WARSAW, POLAND | 10 - 12 OCTOBER 2004

Marketing: Where Science meets Practice

ESOMAR®
The World Association of Research Professionals

IN COOPERATION WITH
EMAC
EUROPEAN MARKETING ACADEMY

TABLE OF CONTENTS

PROGRAMME COMMITTEE

GERDA FEUNEKES COMMITTEE CHAIR	**UNILEVER RESEARCH VLAARDINGEN** NETHERLANDS
SUZANNE C. BECKMAN	**COPENHAGEN BUSINESS SCHOOL** DENMARK
STEVEN COHEN	**SHC & ASSOCIATES** UNITED STATES
WLODEK DAAB	**4P RESEARCH MIX** POLAND
PETER LEEFLANG	**GRONINGEN UNIVERSITY** NETHERLANDS
VERONICA WONG	**ASTON UNIVERSITY** UNITED KINGDOM

UTILIZING RICH MULTIMEDIA METHODS FOR THE ELICITATION OF PREFERENCES FOR RADICAL FUTURE TECHNOLOGIES

Timothy M. Devinney
Jordan J. Louviere
Tim R. Coltman

This paper shows how the application of a platform for information acceleration methodologies can quickly allow organizations to develop preference profiles of potential users even before a product is available for market. The results of this study extend upon a number of common themes that have previously been reported in academic applications and consulting variants. The authors show how such approaches support effective demand assessment for radical future technologies.

INTRODUCTION

Advances in technology have accelerated the pace of innovation and subsequently magnified the competitive importance of understanding how customers react to radical new innovations.[1)] Yet after 30 years of new product research managers remain frustrated by an apparent inability to predict innovation success. New product marketing techniques such as group discussions, test marketing and concept testing do not work well when applied to very different products and technologies (Ozer 1999, Burke 1995, Urban et al 1994). These techniques are limited because they assume respondents can fully appreciate the potential uses and benefits associated with the new product or service under evaluation. This predicament is particularly acute in regards to radically new technologies where customers are expected to make decisions in environments where they cannot possibly value the full utility in the innovation. One way to bridge the gap between current and future states is to use computer-based multimedia simulations (Rosenberger and Chernatony 1995).

Recent developments in the use of multimedia representations for understanding and forecasting consumer response to new product innovation has generated interest among academics and practitioners alike. Multimedia representations and graphic illustrations can be developed quicker and with less cost than actual prototypes. If forecasts are sufficiently accurate they can then support more accurate design of products and greater insight into the timing of new generations of technology. Additionally, many managers believe that multimedia simulations are more vivid and realistic than traditional techniques, creating a useful middle ground between traditional concept descriptions and actual physical prototypes (Urban et al 1997).

Given the level of commercial interest in strategic marketing, it is not surprising that academics and practitioners have developed creative applications that capitalize on recent advances in multimedia technology. This paper directs the spotlight of attention to one particular area known as *information acceleration*. First developed in the early 1990s by a team of MIT marketing academics, this technique has successfully been applied to forecast customer response to radical new innovations in consumer durable and business-to-business products (Urban et al 1997). However while initial validation tests are encouraging, more work is required to test the strengths and weaknesses of this approach across radically new technologies. In what follows the emerging body of literature is reviewed in an effort to understand the underlying capabilities of multimedia and advanced information technology simulators and provide an example based on a recent test case.

INFORMATION ACCELERATION

Information Acceleration (IA) is a virtual representation technique that has been used to test new consumer durable and business-to-business products (Urban et al 1997).[2)] The technique is based on the premise that if marketers provide customers with sufficient information to enable them to realistically experience a future state (when they evaluate a new product's utility) then preferences, purchase intentions, and information usage data can be collected and modeled to forecast sales, product design and marketing programs.

Most applications of IA combine sophisticated multimedia representations with statistical design techniques such as stated preference discrete choice modeling (Louviere and Henscher 2000). This allows researchers to move consumers through a process of information acquisition and experience in ways that: 1) simulate future markets; 2) reflect changes to those markets; 3) replicate the impact of future technologies; and 4) mirror the evolutionary paths that such technologies may take. This dynamic approach to consumer preference elicitation is far more realistic than many of the popular techniques employed by marketing researchers because it more accurately reflects the process by which customers acquire information, and learn through trial and exposure to various technologies and environmental changes. Only after this has occurred can researchers model stated preferences accurately.

For example, one of the first projects initiated at Wharton's Alfred West Jr. Learning Lab describes how IA was used to evaluate demand for an electric car. Using a multimedia virtual showroom respondents were moved forward in time by firstly generating an appreciation for the problem of traffic congestion that has plagued US road networks. But forecasting demand for electric vehicles is a complex multi-dimensional problem that requires consumers to evaluate the extent to which government regulations are favorable, industry reports are reliable and most importantly, that the consumer gets a chance to 'experience' the way the car drives. Each of these conditions can be replicated using IA. For example, respondents were able to read a series of newspaper/magazine articles from the future. They are then able to assess vehicle details by interacting with a multimedia program, which was connected to a laser disk containing a full array of verbal, pictorial, video and text material. Essentially the simulated environment allowed the potential consumer to 'walk' around the car, 'climb in' and discuss the car with a salesperson. The consumer could access complementary information such as television advertising, magazine articles, read prices in a virtual newspaper, and even receive testimonial advice from fellow consumers. They were then able to drive a conventional car, whose petrol engine was replaced by an electric motor. Returning to the computer, respondents were then taken

through a series of choice experiments where their responses were modeled to gauge likelihood of purchase, perceptions and preferences.

