to compare the performance (using, e.g., earnings) of those who received treatment (i.e. training) and those who did not, either by computing simple averages or by using regression methods or matching techniques to control for some of the different background characteristics. However, such methods generally lead to biased estimates of the casual effects. The main econometric concern in the estimation of treatment effects is selection bias arising from differences existing between the treated and non-treated groups that go beyond the treatment itself. So, what are we actually measuring if we compare these averages?

To make the discussion more concrete, let us assume that we are interested in the effects of training hearing aid professionals on sales outcomes at time $t+s$. Let Y_{1i} denote the potential sale outcome of individual i if (s)he was to receive training and let Y_{0i} denote the potential

outcomes of individual i if no training were received. Training status is denoted using a dummy variable D_i that is equal to 1 for trainees and equal to 0 otherwise. For each individual, we observe $Y_i = Y_{0i} + D_i (Y_{1i} - Y_{0i})$, that is, we observe Y_{1i} for trainees and Y_{0i} for everyone else.

A fundamental problem is that we cannot observe both Y_{1i} and Y_{0i} for one individual. A person can only be in one state. The main point here is that we can therefore not directly observe

$$E[Y_{1i}|D_i = 1] \text{ and } E[Y_{0i}|D_i = 0] \quad (\text{eq. 1})$$

Thus, in order to approximate the “counterfactual of interest,” we must therefore make a few assumptions and find a proxy measurement that allows us to estimate the average effect of training on objective performance data¹⁶, such that

$$E[Y_i|D_i = 1] - E[Y_i|D_i = 0] \quad (\text{i.e. the observed difference in average outcome sales performance})$$

=

$$E[Y_{1i}|D_i = 1] - E[Y_{0i}|D_i = 1] \quad (\text{i.e. the average treatment effect on the treated})$$

$$+ E[Y_{0i}|D_i = 1] - E[Y_{0i}|D_i = 0] \quad (\text{i.e. the selection bias}) \quad (\text{eq. 2})$$

Only when an individual is randomly assigned to the treatment (D_i), the latter is independent of Y_i and then $-E[Y_{0i}|D_i = 1]$ may be replaced by $E[Y_{0i}|D_i = 0]$, making the selection bias term vanish.

Consider now a more comprehensive equation:

$$E(y_{t+s}^{treated} - y_{t+s}^{not_treated} | X, D = 1)$$

Where X are explanatory variables and D is the dummy for training participation. Training takes place at time t , and $t+s$ and $t-s$ are the post-training (at $t+90$ days) and pre-training (at $t-120$ days) periods, respectively. While the trainees in our study had been randomly assigned to the treatment, the control group was formed by “matching” the treated group in terms of geographical location, work experience, initial level of sales, and ASP.

¹⁶ It should be noted that participation has direct and indirect effects. A direct effect is seen on specific KPIs (i.e., ASP, net sales, binaural rate) as well as job satisfaction. Such an effect might, in the long run, benefit employer and employee alike.

To estimate the impact of training on objective performance data, we then used a DiD estimator (Heckman et al., 1999), as follows:

$$DiD = \Delta p = E(y_{t+s}^{treated} - y_{t-s}^{treated} | D = 1) - (y_{t+s}^{control} - y_{t-s}^{control} | D = 0)$$

Where Δp is the change in performance (ASP, net sales, binaural rate), which we expect to be statistically significant and positive; $y_{t+s}^{treated}$ is the performance (ASP, net sales, binaural rate) of the treatment group (trained group) at time $t+s$ (+90 days) and $y_{t-s}^{treated}$ is the performance at time $t-s$ (-120 days); and $y_{t+s}^{control}$ and $y_{t-s}^{control}$ are the performance of the control group at time $t+s$ (+90 days) and $t-s$ (-120 days), respectively. Because we employed a matching technique to identify the control group, we used the following equation to estimate the treatment effect:

$$\Delta p = [(y_{t+s}^{treated}) - (y_t^{treated})] - [(y_{t+s}^{control}) - (y_t^{control})]$$

Differences in the time series of mean outcome variables between the test and control groups may lead to biases in the difference-in-difference estimator (Devine and Heckman, 1996). Comparing ASP for both groups during the pre-training period, we found no evidence of such a dip and therefore assume that the results are not biased upward.

Results based on objective performance data

According to the estimations, ASP increased for both groups at time $t+s$. However, the treatment group increased its ASP by approximately \$156, while the control group only experienced a \$15 increase, for a total $\Delta p = \$141$ ($t = 1.391$, $p\text{-value} = 0.089$, unequal variance assumed). The results are illustrated in Figures 5 6, and 7. For confidentiality purposes, we have kept the detailed test results for each subject in the study anonymous.

Figure 5. Average Sales Price (ASP).

