SCNI: A Robust Technique to Investigate Small-Group Learning at College

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The Stimulated Construction of Narratives about Interactions (SCNI) technique for data collection, introduced in this paper, enables robust investigations of small-group learning at college. The SCNI technique consists of promptly soliciting participants' perspectives on their recent joint activity using video records thereof. Thus the SCNI technique creates a space to network the narrative discourses that shape how participants understand their world, and the pragmatic forces that shape participants' interactions in a practice. Data reported in this paper are collected from a number theory class comprised of ethnically diverse students. In this paper, I will report three cases to illustrate the advantages of SCNI data over data collected by video records and unmediated interviews in elucidating, nuancing, and expounding what matters for group work. Through these cases, I will use three different analyses appropriate for SCNI data. Limitations and recommendations for efficient conduct of SCNI are discussed as well.

Key words: Small-Group Learning, Narrative Identity, Interaction Analysis, Discourse Analysis.

Since the 1970s, qualitative and quantitative research have been constantly emphasizing and confirming the positive effect of small-group work on students' learning and achievements (Astin, 1977, 1993; Cockrell, Caplow, & Donaldson, 2000; Laursen, Hassi, Kogan, Hunter, & Weston, 2011; Springer, Stanne, & Donovan, 1999; Tinto, 1997). Simultaneously, an ever growing body of scholarship has been reporting debilitating processes in group work, such as lack of social skills (Barnes & Todd, 1977), poor mathematical knowledge (Webb, Ing, Kersting, & Nemer, 2006), weak coordination (Barron, 2003), undue influence (Engle, Langer-Osuna, & McKinney de Royston, 2014), communication problems (Sfard & Kieran, 2001; van de Sande & Greeno, 2012), problematic identities (Heyd-Metzuyanim & Sfard, 2012; Langer-Osuna, 2011) and others (see a review by Webb, 2013). To investigate the differential processes taking place in group work, researchers have been investing less in achievement studies and more in the study of social interactions in small-group learning, as noted by Cohen (1994).

Additionally, recent research (Esmonde, 2009a, 2009b; Esmonde & Langer-Osuna, 2013; Gresalfi, 2009; Langer-Osuna & Esmonde, In Press) has emphasized the need to study learning ecologies constructed through ongoing interactions with an emphasis on how socio-emotional and power relationships play out in the moment-by-moment of group work. Such a research program, I claim, requires new techniques for data collection. To this date, video records and/or unmediated interviews have been the most common data sources used to investigate small-group learning. Socio-emotional and power forces at play through ongoing interactions do not sufficiently manifest through videos or unmediated interviews for the following reasons:

- During ongoing interactions, participants often act without manifesting the forces underpinning or motivating their actions.
- In unmediated interviews about interactions, participants often sustain a handful of strong impressions from group work and become oblivious of fleeting but otherwise significant ones.
- Although data from unmediated interviews can elicit participants' individualized discourses by which they narrate self, others and the world, it cannot help determine which discursive forces are at play in situ.

This paper will show how video records of group work and interviews of participants are not sufficiently robust to investigate socio-emotional and power relationships in small-group learning. The *Stimulated Construction of Narratives about Interactions* (SCNI) technique for data collection, to be introduced and explicated in this paper, attempts to address the aforementioned challenges to an ecological study of small-group learning. The SCNI technique consists of promptly soliciting participants' perspectives on their recent joint activity as they watch a video of the group work.

In this paper, I will first lay out the conduct of SCNI interviews, then explicate the underpinning theoretical frame of this technique. Second, I will present three cases of SCNI data, which will illustrate how SCNI data complement data from video records. I will also use different analytical methods to treat the SCNI data as illustration of the diverse appropriate analyses that can be used with these data. The underpinning belief of this paper is that combined data from SCNI and video records afford robust understanding of processes that shape small-group learning.

