

U can't touch this”

Stimuli design decisions and prototype trial in concept testing

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Abstract

New product development literature has underlined concept testing’s pivotal role in the introduction of successful products and the increasing need for enhanced guidelines in concept testing design to provide more reliable test results. Concept testing design involves decisions on stimuli presentation, respondent selection, response measurement; each of these might have a relevant impact on concept test validity. Prior work studies respondent selection and response measurement decisions. This work addresses stimuli design issues. Prior work investigated either prototype exposure or prototype trial. Our exploratory studies effectively measure the effect of product trial on concept evaluation by assessing concurrently the effects of prototype exposure and prototype trial. The work theorize conceptually and investigates empirically the effect of using a product prototype trial in concept evaluations on purchase intentions and price level and the difference in results when testing the use of prototype exposure alone. We find that prototype trial positively affects purchase intentions and willingness to pay a higher price. Stimuli design influences concept testing results. We discuss implications for research and managerial practice on concept testing.

INTRODUCTION

Companies cannot depend, in the long run, only on sales promotions, cost savings and quality improvements on their current product offering to meet profit and sales objectives (Hultink and Robben, 1995; Pauwels, Silva-Risso, Srinivasan, and Hanssens, 2004; Srinivasan, Pauwels, Silva-Risso, Hanssens, 2009). In competitive environments, companies need to constantly introduce new innovative products in a continuous stream of development and introduction, to keep maintaining a growing rate and profitability (Cohen and Levinthal, 1994; Hamel and Prahalad, 1991). At the same time, there is empirical evidence of high rates of unsuccessful new products introductions. According to a research by Ernst and Young (1999) the vast majority of new product fails within a year. Cooper (2001) states that only one product out of seven is successful and 44% of new product development projects fail to achieve their targets. Loch (2000) studies the application of 'best practices' principles in new product development projects. Hauser, Tellis, and Griffin (2006) note that for each new product success, the process begins with six to ten concepts that are evaluated as they move from opportunity identification to launch. Pauwels et al. (2004) show that innovation success is a key contributor to both long-term firm sales and financial and stock market performance; yet, they note also that failure rate has not decreased in recent years. Still, launching really innovative products creates value. Srinivasan et al. (2009) find that new-to-the-market innovations have an impact on stock returns that is seven times greater than new-to-the-company innovations, and their advertising support is also nine times more effective.

The role of the customer during the development process is of particular importance for the success of new products. Consumers are increasingly involved in the innovation process (Dahan and Hauser, 2002; Griffin and Hauser, 1993; Kaulio, 1998; Richard and Xiaohua, 2004; von Hippel, 1986, 2005). The involvement in new product development (NPD) process can take place in different manners and with different techniques. In concept testing, the 'voice of the customer' (Griffin and Hauser, 1993) is involved in the early phase of NPD;

customers are asked to evaluate a conceptual idea of the novel product. The company is shaping this by the metrics applied to new product management (Hauser and Katz, 1998).

This study addresses some issues on involving customers in concept testing studies that are deemed as relevant from a practitioner perspective. The work proposes that the use of prototypes already in the concept testing stage of the new product development process allows companies to better understand the marketability of the concept. There is an ample literature on the use of different stimuli designs to present a concept (Page and Rosenbaum, 1992; Dahan and Srinivasan, 2000; Lees and Wright, 2004; Klink and Athaide, 2006; Vriens, Loosschilder, Rosbergen, and Wittink, 1998); yet, only very few studies (Dickinson and Wilby, 1997; Hoeffler, 2003) suggest to study and investigate the effect of prototype trial on concept testing; we are not aware of an established stream of research on this topic though we regard it as particularly relevant for managerial decision making.

In particular, this work assess the role of prototype trial; prototype trial is different from prototype exposure. In prototype trial, respondents have the possibility to directly try the product concept and not only to observe its design. Respondents first have the possibility to observe the prototype (prototype exposure) and subsequently to experience a direct trial (prototype trial). In our work real prototype trial has been investigated. The use of prototypes is often considered costly to produce, inflexible, expensive and fragile to carry. Still, we suggest that the quest to save on costs by not including prototype trial might increase the risk to discard concepts where a go decision would have been more appropriate. This is especially relevant for products with high levels of innovativeness where not using prototype trial will increase the probabilities of a concept not being considered as valid. Designing concept testing studies with prototype trial is a relevant managerial decision to take and guidelines on whether and how to proceed are scarce, at best. Thus, the objective of the current work is to put forward some findings and making a call for more academic work on the issue.

According to Dolan (1994) anticipating product prototype in concept testing phase can provide earlier indications and avoid bigger financial losses. Srinivasan, Lovejoy and Beach (1997) show that, depending on the cost of developing a working prototype, it can be optimal to develop prototypes early in the process to test them in the early phases of product development. Dahan and Mendelson (1998) affirm that, in uncertainty conditions, the optimal number of prototype to produce can be more than a single prototype. Iansiti (1995) confirms that utilizing multiple prototypes early in the development process allows responding to better market and technology shifts and may shorten total development time. Cox and Cox (2002) note that managers may wish to incorporate repeat exposure particularly when concept testing complex product information, as it can reduce risk or uncertainty. Studying concept testing, Hoffman, Kopalle, and Novak (2010) make a call for the use of prototypes. We perform three studies where we can separate the effect of prototype exposure from prototype trial and find that prototype trial does positively affect purchase intentions and willingness to pay higher price. We suggest that the use of product trial in concept testing can provide better go/no go decisions and more reliable results. We propose that use of prototype trial in early stages of the NPD process allows managers to anticipate future reactions and better evaluate opportunities, future developments and gain a screening ability between different concepts.

The work is divided in four sections. First, we present the theory behind concept testing. Then, we address the theoretical background for prototype trial and its effect on concept testing. Next, we present the methodology of the studies and discuss results. Finally, conclusions and limitations of the work are presented.

CONCEPT TESTING: PURPOSE, VALIDITY AND THE ROLE OF STIMULI DESIGN

Both academic work (Feldman and Page, 1984; Moore, 1982, 1987; Page and Rosenbaum, 1992) and managerial practice (Ernst and Young, 1999; Holman, Kaas, and Keeling, 2003; Crawford, Gordon, and Mulder, 2007) consider concept testing as a mainstay of NPD, which is characterized as the process through which a new market opportunity is transformed into a product available for sale; concept testing holds a key role between concept generation and development stage (Gartner and Thomas, 1993; Krishnan and Ulrich, 2001; Mahajan and Wind, 1992). Further, involving customers during the NPD process has been identified of particular valuable for the success of new products (Dahan and Hauser, 2002; Griffin and Hauser, 1993; Kaulio, 1998; von Hippel, 1986, 2005).

Usually concept testing takes place through a survey during which the concept is presented to potential consumers. The concept, in this context, has been defined as: ‘A clearly written and possibly visual description of the new product idea that includes its primary features and consumer benefits, combined with a broad understanding of the technology needed’ (PDMA, 2010). The concept is presented as the product promise and it is constituted by a description of consumer needs that will be satisfied, and product form and technology (Crawford and Di Benedetto, 2008). In the concept testing process, customers are inquired about their thoughts, impressions and purchase intentions related to the concept. There’s an ample literature on concept testing, which involves work on concept testing relevance and purposes and on concept testing validity.

Concept testing relevance and purpose

Literature has since long and widely recognized the importance of concept testing in NPD to decrease uncertainty and to more effectively allocate resources early in the NPD process (Gartner and Thomas, 1993; Feldman and Page, 1984; Krishnan and Ulrich, 2001; Mahajan and Wind, 1992; Moore, 1982, 1987; Ozer, 1999; Page and Rosenbaum, 1992; Peng and Finn, 2010a).¹ Dedicating time and efforts in earlier phases of NPD process can save time overall,

improve product quality and results in a faster developing phase, with less loops back in the process for necessary revisions, even in the face of a certain time rush within companies to be first on the market introducing new and innovative products (Crawford and Di Benedetto, 2008).

