Theory Sequences
in a Problem-Based Learning Group:
A Case Study

Phillip J. Glenn[1], Timothy Koschmann[2], and Melinda Conlee[2]

[1] Department of Speech Communication, Southern Illinois University at Carbondale
[2] Cognitive Science Division, Department of Medical Education,
Southern Illinois University School of Medicine at Springfield

Abstract

Problem-Based Learning (PBL) fosters the development of reasoning strategies via interactive, social processes. The act of theorizing is a component of reasoning being developed in PBL settings. This conversation analytic study investigates the social construction of theorizing in a discussion which takes place in a PBL setting with medical students. Specifically, we describe one instance of theorizing, including theory presentation, treatment, and subsequent ratification by the group. This study holds implications for understandings reasoning as an interactive process.

Keywords — social construction of theorizing, conversation analysis.

1. Introduction

Problem-based learning (PBL) is a collaborative, case-based, and student-centered method of instruction (Koschmann, Myers, Feltovich, & Barrows, 1994; Williams, 1992). In a problem-based curriculum, authentic problems drawn from clinical practice serve as the stimulus for learning (Barrows, 1994). The method begins with presentation of a problem to a group of students (usually six to eight is considered optimal) and a faculty facilitator known as the "coach" (Koschmann et al., 1994). In a setting unaugmented with technology, the group records their deliberations on a whiteboard provided for the purpose. The students, relying on their pertinent prior knowledge, attempt to analyze the problem and to identify areas for further individual study. When the group recesses, the students proceed to identify and utilize resources—person, print and electronic—which provide the additional knowledge necessary for understanding and managing the patient problem.

Our ongoing conversation analytic (see Atkinson & Heritage, 1984) research project involves focusing upon how theories are developed, supported and appraised in PBL groups. The basis for this study was a series of videotapes done following one group of second-year medical students through their deliberations with respect to a single case (i.e., an elderly male patient complaining of problems with his memory, difficulties in "expressing himself", and transient clumsiness of his right leg).

The PBL group participants organize their meetings at least in part around the presentation of a theory plus talk orienting to that theory. Once presented, a theory sets the agenda for subsequent talk in which group members may evaluate, modify, accept, or reject the theory. They accompish these actions by asking questions, fitting evidence and reasoning to theory, producing alternative theories or accounts for data, and assessing ideas. The presentation of and responses to one theory is described below.

2. Presentation of Theory, Evidence and Reasoning: "My Theory"

The second meeting of this pbl group began with reports from the members about what each had found since their last meeting. The coach asked one of the members to summarize the case. Following this summary, the group discussed types of aphasia. At the moment where our analysis begins, the Coach provides a formulation from preceding talk of some symptoms and a conclusion (See Appendix for explanation of transcription symbols):

| Coach: | So he's got speech involvement 'n right leg involvement. |
| Maria: | ( ) |

```
                    [
Coach:                    So-  So whatever his
          problem issh (.) we're pretty
          confident it's on the left side
```

One of the students, Betty, now introduces information from a book lying in front of her:

```
Betty:    See, what it said in here, in-
```

The imperative "See" brings the attention of the other group members to Betty. "What it said in here" further places that focus on the book to which she refers.

Having thus displayed that she is about to present some information, Betty now abandons that course to announce a "theory":

```
Betty:    See, what it said in here, in- m y
          theory (1.2) about this amnesic
          (.) dysnomic aphasia?
```

The possessive pronoun marks the theory as hers individually; it may also make relevant the possibility of the others presenting their own theories. As such it frames theory presentation as an individual action rather than a group action.

Betty has now prefaced two actions, each of which could warrant an extended turn at talk: presenting information from a book and offering a theory. The prepositional phrase "about this (1.2) amnesiac dysnomic aphasia," neatly unifies the two actions, for it provides a grammatically-logical referent for both what is in the book and for the theory:

```
((edited, simplified reconstruction))
Betty:    What it says in here . . . about this
          amnesic dysnomic aphasia
Betty:    My theory . . . about this amnesic
          dysnomic aphasia
```

Although syntactically the prepositional phrase stands closest to the "theory" she also links it to "What it says in here" by looking down at the book in front of her, apparently reading the phrase "amnesic dysnomic aphasia." The linkage of the two prefaces perhaps cues the listeners to treat the two actions as connected, such that the information she is providing stands in support of an about-to-be-presented theory. Betty quotes some from the text, then breaks off quoting to indicate that Maria (one of the other students) too had suggested what this book apparently now confirms (see **boldface** text below).

```
Betty:    my theory (1.2)     about this
                          [   [
Coach:                    °mph •hh°
Betty:    amnesic (.) dysnomic aphasia?
          (1.0) um it says the cause of le-
          sion is usually deep in temporal
          lobe
          just like Maria was saying
          Presumably interrupting con-
          nections of sensory speech areas
          with the hippocampal and
          parahippocampal regions (1.0)
          and I think the hippocampus is
          like a lot more medial.
          So if it was affected in that area it
          might be the anterior cerebral
          circulation.
```

The allusion to what Maria was saying acknowledges that Maria was correct; it also adds Maria's voice to the book's in support of Betty.

Betty quotes more from the book, about consequences of a lesion in the temporal lobe. She stops reading and there is a one second pause. Others remain silent; this may reflect their orientation to the dual-action structure (reading and presenting a theory), and the fact that she has not yet actually offered a "theory." Betty looks up, displaying that she has stopped reading, and via "I think" she marks what is to follow as tentative. This next statement concerns the location in the brain of the hippocampus, posited as a spatial comparison ("a lot more medial"). She presents her reasoning leading to the conclusion (that is, the "theory") that anterior cerebral circulation is the source of the problem for this patient.

