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Transmodality and temporality in design interactions

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Abstract

In this paper I explore the ''multimodal communication'' framework by developing the concept of transmodality. I examine how features of language and embodied action in product design interactions over time consequentially influence the shape of subsequent communicative actions in particular ways, which in turn cumulatively affect the emergence of a design. I show how talk and embodied action themselves constitute through their very properties a central mechanism by which ideas are transformed into designed, real-world objects. Using data collected during an ethnographic study of a design studio in Sweden, I focus on how particular features of a designed object are rendered ''transduced'' calques of corresponding features of the design interactions that themselves traverse modalities (from, for instance, verbal descriptors like ''soft'' to particular gesture forms) and ontologies (from debatable topics to fixed material features of an object). Over the course of several interactions in the studio, spanning a number of days, particular gesture forms are repeatedly and consistently linked to particular concepts, which in turn are translated into hand sketches and computer drawings, which are then used to create a prototype ready for show. As I demonstrate, the process of creation is constituted by a generative contrapuntal elaboration between the emerging interactions and the emerging design.

Keywords: Multimodality; Gesture; Temporality; Design; Sweden

1. Introduction

One of the most potent aspects of the multimodal paradigm for studying face-to-face interaction is its detailed and comprehensive treatment of situated human communication. Positioned in contrast to frameworks that analytically sequester communicative modes like speech and gesture both from each other and from the material world, the multimodal approach instead assumes semiotic complexity as the prerequisite, irreducible condition for communicative social action. While there is considerable analytic purchase in recognizing that talk, embodied action, spatial contexts and more all work together to support and elaborate the collaborative production of meaning in interaction, it is more difficult to account for the complex ways in which these ''modes'' or ''modalities'' link up with, influence, and transform not just ''the interaction'' broadly speaking, but also *one another*, especially with regard to their arrangement in non-contiguous stretches of time.[1]

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[1] Much of the current research that falls under the rubric of multimodality is the result of a gradual culmination and selective convergence of several different research agendas. Though individual examples may still exhibit a range of influences with differing degrees of dominance, including conversation analysis (Mondada, 2007, 2011; Sidnell, 2006), philosophy (Streeck, 2009), and anthropology (Goodwin, 2000; M.H. Goodwin, 2007), most studies of multimodality operate from a point of departure mixing disciplinary assumptions and insights together—including from domains beyond discourse analysis—into a common conceptual framework (see Jewitt, 2009; Streeck et al., 2011).

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In order to address this limitation, in what follows I develop the notion of *transmodality* as an additional component of the multimodality framework. Rather than emphasizing the simultaneous layering of modes in single moments of interaction—for instance the unit composed of a pointing gesture, co-speech, and its ostensive target—I focus instead on the sequential generation of linked semiotic chains over relatively long stretches of discontinuous time. As I will show, within these chains the forms or meanings of given modes do not simply correspond with or support one another, but they also exert some degree of sway over the manifestation of subsequent action. I develop the argument with data collected in a design studio, a context in which transmodality is exceptionally evident, by following the creation of a single commonplace object across many interactions that span several days. Throughout a process that transforms an abstract idea of ''a candle holder'' into a concrete, functioning prototype, details expressed in words are routinely linked to particular kinds of gestures; these gestures are linked to particular graphic representations; and these graphic representations are then used to help craft a material object in a long process or iteration and reiteration. It is precisely this temporally regulated movement of semiotic material between and across communicative modes—and how it changes and accrues and solidifies and changes again—that organizes the flow of the design process, and at the same time produces an emergent object in design interactions.

The extended example I present is taken from a longterm ethnographic study of the politics of design in Sweden. A critical component of this project involves investigating what exactly constitutes *designing* as a practical process. Many popular (and sometimes professional) portraits of design are steeped in highly romanticized notions of creativity, often personified by the work of celebrity designers. Understanding where most designed objects come from, however—how they are shaped, refined, and colored; how their materials are chosen and how they are imagined to function in the world—is more accurately accomplished by examining the unglamorous and often overlooked actions that designers perform on their computer monitors, on pieces of scrap paper, or in conversation (see, e.g. Luff and Heath, 1993; Luck, 2009, 2010; Lymer, 2009; Lymer et al., 2009; Murphy, 2004, 2005; Oak, 2011). Thus in addition to detailing the general concept of transmodality, I hope to show how transmodality itself actually sits at the center of designing-in-action. As I will argue in the analysis, significant features of the *embodied interaction*s that constitute discrete activities in the design process are the very qualities—though in somewhat transfigured incarnations—that come to constitute the significant features of the *object itself*. In this way, we might think of designed objects as repositories of interactional residues left behind by designers as they collaborate on their joint interactional production. The implication of this is that transmodality is not only a concept useful for understanding aspects of face-to-face interaction, but also for understanding other higher-order kinds of consequential social action.

2. Multimodality

Stivers and Sidnell (2005:1) describe multimodality as encompassing ''the precise ways in which talk, gesture, gaze, and aspects of the material surround are brought together to form coherent courses of action.'' This designation destabilizes a longstanding attitude held by both ordinary speakers and researchers alike that privileges verbal language as the central—or even the *only*—significant component of face-to-face communication. Rather than isolating verbal language from the material contexts in which it subsists and erasing concurrent communicative behaviors from analysis, an approach centered on multimodality situates speech directly within related convergent sign systems and looks specifically to how these sign systems *work together* to produce meaning. Talk thus becomes only one communicative mode among many that help accomplish the work of communication in everyday life.[2]

The proliferation of multimodality research has helped entrench the notion that understanding face-to-face interaction requires procedures not only for handling linguistic analysis, but also for confronting more analytically intractable communicative forms that often resist both easy inscription and precise classification. This is, unambiguously, a good thing. However as critical an intervention as the multimodality approach has been for the general study of communicative behavior, it does face some specific constraints in the development of its own agenda.

