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Show Me What You See, Tell Me What You Think:
Using Eye Tracking for Hospitality Research

by Stephani Robson, Ph.D., and Breffni Noone, Ph.D.

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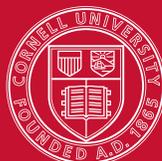
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EXECUTIVE SUMMARY

Identifying precisely what consumers are looking at (and by implication what they are thinking) when they consider a web page, an image, or a hospitality environment could provide tremendous insights to the hospitality industry. By using eye tracking technology, one can almost literally see through the eyes of the customer to find out what information is examined at various points during the hotel search process or to assess which property design features attract guests' attention. When eye tracking is immediately followed by interviews that review a graphical representation of the consumer's eye movements, the thought processes behind consumers' visual activity can be uncovered and explored. In this paper we explain how eye tracking works and how it could apply to hospitality research. Today's eye tracking systems are easy for researchers to set up and use and are virtually transparent to the participant during use, making eye tracking a valuable method for examining consumer choice or facility design, or to develop employee training procedures. We argue that eye tracking would provide rich results and deserves to be considered for a wide range of hospitality applications.

Key words: Eye tracking, consumer research, qualitative methods

ABOUT THE AUTHORS



Stephani Robson, Ph.D., is a senior lecturer at the Cornell University School of Hotel Administration. She graduated from the School of Hotel Administration in 1988, and began her career as a food-service designer, creating facilities for hotels, restaurants, airports, hospitals, universities, and catering halls. Her academic interests center on how the design of environments affect consumer intentions, satisfaction, and behavior. She is a specialist in the psychology of restaurants and has presented and published her research

in the *Cornell Hospitality Quarterly*, the *Journal of Environmental Psychology*, the *Journal of Foodservice Business Research* and a wide range of industry and academic forums around the world.

Breffni Noone, Ph.D., is an associate professor at the Pennsylvania State University School of Hospitality Management. She holds a Ph.D. from Cornell University. Her research interests include pricing and distribution channel management for services, with particular emphasis on consumer perceptions of, and reactions to, revenue management practices. Her work has appeared in such journals as *Journal of Revenue and Pricing Management*, *Cornell Hospitality Quarterly*, *Journal of Service Management*, *Managing Service Quality*, *International Journal of Hospitality Management*, and *Journal of Hospitality and Tourism Research*. She has also served as a consultant to independent and chain hospitality enterprises in the U.S. and Europe.



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Marketers have long known that there are substantial differences between what consumers say they will do and what they actually do.¹ Researchers and marketers often rely on consumer questionnaires or interviews to elicit consumer perceptions and preferences, but the data that result from these approaches can be at odds with actual behavior—even when consumers attempt to explain why they made a particular set of choices. Therefore, a research method that would capture actual consumer behavior is a gold standard in assessing the effectiveness of a given marketing strategy or design decision. As we explain in this paper, eye tracking is such a method.

¹ For example, see: John K. Wong and Jagdish N. Sheth. “Explaining Intention-Behavior Discrepancy: A Paradigm.” *Advances in Consumer Research*, Vol. 12, No. 1 (1985): 378-384.

The methods commonly used to assess actual consumer behavior have considerable value. These include direct observation, analysis of sales data, and, for online behavior, clickstream analysis. Clickstream analysis, for example, yields helpful information about which websites consumers visit, for how long, and which links they select as they navigate, but it does not capture precisely what consumers are doing and thinking while they are reviewing information on a website. Marketers can see where they clicked but still must infer which of those clicks were critical for the consumer's final decision.

A more rigorous method is needed to get a clearer picture of actual visual behavior, in large part because of the competitive advantage inherent in capturing consumer attention, however briefly.² Eye tracking is such a method. Eye tracking—also called gaze tracking—is the practice of capturing eye movements and converting this information into some form of analyzable data. As the technology has improved and become less intrusive for the user, eye tracking has become an important tool in assessing the usability of computer applications and in exploring consumer decision making.³ We feel that there are many opportunities for hospitality organizations to harness eye tracking research to help address questions that go well beyond just how consumers use websites to exploring how to best price a hotel room or how to best configure a hotel lobby.

