

Communication for Specific Purposes as translingual

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Abstract

Recent theoretical developments suggest that meaning making involves the relationality of human and nonhuman agents and diverse semiotic resources working together. “Translingual” is an inclusive term to refer to how different languages and modalities work together in communication. I draw from enregisterment perspectives in linguistic anthropology to demonstrate how a corpus of semiotic features becomes sedimented to identify specialized communicative activities. I illustrate from the Research Group Meeting of international STEM scholars in a midwestern American university. Despite their variable grammatical proficiency in English, the international scholars communicate effectively because they draw from a translingual assemblage that is diversified, and collaborate for joint outcomes adopting reciprocal communicative strategies. Outcomes are not defined by the grammatical mastery of individual speakers, but how participants collaborate through embodied translingual semiotic resources in their setting and community, facilitated by suitable ethical dispositions. The pedagogical alternative proposed will focus on cultivating the dispositions to negotiate translingual repertoires, material ecologies, and social networks for more inclusive outcomes in communication for specific purposes.

Keywords: Communication for Specific Purposes, Translingual Practices, Enregisterment, Specialized Communicative Activities, International STEM Scholars.

Resumen

La comunicación con fines específicos como translingüe

Algunos desarrollos teóricos recientes sugieren que la creación de significado implica la relación entre agentes humanos y no humanos, así como diversos

recursos semióticos que colaboran entre sí. “Translingüe” constituye un término inclusivo empleado para referirse al modo en que distintas lenguas y modalidades contribuyen a la comunicación. Con base en el concepto de *enregisterment*, propio de la antropología lingüística, el objetivo es demostrar cómo un corpus de rasgos semióticos se sedimenta para identificar actividades comunicativas especializadas. Ello se ilustra a partir de la Reunión del Grupo de Investigación de académicos internacionales de STEM en una universidad estadounidense del medio oeste. A pesar de su diversa competencia gramatical en inglés, los investigadores internacionales se comunican eficazmente porque se basan en un conjunto translingüístico diversificado y colaboran para obtener resultados conjuntos adoptando estrategias comunicativas recíprocas. Los resultados no se definen por el dominio gramatical de los hablantes individuales, sino por la forma en que los participantes colaboran a través de recursos semióticos translingüísticos incorporados en su entorno y comunidad, facilitados por disposiciones éticas adecuadas. La alternativa pedagógica propuesta se centrará en cultivar las disposiciones para negociar repertorios translingüísticos, ecologías materiales y redes sociales para obtener resultados más inclusivos en la comunicación con fines específicos.

Palabras clave: Comunicación con fines específicos, prácticas translingües, *enregisterment*, actividades comunicativas especializadas, investigadores internacionales de STEM.

1. Introduction

In a recent retrospective on the state-of-the-art in LSP research, Anna Mauranen (2022) observes in this journal that studies on oral and interactional genres are lacking in the field: “there seems to be almost no interest at all in interactive speaking” (p. 7). She also notes that LSP research does not fully reflect the multilingual nature of many specialized interactions: “There is normally a matrix language that interactions are primarily framed in, but in addition to that, speakers’ other language resources also surface and probably lead to borrowing and blends” (p. 14-15). She further observes that “nonverbal and paraverbal communication is also a worthy topic” (p. 15) in specialized communication. She avers that this neglect might be explained by the fact that LSP research has traditionally been motivated by the interest in teaching written genres to individual students. She calls for more studies that address these gaps in an effort to match our teaching to the actual practices of specialized communication.

Recent theoretical developments offer motivations for addressing these concerns in LSP. The turn to embodiment in communicative studies, influenced by movements such as decolonization and new materialism, have questioned the traditional binaries which treated analyses in disembodied ways (see Canagarajah, 2023). For example, language studies have been influenced by a logocentricism that treated language as the superior medium of communication, treating other communicative resources such as gestures and visuals as secondary. Language was also treated as endowed with the capacity to communicate meanings through its intrinsic grammatical structure, and separated from geographical, historical, and social control. There was also a methodological individualism that treated individuals as the locus of knowledge, communication, and agency. Furthermore, there was a cognitivism that treated the mind as transcending bodies and environments to generate knowledge and meanings by itself. The embodied turn situates communication and people in material environments to theorize how they are mediated by these conditions. Communication always emerges from the distributive practice of diverse social and material agents.