The most significant of these constraints is a limitation on the ways in which *relations between* modes are dominantly conceptualized. In general what this means is a restricted view of how both co-presence and co-dependence hold these relations together. In order for multiple modes to function as something other than a collection of singular modes with singular effects and exact some sort of unified impact on unfolding action, they must be marshaled into minimally coherent configurations, and these configurations must meet some basic criteria. For instance they should be perceivable in the moment of action, and should be treated as meaningful in their configurations by speakers, addressees, or both. In

[2] To be sure, approaches that fall under the multimodality label are by no means the only ones to account for the various non-linguistic channels and techniques speakers use during face-to-face interaction. In general the distinction lies in the degree to which the diversity of communicative modes is foregrounded as a methodological first principle, and the ways in which critical exploration of those modes is integrated (or not) with more traditional procedures for linguistic analysis.

addition the unified meaning should be somehow ''more'' than what is conveyed by individual modes. Of course this ''greater than'' meaning can be derived from a number of different multimodal configurations. For instance their arrangement can be *synthetic*, in which the affordances of individual modes used together generate more complex or more specific meanings, for example, uttering ''the cook stepped outside for a minute'' while performing a cigarette-smoking gesture (Kelly et al., 1999). Or they may be *prosthetic*, in which what is expressed in one mode makes sense only in light of the concurrent use of another, for instance using an actual blender as a prop for describing its missing pieces with gestures and talk (C. Goodwin, 2007). The main drawback to this basic combinatory view of how modes interact is that by restricting co-presence and co-dependence to what can be examined ''in the moment,'' to whatever synchronically organized array of modes can be captured with screen grabs or short video clips, or what can reasonably fit on a transcript of a single strip of interaction, material that is in some way non-present, but which may still be deeply relevant to the interaction, will rarely figure into the analysis.

In order to overcome this drawback, notions of both co-presence and co-dependence should be reformulated to expand their scope beyond *moments* of interaction embedded in specific activities to include more *duratively extensive courses of action* in which activities subsist. Semiotic material often travels through interactions peripatetically. It appears, disappears, and reappears at different times and in different forms—often separated significantly in time and space—preserving a core integrity that itself may be imperceptible in a single moment, but which may still be communicatively generative when viewed over time. A gesture performed at one point in an interaction, for instance, may resonate conspicuously as a verbal description or an augmented gesture at a later point. Rather than allow conditions produced by methodological factors to direct the analysis of multimodal communication, the conceptualization of relations between modes should be reframed (and methods accordingly adapted) to recognize that modes often align asymmetrically—temporally, spatially, and formally.

One way to account for relations between modes more precisely over longer-term courses of action is to figure ethnographic context more prominently in the analysis.[3] The tradition of workplace studies (Heath et al., 2000; Luff et al., 2000) is perhaps the best at highlighting the significance of context (professional and material) both as it is generated by multimodal communicative action and as it influences how that action unfolds. Ethnographic particulars are especially relevant for explaining how professional *activities*, for example, formulating an approach briefing for landing an airplane (Nevile, 2004) or drafting an architectural drawing (Murphy, 2005), are collaboratively accomplished. However rather than treating ethnographic details as chiefly relevant at the level of particular activities, they should also be used for explaining how different activities hang together in consequential patterns. In professions like design meaningful units of activity are not necessarily temporally localized at a very small scale, like ''making a drawing,'' but may instead be oriented to as a series of small, semi-bounded activities that together constitute a more meaningful, and professionally relevant activity, like ''making a candleholder''—or even ''doing design''—a process that can span hours, days, weeks, or even longer. In such cases, the co-presence of ideas, utterances, gestures, drawings, and material objects may not be limited to what is capturable on a single screen-grab or snippet of video. Instead these modes may demand a more telescopic view of how they relate to one another — and their relationships may in fact change over time.

3. Transmodality

In a detailed analysis of a business negotiation between a cookie manufacturer and a marketer, Streeck and Kallmeyer (2001) examine the critical role played by a sheet of paper in mediating the unfolding interaction. Over the course of the negotiation the two businessmen repeatedly inscribe relevant information on the page. Streeck and Kallmeyer describe the sheet as an ''interface,'' which they see as ''a material structure with its own affordances and constraints (two-dimensional lay-out, conventions of writing, etc.) recruited as a field within which intermediate interaction results can be given external and enduring expression'' (2001:472). As the businessmen attempt to broker a deal, they continuously leave marks and traces of different kinds — straight lines, numbers, circles — on the page in front of them. This, in turn, not only helps make their various claims permanent and visible in the interactional space, but also creates an emergent referential field for the interactants to call upon and gesture towards in constructing their arguments. Lines, numbers, and calculations scribbled on the sheet, themselves linked to particular utterances, entail subsequent gestures, inscriptions,

[3] The relationship between multimodality and ethnography should more accurately be treated as bi-directional. The foregrounding of ethnographic material in relation to multimodality is not only useful for understanding multimodal communication, but is also useful for understanding ethnographic phenomena themselves. By way of illustration, treating design not just as a backdrop for certain communicative conduct but also as an ethnographic object of inquiry in its own right actually requires paying close attention to the ways that talk and other communicative forms mediate the very work that counts as design—drawing a sketch, asking for an assessment, suggesting an alternative, crafting a prototype, etc. To disregard the fine mechanics of how these kinds of action play out in design creates an impoverished picture of what on-the-ground designing actually looks like and how it functions.

and verbal gambits in the progress of the negotiation. What Streeck and Kallmeyer show is that the sheet of paper does not merely support the interaction, but in large part motivates the very performance of many of the interaction's constituent elements.

Viewed from the perspective of transmodality, modes like speech, drawing, and gestures, so critical to the business meeting that Streeck and Kallmeyer analyze, do not just *supplement* each other in relationships of mutual support, they sequentially *perforate and interpenetrate* each other, acquiring a certain co-morbid resemblance. When viewed longitudinally the meanings expressed in the different modes dynamically blend, shape, and reshape each other in different ways, and consequentially transform the ''shape'' of an emergent interactional product — in Streeck and Kallmeyer's case, the terms of a business deal, and in the data presented below, the design of a candleholder. Transmodality operates through a series of *semiotic modulations* in which certain core qualities persist, but others are noticeably transformed in the transition from one mode to another. Modulations of all sorts involve movement, mutation, and amplification. Semiotic modulations in face-to-face interaction involve the movement of ideas across modes and an amplification or mutation of meaning derived from the different affordances that different modes bear.

That semiotic material is mobile is, of course, not a new insight. The recognition that the meaning of a given text is not stable and fixed, but is instead conditioned by the specific intertextual relations holding within a range of (temporally and spatially) dispersed signs and sign systems has become an analytical commonplace in the study of text both as literary object and as speech. While a range of sign types can be classified as text (see Hanks, 1989) and thus in some way plug into an intertextual matrix, natural language retains specific features that make it particularly amenable to intertextual engagement. For instance its segmentable structure often (though not always) allows for adding text to text, as with allusions; or swapping out one chunk of text for another, as with some kinds of jokes; or re-voicing the words of another speaker, with the help of conventionalized metapragmatic devices. In such cases intertextual relations function precisely because the relevant components converge at ''an intersection of textual surfaces,'' as Kristeva (1980:65) phrased it, surfaces that share a necessary formal-structural commensurability. Even in cases of translation between different languages intertextual relations are possible because, notwithstanding the actual pitfalls of the process, both the original language and target language manifest at the surface as morpho-syntactic text. While different verbal texts are usually able to align symmetrically without much fuss, the means by which formally incommensurate signs connect, especially in face-to-face interaction, is often less straightforward. There is much more friction between textual surfaces and the surfaces of other semiotic modes.

