Project 6B -

Cognitive Ethnography: The “Whole Picture”

The videographic approach to Cognitive Ethnography allows the burgeoning cognitive ethnographers to finally see the whole picture. Through the videographic data ethnographers can see their informants interacting with their environment’s social, physical, and cultural realms. The ethnographers can then examine the data for the many rich aspects of cognition that emerge during the practice of these activities. By watching the informants in real time we see cognitive activity emerge through the dialectic relationship between the informant’s actions and environment. This relationship, when combined with the collaboration between the two informants in this study, who engage in a continuous, mutually elaborative process, provides a situation teeming with cognitive activities. Some of the documented activities we viewed from our informants included themes we have discussed throughout our course on Cognitive Ethnography: discourse, gesture, embodiment, highlighting, professional vision, gap closing, opportunistic use of the environment, and mapping. This paper will attempt to define the roles each of these activities contribute to the rich setting of a blacksmithing workshop by following the process one of our blacksmith informants, Stephan, goes through in planning out the creation of a dish.

To understand how the process of creation changes and is followed, the informants in this study should be first introduced and their relationship defined. Our informants are two blacksmiths. In many ways their relationship may be viewed as mentor and apprentice: the elder of the two is an Austrian man named Stephan, and the younger is a bladesmith named Micah. In the discourse analyzed below, Stephan is working on constructing a decorative dish that will hold a bowl that he has purchased and brought into the shop. He begins with an idea of what he wants his final product to look like. As he tests that idea in the world, he encounters some constraints that force him to redefine his original idea to one that can be produced within the limitations of his physical environment. Later, these constraints become a force that refine the original idea; driving it to take shape by allowing it to evolve physical properties not originally defined. We have identified six transitions in which the final product, or "goal state," of the dish is envisioned through a mutually elaborative dialectical interaction between the blacksmith (Stephan) and his physical and social domain. These domains are used to dynamically create the imagined goal state at each point in time. As Murphy (2004) says, "Imagination can involve a special kind of perceiving... that is, purposefully seeing things as if they were something else, imaginary things..."
created with gestures, talk, and objects." The goal states represent moments in discourse when the the end product of the evolving construction is represented in physical space -- that is, moments in which we can "see" into Stephan's mind. By identifying these goal states and using them as a coding scheme, we can take a step back and explore in detail the instances of interaction which give rise to cognition, which in turn allows the identified goal states to evolve.

**Goal State Transitions**

![Diagram of Goal State Transitions]

- **Goal State 1**
  - Idea mapped to the world
- **Goal State 2**
  - Idea: anticipation of the next step
- **Goal State 3**
  - Searching environment for less constraints
  - Mutually elaboration
- **Goal State 4**
  - M tries to create shared understanding
  - I want it to be a flower
- **Goal State 5**
  - Gesture + 2 petals
- **Goal State 6**
  - Completion of drawing with long and short petals

Fig 1: Overview of the Goal States

**Setting up the workspace: Turning the arena into a setting**

Arguably, Stephan has a preconceived notion that he wants to create a dish which holds a bowl that he has purchased for this project. The extent that Stephan has planned out specifics of the dish is unknown. However, Stephan starts off with collecting the material for the dish, which he has already decided is going to be a sheet of metal. Micah and Stephan look for the sheets. The manifestation of Stephan's idea begins with a verbal "ah-hah!" moment: Stephan sees the piece of metal sheet he was looking for, picks it up, and brings it to the anvil. He then starts to construct his setting: he places the

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bowl on top of the metal, brings out his chalk, and finds his tape measure. With his setting constructed, he sets to work on his activity, creating a dish:

Goal State 1

Stephan uses the tape measure to measure the diameter of the bowl, then brings the tape measure down to the metal plate and compares the two. This is an instance of gap closing: the tape measure holds the information from the bowl, and allows Stephan to compare a three-dimensional finished product to the raw metal that will be transformed into a dish to hold the bowl. This first rough measurement constructs the problem domain, where Micah stands by and watches the discourse between Stephan (idea) and the environment (problem domain).

This discourse soon shifts from Stephan and his physical environment to Stephan and his social environment. In this second domain, discursive practices shift from physical manipulation (in which ideas are constrained and re-constructed by physical limitations) to the transmission of mental image (the idea) from one professional to another using speech and gesture. He says, "I want to wrap this around." (See Figure 2). This is the first externalization of the goal state.