In this paper, I will demonstrate how we can explain an important genre of scientific communication from this embodied perspective. Such an analysis will show how conversations and texts, texts and contexts, and speakers and listeners have to work together to generate meanings. To capture the ways in which diverse semiotic resources (including multiple languages) are involved in communication, I have adopted the term “translingual” (see Canagarajah 2020 for an inclusive definition). Similarly, in the place of English for Specific Purposes (ESP) and Languages for Specific Purposes (LSP), I use Communication for Specific Purposes (CSP), as these genres involve diverse communicative resources beyond languages.

2. The embodied turn

What many scholars label the embodied turn (see Bucholtz & Hall, 2016) is inspired by movements such as decolonization, disability justice, and new materialist studies which favor a nondualist worldview. The 16th century European Enlightenment, which has shaped modern linguistics, was based on a dualist ontology that made binaries such as mind/body, human/nonhuman, text/context, and language/action, with the former defined as agentive and the latter dependent. Embodiment questions the

previously mentioned binaries, treating entities as interconnected and mutually shaping each other. From this perspective, language too is entangled in diverse social and material conditions. Communication then is always embodied, influenced by geographical, historical, and material factors shaping it. Since languages are thus entangled in diverse resources, sociolinguists have argued that named languages are not primordial. Labels such as English, Korean, or Chinese are social constructs. “English” then is an assemblage of diverse semiotic resources it has come into contact with. (I use the inclusive term “semiotic resources” because “linguistic resources” are only one of many signs people use to communicate.)

In this article, I draw from the disciplinary orientation of linguistic anthropology to discuss how a collection of linguistic and semiotic resources gets *enregistered* as the “language” for specific communicative activities. Enregisterment is an ongoing social and ideological process whereby a semiotic corpus gets identified as conventional for an activity or identity (see Agha, 2005). It is therefore more appropriate to focus on communicative *activity* as the unit of analysis for the diverse semiotic resources constituting a genre, rather than assuming a labeled language or languages as the starting point for our teaching or research. In place of relying on formal proficiency in grammar, which might have variable relevance in communicative practice, we must prepare students for the translingual semiotic repertoires needed for their purposes and develop in them the dispositions to always attune to the mix of entangled resources in any activity.

Foundational models such as structuralist and generative linguistics have treated the grammatical structure as encapsulating language’s essential characteristics and people’s capacity to speak/write (labeled *competence* or *langue*), determining variable communicative uses (*performance* or *parole*). Describing a language by isolating it from its social and material entanglements, and treating it as self-standing with its own internal structure (i.e., *synchrony*), was the hall mark of descriptive analysis, valued over historical changes over time and space (*diachrony*). Similarly, competence was defined as the intuitive (mental) capacity to speak the native language or internalized grammars of additional languages. The internalized grammar was treated as adequate to explain how people activated this competence in diverse social and environmental contexts for communicative performance (see for a justification of these constructs in applied linguistics: Long, 1997).

The embodied turn has favored a flat ontology that perceives languages, minds, and human individuals as entangled with other social and material conditions and calling for distributed practice for generating meanings and outcomes. That is, meanings do not reside in one particular domain (mind) or resource (grammar) but always emerge through their inter- and intra-action. By *intra-action* it is understood that humans not only engage with other agents and resources to generate meanings, but they are themselves changed by this *inter-action*. Since people and resources are always embodied and embedded in diverse social and material conditions, distributed practices for generating meanings and outcomes require relationality. That is, meaningful outcomes require ethical dispositions, such as tolerance, patience, and solidarity. Those who engage with self-centeredness or self-sufficiency impose their own norms and interests on others, resulting in self-serving outcomes.

It is true that certain orientations in language studies have proceeded to focus more on the *practive* of communication by accommodating the role of gestures and multimodal resources in their considerations (see Kress & van Leeuwen, 2001). Despite these salutary developments, these multimodal approaches fall short of the changes called for by the embodied turn. They largely treat multimodal resources as complementing words. Material objects and social institutions are treated as part of the “context” and rarely interpreted as agentively shaping meanings of words or communicating their own meanings. Objects are not treated as communicable agents—beyond providing a context, support, or variation for words. And individual speakers are treated as responsible for constructing or interpreting meanings, though with sufficient collaboration from their interlocutors.