Another way to describe how transmodality operates is through what Michael Silverstein (2003), in the context of translation, refers to as semiotic transduction. Just as, for example, with a rotary motor ''one form of organized energy. . .is asymmetrically converted into another kind of energy'' (Silverstein, 2003:83), translation from one language to another involves some kind of transformative procedures on certain aspects of an original code (surface forms, grammatical categories, etc.) that can produce ''configurations of cultural semiosis of a sort substantially or completely different from those one has started with'' (Silverstein, 2003:91), yet still retain some recognizable elements of the source material, preserving what Jakobson (1959:233) calls ''equivalence in difference.''

Lubomir Doležel (1986, 1990), drawing on the work of his Prague school predecessors, further elaborates the concept of transduction with regard to literary works. For Doležel texts exist in the world not as individuated and isolated aesthetic artifacts, but as '''pregnant' semiotic object[s]'' (Doležel, 1986: 30) that ''constantly 'transcend' the boundary of isolated speech events and enter into complex *chains of transmission*'' (Doležel, 1986:28, original emphasis). Through a number of interconnected operations and within several distinct styles — he singles out criticism and adaptation for closer analysis — literary transduction generates new semiotic objects though the ''active reprocessing'' of the ''formal, semantic and aesthetic potentials'' of an original work (Doležel, 1986:30). Thus a work is subject to literary transduction when it shifts from one sign system to another, as when a novel is adapted into a film, what Jakobson (1959:238) calls ''intersemiotic transposition.'' Likewise a text undergoes transduction when a reader proffers an interpretation in a published review or critical essay, producing a ''stabilized concretization'' (Doležel, 1986:33) of the text's reception, which itself, in circulation, acts as one link in the chain of transmission.

In face-to-face interaction transduction operates on communicative modes in similar ways, motivating and sustaining transmodal relations. Signs like utterances and gestures subsist in sequentially organized chains of transmission. The formal and semantic potential of any given sign is open for subsequent reprocessing for the production of new signs, as when verbally expressed ideas later materialize as gestures or drawings or rephrased utterances. Transmodal links are temporally dislocated, though the length of time between them is highly variable. Following these chains of transmission not just through moments, or even through whole instances of ''an interaction,'' but across multiple associated activities reveals how context-relevant meanings and their material effects emerge through the successive modulation of expressive modalities.

I will now turn to a more detailed analysis of designing-in-action in order to explore transmodality as one possible technique for expanding the analytic advantages of multimodality. The case of crafting a candleholder is quite specific and rather unextraordinary—especially in the context of design—and it is of course not entirely representative of how

transmodality works in all cases. Indeed, the way that transmodality functions in the studio is quite peculiar compared to ''ordinary'' face-to-face interaction. But that is part of my point. By taking seriously the ethnographic circumstances that shape all kinds of multimodal communication, including an attention to the ways seemingly unconnected moments do in fact link together, the contours, dynamics, and implications of the multimodality view of communication begin to change.

4. Designing in the studio

Peter and Matti are two young Stockholm furniture designers working at a studio I call Kontoret. They officially operate their own separate, independent practices, but they share their studio space, including the long worktable they both use, and often collaborate with each other on many of their assignments. They are well-known within the Swedish design world, and both have won numerous awards for their work, but neither is well-known enough to be a household name. The bulk of their projects involve furniture pieces like chairs, sofas, and tables, but they also design glassware and other household goods for manufacturers throughout the Nordic countries, as well as for some international firms.

Whether designing lamps, side tables, chairs, bathroom sets, children's beds, or baby changing tables—all projects Peter and Matti worked on during my time at Kontoret—the process of transitioning from a manufacturer's design brief to a final prototype or set of production documents looks more or less the same. Observed longitudinally, real-time designing is fundamentally an ongoing process of discrimination that manifests in a temporally dispersed series of minor motions—like drawing a line, pointing to a detail, or suggesting a change—that individually do very little, but together accrue and solidify in various formats. A designed object emerges through contrapuntal movement between these different formats and through various modes—for example, a notebook hand sketch is presented to a colleague, who then gives feedback that is incorporated into a new sketch; this is re-rendered on the computer, and further discussed by the designers; a printout of the draft rendering is then used as a guide for crafting a prototype; which when complete, gives a sense of how to refine the final production documents.

One of the most critical effects of these subtle practices, and the particular ways they unfold, is the promotion of certain forms as viable design alternatives, and the concomitant demotion of other forms as nonviable. Most design briefs assigned to the designers by their manufacturer clients do not specify the object's details, and the designers are more or less able to conceive their designs in any way they like. However composing the design is not simply a matter of ''free'' creativity, nor is it produced mechanically from the application of abstract design principles to real world situations. Instead, through the gradual accretion of enacted traces that result from the ongoing performance of loosely patterned minor motions, certain forms are selected for inspection and development while others are left unacknowledged and undeveloped. The production and reproduction of forms, one of the central aspects of designing, is thus firmly embedded in these everyday kinds of multimodal action — habits of talking, patterns of embodied movement, and routine ways of thinking and using tools.

4.1. Day 1

One of the assignments that the Kontoret designers worked on during my time in the studio came from a Danish housewares company, who asked Matti and Peter to design ''a tea light candleholder'' in either ceramic or glass. The original idea that the designers submitted was for a series of collectible candleholders shaped like different kinds of themed landscapes, but the company decided that such a plan was too ambitious. Instead the manufacturer and designers all settled on a single landscape shape, something ''Scandinavian'' and winter-themed.