Crawford and Di Benedetto (2008) summarize the different concept testing purposes in three main objectives: concept screening; sales estimation; idea improvement. Companies can decide to develop different concept simultaneously to answer different objective or even the same objective. Nelson (1961) and Abernathy and Rosenbloom (1968) state the value of developing more concept to pursue the same objective and test them in parallel and that under uncertainty and incomplete information a parallel strategy can provide tangible economic benefits. Sales estimation is usually gained through the intention to buy items, which are part of almost every concept test. The third purpose is to improve the concept, contributing to develop further the original idea, indicating main strengths and possible improvements, and identifying main attributes/benefits that lead to concept statement fulfillment. Theory on the diffusion of innovation (Rogers, 1995) and on lead users (von Hippel, 1986, 2005) has shown how the contribution of certain users can be relevant and valid also for concept development.

Several arguments have been put forward to stress the relevance of concept testing, which has been identified as valid to anticipate consumer behavior, to allocate resources in NPD process, and to choose which concept to develop. As the early phases in NPD are characterized by high uncertainty, concept testing results can be used to anticipate customers' behavior, point out corrections to take and provide directions to pursue for concept future development. During the 'fuzzy front end' phase, companies face imperfect information on consumers and markets, limited understanding of the technology, and uncertainty on the capacity to develop a product that reflects the ideal concept. Concept testing results can provide important indicators on where to allocate resources within the concept and also between different concepts (Peng and Finn, 2010a; Dahan and Mendelson, 2001). New

product managers can base project go/no-go decisions in the NPD process on concept testing results (Lees and Wright, 2004). Verifying the concept in a prelaunch phase allows product managers to have feedbacks on the proposal and to see initial reactions on the concept before putting more investments on it (Moore, 1982), though market share predictions based on purchase intentions have been found to be limited to measure competitive impact and cannibalization effect (Jagpal, Jedidi, and Jamil, 2007). In particular, results of concept testing can be determinant not only for the direction of the concept but even for its survival. Wrong or inflated results can lead to wrong evaluations and consequent wrong decisions on action to take.² Concept test accuracy and validity is at the base of a concept testing's future path; it can have a relevant impact on company performance. The validity of results is therefore at the base of efficient product management.

Concept testing validity

Literature has extensively focused on concept testing validity by assessing its ability to estimate future product acceptance and success (Kalwani and Silk, 1982; Taylor, Houlihan, and Gabriel, 1975; Mahajan and Wind, 1992; Peng and Finn, 2010a, 2010c; Morwitz and Schmittlein, 1992). In particular, studies investigate to what extent purchase intentions declared during the concept testing studies correspond to actual purchase behavior. We shortly discuss theoretical rationale, empirical findings and possible explanations for the variance in results of prior work.

The underlying theory of most studies done in concept testing is based on psychology reasoned action by Ajzen and Fishben (1980) and Fishbein and Ajzen (1975), which affirm that individual behavior is determined by its intention to perform that behavior, and its evolution, namely the theory of planned behavior (Ajzen, 1985, 1991, 2002; Ajzen and Madden, 1986), which introduces perceived behavioral control as a new antecedent to

intentions and behavior. Intention is, in turn, composed by attitudes, that are individuals' evaluation to perform that behavior, and subjective norms, that are the social pressures on individuals to perform or not perform a certain behavior (Fishbein and Ajzen, 1975); intentions are the immediate antecedent of behavior (Ajzen, 2002) and intentions fully mediate the impact of attitude towards the behavior and subjective norm on behavior, and partially mediate the impact of perceived behavioral control (Ajzen, 1991). The technology acceptance model (Davis, Bagozzi and Warshaw, 1989) proposes innovation characteristics of perceived usefulness and perceived ease-of-use rather than norms as antecedents of attitudes and intentions. The theory of trying (Bagozzi and Warshaw, 1990) thinks of behaviors as consisting of two intended actions and unintended actions and defines trying as a desired action whose performance the actor regards as problematic; the intention to try is composed of attitude and expectation of success or failure and the attitude toward the process of trying and subjective norm toward trying. The theory of reasoned action and the theory of planned behavior take final performance of actions as the dependent variables, whereas the theory of trying conceives of action as a process or a striving. Further, scholars in research streams conceptualize trust (e.g. Doney and Cannon, 1997; Morgan and Hunt, 1994), commitment (e.g. Moorman, Deshpandé and Zaltman, 1993; Pritchard et al., 1999), and/or satisfaction (e.g. Zeithaml et al., 1996) as predictors of behavioral intentions. In sum, determinants of intentions are different, but intention is commonly found as a major determinant of individuals' future behavior.³ Various academic works on concept testing focused on behavior intentions, but relative few studies have empirically investigated the relation between intention to buy and actual buying behavior related to concept testing studies.

Work by A.C Nielsen (1972), Taylor, Houlahan, and Gabriel, (1975) and Jamieson and Bass (1989) empirically confirms that there is a relationship between intentions declared during concept testing and real behavior; they study a call-back phase. They show also the presence of a very high variance. For example, in the study of Jamieson and Bass (1989) the

percentage of prediction accuracy ranges from 0% to 61.5%. There has been substantial interest in the literature to explain this variance. The large variation, in fact, suggests that low or high prediction can be due to specific conditions of concept testing (Ozer, 2011). Literature suggests different possible explanations, such as different environmental contexts on different testing occasions (Peng and Finn, 2010c); specific concept characteristics, like product category or product innovativeness (Gourville, 2006; Kalwani and Silk, 1982; Morris et al. 2003; Morwitz, Steckel, and Gupta, 1999); and concept testing design issues (Morris et al. 2003). A recent study by Ozer (2011) shows that the relationship between declared intentions and subsequent behavior is stronger when prior experience with the product category is higher and when consumers attach importance to that behavior.

Concept testing design involves decisions on stimuli presentation, respondent selection, response measurement (Klink and Athaide, 2006); each of these might have a relevant impact on concept test validity. Klink and Athaide (2006) study respondent selection and response measurement decisions. Peng and Finn (2010b) investigate respondent selection. Jagpal, Jedidi, and Kernan (1987) work on response measurement. This work addresses stimuli design issues; it investigates the use of prototype trial in stimuli presentation; prototype trial can affect concept testing results and, in turn, improve validity of concept test indications.

The role of stimuli design in concept testing: Theoretical background and empirical results

The use of different stimuli allows presenting a concept in different ways in terms of content and forms. In concept testing, firms decide how they want to present a product concept. This is relevant since if not enough information is given, respondents will not be able to provide reliable response while if more information is given than available in the marketplace, the responses might lead to errors in prediction and “the results of the measurement exercise will be skewed” (Hoeffler, 2003: 407). A concept is usually presented through a concept

statement; a description that illustrate the concept and its main characteristics. The concept statement can be enriched with concept drawings, pictures or prototypes. Literature addressed the different possibilities in the choice of a stimuli design proposed when using different stimuli. There are studies regarding the different choices in stimuli design on statements' styles; statements with visual descriptions; and statements with product prototypes (Figure 1).

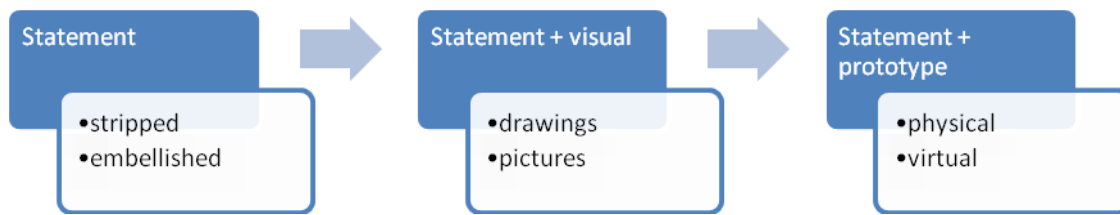


Figure 1 - Different formats of stimuli in concept testing

Findings on the effect of different styles of statements

Lees and Wright (2004) distinguish between stripped descriptions and embellished descriptions. Stripped descriptions - also known as brief (Page and Rosenbaum, 1992; Armstrong and Overton, 1971), factual (Tauber, 1972; Dolan, 1994), bland (Moore, 1982), and objective (Page and Rosenbaum, 1992) - are simple, descriptive and written in a non-emotional style. On the other hand, embellished descriptions are concept statements written in a commercialized or advertising style with a more persuasive tone. Embellished descriptions have also been referred to as comprehensive description (Armstrong and Overton, 1971), advertising format (Tauber, 1972), promotional (Moore, 1982), persuasive (Marder, 1997; Page and Rosenbaum, 1992; Dolan, 1994) and commercialized (Crawford and Di Benedetto, 2008) statements.

