CS Teaching and Racial Identities in Interaction: A Case for Discourse Analytic Methods

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ABSTRACT

Motivation. Teachers can play a role in disrupting social inequities that are reflected in education, such as racial disparities in who succeeds in CS. Professional learning addressing inequities causes teachers to confront difficult topics, including how their own identities impact these problems. Understanding the differing ways teachers' identities surface can provide insights into designing better supports for their professional learning.

Objectives. The goal of this paper is to examine the teaching and racial identities of two secondary CS teachers who participated in professional learning focused on combining CS content and equity pedagogy. The second goal of this paper is to demonstrate how discourse analytic methods can be used to examine interviews and other interactional data.

Method. Teachers were interviewed individually about their teaching identity, racial identity, and professional learning. Drawing on Bucholtz and Hall's identity and interaction framework, interviews were examined for linguistic and discursive features reflecting positionality (i.e., how identity surfaces through the way individuals present themselves to and are perceived by others) and indexicality (i.e., various ways of referring to an identity).

Results. Participants used personal deictics, quotative markers, code choice, and affective and epistemic stances when discussing and negotiating their identities with the interviewer. The data reflected ways teachers problematized questions about teaching identity, negotiated tensions in their disciplinary identities, found the topic of race difficult to address, and highlighted other aspects of their identities relevant to understanding and discussing race.

Discussion. The study provides a demonstration of how discourse analytic methods can reveal nuances of teacher identity that may be overlooked with other qualitative approaches. Findings also revealed how teachers' ethnic identities might be used as a lever in helping teachers discuss the difficult topic of race in education. Discourse analytic methods are encouraged for future CS education research focused on interactional analyses.

CCS CONCEPTS

• **Social and professional topics → K-12 education**.

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1 INTRODUCTION

Professional learning focused on equity pedagogy is a critical factor in efforts to expand computer science learning opportunities to all students [13]. In the United States, racial disparities hamper equitable CS education. Along the pipeline from elementary school to industry, there are notable differences in who has access to and who succeeds in the discipline. For example, secondary students identifying with groups traditionally underrepresented in computer science in the U.S. comprise only 23% of Advanced Placement CS test takers (an exam for secondary students to receive university credit) but 48% of students overall [11]. Although there are students identifying with these underrepresented groups who are highly interested and confident in CS, they remain underrepresented in the field [12].

Teachers, whose pedagogies stem from their beliefs about teaching and learning, play a pivotal role in disrupting educational inequities by influencing classroom instruction [48]. However, addressing racially equitable CS education can be challenging because education culture in the U.S. privileges color-blind discourse where many teachers resist or avoid discussing race [27, 33]. The few studies on racially equitable CS professional learning programs that exist have confirmed this behavior, finding some teachers used various strategies such as evasive discourse or silence to skirt the issue of race or felt extremely uncomfortable covering pedagogical material focused on other races [14, 22, 49]. Another reason for these difficulties is that talking about race requires teachers to reflect on their own racial and teaching identities, which may not occur naturally during professional learning opportunities. For example, a high school computer science teacher of color who was seen by herself and others as highly skilled at facilitating talk about race in her CS lessons, only began to reevaluate her practices after reviewing video of her teaching and noticing limits in her strategies to encourage productive student discussions and analyses of data [40]. Since identity influences how a person engages in learning opportunities or even what learning opportunities are presented to and pursued by them [28, 34], examining the identities of CS teachers could allow us a more nuanced understanding of the supports

and barriers they encounter in attempting to learn about race and CS pedagogy.

If we want to move beyond simply increasing opportunities for CS learning to helping more students succeed in the discipline, we need to attend to the challenging work of talking productively about race, pedagogy, and identities in teacher professional learning. Researchers examining these professional learning settings might draw on thematic analysis to identify patterns in the topics of teachers' conversations or content analysis to examine the frequency of a topic over time. However, productive talk is not only a matter of what we say, but also of how we talk and why we choose to say what we do at a given moment. As noted by Schegloff, one of the founders of conversational analysis, "it is important to register that a great deal of talk-in-interaction - perhaps most of it - is better examined with respect to action than with respect to topicality, *more for what it is doing than for what it is about* [emphasis added]" [45]. Discourse analytic methods, which provide a way to study how meaning is created and negotiated during exchanges, can provide additional tools for examining talk in interaction. In this paper, I illustrate how these methods were used to study the identities of two secondary CS teachers and how they provide insights that might be overlooked using other qualitative approaches.