With the exception of works by Pan, Zhang, and colleagues, and by Yang, we have not seen any published research that applies eye tracking research methodology to a hospitality context.⁴ This is surprising because in services like hotels and restaurants, consumers rely heavily on visual

information to draw conclusions about the potential experience prior to purchase.⁵

Further, hospitality brands invest enormous amounts of time and money to develop what they hope are attractive and effective facility designs, but they have limited means of measuring which design elements are most influential in attracting consumer attention and forming brand identity. Understanding precisely what hotel or restaurant guests look at when assessing a service environment or making a purchase decision would offer brand leadership significant insights that could help streamline the creation of the hospitality servicescape or increase click-through rates from online travel agencies (OTAs) and other marketing channels.

This paper provides an introduction to eye tracking and discusses how this methodology might be applied to specific issues in hospitality marketing, management and development.

A Brief Overview of Eye Tracking Technology

The main idea behind eye tracking is simply to measure where the eye focuses and for how long. Contrary to what we might think, eyes are rarely still for any length of time. When an object is actively observed (as opposed to fleetingly and possibly unconsciously seen), the eye briefly fixates on that object, on the order of three fixations per second. Longer fixation durations are indications of cognitive processing and thus measuring fixation length and location is a precise and quantitative way of determining where a viewer focuses conscious attention when observing a visual stimulus.⁶

Eye tracking systems have been in use for decades, but until relatively recently they have been cumbersome and intrusive for users. In contrast, today's commercially available eye tracking systems are relatively easy to use. These systems combine video cameras with a directed infrared source to take two measurements several times each second: the position of the edge of the pupil and the location of the reflection of the light source on the cornea (called the first Purkinje reflex). The eye tracking software uses these measurements to estimate where these fixations fall on a stimulus and to compute the path the eyes took from fixation to fixation. These rapid shifts in focus—called saccades—can provide insight into the ease with which users can find the information they need and in which order elements of the stimulus are viewed. Eye tracking software can also compute the length of time

² Jesper Clement, "Visual influence on in-store buying decisions: An eye-track experiment on the visual influence of packaging design." *Journal of Marketing Management* 23, no. 9-10 (2007): 917-928; and Russo, J. Edward, and France Leclerc. "An eye-fixation analysis of choice processes for consumer nondurables." *Journal of Consumer Research* (1994): 274-290.

³ Robert J.K. Jacob and Keith S. Karn. "Eye tracking in human-computer interaction and usability research: Ready to deliver the promises." *Mind*, Vol. 2, No. 3 (2003): 4; and Lizzie Maughan, Sergei Gutnikov, and Rob Stevens. "Like more, look more. Look more, like more: The evidence from eye-tracking." *Journal of Brand Management*, Vol. 14, No. 4 (2007): 335-342; Atalay, A. Selin, H. Onur Bodur, and Dina Rasolofoarison. "Shining in the Center: Central Gaze Cascade Effect on Product Choice." *Journal of Consumer Research*, Vol. 39, No. 4 (December 2012), pp. 848-866; Lizzie Maughan, Sergei Gutnikov, and Rob Stevens. "Like more, look more. Look more, like more: The evidence from eye-tracking." *Journal of Brand Management* Vol. 14, No. 4 (2007): 335-342.

⁴ Bing Pan, Lixuan Zhang, and Kevin Smith. "A Mixed-Method Study of User Behavior and Usability on an Online Travel Agency." *Information Technology & Tourism*, Vol. 13, No. 4 (2011): 353-364; Bing Pan, Lixuan Zhang, and Rob Law. "The Complex Matter of Online Hotel Choice," *Cornell Hospitality Quarterly*, Vol. 54, No. 1 (2013): 74-83; and Sybil S. Yang. "Eye movements on restaurant menus: A revisit on gaze motion and consumer scanpaths." *International Journal of Hospitality Management*, Vol. 31, No. 3 (2012): 1021-1029.