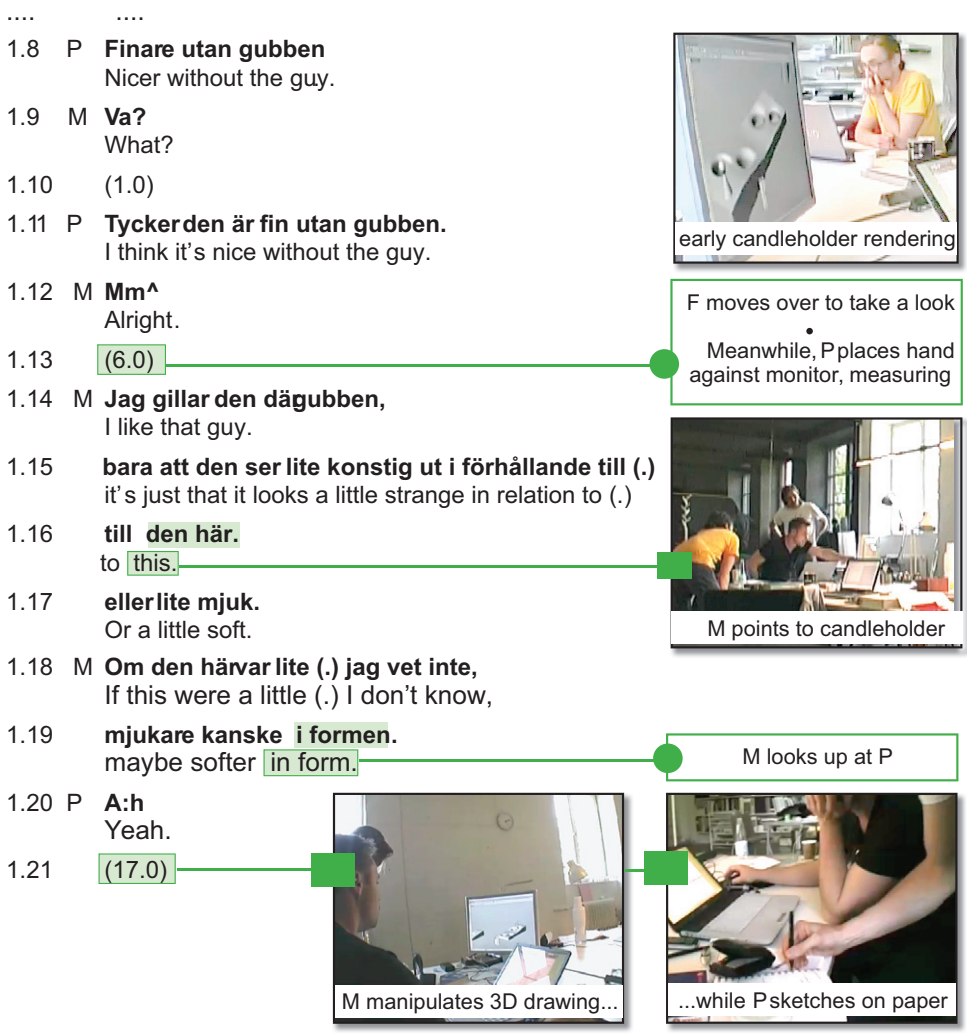
At the start of the process Peter and Matti debated whether to include a few stylized features in the candleholder design, like a small house on the landscape, or perhaps little footprints in the ''snow,'' or even a snowman figure that could either stand alone or be picked up by its head and used to extinguish the candles. In the end they decided to try out a few decorative elements, including the small snowman, to see what might emerge, and Matti set to work drawing up a basic mock-up on his computer. With Matti electing to take the lead on this project, this initial computer drawing will serve as the both the central reference point and primary ''mutable object'' (Fasulo and Monzoni, 2009) that the designers manipulate in the progression of the design. Both designers also use other graphic formats, for instance notebook hand sketches, which often allow the designers to try out quick candidate solutions to problems they identify in the design. However the computer drawing—even though it is in constant flux—takes on the status of the most current ''permanent'' version of the candleholder's design, thus functioning not only as a way to visualize the designers' ongoing work, but also to ''bank'' that work in shareable format.

4.2. Day 2

The day after their initial discussion, after spending the morning working on the candleholder drawing on his computer, Matti asks Peter to take a first look at what he has drawn. Noticing the snowman figure on the drawing, Peter admits that he

thinks the candleholder would be nicer without it (lines 1.8 and 1.10).[4] Matti responds by agreeing that the snowman needs improvement, claiming that it looks "soft" in relation to the shape of the candleholder (lines 1.15–1.17), but that he is not entirely willing to give it up. As an alternative he suggests making the candleholder itself "softer" (line 1.19), a suggestion that Peter agrees with. Matti then turns back to the computer and continues to twist, turn, and rotate the drawing to look at it from multiple angles while Peter begins sketching his own version of the candleholder in a notebook that sits open on the table.

Segment 1



It is important to note that for the designers, the practice of *evaluating* the current state of the design is one of the most critical components of what they do. The progress of a design from initial idea to final rendering or prototype is usually punctuated by a series of explicit exchanges in which the design's then-current status is presented for critique. Indeed, the design process is to a large extent structured around a series of "assessment actions" (Goodwin and Goodwin, 1992) in which one makes public his thoughts and feelings about select design details, allowing the designers to coordinate their experiences of and attitudes about the incipient object. A designer working on the drawing or offering a verbal description of

[4] Most of the transcription conventions in the examples that follow are familiar, though some require further explanation: the first digit of each line number refers to the segment number; the original Swedish text is in bold, with a free gloss in English below; a caret (^) is used to indicate rising intonation, especially in contexts that affect translation; I have used shading to align screen grabs or descriptions of relevant visual action with co-occurring talk; in some cases I have added annotation to the screen grabs, usually to highlight some feature or specify motion.

an idea will sometimes ask for specific feedback (''how do the legs on this table look?''), or may seek a more general critique (''what do you think?), however each of these assessment actions has the potential effect of altering the course of the design. As Fasulo and Monzoni (2009:363) put it in the context of a fashion atelier, ''[b]y exposing their views about the current state of the object, participants work to align their reciprocal perspectives about the necessity of further action on the referent.'' While most features of the design are necessarily worked over, manipulated, and transformed to some degree throughout the design process, only those explicitly proffered as assessables come to dominate and define the process and the object it produces.

The quality of ''softness'' that has been introduced in this interaction (line 1.17) subsequently becomes the most dominant feature for assessment and manipulation in the candleholder's design process. It is the main idea that undergoes and motivates various semiotic modulations as the design emerges, ''continuously and repeatedly passing through transmission, reception, storage, retrieval, reprocessing etc.'' (Doležel, 1986:30). At this early stage the computer drawing reveals few details that evoke a sense of softness—it is somewhat angular and symmetrical—so Peter sets out to hand-sketch what a softened form might look like. This is the first rudimentary modulation of utterance into drawing. Moreover, the final snowdrift-filled landscape will be fired in hard ceramic, so it is especially crucial that the form conveys a softness that the material lacks. Thus the transformation of a ''solid'' block of material into a ''soft'' landscape will require careful and deliberate attention to particular design details.

As Peter tries hand-sketching the candleholder with ''softer'' forms, Matti continues to fiddle with the drawing he has made on the computer. After a period of silence Matti proclaims that the way he has positioned the candle holes on the drawing is too ''rhythmic,'' that their alignment is ''too symmetrical'' (lines 2.26–2.29). In relation to the topicalized concern that the landscape should be ''softer,'' the seemingly rigid symmetry of two holes on one side and two holes on the other adds to his sense that the landscape is not soft enough, prompting him to select these features for further reworking. Peter does not respond explicitly to Matti's assessment, but rather points to one of the only non-symmetrical features on the computer drawing, a candle hole that is missing part of its edge, and repeats several times that the feature is ''nice,'' in lines 2.30 and 2.34.

