Understanding Beliefs, Identity, Conceptions, and Motivations from A Discursive Psychology Perspective

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In science education, psychological (rather than sociological) frameworks play central roles in guiding investigators to theorize and conduct their research objects. For instance, Jean Piaget's theory of cognitive development has been used for decades to understand the benefits of hands-on learning, Benjamin Bloom's taxonomy still is used to articulate behavioral objectives and learning outcomes, and Ernst von Glasersfeld's radical constructivism still contributes widely to science educators' understanding of learning. Recent developments in the social sciences have allowed a form of (social) psychology to emerge that takes a different avenue to understanding psychological phenomena

including cognition, affect, beliefs, identity, conceptions, and motivations: discursive psychology. The purpose of this chapter is to articulate and exemplify this theoretical framework relatively new to and not yet widely used in science education.

Only a decade ago, Harold Garfinkel (1996) asked the thought provoking question, "What more [is there to social scientific research]?" His "what more?" did not concern more of the same type of *formal analysis,* almost all of the existing quantitative and qualitative methods, but a recognition and utilization of the *methods* of analysis that people (*ethno-*) themselves deploy to realize everyday, immortal society in general and science classes in particular. Discursive psychology is one such alternative that provides science educators an additional framework for understanding science teaching and learning. In the following section, we begin by introducing discursive psychology, concretely (practically) demonstrating its method of analyzing talk in science-related contexts. We then move on to suggest how present science educators may use the tool to generate new insights about beliefs, identity, conceptions, interest, and motivation in and for science education. We both propose and advocate discursive psychology as a rigorous tool (theory and method) that offers new possibilities to science educators for taking their research into new directions.

ANALYZING INTERVIEW DATA FROM A DISCURSIVE PSYCHOLOGY PERSPECTIVE

Following Piaget's pioneering studies in developmental psychology, researchers examined children's cognitive development through careful experiments and interviews. In such research, children's understandings of the world have been taken to be coherent, internal cognitive representations (Edwards 1993). In experimental manipulations, language has been treated as an apparently neutral means for getting at the presupposed underlying cognitive states. Edwards suggests that such researchers are taking language to be a window through which one can look at the thoughts in and of peoples' minds. In

the mean time, psychologists also traditionally attempted to produce a psychology of people trying their best, in a disinterested and non-contingent manner, to recall information from memory, articulate beliefs and attitudes, give researchers access to their identities, and so on. But, one might ask, how do psychologists come to talk (know) about the mind (memory, beliefs, attitudes) of people?

Psychologists often claim that they use scientific experiments to accurately "detect" entities (e.g., intelligence, attitude) *out there* in people's minds as if they are scientists to "discover" and "invent" names to label objects *out there* in the natural world. But actually "psychologists did not invent the concept of *emotion*, for example, to account for certain empirical findings; they obtained certain empirical findings because of their desire to investigate a set of events which their *culture* had taught them to distinguish as *emotional*" (Danziger 1997, p. 5–6). That is, psychologists often overlook cultural resources such as language and transform *their* empirical findings directly into psychological categories as stable entities in people's minds without incorporating how psychologists themselves (as human beings in general) learn these psychological topics in the first place—by talking psychological topics with others. As researchers we do not have to assume in the contents of others' minds to understand these psychological topics but rather, we can follow people in relevant contexts to investigate how they use culture resources—language itself for talking about psychological topics. This, then, is the theoretical and methodical starting point and ground for discursive psychology: how, when, where, and why does everyday talk mobilize psychological concepts (memory, cognition, attitudes, affect, beliefs, identity, conception, and motivation)? Discursive psychology thereby has taken psychology into a radically different direction because it understands the role of language in human endeavors very differently (Edwards and Potter 1992). The approach evolved from Ludwig Wittgenstein's (1958) later philosophy on language as a set of games people play, ethnomethodology (e.g., Garfinkel 1967), rhetoric (e.g., Billig 1985), sociology of science (e.g., Gilbert and Mulkay 1984),

conversation analysis (e.g., Atkinson and Heritage 1984), and discourse analysis (e.g., Potter and Wetherell 1987). Interested in the role language plays in participating and learning in human societal activities, discursive psychology constitutes an approach for studying the phenomena psychological concepts in the way interaction participants use them to manage public affairs with stakes or interests in discourses.