⁵ Eileen A. Wall, and Leonard L. Berry. "The combined effects of the physical environment and employee behavior on customer perception of restaurant service quality." *Cornell Hotel and Restaurant Administration Quarterly*, Vol. 48, No. 1 (2007): 59-69; and Mary Jo Bitner, "Evaluating service encounters: the effects of physical surroundings and employee responses." *Journal of Marketing* (1990): 69-82.

⁶ Irwin, David E. "Fixation location and fixation duration as indices of cognitive processing." *The Interface Of Language, Vision, and Action* (2004): 105-133.

that the eyes fixate on a particular visual element, how long it takes for the eye to settle on a particular stimulus, and the size of the pupil, which indicates cognitive engagement with a visual stimulus.⁷ The resulting dataset is a comprehensive resource for quantitatively measuring attention to any sort of text, image or environment.

Eye tracking systems come in two basic forms: mobile and screen-based. Mobile eye trackers, whether head-mounted or worn as eye glasses, are designed for visual behavior studies in built environments. This form of eye tracking enables participants to interact freely with physical spaces, objects, or other people, thereby significantly boosting study validity. With this approach, users' eye fixations can be precisely measured as they move through a real-world space. Applications of mobile eye tracking have include evaluating the effectiveness of the layout of controls on a flight deck,⁸ studying what shoppers focus on when searching for products in the supermarket,⁹ and measuring the value of maps and landmarks in wayfinding in an unfamiliar environment.¹⁰

Screen-based eye trackers, on the other hand, are designed for studying responses to both static and dynamic visual stimuli. The most common application of screen-based eye tracking is for human-computer interface (HCI) and software usability studies. In these studies, users' eye movements are measured while interacting with a website or software interface in order to provide insights into possible design improvements to speed performance, increase engagement, or otherwise enhance the user experience. Marketers have also turned to screen-based eye tracking to assess the impact of advertising messages and package design.¹¹

With screen-based eye tracking, there is the option to use an eye tracker that is integrated into a monitor, a somewhat bulky arrangement that is best suited to a stationary setting such as a research lab. A more flexible approach is a portable

eye tracker that can be snapped onto a laptop to provide an eye tracking solution that can be used virtually anywhere. There are also tablet-based eye tracking applications being developed that integrate eye tracking functionality directly with the tablet's built-in camera, obviating the need for special eye tracking equipment.

It is unclear, however, whether tablet-based systems will offer the same degree of precision that can be obtained with computer-based eye trackers. Indeed, in late 2013, Google patented eye tracking technology designed for its Google Glass product, potentially making eye tracking a viable way of capturing user attention data in almost any setting.

Quantitative and Qualitative Data from Eye Tracking Sessions

Regardless of the type of system used, eye tracking sessions generate a vast amount of quantitative data. A five-minute session, for example, can involve close to 1,000 individual fixations, each of which is measured in multiple dimensions and then filtered to reduce noise in the data. While raw data from eye tracking software can be exported into common analytical applications such as Excel or SPSS, the number of variables recorded for each fixation makes such data difficult to work with for non-specialists. Far more useful for many consumer research applications are the software's data visualizations, notably heat maps, area-of-interest (AOI) maps, and gaze plots. These visualizations take the quantitative data generated by the eye tracker and convert them into readily interpreted static images or video output. Each form of visualization allows a different series of insights to be made.

Heat maps. Heat maps superimpose a representation of the location and frequency of fixations across one or more study participants on top of a single static image. The areas of the stimulus that received a relatively high number of fixations appear "hotter" by means of coloration on the heat map. Heat maps are commonly used to evaluate the parts of a webpage that represent the most valuable "real estate" for ad placement. They are also valuable in examining where the bulk of observers look first when viewing an image or encountering an environment such as a retail display.

Although a heat map is generated by compiling quantitative data, it is best interpreted as a qualitative tool. Heat maps are useful for identifying patterns of looking behavior but they don't provide a basis for the detailed analysis of fixations, nor do they capture saccades or indicate fixation order.