The paper begins with brief overviews of discourse analytic methods and a sociolinguistic theory of identity. After introducing the study, examples of discourse strategies used by secondary educators when discussing teaching, racial, and ethnic identities are provided. The paper concludes with a discussion of how discourse analytic methods might be used in future studies of teacher identity and of other CS education phenomena involving interactions.

2 DISCOURSE ANALYTIC METHODS

The terms discourse and discourse analysis have a variety of meanings in the research world. I focus on the functionalist perspective that views discourse as language that accomplishes social goals [46]. Under this paradigm, discourse analytic methods are used to examine naturally occurring discourse that is an artifact of social interaction. The general approach for a study employing these methods is: (a) selecting a research focus related to interaction, (b) identifying and then gathering appropriate data sources, (c) transcribing the data, (d) conducting a preliminary reading of the data to identify what interactions are happening, (e) analyzing the data to identify discursive strategies used by speakers that relate to the research focus, (f) selecting examples from the corpus that demonstrate these strategies, and (g) writing up the analysis [15]. In the following paragraphs, I briefly summarize research foci, transcription, and analysis related to discourse analytic methods.

Discourse analytic methods are best suited to research questions that attend to how language is used within contexts. Researchers sometimes let questions emerge from the data set so as to not constrain their focus on particular discourse features [41]. Education researchers have drawn on discourse analytic methods to, for example, study classroom conversations and identify the initiate-reply-evaluate structure seen in schools across many cultures [32], to examine how social inequities are reproduced through language in learning environments [3, 44], and to examine how educational policy is reflected in and is mediated by discourse [1]. While CS education researchers have used various methods to examine discourse, use of the discourse analytic methods described here seems rare. One example is Green's study on retention in an undergraduate CS program that found peer-to-peer speech contained more pedagogically productive discursive practices such as conversational turn-taking than student-to-instructor speech [16].

The transcript is central to studies employing discourse analytic methods. Transcripts need to capture not only speakers' words but also other communicative features such as intonation, speed, and nonverbal behavior. Letters and symbols are used differently than standard grammar to reflect these features, as seen in Table 1. Given the wealth of information conveyed during an interaction and the need to produce a comprehensible transcript, researchers select specific information to transcribe and decide how best to represent that information to support their analytic focus. Decisions about the written representation of an interaction as well as variations in transcription conventions can have implications for its interpretation [6]. For example, a transcript written top to bottom can privilege a sequential discourse style where an analyst would assume that an interlocutor's utterance at time two is in direct response to the speaker's utterance at time one [38]. However, this format does not acknowledge the discourse pattern of young children who frequently ignore interlocutors due to boredom, fatigue, or confusion; for these interactions researchers present transcripts in parallel columns. Given the subjectivity in transcription decisions, scholars are encouraged to engage in reflexive practice where they acknowledge their own influence on the final transcript and any transcription choices they made[5].

Table 1: Jefferson's Glossary of Transcript Symbols [24]

Item	Definition
.	Falling intonation, not necessarily the end of a sentence
?	Rising intonation, not necessarily a question
,	Continuing intonation, not necessarily a clause boundary
:::	Stretching of the preceding sound, proportional to the number of colons
-	A cut-off or self-interruption
word	A form of stress or emphasis
WOrd	Loudness
° °	Markedly quiet or soft
> <	Talk is compressed or rushed
< >	Talk is markedly slowed
=	No break or delay between words
(( ))	Descriptions of conduct
(word)	Uncertainty on the transcriber's part
( )	Empty parentheses, something is being said but not hearing can be achieved
(1.2)	Silence in tenths of a second
[	Point of overlap onset
hhh	Hearable aspiration

While the transcription process can be long, with possibly twenty hours needed for every hour of recording, the researcher's closeness with the data during this stage doubles as the start of the analysis process [41]. Analysis tends to focus on aspects of language use such as (a) indexicality, or how speakers reference their social identities and stances towards topics through their language, (b) sequence organization, or how the order of speaker turns accomplishes social tasks, and (c) grammatical resources, or how linguistic features like modals or predicates are used to accomplish social tasks [37, 45]. Analysis should go beyond simply describing these aspects of language use to interpreting how language use influenced the interaction under study. Researchers sometimes fall short in their analysis by only summarizing the themes of participants' discussions, over sympathizing with or criticizing what participants say, providing more data extracts than analysis comments, and overgeneralizing findings [2]. Analysis can be judged for "how well they account for the detail in material, how well potential alternatives can be discounted, how plausible the overall account seems, whether it meshes with other studies" [42].