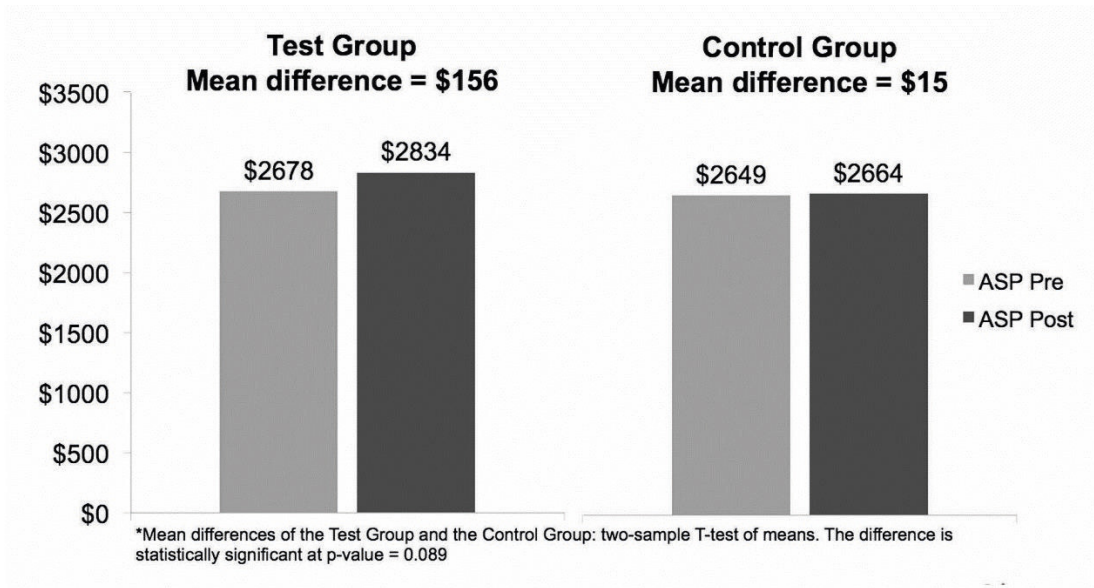


Figure 6. Net Sales.

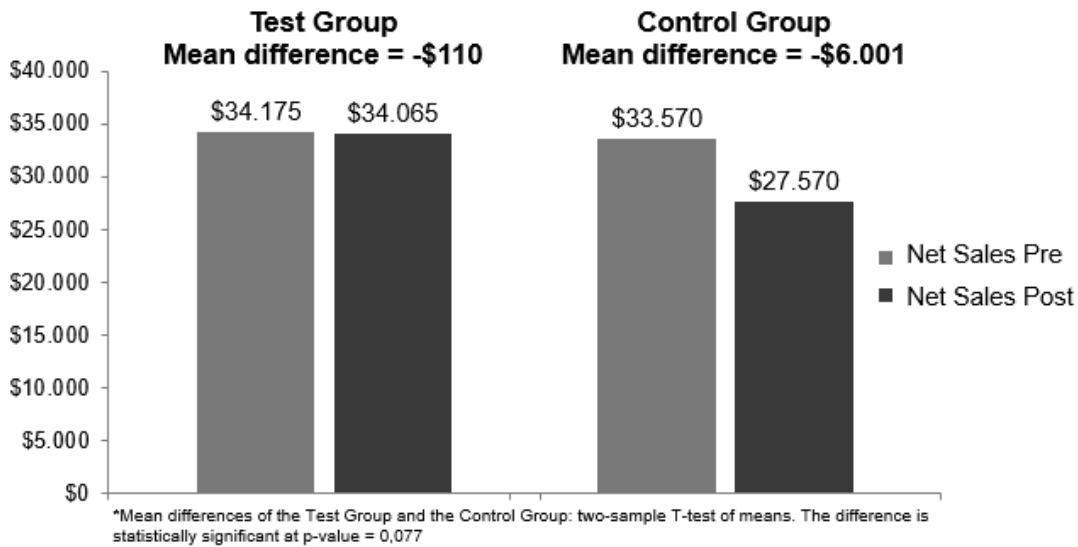
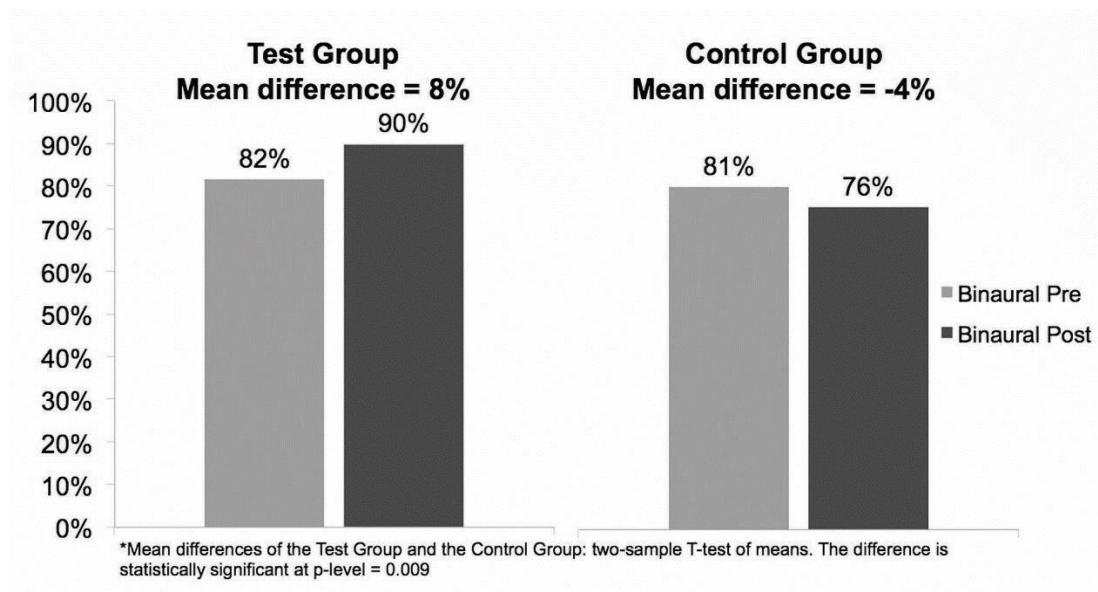