Area-of-interest maps. For studies that involve a static stimulus—for example, when all participants in a study are viewing the exact same webpage—areas of interest, or

⁷ Jackson Beatty, "Task-evoked pupillary responses, processing load, and the structure of processing resources." *Psychological Bulletin*, Vol. 91, No. 2 (1982): 276.

⁸ Nadir Weibel, Adam Fouse, Colleen Emmenegger, Sara Kimmich, and Edwin Hutchins. "Let's look at the cockpit: exploring mobile eye-tracking for observational research on the flight deck," in *Proceedings of the Symposium on Eye Tracking Research and Applications*, pp. 107-114. ACM, 2012

⁹ David Wilfinger, Astrid Weiss, and Manfred Tscheligi. "Exploring shopping information and navigation strategies with a mobile device," In *Proceedings of the 11th International Conference on Human-Computer Interaction with Mobile Devices and Services*, p. 19. ACM, 2009

¹⁰ Peter Kiefer, Ioannis Giannopoulos, and Martin Raubal. "Where Am I? Investigating Map Matching During Self-Localization With Mobile Eye Tracking in an Urban Environment." *Transactions in GIS* (2013).

¹¹ Rik Pieters, Michel Wedel, and Rajeev Batra. "The stopping power of advertising: Measures and effects of visual complexity." *Journal of Marketing*, Vol. 74, No. 5 (2010): 48-60; and Graham, Dan J., Jacob L. Orquin, and Vivianne HM Visschers. "Eye tracking and nutrition label use: A review of the literature and recommendations for label enhancement." *Food Policy*, Vol. 37, No. 4 (2012): 378-382.

AOIs, can be defined before eye tracking begins. This allows a variety of quantitative metrics to be captured for each AOI, including the proportion of participants that view a particular AOI, the length of time it takes participants to fixate on an AOI, and the total duration of all of a user's observations of a given AOI during an eye tracking session. AOI analysis can also include an analysis of mouse-click behavior which allows researchers to evaluate precisely where, within an AOI, mouse clicks took place.

Measuring fixations on AOIs can be helpful in deciding which elements to include in an ad or website, or in determining the attention-capturing potential of attributes like size or color for a given stimulus.¹² However, AOI analysis is more problematic for dynamic stimuli like videos and requires specific analytic tools designed for this work.¹³

Gaze plots. A gaze plot combines eye position and movement information to form a dynamic display of eye behavior that is superimposed over the visual stimulus used in the eye tracking session. The length of a particular fixation is indicated by a circle sized to represent fixation duration, and each saccade is represented by a fine line connecting fixations in sequence. Together, these circles and lines create a clear graphic representation of all of a participant's eye movements which can be saved for later analysis. Like heat maps, gaze plots can illustrate the eye behavior of either a single individual during one session or an aggregation of multiple individuals over several sessions, provided that the same stimulus is presented to each individual.

Gaze plots can be static, where the sequence of fixations is identified by numbers, or dynamic, showing in video form the exact eye movements captured throughout the session. Exhibit 1 shows both types. Following users' eye movements as they complete a task across multiple screens or webpages is an ideal application for a dynamic gaze plot. A widely used procedure for situations like organic search, where the visual stimulus cannot be defined by AOIs, is for researchers to analyze a video recording of eye tracking sessions overlaid with gaze plot visualizations.¹⁴ The resulting dynamic gaze plots can be reviewed on a frame-by-frame

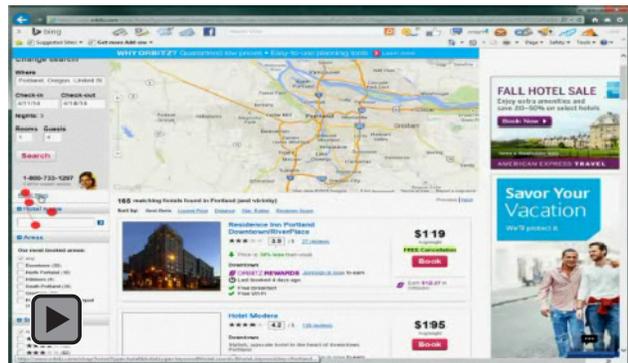
¹² Georg Buscher, Susan T. Dumais, and Edward Cutrell. "The good, the bad, and the random: An eye-tracking study of ad quality in web search," in *Proceedings of the 33rd international ACM SIGIR conference on Research and development in information retrieval* (ACM, 2010), pp. 42-49.