Internal and External Validation

Although this technique has had commercial success, the literature is quite small and few published studies exist that validate the theoretical concepts underlying IA. The key papers in this area are by Urban et al (1990, 1994, 1997) where a series of encouraging results are reported concerning internal and external validation. During the period 1990 - 1995 the authors applied IA and multimedia stimuli to forecast sales on eight new products. Validation checks on three of these new products – the Buick Reatta (Sports Car), a medical instrument (blood count analyzer) and a new camera – are reviewed in their 1997 paper.

The first internal validation is applied to forecast demand for a new sports car, the Buick Reatta convertible. The study compared market forecasts in a computer-simulated automobile showroom to a physical (simulated) automobile showroom. Significant differences between the Reatta and a control product, an RX-7, were observed. No significant differences where found between the simulated and physical showroom. On average, respondents spent 3 minutes and 25 seconds in the computer simulated showroom and 3 minutes and 23 seconds in the physical showroom. This difference was not significant ($t = 0.11$). This suggests that IA and multimedia simulations can portray information sources with a high degree of realism and are sufficiently sensitive to detect differences between automobile types. The authors argue that since computer-simulated stimuli are not significantly different from more traditional laboratory stimuli the technique has internal validity.

The second study was concerned with a medical instrument used by physicians to test a patient's complete blood count (white blood cells, hemoglobin, platelets, etc.). The new product represented a radical advance in its ease of use, increased safeguards against biohazards, low price and improved accessibility to doctors. The physician typically takes primary responsibility for purchase decisions, although technicians and nurse recommendations strongly influence final decisions. To test for internal validity some physicians where allowed to interact face-to-face with technical staff whereas other physicians were restricted to computer simulations for all staff discussions. A series of covariates – judged performance, judged cost, technician favorability, existence of current CBC analyzer, and years of experience – were regressed against judged probability of use as the dependent variable. The adjusted R^2 was 0.55 and the actual versus simulated dummy variable was not significant ($t = 0.63$). The results not only indicate that there was no significant difference between simulated and actual conditions, but also the probability of purchase,

as judged by doctors, declined with full IA stimuli (emphasizing the danger of overly optimistic forecasts when only partial concept information is provided). This suggests that multimedia computer simulations are comparable to actual conditions but also can portray information sources that create a high degree of realism.

The third study investigated external validity by comparing forecasts on a 'really' new camera with actual sales. Standard IA techniques were used on a sample of 671 respondents. Information sources included television advertising, a simulated mass merchandise store environment, simulated word-of-mouth communication, and a simulated magazine article. Market tracking of IA forecasts with actual sales was then undertaken. When adjustment factors where used to account for actual advertising, distribution and the impact of unpredicted events actual sales were within 10% of forecasted sales model. This result is quite respectable – producing acceptable differences between predicted new camera sales and actual sales.

Given that the core objective of IA is to apply future conditioning in a way that supports a more complete user experience these results remain encouraging. However, the theory of IA is relatively new and few studies have been reported since Urban et al's (1997) paper. Various cognitive and psychometric properties still need to be evaluated for reliability and adjustments to the methodology need to be tested before one can conclude that IA offers a major improvement over managerial judgment. We address some of the weaknesses that have been identified in prior approaches to IA in this next section.

Limitations and Lessons from the Field

Five issues are worthy of further discussion and we combine our understanding of the literature with our own experience in applying IA to shed further light on this technique.

The high costs of Information Acceleration experiments

IA has traditionally been expensive. For example, the capital commitments required by the Urban et al studies ranged from $100 million to $1 billion. The direct implication of this is that management is often forced to make a number of trade-offs between the experimental design that would provide the cleanest, most scientific estimate and the experimental design that can be cost-justified. As a result, forecasts tend to rely on a limited number of future predictions and researchers are often left to untangle business complexity in an effort to reduce the cost of implementation.

This raises obvious questions regarding the ability of academics to untangle business complexity. However, recent multimedia advances have reduced the

costs of IA simulations considerably. This enables researchers to be more liberal in their use of interactive media and managers can be more adventurous when testing radically new future scenarios.

Information simulations

Prior to and during product launch, consumers are bombarded with various types of information. Advertising (magazine, newspaper, television), peer reports (close friends, media personalities), reports (trade articles and newsstand publications) and various other information sources all play a role in developing our awareness and interest in a new product or service. On the basis of qualitative consumer interviews, prior academic research and our own experience working across a number of different industries, we have found the most salient information conditions to be fairly generic. These generic information conditions combine descriptive information (product glossary and simulated displays of the working product) with indirect or secondhand information (information obtained from mass-media communications or pier testimonials). Further work however is required to test the validity of firsthand and secondhand information conditions in different market and business contexts, because consumers often trust what they see and hear with their own eyes and ears more than what they hear from others (Kardes 1999).