The SCNI Technique

The SCNI technique consists of probing participants to construct narratives about (comment on) their social interactions by watching a video of the activity in which they participated within 24 hours prior to the SCNI interview. The SCNI technique builds on the cognitive technique commonly known as Stimulated Recall (Gass & Mackey, 2000) and video viewing practiced by interactional analysts (Jordan & Henderson, 1995). Contrary to the heavily cognitive SR technique, the SCNI technique aims at eliciting not only cognitive but also fleeting and enduring social processes individualized by participants. While SR and video viewing interviews seek to understand what happens in the studied group work, SCNI interviews are also interested in knowing who participants are and what frameworks they have individualized to make sense of their world. This distinction will become evident as I explicate the theoretical grounding of the SCNI technique.

Conduct of SCNI Interviews

An SCNI session consists of (i) the preparation of the *medium* (i.e., the video of actual activity); (ii) a low-probing video viewing section; and (iii) a proactive open interview section. I started recording the SCNI sessions with an audio recorder but soon came to realize that they are best recorded as videos to facilitate future analyses.

During the classroom activities, stable and unmonitored video cameras (wirelessly connected to microphones placed in the middle of the group table) captured the entire interactional space of each group. The resulting videos are used to mediate the following two interview styles.

The SCNI sessions, conducted individually in this study, take place within 24 hours of the end of the videotaped group activities. The interviewer launches the interview with this probe: "In my study I try to understand the interactions between people. Today, I would like you to help me see through your eyes to understand what happened in your recent group session. You will watch a video of it to help you recall what happened. You can pause the video at any time you recall your significant mathematical reasoning and your feelings about yourself or your groupmates at the moment of the interactions. Try your best not to confuse your current thoughts and emotions with those you experienced when you were working in group."

The interviewee and interviewer sit facing a screen placed in front of the interviewee and streaming the recently videotaped group session. This seating foregrounds the video and

backgrounds the interviewer to the informant. During this phase, the interviewer may use gentle probes, such as pausing the video and asking whether the informant can recall what s/he was thinking or feeling at that time, or if s/he understood a groupmate's explanation. If informants drift away from talking about the moment of interactions, the interviewer may gently orient him/her back to the task by asking, "Is this what you were thinking/feeling at the moment?" The interviewer must also note the time stamps when the video is paused for commenting.

At the end of the session, the interviewer follows up on the participant's significant comments by rewinding the video to those moments and asking open questions such as, "What did you mean when you said you were frustrated here?"; "Is it common that you feel/think like this in such circumstances?"; or "At time *t*, you said Fred is smart. Why is that?"

People tend to tailor their talks to their perception of their interlocutors' knowledge. Hence, to trigger talks about the mathematics involved in the group work, the interviewer must be knowledgeable in the subject matter and exhibit his relevant mathematical knowledge to interviewees. In my data collection in an upper-division course, I introduced myself as someone who had earned a Master degree in mathematics and assisted students during group work and tutoring sessions.

Theoretical Grounding of SCNI

The SCNI technique creates a space to network the narrative discourses and the pragmatics that govern participants' interactions in a practice (Figure 1). As participants in SCNI talk about their interactions in a recent activity, their comments will be constrained and enabled by two forces: on the one hand, the narrative discourses that construct and regulate their subjectivities (Kramsch, 2010) and, on the other, the pragmatic forces that have just regulated their interactions. Hence, in SCNI sessions, interviewees are positioned in a space negotiating two realms: (1) their individualized discourses that shape the narrations of self, others, and activities and (2) the pragmatic forces that shaped the recent interactions they watched in a video.

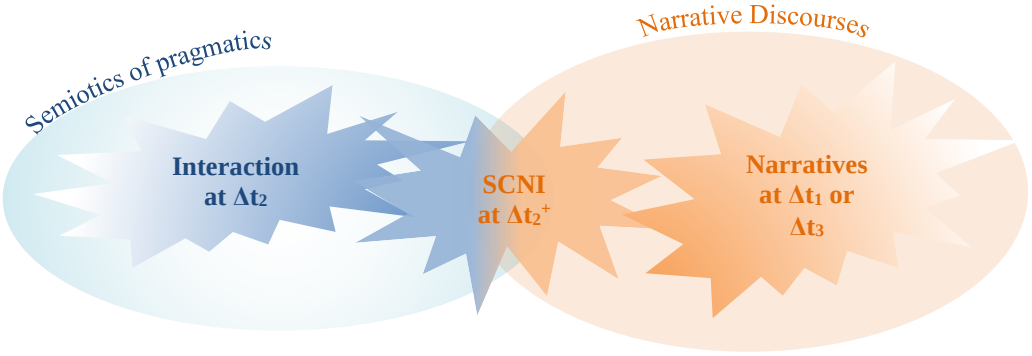

Figure 1. The SCNI conducted at time Δt_2^+ on social interactions at time Δt_2 produces data shaped by (a) the semiotics of pragmatics that govern social interactions at time Δt_2 and (b) discourses that frame unmediated narratives -at time $\Delta t_1 < \Delta t_2$ and $\Delta t_3 > \Delta t_2$.