Segment 2

....

2.25 M **Men jag vet inte.**
But I don't know.

2.26 **Jag tycker att det här är lite,**
I think this is a little,

2.27 **så att säga, för rytmiskt, liksom.**
like, too rhythmic, so to say.

2.28 **De två och de två där.**
Those two and those two there.

2.29 **Blev liksom lite för symmetriskt**
It got a little, like, too symmetrical.

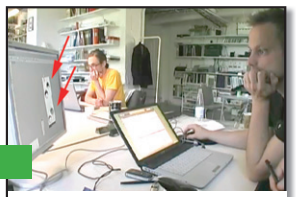
2.30 P **Det var fint att det gick ut,**
It's nice that it goes out,

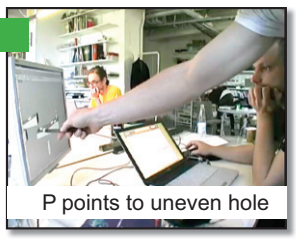
2.31 **utfall et där**
the drop-off there

2.32 M **Mm. Det tycker jag är bra.**
Yeah. I think that's good.

2.33 **Jag har gjort det där också.**
I did that, too.

2.34 P **Den där är jätte fin.**
That's really nice.


M points to holes with cursor


P points to uneven hole

By identifying the holes as assessables Matti characterizes them one possible means by which to introduce softness into the design. Peter reinforces this position by drawing attention to one specific candle hole whose form could be worked to amplify a sense of softness. Because Matti has invoked a logic in which ''symmetry'' and ''rhythm'' stand in contrast with softness, the non-symmetrical detail of a single hole that ''drops off'' becomes a useful starting point for potentially infusing softness into the design.

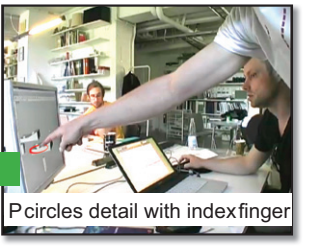
Having identified specific features for further transformation, the designers push on. After a few seconds Peter again draws attention to the unique candle hole by pointing to it and describing its shape as "going off in another direction" (line 3.40). He says, "It's like–" and then completes his thought by modulating the drawn detail of a curved hole that they see on the screen into a gesture performed in mid-air, moving his hands back-and-forth as if tracing out the rounded edges of a larger, imaginary hole.

Segment 3

....		....	
3.39	P	**Också den (.)** Also it (.)	
3.40		**ser ut som den drar iväg åt ett håll.** looks like it goes off in another direction.	P points to hole again
3.41	P	**°Det är ° liksom —** °It's ° like—	
3.42		(1.7)	P uses flat hands to trace contours of hole

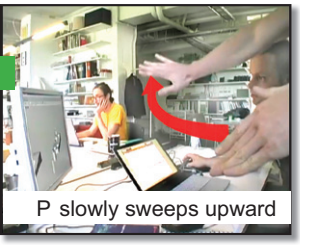
Matti then adds more information to the abstract concept of softness and the physical manifestations in the drawing and gesture by attaching a relevant descriptor, "It gets a little more snowdrifty" in line 4.43. Peter agrees with that description, and for a third time, in line 4.45, he utters that the detail is "nice," this time pointing to the hole and circling its edges with his finger.

Segment 4

4.43	M	**Det blir lite mer dri::va det där** It gets a little more sno::wdrifty that	**(...)** (...)
4.44	P		**A::h ja.** Yeah, yes.
4.45	P	**Det var fint det där °också.** That's nice°too.°	 P circles detail with index finger
4.46	M	**A:h.** Yeah	
4.47		(2.0)	

Emphasizing this detail more forcefully, Peter continues by demonstrating with a gesture how the snowdrift slopes back by slowly pulling one flattened hand up and away from the other.

Segment 5

5.48	P	**(Det) viker upp i en riktning.** (It) doubles back in one direction.	 P slowly sweeps upward
5.49	M	**Ah.** Yeah.	
5.50		(3.5)	

Then, after a distinct pause, Peter finally explicitly picks up on Matti's original stance against symmetry, an idea which he had been working with but had not yet articulated himself other than describing non-symmetrical features as nice. "It would be nice as just one," he says, in line 6.51, while using his index finger and thumb to form a partial—not fully closed—ring and placing it against the drawn hole on the monitor. He then pulls away from the monitor and uses both hands to form another hole in mid-air. "So it has an irregularity," he says, again gesturing a small slope away from the hole he just made with is hands.

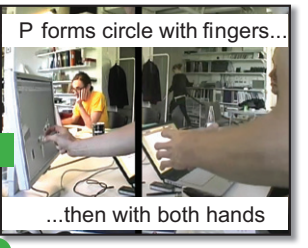
Segment 6

6.51 P **Det vore fint som bara en.**
It would be nice as just one.

6.52 M **A:h^**
Yeah.

6.53 (4.6)

6.54 P **Och så har den en oregelbundenhet.**
And it has an irregularity.



P repeats sweep gesture

Thus Peter, following Matti's call for softness, repeatedly selects the comparatively few drawn details that could be read as soft and modulates them into round or sloping gestures, while at the same time explicitly assessing them as "nice." By wrenching these particular details out of the drawing and bringing them into the interactional space, Peter highlights their significance, targets them as the best means for working softness into the design, and demonstrates with his hands the very features that best express softness in this object.

This short interaction about the candleholder design is characterized by a chain of semiotic transductions centered on the notion of softness. When Peter and Matti turn to evaluate the drawing on Matti's monitor — the "interface" for their joint evaluation, in Streeck and Kallmeyer's (2001) sense — the shape of the snowman detail triggers the idea that the candleholder itself should look "softer." Once softness is invoked as an operational quality, it then undergoes a series of verbal transductions. The symmetrical structure of the candleholder is problematized in direct relation to softness and treated as its conceptual inversion. Details that bear non-symmetrical (implied "soft") qualities are evaluated as "nice," and their enhancement is treated as an enhancement of softness in the design. At the same time these drawn details are given verbal articulations, further transforming a physical detail into a more complexly realized concept ("the drop-off"; "goes off in another direction"). The drawn forms and concomitant descriptions are then granted a different kind of vitality when transduced into gestures. The use of hands to form a hole recreates the drawn detail in three dimensions and at a more easily visible scale. The slow tracing of a slope in the air also adds dimension and scale, but exploits motion and speed as well, to enhance the expression of softness. Each of these minor actions, augments the unfolding design in some direct or indirect way, impacting the candleholder's physical surface, or the arrangements of its elements, or the abstract associations the designer are trying to express. It is from this sequential recirculation of semiotic material between and across these different modes, and its concretization in formats that afford it, that the overall design begins to progressively emerge.

