Chapter 28

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PRACTICES OF COLOR CLASSIFICATION IN PROFESSIONAL DISCOURSE[1]

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One of the most enduring topics in the study of cognition is the analysis of categories. This paper will use video-tapes of archaeologists in the field of classifying color to investigate how categories are socially organized as situated practices.

At times, categorization has constituted the major agenda of entire fields, such as cognitive anthropology. The classic work of Berlin and Kay (1967; 1969), on color categories provides an excellent example of one major approach to the study of human cognition. Different languages classify the color spectrum in different ways.

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However, Berlin and Kay (1969) demonstrated that the diversity of human color systems was built on a universal infrastructure, one almost certainly linked to structures in the brain. To show this Berlin and Kay first located a basic set of color terms in a number of different languages. Then they had speakers of those languages show which color patches on a Munsell color chart fell within the boundaries of each basic color term. The Munsell chart, consisting of carefully prepared samples of precisely defined colors arranged in a grid, is the accepted reference standard for color description. When Berlin

Source: Charles Goodwin, 'Practices of color classification', *Cognitive Studies: Bulletin of the Japanese Cognitive Society* 3(2): 1996, 62–82.

and Kay compared the Munsell maps for different languages they found that all languages locate the foci of their basic color labels at roughly the same place in the color spectrum and, moreover, that a universal pattern exists for adding basic color terms to a language. If a language has only two color names they will be black and white, if it has three the third will be red, the fourth will be either green or yellow, blue will be added next, etc. This work remains one of the central accomplishments of cognitive anthropology.

The theories and methods used to analyze how human beings build and use categories are themselves shaped by deep assumptions about what counts as human cognition, where it is located, and what constitutes an interesting and important finding. Clearly visible in the work of Berlin and Kay are a number of quite pervasive assumptions about the underlying organization of both language and cognition. First, the structures that provide universal mechanisms for human cognition reside in two interrelated places: the human brain and a linguistic system. Cognition is a psychological process and its crucial machinery is found within the human skull. Second, meaning is defined in terms of reference, e.g., the range of color patches that a speaker of a particular language identifies as falling within the scope of a specific color term. Third, the basic units being samples are human languages such as English, Japanese or Tzeltal. The color systems of different languages are systematically compared with each other. Fourth, this vision of where the crucial phenomena relevant to the organization of cognition were to be found had important methodological consequences. Berlin and Kay never looked at how people use color categories to pursue a relevant course of action in the consequential scenes that make up their lifeworld. Instead, all of their informants were performing exactly the same experimental task, and, with the exception of Tzeltal speakers, all the speakers resided in the San Francisco Bay area. The notion of a community of competent practitioners was completely irrelevant to Berlin and Kay's analysis; indeed for many languages, only a single speaker was used.

It is however possible to conceptualize human cognition in ways that challenge these assumptions. Thus, with respect to the second assumption in which meaning is analyzed in terms of reference, Wittgenstein (1958; see also Baker and Hacker 1980) argued that the meaning of a term is not its bearer, the entities it refers to (e.g., shades of color). Instead the study of meaning should focus on description of the practices required to use a term appropriately within a relevant language game.

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We will begin by looking at how archaeologists classify color as one component of the work of competently excavating a site. Rather than being lodged entirely in the world of mental representations, the perceptual task of assessing

color as an archaeologist requires systematic use of specific tools, indeed the very tool used by Berlin and Kay: a Munsell color chart. As a coding framework, the chart both mediates perceptual access to the dirt being classified, and provides a color reference standard. This tool does not stand alone as a self-explicating artifact; instead its proper use is embedded within a set of systematic work practices. Moreover, these practices vary from community to community. Though the chart is used by both archaeologists and linguistic anthropologists (as well as other professions concerned with color), each discipline situates the chart within different sets of work procedures. In brief, it will be suggested that an appropriate unit for the cognitive processes involved in color discrimination is not the brain in isolation, or the categories provided by semantic systems of languages as self-contained entities, but instead the situated activity systems used by endogenous work groups to properly constitute the categories that are relevant to the work they are engaged in. Rather than sustaining an opposition between the "mental" and the "material" such activity systems seamlessly link phenomena such as the embodied actions of participants, physical tools, language use, work relevant writing practices, etc., into the patterns of coordinated action that make up the lifeworld of a workgroup.

