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Ordering Work
Blue-Collar Literacy and the Political Nature of Genre

DOROTHY A. WINSOR
Iowa State University

There's two different worlds, the engineers and us. You're always trying to bridge that gap: "You wrote this. What does it mean?"

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work has been developed by such scholars as Swales (1990), Freedman and Medway (1994), and Berkenkotter and Huckin (1995). Their work and that of others (e.g., Pare, 1993; Schryer, 1993; Smart, 1993) has provided us with an increasing number of studies describing how genres function in various social situations. In the past few years, however, some genre theorists have begun to call for studies of genre that supplement descriptions of a genre's function with a more critical understanding of the working of text. Freedman and Medway (1994) exemplify this development when they argue that we need to ask questions such as the following:

How do some genres come to be valorized? In whose interest is such valorization? What kinds of social organization are put in place or kept in place by such valorization? Who is excluded? What representations of the world are entailed? The absence of such questions is the ideological limitation we see as most needing to be addressed in the next stage of genre studies. (p. 11)

In this article, I respond to Freedman and Medway's (1994) call by arguing that part of the social action implicit in using or recognizing a genre is political. By this, I mean not only that genres encourage certain actions and discourage others but also that people in an organization do not have equal rights to authorship of all genres nor are the texts different people produce equally likely to be regarded as genres. Berkenkotter and Huckin (1995, p. 17) argue that genre is not an all or nothing category but, rather, is a continuum along which more or less typified texts can be ranged. But placement on the continuum is not a straightforward matter. Whether a textual form comes to be perceived as a genre is more than a matter of how commonly its use is. In addition, that common use has to be visible to a significant number of people in an organization. In her groundbreaking article, Miller (1984, p. 156) pointed out that whether a situation and responding text are perceived as recurring and typified is intersubjectively defined by the people involved, but genre theory has not explored this insight in any systematic way. This article argues that among the factors affecting recognition of genre are how important a social system perceives the text's function to be and (not unrelated) how visible its users are.

The visibility of particular texts and writers is part of the order that is constantly renegotiated in any social system. That is, visibility (or invisibility) is a state that is constantly reestablished by both one's own actions and those of others. In an examination of a scientific research facility, sociologist John Law (1994) argued that the organization of this facility was not something that existed objectively outside of the activity of the people within it. Rather, he said that actors in any organization create the order around them in moment-by-moment activity. Thus, organizing a network of actors is an ongoing activity carried out by the participants. However, such organizing does not occur in a state of complete freedom. As Giddens (1984) pointed out, human agency is at work in the organization of society, but participants do not start from scratch. Rather, they operate within already existing situations and "reproduce or transform them, remaking what is already made in the continuity of praxis" (p. 171). In so doing, they shape the order in which they function. Thus, even trivial, everyday actions can have profound effects on the social surroundings that people inhabit.

Indeed, this tension between historically conditioned order and the multiple daily orderings in which people engage makes it hard to say whether order or improvisation constitutes the milieu in which we live. It is possible to see either as more basic, changing with just a shift of the lens through which we gaze. This study looks at the negotiation of order in the engineering center of AgriCorp, a large manufacturer of agricultural equipment. At the engineering center, people seemed primarily to improvise amid the contingencies of their lives. But the organization for which they worked struggled to describe those actions as logical and organized. Specifically, it described the activities of the laboratory technicians as logically reorganized by engineers through the genre of the work order.

Because of the kind of setting in which engineering is typically done, it is a particularly fruitful area in which to examine how people's disparate actions can be arrayed in an orderly fashion that is also hierarchical. As Vincenti (1990) observes, engineering is usually done in overlapping intellectual and organizational hierarchies. That is, management defines a project before managing engineers determine an overall design; the overall design is then divided into major components that are further subdivided to be worked on by specialized engineering groups. The structure of the organization—its hierarchy—and the structure of the engineering problem—its object of knowledge—overlap (for further discussion, see Winsor, 1996, pp. 31-38). The hierarchical structuring of work has also occurred in science and has had consequences because credit is awarded for the work, a factor that is relevant for what I will be describing here. In a study of the laboratory technicians who worked with Robert Boyle, for instance, historian of
science Steven Shapin (1989) pointed out that the work of people such as technicians is often invisible to us, that it is subsumed in the work of the supervising scientist, engineer, or manager. Thus, we say that Boyle did certain experiments or operated his vacuum pump when we mean that he ordered others to accomplish these actions. Mukerji (1996) offered a more contemporary example of the same phenomenon when he examined the way the chief scientist in an oceanography lab was constituted as a scientific genius when the collective work of the lab was attributed to him.

As I will demonstrate here, work done by blue-collar hourly wage workers in a test lab at AgriCorp was similarly folded into the work of an engineering area that depended on lab workers to build the instrumentation necessary for its work and to collect the data that the engineers analyzed. There was tension between these two regions of the engineering center because although their work needed to be oriented toward the same goal (i.e., the development of improved agricultural equipment), their interests were not identical, and they were not always seen as having equivalent agency in the work they did. Indeed, in some ways, the engineers saw the technicians as tools they activated through work orders rather than as agents in their own right. The engineers and the technicians were hierarchically divided, and the organization viewed the existence of this hierarchy as necessary if the organization was to keep the technicians as well as the engineers focused on the organization’s object. However, as is suggested by the quote from the technician with which this article opened, hierarchy is not always functional when people have to work together. Thus, crossing the hierarchical divide between engineers and technicians was also necessary if the two groups were to coordinate their actions and get the work done. This article explores the way that a particular genre, the work order, is used to both bridge and maintain an existing social structure at the engineering center at AgriCorp.