Analyzing Interviews: Finding Underlying Beliefs and Attitudes

To provide practical illustration of the unique characteristics of discourse analysis, we begin with a demonstration of how discursive psychologists analyze interview transcripts (i.e., a form of data sources that science education researchers commonly use). The following interview fragment was partaken from a series of interviews conducted to understand the discourses about future careers drawn on and realized by high school biology students. The fragment is part of an episode where the interviewer asked the student Claire to talk about her preferred career interest: becoming a doctor. Before the fragment, Claire already articulated that she used to follow a doctor around in a hospital; this experience mediated her interest in becoming a doctor in the future. The fragment begins when the interviewer asks the student further questions.[1]

```
01  I:  so you know more?
02  C:  yeah.
03  I:  and now you like it more? ((laughs))
04  C:  i like it a little more, like last year i did not like it
05  I:  oh: REALLY, WHY?
06  C:  i don:t know, because (1.58) i think i was watching like
        (0.95) some shows on how hard it is, right?
07  I:  mm, for example? what kind of situation you [don:t like]
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08  C:                                                      [just just ]
        schooling, seems to pretty:
09  I:  oh:: i see (.) you have to take a lot of [courses ]
10  C:                                            [a lot of]
        courses (.) and i don:t know if i can handle that though
        (.) because my cousin tried taking some of the courses
        but he (.) it was too much for him (.) so::
11  I:  um:: so he give up?
12  C:  yeah he give up
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In this fragment, Claire articulates that although being a doctor is one of her preferred careers she still has some concerns about this occupation including issues of "schooling" (turn 08) and "[taking] a lot of courses" (turn 10). In traditional studies of students' science interests and motivations, it would not be uncommon to see such data being used to make attributions to Claire. In the episode, for instance, researchers might ask "*why* does Claire have these concerns about being a doctor?" The answers to *why* kind of questions would lead researchers to identify *factors* underlying Claire's responses that serve as predictors of science attitudes (see Stake 2006). For example, such researchers might suggest that Claire has been subject to *public media influence* ("watching [TV] show" [turn 06]) or *family/peer influence* ("my cousin" [turn 10]). Traditional research also identifies *psychological entities* that may serve as predictors of students' science grades (see Britner 2008) such as *self-efficacy* or *beliefs.* Thus, in the present fragment, Claire might be identified as not having high levels of self-efficacy because she said, "I don't know if I can handle that though" (turn 06).

The Ethno-Methods of Doing Interest Talk

Discursive psychologists radically disidentify with such approaches. Instead of asking *why* questions and attributing people's discourse to underlying factors or psychological features, discursive psychologists ask *how* questions and take discourse as its own topic. They tend to analyze *how* people use language (especially the use of psychological terms) to achieve particular soci(et)al practices in that context (e.g., interview). Here we demonstrate how discursive psychologists analyze this same episode but focus on very different aspects of the interview discourse without attributing to people's intentions (e.g., what they think, know and understand).

After Claire articulates her previous experiences of following a doctor around, the interviewer asks the question, "so you know more and now you like it more" (turn 01–03). We observe that the interviewer use psychological terms "know" and "like" and a positive correlation "more . . . and . . . more" to articulate a conclusion derived from Claire's prior talk. As a participant in the setting, the interviewer states a possible correlation between Claire's cognition and affect. The issue for discursive psychologists now is not whether and how cognition and affect are correlated *within* Claire's mind but rather how Claire and the interviewer manage to make or dissociate from such a correlation. To understand the unfolding of the interview, all resources analysts require are indeed the same resources that participants themselves provide.