Central to the cognitive processes that constitute science are writing practices quite unlike those typically studied by social scientists investigating literacy. In order to generate a data set – collections of observations that can be compared with each other – scientists use coding schemes to transform the world that they scrutinize into the categories and events that are relevant to the work of their profession (Cicourel 1964; 1968). When disparate events are viewed through a single coding scheme, equivalent observations become possible. The process of systematically making relevant observations about the color of the materials being examined, and then writing them on a coding form (see Figure 28.1), located a small activity system. Within it the categorization of color is mediated by both material artifacts and specific work-relevant practices. Moreover, the vision required to see color in this activity has strong temporal, historical and spatial dimensions as well; to competently perform the task the technician(s) coding the data must use a tool to look at a specific space, at a particular point in the process.

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The form contains slots for describing the color, consistency, and texture of the dirt being examined. Those filling in the form are faced with the task of systematically examining the dirt and making appropriate entries in each slot.

The use of coding forms such as this to organize the perception of nature, events, or people within the discourse of a profession carries with it an array of perceptual and cognitive operations that have far-reaching impact. First, by

SOIL DESCRIPTION: A ZONE upper plow zone	D 1985 backdirt	B lower p
Color (Wet) 10YR 3/4 dk yellowish brown	10YR 4/3 brown to dk brown	10YR 3/6 yellowish
Texture sandy ~~silty~~ loam	sandy loam	loamy sa
Consistency somewhat sticky somewhat plastic	fairly sticky fairly plastic	sticky somewhat
Mottles scattered light	heavily w/ 10YR 5/4 sand and areas of 10YR3/3 silty loam, scattered charcoal and burnt earth.	lightly w soil.
Cultural/Natural cultural		
Comments		

Figure 28.1

using such a system, a worker views the world from the perspective it establishes. Of all the possible ways that the earth could be looked at, the perceptual work of students using this form is focused on determining the exact color of a minute sample of dirt. They engage in active cognitive work, but the parameters of that work have been established by the system that is organizing their perception. In so far as the coding scheme established an orientation toward the world, it constitutes a structure of intentionality whose proper locus is not the isolated, Cartesian mind, but a much larger organizational system, one that is characteristically mediated through mundane bureaucratic documents such as forms.

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Rather than standing alone as self-explicating textual objects, forms are embedded within webs of socially organized, situated practices. In order to make an entry in the slot provided for color an archaeologist must make use of another tool, the set to standard color samples provided by a Munsell chart. This chart incorporates into a portable physical object the results of a long history of scientific investigation of the properties of color. The version of this chart that archaeologists bring into the field has been tailored to the distinctive requirements of their work situation. First, the color samples are organized as pages that fit into a small loose leaf book that can be easily carried to the field. Second, since dirt typically contains only a limited range of color, only a subset of the color samples that would be found in a complete

chart (approximately one fifth of the total) are necessary for the work that archaeologists do. Issues of cost also figure into this calculation. Even the reduced sample book costs $80. While this is inexpensive enough to risk taking into harsh field conditions, it is still considered a costly, valuable tool to be carefully protected. By being adapted to the specific requirements of their work the Munsell book used by archaeologists is as small, portable and inexpensive as possible. Third, circular holes are cut next to each color patch. The archaeologist holds a sample of the dirt being coded on a trowel held under the page. The trowel is moved from hole to hole until the best fit between the color of the dirt on the trowel and an adjacent patch of the chart is found.

Foucault (1970; 1986) uses the term heterotopia to mark "a relatively segregated place in which several spatial settings coexist, each being both concrete and symbolically loaded" (Ophir and Shapin 1991: 13). With elegant simplicity the Munsell page with its holes for viewing the sample of dirt on the trowel juxtaposes in a single visual field two quite different kinds of spaces: (1) actual dirt from the site at the archaeologists' feet is framed by (2) a theoretical space for the rigorous, replicable, classification of color. The