The genre of the work order was one of the discursive tools that simultaneously allowed the technicians’ work to be done despite the tensions between the two areas and maintained the hierarchical structure of the engineering center because it both triggered and concealed the work the technicians did. To echo Giddens (1984), work orders were structured discourse (i.e., they were generic) that helped to structure the organization. They served as an ordering tool for the relationship between the engineers and the technicians, mediating their relationship and serving as a concrete representation of their interaction, a function Bazerman (1997) has identified as one of the uses for texts in organizations, as follows:

Because the produced discursive objects are in a sense concrete, although symbolic . . . they provide a concrete locus for the enactment of social structure. That is, whatever individuals may feel and think about each other, however they may sense they relate to each other, whatever beliefs they hold about social hierarchy and obligations, however they may perceive social pressure and power, there is still an observable, recordable, collectable utterance that concretely mediates among these various personal orientations. (p. 297)

In this article, I will first describe how I conducted this study. Then I will discuss the nature of the technicians’ work in a hierarchical organization, the work order as a generic textual tool within this hierarchy, and the contrast between work orders and other texts that the technicians themselves produced—texts that were treated less as typified responses to typified situations (i.e., as genres) than as individual, idiosyncratic creations. I aim to examine how one organizational genre, the work order, functioned to orient different groups so that joint work (a) could be accomplished despite the tensions between them and (b) could be credited within the normal hierarchy of the organization. This study has implications for our understanding of the role texts play in coordinating joint work and for our understanding of what it means for texts to be perceived as generic. In particular, it emphasizes the political aspect of genre as a form of social action, an aspect our research and theory have tended to neglect.

THE STUDY

Background

The study described here was conducted in the summers of 1996 and 1997 at the engineering center of AgriCorp, a large manufacturer of agricultural equipment. In 1996, I observed three engineers as they wrote at work, including as they wrote work orders that were to be sent to the company’s test labs for technicians to use as the basis for their work (Winsor, 1998). In 1997, I watched three technicians as they carried out various work orders. The work orders were necessary not
only because of the division of labor that was enacted in AgriCorp but also because of the physical layout of the facility. At AgriCorp, engineers and technicians were located in widely separated areas of the large engineering center, creating what Giddens (1984, p. xxvii) calls a "regionalization" of the slice of time-space they mutually occupied (for other discussions of the impact of spatial organization on discourse, see Chin, 1994, or Cross, 1994). About one third of the center was devoted to engineering offices, conference rooms, the cafeteria, and so on. The other two thirds were occupied by numerous labs and mechanical areas. In this space, technicians performed a wide variety of tasks, including building experimental parts and testing them. Testing was done in specialized test cells (i.e., rooms holding equipment that measured and recorded the performance of AgriCorp products under development). This equipment ranged from large refrigeration units to test how well the tractors ran in cold weather to dynamometers, which were the equivalent of tread mills for equipment such as engines and transmissions. On the dynamometers, the products could be run at various speeds and conditions to test, for instance, their durability or power.

**Participants**

The 1996 participants were three engineers who worked in electrical engineering, materials engineering, and drive train testing. I will draw on their comments regarding work orders and technicians, but in this article, I will focus primarily on the three laboratory technicians who participated in the 1997 study:

- Gary, who operated equipment in a test cell;
- Jim, who built and modified engines; and
- Rich, who built custom instruments for the test cells and maintained a supply center to which other technicians came to get parts they needed for their work.

Both summers, I approached the company through the human resources (HR) department. The HR manager sought engineer volunteers for me via e-mail. Because technicians were more closely supervised than engineers were, the HR manager arranged for participants from the lab by contacting the technicians' supervisor. This supervisor recruited the participants for me. One basis for their selection was that Gary and Jim were union shop stewards and Rich had been a steward at one time. The supervisor evidently felt that if these union officials were willing to cooperate with me, I would be better received in the shop area. Such a consideration shows the supervisor's awareness of the possibility for contradictions between the goals of management and the technicians, because the existence of the union signifies the technicians' awareness of the same possibility.

In both summers, I observed each participant for three 2-hour periods for a total of 36 hours, varying the days of the week and times of day during which I observed. I took field notes and asked questions as I watched. I was also able to perform taped interviews with the engineers, although not with the technicians whose time was more restricted. However, the technicians were usually able to talk to me as they worked and seemed willing to do so. These processes resulted in more than 100 pages of single-spaced typed field notes and interview transcripts. During my observations, I read the multiple work orders that the engineers wrote and that were on the technicians' work tables. When I was working with the technicians, they read through some of these with me and offered interpretations and evaluations. I collected other documents, such as a statement of what protective clothing was required in the lab area, an assessment sheet used to evaluate the technicians, and an organizational chart.

Two months after I finished observing the laboratory technicians, I was also able to interview the engineer/manager who was responsible for coordinating laboratory work and engineering work along with an engineer who worked for him and was in the process of examining engineering/laboratory relations, including those generated by work orders. The coordinating engineer provided me with six sample work orders that he cleared for publication. In addition, other technicians who knew about my project approached me and talked to me about work orders when they saw me at the engineering center. I also spent the summers of 1998 (observing managers) and 1999 (observing summer interns) at the engineering center. Work orders were occasionally topics for discussion during those sessions.

To achieve participant validation, I sent a copy of an earlier draft of this article to the three technicians, to the engineer/manager, and to the HR manager so that they could check and comment on my account and interpretations (see Blakeslee, Cole, & Confrey, 1996, for an argument in favor of such validation by participants). None saw anything inaccurate. Both engineers and technicians believed that work orders were important to work at AgriCorp and hoped that my research would offer some insight for improving them.
THE WORK OF TECHNICIANS AND THE HIERARCHICAL DIVISION OF LABOR

As an engineering design center, this AgriCorp facility valued theoretical, symbolic knowledge. As one engineer said, "We make two things at the engineering center: We make the drawing, and we make the specification." In other words, the engineering center does not make AgriCorp products itself; that function is performed by AgriCorp's assembly plants. Instead, the engineering center makes knowledge and symbolic representations of that knowledge. This abstract goal and the hierarchical division of labor through which it is accomplished made it hard to keep the technicians' more hands-on work in mind, an omission that was functional in maintaining the corporate hierarchy.

In AgriCorp, as in many technical workplaces, a portion of the work is carried out by technicians, skilled workers whose hands-on work is seen as supplementing the mental work of white-collar scientists, engineers, and managers. As is common in such workplaces, AgriCorp conceived of hands-on work and mental work as separate and hierarchical steps toward its goal (see Marvin, 1988, pp. 9-15, for a discussion of the cultural history of this hierarchy). The technicians' task is to turn material reality into data. In addition, technicians are also often responsible for taking care of the material entity itself and making sure that it is working correctly (Whalley & Barley, 1997, pp. 47-48). Because their part of the work is initiated and used by the engineers, it can be difficult to keep sight of their contribution. The data they generate is seen as belonging to the engineer, not the technician, or, as Barley and Orr (1997) put it, the technician's job is to "reduce material phenomena to information that becomes grist for the mill of another occupation" (p. 14).