¹³ Bryan Reimer and Manbir Sodhi. "Detecting eye movements in dynamic environments." *Behavior Research Methods*, Vol. 38, No. 4 (2006): 667-682; and Frank Papanmeier, and Markus Huff. "DynaAOI: A tool for matching eye-movement data with dynamic areas of interest in animations and movies." *Behavior Research Methods*, Vol. 42, no. 1 (2010): 179-187.

¹⁴ Sophie Stellmach, Lennart Nacke, Raimund Dachselt and Craig A. Lindley. "Trends and Techniques in Visual Gaze Analysis." The 5th Conference on Communication by Gaze Interaction—COGAIN 2009: *Gaze Interaction For Those Who Want It Most*, pp. 89-93.

EXHIBIT 1

Video clip of dynamic gaze plot



Note: The video above shows a person's eye movements in a dynamic gaze plot. The screen shots from the video below also show fixations, indicated by the red dots, and saccades, indicated by the lines.

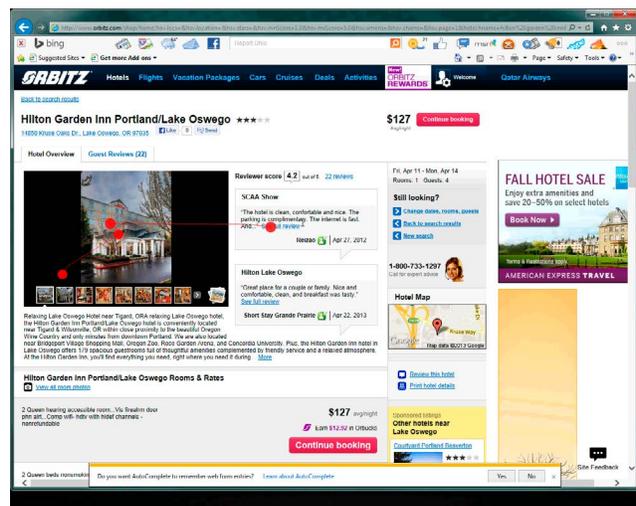
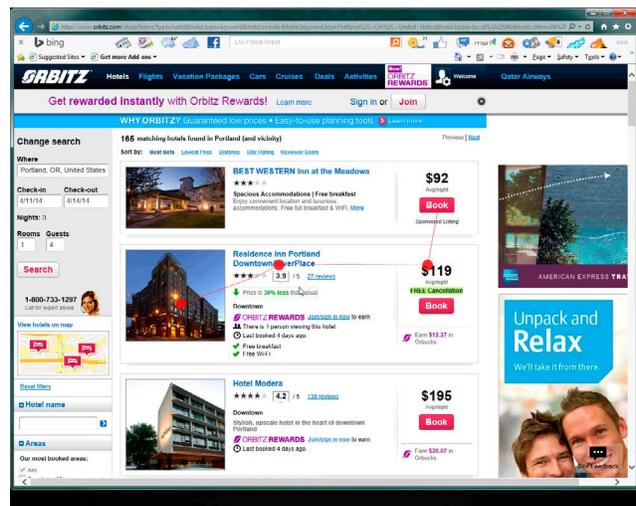


EXHIBIT 2

Video clip of RTA (retrospective think-aloud)



basis to identify the elements being observed at each fixation. This approach to extracting useful data, while informative, can be time consuming, as all of the elements of the stimuli that the users observed and the sequence in which they viewed the elements may have to be manually coded in order to convert the data into a quantitative form for analysis.