Dolan (1994) and Marder (1997) expect higher scores when using an embellished concept. Yet, Lees and Wright (2004) did not find differences in results of concept statements with

stripped statements as compared to embellished statements. There are no conclusive findings in the literature on the effects of different styles of statements.

Findings on the effect of visuals

The use of drawings and pictures with concept statement can clarify concept characteristics and represent aesthetic elements. Jansen et al. (2009) in a study on the impact of images find that the presence of pictures made the respondents more inclined to base their evaluations on what they see respect to what they read. They suggest using the support of pictures when design/aesthetics is the main purpose of the test. They recommend using more than one image, in order to decrease the impact of specific details, and to reduce as much as possible non relevant details, which can be a source of disturbing factors. Holbrook and Moore (1981) find differences, but Domzal and Unger (1985) in a replication study do not find differences in the number of significant main attribute effects when pictures are used or not. Lees and Wright (2004) did not find differences in result scores when concept statement was presented with drawings compared with statement alone. Vriens, Loosschilder, Rosbergen, and Wittink (1998) find a positive effect of the use of pictures. Thus, findings in the literature are inconclusive.

Findings on the effect of prototype exposure and trial

Using prototypes together with statements in concept testing, when feasible, can provide a direct visualization or experience with the novel product concept. We can distinguish between virtual and physical prototypes. Dahan and Srinivasan have suggested that, given a pressing need for low-cost, parallel testing of new product concepts (2000: 100), virtual prototypes of product concepts can “substitute” (2000: 99) physical prototypes and that virtual representations allow design teams to select the best of several new concepts within a product category with which to proceed, without having to develop a physical prototype (2000: 99).

Prototype testing allows determining if the product lives up to its expectations, how it can be improved and how consumers' preferences change after the trial (Moore and Pessemier, 1993). In addition, using prototypes is set to provide more reliable predictions on repeated purchases. According to Tauber (1975), the use of prototypes can, therefore, give a more accurate measure of purchase intention and, eventually, repeated behavior (Tauber, 1975).

Domzal and Unger (1985), Dickinson and Wilby (1997), and Hoeffler (2003) did not find statistical differences between concept statement alone and tests with the use of prototypes. A recent study by Dahan and Srinivasan (2000) provides different results; they conduct an experiment study using verbal concept, physical prototype exposure, and virtual prototype to present the same concept and find market share prediction for virtual and physical prototype higher compared to verbal stimuli. Further of interest are the findings of Soderman (2005); he investigates the use of visual sketches as compared to a context of virtual prototypes and to a real product prototype and finds that participants who were exposed to visual sketches and virtual representations were much less certain regarding their understanding of the product they had to assess than the participants involved in prototype exposure. Moreover, participants with exposure to the product prototype were more positive in their evaluations of the concept. Thus, findings in the literature are inconclusive.

In analyzing stimuli design decisions, researchers usually investigate how the results of studies on concept statement combined with virtual prototypes compare to studies, which combine concept statement with exposure to physical prototypes. Dahan and Srinivasan (2000) did not find significant differences between the use of physical prototypes and virtual prototypes. Soderman (2005) on the other hand finds that participants who were exposed to virtual representations were much less certain regarding their understanding of the product and suggests that though virtual prototypes provide results, they might miss physical/tactile interactions which can be provided only by physical prototypes. Again, there are no conclusive findings in the literature on the effects of different, virtual or real prototype, styles.

In our study, we distinguish between prototype exposure and prototype trial, in addition to styles of verbal statements and visuals. Prototype trial constitutes a particular stimuli presentation of a concept through prototypes. Prototype trial is different from prototype exposure alone, where respondents have the possibility to observe a real prototype, since in prototype trial respondents have the possibility also to directly try and interact with the product. The 37 participants in the Soderman (2005) study were exposed either to prototype exposure or to prototype trial or to visuals only. Prototype trial is investigated by Dickinson and Wilby (1997) with 133 participants and by Hoeffler (2003) with 44 participants in one study and 25 in the other study. Dahan and Srinivasan (2000) study prototype exposure with 102 participants. In our three studies, participants are exposed to both prototype exposure and prototype trial. We study stimuli design decisions in concept testing and suggest that the use of prototype trial to reduce concept-test errors might be important for two reasons.

First, the use of prototypes may enable customers to gain confidence in their ability to assess the product concept on two dimensions; they can become familiar with the product through product-related experiences (Alba and Hutchinson, 1987) and the use of prototypes provides them with confidence in the product concept by allowing them to affirm the ability to perform product-related tasks successfully.

Second, the use of prototype trial in concept testing does, in addition to allow participants to assess their ability in the interaction with the product concept differently, also allow participants to overcome rejection for innovative product concepts based not so much on a benefit that is irrelevant or unappealing to the participant, but on doubts that the product cannot deliver on the actual appeal of the innovative concept itself.

In sum, the use of different stimuli affects concept test results and provides indications on different stimuli choices. The use of prototype is set to increase concept evaluations and represents an opportunity in stimuli design to get more valid results. Physical prototype trial and its effect on concept evaluations has been only marginal investigated, even though the use

of physical prototype trial represents a possibility to improve effectiveness and efficiency of the NPD process. Our exploratory work addresses this issue and analyzes the effect of prototype trial on the evaluations of the concept. Among the different variables that affect the design of traditional concept testing studies, this exploratory work investigates the use of prototype trial versus prototype exposure in concept stimuli, which represents a possible source of differences in outcome of concept testing studies and, in turn, on company's decisions and performance outcomes. We describe the theoretical background, present the methodology and results of the empirical study, and discuss them.

STUDY 1: CONFIDENCE TO ASSESS PURCHASE INTENTIONS WITHOUT PROTOTYPE TRIAL

We assess the role of stimuli design in concept testing in general and the role of prototype trial in particular. We theorize that the use of prototype trial to reduce concept-test errors might be important for respondents' confidence in their ability to assess the product concept. Respondents gain confidence to assess the concept as in prototype trial they can become familiar with the product through product-related experiences (Alba and Hutchinson, 1987) and the use of prototypes provides them with confidence in the product concept by allowing them to affirm the ability to perform product-related tasks successfully.

We include in our empirical study work on concepts that differ in the degree of innovativeness.. We show that there is a difference in results if respondents are exposed to prototype trial if compared to compared to prototype exposure and also if compared to concept statement board in an embellished version or concept statement board and visuals or video.

Investigating effect of stimuli design on purchase intentions and willingness-to-pay for a non-durable product with a high degree of innovativeness

This concept testing study has been carried with the aim to evaluate the potential of a new product concept with a high degree of innovativeness in the food industry. The study involved testing the concept by using concept statement board or concept statement board with visuals or concept statement board with a video and prototype exposure or concept statement board with prototype trial. The company aims at testing the potential for an innovative concept with which you can consume meals produced in Italy that have been prepared with the Sous-Vide cooking technique. The Sous-Vide cooking technique has several benefits, such as keeping the nutritional characteristics of the ingredients and exalting the organoleptic qualities of the meal. In addition, each meal can be prepared due to innovation in technical packaging in less than three minutes by using a simple home appliance device. Thus, the concept aims at delivering the original taste of high quality Italian cuisine while providing alleviations through time savings for time-starved target customers. There are no such products to be found on the shelves of retailers at the time of the study. This product would classify as a product introducing a new product category product or as a classically innovative, new-to-the world product.

This concept testing study has been conducted in Italy where the consumption of the kind of the dishes that the company offers is high outside-home, like in bars and restaurants, and in-home; it is part of individual consumption habits of a majority of the population.

Methodology

A sequential monadic concept test has been conducted on potential customers. The participants were presented the concept in one of four different types of stimuli design, (embellished) concept statement board or concept statement board with visuals or concept

statement board with a video and prototype exposure or concept statement board with prototype trial.

