VIRTUAL FUTURE: REAL LIFE OR FANTASY

INNOVATIONS IN VIRTUAL TESTING TECHNOLOGIES AND APPLICATIONS

Matt Kleinschmit • Andrew Reid • Richard Rizzo

ESOMAR Office:
Barbara Strozzielaan 384
Eurocenter 2
1083 NH Amsterdam
The Netherlands
Tel.: +31-20-664 21 41
Fax: +31-20-664 29 22
Email: customerservice@esomar.org
Website: www.esomar.org

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CONTACT US

ESOMAR
Eurocenter 2
Barbara Strozzilaan 384
1083 HN Amsterdam
The Netherlands
Tel.: +31 20 589 7800
Email: customerservice@esomar.org
INTRODUCTION

In recent years the drive for innovation has led many companies to seek a broader understanding of how consumers view different products, categories and brands as they progress through the shopping process. In addition to primary research designed to better understand market structure and category landscape, companies have increasingly turned to virtual testing solutions to assist in identifying how consumers shop specific categories so they can optimize marketing, product and package variables to better position products in the decision hierarchy. When done correctly, virtual testing can provide critical insights for marketers and category managers on the ‘path of the consumer’, and provide a framework for engaging consumers with products, planograms and communications strategies that best meet their needs. It also can help to engage retailers to make proactive decisions on merchandizing and assortment strategies that can lead to improved sales in critical product categories.

Vision Critical has been a pioneer in the development and application of a wide variety of virtual testing technology and applications over the past ten years. However, the practice of employing life-like, simulated testing environments for research purposes predates our company’s founding by nearly twenty years, and this discipline will certainly continue to evolve and change in the years to come. The past decade alone has seen significant advancements in visualization technology, user interfaces and, perhaps most importantly, the applications for which virtual technology are employed. From fully immersive virtual shopping environments to recent trends in gamification, researchers are rapidly attempting to make their surveys as visual as possible to enable a more realistic research environment that promises to both engage consumers and provide better quality data.

Despite the increasingly vast array of virtual reality-based research that is occurring, there is surprisingly little existing research on the effectiveness of various virtual testing techniques. Clients routinely ask about the impact of varying virtual testing technology and research methods, and for many research suppliers who offer virtual testing services, the answers to these questions are often-times predictably biased to support the type of virtual testing services they offer. This is precisely why Vision Critical recently conducted comprehensive ‘research on research’ that explores a wide array of virtual shopping technologies and research methods – not to better position our own services for client consideration (Vision Critical regularly utilizes all of the various technology and methods included in the research), but rather to seek empirical evidence on which types of virtual testing techniques are best for specific business issues and research objectives. Quite simply, we wanted to definitively answer many of these same questions ourselves, so that we can be stronger partners with our clients and at the same time contribute to the advancement of this exciting and evolving discipline.

This paper traces the evolution of virtual testing and explores both current technology usage and research applications across a wide variety of industry verticals. In addition, we examine current industry best practices for how virtual technology tools can be leveraged to address market research questions, and identify those methods which generate actionable insights most efficiently. This includes the impact of 3D vs. 2D virtual technology, monadic vs. sequential monadic research designs, smaller vs. larger categories, and traditional vs. emerging virtual eye tracking techniques. Finally, we explore emerging mobile technologies such as augmented reality and discuss ways in which this technology could be integrated with virtual reality to create powerful and targeted research applications.

There is no doubt that virtual technologies will become more and more common in the years to come, with advances making the experience even more immersive with applications to a wider range of situations. Yet as technology evolves so too must our research skills, and the role of researcher as an arbitrator of this technology in knowing how best to apply it when addressing key business issues. As we will see, the objective of the research should determine the scale of virtual complexity used, and good research doesn’t necessarily need all the bells-and-whistles. In fact, sometimes more basic versions of the same virtual environment can deliver comparable results with less time and financial outlay. In the end,
virtual testing is another tool in the insight-gathering toolkit, and its benefits and limitations must be fully understood for effective real-world application. This will be particularly true in the coming years as both visual and virtual engagement with consumers continues to expand in both research applications and industry utilization.

THE EVOLUTION OF VIRTUAL TESTING
From its origins in the 1980s, virtual testing techniques have captured the imagination of marketers around the world. The promise of being able to leverage simulated virtual environments to test new products, marketing communications and retail experiences has been profound, fueling a desire for greater flexibility and validity in practical research applications. For many marketing researchers today, virtual testing is no longer a niche activity, and in fact many traditional methodologies are now utilizing facets of virtual technology in subtle ways – from ‘visual questions’ and more realistic three-dimensional product images to fully immersive virtual shopping environments.