Although engineers and technicians got along well at AgriCorp, both groups spoke of occasional problems that seemed to stem from the uneven distribution of power. One engineer, for instance, said that his audience in the shop was people "who can't read or refuse to read instructions." He also said that one technician consistently "bucked the system" and that the department in which this technician worked "prides itself on the number of supervisors they go through." From the other side, Rich said that newly hired engineers often did not know what they could expect from the technicians. He said, for instance, that they might not know there was a union shop and that there were work rules stating what the engineers could and could not do. He said that there had been a plan for new engineers to work in the shop for a few hours to get a sense of what technicians' work was like but that this plan had been resisted by the technicians, who were afraid the company might be planning to have the engineers do their jobs if there were a labor dispute.

The statuses of the engineers and technicians at AgriCorp were marked and thus enforced in a variety of ways. The engineers worked in carpeted cubicles, for instance, whereas the technicians worked in uncarpeted areas with cement floors. This particular contrast also had a practical reason, of course, in that carpeting would not have survived for long in the shop environment. Moreover, the engineers' workspaces were hardly luxurious; a carpeted cubicle is still a cubicle, lacking the walls and door that marked the spaces of their managers. More significant perhaps were the facts that the technicians' time was more regulated than that of the engineers (e.g., they took breaks whose beginning and ending were signaled by a buzzer) and that whereas engineers frequently entered the shop, technicians seldom went into the engineers' area. Both of these facts meant that the technicians' work was scrutinized not only by their supervisors but also by the engineers. In Foucault's (1979) terms, the engineers could exercise a governing gaze, whereas the technicians could not. In contrast, the technicians commented on the engineers' work only to one another (and to me).

The technicians' primary function was to generate data for the use of the engineers (Barley & Orr, 1997). For instance, the technician might run tests to determine if a new piston the engineer had designed would increase the amount of power the tractor provided. He or she would measure the power output of the tractor at various engine settings and communicate this data to the engineer by means of a written test report. At AgriCorp, test reports were almost always lists of numbers. In some test cells, technicians recorded data by hand; in most, they generated the lists of numbers by using the computer to take data at points the technicians preset. According to Gary, technicians had some choice on whether to use the computer, and some refused to do so because they believed that using the computer would mean they were less in control of their own work (cf. Zuboff, 1988, p. 63).

Although computer-generated data made some technicians feel they were less in control, such test reports reflect a creation of meaningful text that is less automatic than it might appear. For instance, when Gary used the computer to set up the tests in his cell, he chose from a menu of possible tests and entered various parameters, some
from the work order and some from his own knowledge. He not only had to set the computer to take the data, but he also had to be able to look at the data and tell if the various machines were working correctly. Thus, the technicians participated in generating order and meaning when they got the data onto the page. The technicians generated these reports, but the engineers did not see the technicians as authors of them. Rather, they saw the numbers as belonging to the engineer who had ordered the test and thus had used the work order to remotely control the technician. They saw these reports as authorless or perhaps as being generated by the equipment in the test cell, a category into which they sometimes placed the technicians as well as the machinery the technicians used. For example, on one occasion, I heard a group of engineers joking that the term by which test operators were called, an X13, not only “sounded like a device to measure with” but was a device to measure with. (See Winsor, 1998, for a more detailed description of these events. See Sullivan, 1997, for a comparable account of IRS clerical workers whose instruction manual treated their work as unrealistically mechanistic.)

Text is a particularly important tool in the process of creating and maintaining hierarchy because, as Latour (1987) points out, it creates an “immutable mobile” (p. 227) that can be used to keep a representation of reality constant while moving it into the control of centers of power. Indeed, the ability to use such immutable mobiles is one of the things that creates and defines a center of power. Being in a powerful position may allow one to use the knowledge someone else has generated, but being able to use knowledge that is one of the things that generates the powerful position. Thus, when a written report of technician-generated data is moved to the engineering offices, the engineers are able to use far more knowledge than they could have generated by themselves. As a tool, text is thus particularly good at allowing the technicians’ work to disappear into that of the engineers.

WORK ORDERS AS GENERIC TEXTUAL TOOLS

As a routine part of their work in the organizational hierarchy, then, technicians read and carried out work orders. These work orders constituted a genre; they were a typified textual response to a typified social situation. Their typification was indicated by the fact that they had a name. The name work order constituted a category into which varied texts could be fitted with almost no effort by anyone working at AgriCorp. The social situation they responded to was more complicated than it might at first appear. Work orders represent an intersection of several kinds of ordering: the organizational ordering enacted by hierarchy and a division of labor, the ordering of technicians’ actions, and the ordering of material objects in the laboratory that results. As this discussion will show, none of these orders is completely stable, and they do not always mesh easily with one another. Both technicians and engineers improvised constantly to make the desired order appear. Although the one-way flow of work orders suggests that the engineers created the final order, examination of the technicians’ work shows that their efforts also were necessary for order’s stabilization. In the long run, order grew out of the improvised efforts of everyone involved.

On the most obvious level, the purpose of the work orders was to establish the tasks of the technicians. Via work orders, engineers told the technicians to conduct a test in a certain way, for instance, or to replace a standard part on an engine with an experimental part. The one-way flow of work orders from engineers to technicians is an important but taken-for-granted tool that marks the technicians’ work as subsidiary to that of the engineers. I saw dozens of such orders during the time I spent in the shop. Figures 1 and 2 show sample orders, with Figure 1 showing an order for tests and Figure 2 showing one for an engine rebuild (I will point to these figures throughout the discussion below).