Figure 7. Binaural Rate.



It is important to note that the pre-test values for ASP, net sales, and binaural rate, were very similar between the test and control groups. This allowed us to establish a (potentially) unbiased estimator for the difference between the treatment and control groups in the pre- and post-training periods. Net sales were expected to decrease in August due to seasonality, but only showed modest decline for the treatment group (\$110) compared to the control group (\$6,001). The difference between groups was statistically significant ($t = 1.472$, $p\text{-value} = 0.077$, unequal variance assumed). Finally, Figure 7 illustrates the test results for the binaural rate. For the treatment group, we observed an 8 percent increase in the post-training period compared to the pre-training period. For the control group, we observed a decrease in binaural rate of 4 percent. The difference between groups was statistically significant. ($t = 2.618$, $p\text{-value} = 0.009$).

The results clearly indicate that sales performance improves after implementing the proposed strategy for selling vertically differentiated products such as hearing aids. These results suggest that introducing more easily processed information to potential users of hearing aid products could lead to several positive outcomes. In addition to enhancing the self-perceived ability of hearing care professionals to counsel clients and convincingly recommend different quality levels of products, the strategic implementation of process fluency in the sales context also results in positive results in terms of objective performance indicators.

DISCUSSION

Companies today introduce more products, faster, with shorter life cycles and less competitive differentiation, while at the same time trying to increase sales outcomes. This situation creates an environment with high cognitive load on both the dispensers and consumers (Schwartz, 2004), leading to suboptimal behavior that potentially undermines firm performance. For dispensers, this environment creates a complex and cognitively demanding sales environment, which may result in the use of simplifying heuristics and a negative effect on the dispensers' ability to convincingly sell the products with highest profits to consumers. From a consumer perspective, complexity in the sales environment may affect the ability to recognize the benefits associated with different products, meaning consumers will not perceive the relative use value of premium products (compared to their exchange value), and will instead opt for lower quality products, which may not necessarily adapt to their needs.

Working from the understanding that markets are comprised of human beings rather than rational economic agents, this paper draws on behavioral research and demand side literature to test the stated hypotheses that strategic implementation of information process fluency in the sales context will increase value creation for current products, through higher consumer payments. Thereby offering perspectives on the possibilities of gaining novel insights by integrating behavioral science into the practice of strategy, and contribute to the literature by proposing and empirically testing information process fluency as a strategy for improving companies' innovation success by helping decision-makers mitigate their individual-level cognitive biases to achieve increased product adoption.

Overall our results suggest support for the concept of process fluency as a strategy to increase value creation in the sales context, which is an important part of the value chain that strategists have offered little attention. The results from the online part of the study suggest that easily processed information allows customers to prioritize higher quality products by referring to benefits present in their memory. The retail clinic part of the study showed how improved process fluency in communicating the benefits of higher quality products result in improved sales outcomes and increases salespersons' perception of self-efficacy in recommending and selling higher quality products.

In this study, we have demonstrated how the proposed method brings professionals and customers from a state where complexity and confusion dominate to one of decision ease and

self-confidence, resulting in increased value creation. The findings show how easily processed information helps consumers to construct preferences for higher quality products. This, in turn, raises the perceived fluency of the salesperson with recommending higher quality products; it improves the sales persons' sense of self-efficacy; and finally, it reduces the negative impact on sales outcome of low perceived use value in the sale of vertically differentiated products. These results counter findings that consumer product preferences should be encouraged through effortful information gathering on the part of consumers (Kumar, Leone & Gaskins, 1995; Morgan & Hunt, 1994; Weitz & Bradford, 1999), and instead support the effect of heuristics as superior in value creation in a strategic decision architecture.

The findings in this paper can guide the identification of strategic opportunities to build and maintain competitive advantage by aiding dispensers and consumers in creating perceived use value and exchange value. The results of our paper therefore show that companies might benefit greatly from addressing the decision behavior that results from a complex sales environment, as well as suggesting, specifically, that companies face substantial incentives to implement strategies that ease the understanding and appreciation of the vertical differentiation between products. This study also adds to the rising discussion among strategy scholars of “challenging the behavioral assumption of microeconomic theory treating market efficiency and decision rationality as empirical questions to be observed and tested in the actual behavior of market participants” (Powell, 2017: 8), and offers an applied method, which shows how managers can leverage value performance by recognizing value creation from a demand-side view.