Early forays into simulated virtual environments employed technology available at the time. Professor Raymond Burke, E.W. Kelley professor of business administration and renowned pioneer in the field of virtual testing, began working with simulated environments in the late 1980s while at the University of Pennsylvania’s Wharton School. In those days, virtual testing employed large-scale video to mimic walking through an actual store; however, the collection of data was still done via interview or paper-based surveys. As computer technology progressed, so did the level of complexity with virtually simulated environments. The interactivity of the computer, and eventually the internet, allowed for the collection of significantly more data without interrupting the participant to ask questions.

Many companies have been experimenting with computer simulation since the 1990s. These include industry icons like P&G, Unilever, PepsiCo, Intel and Kraft – organizations that felt that 3D computer graphics were/are practical test-marketing tactics that can change the way innovation and strategy are approached and executed. In more recent history, both manufacturers and retailers alike have experimented with the development of specialized standalone facilities with fully immersive 3D virtual testing equipment to be able to continually test new retail environments, in-store marketing materials and category arrangements.

A trip down the evolutionary path of virtual shopping reveals three major milestones that have brought us to the present state. The milestones also represented significant benefits both to the participant and the user of the research.

- **From Flat Images to 3D Modeling**: Early simulated environments were created with actual video footage and such video required significant computer power to display and control. As technology progressed, environments could be rendered graphically; however, the ‘reality’ of the environment could be questionable. In more recent times, especially with the advent of computer gaming and real time video rendering, virtual reality is really taken flight. Products, objects, lighting, etc. look almost like real-life with incredible depth and texture. Modeling in 3D provides true interactivity, allowing participants to demonstrate behavior just like in a real ‘space’. This also provides for the collection of a vast array of behavioral data (e.g. time spent shopping, items looked-at, etc.) not just ‘what’ was purchased.

- **From Super Computer to Notebook**: Historically, virtual simulation was so computationally intensive that it could only be handled by advanced high-powered computers. Such computing power was a limiting factor only available to a few manufacturers with deep pockets or rogues with a desire for innovation. Similarly, such technology required large spaces to house the testing facility and the processing computers. Today, virtual environments are available locally – right on your desktop or notebook computer. Internet technology (HTML), Flash, Java and other advanced program languages make the creation and deployment of virtual environments practically ubiquitous. The obvious benefit is that the environments are not only easier to create but they can be deployed anywhere, at the participant’s convenience (not the researcher’s).

- **From Central Location Testing (CLT) to Online**: Some would argue that face-to-face research is superior; however, still others would argue that larger sample sizes derive the greatest confidence and quantitative rigor. Well, virtual technology allows for both. When virtual environments needed vast computing power and large spaces to house the expensive equipment, testing was limited to central location. While CLT provided an opportunity to ‘hear’ the consumer, today’s online methods provide significant opportunity to reach large, nationally representative samples of consumers (including key segments of interest) and still ‘hear’ what they are saying plus ‘see’ what they’re doing. Furthermore, online virtual shopping methods provide anonymity, convenience and turn-around that are simply not available via CLT.

**Typical virtual shopping functionality**
Current virtual shopping technology works much like online shopping interfaces except that respondents are presented product options on a simulated, interactive shelf that mimics the same section in a real-life store. Respondents simply scan the shelf by navigating with their mouse to see the products. Products can be picked up, turned over, placed in the
shopping basket or returned to the shelf. Even products initially selected for purchase can be returned to shelf, with the final stage involving the respondent check-out (purchasing the items). A key benefit of virtual shopping is that all of the event-based behavioral data is collected during the exercise, and in some cases subsequent survey questions can be linked to shopping behavior to further exploration shopper attitudes and motivations. Figure 1 illustrates an example of Vision Critical’s virtual shopping interface.

**FIGURE 1, VIRTUAL SHOPPING USER INTERFACE**

**Validation**

As with any new technology, there are barriers to acceptance: fear, confusion and complacency – to name a few. However, the vanguards of the movement have transformed the use of virtual environments from a fad for curiosity into a tool for proactive, ongoing brand and category management. In fact, real world validation is well documented and ‘best practices’ are being developed and adopted. Some examples of recent validation include: projection of volumes from virtual shopping data that are in line with syndicated data after the test, planogram optimization and real world sales increases, package testing leading to increased consumer acceptance, etc.