Figure 2: first externalization of goal state

Goal State 1 $\rightarrow$ Goal State 2

Stephan then places the bowl on top of the tape measure in the middle of the plate. He measures the plate, then the bowl again. This time he measures the outside of the bowl from rim to rim, announcing "I need nine inches." In order to fit goal state 1, wrapping the metal around the bowl, he needs at least that amount of metal. This last statement is evidenced in a future interaction between Micah and Stephan in which Micah asks Stephan whether he could lengthen the metal to fit the bowl; to which Stephan's reply was "no."

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Stephan re-measures the plate. Though he needs nine inches, he says "I got eight. >Oh I got eight<, let's see." Now armed with a new measurement to map onto the problem domain, Stephan refines his past idea: eight inches might be enough to wrap around the bowl. This is goal state 2. He measures the bowl again, this time with the eight-inch measurement from the sheet to compare with the bowl, but decides that eight inches will not be enough.

This interaction can be discussed in terms of D'Andrade's "direction of fit". In goal state 1, Stephan's idea is mapped to the world by the placement of the bowl and the attempt to impose the bowl's features on the metal sheet. This idea fails because the sheet is not large enough. Next, Stephan attempts to map the world onto his idea by measuring the sheet, and trying to impose the sheet's features onto the bowl.

**Goal State 2 --> Goal State 3**

Goal state 2 is rejected, however, because neither direction of fit would work. Stephan and Micah resume searching the workshop for a bigger piece of metal. At first, this seems to be a return to goal state 1, in that the direction of fit is the imposition of the idea on the environment. However, they do not find a bigger piece of metal, and goal state 3 is actually an augmented form of goal state 2: Stephan decides to use the smaller piece, and change his goal state to accommodate the constraints of the environment.

The process of searching for a new piece of metal is actually a series of shifts in both activity and setting. Originally, Stephan is undergoing the activity of measuring and fitting at the anvil setting. When his setting does not provide him with what he needs, he switches his activity into something that is completely different: searching. However, his new activity is not supported by the current setting of the anvil workstation, and so he switches that, too, to the area where he found the metal in the first place. Thus activity and setting mutually elaborate and establish each other (Figure 3).

### Setting activity dialectic

| 32 | Micah: Here's one of 'em |
| 33 | Stephan: In fact |
| 34 | Here's another one |
| 35 | What do you think? (0.23) |
| 36 | Micah: I think this is the same size. |
| 37 | Stephan: They all have the same size? I guess. (2.02) |

**Figure 3: Switching between settings as a result of activity switch & example of gap closing**

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This new setting, rich with metal pieces, supports Stephan's searching activity and it is here that he uses further gap closing techniques to aid in his search. Stephan needs a piece of metal that is ten inches, and the one that he has is only eight inches. In order to find a piece that is the right size, he does not pick up each one and measure it with the tape, or determine its exact size in any way, but instead holds up the piece that he knows is too small, and compares it to the new piece in question. In doing so, he redraws the problem and the solution to make them closer to each other and reduce his cognitive workload to a simple comparison of sizes (See Figure 3 again).

During this time, Micah is aiding in the search, and Stephan's interaction with him helps to crystallize his cognitive activity. The verbalizations and rhetorical questions such as, "I'll probably have to change my pattern, huh?" both include Micah in the process and allow Stephan to have a more concrete understanding of his problem state, and potential goal states. By externalizing his ideas and bouncing them off another individual, he is proposing an idea and inviting a falsification either from himself or from Micah.

Eventually, Stephan decides that all the pieces are functionally the same size, and selects a piece to use. He brings this back his anvil setting and begins a new activity of sketching. It is worth mentioning here a return to the social setting as well as the task setting. Before they broke to find new pieces of metal, and now as they return to the anvil, there is a great deal of social interaction. Both individuals are positioned to be open and receptive to one another, as well as to the anvil, which is the main focus of attention. Their shared attention is conveyed by the fact that they are both interacting, though with differing levels of involvement, with the same artifacts. This is very different from earlier times in the video when Micah and Stephan would each have their own projects that they were working on, and one person might have their back facing the other. Here the interaction takes shape around the physical constraints of the setting and nature of the activity. Micah and Stephan are not standing and talking to one another face to face, or across the room. This is because their activity is something that requires them to be focused on a tertiary object that requires a fair amount of up-close scrutiny. Though Stephan is the primary actor in this activity, he does not stand square against the anvil, which might be more natural or afford him a better perspective, but shifts his body to an angle to allow Micah an equal view of the cognitive hot spot that is the anvil. Returning to this arrangement of activities and positions, Stephan proceeds to sketch his idea out.