User Information Search Patterns

In practice, considerable time and effort needs to be invested by consumers if they are to visit all possible information sources. Hence, in the real world, consumers make conscious decisions regarding the size of the benefit that is likely to result from information search activities and as a consequence, consumers often do not visit all information sources. In the IA environment the cost of visiting a source of information is much less than in a real decision environment. This creates an artificial situation that needs to be overcome and researchers must continually adjust the amount of time available, so that respondents visit roughly the same information sources as they would in a real setting. Although this aspect of the methodology is subjective, we can control against these problems. Modern database technologies used to host experimental designs provide time stamped data that can be used to track the time respondents spend visiting each information source. While the use of these techniques can protect forecasts from gross error, there is certainly room for further development in this area.

User experience

Simulated experience has proven to be sufficient in cases where customers are required to evaluate new cameras or pay TV packages (Urban et al 1997, Almquist et al 2003). In each of these cases, customer choice is fairly straight forward, as they have some experience and knowledge of cameras and broadcast media. Even in the case of radically new products like an electric car, the researchers were able to combine a simulated showroom with a drivable prototype to allow respondents to experience some of the electric car's attributes (Urban et al 1997). However, some products require more extensive levels of consumer experience. Indeed many service situations cannot be appreciated until the customer has fully consumed the service. Only after the service has been completed – a process that could take weeks or months – can the respondent accurately evaluate its usefulness. Whenever researchers are required to take account of the way a product is used or a service consumed, it is preferable to utilize real prototypes or suitable control products to minimize risk and enhance the usefulness of IA.

The issues described above imply that IA is no silver bullet. However, despite these challenges, the technique has proven that it can yield more meaningful forecasts and it does enable marketers to understand the potential impact of different marketing strategies. By using IA to compare informed with uninformed responses, researchers can better understand the dynamic nature of consumer demand and more effectively estimate the marketing effort that will be needed to increase awareness, interest and take-up capability.

Dynamic market evolution

IA experiments have, to date, only generated point estimates of steady state demand. It can be argued that what is most important for new products is not the stationary future demand, but the path of demand over time. What this requires is nested experiments where context changes and, with it, the appropriateness of past information. From a macro marketing perspective, the issue of competing standards might be important if it would be critical for firms to understand exactly what damage or benefit is received from having multiple formats for a single technology (e.g., Beta/VHS, multiple DVD formats, different OS for computers or handhelds). From a micro marketing perspective firms could want to know when to introduce versions of product (e.g., to seed a market) or whether to introduce a blocking/flanking product to slow down a competitor or the extent to which complementary features in a product are relevant to demand (e.g., software for mobile devices).

Technologies of Information Acceleration

The technology used to support IA simulators varies in terms of academic application (e.g. Wharton's Future View, MIT, Illinois) and its consulting variants (e.g. offerings of Mercer Management Consulting and Allison Research Technologies). However there are a number of common themes. Firstly, they all seek to utilize an architecture that supports integrated multi media and graphic stimuli. Secondly, they all use statistical design techniques to develop and estimate complex models of customer choice. Technical architectures must support visual display of choice sets and provide a reliable means to collect data for analysis.

The software development component has traditionally been built on architectures that support extensive computer based stimuli. A major problem with current accelerator research is that it is expensive, leading to tradeoffs between generalizability and cost. For example, Urban et al (1997) argue that the approach is valuable only for developments requiring large capital expenditures because significant resources need to be directed to customized programming, professionally produced advertising, simulated video footage, as well as believable newspaper and magazine articles, and product brochures. As a result, the smallest project this technique was used on was $100,000 whereas the largest was over $1 billion. Even given recent advances in multimedia, the authors suggest that information acceleration projects are expensive because of high customization and application of proprietary technology.

However these capabilities are now becoming available using web-based standards. For example, the Future View project at Wharton project shows there is value in developing a general architecture into which different experiments can be slotted. In their case the complete site is based on open source media using JavaScript and XML. This open source configuration allows faculty members to manipulate the future experience and product information options to create different 'scenarios' that are automatically assigned to each user. Further, new software and hardware is making the multimedia prototypes easier to develop and more realistic. For example, rich visualization can be easily supported using Macromedia flash to enhance respondent's appreciation and enjoyment of the task.

We next discuss several competing paradigms that offer creative application towards understanding the impact of radical new innovations.

Competing Paradigms

Computer simulated applications of consumer adoption behavior are not exclusive to IA, but can be found in various concepts and theories within innovation research and new product design. The general intent is to use various media to allow respondents to view new product concepts and express their preferences using conjoint-analysis-like methods. Several of the major consulting firms (e.g. Mercer Management Consulting and Allison Research Technologies) offer their client's microcomputer-based simulations. Buyers are asked to make tradeoffs between multiattribute products and services that are visually displayed using computer generated menu options. On the basis of utility choice options and respondent demographic data this data is modeled and used to support new product design (Green and Srinivasan 1990). At AT&T Bell, simulations are extensively used to prototype new products on potential customers in their consumer laboratories. These simulated environments have proven very successful and represent a significant departure from traditional marketing techniques (Santosus 1994).