The reality of virtual is that it no longer remains the stuff of science fiction but is a real and present tool for marketers and researchers. Risk takers and innovators took and expanded on the fact that behavioral data (what people do) is much better than articulated data (what people say) to create a platform for insights generation that leaves old-school paper surveys in the trash can. As technology and comfort with virtual testing expands, the applications will only increase, with the only limits being the creativity and ingenuity of marketers and their counterparts in consumer and shopper insights.

**TODAY’S VIRTUAL TESTING APPLICATIONS AND TECHNOLOGY**

In the 2007 GMA/ Deloitte Consulting report “Making Shopper Marketing Work,” virtual shopping was praised for “allowing for rapid and realistic scenario testing of merchandising, product and promotion designs and layouts with reduced need for field testing”. Indeed, these applications are now widely utilized within the Fast Moving Consumer Goods industry (FMCG), which has rapidly integrated virtual shopping into its extensive shopper insights and category management toolkits. Virtual shopping data is routinely gathered by FMCG manufacturers and shared with retailers to help support new product placements and aisle flow changes. In response many retailers are not only embracing and leveraging these data in their decision making, but also requesting additional information and strategies from forward-thinking manufacturers.

**Current and emerging virtual shopping applications**

Probably the single-biggest driver of growth in the Virtual Shopping arena over the past 15 years has been from retailers and manufacturers working together to improve the performance of individual FMCG categories. “Category Captains” (those manufacturers who represent the largest share of category sales) are routinely tasked by retailers with developing strategies that will invigorate growth. As a result, many manufacturers have turned to virtual shopping methods to help test a wide variety of category management strategies and tactics. The uses and applications of virtual shopping are expanding as creative marketers and researchers alike look to leverage the considerable benefits of immersive virtual testing stimuli into a wide array of product innovation, portfolio optimization and shopper exploration initiatives. Below are a few examples of both current and emerging virtual shopping applications:

- **Category Reinvention:** While many FMCG manufacturers routinely test the effectiveness of alternative product and brand blockings in key grocery categories (i.e. cookies, frozen dinners, etc.), they are also increasingly expanding this critical application of virtual testing into broader category reinvention initiatives that seek to optimize entire category
flow and sub-category adjacencies. In a study recently completed by Vision Critical and reported on in ‘Shopper Marketing Magazine’, a leading FMCG manufacturer was interested in re-creating the ever confusing condiment aisle from scratch, incorporating shopping behaviors and preferences into new planograms for both Grocery and Mass channels. This study leveraged a new, interactive virtual category creation exercise called “Build Your Own Aisle”, that allowed respondents to create their most-preferred aisle flow and sub-category adjacencies. The results of this online quantitative exercise were used to create two new category configurations, which were subsequently tested via online virtual shopping along with other manufacturer- and retailer-driven aisle scenarios. Interestingly, the planograms that were derived from shopper-preferred adjacencies produced the greatest incremental reach, revenue and volume for both the client’s brand and the category overall, prompting a key national retailer to begin in-store testing of these new ‘shopper-preferred’ category arrangements to validate the results prior to broader implementation. (See figure 2.)

**FIGURE 2, VIRTUAL ‘BUILD YOUR OWN AISLE’ EXERCISE**

- **Portfolio & Pricing Optimization Research**: Global macro-economic trends over the past several years (including rising commodity prices) have prompted a rise in the use of virtual testing methods to test new portfolio, pricing and product size strategies. Where in the past a manufacturer may have test-marketed various merchandising alternatives or size/price combinations of products and determined optimal merchandising after months of collecting sales data, manufacturers are now integrating virtual shopping techniques with Discrete Choice Modeling (DCM) for rapid testing of various price and size combinations. These methods can produce powerful simulation models that allow manufacturers to predict how consumers will respond to changes in package size or price (or both), and how these portfolio changes affect reach, share, volume, profitability and product migration. FMCG manufacturers leading these efforts believe that the investment of virtual shopping-based category decision-making allows them to help guide retailers on proposed category changes, positioning them as valued partners in ensuring incremental category growth while also ensuring that any changes recommended affect their own brands in a positive fashion. (See figure 3.)