Following interaction analysis methods (Jordan & Henderson, 1995), the SCNI technique provides participants' perspectives, that is, the pragmatic frames that participants activate to make sense of interactions *during ongoing activity*. Are the narratives produced by interviewees in SCNI sessions pure recall of what really happened in recent activity? Certainly not. But neither are they pure constructions disconnected from the reality of recent activity. Narratives of past events are partly faithful and partly unfaithful to actual events. By placing interviews, like in

SCNI sessions, soon enough to the focal activity and constraining narratives by strong stimuli like videos of activity, we increase the reliability of recruited data.

Informants' responses in SCNI sessions ought to be treated as narratives. Like all narratives, they draw on *remembered* impressions that are *narrated* employing internalized genres and styles (Baynham, 2014; Dervin & Risager, 2014). The discontinuity of SCNI data with actual interactions does not threaten its reliability. On the contrary, the internalized narratives by which informants narrate their recent interactions regulate their enduring identities (Kramsch, 2010). To put it in a way pertaining to small-group learning, by talking about their recent group work in SCNI sessions, participants implicitly or explicitly give off signs of their entrenched understanding of themselves, their groupmates, mathematics, and group work activity. Whether in group work or in SCNI sessions, participants act by the same *habitus* (Bourdieu, 2003; Bourdieu & Thompson, 1991) that gives each one of them an enduring existence through different contexts and activities.

As noted in the introduction of this paper, researchers of small-group learning must invest in robust studies of ongoing interactions in group work and all that they involve (hidden social norms, emotions, and power). Yet ongoing interactions are fleeting. Traditionally they are accessed through either records thereof, such as videos, audios and fieldnotes, or perpetrators of actions. Researchers have attempted to capture ongoing interactions through video records and thus made them objects of analyses. Although video analysis is a powerful tool to investigate ongoing interactions, it presents limitations and biases, such as the orientation of the camera (transforming the 3-D reality into 2-D video), and the limitation of capturing good sound quality in a noisy environment (see Erickson, 2006; Hall, 2000). In some way, videos are one narrative about reality. In addition to videos, past interactions can be accessed through participants who engaged in them. The uniqueness of SCNI technique resides in investigating ongoing interactions by revealing the subjectivities/habitus/identities of participants in relation to the studied interactions.

The SCNI technique has its own limitations. First, interviewees must have agility in talking about interactions and verbalizing their emotions and experiences. Although the SCNI technique resulted in rich data for all participants in my research (youngest age is 19 years old), it may not be equally informative with elementary and middle school students. Second, crucial for rich SCNI data, the interviewer and interviewee must construct a safe environment as much as possible, allowing the interviewee to speak his/her mind and say what s/he conceals in her/his ongoing interactions with groupmates because of face-saving and politeness processes (Goffman, 1967; Pearson, Kreuz, Zwaan, & Graesser, 1995).

Results

Data reported is collected from a number theory class at a Northern California college. The course was solely based on small-group work throughout the semester. Students (10 females and 13 males) composed their groups at their will. There were 5 groups of 4 or 5 students each. Four groups (G1, G2, G3 & G4) consented to be videotaped (all their group sessions were videotaped) and 15 students of these groups participated in individual interviews (early and late unmediated interviews + SCNI). Groupmates participated in SCNI interviews on the same day and every other week. I conducted 45 SCNI interviews in total.