The motivation of this paper was to explore whether firms can identify strategies for value creation using a demand side perspective on value, and instead of taking demand as a given, feeding these insights back to a resource allocation question by understanding what drives value creation for a larger value to capture inside the firm. Traditionally industries like the hearing aid industry has focused on driving value creation through vast introduction of new products and product features, to generate higher average selling prices, and a higher demand for their specific product benefits. This demands large investments in R&D development, patent applications, production and marketing of new product campaigns within short time spans. So the suggested approach can offer value not only for the demand-side, but also on the firm-side through savings on these resources for reduced cost. In the hearing aid industry, new product

introductions every half year, and within the dominating companies an expectation for technology driven landmarks every year is building pressure on companies to deliver.

In conducting this study, we learned how complex product ranges and information overload can create sub-optimal outcomes for company performance, and the empirical results support the importance of addressing this problem. Consumers and salespersons both have an interest in simplicity, and by carefully designing the information environment around the sales process of selling complex, vertically-differentiated goods, process fluency will alter the decision making context to match consumer decision behavior ease for value creation of current products in the market. This offers a completely new perspective on value creation, where resource allocation for process fluency in the market can be a strategy for value creation compared to producers' constant focus on R&D innovation to strive to aid consumers' benefit experiences by adjusting product characteristics. Instead, basing resource allocation decisions on the fact that consumers cognitive capital influences their choices and the benefits they ultimately experience through consumption, the allocation of resources to support product consumption situations, not by introducing new products in the sale, but increase benefit relevance of existing products, can offer sustainable strategic alternatives.

Firms often make substantial efforts to innovate their products and processes, aiming for revenue growth and improved profit margins. These innovations are, however, often expensive and time-consuming. Investment in marketing, sales or training resources for knowledge building to increased value creation of current products may be relatively less expensive than R&D resources used to develop new products to seek higher exchange values from consumers, through the relative strategic priorities of these activities. The results of this study emphasize why it will be useful for strategists to analyze consumption processes, and develop our understanding of value in the strategic management field by not solely focus on the manufacturer side of the value equation, but integrating a demand-side perspective on value creation, and the "allocation of resources to everyday fundamentals of business success" (Powell, 2017: 1)

The demand side perspective of the sales context also comes with inherent limitations to consider. First, the effect of process fluency tested in this study may apply more precisely to products, which are complex and differentiated, and thereby require a higher level of consumer knowledge capacity during consumption. The strategy may be less effective for increasing value

creation of everyday commodities, where there is only need of low levels of cognitive capacity to generate a perceived use value consistent with a sustainable strategy for the firm. Second, the effects on exchange value by targeting increased perceived use value for the consumer in a sales situation will be limited by the consumers capability to pay.

The empirical research in this study represented a single company, which provided us with an environment in which to test the effect of the proposed strategy and control for extraneous factors. This however do not control for firm specific effects (Hambrick, 1981). In order to establish generalizability, however, it is important that the proposed strategy also be replicated and tested in other relevant industries. We measured ASP, net sales, and binaural rates, which are the immediate results of selling higher quality products. Further research could address the more long-term effects of using the method and the improved confidence in recommending and assessing the value of benefits. Long-term factors of interest could include consumer satisfaction, continued use, and product recommendations, as well as salesperson compliance with the method. Another perspective to explore is specific strategies for value creation in an online consumption environment, where the dispenser is not part of the equation. We leave these questions for further research.

CONCLUSION

With the increasing complexity of sales environments, and the resulting increase in cognitive demand, this study demonstrates how organizations can provide product information that can be more easily processed. The strategy proposed in this study was shown to be easily accepted and implementable, offering recommendations for actions that managers can follow to ensure successful implementation. This information will help managers evaluate where resources are most needed in order to reduce the negative impact of information complexity in vertically differentiated markets, and bring the consumer and dispenser from a state of confusion and complexity to one of decision ease, leading to increased value creation for maximizing firm performance.

The demand side perspective can offer potential insights for management strategists as to where and how resources are used, being it in marketing, R&D or production for maximizing not only the value capture internally in the firm, but also the value creation in the product market. Using the demand side perspective as a complement to link producer strategies with consumer benefits, makes an elemental move of the strategy field from one of description to

useful description (Robert & Meyer, 1991; Priem, 2007), unveiling how specifically companies can aid consumers in their value experience.