Application service providers (ASPs) are also developing web-based menu-driven systems that can be used by clients to create customized surveys. For example, Faura (2000) demonstrates a web-based system that automatically sets up a complete online test bed. Other ASPs such as zoomerang.com use website surveys and Sawtooth Software Inc. have recently announced commercial software for the design of web-based interviewing systems. Web-based interviewing is a relatively new development that offers potential benefits to the way product teams analyze information and interact with customer focus groups. Advances in telecommunications technologies are complementing this approach by linking the voice of customers directly to the capabilities of the product design team.

As alluded to previously, service situations are particularly tricky to evaluate because it is difficult for respondents to evaluate their benefit prior to the service's consumption. To overcome these problems Rosenberger and Chernatony (1995) propose a more appropriate simulator for service situations known as SERVASSOR. SERVASSOR draws upon the ASSESSOR pre-test market model and then incorporates virtual reality technology across a number of stages.[3)]

Advances in virtual reality (VR) computer techniques provide a number of opportunities to immerse consumers in new environments and experience radical new products and/or services. For example, Burke (1992, 1995) used advances in 3-D computer graphics to create a computer-simulated supermarket. Using a computer mouse, respondents could 'walk' down shopping aisles, examine products and place selected items in a virtual

shopping trolley. Over a seven-month period these studies were reasonably valid when compared with actual market purchase shares. This suggests that VR may be a useful way to evaluate purchase patterns because participants are able to experience a multitude of 'soft cues', as well as interact with the service in a dynamic manner. A criticism of this work is that VR techniques generate an unusually high level of interest in shopping, due to their novelty. Burke (1995) found that after about four virtual shopping trips, respondents reverted to lower involvement activity, approximating in-store behavior.

More research is still needed to assess how these new techniques affect consumer behavior. Additionally we have seen few practical applications of this technique and no internal or external validation work has been undertaken.

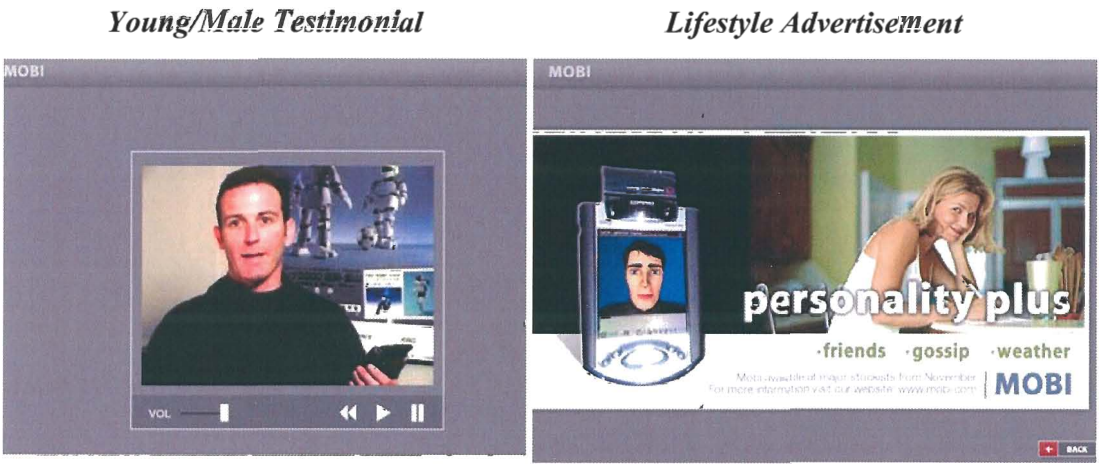
A MULTIMEDIA BASED IA APPLICATION

In dealing with the issues outlined above, we have developed a multimedia-based approach to IA that allows for building structured nested experiments where individuals can move through an information and contextual environment before making their evaluations of product and service alternatives. This approach has been applied successfully in a number of contexts, one of which is discussed here. The example used is that of a wireless personal digital assistant (PDA) with voice recognition capability and personal visualization.

Experimental Setup and Design

The experimental design was a choice experiment nested within an information manipulation. The information manipulation immersed subjects in an environment that provided them with newspaper articles (either no article or one with a neutral, negative or positive slant), testimonials (given by either a male or female aged young or old), advertisements (with emphasis on either productivity improvement or lifestyle), demonstration of the usage of the product (where the demonstration featured different voice (American or English accent) and gender configurations (either a male or female visualization of the spoken component of the product) and emphasis on specific features of the product (email, currency conversion, weather, news, language translation, wireless applications or interactive games). Figure 1 shows an example of the IA design palette and two of the information conditions. Individuals were tracked as they moved through this information allowing us to determine whether the information was accessed, in what order it was accessed and for how long it was accessed.