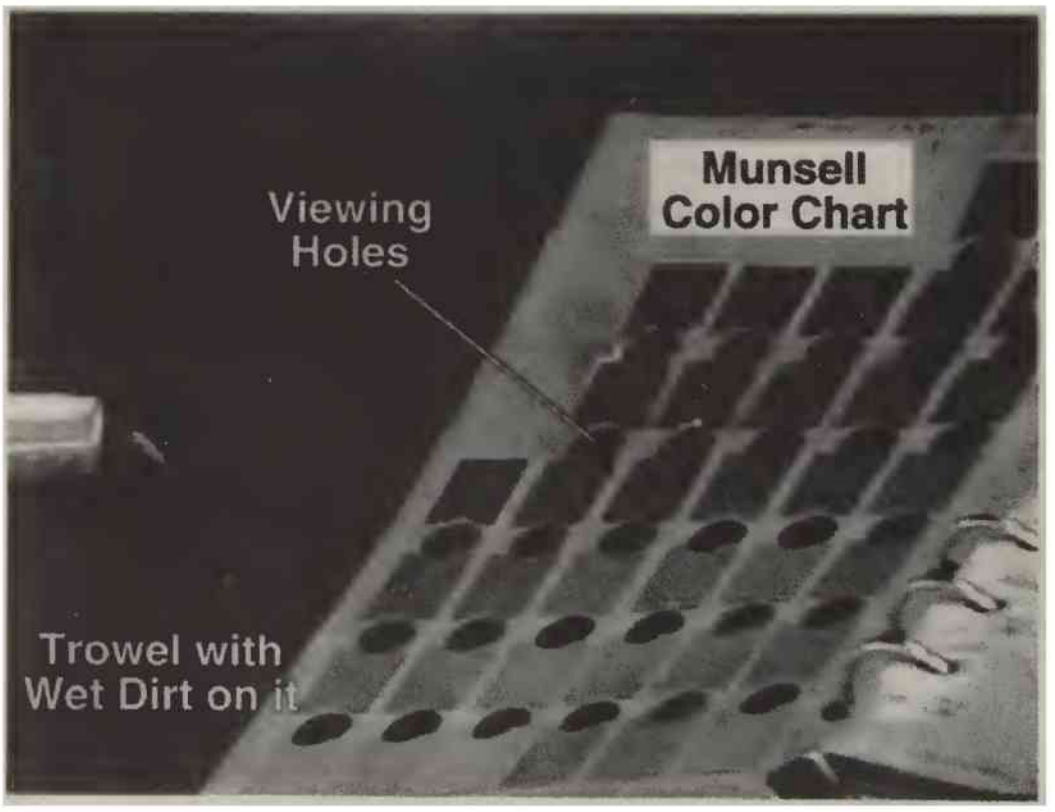

Figure 28.2

latter is both a conceptual space, the product of considerable research into properties of color, and an actual physical space instantiated in the orderly modification of variables arranged in a grid on the Munsell page. Ophir and Shapin (1991: 13) propose that in the modern West the sites where science is done are fundamentally heterotopic spaces. This notion is applicable not only to tools such as the Munsell book, but also to the excavation site itself, with its specialized personnel making visible the phenomena that define their discipline in limited, carefully organized places, such as the pits they systematically dig. Though segregated from the everyday world just outside its borders, the site and its tools are systematically linked to the work and activities of other archaeologists. Thus the Munsell book encapsulates in a material object theory and solutions developed by earlier workers at other sites faced with the task of color classification. The pages juxtaposing color patches and viewing holes that allow the dirt to be seen right next to the color sample provide an historically constituted architecture for perception.

The Munsell system organizes color description by using three variables: hue, chroma and value. Each page in the book (Figure 28.3) is organized as a