Of course a preference for progressivity is a general feature of interaction itself (Stivers and Robinson, 2006; cf. Sterponi and Fasulo, 2010), not just those that comprise the design process. However while Schegloff's (2007:15) description of progressivity as "[m]oving from one element to a hearably-next-one with nothing intervening" highlights a preference for adjacency in the ordering of relevant utterances, that specific ordering may not apply, or may not apply as strongly, to all elements of a given interactional infrastructure. In other words, while talk may be structured primarily through adjacently (or near-adjacently) positioned pair-parts, other components of the interaction may progress at different rates or in different ways, with "next" elements of the semiotic chain tying together in more irregular patterns.

Sacks (1995) has identified a number of procedures that speakers rely on for tying utterances such that turns at talk hold together as recognizably ordered and mutually relevant. These include, for example, pro-terms like "it" that refer to an antecedent predicate in the previous utterance, and lister terms like "first," "second," and "third," which project an emergent pattern of grouped and ordered bits of information. Goodwin and Goodwin (1987; see also Goodwin, 1990) examine such tying techniques in the context of children's argumentation, focusing on the "ways in which return moves tie-to the detailed structure of the talk that they are opposing" (205), what they call "format tying." Crucial to their analysis is that "within argumentation children do not simply tie to the action contained in a prior utterance but also to a range of features implicated in its construction and that such format tying provides an arena for the productive creation of new structure through systematic operations on existing structure" (225–226). Tying one utterance to a previous utterance is not only a means by which a speaker demonstrates retrospective understanding of the previous turn at talk, but also a means by which interlocutors can prospectively and continuously produce the conditions for subsequent action. In Peter and Matti's candleholder discussions, rather than producing new structure just through tying the format of their utterances to previous talk, they create new structure through the complex interweaving of transmodal calques of specific features like lines and specific qualities like "softness" that progressively, across several temporally dislocated interactions, come to achieve an operational "equivalence in difference" that motivates the design itself. Thus far this has been predominantly (though not exclusively) mediated through the interface of a single computer drawing, but soon other related graphic interfaces also enter the process.

4.3. Day 3

The next day, after Matti has refined the computer drawing based on the previous afternoon's discussion, Peter decides to create a styrofoam prototype of the candleholder in order to better visualize the curves they are trying to achieve, and to test out the object's functionality. Before he begins Matti calls him over for some last minute suggestions for how to refine the prototype's form. As Matti offers some advice for how to go about cutting and shaping the foam, he traces over the lines of a hand sketch he has made in his notebook, emphasizing with deliberate, slow movements the slope of what should look like a snowy hill on the candleholder's winter landscape surface. He points out areas that will need extra sanding ''so that it gets soft and nice.''

Segment 7

....

7.20 M **Det var ju så jag tänkte, det är inte helt lätt att såga ut bara.**
It was how I thought, it isn't totally easy to just saw out.

7.21 **Så man får nästan i så fall göra en tunn skiva först**
So in that case you can almost make a thin slice first

7.22 **och sen limma på den där klossen.**
and then glue it to that block.

7.23 **Och sen skulle man ju slipa det där ändå**
And then you should sand that still

7.24 **så att det blir mjukt och fint liksom.**
so that it gets like soft and nice.

7.25 **Jag vet inte,**
I don't know,

7.26 **det kanske är att freebasa och slipa ner?**
maybe improvise and sand it down?

M continues to retrace the drawing's contours, lines 21 - 24

Matti then emphasizes (line 8.29) that it would be ''nice if that hill went down a little in different directions,'' modulating the hill that he has drawn on both his hand sketch and the computer drawing into a sloping hand shape that is formally similar to Peter's sloping gestures from the day before (line 5.48; though this time performed as a static representation). While in this instance Matti is referring to the candleholder's hill rather than the slope of one of the holes, he invokes Peter's same characterization of a landscape detail that ''looks like it goes off in another direction'' while performing a gesture that simulates, but does not directly copy, Peter's previous accompanying gesture. This sequence has established a structure of transmodal links for Peter to use in crafting the foam prototype: Matti's sketch, accompanied by slowly repeated tracings and a gesture with a recognizable handshape, alongside an explicit linking of production techniques—a softening of the curves in the foam through sanding (lines 7.23–7.24)—to the representation of a sloping, snowy hill on the candleholder (lines 8.29–8.31).

Segment 8

....

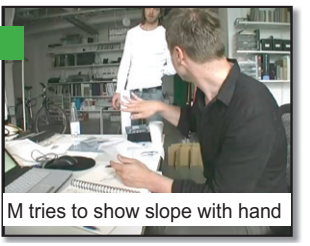
8.29 M **Det var mer att det var fint om den där backen-**
It's more that it was nice if that hill-

8.30 (1.2)

8.31 M **gick ner åt lite olika håll, liksom.**
went down a little in different directions.

8.32 P **Ah.**
Okay.

P stops, turns, and looks at M



Peter then proceeds into the studio's workshop to begin sculpting the prototype, a process centered on the modulation of graphic representations of the candleholder into three-dimensional counterparts crafted from foam. A large block of

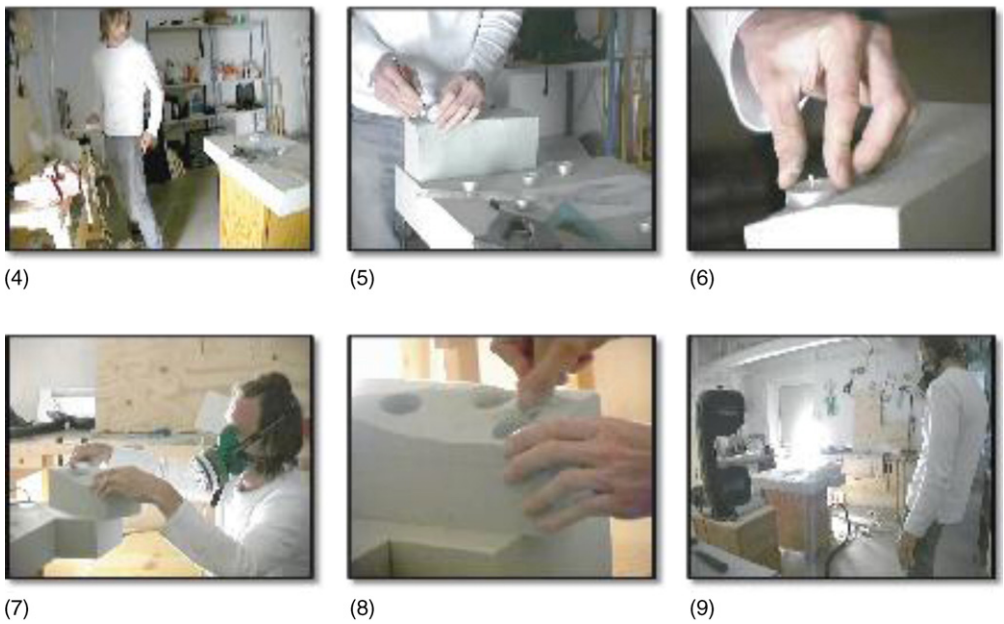
(1) (2) (3)