As Figures 1 and 2 show, test orders contain some repeated formal elements. At the top of the order, there was always orienting information: the date; the engineer’s name, mail code, and phone number; the account number to which the test would be billed; and the start and finish dates for the testing. Although these same items always occurred in work orders, their order varied rather freely, as can be seen by comparing Figures 1 and 2. This variability suggests that there was no companywide template for work orders, although departments may have had one and individuals certainly did. According to Gary, most engineers had previous work orders saved in their computers and used them as templates for generating new ones, a practice that was efficient but not unproblematic because the engineer sometimes overlooked changes that needed to be made to adapt an old order for a new purpose. In addition to the orienting information at

(text continues on p. 169)
TEST LAB SHOP ORDER

<table>
<thead>
<tr>
<th>Dept.</th>
<th>C</th>
</tr>
</thead>
<tbody>
<tr>
<td>Work Area</td>
<td>2AX10</td>
</tr>
<tr>
<td>Operator</td>
<td></td>
</tr>
<tr>
<td>Est. Start</td>
<td></td>
</tr>
<tr>
<td>Comp. Date</td>
<td></td>
</tr>
<tr>
<td>Order ID</td>
<td></td>
</tr>
<tr>
<td>Shop Use Only</td>
<td></td>
</tr>
</tbody>
</table>

Date 14 Sept 98
Engineer  
Mail  
Code 81J  
Phone  
Account  
Test  
Unit  
Parts Avail 14 Sept 98  
Due Date 28 Sept 98  
Initials  
Backup  
Backup Phone #  

cc:  

Subject: XXXXXXXX EMISSIONS CORRELATION TESTING

This engine will be used for baseline testing in our emissions test cells. It was tested at XXXX and will now be used to correlate emission test cells at XXXXX.

THIS ENGINE MUST NOT BE CHANGED IN ANY WAY THAT COULD AFFECT PERFORMANCE OR EMISSIONS. DO NOT MAKE ANY CHANGES TO THE FOCUS ECU. ENSURE FOCUS ECU REMAIN WITH THE ENGINE.

1. Instrument to measure:
   a. Dyno load  
   b. Engine speed  
   c. Fuel weight  
   d. Fuel time  
   e. Fuel inlet temperature  
   f. Fuel outlet temperature  
   g. Air meter outlet temperature  
   h. Oil sump temperature  
   i. Coolant inlet temperature  
   j. Coolant outlet temperature  
   k. Compressor discharge temperature OR  
   l. Intake manifold temperature  
   m. Turbine inlet temperature  
   n. Turbine outlet temperature  
   o. Blowby  
   p. Smoke  
   q. Oil pressure  

2. Use the ECU for all of this testing, droop 1 and torque curve A. Set dewpoint to 15°C for all tests.

3. Run a variable speed curve (2200 to 800 rpm) in 200 rpm increments. Confirm correct engine operation with writer. The following table shows some expected values for full load rated speed:

<table>
<thead>
<tr>
<th>Intercooler Outlet Temp: 65 ± 2°C (Need Automatic intercooler)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Intercooler pressure drop: 20 ± 2 kPa</td>
</tr>
<tr>
<td>Speed: 2200 rpm</td>
</tr>
<tr>
<td>Load: 867.7 ± 15 N·m</td>
</tr>
<tr>
<td>Power: 200 kW</td>
</tr>
<tr>
<td>Timing: 8.0 ± 0.5</td>
</tr>
<tr>
<td>BSFC: 204.4 ± 3 g/kWh/hr</td>
</tr>
<tr>
<td>Fuel Rate: 41.1 ± 0.8 kg/hr</td>
</tr>
</tbody>
</table>

4. Run 3 8-mode emission tests with particulates. (If control problems, run governor in MIN/MAX). Run mode 8 at the free idle speed, i.e. 800–5 rpm and no applied load on the engine. Peak torque speed 1400 rpm.

   Use these operating conditions:
     a. Air inlet temperature 25 ± 1°C
     b. Intercooler outlet temperature, FLRS 65 ± 1°C
     c. Coolant outlet temperature 92 ± 2°C
     d. Fuel inlet temperature 40 ± 1°C
     e. Air intake restriction 3 kPa @ full load, rated speed
     f. Exhaust outlet restriction 7.5 kPa @ full load, rated speed

5. Run 3 (sets of 3) Federal Smoke Tests using the Celesco smoke meter (ECU must be in ALL SPEED MODE). Record data using the strip chart. Set intake restriction to 6.2 kPa. Check with writer to determine whether additional FSC testing is required.

6. Do all other work required for completion of this order.

Figure 1. Work order for testing

Figure 1  Continued
TEST LAB SHOP ORDER

Dept: 029
Order ID:

<table>
<thead>
<tr>
<th>Work Area:</th>
<th>Date: 05 May 1998</th>
</tr>
</thead>
<tbody>
<tr>
<td>Operator:</td>
<td>Engineer:</td>
</tr>
<tr>
<td>Act. Start Date:</td>
<td>Mail Code:</td>
</tr>
<tr>
<td>Act. Comp. Date:</td>
<td>Phone # (Pager):</td>
</tr>
<tr>
<td>Shop Use Only</td>
<td>Account #:</td>
</tr>
<tr>
<td>Req Start Date: 05 May 1998</td>
<td>Test Unit #:</td>
</tr>
<tr>
<td>Req Comp. Date: 06 May 1998</td>
<td>Parts Avail.: now</td>
</tr>
</tbody>
</table>

CC:

SUBJECT: Replace Damaged Piston / Liner and Repair Engine as Needed

Engine XXXXXXX was running in the dyno cell prior to failure. Please do the following to get the engine back in test condition;

1. Place the engine in a rollover stand.

2. Remove all engine components and test equipment that will hamper the removal of the cylinder head.

3. Remove all of the pistons and replace with the part number listed below.

4. Do any work necessary to complete this shop order.

<table>
<thead>
<tr>
<th>Part Number</th>
<th>Qty.</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>XXXXXXX</td>
<td>4</td>
<td>Piston</td>
</tr>
<tr>
<td>XXXXXXX</td>
<td>1</td>
<td>Piston</td>
</tr>
<tr>
<td>XXXXXXX</td>
<td>5</td>
<td>Ring, Piston, Set</td>
</tr>
<tr>
<td>XXXXXXX</td>
<td>1</td>
<td>Gasket, Cylinder Head</td>
</tr>
<tr>
<td>XXXXXXX</td>
<td>2</td>
<td>Gasket, Exhaust Manifold</td>
</tr>
<tr>
<td>XXXXXXX</td>
<td>2</td>
<td>Gasket, Exhaust Manifold</td>
</tr>
<tr>
<td>XXXXXXX</td>
<td>3</td>
<td>Gasket, Intake Manifold</td>
</tr>
</tbody>
</table>

Approval:

Figure 2. Work order for equipment build

the top, common formal elements in work orders also included subject lines and numbered lists. Gary saw the subject line’s clarity and completeness as one of the factors making for a good work order, and the orders that I saw were usually arranged in numbered steps.