Now consider how the focus of analysis will shift radically with the embodied turn. Rather than supplementing the previously dominant constructs such as language, cognition, and individuals with other resources, embodiment will motivate a different starting point for our analysis and teaching. The unit of analysis will shift to something broader that will accommodate the diverse semiotic resources, social networks, and environmental conditions that shape meanings. We should shift the analytical focus to the whole communicative *activity*. This shift is not novel, as linguistic anthropology has a long history of treating activity as the unit of analysis in its more socially grounded orientation. This will be a radical departure from past attempts to variably treat the following as unit of analysis in linguistics: i.e., language (how is meaning made in relation to the grammar of a single

language); individual (how is a break down or misunderstanding explained by the lack of competence of the speaker or the auditor); or cognition (how is the speaker's intuitive or internalized grammatical and discursal proficiency attributable to communicative success or failure). Activity as a framework will thus accommodate the distributed practice of diverse languages, semiotic resources, and objects mediating each other; diverse social participants and social networks collaborating for meanings; and bodies shaping meanings in the form of affect, intuition, dispositions, and ethics—all of which were previously treated as not intrinsic to language analysis or proficiency, but an additional or secondary concern at best.

3. Analytical orientation

Admittedly, *activity* is too large a unit for analysis, and entangled semiotic resources too messy for analytical focus. How do we identify the consequential resources for each communicative practice or genre? I hold that some of the constructs developed in linguistic anthropology (and adopted in methods such as Interactional Sociolinguistics) can be repurposed for this analytical undertaking. Though these constructs were used in the past to study the meanings generated through linguistic resources by human agents, they can be expanded to include other resources and agents in the embodied orientation (see Canagarajah, 2020).

The unit of analysis as *activity* complicates the previous analytical distinction between *text* (or language) and *context*. In the embodied framework, everything in the “context” can become indexical and entextualize meanings. In the place of the traditional static and secondary notion of context, sociolinguists prefer the more dynamically defined “*frames*” to identify the communicative purposes and conventions. Bauman and Sherzer (1975) define frames as “a metacommunicative device which signals the interpretive context within which a message is to be understood, a set of interpretive guidelines for discriminating between orders of message” (p. 106). Frames can range from discursal, cultural, institutional, national, and geopolitical conditions to relevant scales of space and time. At the more micro scale of interaction, frames can include the following: the task structure, participant frameworks, genre conventions, and language ideologies. Though frames can help focus on the salient resources of a communicative activity, they are not pre-given. They are interactively and semiotically achieved. Goffman (1974)

treats frames as ever-evolving schema that participants in interaction use in making sense of ongoing exchanges. In fact, frames and semiotic repertoires interact in dynamic ways to shape each other. While interlocutors might start the interaction with the frames into which they are habituated in relation to their ongoing practice, it is possible for the frame to be reconfigured, based on the discourse strategies of the participants.

Frames circumscribe the environment for an interaction and determine how semiotic *resources* become *repertoires* (Kusters et al, 2017). Though all the symbolic and material resources in a setting could potentially be communicative, many resources are not salient or functional for a given activity. Based on how the activity is framed, certain resources become more functional. And as these *resources* get used frequently in specific interactions, they become enregistered as the conventional *repertoire* for that activity and for those interlocutors. When a corpus of semiotic resources becomes used over time with uptake by others in that activity, it becomes *enregistered* to identify that social group and/or that genre of activity (Agha, 2005). Through enregisterment, we can also distinguish *between* resources. We can distinguish how “some resources are permanent and enduring and others are temporary and dynamic” (Kusters et al, 2017, p. 5). That is, certain semiotic resources become more significant in functionality than others, or more typical for that activity while others are variable. These functional differences within semiotic resources form “hierarchical constellations” within repertoires (Kusters et al, 2017, p. 8), mapping their relative importance for specific activities. When these differences become enregistered over time, we get “regularised, patterned communication-practices” (Kusters et al, 2017, p. 9). A particular feature that helps to bring into salience the semiotic resources that are significant for an activity are *rules of (ir)relevance*. Erickson (1975) defined this as “decisions about which attributes of a person will be treated as important to the interaction” (1975, p. 49). We can expand this perspective to decisions about which semiotic resources are significant for an activity, depending on the frame and enregisterment. Why interlocutors treat certain grammatical and discursive deviations as irrelevant (adopting the “let it pass” principle—see Firth, 1996), and others as needing to be resolved, will depend on their rules of (ir)relevance.