Figs. 1–3. (1) Origins of the block. (2) Making measurements. (3) Sawing out the model.

green foam sits on a bench in the center of the room. On top of the block Peter sets several tea light candles and a printout of the most recent computer drawing of the candleholder (Fig. 1). On the printout he has used a marker to trace out guidelines for cutting and sanding the foam based on Matti's suggestions. Peter measures and marks a small corner of the foam block to cut out, which he will use to make the prototype. Once the cutting lines are drawn, he glances over to the printout and arranges the candles on top of the block section, approximately as they would be aligned in the holder (Fig. 2). After repeating this procedure several times, moving his eyes back and forth between the printout and the block and carefully marking the position of the candles, he saws through the foam with a standard handsaw (Fig. 3) to quarry the smaller rectangular block for the prototype.

He then picks up an electric carving knife, the kind used in kitchens, and starts shaving off slices of foam to carve out the initial forms that will eventually turn into slopes and snow drifts. As he works he continues to glance at the printout, which rests behind him on the remainder of the large foam block (Fig. 4). After almost 5 min at this he again uses the candles to guide more measuring, this time to determine how deep the candle holes should be (Fig. 5). He then grabs a drill, puts on a breathing mask, and proceeds to bore out the candle holes, periodically stopping to insert a candle to test whether it fits (Fig. 6). He continues using the electric knife to refine the landscape shape (Fig. 7) before switching to sandpaper to polish the sculpted, curved forms (Fig. 8). As he works he uses his hands to test the curvature of the candle holes and the slope of the snowdrift, making sure that the material forms he is crafting at least minimally calibrate with the drawing, but more importantly, with the experience of softness itself — a kind of transmodal, and trans-sensorial, format tying. After working on the model for about 45 min, Peter takes one last look at his work (Fig. 9) and walks the model out into the studio.

Back in the studio, Peter places the prototype on the table, a few feet away from Matti. Almost immediately Matti offers a positive assessment, ‘‘I think it's really nice.’’ After looking at it for a few seconds, Matti then points out a few potential



(4) (5) (6)

(7) (8) (9)

Figs. 4–9. (4) Checking the sketch. (5) Measuring hole depth. (6) Fitting the candle. (7) Refining the curves. (8) Sanding the holes. (9) Evaluating from afar.

flaws, focusing specifically on the candle holes, whose edges he suggests should ''sweep out a little more,'' which he displays with a slow, broad sweeping gesture.

Segment 9

P is standing near the model, M is halfway across the table, in his chair

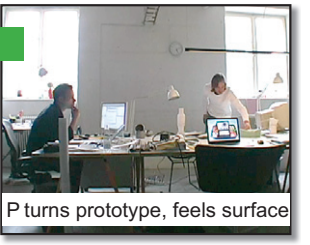
9.1 M **Hm. Jag tycker det är jättefint.**
Hm. I think it's really nice.

....

9.8 M **Kan man borra lite djupare där,**
Can you drill a little deeper there,

9.9 **med det där sista ljuset som sticker ut lite?**
with that last light that sticks out a little?

9.10 P **Ja:::**
Yea::h


P turns prototype, feels surface

9.11 (3.0)

9.12 M **Det är mer att det känns lite som ett misstag.**
It's more that it seems a little like a mistake.

9.13 P **Det gör det?**
Does it?

9.14 M **A:h, tror jag.**
Yeah I think so.

9.15 (4.0)

9.16 M **Så kan man väl liksom s::vepa ut dem lite mer**
Then you can like s::weep them out a little more.

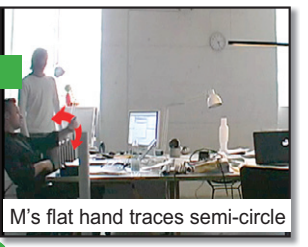
M makes wide, slow sweeping gesture, repeats
•
P walks back to M

9.17 P **Mm^**
Yeah.

Then, after silently scrutinizing the prototype for several seconds, and identifying some technical flaws, Matti again targets the aesthetics of the candle holes, saying in line 10.18 that he really likes ''that turning''—the curve of the hole's edge—while using his flattened hand to make a curving gesture. This ''turning'' gesture is performed relatively slowly, but the rounded trajectory that it follows expresses the kind of ''softness'' that Matti has thus far been advocating.

Segment 10

10.18 M **Men jag gillar den där vridningen, måste jag säga.**
But I like that turning, I have to say.


M's flat hand traces semi-circle

10.19 P **Ja::, men det blir väldigt tomt**
Yea::h, but it gets really empty

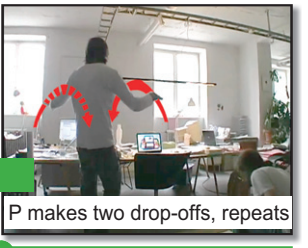
10.20 **på ena sidan (.) av (1.0) ytan.**
on one side (.) of (1.0) the surface.

10.21 (6.5)

P walks back, turns model again

The designers continue to observe the model (not shown on the transcript), standing up and approaching it, holding it, feeling its surface, replacing it on the table, and stepping away to see it from a distance. After the two designers indicate a few sections that need more drilling or more sanding, Peter returns to describing the edges of the candle holes. ''Then they're pretty distinct,'' he says, as he repeatedly uses his flattened hands to trace the curved edges of the holes in front of his chest (line 11.37), once again highlighting the significant details of the softened design by transducing them into curved gestures. Matti follows this up by reiterating his intention for the holes to be soft, accompanying this with his own curved gesture that, while smaller in scope and scale, closely mirrors Peter's (lines 11.38 and 11.40).

Segment 11



....