These common formal features, however, did not seem to me to be what marked these texts as a genre. Rather, their generic status flowed from the social action they repeatedly performed. They were always written by people in the engineering area to the technicians so as to set the tasks the technicians were supposed to accomplish. Everyone in the organization could recognize a work order from that social action even if the order were handwritten, say, or the instructions were bunched into a paragraph.

Work orders, then, are aimed at shaping the technicians’ actions and, by means of those actions, shaping the physical devices they work on so that data can be gathered. Although the written work orders initiate a situation in which certain work gets done, they do not determine that work by themselves. Rather, they are supplemented by a wide variety of material and social arrangements, including organizational and intellectual hierarchy, phone calls, engineers’ visits to the laboratory, the craft knowledge of the technicians, and other forms of writing, such as manuals, instruction sheets, marks on the machine parts, and Polaroid photos. Texts such as the work order interact with other factors to lead to work occurring. However, work orders seem to be the most visible and central representation of the process. Other factors are oriented around them and seem subsidiary to them. Their very visibility and permanence is what gives power to the account they give. In this sense, they function like the immutable mobiles Latour (1987, p. 227) describes.

The Process of Issuing Work Orders

Work orders are supposed to be issued in a particular, official way. This official way can and does change periodically, but during the summer of 1997 when I observed the laboratory technicians at Agri-Corp, the official story of how work orders should be issued went like this: The engineer wrote the order and sent two copies, one to the supervisor of the shop area in which the order would be carried out and one to the person who maintained the schedule of work in the shop. The supervisors and scheduler met once a week to prioritize the work and allot it to the various test cells, which were run by the
laboratory technicians. As a technician finished one job, he or she was supposed to call a supervisor who called the scheduler to get the next order on the list. Notice what this story of how work orders were issued implies: Because technicians were expected to take the next work order in the priority list, the official process implied that any technician could do any job, that they were interchangeable tools. In reality, this story of issuing work orders was a tidy fiction, a goal that people aimed to match but from which they departed when it interfered with their efforts to accomplish meaningful work. This story of issuing work orders was thus a site in which the order of hierarchy was maintained, but improvised effort from everyone was necessary to support that orderly appearance.

For instance, Gary took me to meet one of the engineers for whom he commonly conducted tests. This particular engineer said that he could send his work orders to the shop via computer. They would then go to Gary's supervisor, who would enter them in the normal scheduling process. However, this engineer preferred to print them out and hand carry them directly to the test cells so that he could talk to the technicians and explain exactly what he wanted. Thus, his orders arrived on Gary's desk outside of the normal scheduling procedure, and Gary had to backtrack to get them on the schedule. His preference suggests that he recognized the extent to which work orders needed to be supplemented to be effective. He did not entirely trust the text to serve as the sole representation of the technician's work, even though that is what work orders were officially supposed to do.

A similar departure from the official process occurred while I was observing Jim modifying an engine by installing an experimental part. The engineer who had written this particular order came into the shop to see how the work was progressing and to ask Jim if he could rebuild another engine when he was finished with the current one. In effect, the engineer was trying to jump to the top of the priority list. A priority list of work orders was actually sitting on Jim's desk, and needless to say, this engineer's request was not on it. When I asked Jim about the practice, he said that to avoid arguing with the engineer, he usually agreed to engineers' requests for special treatment but then did not always carry through on his agreement. In this case, he said he probably would do as the engineer had asked because he needed a piece of equipment that he would get by working on the next engine. Indeed, while I was there, he asked another technician who worked in a different area to prepare this second engine for Jim's work by removing a part. This technician joked, "One of these days we'll get an order so we know what's going on," and the technician who worked next to Jim joked back, "We don't need any orders." These technicians were improvising an order without the written orders.

In addition to jumping the priority list, engineers worked around the system by getting their work order onto the priority list and then adding to it once it reached the technicians. That is, the engineers held their place in the line with a minimal order and then elaborated on the task as they waited for it to rise to the top of the priority list. This practice is evident in the last sentence of Step 5 in Figure 1: "Check with writer to determine whether additional FSC [federal smoke tests using Celesco smoke meter] testing is required." The technicians minded this practice only because it could create problems for them with their supervisors. When the supervisor gave a work order to the technician, he or she would allow a certain number of hours for the job to be completed (coded into the work order format in the spaces for the start and completion dates shown at the top of Figures 1 and 2). The engineer's adding to the order would obviously lengthen the amount of time the order would take to complete, and the supervisor could criticize the technician because the task was not completed in the allotted time. Thus, in this situation, there was some tension between the various kinds of order that AgriCorp struggled to maintain. The organizational order within which the technicians worked called for them to provide the artifacts and data that the engineers needed but to do so within the time frame their supervisor allotted. The need to take the time to provide sufficient data to satisfy the engineer did not always fit easily with the need to follow the orders of their supervisors. In these situations, the engineers and technicians were cooperating so that knowledge could be created even when the organizational hierarchy did not command it and indeed, to some degree, forbade it. Because the official work order process did not allow this kind of improvisation, it was done somewhat surreptitiously, a fact that allowed technicians' initiative to remain hidden and thus helped to construct and justify the corporate hierarchy. The only visible representation of the technician's activity was the work order, a text that represented the engineer's instructions as controlling the work to be done.

Thus, the distribution of work orders sometimes happened in an improvised practice that existed under the orderly surface of the official work order process. The engineer-manager who coordinated between the laboratory and the engineers seemed undisturbed by
such unofficial practice so long as test cells did not sit idle and there were no undue delays in accomplishing work. He noted, for instance, that an engineer’s taking a work order directly to a technician might be a sign that an engineering group that shared a test cell had decided its own test priorities for itself and made a reasonable change in a preset schedule. He thought of his job as laboratory management rather than laboratory planning because the former term suggested the need for flexibility. He knew that the formal written rules for distributing work orders sometimes had to be ignored if work was to be accomplished.