**FIGURE 3, VIRTUAL SHOPPING-BASED DISCRETE CHOICE SIMULATOR**
• **Packaging and Design Research.** As packaging continues to play an important role in standing out on shelf in an increasingly cluttered retail environment, many manufacturers are embracing virtual testing to move beyond a “beauty contest” of design to actually quantify how new packaging, graphics, structure or the inclusion of other elements such as secondary and shelf/retail-ready packaging affect at-shelf shopper behavior. This is particularly true as more manufacturers are shifting to more cost-effective packaging (such as pouches) to help offset rising raw material costs, or incorporating enhanced secondary packaging to help elevate on-shelf communications. When armed with virtual shopping data that shows the impact of changes on actual purchase behavior, companies are less likely to miss the mark when it comes to real-world execution.

• **Point-of-Sale (POS) and In-Store Marketing Research.** Both manufacturers and retailers alike have adopted virtual shopping methods to understand what impact various signage, secondary displays, endcaps, and other in-store Point-of-Sale (POS) materials have on sales. In this context, virtual shopping technologies allow multiple creative executions to be tested virtually prior to deployment, providing an in-depth understanding of how various creative and communications tactics impact shopping and purchase behavior.

• **Disruptive Retailing Strategies.** As manufacturers look to non-traditional distribution and merchandising strategies to help increase incrementality (such as secondary merchandizing locations, vending and other scenarios), virtual testing methodologies are increasingly being employed to efficiently predict the performance of secondary distribution and merchandizing scenarios and also to assist in ‘sell-in’ presentations with retail partners. Armed with virtual testing data that quantifies the impact of these strategies, manufacturers are moving away from a ‘test in-store and learn’ mentality and are instead targeting specific outlets (i.e. mall operators, retailers, Quick Service Restaurants, etc.) and providing them with fact-based evidence as to why distribution through their channel or secondary merchandizing locations makes sense.

• **Virtual Shopping-based In-Home Usage Test (iHUT):** Manufacturers have long embraced iHUTs to assess product performance and repeat purchase, and are now also beginning to ‘book-end’ these studies with virtual shopping exercises so that the impact of the product’s performance on reach, revenue and volume can be quantified. This new type of virtual shopping-based iHUT consists of an upfront virtual shopping exercise that is followed by an in-home product placement and evaluation based off of the products actually purchased in the virtual shopping exercise. Then, a subsequent virtual shopping exercise among the same consumers is conducted to quantify the impact of actual product usage on subsequent shopping and purchase behaviors, taking results far past traditional stated purchase intent. This unique longitudinal research plan provides a multitude of data for fact-based product and category decision-making for both manufacturers and retailers alike.

• **New Product Category Placement.** As new product innovation continues to grow, FMCG manufacturers are also using innovative virtual shopping applications to not only understand how a new product will perform on-shelf and where its source of volume may come from, but to also understand where in store a new product should be placed. This is particularly true for disruptive product innovations that have the potential to be shelved across a wide variety of categories. In these cases, manufacturers are employing hybrid virtual testing methods to both assess benefit alignment with other similar products and to quantify performance when placed within a variety of categories.

• **In-store Eye-Tracking:** As in-store environments are becoming increasingly cluttered, both manufacturers and retailers alike are seeking more information on what catches shopper attention — from end cap displays and shelf violators to package designs and POS. While eye tracking techniques have traditionally been used to answer many of these questions, new alternative eye tracking methods have emerged in which research participants are shown virtual stimulus and asked to click on areas that pique their interest. While these methods are more cognitive in nature, they are often accompanied by interactive, online reporting tools that allow for diagnostic refinement of stimulus to maximize their effectiveness.

**Broader industry adoption of virtual testing**
Just as the applications for virtual testing have expanded within the FMCG vertical, other industries are also embracing the promise of simulated environments and interactive tools within the consumer research they conduct. The following section examines a few noteworthy examples.

• **Technology and Telecom:** The technology and telecom industries routinely utilize virtual testing for understanding in-store shopping behaviors, optimizing pricing and identifying which Point-of-Sale (POS) information is most impactful on purchase. This research often includes multiple cells of respondents with each exposed to different product information and pricing scenarios, with the resulting comparative analysis revealing the relative impact of varying levels of product information on purchase intent.
- **Financial Services**: Banks and other financial institutions first turned to virtual testing approaches for the same reasons that retailers do: to understand guest experience and identify areas within new branch designs and in-store marketing materials that may influence consumer behavior. Over time, this has evolved into the development of new approaches that serve to simulate or mimic other consumer touchpoints with their financial institution. One such approach is a Vision Critical application called “Virtual Mailbox” that imitates consumer interaction with direct mail, allowing respondents to sift through mail, “keep” or “throw out” items, and then “open” and read the materials. Respondents can also interact with the creative and copy for each piece, highlighting areas that are appealing, confusing, etc. This provides a realistic platform for marketers in the financial services industry to test and optimize their direct mail efforts from both efficiency and call to action perspectives. (See figure 4.)