The participants were in a first step exposed to one of the four stimuli designs and were given a questionnaire with same questions for all respondents. In each questionnaire, independently of stimulus design, a brief description of the product and of its characteristics was included: the new concept, in an embellished form, the sous-vide technique used to prepare the meals and the benefits were presented to respondents. It took participants about 20-25 minutes to fill in the questionnaire and, at the end, each respondent was given a sample of the prototype. In a second round, all the participants could have at least one experience of prototype trial independent of the stimuli design they were exposed to in the first round. The second round took place several days later; the same respondents were asked to fill another, shorter questionnaire, in which a more synthetic description of the product was presented and some of the questions included in the first survey on purchase intentions and willingness-to-pay were submitted again in an unvaried form.

Sample

The sample comprises 50 individuals; age 35-60, employed in a full-time job in a law office. Respondents were selected on the basis of a pre-determined target customer group for this innovative concept, which was conceived for people with the particular need of saving time while aiming at consuming a high quality product. The company considered that the respondents exhibit demand for consuming a tasty meal in a short time period, such as the lunch break during the office time; billable hours are a measure of lawyers' productivity. Moreover, not less important, the target was according to the company composed by individuals able and willing to pay a premium-price compared to the alternative of preparing the dish by cooking it themselves.

Fieldwork and interview location

Interviews have been carried out in the office of the law firm in Rome. Respondents have been pre-recruited through an ad hoc questionnaire to verify eligibility conditions (correspondence with targeted sample) and respondent's availability.

Questionnaire

The questionnaire of the first round was made up of six different sections. The first section asked questions about frequency of the person cooking on his or her own and drivers of cooking (whether they cook because they like cooking or because it is cheaper than going out, etc.); the second section was on eating at lunch and at dinner. The third section described the concept and asked questions, among others, on interest, overall liking, uniqueness, and purchase intentions. Further, respondents answer questions related to price levels; the respondents are asked the spontaneous prices indications they are willing to pay for the product concept; so high that they would no longer be willing to pay for it; so expensive that they not even consider buying it; and so inexpensive to question its quality; so low that you doubt its quality. Moreover, the respondents were asked questions about their habit to purchase grocery in section four, information about their person in section five and about their occupation in section six.

In the second round, after all respondents had tried at a location of their convenience (home or office) the prototype, they were asked to fill in a questionnaire with two sections. The first introduced again shortly into the innovative concept and asked questions about willingness-to-pay, uniqueness, interest, overall liking and purchase intentions. The second section, included questions on eating at lunch and at dinner.

Results

The results of this study show that differences in stimuli design will lead to differences in results in the level of purchase intentions and willingness-to-pay.

Stimuli design and purchase intentions

The results show that the innovative concepts scored consistently higher in the respondent group who in stimuli design was exposed to prototype trial.

Table 1. new product concept measures for each group of tests with different stimuli

	Concept statement				Concept statement + Visuals			
	<i>Purchase intentions.</i>	<i>Overall Liking</i>	<i>Product Interest</i>	<i>Uniqueness</i>	<i>Purchase intentions</i>	<i>Overall Liking</i>	<i>Product Interest</i>	<i>Uniqueness</i>
Mean	3	2,9	2,9	3	3,091	2,636	2,545	2,818
St. Dev	0,94	1,2	1,2	1,49	1,514	1,027	1,036	1,328
Mode	3	2	2	2	3	3	3	3

	Concept statement + Video + Exposure				Concept statement + Prototype Trial			
	<i>Purchase intentions</i>	<i>Overall Liking</i>	<i>Product Interest</i>	<i>Uniqueness</i>	<i>Purchase intentions</i>	<i>Overall Liking</i>	<i>Product Interest</i>	<i>Uniqueness</i>
Mean	2,364	2,727	2,455	2,818	3,824	3,529	3,353	3,882
St. Dev	1,027	1,489	1,036	1,168	1,468	1,231	1,169	1,495
Mode	3	1	2	2	4	4	2	3

The respondents who have tried the prototype product before responding to the different concept testing questions scored about 0,8 points respectively 1,5 points distant from those group of respondents exposed to a different stimuli design. It is notable that the responses of the respondent group exposed to concept statement and prototype trial exhibit a high standard deviation. This might be due to the fact that, taste is much more subjective than other characteristics of the product; related and notable we find in our work that taste represents the most relevant decision criterion in food purchase criteria. Confirming our results, mode for purchase intention and overall liking in this respondent group are highest.

Table 2. Mean, Standard Deviation and Mode's comparison for new product concept measures for each group of tests with different stimuli in the first and second round

	Purchase intention		Product Interest		Overall Liking		Uniqueness	
	<i>First Round</i>	<i>Second Round</i>	<i>First Round</i>	<i>Second Round</i>	<i>First Round</i>	<i>Second Round</i>	<i>First Round</i>	<i>Second Round</i>
Mean	3,16	4,57	2,88	4,17	3,02	4,13	3,22	4,23

St. Dev	1,37	1,45	1,15	1,43	1,27	1,23	1,43	1,5
Mode	3	5,6	2	4,2	3	4,2	3	4,2
p-value	0,0000		0,0000		0,0001		0,0016	

While a statistical test of the null hypothesis according to which there are no statistical significant difference for purchase intentions or willingness-to-pay due to stimuli design was not applied in the analysis of the first round because of small sample size of the different respondent groups, we compared the responses of the first round with the results of the second round. We find that there are significant differences in responses to purchase intentions expressed after prototype trial when compared to other stimuli design choices. This provides support for the role of prototype trial in concept testing.

Stimuli design and willingness-to-pay

The results of this study show the respondent group exposed to prototype trial is willing to pay a higher price.

Table 3. Measures of willingness-to-pay of each respondent group exposed to different stimuli design

	Concept Statement	Concept Statement + visuals	Concept Statement + video + exposure	Concept Statement + prototype trial
Mean	3,000	3,545	3,800	4,406
St. Dev	0,940	2,285	1,889	0,800
Mode	3	5	5	4

The mean result is highest when prototype trial was involved in the concept testing. Respondents exposed to prototype trial were willing to pay a 47% higher price than those respondents exposed to the concept statement board or 25% respectively 16% a higher price when compared to respondents who were exposed to concept statement board and visuals respectively a video and prototype exposure. Moreover, for the prototype trial group, the standard deviation was the smallest meaning that respondents of this group on average

expressed a more similar assessment of their willingness of paying a certain price than the other respondent groups.

Table 4. Mean, Standard Deviation and Mode's comparison for willingness to pay in the first and second round

	Willingness to Pay	
	<i>First Round</i>	<i>Second Round</i>
Mean	4,06	4,13
St. Dev	1,66	1,13
Mode	5	5
p-value	0,8134	

Respondents who were exposed only to the concept statement board exhibited the lowest willingness-to-pay; they were also consistent in their assessment compared to other respondent groups given the relatively low standard deviation.

In addition, after round two respondents expressed now that they have tasted the prototype a higher willingness-to-pay than when exposed to concept statement board solely or to concept statement board and visuals or to concept statement board and video and prototype exposure. In addition, it is to be noted that the mean after prototype trial for all respondents was very similar to the mean of the respondents with prototype trial already in the first round; there is no significant difference. Further, there is a decrease in standard deviation. When asked second time how much they would have been willingness to pay for the product, respondents, on average, stated a higher amount and agreed to a higher extent on the amount. Thus, respondents that are exposed to prototype trial agree overall on a price level, which is a price level very different from the price level indicated if not exposed to prototype trial. Thus, the results of study 1 state that differences in stimuli design will lead to differences in purchase intentions and willingness-to-pay; stimuli design influences concept testing results.