Although it may seem unremarkable to anyone who works in an organization that the surface orderliness of rules must sometimes be violated for a larger order to be created, the shoring up of order by informal means shows the unstable and largely unexamined nature of order. Especially in a complex organization, order is seldom unitary. Many orders exist simultaneously in a more or less harmonious relationship. When knowledge-creating work was being done in the AgriCorp labs, the ordering that led to knowledge seemed to be given priority over the organizational order of rules. Despite the frequency with which it occurred, however, informal working around was always treated as extraordinary, as a departure from order rather than a maintenance of it. Thus, corporate hierarchy was preserved even as knowledge was made outside it. Work orders served as an orderly surface representation of a whole array of improvised activity.

Supplementing the Written Work Order

The work orders, then, were meant to trigger work, but the relationship between work orders and the resulting work was not straightforward. To some degree, the engineers seemed to believe that following work orders should be unproblematic if the order were clearly written and the technician were competent. For instance, one of the engineers told me that he tried to write work orders in what he called a cookbook style because that way he could get the work done as he wished. In other words, the engineers sometimes seemed to think of the technicians as passive tools that the work orders should be able to activate. As we will see, there are problems with this way of viewing the laboratory technicians and their work.

In a discussion of the work involved in following instructions, Amerine and Bilmes (1990) state,

Successfully following instructions can be described as constructing a course of action such that, having done this course of action, the instructions will serve as a descriptive account of what has been done, as well as provide a basis for describing the consequences of such action. (p. 326)

In other words, people following the instructions do a great deal of creative and interpretive work to accomplish the actions that the instructions called for. They must, for instance, know how to read between the lines of the instructions and do what is expected but not spelled out. They must know what is essential in the instructions and what may be modified if necessary to accomplish the same goal. They must be able to recognize when a step has been successfully completed. In the case of the laboratory technicians, they also had to be able to judge when the data they were generating were valid (as is evident in the second sentence of Step 3 in Figure 1: “Confirm correct engine operation with writer”). However, once the actions are accomplished, that creative work fades from view and only the instructions remain. The course of action then looks like the instructions controlled it from the start, and the actor looks passive. Thus, as a genre, the work order both triggered and concealed technicians’ work.

Indeed, the fiction of the stand-alone work order concealed necessary work by the engineers as well. The written work orders had to be supplemented and supported by efforts from everyone who was oriented around the work order and disappeared into it. For instance, although engineers could talk about the desirability of making the orders complete, in practice completeness was impossible because the writer could not anticipate all contingencies. The engineers’ desire to talk to the technicians shows one supplement that all said was vital. Everyone I talked to about the process of following work orders said that the technicians and the engineers needed to be able to talk to one another, sometimes face to face and more often by telephone. The expectation of such communication is evident in Steps 3 and 5 of Figure 1. Face-to-face communication normally took place when the engineer visited the shop. Such communication was important because it allowed engineers and technicians to build a working relationship, something both Rich and Gary told me was important. Moreover, being together in the shop allowed the engineer and technician to look together at the engines, test stands, and parts they were working with. Such examination is particularly useful in an engineering development center because nonstandard parts and configur-
instructions that came with the parts. I also saw both him and Rich look away from work orders to consult Polaroid pictures they had taken of parts they had built previously so that they could duplicate work they had done before. Rich also told me that when work orders gave what he considered to be very minimal diagrams for building an electronic part, he made up his own charts and tables to follow. He did not mind doing this because he knew that the engineers “had engineering to do” and that he could do the charts for himself.

As Rich’s constructing charts suggests, in addition to supplementing their work orders by visiting the mechanics or phoning them, the engineers were able to rely on the technicians’ expertise in familiar situations to enable them to shorten their own writing task. They did not have to spell out every action because the technicians would already know what to do in standard situations. Indeed, the engineers had to rely on the technicians whether they wanted to or not because they could not anticipate contingencies such as missing parts (or, as happened in one instance I saw, a nest of wasps in an engine) and so had to rely on the technicians to order these unexpected events. Thus, almost all work orders contain a line such as those in Step 6 of Figure 1 and Step 4 of Figure 2: “Do all other work required for completion of this order” or “Perform any additional work to complete” or (my favorite) “Please try to anticipate any future problems with this project.” One technician who was not in the study told me that he had never read a shop order that actually told him what to do. He said that they all read “do as needed.” In one way, these sentences reveal the tension between engineers and the technicians in that the engineers saw these sentences as defensive; they believed that if they did not have such a line in an order, technicians might refuse to do anything that was not specified. But these sentences also reveal a great deal of reliance on the capabilities of the technician and do not at all reflect a cookbook notion of their work. As Jim said, “They assume we know a lot.” The technicians told me they minded this only because they did not get credit for the extra work time such a sentence might involve. As Shapin (1989) noted was the case for Boyle’s laboratory assistants, they also did not always get credit in the official recognition of how work is done.

Even in small ways, the laboratory technicians I observed had to supplement the information in work orders. For instance, when Gary showed me what he said was a typical work order, he pointed out areas that he saw as potential problems. For example, the order called for a wet/dry test to be done. Gary told me that this test was no longer
done but had been replaced by readings done on a dew point meter. The engine number on the work order did not match the one taped to the engine in Gary's test cell or the one engraved on it, which also did not match one another, but Gary said he knew this was the engine to be used because he had had it in his cell for a long time. The brand-name pump mentioned in the subject line of the order was different from the brand name mentioned in the order's first line, a variation Gary attributed to the engineer's using a previous work order as a template for this one and failing to change the first line. Gary assumed that the pump mentioned in the subject line was the correct one, but he phoned the engineer to make certain. Thus, even this relatively good work order required effort from Gary to make it effective. He said that some technicians followed the work order "to a T" but that he had been around long enough to know that this was not always the right thing to do. "If you do everything on that order just the way it's written down, chances are something won't work out. They can't foresee all the problems you might have."

