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Embodied Geometry in Haircutting Practice

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Abstract: We investigate the emergent, interactionally achieved, embodied geometry that two hairstylists collectively enacted during a haircutting session.

Introduction

We investigate the emergent, interactionally achieved, embodied geometry that two hairstylists enacted during a haircutting session. By stepping out of classroom environments and into the world of a professional trade, we shed light on alternative, powerful forms of embodied mathematical practices (Hall & Nemirovsky, 2012), and join efforts that seek to counter epistemological injustices and marginalization (Medin & Bang, 2014).

Theoretical framework

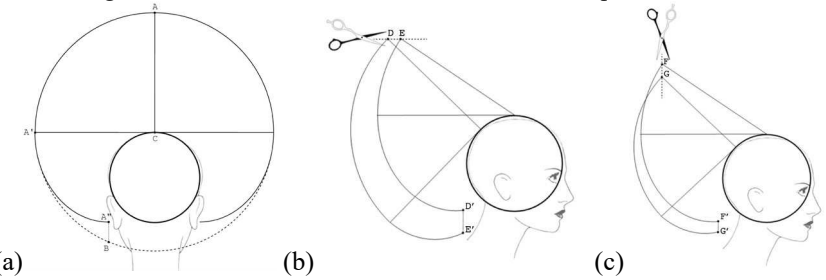
We adopt an *interactionist* perspective (Jordan & Henderson, 1995) and take it that cognition is embodied to the extent that knowing and learning are processes that take place through bodily perception and action, and which unfold within specific material, physical, and social settings (Hall & Nemirovsky, 2012). In this approach, therefore, the body is seen as "a dynamically unfolding, interactively organized locus for the production and display of relevant meaning and action" (Goodwin, 2000) and "concepts… [are] forms of modal engagement in which bodies incorporate and express culture" (Hall & Nemirovsky, 2012, p. 211). We emphasize the coordination of action between participants in a setting, the multifaceted roles that bodies take on during the process, the tool mediated character of the job, and how reasoning and action emerges from the exchanges between participants.

Empirical methods and context

We investigate a single episode of an interaction between two professional hairstylists, Steven and Brooke (pseudonyms), and a client. Steven, a male in his early forties, had specialized in cutting hair for 16 years, while Brooke, a female in her late twenties, had specialized in coloring hair for seven years. Steven and Brooke had arranged to help each other develop their coloring and cutting techniques, respectively. We focus on the session in which Steven guided Brooke through a haircutting job for which the client had requested a layered cut. We video recorded the naturally unfolding exchanges between Steven and Brooke, as they worked at a salon.

Analysis

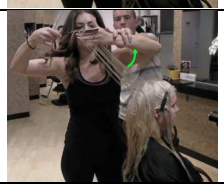
Layers are created by cutting sections of hair so the ends of the hair fall around the head in such a manner that their overall relative lengths appear to be "graduated." In canonical geometry terms, the process rests on the concepts articulated in Figure 1. Key concepts of haircutting operate "on top" of, and in tandem with this geometry basis: (1) *sectioning* is the act of dividing the hair at the scalp to separate the hair into uniform working areas; and (2) a *guideline* (or guide) is a section of hair that establishes the length to which the hair, locally or overall, will be cut—that is, it acts as a guide as to where to cut the hair in each subsequent section or subsection.



(a) (b) (c)

Figure 1. (a) Hair extended from point C to A is free to rotate about point C until it reaches A', at which point the hair is extended in a line tangent to the head and begins to wrap around the curve of the head, effectively "shortening" in length relative to where it would fall if allowed to rotate freely. Thus, upon reaching point A', the hair wraps around the head until it falls to point A'', as opposed to point B; (b) and (c) Notice that even if the length DE is equivalent to length FG, the differences in length D'E' and F'G' differ as the hair wraps around the head, following the *involute* of the roughly circular head shape.

On this background, we pick up the action as Brooke had established the guideline (17:42) and moved to section the hair to be cut into layers. Creating precise layering effects is founded on the formal geometrical concept of *involute of a circle*. If cutting a single strand (Figure 1b), one can see that the hair rotates freely, in a *semicircular* path, until it reaches point A', at which it appears to "shorten" in length as it wraps around the head. When cutting a whole section of hair, then, the angle at which hair are elevated and cut have a drastic effect on the graduation of the layers. For instance, cutting across a section of hair parallel (Figure 1b) and perpendicular (Figure 1c) to the ground creates differences in *lengths* among the strands in the section (compare length D'E' to F'G') and, once an *angle* (parallel or perpendicular) is adopted, one must adhere to it throughout; Stephen and Brooke had decided for a parallel angle. But as Brooke was about to carry out the first cut in the process, an imprecision in cutting angle threatened to violate these principles and to introduce layering inaccuracies:

Turn	Time	Participants' talk and action annotations	Image annotations
1	18:11	Steven: ((Talk unintelligible)) ((Began moving his left hand towards Brooke))	
2	18:12	Steven: Just, watch the arm bend up there ((pointing to her left wrist)).	
3	18:13	Steven: ((Talk inaudible)) ((Grabs Brooke's left arm near the wrist and lifts it so it is parallel to the floor)). Brooke (18:14): The hair? Steven: Yeah.	

As Brooke lifted the hair away from the client's head and neared her first cut stroke (turn 1), she rested her hand on the hair and held her elbow at a depressed (incorrect) angle toward the floor (turn 1, image)—in effect "bending" that hair section, rather than creating a straight line. This action, akin to disregarding a fundamental axiom of geometry, breaks the geometric basis upon which the relevant cutting theory is dependent. Immediately noticing the problem (turns 2-3), Steven directly intervened by grabbing Brooke's left arm and correcting its position and, by implication, her hand's angling and holding of that hair section.

Discussion and conclusion

We found that the geometry of hairstyling is an interactional, embodied accomplishment in that: (1) Body parts were literally operated upon, cut and discarded, according to underlying geometric principles; (2) Bodies were constantly coordinated to obtain meaningful relationships of geometrical nature; and (3) Hairstylists' actions and body posture were founded on, and expressed geometrical concepts. In all, the embodied mathematical practices we reported upon reflect a complex geometry, yet achieved through means quite different from canonical mathematical practice and based on quite distinct epistemological and ontological bases. The complexity of such math and its instantiation in a traditional trade reaffirms the power of alternative STEM epistemologies (Medin & Bang, 2014) and the promise that research on learning out-of-school holds for advancing our field.

References

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