Investigating effect of stimuli design on purchase intentions and willingness-to-pay for a non-durable product with a low degree of innovativeness

This concept testing study has been carried with the aim to evaluate the potential of a new product concept with a low of innovativeness in the food industry. The study involved testing the concept by using concept statement board or concept statement board with visuals or concept statement board with a video and prototype exposure or concept statement board with prototype trial. The study aims at testing the potential for an innovative product, namely a yoghurt made of so-called South–American superfruit (berry) açai. In studies, it is affirmed that açai exhibits the highest levels of antioxidants, which provide anti-aging effect, among all natural products in the world known so far. Thus, it is declared that açai exhibits several benefits, such as containing vitamins, which improve visual acuity or those improving memory, concentration, and sleep, etc. The concept statement board notes that “some of the healthy elements in fact are only found in açai and no other natural product in the world. The yoghurt provides the daily amount of elements and vitamins to keep both kids and adults healthy and beautiful.” There are no such products to be found on the shelves of retailers at the time of the study; this product would classify as a line extension product.

This concept testing study has been conducted in France and in the European part of Russia where the consumption of this kind of food category is high.

Methodology

A sequential monadic concept test has been conducted on potential customers. The participants were presented the concept in one of four different types of stimuli design, (embellished) concept statement board or concept statement board with visuals or concept statement board with a video and prototype exposure or concept statement board with prototype trial.

The participants were in exposed to one of the four stimuli designs and were given a questionnaire with same questions for all respondents. In each questionnaire, independently of

stimulus design, a brief description of the concept and of the product characteristics was included in an embellished form.

Sample

The sample comprises 50 individuals; age 22-60, both students and people employed in a full-time job. Respondents were selected on the basis of a pre-determined target customer group for this innovative concept, which was conceived for people who care about healthy food. It was considered that the respondents exhibit high levels of demand for consuming a healthy food products. Moreover, the target was composed by individuals able and willing to pay a premium-price for what they consider a healthy product.

Fieldwork and interview location

Interviews have been carried Paris and in the European part of Russia and in Moscow. Respondents have been pre-recruited through an ad hoc questionnaire to verify eligibility conditions (correspondence with targeted sample) and respondent's availability.

Questionnaire

The questionnaire was made up of four different sections. The first section asked questions about health products in general and healthy food in particular. The second section described the concept and asked questions, among others, on interest, overall liking, uniqueness, and purchase intentions. Further, respondents answer questions related to price levels; the respondents are given price ranges and are the price range level they are willing to pay for the product concept. Moreover, the respondents were asked questions about information about their person and their occupation in section three.

Results

The results of this study show that differences in stimuli design will lead to differences in results in the level of purchase intentions. Thus, , stimuli design decisions may affect the outcome of concept testing studies.

The results show that the innovative concepts scored consistently higher in the respondent group who in stimuli design was exposed to prototype trial.

Table 5. New product concept measures for each group of tests with different stimuli

	Concept statement				Concept statement + Visuals			
	<i>Purchase intentions.</i>	<i>Overall Liking</i>	<i>Product Interest</i>	<i>Uniqueness</i>	<i>Purchase intentions</i>	<i>Overall Liking</i>	<i>Product Interest</i>	<i>Uniqueness</i>
Mean	3,618	3,225	3,564	3,273	3,673	3,273	3,618	3,291
St. Dev	0,68	0,645	0,601	0,706	0,610	0,622	0,593	0,685
Mode	4	3	4	3	4	3	4	3
Top box	7%	0%	2%	0%	7%	2%	4%	0%
Top two	58%	35%	58%	42%	60%	38%	61%	40%

	Concept statement + Video + Exposure				Concept statement + Prototype Trial			
	<i>Purchase intentions</i>	<i>Overall Liking</i>	<i>Product Interest</i>	<i>Uniqueness</i>	<i>Purchase intentions</i>	<i>Overall Liking</i>	<i>Product Interest</i>	<i>Uniqueness</i>
Mean	4,327	3,727	4,400	3,818	4,291	4,091	3,800	3,891
St. Dev	0,640	0,592	0,784	0,819	1,048	1,110	0,869	0,832
Mode	4	4	5	4	5	4	5	4
Top box	40%	16%	56%	20%	58%	46%	16%	26%
Top two	87%	66%	86%	65%	79%	75%	78%	61%

The respondents who have tried the prototype product before responding to the different concept testing questions scored about 0,6 points from those group of respondents exposed to concept statement board and concept statement board and visuals. It is notable that the responses of the respondent group exposed to concept statement and prototype trial exhibit a high standard deviation. This might be due to the fact that, taste is much more subjective than other characteristics of the product. We find in our work that taste represents the most relevant decision criterion; 56% of the respondents said that the taste is a “very important” criteria for them when it comes to making a purchasing decision regarding

yoghurts. Confirming our results, mode for purchase intention and interest in this respondent group are highest.

Only 7% of respondents exposed to concept statement board or concept statement board and visuals stated that they would definitively buy the new product, more than 55% would definitively buy the new product when exposed to prototype trial. The results of the top two box of responses to purchase intentions when exposed to concept statement or concept statement and visuals would indicate not to pursue the innovative concept. Results are different when respondents are exposed to concept statement and prototype trial. Interestingly, the results are not very different if we compare prototype exposure to prototype trial, a finding we will explore upon in our discussion section. Overall, we find in study 2 differences in responses to purchase intentions expressed after prototype trial when compared to other stimuli design choices.

Stimuli design influences concept testing results. We find that it does so both in the context of concepts with a high degree of innovativeness or a new product category product (Sous-Vide study) and with low degree of innovativeness or a line extension product (yoghurt made of açai study). Respondents gain confidence to assess the concept as in prototype trial they can become familiar with the product through product-related experiences (Alba and Hutchinson, 1987) and the use of prototypes provides them with confidence in the product concept by allowing them to affirm the ability to perform product-related tasks successfully.

STUDY 2: CONFIDENCE IN THE EVENTUAL PRODUCT FULFILLING CONCEPT'S BENEFITS

We performed assess the role of stimuli design in concept testing in general and the role of prototype trial in particular. We theorize that respondents gain confidence to assess the concept as in prototype trial they can become familiar with the product through product-

related experiences and the use of prototypes provides them with confidence in the product concept by allowing them to affirm the ability to perform product-related tasks successfully.

The concept testing study has been carried out by TNS, a market research company, for a consumer good firm with the aim to evaluate the potential of a new product concept. The study involved testing the concept by concept statement board and prototype exposure and concept statement board and prototype trial. The company aims at testing the potential of a device for espresso machines for home usage. The product prototype is a device for the preparation of hot beverages, which is used together with an espresso machine for home usage; a steam arm is incorporated, which can be utilized for the preparation of hot milk-based coffee beverages. Thus, the consumer can prepare herself thanks to the device a “caffè macchiato” that is an espresso filled with hot steamed milk. The device is constituted by a cylindrical jar that connects through a pipe with the steam arm of the machine and which can automatically prepare a variety of hot beverages like cappuccino and caffè macchiato in an easier manner by pushing a single button; furthermore, the final results exhibits a higher quality than the preparation of the beverages with espresso machines but without this new device.

This study has been conducted in Italy where the consumption of these kind of beverages, cappuccino or caffè macchiato, is high outside-home, like in bars and restaurants, and part of individual consumption habits of a majority of the population, but low in the in-home habitat. The concept is aimed at increasing the appeal and the consumption of milk-based coffee beverages at home and at offering a device able to complement and improve the company's value proposition of espresso machines for home usage.

Methodology

A monadic concept test has been conducted on potential customers. The concept has been presented through a concept board with product description in an embellished style and a working product prototype.

The participants were in a first step exposed to the concept statement and prototype exposure: “Now I’m going to show you a new product. Please observe the product and read carefully the description of the product on this board”. They were given a questionnaire to fill in. In a second step, they went through prototype trial: “Now I’m going to demonstrate you how the products works, then, you will have the possibility to directly try the product preparing a cappuccino or a caffè macchiato.” Again, they filled in a questionnaire.

Sample

The random sample comprises 150 individuals; 20-50 years old, in charge of the acquisitions for the household and owners of electric espresso machines with a steam arm for home usage and regularly drinking a cappuccino or a caffè macchiato. The sample includes a boost sample of 75 individuals, which are owners of a company-branded machine, selected among customers on company database. Quotas have been applied on gender (30% male and 70% female), age (50% 20-35 years old and 50% 36-50 years old), and geographical area (50% in Milan and 50% in Rome).