**FIGURE 4, EXAMPLE OF ‘VIRTUAL MAILBOX’**

- **Automotive and Aviation**: Automotive and aviation manufacturers have also experimented with a wide variety of virtual testing methods for optimizing the design and interaction aspects of their products. This includes immersive virtual depictions of exterior and interior design elements in which navigation/viewing behavior is tracked and the virtual experience is followed up by evaluative questions surrounding consumer preferences.

- **Quick Service Restaurants (QSR)**: Quick Service Restaurant operators have also adopted virtual testing methods for interior and drive-thru menu board optimization, as well as in-store signage testing. In these applications, virtual ordering experiences are mined to identify which menu items and signage are most impactful in purchase decisions, allowing QSR operators to optimize menu real estate to maximize sales of high-profit items by day-part and shopper types. (See figure 5.)

**FIGURE 5, VIRTUAL QSR**

- **Others**: A wide variety of other industries are also experimenting with virtual testing methods, including casinos for new game testing and shopper marketing agencies who are utilizing virtual testing to validate in-store and creative executions of their work.

**The impact of varying technology and research methods on virtual shopping results**

With an ever-expanding array of industries, applications and technology being developed and employed for virtual testing, Vision Critical recently conducted rigorous research on research to assess the pros and cons of a wide variety of virtual...
shopping methods. This research was undertaken in an effort to have empirical answers to many of the common questions we receive from clients who are interested in virtual testing, without bias for method or technology. The following areas of exploration were included in this study:

- 2D vs. 3D Virtual Technology
- Monadic vs. Sequential Monadic Research Design
- Reduced Category Shelf Set vs. Full Category Shelf Set
- Virtual Eye Tracking vs. Traditional Eye Tracking

2D vs. 3D Virtual Technology
The past several years have seen many advances in virtual shopping technology so that it better mimics real-life, including immersive 3D technology that allows for free-form navigation within virtual environments. While the technology has improved, what is less known is the impact of the seemingly more realistic virtual simulations on data quality and ability to impact business decisions. While the respondent interface may be more realistic, virtual shopping studies that employ 3D technology generally take longer design and execute, and are also typically more expensive than 2D virtual environments.

To understand the differences, two identical cells of online quantitative virtual shopping research were fielded in the oral care category. One utilized 2D virtual depictions of the category’s shelf and the other utilized 3D virtual depictions. Sample composition was consistent across the cells, as was the respondent experience outside of the virtual shopping exercise. (See figures 6 and 7.)

FIGURE 6, 2D VIRTUAL SHELF SET

The results: The full 3D environment does lead respondents to pick up more products, and as a result they take longer to complete the virtual shopping exercise. Interestingly, the number of products they actually purchased was relatively consistent, as was the amount spent. Analyzing the data at the brand and SKU level similarly revealed very little difference in spending and dollars spent as well. We also included a very basic shopability measure — satisfaction with the shop to understand that aspect of the equation too, and satisfaction scores were also at parity. This suggests that if the goal of the research is to understand how a new category arrangement will impact spending, 2D virtual technology will likely suffice — thereby saving both time and money before a decision can be made. However, that does not mean that the use of 3D technology is superfluous. On the contrary, a 3D shelf set may, in fact, be needed when evaluating shelf signage, violators or unique package structures (i.e. custom shapes), as well as for understanding broader virtual environment navigation. (See figure 8.)
Monadic vs. Sequential Monadic Research Design

A common objective in virtual shopping initiatives is to test a wide variety of different category arrangements to understand which are most successful at increasing brand and category reach, revenue and volume. When there are a large number of category scenarios to test, sometimes a sequential monadic research design is employed to help reduce costs. In a sequential monadic design, respondents are exposed to a series of shelf sets within the same study. This allows for more category scenarios to be tested with fewer respondents, but also limits the degree of additional diagnostics that can be included for each category scenario, and can also introduce bias that is not found in monadic research designs (in which each respondent shops only one virtual category scenario).