So the written script of a work order is a kind of fiction describing a simple, logical sequence of actions that the engineer chooses and the technician follows. In reality, however, orders are not simple things. Rather, to be effective, they must be supported by a whole system that includes oral interaction, further texts, and the technicians' expertise. It is only after the work has been accomplished that these supports are forgotten and the work order seems to stand alone as the description and cause of the action. At that point, much of the knowledge-generating work that is unique to the technicians vanishes, and only the engineer's planning seems to remain. Thus, it was common for engineers to talk about shop work in ways that appropriated it to themselves in quite natural ways. "I didn't change those return springs when I lowered that pressure," said one at a meeting, meaning that he had not asked the technician to change the springs when the technician made the adjustments necessary to lower pressure. "I need to remove some teeth from a gear," said another as he wrote a work order for a technician to do just that. And a third engineer asked a coworker, "On the traces you ran ... did you have anything plugged into the pilot valve?" The traces were, of course, run by a technician who would have set up the pilot valve. The engineers' language treated the technicians' actions as belonging to the engineer even though he or she was not the one who physically performed them. This ownership was established by means of the description of work appearing in the work order.

Thus, despite their status as semi-tools, the technicians actively participated in the creation of the social system in which they worked. They built and tested the devices designed by the engineers. They cooperated in working around the rules for how work orders were to be distributed without openly challenging those rules. They contributed their expertise to carrying out work orders, and in the part of this process they were least happy with, they allowed their contributions to be seen simply as following the engineers' instructions so that credit for their work often rested with the engineer who wrote the work order. Thus, in their large and small daily activities, they helped to create and maintain the organization of the AgriCorp engineering center and to see that its work was accomplished amid the contingencies of everyday life.

TECHNICIANS' TEXTS AND DEFINITIONS OF GENRE

Work orders, then, were texts that ordered and defined joint activity across discontinuities within the engineering center. In contrast, within their own workspaces, the technicians also produced texts that affected the shape of this organization, but the effect of these texts was confined to the laboratory. Because the technicians' attempts at textual ordering were mainly confined to their own work and work spaces, they were largely carried out without interference but also without support from above. Their texts were less visible than work orders within the overall organizational activity and less the focus of organizational attention. As a consequence, the organization was less aware of the technicians' literate activity than it was of the engineers'. Moreover, the limited visibility of the technicians' texts meant that the organization did not perceive them as generic, a category that is more political than commonly acknowledged in theoretical discussions about genre, which tend to treat it as a rather neutral concept (Berkenkotter & Huckin, 1995; Miller, 1984).

In the lab, technicians used writing to order their own activity. For instance, all the technicians made notes to themselves as they worked to shape their own actions. These notes could be as simple as check marks next to steps they had completed or as complex as the wiring diagrams that Rich generated for his own use. Rich also put up numerous signs to help himself maintain order among the hundreds of parts he maintained in inventory. Thus, he labeled everything from
shelves and baskets of parts to individual wires in the parts he created. He also used signs to try to shape the actions of others who were in and out of his area all day delivering or picking up parts. For example, he marked one area as the "setdown area" where a particular vendor was to leave deliveries. A sign taped to his desk read, "There's nothing here that belongs to you, so leave it all here!"—a warning he said was necessary because passersby did not always distinguish between parts that were in inventory and could be borrowed and the possessions on Rich's desk. Another sign over a rack containing spools of wire read,

If you are not intelligent enough to remove and replace the rubber bands that hold the wire from unwinding—or you have a handicap that prevents you from replacing wire spools when they are empty—then you shouldn't be using wire from this rack! Thank you.

Rich told me that this last sign was new, as was evidenced by the fact that no one had yet attached any notes responding to his obvious annoyance. He told me that people were actually quite responsive to these signs. For instance, he had taped a sign on a countertop asking people to put returned parts away rather than pile them on the counter and had not had an accumulation of parts on the counter since then.

One of the characteristics of these technician-generated texts is that within AgriCorp, they were perceived as more improvised and idiosyncratic than work orders. It would certainly be possible to demonstrate that there were also idiosyncratic features in work orders generated by different engineers, but no one in AgriCorp would say that in writing a work order, an individual engineer spontaneously created a textual form in response to a unique problem. That is, work orders were perceived as generic, as texts whose form was shaped by the organization as a whole and behind which the authority of the organization lay.

In contrast, the texts that the technicians created were seen as shaped by individuals. Rich's signs, for instance, were very much seen as his, which was why his fellow technicians enjoyed attaching provocative notes to his written warnings (a kind of activity that is inconceivable in response to work orders). Thus, it is possible to claim that the texts produced by technicians were less generic than were the work orders. At AgriCorp, the technicians' texts were confined to the lab and did not circulate widely. Moreover, the work they accomplished through those texts was made largely invisible in the way the dominant genre of work orders was understood to function. Thus, one could understand Rich's cautionary signs as part of an organizational genre. Indeed, they did echo a company practice of using signs to order space and action. The floors in the hallways, for instance, were painted with lines that indicated where one could safely walk, and doors were marked with warnings that hearing protection should be worn beyond a certain point or that only authorized people could enter. But Rich's texts were not seen as part of the same family. Rather, they were seen as originating with him individually and as therefore lacking the power that comes from institutional backing. The nongeneric status of technicians' texts suggests the corporate invisibility of their literary activity, whether it be writing signs or reading and interpreting work orders. Thus, it reflects and perpetuates the way their work disappears into the corporate effort and, consequently, reflects and perpetuates the hierarchical order of the Agri-Corp engineering center.

CONCLUSION

What, then, is the relationship I am describing between text, genre, and the creation of a political order? If AgriCorp work orders are not idiosyncratic, then some texts in organizations are tools around which activity and the way the activity is understood can be oriented. Such texts are highly likely to have generic status within the organization. They work invisibly through what people perceive as approved genres to make work and literary visible or invisible. That is, power relations and perceptions of work lead to and from perceptions of genre. Such texts can draw together the work of discontinuous areas in an organization. They can also shape the form in which that drawing together is accounted for and understood. In the case of work orders, texts shape technicians' actions, but the technicians ultimately control their own activity and the contribution it makes to making meaning in the engineering center. Read retroactively, however, work orders give the appearance of control; thus, they also shape participants' sense of the relationship of the work of the engineer to the work of the technician. Moreover, because texts such as the work order are generic, they encourage the perception and enactment of a consistent order and discourage looking at activity in different ways. They help
the social system's participants to see it as ordered in a certain way, and participants then act in accordance with the order they perceive. That is, these texts do political work.