Fieldwork and interview location

Interviews have been carried out in locations in Milan and Rome. Respondents have been pre-recruited through an ad hoc questionnaire to verify eligibility conditions (correspondence with targeted sample) and respondent’s availability. Interviews have been collected through computer assisted personal interview technique (CAPI); interviewers enter answers on a computer terminal that assists them during the interview.

Questionnaire

Respondents' habits are investigated on frequency of hot beverages consumption and frequency of usage of the steam arm of the espresso machine for the preparation of milk-based coffee beverages. The concept board is shown to the respondents together with the product prototype; respondents are given all the time needed to read the board and observe the prototype, which is present in front of the respondents throughout the complete interview process. First, there is prototype exposure; a demonstrator shows how to use the prototype by preparing a cappuccino. Respondents are interviewed on interest, overall liking, uniqueness, and purchase intentions (5-points scale).

Further, respondents answer questions related to price levels; the respondents are asked the spontaneous prices indications at which they consider the product concept as a good value; becoming expensive but still worth considering to buy it; so expensive that they not even consider buying it; and so inexpensive to question its quality. Respondent are asked their purchase intentions (5-points scale) with respect to the price they indicate as being at a good value and to the price level they indicate as expensive but still worth to buy it, and questions on the frequency of usage they foresee for the usage of the concept would they own it.

Next, there's the prototype trial phase; respondents are asked to directly try the prototype by using the device themselves. Afterwards, the questions on interest, uniqueness, overall liking and purchase intentions and on spontaneous price evaluations are repeated.

In addition, respondents are asked questions on the frequency of usage they foresee for the usage of the concept would they own it (usage habits) and, in the end, general questions on socio-demographic characteristics.

Results

The results for prototype exposure indicate a positive acceptance in terms of interest generated (72% of top-2 boxes), overall liking (4.00) and uniqueness perceived (3.25 on a 5

points scale). There was reasonable variation between the means and around the means shown in Table 1. Different items generated different average scores, which is in line with the work by Lees and Wright (2004).

	Interest (Five-Point Scale)	Overall liking (Six-Point Scale)	Uniqueness (Five-Point Scale)	Purchase Intention (Five- Point Scale)
Average	3.75	4.00	3.25	3.60
Top Two-boxes	72%	43%	36%	63%

Table 1 – Concept Evaluations average and top-two boxes n=150

We find that prototype trial affects purchase intentions and price sensitivity, and prefigured usage. Purchase intention are already high before prototype usage demonstration and prototype trial; the top-2 boxes level (definitely or probably buy) comprise 63% of respondents and a purchase intension average of 3.60 out of 5 overall and 3.76 for the Milan-based respondents. After prototype usage demonstration and trial, intention to buy is statistically higher as results for definitely would buy the product pass from 12% to 37% and for probably or definitely would buy it from 63% to 85% (see Figure 2).

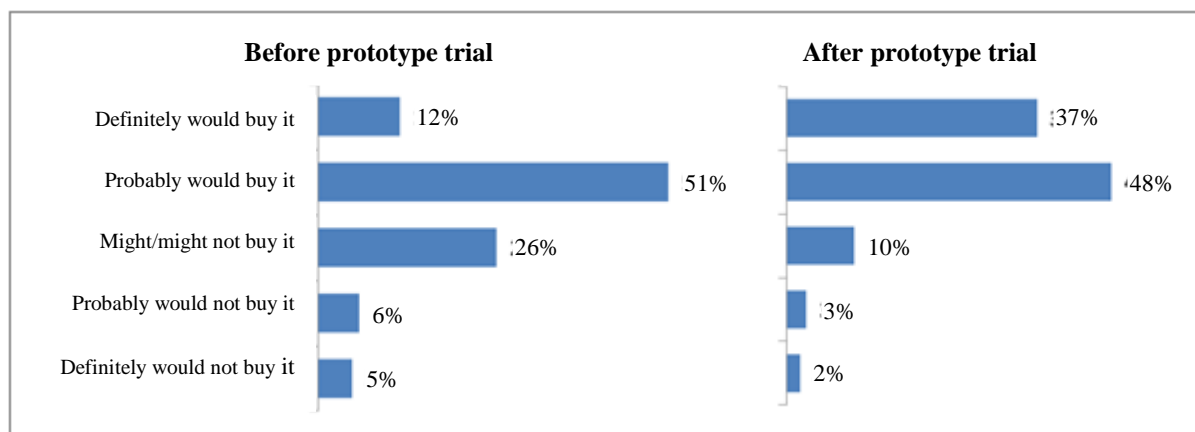


Figure 2 – Study 1: purchase intention before and after prototype trial n=150

The effect of prototype trial is positive across all the different demographics categories (see table 1); in specific, we find that the effect takes place across age and sex groups in a

common manner. Lower levels prior to trial of respondents who would definitely buy systemically increase to higher levels after trial, with the same extent on both categories.

Base:	Total		20-35 years old		36-50 years old		Male		Female		Brand possessors	
	Before	After	Before	After	Before	After	Before	After	Before	After	Before	After
	150	150	75	75	75	75	45	45	105	105	75	75
	%	%	%	%	%	%	%	%	%	%	%	%
Definitely would buy it	12	37	12	37	12	36	13	36	11	37	9	33
Probably would buy it	51	48	48	49	55	48	53	49	50	49	51	44
Might/might not buy it	26	10	28	7	24	13	22	9	28	10	24	15
Probably would not buy it	6	3	8	4	4	1	9	2	5	3	7	4
Definitely would not buy i	5	2	4	3	5	1	2	4	6	1	9	4
Top 2 boxes	63	85	60	87	67	84	67	84	62	86	60	77
average	3.6	4.15	3.56	4.15	3.64	4.16	3.67	4.09	3.57	4.18	3.44	3.99
std.dev.	0.94	0.86	0.95	0.91	0.94	0.81	0.9	0.97	0.96	0.81	1.07	1.01

Table 2 - Purchase intention before and after prototype trial among sub-breaks.

We also find a positive effect of prototype trial on willingness to pay. We analyze at different price levels, cumulative frequencies of price consideration (good value, expensive, too expensive, too cheap) and dimensions of acceptable price and find that acceptable price level range raises from the € 22,5–€35 price range before to € 27,5–€40 after trial.

Thus, the results of this study indicate that differences in stimuli design will lead to differences in purchase intentions and willingness-to-pay; stimuli design influences concept testing results. Prototype trial may allow respondents to gain confidence to assess the concept as in prototype trial they can become familiar with the product through product-related experiences and the use of prototypes provides them with confidence in the product concept by allowing them to affirm the ability to perform product-related tasks successfully.

DISCUSSION

Klink and Athaide (2006: 367) affirm that “considerable opportunity exists for future research to investigate stimuli design issues in concept testing.” We investigate prototype trial and find that prototype trial when compared to solely prototype exposure or other forms of stimuli design, such as embellished concept statement board or concept statement board with video,

positively affects purchase intentions and willingness to pay a higher price. The results of this study show that differences in stimuli design will lead to differences in results in the level of purchase intentions and willingness-to-pay. Thus, in addition to respondent selection (Peng and Finn, 2010b) and response measurement decisions (Jagpal, Jedidi, and Kernan, 1987), stimuli design decisions may affect the outcome of concept testing studies.

Given that Peng and Finn (2010c: 378) find that concept test evaluations provided on an initial exposure are more favorable than evaluations received on any later occasions, our findings are particularly relevant for managerial decisions on concept testing design. In addition, we explore the reliability of prototype trial in the light of recent research on virtual concept testing and elaborate on the implications of our results for the usefulness of prototype trial as stimuli design for concept evaluation. Finally, we discuss the usefulness of prototype trial as stimuli design for concept evaluation.