Claire responds by adjusting the interviewer's assertion to "like it a little more" (turn 04). Claire does not use "no" to reject the interviewer's statement, but uses "little more" that does not reject or agree but has both functions at the same time. That is, the adjustment "little more" allows Claire to *reformulate* the interviewer's conclusion without creating a directly conflicting statement (perhaps taking a risk to offend the interviewer). Claire then provides *evidence* for articulating such an adjustment "like last year I didn't like it" (turn 04) that describes a temporal period for her dislike. The interviewer further asks "why?" (turn 05) and Claire first answers "I don't know" (turn 06), which indicates that she does not yet have an explanation ready to hand. But then,

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she says "because I think" (turn 06) followed by an elaboration. Here, we notice that Claire originally does not "know" why she disliked being a doctor last year, but after a conversationally long pause (1.58 seconds) she then, apparently spontaneously, comes up with an explanation here and then. She uses the adverbial and conjunctive "because" to articulate her *reason*. This is especially evident that Claire uses a present tense "think" (rather than the past tense "thought") that indicates Claire's formulations of what she is doing at the moment—*thinking during the interview*. That is, Claire is producing an after-the-fact rationale *during* the interview and allows it to be heard as a cause (be*cause*) for a previous dislike (last year) to respond the interviewer's "why" question. This account is rendered for the purposes of the interview. It therefore has to be understood in terms of its dynamics and requirements for *doing* the interview rather than as a feature of Claire's psychological make up.

From turn 01 to the beginning part of turn 06, there is an important message for researchers to rethink the issue of cognitive entities. That is, an interviewee does not need to have a "reason" or "mental model" beforehand to answer a question but can spontaneously generate a plausible answer and make it like a causal reasoning *during* the interview for justifying her *interests* (i.e., "because I think I . . ."). This message has significant implications for science education in particular, as the existence of mental models (conceptions) in the minds of students and teachers is a dominant presupposition (Roth et al. 2008). That is, conceptual change researchers aim to research and to change students' and teachers' (mis-/alternative) conceptions that exist somewhere in people's mind rather than possibilities that come with their language. However, when we take a closer look at the micro details on how people articulate and interact, we find that people always enact and talk differently in different situations. It is therefore not surprising for us to hear that researchers may collect different kinds of "(mis-) conceptions" from the same participant by means of interviews, questionnaires or tests because the contingent nature of different discourses employed across settings. Thus, we purport that parts of

contributions from discursive psychology are to help researchers challenge or question these generally invisible assumptions underlying science education research.

Doing Reaching Consensus

In part, discursive psychology is interested in how people use talk to arrive at consensus concerning their topics of talk. The results of such investigations clearly show how topics are collective achievements and not the residues of individual minds. Take, for example, the latter part of turn 06 where Claire makes her explanation (about disliking being/becoming a doctor) available to the interviewer ("I was watching like some (TV) shows on how hard it is, right?"). Here, we can hear not only how Claire provides an explanation but also how she ends with a tag question ("right?"). Such a question puts the other party in a position that requires an answer. We may ask, "Why does Claire need to propose a question here?" Claire is an interviewee and she is supposed to answer rather than ask questions. However, in the situation, we can hear her tag question as an offer for articulating *consensus* between the two participants (Edwards and Potter 1992). That is, the tag question opens a space for the interviewer to confirm, in one way or another, the preceding talk that was offered as the completion of a query–explanation pair. After responding with what can be heard as an affirmative "mm" (turn 07), the interviewer asks for an example (turn 07). Claire then says, "schooling" (turn 08). Responding with a comprehensive comment "oh, I see" (turn 09), the interviewer then offers a description of schooling ("you have to take a lot of courses" [turn 09]) as an explanation candidate. Here, the interviewer does not only say "courses" but "a lot of courses," which particularly emphasizes the quantity of courses in an extreme way. The *extreme case formulation* (Pomerantz 1986) is a way to legitimate claims. For instance, saying "a lot of courses" allows the interviewer to point out an intelligible reason for not wanting to become a doctor.

Claire then comments that she does not know if she can handle that "because my cousin tired taking some of the courses but he, it was too much for him" (turn 10). Here, we, the analysts, in the same way as the interviewer, not only can hear Claire no longer talk about previous experience, but also witness the inclusion of another person's experience—her cousin. He had been taking courses but, as Claire suggests, "it was too much for him." Here, by drawing on another person's similar view, Claire builds a witness case that can make a strong *corroboration* (Potter and Edwards 1990) in support of her claim: the schooling required for becoming a doctor is hard. Moreover, Claire's descriptions about her cousin's experience make a clear contrast: "my cousin tried taking *some* of the courses *but* he, it was *too much* for him." That is, using a small number of courses ("tries taking some") at the beginning to which is added a disjunctive conjunction "but" followed by a high quantity of stress ("too much for him") construes a *contrast* (Heritage and Greatbatch 1986) that makes her witness case even stronger and justifiable.