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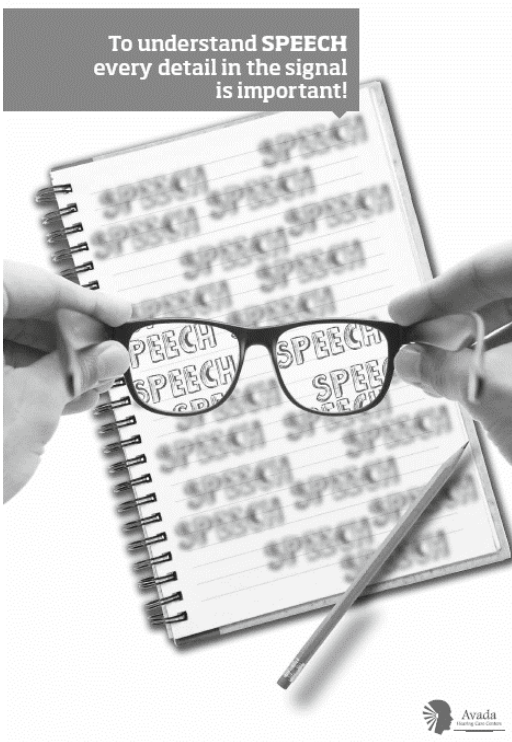
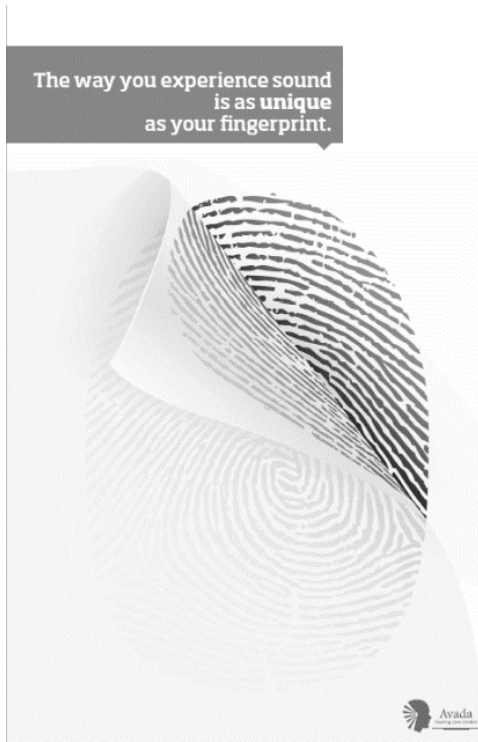
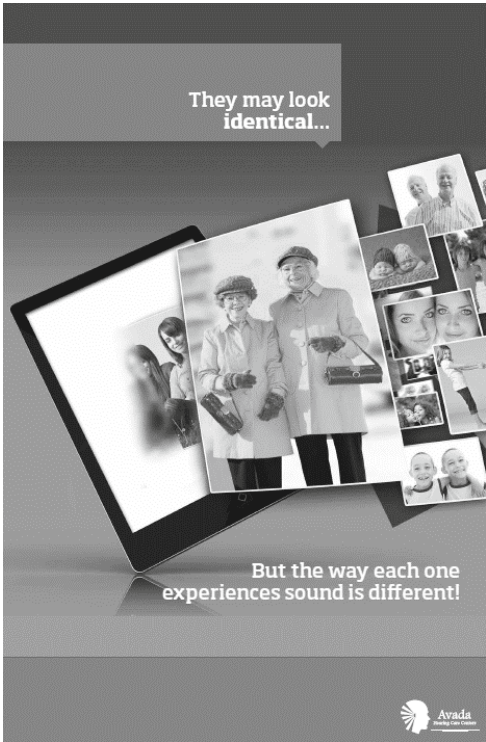
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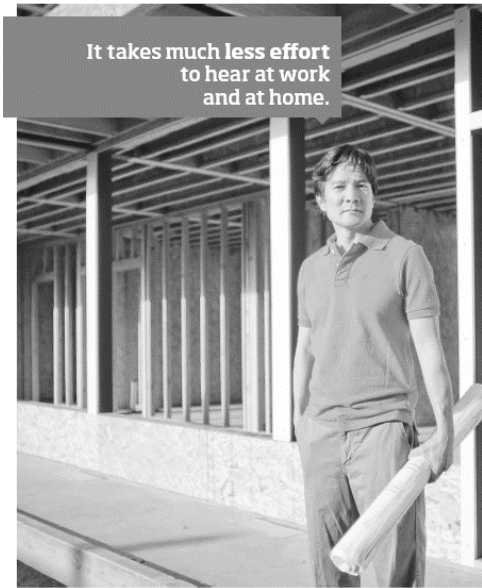
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Appendix

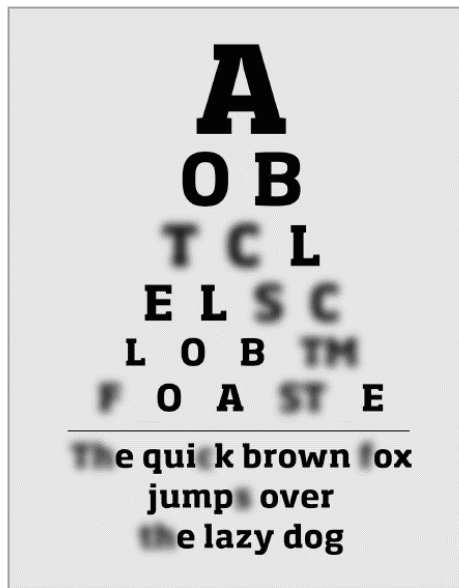
Posters used for Study 2





It takes much less effort to hear at work and at home.