The effects of prototype trial on purchase intentions

Purchase intentions, after prototype trial, increase both on average and for the top-2 boxes, which inquire whether respondents would definitely or probably buy the item. We propose two reasons for this finding, namely that trial enables respondents to assess whether the innovative concepts can deliver on its promise and that trial enables respondents to gain familiarity and expertise. Morris, Abrams, de Moura and Durlach (2003) note that while consumers do not have difficulties in evaluating concepts of not very innovative, me-too product concepts, they have less confidence in their evaluation of more innovative concepts, with which they do not have any prior personal experience. They suggest that time delay between presentation of an innovative product concept and its subsequent evaluation will increase the positive evaluation of the innovative concept, but they find that time delay did not have any impact on liking innovative concepts less than me-too concepts. We propose that product trial might in fact overcome rejection for innovative concepts based not so much on a

benefit that is irrelevant or unappealing to the consumer, but on doubts that the product cannot deliver on the benefits of the concept. Jansen et al. state that respondents “seemed to cognitively correct for ... the impression by stating that an illustration does not show reality and that the things might be different (*less beautiful*) in practice” (2009: 294; italics added). Soderman shows that respondents exposed to visuals or virtual representations, but not to prototypes, did express less certainty regarding their understanding of the innovative concept and that they affirm “that they need to touch, feel and try” (2005: 319). Prototype trial is set to overcome this issue.

Vriens et al. (1998: 466) note that the different forms of stimuli design influence different dimensions of decision-making; they suggest based on their study that a visual representation heightens understanding while a verbal representation facilitates judgment. Sodermann (2005) notes that also virtual representations, even with a high degree of realism, do not make a product concept more understandable, unless the concept test participants are used to interact with virtual representations. The vast majority of companies offering physical products to their customers will hardly have a (test) customer base with regular exposure in their daily lives to virtual representations of their products. Product knowledge, which influences concept testing outcomes, requires interaction and physical contact. Work has focused on the inapplicability of existing knowledge structures to understanding new products (Moreau, Lehman, and Markman, 2001; Moreau, Markman, and Lehman, 2001). When it comes to assess product concepts with high degrees of innovativeness, participants will be lacking product knowledge, unless enabled to gain familiarity and expertise with the product concept through interaction and physical contact, which prototype trial can provide.

Klink and Athaide (2006) suggest controlling for adoption orientation as late adopters are inclined to evaluate a variety of information sources other than the concept in itself in their purchase decision. Our results cannot not be explained such by a late adopter effect. Concurrently, our results contribute to enforcing the call by Klink and Athaide to “provide as

much information as would be available in the marketplace” (2006: 367). Prototype trial enhances the respondents understanding of the validity of a concept.

Lees and Wright (2004) note that higher scores in interest found by prior studies on the use of visuals might be due to substantial additional information being provided by the visual during the concept test rather than differences in information processing. In our case, prototype trial as compared to prototype exposure did not provide further information on the innovative concept, which was not available during prototype exposure. Evidently, it provided the possibility to try the prototype and gain tactile interaction, but no further information on the concept beyond the one provided during prototype exposure was provided. Thus, we test the effect of prototype trial in a controlled way. We find that prototype trial is set to lead to more accurate evaluation of the actual appeal of the innovative concept itself. We propose to consider it as an essential decision for stimuli design in concept testing studies. We suggest that the use of prototype trial to reduce concept-test errors might be important for reasons related to respondents’ confidence in their ability to assess the product concept and for reasons related to the product concept and respondents’ confidence in the eventual product fulfilling concepts’ benefits.

The effects of prototype trial on willingness to pay

Our work finds an increase in the price level considered as acceptable by respondents on the concept. Previous studies on stimuli design (e.g. Dahan and Srinivasan, 2000; Dickinson and Wilby, 1997; Hoeffler, 2003; Lees and Wright, 2004; Vriens et al., 1998) do not look on the effect of stimuli design on price sensitivity. These studies when evaluating the effect of different concept formulations, take into account the effect on purchase intentions (average and top-2 boxes), concept overall liking, uniqueness, and believability, but do not take into account the effect on price sensitivity. Our study shows that price evaluations are affected by trial.

We suggest that the effect on price levels, due to prototype trial, can have implications for managerial assessment of the validity of economic feasibility or attractiveness of the concept. Concepts run the risk of being discarded because acceptable price level is too low to sustain a production with the profit margins required by management. A change in price sensitivity, due to the use of prototype trial can, therefore, provide a shift in assessment by management. Usually, companies dedicate a substantial amount of care to avoid Type I errors, since they will be evaluated on not having spent money on a project, which turns out negatively. Type II errors, though present, are less likely to be part of companies' evaluations of their concept testing activities; type II errors involve an error due to a wrong decision to discard a concept, basing on concept testing results, when in fact a go decision would be appropriate. Prototype trial might help companies to decrease errors in concept testing in the sense of discarding valid ideas that are not positively assessed as respondents are not certain the company can deliver on it and therefore express a low willingness to pay for it.

Physical or virtual representations to prototype trial

Recent studies are stressing the convenience and the reliability of virtual or web-based concept testing design. This has certainly provided aspects as lower required investments, larger sample feasibility, and the possibility to develop prototypes at a lower cost and with similar visual effects (Dahan and Srinivasan, 2000). At the same time, some scholars have raised considerations which cannot be neglected. In specific, they suggest that despite virtual prototypes provide similar results in visualization, such type of prototypes miss physical/tactile interaction which is provided only by physical prototypes; more poignantly, participants' attention and assessment of the concept can be biased by their reaction to the virtual representation, which they did not 'trust' and which became the focus of their assessment rather than the concept (Soderman, 2005: 321). Dahan and Srinivasan (2000) also assert the use of virtual representations misses the sensory experience of prototype trial.

While Dahan and Srinivasan state that they “expect that many durable goods categories can be represented using [virtual representations]” (2000: 108f.), the study of Soderman (2005) suggests that unless prototypes are used, results of concept testing studies might be inappropriate even for durable goods, such as a car, where a product prototype is certainly costly to undertake if compared to using sketches or virtual representations. Thus, the risk of virtual or web-based concept testing designs is that no-go decisions might be taken due to the participants’ reaction to the virtual representation, which confounds their assessment of the concept.

Prototype trial as stimuli design and its usefulness for concept evaluation

Our study investigates prototype trial; it has effectively measured the effect of product trial on concept evaluation. Thus, our study completes and expands prior research, which has shown that the use of prototype as a visual representation of the concept in stimuli presentation is able to provide an effect in concept test evaluations. Vriens et al. (1998) also note that the purpose of concept testing studies might influence the choice of the appropriate representation mode. A visual stimuli presentation can be suitable to represent product category in which design and aesthetic elements are the main drivers and when commercials, print papers and internet main sources of interaction; physical prototypes and prototypes trial, though, might be more appropriate in occasions where a direct interaction with the product is at the base of product usage and benefits appreciation, and in turn for concept understanding. Based on our study.

Dickinson and Wilby (1997) and Hoeffler (2003) do not find an effect of product trial on concept positioning. Dickinson and Wilby’s (1997) study does not investigate the effect of product trial on purchase intentions or other scales measuring the validity of the concept. This might be due to product trial in their research design preceding product concept statement. In their context, namely a new toothpaste or a line extension product, product trial might

represent a less crucial element for consumer evaluation than in the context of products with a high degree of innovativeness and durable products or high involvement product categories. Similarly, Hoeffler (2003) finds *lower* values for purchase intentions after trial for incremental, but even more distinctively so for really innovative new products. He investigates as really new innovation Dryel from Procter & Gamble, a product that enables customers to clean their dry clean at home in their dryer, and as incremental innovation Shout Wipes from the same firm. Hoeffler (2003) and Dickson and Wilby (1997) investigate particular categories. Dickson and Wilby (1997) themselves tentatively suggest that a reason for their finding might be that they investigate a low involvement product category of consumer goods (1997: 124). Dahl and Hoeffler (2004) note that respondents tend to underestimate the usefulness of radically new features or highly innovative product concepts. Lees and Wright (2004) distinguish durable and consumable; high price and low price; highly innovative and line extension products for establishing generalizable results for design effects on concept evaluations. In fact, they find much lower purchase intentions and average rank for durable products, such as DVD recorder, than for consumables or toothpaste, the very same category investigated by Dickinson and Wilby (1997). Interestingly in our study, there are differences in results if we compare prototype exposure to prototype trial if concepts represent a highly innovative product or durable product, but not in case of a non-durable product with a low degree of innovativeness. These findings suggest that the results of the study by Dickinson and Wilby (1997), which did not investigate the effect of product trial on purchase intentions and willingness-to-pay and which did not find differences when assessing effect of prototype trial on concept positioning, can hardly be generalized to other types of product categories. Alexander, Lynch, and Wang (2008) find that respondents are less likely to report intentions to buy really innovative product concepts and that follow-through or purchase intention statements was negatively related to innovativeness of concept and that

likelihood for follow-through decrease over time for really innovative product concepts. Prototype trial, thus, brings the concept a step closer to a real purchase experience.