As a brief example of these concepts, consider Bucholtz and Hall's [9] application of discourse analytic methods to a data set originally gathered during an ethnographic study focused on the lives of teenagers. Interested in how youth negotiated and contested their identities, they reexamined the opening section of interviews where participants provided demographic information. By using discourse analytic methods, they showed how a subset of participants took issue with the request for their racial and ethnic identities by using a variety of linguistic strategies such as laughter and elaborated reactions. In Table 2, Student 1 responds to the demographic information request by quickly providing age, gender identity, and school level in lines 7-10. However, when describing their racial identity, there is a noticeable increase in the use of laughter (lines 11, 13, 14, 18, 19), self-interruptions (lines 11, 19), and stretching of sounds (lines 11, 17). Bucholtz and Hall's analysis further explained how the observed discourse patterns, along with original ethnographic data, reflected racial tensions in the students' school.

Table 2: Modified Transcription Excerpt from Bucholtz and Hall [9]

7	Student 1:	Okay.
8		I'm sixteen years old.
9		(1.6) female,
10		(1.7) junior,
11		(1.7) I guess I'm w- white. @:
12	Interviewer:	@@You guess?
13	Student 1:	@@Well,
14		@I mean
15		I I I hate questions like that,
16		it's like,
17		we:ll,
18		@let's see,
19		if you w- really want to trace my heritage, @

Note: The transcription conventions used here are from Jefferson [24] and are noted in Table 1. Each @ symbol represents one pulse of laughter.

3 IDENTITY IN INTERACTION

Attending to identity is particularly important in CS professional learning contexts in the U.S. because many CS teachers are new to the discipline and navigating between teaching identities rooted in other disciplines and their developing CS teaching identities. Teachers' educational backgrounds, peer community, and confidence influence the degree to which they identify with CS and their willingness to participate in related professional learning [21, 35, 36]. Also, many teachers feel underprepared to implement culturally-relevant pedagogical practices in CS [25], but are being asked to examine their racial and ethnic identities as they work towards these practices. While in professional learning, they may be developing new ways of understanding and expressing their identities. How a teacher's identities are affirmed or contested in these environments "carries moral implications for... what is and was not made possible for them to reveal about themselves as literate people and learners in and through their discourse about themselves and others" [17].

Studying teacher identity using discourse analytic methods requires a framework that defines how identities are expressed in interactions. Bucholtz and Hall [8] developed a framework for analyzing identity that centers on five principles: emergence, positionality, indexicality, relationality, and partialness (see Table 3). Key to their framework is that identity is not static or individually determined but instead emerges during interaction with others (i.e., emergence). Also, people indicate relevant information about their identities and social positioning through various linguistic resources such as hedges, intonation, phonological lengthening, repetition, or speech acts that are situated within larger cultural contexts (i.e., positionality, indexicality) [20, 37]. For example, Schilling-Estes [47] examined how variations in the use of linguistic features such as copula deletion (e.g., "He a nice guy" instead of "He *is* a nice guy") reflected either ethnic distance or connection between an interviewee and an interviewer. Furthermore, identity is relative to other identities and interlocutors present in an interaction (i.e., relationality). So, while a speaker might put forth a particular identity, this identity can be negotiated and disputed by the interlocutor. Lastly, as interactions and the identities that emerge therein are dynamic, identity can only be partially represented in an interaction (i.e., partialness). So, one interaction cannot present a complete picture of a person's identity.

In the present study, I explore CS teacher identity by examining the discourse of two secondary teachers with a focus on the positioning and indexicality principles of Bucholtz and Hall's framework. The principles of relationality and partialness, while important to the context of this work, were excluded because they require additional data points for analysis and will be considered in future studies. The emergence principle was not explicitly analyzed as it undergirds all other principles of the framework.

4 METHODOLOGY

4.1 Project Context

The data presented in this paper are part of a larger research study that explores equitable CS pedagogy in secondary education. More specifically, the study aims to support secondary teachers in developing both subject matter knowledge and racial equity strategies

Table 3: Bucholtz & Hall's Framework for Analyzing Identity and Interaction [8]

Principle	Definition
Emergence	Identity is "a social and cultural phenomenon"; it is an "emergent product of linguistic and other semiotic practices"
Positionality	"Identities encompass (a) macro-level demographic categories; (b) local, ethnographically specific cultural positions; and (c) temporary and interactionally specific stances and participant roles."
Indexicality	"Identity relations emerge in interaction through several related indexical processes"
Relationality	"Identities are intersubjectively constructed through several, often overlapping, complementary relations, including similarity/difference, genuineness/artifice, and authority/delegitimacy."
Partialness	Identity is "constantly shifting both as interaction unfolds and across discourse contexts."