Key to distinguishing semiotic repertoires is also their variable locus. Gumperz initially defined verbal repertoire as “the totality of linguistic forms regularly employed *within the community* in the course of socially significant interaction” (1971, p. 182; emphasis added). Though he expands repertoires beyond the

labeled language, he locates them “within the community.” Even if we qualify “community” as expanding beyond the speech community, such as *communities of practice*, this locus does not explain all of one’s semiotic repertoires. Other scholars have theorized the repertoires of individual speakers.¹ They treat these repertoires as evolving from the communicative activities in people’s life histories. For example, Blommaert and Backus (2013) define repertoire as “individual, biographically organized complexes of resources” (p. 8). Detaching a speaker’s repertoires from that of the community is well motivated as one may not know or need all the resources that constitute a speech community’s repertoire. Nor is one’s proficiency limited to the norms of a single community. One’s mobility trajectory plays a role in which communicative activities have been relevant and what resources have mattered for accomplishing them.

In addition to the community and the person, some repertoires are embedded in the physical environment and labeled as “spatial repertoires” (Canagarajah, 2018; Pennycook & Otsuji, 2015). Goodwin’s (2013) notion of “substrate” gives insights into such repertoires. He suggests that interlocutors draw from “an immediately present semiotic landscape with quite diverse resources that has been given its current shape through the transformative sequences of action that culminate, at this moment, in the current action” (p. 11). The semiotic resources used by previous interlocutors for that activity in that setting become sedimented to shape communicative activities associated with that place later. Other interlocutors may repurpose them for their own communication. Consider the typical layout of a classroom, with the configuration of a board, screen, podium, and chairs set up in particular relation to each other, and which instructors creatively use to shape their instruction. These resources are spatial in the sense that they are embedded in the physical contexts (or places) in which the communicative activity occurs.

In interactional analysis, therefore, researchers should be sensitive to how the repertoires of a *community*, *participants*, and *space* work together in shaping communication for varying meanings and outcomes. Despite distinguishing the range of resources that are functional in an activity, we have to be cautious not to treat them as generating meanings by themselves. In the embodied orientation of relationality, ethical dispositions are key to the relevant strategies interlocutors adopt to generate meanings out of these expansive and changing communicative resources. As different participants with different identities engage in these activities in changing settings, the repertoires will also change.

Enregisterment becomes an ongoing process. These diverse and changing semiotic resources require relational disposition for meaning making. Based on the participation framework and task structure framing that activity, the interaction will call for different values, ethics, and language ideologies. For example, certain interactions I study in professional communication involve people with different specializations engaging in collaborative interactions for mutually invested outcomes. These interactions call for values such as collaboration, solidarity, and tolerance in negotiating their semiotic diversity and achieving communicative success. Of course, functional hierarchies relating to status and role differences have to be respected as everyone engages in collaborative outcomes. However, in interactions where interlocutors are not mutually invested, or statuses are more regimented, some interlocutors will adopt a footing that is less inclusive and collaborative.

4. Repertoires of a communicative activity in STEM

I proceed now to analyze a communicative activity of international scholars in STEM (science, technology, engineering, mathematics) to illustrate how different semiotic resources constellate in specific ways to enable their communication. The activity is lab meetings, also called Research Group Meetings (or RGM; Swales, 2004). Swales has outlined the genre of RGM in terms of its communicative activities. In RGM, novice scholars are apprenticed while engaging in legitimate peripheral participation (Wenger, 1998) in research and knowledge dissemination with senior scholars.

4.1. Background to the study

The data comes from my ongoing qualitative research in the fields of Microbiology, Engineering, and Entomology in a midwestern US university, where I am focusing on the interactions of international scholars as they engage in research with a mix of “native English” speaking and multilingual professionals. My study began with the question: “What role does grammatical competence in English play in the professional communication of international STEM scholars in American universities?” Data collection has been proceeding since 2013. The video recording of research and teaching interactions is complemented by biographical interviews with focal international/multilingual scholars, discourse-based interviews on artifacts and transcripts, collection of written drafts and publications, and

ethnographic observations of workplace practices. The broader findings have been reported elsewhere (see Canagarajah, 2018, for example).