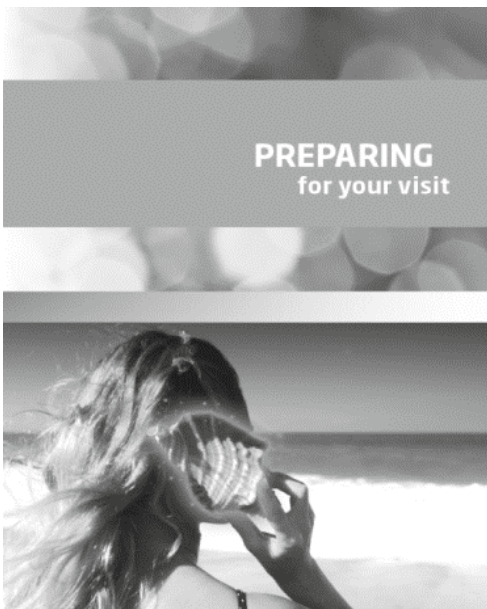
"I don't have to work as hard to be part of the conversation."



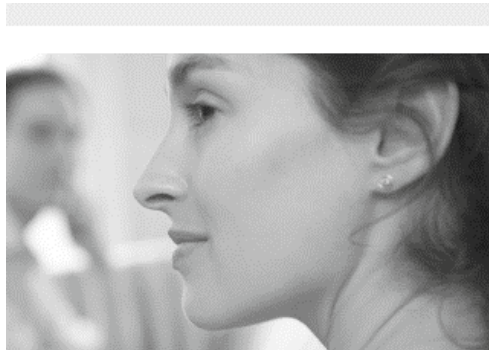
To understand speech, every detail in the signal is important.



Brochure used for study 2



Preparing For Your Hearing Consultation



Your hearing ability is as **UNIQUE** as your fingerprint.

Your sense of hearing is a vital link to your world—a source of pleasure, information and communication. A hearing assessment by a qualified hearing care professional is an important step in learning more

about your hearing capabilities. If you have a hearing loss, there is something you can do to take control of the situation. Hearing loss should not get in the way of enjoying your life.



If you have never visited a hearing care professional you probably don't know what to expect. You are in for a pleasant experience that is interesting, informative and a great start on your path to better hearing. You should feel at ease during this visit because you will have an opportunity to better understand your hearing needs and explore possible solutions.

Your Sense of Hearing Is Precious. Hearing contributes to personal safety, emotional well-being, and independence. Through your hearing you are able to communicate directly with others and experience the sounds in your environment. It's no wonder that hearing loss can be tiring

and a challenge. Studies have linked the effects of untreated hearing loss to many problems including stress, depression, isolation, reduced earning power, and even health issues. But thanks to major strides in the field of hearing care, there are solutions that can improve your life.



Did you know?

As you prepare for your appointment, there are a few things you need to know:

1. Two ears matter!

Your two ears work together to serve many purposes such as keeping you safe, locating where sound is coming from, and helping you following conversation. Think of your hearing as a system— your two ears and brain. Your ears funnel information into the system and your brain processes the information into sound. The system

(two ears and your brain) constantly takes in a wide variety of cues and automatically, and effortlessly identifies the sounds and locates where they are coming from. Imagine you are about to step into traffic. It is your two ears working together that let you know whether or not it is safe to proceed.

In noisy environments, your two ears work together to improve your speech understanding by providing access to the important details in the sound environment. The more detailed the information your brain receives the easier it is to identify what is being said. Using both ears allows you to focus on the person you want and helps you to disregard some of the background noise.

2. Sound Is an Individual experience!

Many people are surprised to find out that no two people experience sound in exactly the same way. Two people with identical test results will prefer their hearing devices to be set differently. These settings are more than mere preference.

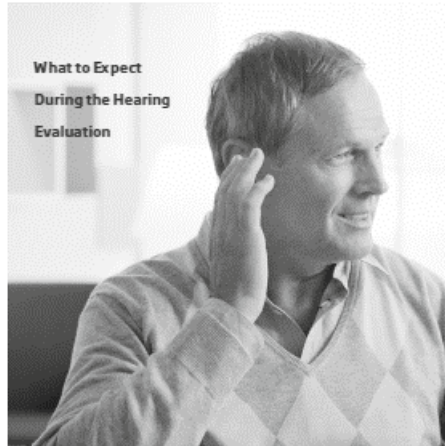
They reflect how each individual experiences sound. Therefore, the best listening experiences are those that can be customized to match your listening needs.

3. Living with a hearing loss can be tiring.

Getting through the day with a hearing loss can be hard work. Everyday situations require more effort in order to follow and understand what is being said. Conversations and situations most people normally take for granted are not always easy. All of this additional work adds up and at the end of the day you can feel exhausted. Finding a hearing solution that helps you go through your busy day without as much effort and stress is a key to success.



