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From Roberts' Subtraction Cutting and Dart Manipulation: Concepts for Patternmaking Theory

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According to McKinney, Stanley, Plummer, Thompson, and Rorah, (2016), Roberts' (2013) subtraction cutting technique (SCT) is creative and approaches the body differently than traditional practices. The process of SCT relies on creating holes in the fabric, in which a body can pass through, thus focusing on negatives shapes rather than constructing a garment around a body. Design research was completed by engaging in Roberts' (2013) SCT and reviewing the process and outcomes in the context of traditional flat pattern principles, with the intention of theory development (Bye, 2010; Pederson, 2007). The exploratory design research methods included creation of a full-scale application of SCT, an adaptation in the form of a leg-o-mutton shaped sleeve, and small-scale prototypes to isolate the outcome of the SCT. The completion of these garment studies resulted in the development of three concepts that could add to the knowledge of apparel patternmaking. Concepts are explained in the context of related literature.

Concepts

Concept 1: Subtraction Cutting Functions As, but Does Not Look Like a Dart

The Dart, "a wedge-shaped cut-out in a pattern to control the fit of a garment when stitched" (Joseph-Armstrong, 2010, p. 10), was found to be the primary principle that Roberts' adapted and reinterpreted to develop his SCT. There are similarities between SCT and darts; both remove excess fabric from the design. Roberts' named his technique because it removes fabric (Roberts, 2013). Both also transform two-dimensional fabric into three-dimensions. A dart contours fabric to the body and SCT encourages the fabric to drape around the body. Both procedures create extra fabric, traditionally known as dart excess (Joseph-Armstrong, 2010).

While Roberts' SCT performs like a dart, removing the fabric, it does not visually look like a dart. Instead of a wedge shape, circles are cut-out and then joined so that a body can pass through them. A body does not pass through a dart. Despite differences in the shape of the fabric removed, how darts function can assist in understanding how SCT manipulates fabric. In general double (or "fisheye") darts join their legs together, their points do not join. However, if one can set aside Roberts' different shape, circles, it can be said that the circles join the way the points of double dart would.

Concept 2: Subtraction Cutting Works with Different Shapes

The above understanding leads to the possible iteration that the connecting shapes do not have to be circles; triangles or other shapes could be used. A hypothesis was made that cutting out only one shape, an oval, would achieve the similar visual look like the two circles. This hypothesis proved to be true when executed.

Concept 3: Direction of Joined Shapes Relates to Garment Length and Volume

It was also found that: (a) shapes connected vertically will shorten the garment length, (b) shapes connected horizontally will decrease the garment volume, and (c) shapes connected on a

diagonal will shorten the garment length and decrease its volume. SCT removes length and volume through the center of the garment, whereas darts reduce vertical or horizontal length at the edge of the garment.

Implications for Manufacturing and Pedagogy

Understanding SCT through the lens of dart manipulation could allow for mass manufacturing of the technique and encourage experimental patternmaking in an educational setting. Another parameter required to execute darts correctly is the ability to accurately apply mathematical concepts (Joseph-Armstrong, 2010). Whereas Roberts (2013, p. 13) promotes "chance discovery, distance and the ability to cut fast and inaccurately," preventing SCT from being reproduced and mass manufactured. This assumption may be incorrect because utilizing the concepts discovered such as fewer shapes being removed from the fabric lends itself to mass manufacturing. The other finding—how joining the shapes together changes garment volume—introduces that one can measure the differences between the shapes to achieve specific manipulations. Initiating mathematical processes into the development of the garment could lead to its mass reproduction. Further research may to support and articulate these suggestions for manufacturing.

Roberts' SCT could provide a means to employ analogy and metaphors to promote creative thinking amongst learners (Joyce, Weil, & Calhoun, 2009). Gordon's (1961) learning strategy of synectics encourages the use of metaphors to approach problems and complex ideas. Introducing Roberts' SCT after students learn dart manipulation could create the situation where students take a familiar concept and compare it to something unfamiliar. In contrast, one could teach Roberts' first and then introduce dart manipulation as a means to make the strange familiar. A formal scholarship of teaching and learning study could determine the value and outcome of each case and add to the proposed methods of "teaching conceptually" (Ashdown, 2013) for technical design.

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