In this article, I perform an interactional analysis of excerpts from a team of researchers in Microbiology as they troubleshoot their experiments in their lab. This RGM interaction features: a South Korean postdoctoral researcher, whom I call Jihun; Anglo-American Principal Investigator (PI) who runs the lab and the research project, Nick; Indian Associate Professor in Chemical Engineering, Mohan; Chinese postdoctoral researcher, Jie; Anglo-American graduate student, Jane; and Irish graduate student, Rob. The excerpts I analyze below mainly involve Jihun and Nick, who display major status differences. The participants reviewed figures and images from their experiments projected on a monitor placed centrally in the room. In the interaction under consideration, the members are discussing whether their images make visible what they claim as their findings in an article submission. The journal’s reviewers have challenged their claim.

The physical setup of the meeting room is an integral part of the framing of the Microbiology RGM under consideration and provides spatial repertoires. It takes place in a small room equipped with a cylinder-shaped table, six chairs, and a computer connected to a wall-mount monitor and to a wireless keyboard (see Figure 1). Typically, Nick and the person reporting on experiments sit next to the monitor across from each other, which Jihun explained as “just everyone’s preference.” This seating arrangement shapes the unfolding of the meeting, as the participants frequently orient toward and use gesture relative to microscopic images presented on the monitor. The monitor, visuals, gestures, and body—and their physical configuration—serve as spatial repertoires for this RGM. They help configure the “ecological huddle”—i.e., an emic organization of human bodies and objects constituting a shared focus of attention (Goffman, 1963).



Figure 1. Physical configuration of the RGM

Note that not all RGMs have the same spatial repertoires. Another RGM I am studying, featuring engineering scholars, is set up differently. The members sit around a chalk board. This framing reflects their genre of working mathematical problems on the board for communication.

My focal participant Jihun had done all his education, including his doctorate, in Korea. He had migrated to the United States about 7 years earlier for professional training, working as a postdoctoral scholar successively in two universities. In interviews with me, he said that he had considerable difficulty in understanding conversational English and that he was anxious about his limitations. He stated, “It’ll be better if I can understand spoken language better and I am more fluent.” Jihun’s self-acknowledged grammatical imperfections do not appear to compromise his ability to perform professionally. I asked how he explained the fact that, despite his claimed limited English proficiency, he efficiently took the lead in RGMs where he had to report on emerging findings and negotiate conflicting interpretations. One might assume that very advanced English grammatical proficiency is needed to negotiate an interaction where participants from different countries use diverse varieties and proficiencies of English. In response, Jihun articulated the language ideologies and ethical dispositions framing this interaction:

Excerpt 1:

- ASC: How do people from all these countries- able to work efficiently?
- Jihun: They actually have some common things, like we have a goal. [. . .] People keep looking for someone actually who can supplement or compensate our weak point. [. . .] Because one person cannot do everything.
[. . .]
- A: I wonder if there are any communication problems because you all talk differently? [. . .]
- J: I think it is sufficient what we need to do, what we have done. I am always hoping to be more fluent to get a better understanding of what to do what to say what to be spoken.
- A: Do you have any problems understanding Jie? Because her accent is different?
- J: Sometimes I had a problem during the conversation, but I know what she meant.

The following features of the RGM framing stand out. The task structure involves members engaged in a shared or common goal, i.e., the formulation of their research findings, which in turn is connected to other larger goals such as presenting them in successful publications, obtaining grants based on the success of their research, and thus ensuring the continuation of their lab and their careers. This influences a collaborative participation framework for this interaction. Jihun says that the relationship is based on complementing the strengths each person brings to the group. Jihun mentioned elsewhere that his expertise was in electromagnetic imaging, and that the group found his work indispensable for its research. In such a situation, the power relationships between the participants are relatively distributed and negotiated. For example, while Nick is the senior professor and PI, his status is qualified by the indispensability of Jihun's expertise for certain experiments. In the interaction to be reported below, Nick positioned Jihun as more knowledgeable about certain matters, and adopted a deferential footing.