Case 1: Friends, yet not alike

Izabelle, Nawal, Leila, and Gaia wanted to be in the same group, G1, because they had been friends for at least a year. On September 22nd (henceforth 9/22) the instructor Hoffmann started the class by explaining the definition of primitive roots for about 10 minutes then set the groups to work. The group G1 was still in the middle of a worksheet that they could not finish during the last session. While groupmates were opening their notebooks and getting ready to work together, Gaia called the instructor. We observe in the video of this group session that Leila was surprised (evidence: eyes wide open, head turns swiftly, then she frowns) when she looked up and found the instructor at the group table. The video does not show significant reactions from Izabelle and Nawal. In the individual SCNI interviews that followed this group session, Izabelle did not comment on Gaia's behavior, but Leila and Nawal did.

Leila: [*pauses the video at the moment when Gaia calls the instructor*] I was a little annoyed by what happened there ... haha because we were all like kind of like trying to get like going and then Gaia she's been like really on top of stuff but I just felt like as a group like ... we should have ... kind of like went over stuff together and then she just like jumped in and like asked Hoffmann when we like I or at least I didn't feel like I was ready to like kind of ... ask the questions about that yet. Because I hadn't even really had the chance to look at it so like as far as like working as a group I was like a little like ... frustrated like I hadn't even had the chance to look at it and we were already going [*cough*s] going for it.

Nawal: [*pauses the video slightly before the moment when Gaia calls the instructor*] I felt kind of annoyed with Gaia when she did what was coming up. Cuz she called over the professor right away instead of like asking us the question she had and I thought it was kind of like not very like group like because I feel like if you have a question and you're sitting with your group you should like ask the rest of your group members first because like maybe someone gets it too or maybe they have the same question. So I remember feeling kind of like annoyed and I thought it was kinda rude how she like called him [Professor] over and asked him directly instead of like talking to us about it first.

While Izabelle seemed to not be affected by Gaia's calling the instructor, Nawal and Leila found Gaia's act annoying. However, Nawal and Leila narrated their frustrations differently. Leila was frustrated because she "hadn't even had the chance to look at" the problem and thus not yet ready to follow any conversation about it. Nawal felt insulted ("it was kinda rude") that Gaia did not consider her groupmates capable of answering her question, because Gaia "called and asked [Hoffmann] directly instead of like talking to [them] about it first." Three women who had associated with each other in the past two years and shared a Hispanic background had different reactions and understandings of the same act. The diversity of individualized discourses employed to make sense of group interactions would not have been revealed without SCNI interviews. Video analysis is not enough to study group interactions.

Case 2: My personal space

For the purposes of this paper, I will merely sketch the argument for cases 2 & 3 (the full set of data will be included in the extended paper, if the proposal is accepted). In the early unmediated interview (general questions about students' experiences with mathematics classrooms and small-group work), Leila (on 9/12) said that she needed her "personal space" and became irritated when groupmates, particularly Gaia, started writing on her notebook and got

physically close to her. Indeed, on the group session of 9/22, Leila gave Izabelle, who moved her body close to Leila, a look from the side of her eyes and immediately Izabelle backed off and smiled. In her SCNI on 9/22, Izabelle commented, "Leila likes her own space." Nonetheless, on 9/22 Gaia stood twice (for about 1 minute 30 seconds each time) over Leila's shoulders and wrote on her notebook. Surprisingly Leila did not seem irritated by Gaia in the video.

In her SCNI interview on 9/22, Leila repeatedly commented that she was struggling to make sense of the mathematical conversation of the instructor with her group. She also mentioned that she was masking her lack of understanding by nodding every time the instructor looked at her. When the instructor left the group, Leila was totally confused about the task and what they were supposed to prove and how. But her groupmates started working on the problem without noticing her struggle, for which reason she was even more irritated. She ended up asking her groupmates a couple of questions, and it was Gaia who immediately volunteered to explain matters to Leila by standing over her shoulder and writing on Leila's notebook. In her SCNI interview, she commented on this moment of group session.

Excerpt SCNI-Leila on 9/22. [*Leila pauses the video of group session at 28:10 when Gaia is standing behind Leila and explaining to her*].

Leila: […] at this point I was like understanding like when Gaia explained to me [*clears throat*] how you get from like our what we're trying to show like how you would factor out one part or whatever [*sniffs*] and then like basically like how we got to like what our conclusions were supposed to be and then this is where it clicked for me, I was like, Oh that makes sense now … So I was feeling good about myself. [*laughs*] for once.