To understand the differences of employing sequential monadic and monadic virtual shopping methodologies, Two identical cells of online quantitative virtual shopping research were fielded in the oral care category. Respondents in one cell saw only one shelf (monadic); whereas, respondents in the other cell saw three in random order. Sample composition was consistent across the cells, as was the respondent experience outside of the virtual shopping exercise.

The results: The number of products picked up was greater and the time spent during the shop was longer during the monadic shop as respondents spent time exploring the category and picking up products. Interestingly, basket size and spend were remarkably similar between both monadic and sequential monadic shops, however, which indicates that if the goal of the research is to test impact of category changes on these critical spend-related variables, then sequential monadic exposure is sufficient to meet the goals of the research. Conversely, if the goals of the research also require additional in-depth diagnostics for each of the planograms under consideration (such as findability and shopability exercises), a monadic design that allows for this additional survey time might be preferred. (See figure 9.)

Reduced Category Shelf Set vs. Full Category Shelf Set

The basis for this research is grounded in the idea that for results to be accurate in a Virtual Shopping study, all SKUs in the shelf set must be accounted for. For a variety of reasons, including availability of images, regionality of products and other factors, it isn’t always easy to find every product image necessary to produce a fully accurate shelf set. When this happens, researchers are faced with a dilemma: slow down the research and attempt to physically find the missing products in store so they can be photographed and added to the shelf set, or simply forgo the product and don’t include it in the exercise. When the product is a major player, there has been universal agreement that the product must be included in the exercise. However, when the product is a niche player with a very small percent of total category sales relative to most competitors, the decision becomes more difficult. Add to this the fact that there may be trepidation for a
manufacturer to present results to a retailer when the shelf set isn’t an accurate depiction of the entire category, and the decision becomes even more difficult.

Because of the issues surrounding this scenario, two identical cells of online quantitative virtual shopping research were fielded in the oral care category. Respondents in one cell saw a full virtual category that reflected all of the products currently in market; whereas, respondents in the other cell saw a reduced virtual shelf that contained roughly 70% of category SKUs. Please note that brand/ product proportions were kept the same, sample composition was consistent across the cells, as was the respondent experience outside of the virtual shopping exercise.

The result: Not surprisingly, the larger shelf set did cause respondents to pick up more products, and spend a bit more time completing the virtual shopping exercise. However, similar to other hypotheses tested, the number of products that were actually purchased was again relatively consistent, as was the dollar amount spent. There were also no significant differences at the brand and SKU level, suggesting that reducing the shelf set of minor category players had no major effect on the research results. We also included a very basic shopability measure — satisfaction with the shop — to understand that aspect of the equation too, and these satisfaction scores were consistent as well. (See figure 10.)

**FIGURE 10, REDUCED CATEGORY SHELF SET VS. FULL CATEGORY SHELF SET**

![Figure 10](image)

**Virtual Eye Tracking vs. Traditional Eye Tracking**

The past several years have seen many advances in various eye tracking methods, including both online and offline approaches. Today, eye tracking, as used in marketing research, falls into two main categories: Pupil center corneal reflection (Traditional Eye Tracking) and Cognitive Click-mapping (‘Virtual’ Eye Tracking). Traditional eye tracking is typically conducted in a central location facility using one or several near-infrared illuminators, invisible to the human eye, which create reflection patterns on the cornea of the eyes of participants. In other words, the eye tracker works much like you would if you were facing another person and estimating where they are looking just by observing their eyes. Conversely, using a personal computer and a mouse, virtual eye tracking asks participants to click on things that capture their attention. The exercise can be limited to a specific number of clicks or in other cases to a finite amount of time. In essence, virtual eye tracking works much like pointing with your finger at what you are looking at. While virtual eye tracking is cognitive in nature, it does offer some unique benefits, namely its speed in data collection, ability to include a large, nationally representative sample of respondents and possibilities for rich diagnostic analysis.

Since much discussion has ensued about the viability of virtual eye tracking methods as substitutes for traditional eye tracking methodologies, Vision Critical conducted research-on-research to better understand the pros and cons of each approach so that they can be effectively applied to meet client needs. Respondents in the Traditional Eye Tracking test cell were tracked using Tobii T120 Eye Trackers integrated with a 17-inch monitor. The sample included n=200 primary grocery shoppers aged 18 to 64 years, recruited to four central research locations nationally (United States). Respondents in the web-based virtual eye tracking test cell used the proprietary click mapping application. The sample included n=1,200 primary grocery shoppers aged 18 to 64 years, recruited from the nationally representative Vision Critical Springboard America online panel. Respondents in both cells were randomly assigned two of three individual products for eye-tracking, as well as an aisle planogram image.