for teaching CS by: (a) developing a set of professional learning activities that address CS subject matter and racial equity topics together; (b) examining how well the activities engage teachers in learning and talking about CS content, race, and equity pedagogy; and (c) interviewing teachers to learn how their racial identities and teaching identities influence their participation in the activities. In spring 2022, a pilot study was conducted with four teachers who were members of a CS professional learning community (PLC) in the same school district. The district's PLC gathered monthly and invited all secondary teachers to join. Participation was optional but teachers received a stipend for attending. Meetings were held after the school day and lasted 1.5 hours. Each PLC began with general announcements for about 30 minutes. Teachers then split into smaller breakout groups based on grade level for about 60 minutes. Professional learning activities for the study were conducted in an additional breakout room. During the pilot study, the teachers who volunteered for the study, the author of this paper who facilitated the activities, a research assistant who observed each meeting, and the district's CS director met across three sessions. We spent the sessions discussing what racially equitable CS teaching meant to the teachers and to their district, developing a rubric to evaluate course materials with an eye on both CS content and equitable teaching, and listening to teacher presentations about their application of the rubric in their classroom.

4.2 Teacher Interviews

Three of the participating teachers agreed to be interviewed individually outside of the PLC sessions. Interviews with Roberta and George (pseudonyms), who attended all study meetings, form the corpus presented in this paper. Roberta was a middle school (ages 11 to 13) teacher who previously taught mathematics and art and was in her sixth year of teaching CS. George was a high school (ages 14 to 18) mathematics teacher and in his first year of teaching CS. Both teachers had about 20 years of teaching experience. While Roberta was a regular attendee of the district's PLC, George was a new member. Each teacher was interviewed over videoconferencing for about fifty minutes. Roberta was interviewed after session 3 of the PLC; George was interviewed between sessions 1 and 2 of the PLC.

The interview consisted of three sections. Section 1 contained five prompts related to CS teaching identity. Section 2 contained four prompts related to racial identity and teaching. Section 3 contained six prompts related to racially equitable CS education and professional learning. Prompts were drawn from existing research on teacher beliefs [30], teacher identity [4], and photo elicitation [19]. A set of prompts specific to the study were also included. Four interview prompts that explicitly asked teachers to discuss their identity were selected for analysis:

- Section 1 - Q3. How do you describe your role as a CS teacher?
- Section 2 - Q7. How do you describe your racial identity? your ethnic identity?
- Section 2 - Q8. How, if at all, has being [race/ethnicity] influenced your teaching practices?
- Section 3 - Q14. How, if at all, has your CS teaching identity or your racial identity influenced your participation in past professional learning activities?

Table 4 shows the amount of time each teacher spent responding to the prompts. Interviews were initially transcribed using an automated transcription service. Interview responses for the four prompts listed above were then further transcribed using standard discourse analysis conventions which are listed in the Appendix. However, markers for overlapping speech were not included as the bulk of overlaps occurred where the interviewer provided conversational acknowledgements (e.g., mm hmm) to the interviewee.

Table 4: Length (seconds) of Responses to Interview Prompts

Interviewee	Q3	Q7	Q8	Q14
George	65	120	309*	195
Roberta	54	24	217	79

*Note: George's response lasted 599 seconds. Approximately 290 seconds were not included in the analysis due to the private nature of the responses.

4.3 Positionality Statement

Preparing a positionality statement encourages scholars to reflect on how their backgrounds influence their research procedures and findings [33]. For a study focused on analyzing identity in interactions between a participant and a researcher, positionality is particularly important because the researcher is an actor in a social performance with the participant. Just as performers might adjust their message to particular audiences, so to might participants and researchers adjust their behaviors based on how they perceive each other.

This is a study focused on racial, ethnic, and CS teaching identities situated within the United States. I identify as African American and a woman, which are considered minoritized identities in the larger U.S. culture, within education, and within the CS field. While I do not consider myself a teacher, I have had CS teaching experiences at the secondary and post-secondary levels. Also, my research career has provided me multiple opportunities to observe and collaborate with CS teachers in both formal and informal educational spaces. I grew up and was educated in the midwestern and northeastern regions of the U.S. with family roots in the southeastern region of U.S.. Connections with these spaces has given me a linguistic profile that differs from accents encountered in the western region of the U.S. where this study was conducted.