[*The video is running at 28:50. Events in the video: Izabelle remarks that the difference is reversed; Gaia moves close to Izabelle to explain to her that* $if\ a-b\ \equiv 0\ then\ b-a\equiv 0$]

Leila: Yeah see Gaia is so teachery [*laughs*]

Facilitator: Ok, umm, why are you saying this?

Leila: Gaia is like very teachery like sometimes it's good like I like like in cases like this I like it but sometimes it's a little too much for me ... like it's a little sometimes I feel like it's a little overbearing. But like in this situation like the way that she like approached helping me and showing me like, Oh I was really appreciative of it because she like really helped me and explained it really well.

Leila did not seem irritated by Gaia's invasion of her personal space as she was explaining the exercise to her in this group session (9/22). She backgrounded her sensitivity about her personal space because other contextual issues were more pressing at that moment. Leila was desperate to understand the mathematics discussed and to catch up with her groupmates' work. Because Gaia's explanation was helpful to Leila and thus responding to a contextual pressing need, the latter could tolerate Gaia's intrusion into her personal space. This case cautions us about using data from unmediated interviews to explain ongoing interactions, which are subject to contextual forces that can qualify or compromise what people think about themselves and others in absolute terms.

Case 3: Two types of passive engagement

Boutros, a member of group G3, and Tito, a member of group G2, were only passively engaged in group-work for several sessions. Both of them sat in their group silently, listened to what groupmates were discussing, took notes, sometimes detached themselves from the group to

do individual work, and almost never shared their mathematical thoughts with the group. They would engage sometimes in off-topic conversations with groupmates.

In their first SCNI interviews (Tito on 9/24 and Boutros on 10/15), Tito and Boutros commented on their respective group sessions in two distinct ways. Tito exhibited evidence that he was following the group discussion, even when he was not actively participating. He accurately commented on group activity using "we" (31 times) instead of "they" (5 times), despite his rarely participating in the group activity. On the contrary, Boutros spoke little about group activity, which he could rarely identify, using the pronouns "they" (7 times) and "we" (4 times). While Tito identified himself with the collective activity (e.g., "we solved the problem"), Boutros narrated a gap between his and his groupmates' actions. Following are two samples of Tito's and Boutros's comments.

Tito: Um, clearing it up. Cause we already finished it we were um, we concluded that Tom's part was right, so we just so everyone's writing it down.

Boutros: Uh, yeah I was looking at the problems on the worksheet and tryna figure out what they were working on. Yeah like I think I was listening to them a little bit, so I knew what problem they were doing […] It was the second one? So they finished the first one and then they started working on the second which, which was, which was can't remember right now. [*underlines are mine*]

I also coded the subjectifications and objectifications (as presented in Heyd-Metzuyanim & Sfard, 2012) in Tito's and Boutros's styles of narrations. Each one of them produced 100 subjectifying units, i.e., attributing social and socio-mathematical actions to agents. Note that for Tito, 31% of subjectifying units were attributed to the collectivity ("we"), compared to only 4% for Boutros. Boutros produced 20, as opposed to Tito having produced only 4, objectifying units.

According to the sfardian learning theory (Sfard & Prusak, 2005), Boutros is more prone to maximize his learning gain than Tito, because he is aware of a gap between his and his groupmates' actual actions. Although working in small-group, Tito may have fallen into the same illusion of students attending lectures, who misperceive the neat proofs laid out on the whiteboard by the instructor as representations of their own state of understanding and thus remain heedless of their actual state of knowledge. Future work will investigate this prediction and conjecture.

Conclusion

When working in small-groups, students draw on their social and socio-mathematical habits, which they internalize through their prior experiences in other or outside classrooms, to act and interpret groupmates' acts. As the field of small-group learning is moving toward investigating interactions and their underpinning power and socio-emotional forces, the SCNI technique is well suited to the task. Data from unmediated interviews may not be reliable for contextual analysis (case 2) and video analysis of group sessions may not be sufficiently informative (case1). The SCNI technique affords nuanced data in rapport to ongoing interactions, mainly due to participants' perspective *in situ*, and opens up the possibility for new analytical methods (for example, case 3) to enhance our understanding of small-group learning.

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