Section Conclusions

Our case exemplifies how discursive psychologists take psychological phenomena such as interest or self-efficacy as *topics* of talk rather than as features of mind. That is, discursive psychologists are interested in identifying people's language deployed in performing certain social actions rather than identifying people's cognitive or affective entities in their minds. When Claire mentions her cousin, discursive psychologists articulate it as a device to make Claire's statement reliable and convincible in the interview context by including a witness case rather than suspend it as a *family/peer influence* on Claire's *self-efficacy* or *belief*. That is, discursive psychology only focuses on what participants make available to one another in that concrete situation but do not make attributions to individuals' minds forever inaccessible to others and to analysts. These devices are shared cultural resources that interlocutors draw in managing both their

interaction and the topics of talk. That is, language rather than people is the focus of the analysis. The people all but concretize the possibility that exist in and with the language.

The main task for discursive psychology is to articulate how psychological topics are mobilized in and for everyday interactions. In addition to the aforementioned topics, discursive psychologists do not consider social categories such as gender, age, race, class, or institutional identity into their analysis unless participants themselves articulate them or make available for analysts, as these social categories are like "categories of professional judgments" (Bourdieu 1992) that researchers generally use without questioning. Focusing on language-in-use and featuring data transparently (i.e., transcribing very details of conversations) makes discursive psychology a rigorous and reliable approach (theory and method) for understanding society in the making, including science lessons and research interviews.

NEW INSIGHTS IN/FOR SCIENCE EDUCATION

With regard to the unique nature of discursive psychology, researchers have started using it as a new tool for rethinking traditional science education topics in new ways including beliefs, identity, conceptions, interests, and motivations. In this section, we illustrate how science educators presently apply discursive psychology to investigate science-education related situations. We thereby provide an outline of what answers to the question "what more?" can contribute as insights in and for science education.

Interpretative Repertoires for Talking Science Epistemologies and Beliefs

The concept of *interpretative repertoire* first appeared in a sociological study of biochemistry laboratories in the UK and in the USA (Gilbert and Mulkay 1984). The authors found that scientists employ certain stable interpretative forms of talk with great flexibility to generate radically different accounts of social phenomena. They identified two interpretative repertoires: empiricist and contingent repertoire. The empiricist

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repertoire usually happens in the formal discourse (e.g., conferences) where scientists use impartial and objective words to support their articulation like "the experiment confirmed . . ." or "the results show . . . ," and so articulate scientists as objective and as following particular experimental procedures that lead to the factual results. However, scientists also described themselves as social beings whose work is sometimes affected by their desire, beliefs, and prejudice. Gilbert and Mulkay termed this the *contingent repertoire*. It was generally found in informal settings (e.g., interviews) or when things go wrong where scientists use many interpersonal words (e.g., "Dr. Smith believes that . . ." or "the result must result in human errors . . ."). Sometimes the two repertoires led to contradictions, such as when the same scientist claimed only minutes apart that science is both socially contingent and objective. In this case, special *discursive devices* were invoked to resolve them. Thus, for example, the *truth-will-out device* (TWOD) allowed scientists to talk themselves out of the contradiction that science is both contingent (subjective) and objective.

Interpretative repertoires therefore can be defined as "the building blocks speakers use for constructing versions of actions or cognitive processes" and are "constituted out of a restricted range of terms used in specific stylistic and grammatical fashion" (Whetherell and Potter 1988, p. 172). Interpretative repertoires are also part of any community's common sense and are available to any member of a culture, providing a basis for shared social understanding. Thus, identifying interpretative repertoires in science discourses allows researchers to better understand the culture and ideology shared in certain communities including science classrooms or environmentalist groups. In science education, the major works employing interpretative repertoires include:

– Studies designed for understanding students' discourses about ontology, epistemology, and sociology of scientific knowledge. One study identified nine interpretative repertoires that students used to support their more tentative claims about the nature of scientific knowledge: *intuitive*, *religious*, *rational*, *empiricist*,

historical, *perceptual*, *representational*, *authoritative*, and *cultural* repertoires (Roth and Lucas 1997). In addition to these interpretive repertoires, students drew on a variety of discursive devices to mediate the conflict between repertoires including the "as-long-as-it-works-take-it-as-truth" and "truth-will-out" devices (Roth and Alexander 1997). These studies show that it is important to know *how* students draw on repertoires to ground their claims about science epistemologies or beliefs, for they may articulate very different epistemological stances employing the same interpretative repertoires.