Here he opportunistically uses a feature of his environment, the ability to mark on the metal, to create a discourse with the environment and the other person. It is in this sketching process that Stephan is able to formulate and externalize goal state 3.
Goal State 3 --> Goal State 4

At this time, the interaction between Micah and Stephan helps to further refine Stephan's goal state. Micah tries to suggest a method for saving metal. He takes possession of the metal sheet and moves his hand into position to easily receive the chalk from Stephan. This is an invitation for Stephan to relinquish control of the chalk and the discussion, without rudely snatching it from him. When Stephan accepts, Micah uses multimodal communicative practices to convey his idea to Stephan. By employing a diagram, speech, and gesture, he creates a statement that would have been unintelligible if the part were not experienced in conjunction and in context. Micah says, "Have this kind of dip in on the sides like that." Micah employs deixis to highlight certain aspects of the design. In this case, it is the curvature of the metal instead of using a straight line.

This suggestion is not helpful in the sense that Stephan accepts it, but it is helpful as a disambiguation of the goal state. It makes Stephan realize that Micah does not understand what he is going for, and forces Stephan to refine his goal state in order to keep Micah in the loop. He says, "I want to make it like a flower type thing," as he takes back the chalk and the metal. Goal state 4 arose from discourse (verbal and illustrative) between Micah, Stephan, and the problem domain; goal state 4 is solely a verbal refinement of the idea. Meanwhile, this social discourse between Micah and Stephan leads Stephan to flip the metal over and start a different type of drawing on the clean face.

Goal State 4 --> Goal State 5

This new drawing is goal state 5, coming out of the discourse and disambiguation between Micah and Stephan. This drawing does not try to depict the elevation of the metal as it wraps around the bowl. Instead, Stephan draws petals directly on the metal, as a template to later cut. Having highlighted certain sections of the metal as foreground with his drawing of petals, he utilizes gestures coming upward from the metal to embody the shape of their future state. (See Figure 4) As he does so, he says, "Bring this up like flower petals. Bring them up." He further refines that with additional gestures (Figure 4 again), selecting a subset of the previous area to focus his embellishment, by simultaneously saying, "And bring the ends down." Goal state 5 is defined by drawing, gesture, and speech. In this refinement Stephan uses his hands bring the edges of the two dimensional drawing up so the idea of the shape takes three dimensional form in real time.

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Go up like this.
Something like that () I'm not sure which (0.5)
And then bring it up like this and curl it on the outside (1.0)

Then (pause)
Bring this up like flower pedals (0.5)
Bring them up (0.5)

M: Okay.

S: And bring the ends down.

Figure 4: multiple dimensional gestures coupled with speech and drawing

Goal State 5 --&gt; Goal State 6

Goal state 6 arises out of an interaction with the environment, where Stephan takes advantage of extra space afforded to him by previous decisions about which piece of metal to use and how. This 'ah hah' moment is signified by Stephan's use of the world "actually" in the statement "So actually I could have a long ones." (line 66). He then utilizes this space by drawing in the long and short petals he will make. It is actually a refinement of goals state 5, where more detail is made explicit, rather than changes made. Stephan explains goal state 6 to Micah by once again using gesture and speech (line 69) (see Figure 5) to pick up the two-dimensional drawing and create a three-dimensional form in the workspace created between himself and Micah. Goal state 6 can be validated as a transition from previous goal states in the linguistic cues provided by Stephan. He says, "...bring the long ones. higher up to-" (line 69). The use of the suffix "er" in lines 69 and 71, "higher," indicates a modification of a past idea, or higher than the bowl, like in goal state 3. Either way, it is another clue of the transition through the goal states that Stephan has been navigating since the beginning of his task.

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Figure 5: co-gestured, co-drawn speech

Conclusions

By using video to capture the interaction of their informants, the ethnographers were able to get a much more complex picture that included the simultaneous use of gesture, drawing, and speech, as well as discourse, gesture, dialect establishment, highlighting, professional vision, gap closing, opportunistic use of the environment, and mapping. While one can never get the "whole picture," which is where cultural models come in, this videographic method is excellent for capturing the semantic transmission of ideas between individuals, as well as the discourse that one individual engages in with other individuals and their environment. We have certainly seen this throughout the course of the paper, and only begin to extract the vast amounts of cognitive activity present in the everyday actions of these blacksmiths, or any individuals engaging in meaningful activity.

Committed to the goal state concept is risky, because it is easy to fall into naive materialism - especially when you commit to it and then fail to deliver to it.
Great energy overall. Good analysis and insight.

Presentation: nice 25
Readings: 20
Execution: 94

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