Figure 1
EXAMPLES OF THE INFORMATION CONDITIONS PALETTE



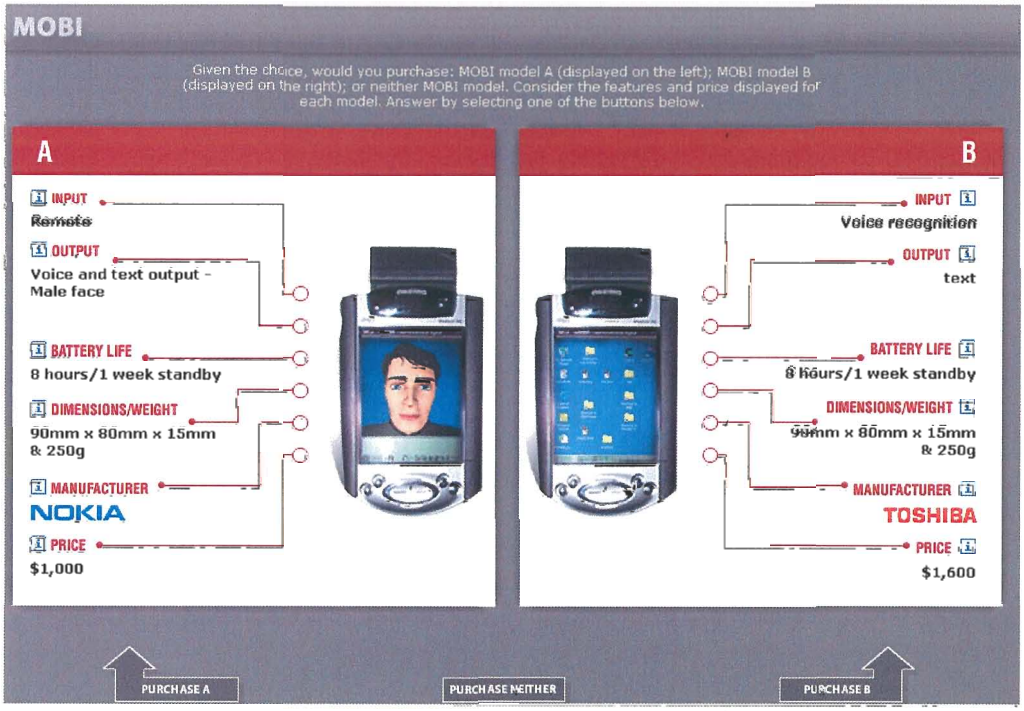
The choice experiment required individuals to compare 32 different pairs of PDAs where one was the new wireless PDA (hereinafter referred to as MOBI) and the alternative was a standard PDA. The features used in the experiment were the price, the nature of the input, the nature of the output, battery life, the dimensions and weight of the product, and the brand name.

A realistic price range was set based on 25% increments above the current recommended retail price. These prices were $249, $499, $799 and $999 respectively. The battery life varied between two options (two hours and eight hours) and the dimensions regarding overall size and weight were 90mm x 30mm x 25mm x 250g for the smallest version and 150mm x 30mm x30mm x 400g for the larger one. The manufacturers – Nokia, Toshiba and Compaq – were selected as a representative of the major competitors in the market (a no brand option was also used). The output options were text only, text and voice (voice being male or female and using either an American or British accent), and face and voice (where the face and voice match – male/female– with either American or British accents).

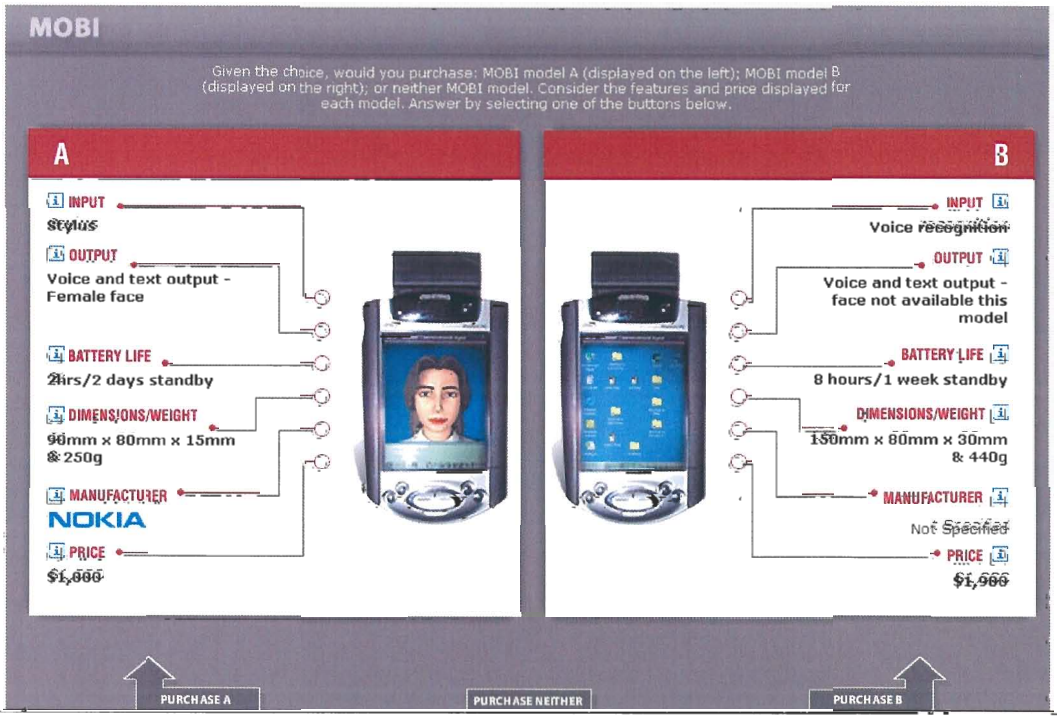
In order to simplify the task for the respondent, we based all comparisons on a control product (i.e., a traditional PDA) that did not possess advanced input and output functionality. This served two purposes: 1) MOBI purchase forecasts can be compared against a current PDA, and 2) market response parameters for advertising, word-of-mouth, distribution, and so on, can be compared with a current PDA. Figure 2 shows an example of the task. At any point in the experiment the subject can go back and get information by clicking on an information icon.