11.37 P **Sen är de ju ganska distinkta de här, (1.7) så.**
Then they're pretty distinct, these (1.7), like this.

11.38 M **Jag tycker de ska vara smältbara.**
I think they should be meltable.

M makes small rounding gesture with cupped hand

11.39 P **Ja:.**
Yes.

11.40 M **Eller (.) de måste ju vara ganska mjuka.**
Or (.) they have to be pretty soft.

M repeats small rounding gesture

Over the course of several days the thematic emphasis on softness in the candleholder's landscape form has all but controlled the designers' discussions about the object. Amidst an oscillating modulation between drawn lines, verbal descriptions, and embodied actions, a focus on the ways in which the candle holes and snowdrifts should generally look has come to be normatively characterized by a set of related gesture forms—curves, turns, and slopes—made by both designers and differing mostly in size and lateral orientation. For the designers the softness of the landscape is the signature design feature that bears the bulk of the object's aesthetic burden. As such, these gesture forms, both as emblematic of the concept of softness and as an actual visual depiction of the model's form, become dominant within the process of designing this piece, and any focus on other details is either downplayed or non-existent. In other words, once "softness" is articulated as a central quality for this design, much of the communication about the object becomes tethered to that particular topic, and most of the embodied actions—modulations of verbally, graphically, and gesturally expressed details, continuously remodulated in other modes—are directed toward visually transforming or amplifying the details they see as "softenable."

With the majority of the design work behind them, Peter walks back into the workshop to make some final refinements to the foam prototype. When he brings the model back into the studio, the designers decide to see how it looks in action.

Segment 12

12.1 P **Tänd det.**
Light it.

12.2 M **Huh?**
Huh?

12.3 P **Tänd det.**
Light it.

12.4 M **Tända alla?**
Light them all?

12.5 P **Ja:::**
Yes!

12.6 M **Släck ljuset!**
Turn off the lights!

12.7 M **There's something about Christmas time!**

Sing-song voice [Eng]

12.8 P **"Last Christmas, I gave you my heart"!**

mock "Wham! voice [Eng]

12.9 (5.5)

P gets up for better look

12.10 M **Awch. (1.0) Weep.**

12.11 (4.0)

laughter

12.12 M **Det är bra. Det är fint. Och så vitt på det?**
It's good. It's nice. And it'll be white?

12.13 P **Vitt.**
White.

12.14 (5.0)


(10)


(11)


(12)

Figs. 10–12. (10) Original computer drawing. (11) Prototype, first iteration. (12) Prototype, final version.

The candleholder's winter landscape effect, with its sloping snow hill and snow drifts, was, in fact, more or less successful, according to the designers. Matti and Peter were pleased with the way the softness of the lines turned out, even though the snowman detail—the very detail that inspired softening the candleholder in the first place—had been abandoned along the way.

Segment 13

13.15 M **Men jag saknar en liten snögubbe, måste jag säga.**
But I miss a little snowman, I have to say.

13.16 P **Det gör du?**
Do you?

13.17 M **Ja eller så. Men det blir ju fint det där.**
Yeah I guess. But it'll be nice.

5. Transmodality and the culture of design

Nearly all processes of design involve the gradual progression from vague and abstract idea to concrete, perceptible object—and in cases like this candleholder, a tangible material object. I have analyzed the design and creation of this candleholder as a way to explore the concept of transmodality, both to explain how it functions in a general sense and to illustrate its relevance to a particular ethnographic phenomenon. A central principle for transmodality is that what manifests in one mode does not merely ''correspond'' or simplistically ''look like'' what emerges from other modes, but instead fundamentally *relies* on its placement within a field of other semiotic phenomena to help shape its interactionally realized form. In designing this candleholder what begins as a textual description—''a tea light candleholder in either ceramic or glass''—becomes through talk a winter landscape rendered as a hand sketch and subsequently remade as a computer drawing. Discussions of the computer drawing stimulate more talk and gestures linked to particular design features revealed on the drawings, which then become the primary qualities open for further modification. These features then, throughout the design process, are subject to, and in turn influence the manifestation of, subsequent verbal, gestural, and graphic assessments. Graphic features of the drawing, modulated forms of enacted gestures and verbal descriptions, are used as guides for crafting a prototype, which itself is later used to alter the drawing even more. And so on (Figs. 10–12).

Over time the oscillating transduction of utterances, gestures, and graphic artifacts in the design of this candleholder establishes a loose interactional architecture dominated by softness, curves, and slopes. The progression of the design—the revision and refinement of its details as they are represented in media like drawings and models—deeply parallels this interactional architecture, such that the form of the resulting object roughly matches the form of the interactions that produced it. The differences between, for example, the digitally-rendered curvature of a candle hole, a slowly performed sloping gesture, the manual action of shaping the hole in foam, and the curved hole itself are not entirely categorical differences between modes, but rather can be seen as transmodal modulations of the core concept of softness that the designers have decided is significant to the object's design. As such, features of the object have become sequentially linked transduced calques of corresponding features of the design interactions. To be sure, some of these modes were co-

present with one another in a traditional sense, during moments of interaction. However in another sense some modes remained co-present in transduced form, as for example, the residue of a gesture left behind in a graphic format, or the slope of a drawn curve in hand-shaped foam.

My central concern with this article has been developing transmodality as a useful and generative extension of the analytic affordances of the multimodality paradigm. Critical to this was the contention that meanings emerge in interaction not just at the ''intersection of textual surfaces,'' as Kristeva pointed out, but at the intersections between gestural, graphic and material surfaces as well. I make no claims that a candleholder should be treated as an eminently significant social object. However in the particulars of its design can be observed the underpinnings of a more general process by which transmodality facilitates the momentum and progression of communicative action. To be sure, transmodality as I have described it is more apparent in highly visual and graphically mediated interactions like those that characterize designing. However as context specific as it might seem, I would argue that transmodality is observable in a range of disparate kinds of interactions, from diagnosing and then explaining the cause of car trouble (Streeck, 2002, 2009), to conducting a surgical procedure while simultaneously treating it as a pedagogical event (Koschmann et al., 2010), to producing joint interpretations of scientific concepts (Ochs et al., 1996). The ways in which communicative modes tie together will of course vary from context to context, however I hope to have shown that as a general approach, following the movement of semiotic material beyond single actions and across time and space, with close analysis of how these actions are consequentially stitched together, provides a richer and more accurate picture of how the mechanics of face-to-face communication work in certain kinds of settings.

I have also tried to highlight the potential benefits transmodality offers for thinking more specifically about creativity and collaboration ethnographically, especially in the context of design. Indeed, as an ethnographer broadly interested in design, I am not only (or even primarily) concerned with how gestures and other transmodal communicative forms work *in* design, but rather with how they work *for* design. Exploring how talk and embodied communication figure into the larger lifeworlds of the people we study not only provides a richer picture of the micro-mechanics of communication in action, but also helps us understand those people and their work more deeply. In looking to transmodal modulations in design work, I hope to have shown some of the complex ways in which communicative modes relate to one another—and the consequential effects they have on the material world—while also offering a small glimpse into the organization of interactional form-making, which, for designers, is extremely relevant indeed.

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