These identities and experiences stand largely in contrast with those of teachers who participated in this study. One potential concern this raised was whether these differences would alter our interactions and make participants less willing to respond openly to the interview prompts. To help participants feel more comfortable talking about potentially sensitive topics related to our identities, I included and participated in open-ended, non-evaluative activities at the start of the study that encouraged participants to share their ideas without evaluation. It was hoped that this approach would build rapport with participants and help them feel more comfortable sharing responses during our interviews. During data analysis, I remained vigilant to how these differences, including variations in our linguistic profiles, might have influenced our conversations and used prior literature to guide my examination of relevant linguistic features.

5 ANALYSIS

Analysis was guided by Bucholtz and Hall's framework for analyzing identity as it is reproduced and negotiated in social interactions (see Table 3). I reviewed literature related to the principles in their framework and identified the following list of relevant discourse resources. The goal was not to find examples of each resource, but rather to use them as a guide for linguistic features that might appear in the data set. I then selected illustrative examples from the interviews containing some of these markers that reflected the principles of positionality and indexicality:

- **Personal deictics** or pronouns such as I, you, we, he, she, they [51]
- **Verb tense changes** such as shifting from present tense to past tense [39]
- **Change-of-state verbs** like to become [39]
- **Quotative markers** or linguistic forms that introduce represented speech such as the underlined words in the following: everyone goes oh, everyone's like 'I wish I had a tutor" [8]
- **Code choice**, such as using a regional accent to pronounce a word while primarily speaking in another accent [8]
- **Narrative styles** as reflected in features such as pauses, length of turn, and overlapping speech [31]
- **Affective and epistemic stance**, such as hedges or mood that reflect dispositions and degrees of certainty [37]
- **Problematizing the question** through resources such as laughter or elaborated response [9]

5.1 The Nuances of Teaching Identity

Education in the United States can be described as heavily divided along disciplinary lines with differing teaching cultures. For example, one study found mathematics teachers, as compared with teachers of English, social studies, science, and foreign languages, reported less freedom to decide on course content, more departmental coordination, a greater view of their discipline as static and unchanging, and a greater belief in grouping students by prior achievement for beneficial instruction [18]. In secondary education, teachers of CS are often navigating multiple disciplinary cultures. And so, one might assume that teachers entering CS from a particular discipline might need certain supports to address the similarities and differences of their discipline with CS. For example, a mathematics teacher accustomed to pedagogy focused on facts and specific procedures might struggle to identify and implement pedagogical strategies that allow for multiple approaches to problem solving common in CS [23]. However, this assumes a static view of teacher disciplinary identity, which may in fact obscure how teachers relate to their first disciplines and limit opportunities to fully understand how teaching identity influences teachers' participation in CS professional learning.

Take for example Roberta's response to Q3 in describing her role as a CS teacher (Table 5). She described herself as a "coach" for students. An analysis focusing only on the content of her response could identify Roberta as espousing responsive teaching beliefs [30] that focus on helping students develop knowledge through collaboration with teachers and peers. However, an interactional analysis offers additional insight into the degree to which she aligned with these beliefs based on how she provided her responses.

Roberta's use of discursive resources suggests she was distancing herself from the prompt. First, she expands the adjacency pair initiated by the interviewer in line 1. An adjacency pair is a conversational sequence composed of two sequential turns by different speakers (e.g., a greeting from person A followed by a greeting from person B) [45]. Inserting an additional response into an adjacency pair usually indicates repair of earlier talk (e.g., if an interlocutor did not hear the initial speaker) or a disagreement [10]. Instead of directly answering the initiating question (line 1), Roberta provides an insertion about the teaching field (lines 3-4) before responding to the question (lines 6-10). Throughout the response, she uses stretched sounds (*um* in line 3; *so* and *to* in line 6) to possibly delay answering the prompt. Furthermore, Roberta uses the discourse marker *I guess*. Common in American English, this marker when used in the second part of an adjacency pair might reflect that she is providing hearsay evidence about her role (e.g., similar to "people say") or helping the interviewer understand the purpose of her statement in lines 3-4 [26]. All of these strategies could indicate that the prompt is problematic for Roberta. Without more evidence, we can only speculate on the reasons for her hesitation which might be that she does not identify as a CS teacher, she disagrees with the coaching trend seen in the teaching world, or she does not want to discuss the topic with the particular interviewer.

As another example, George demonstrates the complexity of his teaching identity as more than a simple disciplinary affiliation. Multiple times during the interview, George indicated he identified as a mathematics teacher. But, his use of varying personal deictics

Table 5: Roberta responds to 'How would you describe your role as a CS teacher?' (Q3)

1	I:	and then how would you describe your role as a CS teacher?
2		(3.0)
3	R:	((lip smack)) **um:::** (4.5) I think over the years (0.7) all teaching has moved away from direct
4		instruction and towards (0.5) coaching
5	I:	mm-hmm
6	R:	um (0.8) **so::: I guess** my role is **to:::** (1.3) um (1.3) present (0.9) um ((lip smack)) (1.6) present
7		>content< that has multiple entry points (0.8) and then (0.5) kind of coach the kids along to
8		(1.0) um (0.8) find >find< something in it for them
9	I:	mm-hmm
10	R:	and learn what I'm teaching.