Figure 2
EXAMPLE OF THE CHOICE TASK PALETTE

Choice Task: Male Face in MOBI



Choice Task: Female Face in MOBI



Experimental Sample

Experiments were conducted in a specially designed computer laboratory at the Australian Graduate School of Management (AGSM). The laboratory hardware included desktop Pentium computers, with 15" monitor, headphones and network card. The software was written in hypertext markup language (HTML) to support delivery via the web. All product demonstrations and interactive word-of-mouth testimonials were displayed using Flash video files that were downloadable over the web.

The sample was drawn randomly from the student population at the University of New South Wales. This sample comprised 320 undergraduate and postgraduate students from a wide range of schools. Respondents were given a $20 incentive for participation. This level of incentive proved sufficient to ensure strong participation from the respondent population and a willingness to stay engaged for the duration of the experiment.

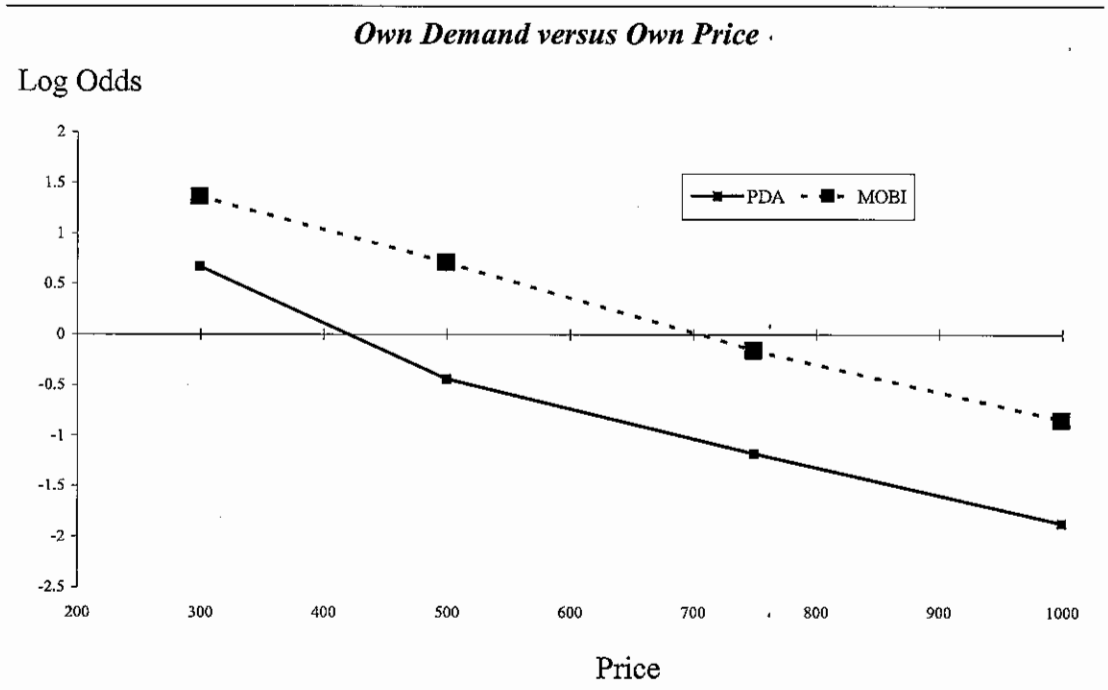
To maintain consistency across experiments the laboratory manager was required to follow a detailed lab procedure and script. The procedure-included steps relating to laboratory setup, respondent greeting, experiment introduction, study conduct and conclusion.

Results

The data was analyzed using a multinomial logit (MNL). We were concerned not just with the estimates but the reliability of the technique we used for assessing choice and demand for the new product based on its underlying attributes.

Overall, in 45% of cases MOBI was chosen, in 22% of cases the standard PDA was chosen and in 33% of cases neither was chosen. We also see some other patterns that confirm the validity of the approach used here. Figure 3 presents the log-odds of choosing each option based on its own price and the price of the alternative. We see that the patterns are consistent with expectations. It appears that MOBI's demand is a simple shifting upward of the demand of a standard PDA. (See figure 3.)