What to Expect During the Hearing Evaluation



To make the most of the evaluation it's best to come prepared. Before your appointment, spend a few moments thinking about how hearing affects

your life, what challenges you are experiencing, and what would improve if you could overcome these challenges.



Please answer these questions and bring them with you to your appointment. They will help your hearing care professional better understand your needs. It may also help if you can talk these over with your family and friends.

1. Do you think that you have a hearing loss? Please explain.

2. In which situations have you experienced challenges with your hearing?

3. Has your hearing been frustrating you?

Please contact us if you have any questions before your next appointment. It is important to us that you get the best possible results from your new hearing devices.

Hearing Care Professional: _____

Telephone number: _____

Date of fitting: _____

Date of follow-up: _____

www.avada.com



Letter used for Study 2

Dear <Patient Name>,

Preparing for your hearing care appointment

Thank you for making an appointment with us. We are very much looking forward to seeing you on:

<Day> <Date><Time>

Before we meet, it would be great if you could take a moment to read the enclosed brochure. It includes some useful basic information about hearing care that will help you understand what we talk about when you come in. It will also put you in a good position to ask us anything you may be unsure about.

Hearing is extremely personal. No one hears the same way you do. For this reason, the more we know about you and the situations and sounds you most enjoy, the easier it will be for us to find the ideal solution. We will explain more about this when you come in.

In the meantime, please fill out the questions in the back of the brochure and remember to bring it with you when you come for your appointment.

If you have any questions at all before then, please feel free to call or email.

With all good wishes,

5. CONCLUDING REMARKS

How does individual decision-making behavior impact value creation from innovation? By spanning the boundaries between behavioral science and management strategy, this thesis offers the possibility of advancing our understanding of the role of individual behavior and its implications for organizational strategies aimed to increase value creation for innovation. This offered a platform through which to identify a theoretical contribution by linking the literatures of innovation strategy and demand-side strategy through a behavioral science lens at the organization, dispenser and consumer levels. It provides a richer insight into the managerial implications by exploring the research question.

To what extent do behavioral bounds at the individual level affect value creation at the firm-side and the demand-side of the value chain, and what management practices can facilitate decision-making for improved value creation?

Following a demand-side view, value will be created by offering benefits, which establishes or increases consumers' subjective benefit preferences and valuation that then will induce payments from willing consumers (Priem, 2007). This strong focus on perceived benefits to the consumer does not mean that consumers' perspectives can stand alone. Instead, it complements and extends the strategic innovation perspectives by linking producer strategies with consumer benefits to maximize return from innovation. The innovation outcome that companies send to the market as well as the salespersons' expert value validation plays an important role in this process (Priem et al., 2012), especially in industries in which expert selection models are strongly represented, like the banking or medical industry.

Changing the focus of value creation from purely on WTP and opportunity cost toward subjective benefit preferences opens a perspective that can help determine whether behavioral bounds are at the heart of innovation “failure.” According to behavioral science theory, cognitive processes—representing the relationship between thinking processes and decision-making in a specific context (Neisser, 2014)—are predominant influencers of human behavior. Taking the perspective of ecological rationality processes (Gigerenzer, 2008), this thesis has proposed and tested a redesign of the decision-making environment to affect benefit preferences for innovation “success” through value creation, to help managers develop and deliver effective strategies. This will facilitate development of our understanding of how strategies for value creation can be managed and allow for a conclusive prescription toward managers and executives.

Although marketing researchers have used the behavioral frameworks to understand product adoption, bridging the gap between studies on innovation success, product adoption and behavioral science within the decision context has not gained a lot of attention in the management literature (Lehman, Chiu & Schaller, 2004). To help managers clearly address the challenges of bringing value from innovations brought to market, researchers have an obligation to explore whether their assertions bear out in reality. The aim of combining the three papers that form this thesis was to make theoretical, empirical and methodological contributions to our understanding of value creation in innovation.

To address the research question using the case of the hearing aid industry, an exploration of the different contexts in which cognitive bias affects decision-makers behaviors was carried out. By adopting a principal of methodological integration (Powell, Lovallo & Fox, 2011) within the three papers, the findings have helped further our methodological, theoretical and empirical understanding of how individual decision-making behavior impacts value creation from innovation.

The first paper (Chapter 2) explored how firms often combine different modes of ambidexterity in an approach we label "multidexterity". A detailed qualitative study of William Demant Holding contributed to building a new theory regarding how companies can best facilitate a multidextrous approach. This study links the balance between the contextual and structural modes in multidexterity to the usefulness and novelty dimensions of innovation through the behavioral traits of individual motivation. Chiefly, it proposed that contextual dominance drives usefulness and structural dominance drives novelty in innovation. These insights offer new perspectives on management innovation strategies, focusing on innovation focus and not only on innovation magnitude. Balancing novel and pro-social innovation outcomes, managers can strategically target consumer benefit preferences either through technology newness or perceived usefulness to support value creation, and thereby consumers' willingness to buy products.