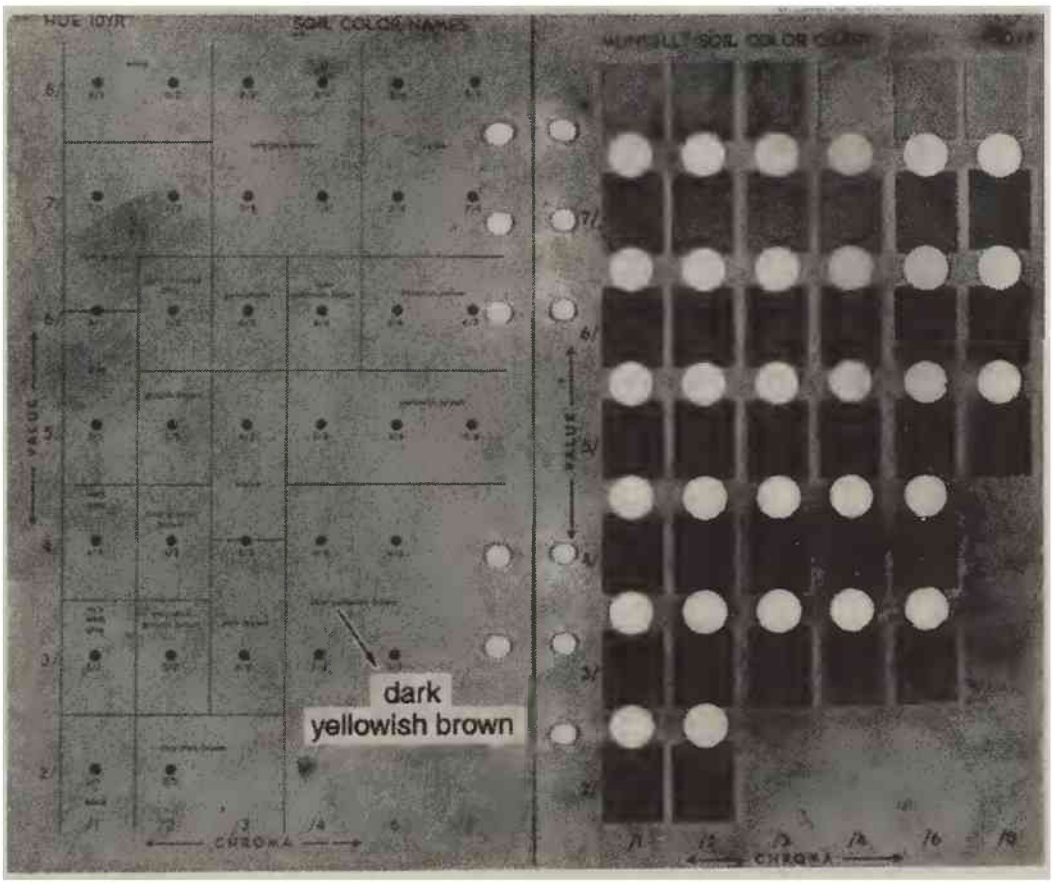

Figure 28.3

grid of chroma and value samples for a single hue. In addition to the samples and viewing holes, each Munsell page also contains several different kinds of written text: (1) numbers; (2) labels for the two axes, with value from bottom to top, and chroma from left to right; and (3) standard color names, such as "dark yellowish brown", which are found on the facing page to the left of the actual sample page (because of the reduced size and degradation of the small print on the original page I've rewritten the bottom right color name in larger type).

The page thus provides not one, but three complementary systems for identifying a reference color: (1) the actual color patch; (2) numeric coordinates specifying its position in the grid (e.g. "3/4"); and (3) color names. Moreover, these systems are not precisely equivalent to each other. For example, a single color name may include several different color patches and grid descriptions. Thus, on the page reproduced above the color name "dark yellowish brown" in the bottom right quadrant of the grid, refers to four patches/sets of coordinates: 4/4, 4/6, 3/4 and 3/6. Similarly, "yellow brown" just above it includes 5/4, 5/6 and 5/8.

Why does the Munsell page contain multiple, overlapping representations of what is apparently the same entity (e.g. a particular choice within a larger set of color categories)? The answer seems to lie in the way that each representation makes possible alternative operations and actions, and thus fits into different kinds of activities. Both the names and numbered grid coordinates can be written, and thus easily transported from the actual excavation to the other work site, such as laboratories and journals, that constitute archaeology as a profession. Unlike the names, the numbers can be used in statistical analysis (the patches are carefully constructed to represent equal intervals). Moreover, as noted in the preface to the Munsell soil color book that archaeologists use, numbers are "especially useful for international correlation, since no translation of color names is needed." However, despite its greater precision, the number system has its own distinct liabilities. In order to grasp the color being referred to as "10 YR 3/4" a reader needs access to a Munsell book. Color names, such as "dark yellowish brown" are thus more appropriate than the numbers for general journal publication, since they can be recognized and compared, at least roughly but adequately for the purposes of the moment, by any speaker of the language. The outcome of the activity of color classification initiated by the empty square on the coding form is thus a set of portable linguistic objects that can easily be incorporated into the unfolding chains of inscription that lead step by step from the dirt at the site to reports in the archaeological literature (see also Hutchins 1995: 123). However, as arbitrary linguistic signs produced in a medium that does not actually make visible color, neither the color names nor the numbers allow direct visual comparison between a sample of dirt and a

reference color. This is precisely what the color patches and viewing holes make possible. Moreover, as discrete, bounded places on the surface of the page they can be identified not only through language, but also by pointing. In brief, rather than simply specifying unique points in a larger color space, the Munsell chart is used in multiple overlapping activities (comparing a reference color and a patch of dirt as part of the work of classification, transporting those results back to the lab, comparing samples, publishing reports, etc.), and thus represents the "same" entity, a particular color, in multiple ways, each of which makes possible different kinds of operations because of the unique properties of each representational system. [. . .]

The chart does not stand alone as an isolated tool; instead, its proper, appropriate use is situated within a larger set of work-relevant practices. First, a place for taking a sample of dirt from the site has to be chosen. In its original location in the ground itself the dirt to be sampled is embedded within a dense, complex visual environment. A trowel is used to lift the sample from this dense perceptual field so that it can be scrutinized in isolation. A figure constituted as the object of current work-relevant attention, the dirt on the tip of the trowel, is quite literally extracted from an amorphous ground. This process of *positioning for perception* is one particular type of *highlighting* (Goodwin 1994), one of the most general practices used to reshape phenomena in the domain being scrutinized by a workgroup so that just those events which are relevant to the tasks they are engaged in are made salient.