This political nature of genre is implied in studies such as Schryer's (1993), in which inhabitants of a veterinary college privileged either the scientific research article or the veterinary medical records system. The status of the genres and the status of the genres' users were plainly intertwined. Similarly, Sauer's (1998) descriptions of how officials ignored some testimony about potential dangers in a coal mine allow us to see how the ignored testimony did not fit into an identifiable genre, a fact that in turn reflected the low political status of those giving the testimony. We know that genre is a form of social action. As a field, however, we have not always paid sufficient attention to the fact that this necessarily means that genre is also a form of political action.

We might be tempted to judge the system I have described as a pernicious one. However, I do not believe that all exercises of power are pernicious. Power is a way to make things happen. It can be productive. But in hierarchical companies such as AgriCorp, power is never evenly distributed. The uneven distribution of power is not due to heroic accomplishments that result in merited differences. Rather, it is accomplished in the systemic use of sociotechnical means, including generic texts such as work orders that ordinarily slip unnoticed beneath the surface of everyday life. This study suggests that power is constructed in the trivialities of everyday life that are so taken for granted as to be transparent to us. If we wait for big events to come along, we will miss how ordinary life happens. We will not be able to see how the technicians' work becomes folded into the engineers' work and how the engineers' work becomes folded into that of management so that, in the end, what we have is a product credited to AgriCorp and not to any individual employee. We will also fail to see how managers are given greater credit and reward for the product, as they are also given greater responsibility and blame when things fail. These conditions will seem natural to us rather than as the accomplishments they are.

As this study suggests, writing is, among other things, an important means of creating and maintaining a social system's order. The access to text production that people have is thus important to their participation in shaping their world. Genre theory tells us that workplace literacy is more than a matter of knowing how to read and generate grammatical prose. A successful writer must also be able to read the typified social situations that indicate which kinds of text are appropriate. This individualized notion of literacy is not enough, however. In the workplace, writers function within organizations that value some work more than other and that increase or lessen the likelihood that they will produce texts that others will heed. As Bazerman (1997) points out,

The subordination and division of laboratory labors as well as the participation of individuals in the aggregation and distribution of collective work are realized through the discursive spaces each member of the collective can come to inhabit, in negotiative dialectic with other members of the collective. (p. 304)

The organization of a social system constitutes some tools and not others as useful and enables some actors and not others to use them (Hull, 1997, 1999). Textual genres are among the tools that are so constituted and made available. Literacy is a complex system in which an individual writer fits into an ecology from which he or she can draw strength (or not) and on which he or she can have an effect (or none). The social systems in which blue-collar workers function may be one of the factors that leads to their being considered less literate than are white-collar workers, because opportunities for and definitions of literacy reflect the work of the dominant group. As a textual tool used to accomplish work, genre is a profoundly political force.

NOTES

1. I use pseudonyms throughout this article.
2. The amount of time I spent observing resulted from a variety of factors, almost all of which were practical rather than theoretical. AgriCorp was willing to have me on site for only limited periods so that I did not disrupt work in process. At the same time, the observations I was making required intense attention to everything I saw and heard around me, and I found it difficult to sustain this attention for stretches of longer than 2 or 3 hours. I varied the days of the week and times of the day I observed because work weeks often have a pattern that varies from day to day. I believe that three 2-hour observations of each mechanic and engineer gave me a good sense of their routine working life because, by the third observation, I found that I was familiar with most of what happened. If I had been able to observe longer, I would probably have seen exceptional events and changes in routine, but research in the workplace is almost always limited by the kind of practical features I mention here. As researchers, we need to learn to work around these limitations to the extent we can and hope that other studies compensate for the limitations of ours.
3. In January of 1999, I gave a presentation to AgriCorp managers about the study’s findings to date. In this presentation, I encouraged a greater recognition of the flexible nature of instructions and of the mechanics’ contributions to completing work orders. The handout I used at this presentation was later distributed throughout the engineering offices. I do not know what, if any, impact this presentation had, but the manager who arranged it asked if I would be willing to give further presentations about my work, suggesting that he at least found it useful.

4. Interestingly, differences in income were not clear markers of the relative statuses of the technicians and engineers. The technicians’ base salary was approximately $47,000 per year plus benefits and overtime. In many ways, AgriCorp valued these workers highly.

5. At least one of the technicians explicitly connected the visual observation of someone else’s work with its regulation. He told me that if he were as rich as Bill Gates, he might "hang around and annoy" his boss by sitting in the cafeteria and "gazing at him when the break buzzer rings.”

6. Although work orders always originated in the engineering area, they were not always written by engineers. While I was at AgriCorp, one engineering area used a co-op student to write some of its work orders, and another used a retired technician who had been hired back in the engineering area to serve as a liaison with the lab. This variability in writers suggests the degree to which work orders’ authority came from the social roles the engineering and lab areas played in the organization rather than from the education or personal authority of the writer.

7. Technicians worked for some engineers more often than others because the technicians usually worked in the same test cell and that test cell had a certain line of the company’s products in it. Thus, the engineers working on that product wrote orders for the same technicians repeatedly.

REFERENCES


Taking a social constructionist point of view and drawing on the work in cognitive psychology on situated cognition and expert performances, this study reports on a segment of an ethnography of writing in a workplace setting that reveals the interconnections of discourse community goals, writers' roles, and the socialization process for writers new to a given discourse community. Specifically, the data reveal 15 different writing roles assumed by members of the discourse community that depict a continuum from novice to expert writing behaviors. Writing roles were defined in relation to both the importance to community goals of the text to be written and to the amount of context-specific writing knowledge required to accomplish the task. The study applies the notion of legitimate peripheral participation in a discourse community and creates a framework for conceptualizing a social apprenticeship in writing either in school or nonschool settings.

Learning the Trade

A Social Apprenticeship Model for Gaining Writing Expertise

ANNE BEAUFORT
American University

In recent years, expressivist, social constructivist, social constructionist, and cultural studies approaches to theorizing and research in composition studies have generated interest in how the writer's relationship to the larger community or culture affects learning. In addition to focusing on the writer's inner process, expressivists stress the importance of eliciting reader feedback during the composing process (Elbow, 1981; Macrorie, 1985). Social constructivist researchers (Flower, 1994; Nystrand, 1990; Prior, 1994; Sperling, 1990), drawing on theories that highlight dialogic aspects of communication and learning (Bakhtin, 1986; Vygotsky, 1978), look at particular interactive

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