The dynamic gaze plot shown in Exhibit 1 was obtained as part of an exploratory study we conducted on how consumers use various sources of information when making an online hotel purchase decision (Exhibit 1). A summary of the quantitative findings from this study is found in the accompanying report: Breffni A. Noone and Stephani K. Robson, “A Deeper Understanding of Consumers’ Online Hotel Search Behavior,” *Cornell Hospitality Report*, Vol. 14, No. 18 (Cornell Center for Hospitality Research).

Clearly, eye tracking technology offers a remarkable resource for collecting objective quantitative data about users’ visual behavior. Researchers can also combine quantitative eye tracking data with a parallel stream of qualitative data to more fully understand, or explain, the meaning behind visual activity. To this end, many eye tracking systems offer a way to capture facial expressions and vocalizations during an eye tracking session. These can be helpful in assessing emotional responses to the visual stimuli being observed or for gaining some insight into user thought processes. However, a key concern is the validity and reliability of these measurements: facial expressions alone are hard to interpret with any accuracy,¹⁵ and if users verbalize their thinking while performing the task, head movements during natural speech can interfere with accurate gaze capture.

¹⁵ Michaela Riediger, Manuel C. Voelkle, Natalie C. Ebner, and Ulman Lindenberger. “Beyond “happy, angry, or sad?”: Age-of-poser and age-of-rater effects on multi-dimensional emotion perception.” *Cognition & Emotion*, Vol. 25, No. 6 (2011): 968-982.

A far more effective approach to obtaining qualitative data to accompany the eye tracker’s quantitative data is via an in-depth interview that occurs after the eye tracking session is complete. These are commonly called retrospective think-alouds or RTAs.¹⁶ RTAs can be conducted with or without some kind of visual cue, although the most effective approach is to accompany the think-aloud interview with a playback of the dynamic gaze plot superimposed over the system’s video recording of the user’s eye tracking session.¹⁷ In this form of RTA, participants’ dynamic gaze plots are replayed for them after the eye tracking session is complete, and an interviewer asks them to describe their thought processes and outline the reasoning for their actions and choices as they view the record of their eye movements. The resulting oral report can then be transcribed and analyzed using content analysis. As an illustration of this technique, Exhibit 2 depicts a short segment of a RTA being conducted as part of a hotel choice study that we conducted.

This combination of actual visual behavior paired with verbal reports of thoughts and feelings that are occurring at the same moment makes eye tracking an excellent way to test how a user responds to any kind of real or simulated stimulus. However, due to the significant time and resources required to conduct eye tracking sessions, sample sizes need to be smaller than those used in other types of consumer research, such as surveys. While some published eye tracking studies use forty participants or more,¹⁸ many of these studies have much smaller numbers of observations, particularly when eye tracking is combined with RTAs.¹⁹

Applying Eye Tracking to Hospitality Research

Being able to pinpoint what the guest actually sees is of particular importance to the hospitality industry because of the intangible nature of the hotel offering. For example, in the majority of cases, consumers make the online hospitality purchase decision based partially if not wholly on sight (whether images of the property or posted reviews). Brands and operators must generate sales through web interfaces that they often do not control themselves—specifically, those

¹⁶ Clayton Lewis, *Using the “thinking-aloud” method in cognitive interface design*. IBM TJ Watson Research Center, 1982.

¹⁷ Tobii Technology. “White paper: Retrospective think aloud and eye tracking: Comparing the value of different cues when using the retrospective think aloud method in web usability testing.” Falls Church, VA: September 2009.

¹⁸ For example, see: Buscher *et al*, *op.cit.*; and Russo and Leclerc, *op.cit.*