Archaeologists know from experience that the apparent color of a bit of dirt can be modified by many factors. After the dirt has been placed on the trowel it is sprayed with water. By squirting all samples with water some of the variables relevant to the perception of its color can be controlled by creating a consistent environment for viewing. The moment where the archaeologist gazes at the dirt through the Munsell chart is thus but one stage within a larger sequence of temporally unfolding practices. Mundane, routine work with the Munsell chart seems quite distant from the abstract world of archaeological theory, and the debates that are currently animating the discipline. However, the encounter between coding scheme and the world that occurs as the archaeologist in the field holds a sample of dirt under the Munsell page, is one example of a key locus for scientific practice. This is the place where the multifacted complexity of "nature" is transformed into the phenomenal categories that make up the work environment of a scientific discipline. It is precisely here that nature is transformed into culture.

Despite the rigorous way in which the combination of a tool such as the Munsell color chart, and the practices developed by archaeologists for its relevant and appropriate use, structure perception of the dirt being scrutinized, finding the correct category for the classification of a bit of dirt is not

1	Pam:	Okay that should be, *we*t enough.
2		(1.5)
3	Pam:	° Hmph (0.7) *((holding trowel))*
4	Jeff:	We're lookin at that right there?
5		(0.3)
6	Pam:	Mmm,
7		(0.4)
8	Jeff:	Much darker than tha:t.
9		┌there.
10	Pam:	└Yeah. I'm not-
11		I'm just tryin ta put it ***in*** the:re.=
12		=eh hih an(h)ywhere. °hih heh huh
13	Jeff:	I'll take it. *((takes trowel))*
14		(2.0)
15	Pam:	Down.
16		(1.2)
17	Pam:	En this one. *((Points))*
18		(0.4) *((Moves Trowel))*
19	Jeff:	yuhhh?
20		(1.8)
21	Pam:	°Try that one? *((Points))*
22		(0.8)
23	Pam:	Fou:r.
24		(0.8)
25	Pam:	Is it that?
26		Na: That's- not-
27		↑What was the ***br***owness of that?
28	Jeff:	°mmhh,

Munsell Book

Figure 28.4a

an automatic, or even easy task. According to the instructions at the beginning of the Munsell book:

> Rarely will the color of the sample be perfectly matched by any color in the chart. The probability of having a perfect matching of the sample color is less than one in one hundred.

Rather than automatic matching, the person doing the coding is charged with making a competent judgement, deciding which of the chart's colors the sample falls between, and which reference color provides the closest, but by no means exact, match. Moreover, the very way in which the Munsell chart provides a context-free reference standard creates problems of its own.

		((Points))
29	Pam:	How bout, (0.4) ***th***ree four.
30		(3.2)
31	Jeff:	How bout, three ***si***:x.
32		(0.5)
33	Pam:	Three six,
34		(2.0)
35		Hmm *((high pitch sung))*
36		(0.4)
37		S:- Is it yellowish (like that?)
38		(2.4)
39	Jeff:	Three ***si***x is what I would say.
40	Pam:	Oka:y. *((reluctantly))*
41		(2.5)
42	Jeff:	Ya have another preference? *hhhh
43		(7.8)
44	Pam:	I would think it's (maybe), (0.5) three ***fo:ur***.
45		(1.1)
46		All right.=
47		=Maybe we can say it's a- a three four s-
48		(0.6) *((does gesture of a slash))*
49		[slash three six.
50	Jeff:	[(I'll see if it's o-)
51		(1.3)
52	Jeff:	Okay.
53	Pam:	°And say it's in between.
54	Jeff:	We'll compromi:se.

Figure 28.4b

The color patches on the chart are glossy, while dirt never is, so that the chart color and the sample color never look exactly the same. In Figure 28.4 two students at the field school looking at exactly the same dirt and reference colors disagree as to how it should be classified.

In this sequence the task of color classification is organized within a situated activity system that links a range of apparently disparate phenomena, including talk, the bodies of the participants, the dirt they are examining, and the tools being used to scrutinize that dirt, into a coherent course of action. It is useful to begin with consideration of the participation framework visible in the orientation of their bodies. For Goffman (1961: 7) "focused interaction occurs when people effectively agree to sustain for a time a single focus of cognitive and visual attention." Orientation to such a common focus