3. Response to Theory: Implicit Endorsement

Betty has now presented evidence and reasoning leading to a concluding theory. How do the others treat this theory? As Betty nears completion of her turn, Norman says the word "anterior" in unison with her. This bit of overlapping speech occurs at what elsewhere has been described as a recognition point, an earliest possible moment at which a co-participant may show understanding and ability to anticipate the substance of utterance completion (see Jefferson, 1973, 58-59).

```
Betty:    So if it was affected in that area
          it might be the a n t e r i o r
          cerebral
```

[

Norman: **Anterior.**

Betty: circulation.

Norman thereby can show that, given Betty's reasoning, he too arrives--independently--at the same conclusion. Perhaps this collaborative completion may also serve as a way to demonstrate alignment, if not outright agreement, with her theory.

At this point the Coach leads the group into a discussion (not shown in this paper) devoted to having the students identify the hippocampus on a flip chart showing various views of the brain. Following this, Betty presents a _second_ theory (not shown). In contrast to the first one, this second one gets no support from any other group members; in fact, it draws critical questions and possibly disaffiliative laughter (not shown). Maria and Norman list symptoms which "you would expect" if the second theory were true. Betty then concludes in favor of the first theory, which invoked cirulation problems to account for the symptoms:

Maria: Headaches, you would expect=

Norman: =You would expect headaches=

Betty: =°Yeah, maybe°=

Maria: =Seizures.

(?)   °Mm hm°

Betty: **Um- (0.7) It's more likely to be vascular.**

Coach legitimizes this conclusion as valid by his subsequent actions. His "okay" moves them on to next matters (see Beach, 1993), and he asks a question which presumes "vascular" to be at least plausible enough to provide a basis for further theory construction:

Betty: Um- (0.7) It's more likely to be vascular.

             (2.4)

Coach: °Okay°

             [

Maria: °With his history and social°

Coach: **So so**

             So if it's vascular did he have a +stroke or is he having a TIA. What is the difference between those two things anyway?

The participants have entertained two theories, rejected the second, and, if not outright endorsing the first, at least accepted it enough to use it as a basis for further questioning and theory construction. As our analysis concludes, the group seems to be pursuing the notion that this patient's problem involves a vascular lesion.

4. Discussion

In this paper we have described some organizing features of talk in one portion of a pbl group meeting. Specifically, we suggest that participants orient to the presentation of theories as a central activity. One student presents a theory and supports it with evidence and reasoning; another student displays concurrence with her reasoning. The coach then initiates discussion devoted to clarifying information relevant to the theory (not shown here). Upon completion of this clarifying task, the same student who presented the first theory presents a second theory posed as alternative to the first (not shown). This second theory gets no support from other participants, who respond with possibly -disaffiliative laughter and with critical questions (not shown). The presenter herself concludes that the first is valid. The coach uses this theory, implicitly "accepted" for the moment, as a basis for a subsequent question which leads to presentation of additional information.

Several observations seem relevant here. First, while presenting a theory may be an individual task, the "processing" of any theory (including such actions as agreeing, disagreeing, questioning, modifying, etc.) is thoroughly interactional. Second, the presentation and treatment of theories seems to be one major organizing principle in this interaction, but it is not the only one. Third, in this excerpt, both theory presentations and turns at talk are differentially distributed and such distributions provide ways to create, maintain, and modify social interactional roles such as leader, follower, critic, etc., within a group setting. Fourth, the coach intervenes at particular moments and guides the group work in particular ways. This type of activity could serve as data for future analyses. Finally, in consideration of the preceding point, this interaction involves at least two organizing frameworks or sequential contexts. One is group problem-solving or decision-making. The other is instructional, teacher-student interaction. How they make one or the other framework relevant at particular moments provides an interesting question for further exploration.

References

Atkinson, J. M., & Heritage, J. (1984). Structures of social action: Studies in conversation analysis. Cambridge: Cambridge University Press.

Barrows, H.S. (1994). *Practice-based learning: Problem-based learning applied to medical education.* Springfield, IL: Southern Illinois University School of Medicine.

Beach, W. A. (1993). Transitional regularities for 'casual' "Okay" usages. Journal of Pragmatics, 19, 325-252.

Jefferson, G. (1973). A case of precision timing in ordinary conversation: Overlapped tag-positioned address terms in closing sequences. Semiotica, 9, 47-96

Koschmann, T., Myers, A., Feltovich, P., and Barrows, H. (1994). Using technology to assist in realizing effective learning and instruction: A principled approach to the use of computers in collaborative learning. *Journal of the Learning Sciences 3,* 227–264.

Williams, S. (1992). Putting case-based instruction into context: Examples from legal, business, and medical education. *Journal of the Learning Sciences, 2,* 367–427.

Authors' Addresses

Phillip J. Glenn: Department of Speech Communication, Southern Illinois University at Carbondale, Carbondale, Illinois, 62901, (618) 453-2291, PJGLENN@SIU.EDU; *Timothy Koschmann and Melinda Conlee*: Cognitive Science Division, Department of Medical Education, Southern Illinois University School of Medicine, Springfield, Illinois, 62794-9230, {tkoschmann, mconlee}@siumed.edu.