We suggest that the use of prototype trial to reduce concept-test errors might be important for reasons related to respondents' confidence in their ability to assess the product concept and for reasons related to the product concept and respondents' confidence in the eventual product fulfilling concepts' benefits. The results of our study provide support for our call to incorporate product trial in concept testing studies before generalizable suggestions on stimuli design of concept testing studies can be made.

CONCLUSIONS

The design of concept testing can have a determinant role on the results of concept testing studies. Concept testing is a relevant tool in NPD, but it requires further methodological guidelines to provide more reliable predictive results and effective use. Companies are faced with a variety of decisions to consider when planning their concept testing design. This work addresses stimuli design decisions and investigates the use of prototype trial, which has been considered by the company as fundamental for their decision making process. Prototype trial allowed respondents to directly try the product and not only to observe it.

The results show that the effect provided by trial can lead to higher concept testing scores in terms of intentions to buy and to higher degrees of willingness to pay a higher price. Usually product trial takes place later in the product development process, but anticipating it, we suggest, in the concept evaluation phase does enable companies to decrease the possibility of making a no-go decision when a go decision would have been appropriate.

This will be particularly relevant for products with high degrees of innovativeness. While prototype trial might be more difficult to obtain for product concepts with high degrees of product innovativeness, it might at the same time be *more* relevant. In fact, scholars

investigating the management of highly innovative products suggest to engage with customers with the products (Lynn, Morone and Paulson, 1996).

In fact, Dickinson and Wilby (1997) find that those respondents who tried the prototype express significant *less* confidence in overall liking of the product concept than the ones who did not try the concept. Similarly, Dahan and Srinivasan (2000) find that one of the product concepts they study does obtain high levels of evaluation, and in turn market share predictions, but when the respondents are exposed to the same concept through product prototype, it was ranked last and unable to achieve any market share. Thus, we suggest that concept testing with product trial allows companies to obtain more valid information on intentions to buy a new product or on willingness-to-pay and increase the validity of concept testing.

Limitations and future research

Our study did not control for adoption orientation in the sample; it might be that the increase in purchase intentions, willingness to pay a higher price, and predicted frequency of usage occasions might be due to prototype trial, rather than solely prototype exposure, having provided to both early and late adopters different information. It might be that this kind of information contributed to overcome the barriers to adoption for late adopters; in consequence, responses after prototype trial exhibited significantly higher levels of adoption propensity. Future studies on prototype trial could control for adoption orientation of the respondents and investigate the effect of prototype trial on different categories of potential adopters along the innovation diffusion curve.

Our study did not control for social desirability (Richins and Dawson, 1992), change seeking attitude (Baumgartner and Steenkamp, 1996) and cognitive effort. We suggest future studies to incorporate items for these measures as they might influence the response by

participants. For example, participants might feel inclined to respond more positively due to social desirability considerations, such as the effect to respond in a certain social acceptable way to receive the approval of others (Peng and Finn, 2010b).

Moreover, future research might investigate whether innovators and early adopters in fact contribute to socially influence early majority customers as deemed, conceptualized, and measured by the literature. An investigation could examine whether innovators and early adopters that were exposed to product trial in concept testing studies are more prone to promote the diffusion of the innovation than those who were given visuals or visual representations in their concept testing studies. This might provide further support for the use of prototype trial in concept testing studies.

Prototype trial can limit respondents' customization of the concept and the possibility to self-design the product from the concept, being respondents introduced to a prototype. The "I Designed It Myself" effect is different from psychological ownership (Pierce et al., 2003) and or from the feeling of accomplishment (Belk, 1988) and has been found to creates economic value for the customer and generate a significantly higher willingness to pay (Franke, Schreier, and Kaiser, 2010). Future research might investigate whether real, repeat purchase behavior is different for product concepts selected based on prototype trial from products that drawn on the "I Designed It Myself Effect."

Product trial might also not be appropriate for concept testing when trial will not allow participants to detect the presence of the effect of innovative attributes. There might be cases when the benefits of an innovative offering can only be transmitted by the concept statement as participants lack the ability to discern it during product trial.

A negative aspect of virtual representations, in addition to missing the sensory experience of product trial (Dahan and Srinivasan, 2000; Soderman, 2005) is that participants attention and assessment of concepts can be biased by their reaction to the virtual representation, which they did not trust (Soderman, 2005). Further, virtual representations are

exposed to a sample bias (Dahan and Srinivasan, 2000). These two aspects might over time become less relevant as daily exposure to the Internet and virtual representations is continuously increasing. Still, the relevance of risks and limitations of virtual representations is an empirical matter and could be investigated by future studies.

Our work goes beyond most concept testing studies as it does not only look for purchase intentions, but also for the price level at which consumers exhibit willingness to pay for product. At the same time, our study does not counted for actual buying behavior. Future research could investigate whether the respondents who expressed that they would “definitely buy” the product actually did so. A recent study by Ozer (2011) investigated this relationship on online services, which in the cases of Ozer’s (2010) empirical study do not require that consumers exhibit a monetary cost for the usage of the product. Future research could investigate whether the role of prior experience and behavioral importance in the strength of the relationship between expressed intentions and real behavior is equally strong when customers have to pay for the product/service and when physical rather than virtual products are involved.

Our results are, in fact, similar to Pope’s (1981) data on the more positive evaluation of home-use test placement as compared to exposure to concepts only and close to Lewis’ (1984) insight of not using product placement contingent on a positive evaluation of the respondents to the concept, but providing it to all respondents. It is unfortunate that academic research for the last three decades, apart from few exceptions, did not follow up on these findings and did not investigate the role of prototype trial in concept testing. Lewis (1984: 55f.) affirmed that the results of his work using prototype trial led to “changes in operating procedures” for concept testing at Pfizer. We hope that our findings will influence managerial practice; the aim of improving managerial decision making can be further enhanced by researching the relationship between concept innovativeness, concept testing stimuli design and respondent reaction. Thus, companies better have customers to “touch” their innovative

product concepts. A deeper understanding of concept test stimuli design effects will lead to improvements in stimuli design choices, better quality of concept testing results, and a more efficient and effective product management.

ENDNOTES

¹ It is to be noted though that there are also works, like Hamel and Prahalad (1991), Voss and Voss (2000), and Zaltman (2003), which propose not to apply a customer oriented approach and not to validate the consistency of voice of the customer using structured questions in developing new products, especially for radically innovative, new-to-the-world products.

² Tauber (1972) and Schmidt and Calantone (1997) distinguish between two types of errors: type I error, that occurs when concept test results advise to go when a no-go decision would have been more appropriate and type II error, that occurs, on the contrary, when a no-go decision is taken while a go decision would have been more appropriate (Schmidt and Calantone, 1997; Klink and Athaide, 2006). This work does not account one of the two types of errors separately but aims to reduce, as discussed, the potential of type I and type II errors in general when evaluating concept future decisions. It is to be noted though that its implications are especially relevant for avoiding type II errors.

³ The theory of reasoned action and planned behavior, and to a lesser extent the theory of trying, have been criticized as reductionistic as they use global or summary psychological variables to explain social action and for being noncontingent (Bagozzi, 1992). Thus, in addition to classic attitudinal variables, recent work started to incorporate anticipated emotions (Dholakia, Bagozzi, and Klein, 2004; Bagozzi and Dholakia, 2006a, 2006b), desires (Bagozzi, and Dholakia, 2002, 2006b), and social processes (Bagozzi, Dholakia, and Klein Pearo, 2005) in models on intentions.

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