organizes the bodies of participants in an encounter into visible patterns of mutual orientation which frame the talk and other interaction which occurs within them (Kendon 1990; [Chapter 22]). Goodwin (1981) has demonstrated the central importance of mutual gaze between speakers and hearers in the organization of turns-at-talk in conversation. However, here the parties are gazing not at each other, but instead at the Munsell page with the dirt sample beneath it. This chart with its viewing holes organizes not only the color spectrum represented on its surface, but also the embodied actions of those who use it. Its proper use proposes a particular orientation of the body and focus of attention. The participation framework necessary for the analysis of what is happening here thus includes not only the bodies of the participants, but also the tools they are using. Color classification could be done, indeed characteristically is done, by a single archaeologist peering through the Munsell book alone. In light of this it is possible to see the defining feature noted in Goffman's definition, a focus of cognitive and visual attention, as applying not only to focused multi-party interaction, but also the engagement of a single party with a relevant tool that organizes a visible focus of attention (though quite properly this situation would fall outside the scope of Goffman's focus on multi-party interaction). In brief, rather than drawing an analytic bubble that ends at the actors' bodies, it is useful to extend the notion of participation framework to encompass as well the tools that participants are working with.

Let us now look more closely at how action is organized within this framework. Use of the Munsell chart structures the activity of color classification in a quite specific way. To locate the proper color category the sample is moved from color patch to color patch under the ordered grid provided by the page until the best match is found. Through use of the chart the process of color classification has been reorganized as a spatial task. Consider for a moment some of the issues posed in the analysis of action that includes an intrinsic spatial component. A goal in American football occurs when a player carrying a ball crosses a particular line drawn on the field where the game is played. The action can be neither defined nor analyzed by looking at the body of the running player alone. Instead, the playing field as a visible arrangement in space that carries specific kinds of meaning as defined by the rules of the game, makes possible forms of action (balls going out of bounds, touchdowns, etc.) that could not exist without it. The Munsell chart, the place where the archaeologists performing this classification are looking so intently, provides a similar arena for the constitution of meaningful action. At line 17 Pam moves her hand to the space above the page and points at a particular color patch while saying "En this one." Within the field of action created by the activity in progress this is not simply an indexical gesture,

but a proposal that the indicated color might be the one they are searching for. It creates a new context in which a reply from Jeff is the expected next action.

In line 19 Jeff rejects the proposed color. His move occurs after a noticeable silence in line 18. Dispreferred actions in conversation, such as this rejection, are frequently preceded by gaps (Pomerantz 1984). However, when the tape is examined something else seems to be going on. The silence is not an empty space, but a place occupied by its own relevant activity (Goodwin 1980). Before a competent answer to Pam's proposal in line 17 can be made, the dirt being evaluated has to be placed under the viewing hole next the color sample she indicated, so that the two can be compared. During line 18 Jeff moves the trowel to this position. Because of the spatial organization of this activity, specific actions have to be performed before a relevant task, a color comparison, can be competently performed. In brief, in this activity the spatial organization of the tools being worked with, and the sequential organization of talk in interaction interact with each other in the production of relevant action (e.g., getting to a place where one can make an expected answer requires rearrangement of the visual field being scrutinized so that the judgement being requested can be competently performed).

This has a number of additional consequences. First, Pam's own ability to evaluate the appropriateness of the color she proposed changes when Jeff moves the sample to the correct viewing hole. Only then is she in a position to rigorously compare the dirt with the Munsell color. Pam's action of pointing to a particular color patch at line 17 could be heard as a request to perform this action, to put them both in a position where that patch might be evaluated, rather than a definitive judgement that is subsequently disagreed with. Indeed, a moment later, in line 23, Pam suggests another possible color. However when the trowel is moved to the appropriate viewing hole she herself rejects the match, saying in lines 25–26 "Is it that? Na: That's- not-".

This process of color classification involves a sequence of movements through space and time. What can be seen and evaluated changes as each step in this process. The relevant unit for analyzing the problematic status of a specific proposal is not primarily the mental state of a particular actor, but instead the different possibilities for seeing relevant phenomena that alternative positions in this sequence provide.

Second, it is sometimes argued that abstract, context-free language is not only superior to context-bound talk (the latter argued to constitute a restricted linguistic code), but a defining characteristic of rational discourse in institutions such as science (see for example Bernstein 1964). Here we see people who are actually doing scientific classification making extensive use of indexical language ("this one" line 17, "that one" line 21, etc.) tied to