Figure 3
PRICE AND CROSS PRICE DEMAND



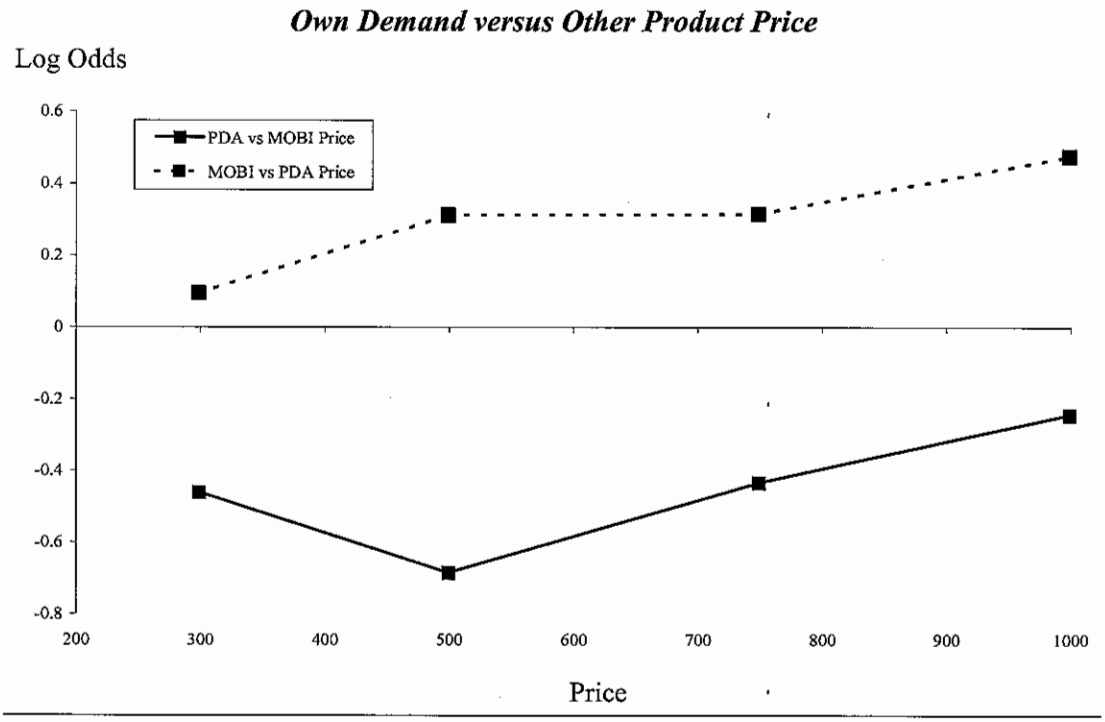
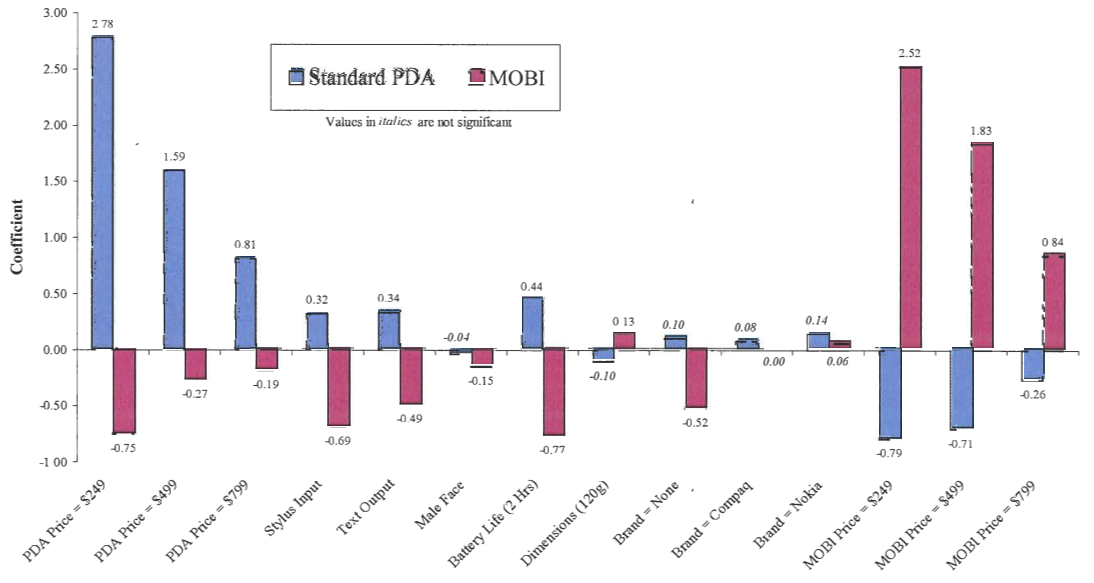