– A study to understand how environmental educators account for their curriculum design (Reis and Roth 2007). Five interpretative repertoires were identified: *relevance*, *knowledge transferability and translatability*, *emotionality*, *expertise,* and *empiricism*. These interpretative repertoires help researchers to understand how environmental educators articulate *why they do what they do* and *how they do what they do* for designing environmental curriculum and so illustrate the common ground and ideology shared in the culture of environmental educators.

– A study of the discourse to introduce authentic science activities (e.g., internships) to students. Six interpretative repertoires were discerned in a real-time classroom discourse (Hsu and Roth in press): *specialized*, *a-stereotypical*, *relevant*, *empirical*, *emotive*, and *rare-opportunity*. Importantly, when students were asked for their rationale for participating in these science activities, they drew on similar interpretative repertoires that appeared in their teachers' introduction discourses. That is, their discourses about these science activities produce and reproduce the discursive resources as historical-cultural phenomena.

– A study of Swiss junior high school students' discourses concerning environment and environmental protection (Zeyer and Roth in press). This study identified three main repertoires similar to the ones offered in previous research: *evidence*, *intuitive*, and *agential* repertoires. The agential repertoire can be seen in two areas of tension giving

rise to two additional, second-order repertoires. One repertoire emerges from the tension between the ideal and real, whereas the other arises from the tension between self and others. The repertoires explain the post-ecological discourse observable in Swiss society as a whole.

Identifying these interpretative repertoires in science discourses is important because they allow researchers to identify general resources shared within communities not only in schools and among students but also within culture more generally. Moreover, the interpretative repertoires are associated with a high degree of ecological validity for applying in everyday conversations such as in classrooms, because they are in a practical form of language itself rather than in an abstract form of theoretical or psychological formulations.

Understanding Identity in and through Discourse

Identity has become an important topic in science education for understanding science teaching and learning (Roth and Tobin 2006). However, the complex nature of identity makes this a difficult topic. Discursive psychology can be used to identify the rhetorical devices by means of which identity and self-representation are realized in conversations for the purposes at hand. For instance, a study designed to understand how the identity scientists came about in interviews showed how rhetorical devices such as "stake" and "footing" are employed (Lee and Roth 2004). Take *footing* as an example: an individual scientist sometimes uses plural pronouns "we" or "scientists" (rather than "I") that allows the individual to distance him-/herself from possible blames or to minimize his stake in case his assertion is incorrect (e.g., "scientists speak over people's heads"). That is, by shifting in different pronouns in his talk (footing), a scientist can manage his identity talk to be justifiable, rational, acceptable, or believable and so making his scientist identity as objective, passionate, expert, and disinterested.

In addition to these rhetorical devices, discursive resources have been identified to support identity talk. Thus, a fish culturist articulated his expertise by drawing on a *workplace repertoire* that construes him as a person of modest education with much hands-on experience who could solve problems on the ground; the *school repertoire* allows the treatment of knowledge and learning as abstract and theoretical with minimal concrete relevance to everyday life in the hatchery (Lee 2007). Furthermore, a study in urban high schools shows that identity talk can be understood in terms of the discursive contrast between two contrasts: (a) between talk about "same" and "other" and (b) between talk about the "material body" and "person" (Roth 2006). The first contrast articulates the difference between being caught up in and practical understanding of the world. The second contrast opposes the material body of a human being with its personhood. Each term that appears within one contrast can be applied to another contrast giving rise to a new form of device employed in the realization and production of identities.

