Synthesis of the Art of Science and Innovative Technologies in Creative Apparel Design

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Introduction. Elements of time, motion, space, optics, and perception can be found in both artists' works and scientific research. Even if the scientific analysis may be applied to optical (Op) art, the artist may not always use rich scientific research to approach his/her work. Op art is the essence of art, relying on complete abstraction (Parola, 1969), and is a form of visual expression (Lancaster, Palmer & Cowdell, 1973). Inspired by the interdisciplinary nature of Op art, this apparel design research mainly focused on using innovative technologies, laser cutting and digital printing, to apply the art of science to the expression of creative apparel design. The final result of this apparel design research was a final collection called "Visual Games." The three-step design process model developed by LaBat and Sokoloskwi (1999) was used as a framework for the design process and involved: 1) problem definition and research, 2) creative exploration, and 3) implementation.

Implementation. *Step 1: Problem definition and research*. The main questions for this research project regarded which artwork should be used as inspiration for the Op art print design to present the artworks by fabric. Geometric–Op Illusions are a subclass of visual distortions. In Geometric-Op Illusions, geometric properties of a stimulus relate to lengths, angles, areas, or forms (Ehm & Wackermann, 2016). Twelve Geometric-Op artworks from different art fields, such as painting, sculpture, and woodwave, that demonstrate strong visual illusions were selected as final inspirations. In these Geometric-Op patterns, geometric shapes (e.g., curves, triangles, and irregular polygons) underwent regular perspective repetition. Each regular change would cause the displacement of a single repeat pattern to change or become proportional to a specific value difference. The designer chose to apply innovative technologies, such as laser cutting and digital textile printing, for assisting in the creation of this series of designs to achieve the best illusion patterns. When laser cutting and digital textile printing were combined with Adobe Illustrator, the Op patterns were able to be accurately transferred onto the fabrics. Laser cutting technology has the unique characteristic of enabling a thermal sealing cutting edge on synthetic fabrics, which can block each cut edge cleanly so as to assemble these cut strips into a clean and complete Op Illusion pattern. Similarly, digital printing allows precise printing of detailed and complex Op patterns onto fabrics.

Step 2: Creative exploration. This process aimed to involve concept development and experimentation in creating the collection. Design ideas were built on three stages: Op Art motif creation, fabric manipulation, and silhouette creation. In the concept development work section, a few works of Geometric Op Art were selected as an initial inspiration for designing textile motif patterns. Next, fabric manipulation techniques were researched in order to determine appropriate methods for implementing the initial inspiration motifs. Fabric manipulation swatches were created in different fabric combinations. Fabric swatches were digitally printed to test the visual effect of the creations of Op Art motifs. The second work section involved experimenting with the garments in the collection. After completing 12

sketches and three collages, three looks were selected for further development. The three looks followed the design sequence that included silhouette testing and pattern making (2D-3D-2D). Pattern making first involved flat pattern drawing, then stereo adjustment on a mannequin, and finally a return to flat pattern making to determine the details of the stereo adjustment on the flat pattern paper. Garment component design was mainly accomplished in the form of finding swatches. After completing a series of design development processes, a complete line of illustrations was drawn by the designer according to the results of all the above steps (see Figure 1).

Figure 1. The final line of illustrations

Figure 2. First look (left), second look (middle), third look (right)

Step 3: Implementation. Three final ensembles are shown in Figure 2. The first look was a dress made by using digital textile printing as the motif production method, resulting in a highly accurate motif print consisting of lines and block faces, and using a fast speed laser cut edge sealing for the finishing method. Linear sequins and print motifs were blended together to enrich the fabric texture. The second look consists of a top and a skirt created by using laser cutting as the motif production method. With the aid of laser cutting, the designer was able to complete this large number of stripe cuts and complex motif cuts and, simultaneously, precisely control the width and length of each stripe. The surface of the top is covered by an Op motif, which consists of many twisted fabric strips. The mirror effect skirt fabric combined with a laser cut white suede that was made into an Op motif as a print on the skirt. To create the third look, digital printing and laser cutting were combined to produce the motif on the garment. The digitally printed fabric with the Op motif was laser cut into stripes of different widths with sealed edges, and the stripes were able to be made into ruffles. Each ruffle acted as a line, and when many stripes of

ruffle printed with the Op motif were aligned, they were able to be combined into an Op motif on the surface of the dress.

Conclusions. Contributions from this design research demonstrate the application of design process models in creative design research, and represent innovative technologies that use laser cutting and digital printing techniques to manipulate surface designs that ideally portray the fantasy of optical art. At the same time, the design and development process of this collection successfully demonstrated the perfect combination of art and science with the assistance of innovative technology.

Reference

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