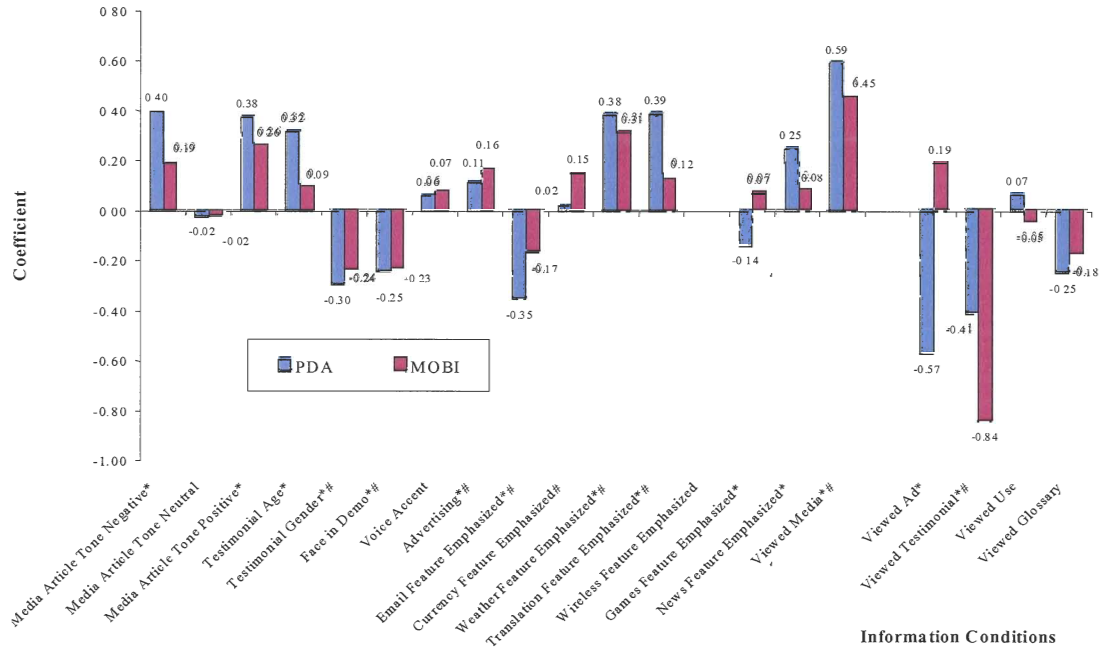
Figure 4 expands this further by examining the log-odds of choosing a product based on the underlying attributes on offer. The most noticeable effect is the impact of price on willingness to purchase. As the price for the traditional PDA increases – from $249 to $799 – the odds of purchasing this product decrease from 2.78 to 0.81. A similar, less significant decrease from 2.52 to 0.84 occurred for the MOBI product. Strong effects are also evident in the case of batteries where shorter life (i.e., two hrs) has a strong negative effect (-0.77) on willingness to purchase the MOBI product. The results also suggest that several attributes have a minimal impact on the decision to purchase both products. For example, the inclusion of a computer simulated male face (-0.04 and -0.15), weight of the device (0.13 and -0.10) and different brands (Compaq and Nokia) have relatively little effect on purchase intentions. Although differences between these popular manufacturers are not significant it is extremely important that the MOBI product is associated with a recognized manufacturer. The impact of no brand had a strong negative effect on the willingness to purchase the MOBI product (-0.52) but is unimportant for a standard PDA. (See figure 4.)

Figure 4
LOG ODDS OF CHOICE BASED ON PRODUCT ATTRIBUTES



The value of AI lies in the ability to embed the choice experiment in an information milieu. The effect of this is shown in figure 5. When viewed by the respondent, advertising provides the strongest effect. In the case of intent to purchase MOBI the advertising influence was positive (0.19), while the impact on decisions to purchase a traditional PDA was negative (-0.57). The impact of testimonials on the decision to purchase both products was strongly negative; however this information condition contains age and gender interactions that should be taken into account. As the age of the presenter increased the odds of purchasing both products decreased (-0.30 and -0.24, respectively).

Figure 5
LOG ODDS OF CHOICE BASED ON INFORMATION CONDITIONS



It is interesting to note that some items that have no impact on purchase directly do impact choice through the information conditions. For example, although the gender of the face has no impact on purchase, the gender of the face shown in the information condition does, with male faces being generally disliked (-0.25 and -0.23). In addition, the way people used information was not obvious. The impact of product evaluations was positive both when the tone was positive (0.38 and 0.26) and when it was negative (0.40 and 0.19) but not neutral. In addition, the more information people accessed the less they were inclined (on average) to want to purchase either product. Viewing the ads helped push up demand for MOBI slightly (0.19) and down for the PDA

significantly (-0.57). Hence, the impact of advertising mainly being a reduction of demand for the standard PDA rather than increased demand for MOBI!

CONCLUSIONS

The purpose of this paper was to demonstrate a relative simple platform for the application of IA techniques to radical new product development and subsequent marketing. The approach used here is based on a behavioral model of user demand for products and how they incorporate information into their purchase intentions. In addition, the use of a robust multimedia platform allows us to execute these experiments quickly and cheaply. We go beyond traditional IA by having the ability to corporate multiple layers in the experiments that allow us to recreate market context more accurately. Finally, recent advances in the technique allow us to go beyond static analyses and examine the evolution of the customer intention as the market evolves by making these experiments dynamic.

FOOTNOTES

1. A radical product innovation is a new product that incorporates a substantially different core technology and provides substantially higher customer benefits relative to previous products in the industry (Chandy and Tellis 1998). In many cases radical new product innovation represent a shift to a new technology frontier.
2. Mercer consulting currently holds a registered trademark for the term 'information acceleration'.
3. Jaron Lanier originally coined the term 'virtual reality' in the late 1980s, but its origin goes back to Ivan Sutherlands' 1960s work on interactive computing and head mounted displays. In the late 1980s, Lanier used the term to describe interactive, computer generated 3D immersive displays and sound. The ultimate aim was to develop sensory systems that convey 'experiences' indistinguishable from those of the real physical world.

REFERENCES

Almquist, E., Kon, W. and W. Bon. (2003). Economics' Gift to Marketing. *Mercer Management Journal*, 15: 22-32.

Burke, R.R., Bari, H.A., Kahn, B.E., and L.M. Lodish. (1992). Comparing Dynamic Consumer Choice in Real and Computer-Simulated Environments. *Journal of Consumer Research*, 19(6): 71-82.

Burke, R.R. (1995). Virtual Shopping. *OR/MS Today*, August, 28-34.