The Application of 3D Design Technology to Fashion Retail Research

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Abstract
This Abstract article suggests a research methodology of creating 3D virtual stores for research on retail atmospherics. The article reviews the methodological evolution on retail atmospherics, and exemplary research using 3D virtual stores is introduced. Applying lifelike 3D-designed store stimuli to a study is believed to contribute to the rigor of the experiments by enhancing both internal and external validity.

Keywords: Technology; Virtual store; Retail atmospherics; 3D design technology; Method

Opinion
In the era of digital retailing where e/m-commerce continues to gain a foothold in the fashion retail landscape, the role of physical stores has been transformed from the sole transaction to communication projecting a particular theme or a message to customers. It is now important to know how the implicitly communicated messages via store atmospherics change and affect consumers’ feelings and behaviors more than increasing purchase intentions. Revealing a unique effect of a particular element (e.g., lighting) out of a holistic store atmosphere requires rigorously designed experimental studies. This article suggests a research methodology of creating 3D virtual stores in the field of retail atmospherics. The methodological evolution on retail atmospherics is discussed, and exemplary research using 3D virtual stores is introduced in the following section.

Methodological Retail practitioners Devlopmhavent used Studies a variety in of Retail methods Atmospherics for optimal store design decision making. One of the classical and representative methods is the use of a prototype. Baker et al. [1] used an example from The Limited's prototype store to test customer acceptance before making a decision for new store design. After two decades, this method is still used; Macy's recently opened a prototype store as a version of the store-within-a-store concept to test a new model featuring “lifestyle” departments [2]. Such a method can help figure out the effect of a store's design on sales directly, which is the primary interest of practitioners. However, the expensive and time-consuming nature of the prototype method makes it difficult to apply to academic research.

To date, methods of store environmental research are evolved and developed. The first/conventional method was to ask participants to recall their last visit to a store when answering questionnaires. Sherman et al. [3] approached shoppers in research right after their exit from the store and interviewed them about their perceptions of the store environment, shopping experience, mood, etc. They found positive relationships between consumers’ mood and favorable evaluations of the store environment, number of products purchased, and time within the store. However, it was hardly determined whether the reported emotions were a cause or a result of shopping behavior [4] or which factor in a store environment triggered the reported emotion due to uncontrolled factors.

To overcome this problem, the provision of verbal/visual description with scenario was adopted. Participants were asked to answer questionnaires after being given a description of the store [5,6]. Employing pictures or video of a real store [1,5] could increase external validity by generating similar results to field studies. This method was widely used in experimental research to test the effects of specific design or mood elements on brand evaluation [7]. However, data provided in response to these stimuli could be biased by insufficient control of exogenous variables or time lag between the participant’s actual experience in the store and the data collection period [8].

Nowadays, researchers can make use of virtual store stimuli where factors of interest are digitally manipulated while controlling other factors identically. Interestingly, two decades ago, Baker et al. [1] proposed the use of virtual store
as an effective and efficient way to test the effect of store design. They mentioned that using computer-Assisted Design (CAD) technology had great potential for experimental research by producing a virtual stimulus quickly and inexpensively. However, limitations existed at the time due to the unfamiliar software along with limited computer capacity to run such software [1]. Currently, user-friendly design software such as Sketch Up is not only easily accessible, but the quality of the outcome has been enhanced to obtain high-fidelity, three-dimensional (3D) stimuli. Applying such lifelike 3D-designed store stimuli to the study contributes to the rigor of the experiments by enhancing both internal and external validity.

Examples As the of use Retail of 3D Studies design software Using Virtual became Store widespread, Stimuli studies on store atmospherics that utilize a virtual store stimulus increased [6,9,10,11]. For example, Jung et al. [11] investigated the effect of human crowding and the physical attractiveness of others on shoppers’ approach-avoidance behavior in a fashion store. While most of the studies on store crowding have used recall or field surveys [12,13], Jung’s 2017 study used a virtual fashion store with manipulations on the level of crowding and physical attractiveness of others. Images of real people were manipulated using Photoshop and used for customer presence in the virtual store. By manipulating factors of interest, crowding level of a store and physical attractiveness of customers in this study, the stimuli were carefully designed to control the size, noise, products, and interior of the store across different conditions. A minute-long video clip was created showing a traffic line entering the store and looking around the entire store. The results found that a positive effect of physical attractiveness of other customers increased customers’ approach intentions to the store only when the store is less crowded (Figure 1).

![Figure 1: Human crowding manipulation (Top: high-level, Bottom: low-level) using Photoshop and SketchUp. Both are in a high physical attractiveness condition.](image)

Conclusion

Using 3D design technology is believed to bring a methodological advancement contributing to future research on retail atmospherics. Designing an experiment that focuses on particular variables of interest while controlling other variables can enhance the rigor of the research. Thus, it helps interpret results based on predictions in a confirmatory rather than in an exploratory way. Also, measuring the real-time response of subjects to a given store stimulus can reduce confounding factors, thus increasing the research validity, as well. Applications of virtual design technology to other disciplines such as human-computer interaction pushes the envelope on retail atmospheric research further. Participants are able to move freely and interact with elements in a virtual store using a joystick [14-17]. More realistic experience can be examined by projecting the 3D designed virtual stores to immersive, head-mounted display. Integrating with cutting-edge technologies such as virtual reality, 3D design technology in retail research is believed to overcome inherent pitfalls such as weak validity. Implementing a finely designed experimental study will enhance the internal validity while providing a holistic picture of an environment where elements are manipulated or controlled will maintain the external validity.

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