The results: Our research showed that path of gaze and order of clicks are very similar but not perfectly aligned; however, the differences between “path of gaze” versus “order of clicks” are not dramatic and the general outputs are nearly analogous in totality. Differences may be attributed to precognitive reactions detected by traditional eye tracking methods, with virtual eye-tracking requiring actual respondent recognition and subsequent clicking on areas of interest. As a result, virtual eye tracking is a suitable substitute for traditional eye tracking when used to evaluate packaging or the physical presentation of products and displays (i.e. retail store shelves). Minor variations were noted when comparing the
hierarchy of attention or ‘sequence of eye movement’ but in totality, the two methods might be considered analogous. When cost-savings, larger samples and more dispersed sample sizes, and detailed diagnostics are factored in, virtual eye tracking might be considered superior for many common eye tracking applications. (See figures 11 and 12.)

**FIGURE 11, VIRTUAL EYE TRACKING VS. TRADITIONAL EYE TRACKING - OVERALL ATTENTION**

![Virtual vs. Traditional Eye Tracking](image1)

**FIGURE 12, VIRTUAL EYE TRACKING VS. TRADITIONAL EYE TRACKING - ‘PATH OF GAZE’**

![Virtual vs. Traditional Eye Tracking](image2)

There is no doubt that Virtual Shopping and other immersive research techniques are keeping pace with technology; however, our research on research shows that the objective of the research should determine the scale of complexity used. The results of our extensive research on research highlight that good research doesn’t necessarily need all the bells-and-whistles. In fact, as the data showed, more basic versions of the same virtual environment can deliver comparable results with less time and financial outlay.

**FROM VIRTUAL TO AUGMENTED REALITY AND BEYOND**

As we have seen in Virtual Shopping’s evolution over the past ten years, it is inevitable that the technology and its applications will continue to both evolve and expand in the years to come. Already we are seeing advancements in the ability to deliver even more realistic virtual simulations via online studies, as well as the integration of virtual stimulus with other complementary technologies such as biometrics, neuroscience and facial recognition – which when executed together can provide unprecedented understanding of how both human emotions and behavior intersect at the retail shelf.

One area that holds significant promise in virtual testing is the integration of advanced Smart Phone Augmented Reality applications with immersive virtual stimulus. Whereas Virtual Reality is the exercise of creating realistic environments in a virtual setting, Augmented Reality is defined as a live, direct or indirect, view of a physical, real-world environment whose elements are augmented by computer-generated sensory input such as sound, video, graphics or GPS data. This could signal a turning point in research because we can now expose shoppers and respondents to “what if” scenarios while they’re in-situation, effectively merging real-life, augmented and virtual environments together to achieve specific research objectives. By changing or “augmenting” a shopper’s reality, researchers can expose them to situations while they are in full shopper mode, in a real store, and see what effect this has on their behavior.

Vision Critical is currently exploring this technology for a variety of research applications, including package testing. In this setting, respondents would use their smart phone to scan over a specific product in store, which would trigger the application to start a short mobile-based survey that tests alternative packaging designs while the shopper is still at shelf
and in-store, gathering data on their reactions to the new packaging and subsequently reporting findings in real time to incent and encourage future respondent participation. Figure 13 provides an example of how this could work.

**FIGURE 13, AUGMENTED REALITY FOR PACKAGE TESTING**

Respondent holds iPhone up to product packaging.

The respondent is taken to a mobile survey asking them which package they prefer.

The next question asks the respondent what they like about the new package. Once complete, they are taken to the end page which displays the percentage of agreeing respondents.

Similar applications of this technology could include testing of alternative in-store signage and point-of-sale materials, much like the packaging example above, followed by shopping exercises to help understand the impact of such scenarios on purchase, volume, trial and switching behavior.
Integration of augmented reality research with GPS-enabled location-based services will also gain prominence as a research tool in the near future, allowing both manufacturers and retailers alike to test new products, category arrangements and in-store marketing materials, and extending into adjacent industries such as hospitality, sporting and entertainment venues where consumer touch points are typically not maximized to their fullest potential. Longer term, augmented reality and image recognition technologies (such as Google Goggles) may help marketers to capture and quantify brand touchpoints throughout consumers’ daily lives. This holds promise in reinventing brand health tracking initiatives, replacing brand recall with actual tracking of exposure (including location) and truly understanding both the incremental and cumulative value of brand interactions on favorability, health and purchase. Similarly, this type of application could also replace consumption/ purchase diaries and product scanning methods, allowing consumers to simply photograph products they purchase or consume in a day, or capture an image of their pantry, versus the manual nature of the traditional diary and inventory data collection methods. (See figure 14.)