*Note: Bold font is used to call attention to sections of the transcript referenced in the paper.

and quotative markers suggests he sees himself as a different type of mathematics teacher. In responding to Q3 about his role as a CS teacher, he uses the first-person plural pronoun *we* to reflect his stance as a member of the math education word (see Table 6, line 4). However, later in the interview, George distances himself from a part of the math community he finds problematic by using quoted speech with first-person singular pronouns in prototypical comments from the type of math educator he does not align with (see Table 7, 13-14 and 16-18). This distance is further supported by (a) words that explicitly reflect his disapproval of math culture (e.g., problematic in line 6, gatekeeper style in line 12), (b) stress placed on the words man (line 6) and necessary (line 13), and (c) slowed speech around the word well (line 16) just prior to providing concrete examples about his perceived issues with the community.

5.2 Difficulties in Discussing Race

Only a few studies have examined discussions of race in CS professional learning and they have found a tendency towards colorblind discourse among participants. Silence, a colorblind strategy, was addressed by both interviewees in responding to Q14. George explicitly says that as a White person he tries "to be careful not to dominate the airspace...and to not be the first one to jump in" when participating in courses. Roberta noted that she felt "intimidated and like I'm White and I should behave myself and just listen" when guest speakers joined professional learning activities. However, one prior study noted an increased willingness to discuss race when conversations shifted from a focus on access and participation to a focus on curricula [14]. In the current study, teachers who were participating in professional learning focused on curricular materials indeed discussed race during interviews but used a variety of strategies to reflect possible discomfort or hesitation with the topic. Consider how Roberta (Table 8) and George (Table 9) responded to Q7 asking for their racial and ethnic identities. Roberta, using markedly quieter speech, explicitly said "well that's always hard for me" (line 3) and slowed her first enunciation of the word Jewish (line 4). Instead of just providing a direct answer, George disrupts the adjacency pair started with the interview prompt by providing an extended response about his perceptions of American society expecting a detailed explanation to the prompt (lines 6-9) before continuing on to explain his ethnic identity through his family's history. His response is also sprinkled with extended speech (lines 5 and 6) and a noticeable pause (line 6), which might be ways of indicating he cannot respond to the prompt with a direct answer. A similar pattern is observed when George begins his response to Q8 about the impact of his identity on his teaching (Table 10). George used a noticeable pause, stretched speech, and a noticeable aspiration (line 5) before stating "it's not an easy question to think about".

Despite this discomfort, both teachers continued to discuss their racial identity throughout the interview. And, while both identified as White, they seemed to position themselves as distinct from normative views of a White racial identity that harms students of color. For example, George described White racial identity with phrases like 'baggage that that entails', 'I know it's a terrible identity', and 'I try not to be the guy that makes me cringe'. Beyond the content of his responses, some linguistic features he used also reflect this distancing which might serve to authenticate his non-normative White identity that attends to 'the cultural issues that are going on' in education. Throughout the interview he used explicit identity categories and code choices to reflect his awareness of non-normative cultures including 'hella White' (a common slang term used as a quantifier or intensifier meaning a lot [7]) and emphasizing the Māori pronunciation of pākehā (the term for a New Zealander of European origin [43]). In Table 11, George switches from the first-person singular pronoun I to either the first-person plural pronoun we (line 3) or the second person pronoun you (lines 8-10) in describing the inner thoughts he has related to confronting what he calls White oppression. This use of multi-voiced narrative, which has been noted in prior research to reflect complex identities and foreground contradictions [31], might also serve to legitimize his non-normative White identity. Roberta, after spending some time discussing the systemic racism she has observed at her school in response to Q8, speaks about her own minority status. She explicitly says that she does not often mention she is Jewish in her classroom and that "I don't know why I do it." This last statement is offered in quieter speech and followed by a longer than usual pause, which might suggest an affective stance that reflects a level of awkwardness. Indeed, she ends the section saying "it's weird having a minority status that you can hide."