pointing gestures. Moreover the very instrument they are looking at and pointing to contains both (relatively) context free numbers for describing these entities, and a set of color names that their community has explicitly agreed to treat as a common standard. However, there are very good reasons for use of indexical language here. First, the task posed at this point in the process is visual comparison of the reference color with the sample of dirt. Locating the scientific name or number for that sample requires an extra step, a look away from the color of the sample to the borders of the chart or even the facing page. By way of contrast, pointing right at the sample heightens focus on its relevant visual properties, which is precisely the task of the moment. Reading off the correct name from the chart can be done later, after a particular patch has been located as the best match. Second, this gesture is lodged within multiple spatial frameworks that are relevant to the organization of the activity in progress. In addition to the way that the pointing finger locates a particular patch within the larger array, which we can gloss as the *reference space*, the hand carrying the gesture also constitutes a relevant action within the *participation space* being sustained through the orientation of the participants' bodies toward the materials (chart and dirt sample) that are the focus of their attention; Pam's hand moves right into Jeff's line of sight as he gazes toward the chart. Rather than telling him what color to look at, she shows him. Third, as noted above, Pam's proposal constitutes a request that he move the sample to the viewing hole for this patch. By pointing at the patch she makes a relevant move within the *local action space* by showing him where to position the sample next. In brief, the proposed advantages of apparently abstract, context-free descriptions, such as the standard names or coordinates, pertain to use of the Munsell system in a quite different domain, such as publishing findings in journal articles (which is of course contextually organized in its own right). Within the activity of color classification that is occurring here Pam's gestures are not only appropriate, but rich, multi-functional actions.

Indeed the data suggest that there might be a systematic ordering of representations throughout this sequence, with pointing being the first choice, and numerical coordinates the second. At line 19 Pam starts to move her extended index finger to a particular color patch. What she says while making this movement "How bout," explicitly classifies what her hand is doing as a next proposal. She then delays the onward progression of her talk until her moving finger actually lands on the appropriate patch. Her action of proposing a particular color category as the best match is done through the integrated coordination of talk, body movement, and the representational field provided by the Munsell chart. Only as her finger is leaving the chart does she state vocally the grid coordinates that name this patch "*three* four." In a very real

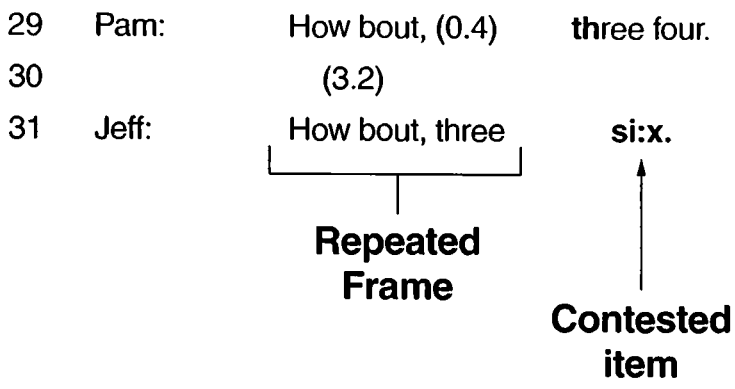

Figure 28.5

sense the syntactic construction initiated by "How bout" has two complements, first a visible reference color specified by the pointing finger, and second a verbal name for that color, spoken as the gesturing finger departs. Pam's finger on the patch, in addition to showing Jeff the color she wants him to evaluate, might also help her read the coordinates. Her raised finger provides a prominent, fixed reference point as she moves her eyes to each of the chart's borders to find the correct numbers. The third representational system provided by the chart, the standard set of color names, is never used in this sequence. These color names do not uniquely identify reference colors, and they are written on the page facing the color samples. This page is being held in a position that makes it difficult to see.

Jeff never points to a color patch. He can't, since one of his hands is holding the Munsell book and the other the trowel with the dirt sample. However he does perform an action that is structurally similar to Pam's points by moving the dirt sample to specific viewing holes.

At line 31 (see Figure 28.5) Jeff uses the resources provided by the organization of talk in interaction to make visible explicit disagreement with Pam's position. Rather than simply proposing a new color, he reuses the structure of her utterance, the "How bout" frame, but replaces her proposal with his own, giving "**si:x**", the syllable that marks the difference, enhanced contrastive stress.

[. . .]

Recently renewed attention has been focused on the body, and the nature of embodied experience, by scholars in a number of different disciplines. The situated activity system of doing color classification, with its tools and distinctive tasks, creates a framework within which the bodies of the participants are seen to be doing specific things. This visible meaningfulness arises

not from the body in isolation, but rather from the way actors can be seen to be using particular tools to perform relevant tasks. The conclusion to this sequence provides one example. Pam does not acquiesce to Jeff's "Three six" (see lines 33–37) but finally agrees reluctantly to let it stand. As she says "Oka:y" at line 40 she stands up so that she is no longer gazing intently at the Munsell chart with its dirt sample (see the fourth picture from the top in Figure 28.4). The end of the classification activity is thus marked by the removal of her body from a position required to perform that task.