¹⁹ Mackenzie G. Glaholt and Eyal M. Reingold, “Eye movement monitoring as a process tracing methodology in decision making research,” *Journal of Neuroscience, Psychology and Economics*, Vol. 4, No. 2 (2011): 125-146; Glöckner, Andreas and Ann-Katrin Herbold, “An eye-tracking study on information processing in risky decisions: Evidence for compensatory strategies based on automatic processes,” *Journal of Behavioral Decision Making*, Vol. 24 (2011): 71-98; and Papenheier and Huff, *op.cit.*

of online travel agencies and destination marketing organizations—and are required to pay a premium for what is perceived to be preferred placement in search results or hotel listings. So too in restaurants: while suggestive selling by a server can contribute to the guest check, much of the diner's purchase decision is driven by the visual stimuli of the menu, the servicescape, and even what neighboring tables are ordering. But identifying what captures guest attention goes beyond identifying the drivers of sales. With the increasing importance of design as a product differentiator and as a major pillar of a hotel brand's identity, understanding how guests see and interpret hospitality settings either during the product development phase, or after construction is complete, can help brands and operators create better designs based on quantitative evidence. For these reasons, we feel that eye tracking is an ideal methodology for testing a wide range of hospitality research questions.

While eye tracking offers the potential to address many issues of interest to hotel or restaurant firms, we have seen only a few published studies that apply the methodology in a hospitality context. For example, in their study of consumers' online hotel choice behavior under simulated conditions, Pan, Zhang, and Law used eye tracking data and RTAs to evaluate how consumers consider text and images when selecting a hotel from a pre-determined list of hotel properties.²⁰ In her 2012 work, Yang used eye tracking on restaurant menus to test and debunk the "sweet spot" theory of menu design.²¹ As we describe next, further opportunities to gain insight from eye tracking include choice analysis, distribution channel conversion analysis, facility design analysis, and employee development.

Choice analysis. Any time a guest evaluates a visual presentation to make any kind of choice, eye tracking can play a role in determining how that choice was made. For example, building on the work of Yang, eye tracking has recently been employed to assess guest choice on the International House of Pancakes restaurant menu and could just as readily be used to test responses to any kind of offerings list.²² This research can determine the number of menu items considered before a choice is made and whether the visual information could be arranged more effectively to either speed choice or to increase likelihood of purchase. More applied questions could examine whether wine purchasers make their selections by looking at prices more than the information about the wines themselves, or if minibar or grab-and-go sales could be increased by rearranging the display of the available products. Being able to accurately measure

²⁰ Pan et al, *op.cit.*

²¹ Yang, *op.cit.*

²² Megan Garber, The engineering of the chain restaurant menu. *The Atlantic*, March 12, 2014.

what a user is examining throughout the choice process allows an organization to craft more effective marketing tools of all types, whether on a digital device, in print, or in the built environment.

When paired with an RTA, eye tracking choice research can uncover the thought process behind guest choices with higher validity than focus groups, surveys, or regular interviews.²³ For example, for hotels, this information could help identify which elements are attractive to guests in the images of the property posted online. From there managers can decide which images to make available to the online travel agent sites to increase the likelihood of click-through. For a food-service operation, the reasons why a particular menu item is not chosen or even examined in any detail could be combined with sales data to fine-tune offerings for maximum impact and revenues.

Distribution channel conversion analysis. A significant problem for hotel revenue managers is how to best allocate inventory across multiple channels. Channels that directly generate bookings are logically viewed more favorably when it comes to assigning inventory or planning advertising expenditures. But although a hotel booking is routinely attributed to the website that generated the "last click" prior to purchase, most consumers may visit several websites prior to booking. Clickstream analysis can indicate which sites were visited but cannot identify with any precision which elements of those sites were most influential in the consumer's decision to book. Therefore, combining clickstream analysis with eye tracking could offer an effective way of fairly assessing the actual contribution of particular advertisements, campaigns, or distribution channels to revenue, and thus help refine marketing and revenue management strategy.

Facility design analysis. We see a pressing need for evidence-based design research in the hospitality industry. Many industries, notably health care, have moved towards making facility decisions based on measurable user outcomes such as reduced infection rates, faster healing, or improved personnel performance or satisfaction.²⁴ The hospitality industry does not have such metrics, and a great number of design decisions are based on subjective information or on inferred relationships between design and outcomes that are rarely empirically tested because of the cost and complexity of this kind of research. We have seen few empirical studies of the effects of hospitality facility de-

²³ Catherine Marshall and Gretchen B. Rossman. *Designing qualitative research*. Sage, 2010.