Table 6: George responds to 'How would you describe your role as a CS teacher?' (Q3)

1	I:	and that relates? a little bit to the next question, um (.) how would you describe your role
2		as a CS teacher?
3		(1.0)
4	G:	that's so I see- so there's this great phrase uh that **we sometimes that you know use in the**
5		**math education world** which is like uh (0.6) uh what is it (0.4) uh (0.6) how does it work?
6		It's like (0.3) I can't remember now okay geez it's not not a sage on stage right?
7	I:	um mm hm
8	G:	it's like a coach right? more
9	I:	mm hm
10	G:	but a guide on the side,

*Note: George's response continues with a description of how he attempted the "guide on the side" approach in his CS course.

Table 7: George responds to 'How has your identity influenced your participation in professional learning courses?' (Q14)

1	I:	would you say that your identity as a c s teacher (0.7) um (0.3) or your racial identity has
2		influenced how you participated in those courses.
3		(1.6)
4	G:	Oh (0.6) uh::: interesting (0.6) well I mean I don't have much of an identity as a computer
5		science teacher cuz I'm just starting. (0.3) uh I have an identity as a math teacher and I'm
6		always wary about that because (0.5) **man** math teachers are problematic (0.4) let me tell you
7		(0.4) and uh
8	I:	how so?
9	G:	what's that?
10	I:	how so?
11	G:	oh::: there's so much be- because it's about elitism right. so much of like math teaching and
12		the culture of math teaching (0.4) is like gatekeeper style. right. (0.3) and I'm not sure it's not
13		it's not **necessary** but it's part of the culture of math teaching. right. **It's like, can, are you**
14		**good enough? (0.2) right. can you do it?** (0.3) right. and deciding and this is, comes back to
15		this thing, like (0.5) who decides. right. (0.3) right. and uh (0.5) and uh (0.4) and it's very
16		judgey. (0.4) right. (0.3) and it's very much like <**well**> it like pseudo objectives. **like it's I'm**
17		**not (0.5) I'm not (0.7) discriminating against you. it's not my fault you can't pass this**
18		**math class.** (0.3) right. (0.5) and uh (0.4) that that's the kind of tone right. that you
19		get sometimes. uh and it's it's just sort of very much (0.7) uh, just kind of positivistic in that
20		sense right. it's not really (0.6) ther- sometimes it feels as though the math teacher
21		community is (.) not super reflective about (0.5) uh some of the (0.3) uh the cultural issues
22		that are going on.

*Note: George's response continues with a discussion of how his racial identity influences the way he participates in professional learning opportunities (see Table 11).

Table 8: Roberta responds to 'How do you describe your racial and ethnic identity?' (Q7)

1	I:	okay. um so for next question in this section. how do you describe your racial and ethnic
2		identity?
3	R:	um::: (0.8) uh my rac- °**well that's always hard for me.**° my racial identity is white. and my
4		ethnic identity is **<jewish>**. um (2.0) I think of it as uh::: (0.5) eastern european jewish.

5.3 Summary

Discourse analytic methods provided an approach for examining Roberta and George's identities through their use of various linguistic resources. Difficult topics were preceded with stretched sounds, pauses, or speech that was noticeably quieter or at a different tempo. Possible tensions or dissimilarities with certain identities were noted with extended responses that disrupted adjacency pairs initiated by the interview prompts. The complex nature of aligning with some aspects of an identity but not others was reflected

Table 9: George responds to 'How do you describe your racial and ethnic identity?' (Q7)

1	I:	so while the project has a focus on racial equity, we don't wanna assume anyone's identity
2		or how they identify themselves.
3	G:	yeah.
4	I:	um and so would you mind telling me if you identify with any particular racial groups?
5	G:	**oh:::** interesting. yeah so I I I would say that I am white. and hhh (0.6) uh you know uh with
6		all the sort of **(1.5) uh:::** baggage that that entails, you know my uh you (0.8) it's interesting
7		in america- I spent a long time in england. I spent like nine years in england (.) but uh (.) in
8		america, so in contrast right, in america, what's interesting is everyone's got a story right
9		(0.3) about like where their (.) where their people are from (0.4)

*Note: George's response continues with additional details about his background and where his parents and relatives are from.

Table 10: George responds to 'How does your identity influence your teaching?' (Q8)

1	I:	the next question is how if at all has being white (0.3) um, and also having this (0.8)
2		irish (0.5) I forget the whole terminology you used but the ((laughs)) your irish ethnicity
3	G:	yeah
4	I:	um influence your teaching practices.
5	G:	yeah. that's a really, that's a really interesting question. (0.3) **uh:: (1.3) hhh** oh man.
6		it's not an easy question to think about (0.3) right. so like (1.2) there's probably, there's
7		probably like (0.5) uh, better and worse ways that it- I don't know. it's a- that's a difficult
8		question to think about how has it influenced my, (0.7) uh, my teaching practices? well, I mean,
9		I've had to (1.0) I've had to become more aware (0.4) right. of, of my whiteness (0.3) right. and
10		the impact that it has on student learning. (0.4)

*Note: George's response continues with additional details about his identity being harmful for learning and his experiences with with race and teaching in another country.