However, recognizing her reluctance, Jeff reopens the task, asking at line 42 if she has "another preference." A quite long silence ensues before she offers "**th**ree four" as an alternative to his "three **si:x**." Research in conversation analysis (Pomerantz 1984; Sacks [1973] 1987; 1995) has demonstrated that, as part of a structural preference for agreement, disagreements are frequently preceded by long silences (which can do a number of different jobs, such as giving the party whose talk is being disagreed with an opportunity to revise it before overt disagreement becomes explicit). While upcoming disagreement is certainly relevant, the silence here is occupied by Pam visibly putting herself in a position to produce a careful, competent answer. Just after Jeff asks if she has another preference Pam walks around to the side of the Munsell book, leans down and grasps it with her hands while putting her head as close to its surface as Jeff's is (see the picture attached to line 44 in the transcript), and then stares intently at the page with the dirt sample under it for several seconds before offering her alternative category. People are sometimes described producing a "thoughtful" answer. Here through a display of her body intensely scrutinizing the materials required for a competent judgement Pam visibly demonstrates that the answer she eventually produces is the product of the systematic practices required to make such a judgement in this activity.

[. . .]

Finally, the visible structure of the Munsell chart interacts with talk in more subtle ways as well. In a paper investigating how intricate pun-like processes organize some aspects of talk Sacks (1973) has described how the selection of words and images by a speaker can be influenced by quite diverse properties of the talk that preceded it, e.g. not only its explicit, topic-relevant semantic structure but also its sound structure, the scenes it represents, etc. In the present data, when offering the compromise that ends the activity Pam uses both the word slash ("we ca say it's a- a three four s- slash three six") and a gesture depicting a slash. To determine the grid coordinates of her proposed category she has just been looking at the borders of the chart where row and column labels are written as numbers next to slashes ("3/" or "4/").

The graphic organization of the Munsell page shapes not only her task of color classification, but also her talk in many complex ways.

With respect to the scope of the disagreement that occurs here it should be noted that the 3/4 and 3/6 colors patches on the 10YR page are extremely similar to each other. I can barely tell the difference between them. Both fall within the boundaries of a single color name "dark yellowish brown." For all practical purposes, including subsequent analysis of the data being coded here, whether the color of the dirt is a 3/4 or a 3/6 will not matter at all. The carefulness of the students here, and their unwillingness to acquiesce to an answer that one does not think is quite right, in no way undermines the scientific work being done here. Instead, the trustworthy, objective character of the descriptions they enter on the coding sheet emerges precisely from their detailed attention to the systematic practices used to constitute the categories of their profession, and their recognition of the real difficulties involved in unambiguously classifying complex continuous phenomena into discrete categories.

The definitiveness provided by a coding scheme typically erases from subsequent documentation the cognitive and perceptual uncertainties that these students are grappling with, as well as the work practices within which they are embedded, leading to what Shapin (1989) has called "the invisible technician."

This paper has not attempted to challenge the findings of Berlin and Kay (e.g. to propose a different sequence of color universals, or even to suggest that theirs is wrong), but instead to explore the possibilities provided by an alternative geography of cognition, one in which the crucial phenomena relevant to color classification are not located exclusively in the human brain, but instead in the situated activity systems that make up the lifeworld of a work group. Within such systems human cognition is embedded not only in biology and linguistic structure, but also history, culture and the details of local, situated interaction. By using historically constituted tools new archaeologists, such as the students examined here, are able to build on the work of their ancestors in not only archaeology but also other fields faced with the task of systematically describing color. The solutions these predecessors have found, and built into material artifacts such as the Munsell color chart, shape in fine detail the processes of cognition implicated in work-relevant classification of color. However these tools cannot be analyzed as self-contained objects in themselves. They only become meaningful when used to accomplish relevant tasks within local activity systems. As a particular kind of hetrotopia that juxtaposes in a single visual field the world being classified and an artfully crafted system of classification (one that contains multiple representations of the same category, each suited to alternative tasks), the Munsell page provides an example of an historically shaped, locally constituted

architecture for perception. The analytic unit required for describing how a competent member of this social group, an archaeologist, understands an expression such as "dark yellowish brown" when used in the context of her work, is not the English language as a homogeneous, autonomous structural system, but instead a situated activity system that includes not only semantic categories, but also specific tools, such as the Munsell book, and the practices required to use these tools appropriately. When multiple parties work on this task together the full resources provided by the organization of talk-in-interaction for shaping intersubjectivity within process of coordinated action are mobilized. The objectivity of the work of coding is provided for by the in-situ articulation of a dense web of local, accountable practice, built through the actual spatio-temporal arrangement of talk, gestures and relevant tools. The products of this process are trustworthy classifications that can be transported as written inscriptions to other work sites (excavations, offices, journals, etc.) that constitute the field of archaeology. The outcome of the activity of color classification initiated by the empty space on the coding form is a fully realized world of space, cognition and lived action embedded within the worklife of a particular scientific discipline.

Note

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