²⁴ Blair L. Sadler, Jennifer DuBose, and Craig Zimring. "The business case for building better hospitals through evidence-based design." *Health Environments Research and Design Journal*, Vol. 1, No. 3 (2008): 22-39. See also: Brooke Hollis and Rohit Verma, "The Intersection of Hospitality and Healthcare: Exploring Common Areas of Service Quality, Human Resources, and Marketing," *Cornell Hospitality Roundtable and Conference Proceedings*, Vol. 4, No. 2 (2012), Cornell Center for Hospitality Research.

sign on performance outcomes, and most of those that have appeared are related to building energy use. Eye tracking is a logical application to obtain objective, quantifiable data on the effect of facility design decisions on guest behavior and, when paired with RTAs, on guest perceptions and attitudes toward a hotel or restaurant servicescape.

While most eye tracking research focuses on two-dimensional stimuli, improvements in the technology now allow effective eye tracking in three-dimensional immersive settings, presented either in the real world or virtually.²⁵ Computer simulations of proposed designs might be pre-tested using eye tracking at much lower cost than testing consumer reactions to a full-scale guestroom mockup. Eye tracking can be applied to walk-throughs of real or simulated environments as a way of measuring response and allowing the design team to adapt their work where necessary for maximum impact. For example, a hotel brand might develop four or five alternative schemes for a spa retail area and use eye tracking to determine which design approach garners the longest viewing of the spa products for sale.

Eye tracking could also be a valuable tool in wayfinding studies, either through simulations before a property is built, or after the fact as part of a post-occupancy evaluation. This process analyzes how easy it is for guests to find the entrance to a restaurant off the lobby (or even to notice it), for instance, or to assess what guests see as they navigate through the hotel to the fitness room or pass through the casino. Insights gained from such studies could guide floor planning to obtain desired circulation effects or improve the design and sign placement.

Eye tracking may also provide the kind of quantitative evidence that is needed to demonstrate to property owners that a particular investment in the physical plant is warranted. A common source of friction between owners and brands is the property improvement plan (PIP). Eye tracking combined with an RTA could provide objective data regarding the elements of a proposed renovation that specifically contribute to a positive impression of the property or brand, which could help make the case to owners for spending the funds even if reliable return-on-investment data for a brand initiative are not yet available.

Employee development. Eye tracking could be used as an element in the training of front-line staff. Consider the value of a dynamic gaze plot superimposed on a video of a service encounter as part of a training session on what to look for as employees wait on tables or inspect guestrooms. As the technology becomes more widely available, wearable eye trackers could also become an important assessment tool for measuring staff performance.

²⁵ Stellmach *et al*, *op.cit*.

Conclusion

Eye tracking is a well-established and effective method for recording consumers' visual behavior. Despite its tremendous potential as a method of exploring how consumers actually see, interpret, and use two- and three-dimensional environments, eye tracking has rarely been applied in published hospitality research. The relative dearth of eye tracking studies in hospitality research may be due to perceived challenges with the equipment or concerns about costs. However, current eye tracking technology is far more sophisticated and simple to use than earlier eye tracking systems that required complicated and restrictive equipment, and the cost of these systems continues to come down.

Eye tracking provides a wealth of objective, quantitative data regarding what users are looking at and for how long, making it the tool of choice for rigorously measuring visual behavior. The combination of gaze data and in-depth post-eye tracking interviews also provides a powerful approach to uncovering consumer perceptions and beliefs that may arguably be difficult to capture through traditional research methods.

While most hospitality organizations may be familiar with using eye tracking to measure website effectiveness, we feel that there are many research questions across the industry in which eye tracking can be fruitfully employed. In describing the methodology and highlighting its practical applications to questions of real import, we hope that we have provided hospitality professionals and academics with the motivation to consider adding eye tracking to their research agendas. ■

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Cornell University
School of Hotel Administration
The Center for Hospitality Research
537 Statler Hall
Ithaca, NY 14853

607.255.9780
shachr@cornell.edu

www.chr.cornell.edu