Rethinking Science (Mis)Conceptions, Interests, Motivations

Studies of students' (mis-, alternative, pre-, naïve) conceptions and conceptual change have dominated the science education literature for over three decades. The general assumption in these studies is that people hold stable mental models in their minds and conceptual change researches aim to change these mental models from the *wrong* ones to the *correct* ones. There is increasing evidence, however, for the contingent nature of discourse, which questions the theoretical formulations underlying conceptions and conceptual change research. For instance, having a globe nearby in situations where children are interviewed about the universe leads to radically different claims about what children know (Schoultz et al. 2001). Previous research concluded that many children have misconceptions about astronomical concepts, such as the shape of the earth and gravitation, whereas Schoultz and his colleagues show that there is no misconception talk

following the same interview questions when a globe is present. That is, the presence of misconception talk was actually an artifact of method of previous research.

Influenced by discursive psychology, science educational researchers start becoming aware of these issues. In science classrooms, for instance, researchers found out that there are numerous variations in students' discourse on the same scientific concepts within and across contexts even after teachers' instructions (Roth et al. 2001). This result indicates that students respond and interact with others differently (e.g., researchers, interview questions, written tests) in terms of different physical, social, and available resources in particular situations. The reported *systematic* inconsistencies in students' discourses about scientific concepts challenge the assumption of fixed mental models lodged somewhere in students' minds. In particular, the direct evidence obtained from participants' themselves shows that people do not need to have a mental model beforehand to explain a particular nature phenomenon but it is *language* provides them with resources to provide answers (Roth 2008). For example, Claire says "I don't know, because I think. . . (turn 06)." She makes a plausible *reason* at that moment to talk *to/for/with* the listener (interviewer) *during* that situation (interview). The awareness and need of rethinking the issues of (mis-) conceptions is salient in 2008 Volume 3 (2) of *Cultural Studies of Science Education* entirely devoted to this question.

Besides issues about cognitive entities, science educators have also started drawing on discursive psychology to address how affective issues such as interests and motivations are mobilized in settings of interest to science educators. For example, in interviewer–student conversations about career interests (Hsu and Roth 2008), students always orient to the listener (i.e., the interviewer) and their talk is mediated by the context (i.e., available tools, interview environment). They use a language not their own, together with the topics it enables such as interests and motivations, speak it for the other (interviewer), and thereby return the language (the topics) to the other. Moreover, the interviewer questions and artifacts already frame the discourse participants to the event

draw on. That is, what researcher called *interests* and *motivations* are actually the collective products negotiated and constrained in the interview discourse (including interviewer, interviewee and its interview context) rather than students' *own* interest and motivations. In other words, instead of taking *interests* and *motivations* as entities in people's mind, they can be thought of as discursive resources mobilized and managed for social actions and accountability.

CODA

In this chapter, we show how discursive psychologists analyze discourse without attributing it to forever-inaccessible structures in people's minds. This comes with new opportunities for science education research and praxis. Rather than focusing, for example, on children's misconceptions about the sun and earth, science educators can use discursive psychology to study how language itself provides the resources to achieve topical conversations. An utterance from an everyday conversation such as "this is a beautiful sunrise" where agency and movement around the earth is attributed to the sun may serve a child as a linguistic resource for explaining the concept of "day and night" without having previously thought about and constructed a framework to respond to such a question. That is, discursive psychology only makes claims that are observable and therefore challengeable by readers. In fact, discursive psychologists have raised the question of the problematic reductionism existing in psychological research, which normally uses experiments, questionnaires, tests, or interviews to detect people's complex relationship with the natural world and then transforms and reduces data sources into factors or causes to explain peoples' behaviors (Edwards and Potter 1992). Having discursive psychology in their cultural tool kit, science educators now are in a position to begin a serious rethinking of their presuppositions about mind and language. They now can seriously rethink their ways of conducting research, analyzing language-in-use, and provide advice to teachers on the features of student talk that they ought to attend to.

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NOTES

[1] We draw on Jefferson's (1984) notation for transcribing the episode. Brackets ([text]) indicate the start and end points of overlapping speech; Period (.) indicates falling pitch or intonation; Question mark (?) indicates rising pitch; Comma (,) indicates a temporary rise or fall in intonation; Period inside single parentheses (.) indicates a brief pause, usually less than 0.2 seconds; Numers inside single parentheses (# of seconds) indicates the time, in seconds, of a pause in speech; Capitalized text (ALL CAPS) indicates shouted or increased volume speech; Colons (:::) indicates prolongation of a sound; Text in double parentheses ((text)) indicates annotation of non-verbal activity.

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