Table 11: George responds to 'How does your identity influence your participation in professional learning? (part 2)' (Q14)

1	G:	I don't think I'm super defensive at this point, I was never super defensive about it (0.5)
2		but like when I do get defensive (.) about it I'm- I I try to check myself and be like okay
3		**wait what what what are we identifying with exactly? (0.3) are we identifying with**
4		**the with the the white oppressor?** it's not a good idea. right. so, (laughs) so I try not to be
5		defensive about this stuff and I try to try to be open and uh reflective. (0.4) and also be, uh
6		(0.9) you know open to the idea (0.5) that- I mean, it's hard, but right. It's hard when you hear
7		that you are (0.5) that part of your identity is part of the problem (0.3) but is also an
8		important thing to reflect on. right. and like (0.4) how (0.5) **how can you understand that?**
9		**and how can you (.) like what action can you take (1.1) right. to uh (0.6) uh from**
10		**from that perspective**. so you know that that's the sort of (0.8) the approach I take to to
11		things like that. but um (1.2) does that address your question

*Note: This excerpt is the end of George's response to Q14. The beginning of the response is in Table 7.

in switching between singular and plural pronouns. Awareness of non-normative cultures was reflected in code choices. Lastly, possible uncertainty with a description of teaching culture was reflected in one interviewee's use of a common epistemic marker when transitioning to a description of their own CS teaching beliefs. This study is an initial foray into the use of discourse analytic methods to examine teaching identities. Additional work is needed to further understand the role of identity in professional learning for computer science teachers. Namely, more data should be collected to understand the degree to which the patterns observed here are consistent and to identify how context shifts the ways teachers' identities interact with the topic of equitable CS teaching.

6 DISCUSSION

This study provided a demonstration of how discourse analytic methods can foreground relevant discursive features that are often overlooked when examining language in CS educational contexts. These methods highlighted the multifaceted and somewhat contentious nature of Roberta and George's teacher, racial, and ethnic identities. Roberta described her CS teaching identity as that of

a coach, yet her discursive strategies suggested some tension or discomfort with accepting this identity. George felt himself more of a mathematics teacher than a CS teacher, but did not align with its elitist culture. Both teachers expressed difficulty in talking about their White racial identities with George noting "it's hard when you hear that part of your identity is part of the problem." Both teachers also distanced themselves from what they considered the problematic aspects of a White racial identity in the U.S. education setting.

But how did this analysis help me examine "what is and was not made possible for [teachers] to reveal about themselves" and "what [teachers] can and do demonstrate and learn in the opportunities made available to them" [17]? In addition to uncovering how teachers talked about their identities, discourse analytic methods allowed me to interrogate why such patterns emerged. Understanding these rationales can be useful in defining design principles for professional learning courses that meet the ambitious goal of disrupting educational inequities. Take for example the observation that Roberta and George felt constrained in participating in professional learning discussions because of their racial identities but were comfortable surfacing their Jewish identity (Roberta) and their international identity (George). Professional learning providers might use this information to create activities that allow teachers to first surface the non-racial aspects of their identities and then build on them while discussing new pedagogy that directly address racial inequities and supporting all students. As another possibility, given the challenges in operationalizing teacher learning [29] and the limited research on the process of teacher learning in collaborative environments [50], discourse analytic methods could help in understanding how teachers respond to the learning opportunities made available in CS professional learning and how these responses are influenced by teachers' interactions with each other and with facilitators.

The benefits of discourse analytic methods go well beyond teacher identity research and could be useful for other areas of CS education. For example, a study of pair programming interactions might shed light on how to better guide students in working collaboratively. Analyzing technical interviews could help us learn how similarities and differences in the ways employers and candidates discuss computing topics influence students' performance. Examining the messaging undergraduates receive from their departments about the tech industry can help us understand and better support students' career decision-making. Using these methods in our community would require us to ask questions that move beyond a focus on the content of participants' talk, to attend to how we as researchers influence participants' interactions (i.e., the relationality principle), and to collect data over extended periods of time and contexts to develop a more comprehensive understanding of learners (i.e., the partialness principle). I hope this paper provides compelling evidence for the greater use of discourse methods that focus on understanding talk in interaction in CS education research.

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