The second paper (Chapter 3) explored how the intersection between behavioral science and a demand-side view can create novel insights on value creation for innovation and how these insights can guide incumbent firms facing new challenging market entrants. In contrast to current assumptions in which firms seek to respond to new technology market entrants quickly, the results of this study support incumbent firms building value creation in the form of subjective benefit preferences, not by chasing a fast response, but by prioritizing the current technology and business model. The value created via current solutions is mediated by

psychological ownership and the role of the salesperson as an expert validator of benefit value. These findings support a different strategy for allocating resources in R&D, marketing, and sales departments for companies that actively proceed with their current products and/or business models, compared to companies seeking to commercialize new products.

The third and final paper (Chapter 4) introduces a redesign of the decision-making context, using the construct of “processing fluency” (Schwarz & Kliban, 2004) in the sales environment. Results show an improved innovation outcome by strategically targeting value creation through a higher perceived premium benefit value at the level of the consumer, and increased validation of the premium benefits at the level of the dispenser, as indicated by higher average selling price (ASP) and net sales and the qualitative data collected among dispensers. The utility of process fluency in the retail environment is assessed as a method for improving organizational outcomes related to innovation. This study supports the use of the method to increase value creation, not by pushing new technological innovations, but through increasing self-efficacy in recommending products for the dispenser and increasing the relevance of product benefits to the consumer. These results imply that even though managers have expectations about the consumer’s perceived value, either due to the products having a long history in the market or the product having objectively better technology, there is a need for process fluency at the levels of both the salesperson and consumer to ensure value creation.

The ultimate goal is not to remove all biases and expect rationally predictable behavior, but to see managers as "decision architects" who acknowledge that it is not possible to change the way the brain is wired and instead focus on changing the context in which decisions are made (Beshears & Gino, 2015). Introducing process fluency into the sales context increases the adoption of higher tech level products without the need to introduce new products. Instead, by increasing the perceived relevance of product benefits, both for the customer and for the dispenser, decision ease is introduced into the recommendation and purchase of product innovations. This can help improve the perceived value of the innovations because it creates less demand on the consumer's cognitive capacity (Priem, 2007). When organizations acknowledge the need to prepare both the customer and the consumer with easily understandable information about product benefits, it has the potential to improve innovation outcome.

By using the framework of behavioral theories, this thesis aimed to address the challenges of complexity in measuring perceptions and behaviors and how those challenges can explain non-rational, low product adoption rates. A deeper understanding of the behavioral framework explicit to value creation thus offers a unique angle from which to investigate why

consumers decline to buy innovative products, even when those products offer distinct improvements (in terms of technology and/or design or business model) over existing ones, and why companies invariably place more faith in new products than is warranted.

LIMITATIONS AND FUTURE RESEARCH

Despite the evidence provided in this thesis to support the conclusions, the dissertation must be viewed in light of its limitations, which should be overcome in future research. First, all empirical data were collected from a single industry, the hearing aid industry, which provided an environment in which to explore the proposed research question while controlling for extraneous factors. To establish generalizability, it is important that the proposed findings be replicated and tested in other relevant industries to avoid firm-specific effects. Multiple industries are settings in which innovation is driven by technology height, well-informed experts act as value validators, and consumers' perceived benefit value is not strategically thought into the innovation management. Examples of such industry settings include banking and pharmaceutical industries.

The three studies that contribute to this thesis base their results on different methodological approaches, each having great advantages, but also different limitations. When quantitative methods stand alone, as in Paper 2 (Chapter 3), they may have lower interpretation bias than qualitative data but will be less able to capture the more finely spun aspects of human behavior. On the other hand, qualitative studies like Paper 1 (Chapter 2) offer a deeper insight into individual behavior and motivation guiding innovation outcome but are less generalizable. Thus, a future quantitative study investigating the findings from this study may allow generalizability to other industries. The third paper (Chapter 4) offers results from a test and control group experiment. Comparing a treated group to a non-treated group leads to the potential for the Hawthorne effect, which could be addressed by a future study in which a third group given a placebo treatment is introduced.

Due to the nature of the hearing aid industry, this thesis has focused on the mature consumer segment, or people aged 55 years and older. The findings from this generation, however, might not resonate with the coming generations' attitudes, motivations and preferences. In particular, the role of social media and online communication would be an interesting area for future research on the curse of knowledge in product adoption. In developing paths for future research, I also refer to insights generated by research outside the strategic management domain, i.e., behavioral science and marketing research. "Cross-fertilizing the

strategic management field with findings from other adequate areas can substantially contribute to the development of our knowledge about particular strategic management topics” (Furrer & Goussevskaia, 2008: 16). Also, human behavior is an extremely complex phenomenon, and even though this thesis offers insight into the behaviors of different decision-makers in the product adoption chain, it does not offer complete insight into the cognitive biases that management processes and practices need to address. I leave these questions for further research.

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TITLER I PH.D.SERIEN:

– a Field Study of the Rise and Fall of a Bottom-Up Process

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