**FIGURE 14, EXPERIMENTAL IMAGE RECOGNITION TECHNOLOGIES**

There are also a number of other emerging technologies and research methods that when combined with virtual testing could yield powerful insights for both manufacturers and retailers alike. One such method is the integration of ongoing virtual testing with a proprietary community panel comprised of key high value consumers. This ‘Virtual Shopping Panel’ would ask members to record their purchase behaviors via mobile QR/ Barcode scanning, while at the same time completing ongoing virtual shopping exercises in which they are exposed to a wide variety of potential product, pricing, portfolio and merchandising scenarios. Over time, this scalable research platform could provide ongoing, incremental learning about how consumers will react to potential category, product, portfolio, shelving, pricing and POS changes; with dynamic predictive modeling and associated deliverables graphically displaying the impact of all possible category changes on revenue, volume, reach and shopability. No longer would virtual testing be limited to only a few test scenarios under consideration – over time all possible category scenarios would be exposed to shoppers and evaluated. (See figure 15.)

**FIGURE 15, VIRTUAL SHOPPER PANEL CONCEPTUAL FRAMEWORK**

*Virtual Shopper Panel:*
*A Private Virtual Research Lab for Shopper Insights*

- Ongoing Virtual Shopping Exercises
- Portable Interactive Activation Deliverables
- Longitudinal learning on category evolution

Targeted group of category shoppers whom you **engage with and learn from over time**

Feed insights back into the full panel for quantitative testing

Breakout unique groups to participate in deep-dive studies and discussions

- Quant and qual seamlessly integrated in ONE solution
- Rapid, longitudinal research and ongoing learning
- Your high-value consumer population
- Your own private research lab for category management and shopper insights
SUMMARY AND CONCLUSIONS

Virtual testing technologies are in a perpetual state of motion with new developments rapidly creating exciting possibilities for researchers around the world. As these possibilities expand into new research applications across industries, researchers will be increasingly tasked with ensuring that the appropriate technology is deployed to answer the business issues at hand. Our experience in leveraging a wide variety of virtual testing technology and methods over the past ten years has shown that a proper balance between technology and research rigor must be maintained to ensure success. Virtual Shopping and other immersive research techniques will no doubt continue to keep pace with technology; however, the objective of the research should determine the scale of complexity used. Our comprehensive research on research highlights that good research doesn’t necessarily need all the bells-and-whistles. In fact, as the data showed, more basic versions of the same virtual environment can deliver comparable results with less time and financial outlay.

However, this balance could become increasingly difficult to maintain as virtual reality applications proliferate and consumers and clients alike become accustomed to heightened visual engagement in research. Mobile-based augmented reality applications, facial recognition, GPS enabled location-based services and advanced 3D gamification techniques all hold promise as viable techniques that could provide greater flexibility in research design and applications. But as the MR industry applies these technologies in the coming years careful consideration must be taken to continually leverage the same techniques that we would employ to help our clients to verify whether a new method is viable and accurate. Without rigorous testing to understand the impact of varying technology and methodological designs on data quality and insights, the industry risks losing credibility in effectively leveraging technology and could cede this position to outside industries. Our hope is that the MR industry as a whole can benefit from collaborative exploration on how best to deploy emerging virtual reality technologies to address key business questions. Forums that delve into these issues and include a variety of both research suppliers and clients from a range of industries could have a profound impact on ensuring the validity of their application – not to mention helping these emerging techniques to proliferate in usage. In the future clients will certainly expect an increasingly visual and virtual research experience that is validated and credible, MR suppliers will need to deliver these methods based on agreed upon quality standards and consumers will indeed require both in exchange for their ongoing attention, opinions and engagement.

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THE AUTHORS

Andrew Reid is Founder and Chief Executive Officer, Vision Critical, Canada

Matt Kleinschmit is Senior Vice President, Integrated Consumer, Shopper and Retail Insights Division, Vision Critical, United States.

Rich Rizzo is Vice President, Integrated Consumer, Shopper and Retail Insights Division, Vision Critical, United States.