Because of such participation framework, the participants' language ideologies and ethical values are also differently framed. In the above excerpt, Jihun says that their communication is based on "sufficiency" rather than correctness or mastery. In other words, the group brings a functional orientation to language, treating the relevance to their work at hand as more important than normative grammatical correctness. Jihun goes on to say that in times of communicative difficulty or breakdown, they resort to guessing the meaning ("I know what she meant"). To understand this possibility, we have to consider how the group draws from all the communicative repertoires as relevant. Participants do not depend on words alone, but the embodied repertoires of their setting and community. Such an orientation is enabled by the ethical values motivated by this framing. Jihun says that their common professional goals motivate them to "supplement or compensate our weak point." The framing calls for dispositions such as tolerance, patience, and collaboration. It is this framing of the RGM interactions, based on values of functionality, sufficiency, and solidarity, that explains how Jihun's developing proficiency in English grammar does not result in communication breakdown.

4.2. (Ir)relevance of prescriptive knowledge of English

In the recordings of the RGM, I observed numerous instances where grammatical and discursive conventions of ordinary conversation are

suspended or altered. Jihun’s personal grammatical repertoire (the “English” he brings with himself) becomes less important in the context of the RGM framing. While rarely problematized in the meeting, Jihun’s talk exhibited Korean-influenced pronunciation and frequent grammatical missteps. For example, when requested by Nick to clarify whether the amount of detergent used was above or below a certain threshold, Jihun responded as follows:

Excerpt 2²

- 1 Nick: it’s- it’s above it, or below it.
 2 Jihun: it’s^{iu} above. °it’s^{iu}- it’s^{iu}- it’s^{iu} above°
 3 way much abover (.) °than one cmc°
 4 Nick: °°yeah.°°
 5 >so what would people do<
 6 when they are looking at membrane proteins

Here, Jihun’s turn in lines 2 and 3 features three noticeable linguistic deviations from prescriptive grammar: i.e., constant vowel insertion after *it’s*, unconventional use of *way much* for intensification, and erroneous application of the comparative form to a preposition *above*. These features would typically be treated as evidence of incompetence in gatekeeping examinations such as TOEFL and IELTS, but they are not oriented to as objects of repair or correction in the RGM. Most remedial courses in universities would intervene to correct such deviations. It emerges that given the framing of the activity and solidarity in the research group, the participants applied their own rules of (ir)relevance and “let pass” these linguistic deviations.

To understand how the participants determine what is passable, we must also consider a case where the participants correct verbal deviations. Excerpt 3 below showcases one such instance:

Excerpt 3

- 1 Jihun: so- (.) so: you just put like
 2 ↓twelve twenty forty eighty something like-
 3 >this kind of< (.) gradient?

- 4 or the-[machine]
- 5 Nick: >[that's not] a gradient.< that's a step.=
- 6 Jihun: =step, yes.
- 7 Nick: ((continues to elaborate on gradient))

In this short fragment, Jihun attempts to make a confirmation check delivered with rising intonation regarding his understanding of *gradient* (as compared to *step*), following Nick's extended turn discussing the two terms. However, unlike what we have seen in Excerpt 1, Nick immediately and directly corrects Jihun at this instance (line 5), as the word in question is critical to the technical details of the experiment. From this, it can be inferred that the local rule of irrelevance may not define as passable verbal errors that relate to a critical detail of research. What we see here is that not all deviations are accepted. Certain verbal deviations do not merit the "let it pass" strategy (Firth, 1996). The community repertoire of this disciplinary group, rather than the correctness of "native speaker" grammar, is treated as more significant in this instance. Nick makes the correction matter of fact and moves on to build the conversation after Jihun demonstrates uptake, again demonstrating a solidarity ethic. Note moreover that work and learning co-occur in these interactions. Interlocutors do not always bring all the semiotic resources needed for an interaction. The participants are willing to learn/teach patiently as they work together, as in the theorization of *communities of practice* (Wenger, 1998). In this way, Jihun gets opportunities to develop proficiency in the communally shared repertoire.

4.3. Constellations of repertoires

I now illustrate how diverse semiotic resources work together in the activity of this group. The chosen excerpt for illustration begins with Jihun explaining to his team the images he has obtained from his experiment. They are projected on the screen, and he moves his cursor across the screen to point to the details:

Excerpt 4:

- 1 Jihun: this is the- so this is >situated< from one ↑ to seventeen.
—>uses the cursor to point at the screen —>
- 2 so one is actually same for the- each gel

- +moves open hand toward the screen
- 3 to make it like °something like (x)° control.
+moves open hand toward the screen to point
- 4 so one is cell extract and then °done membrane protein (.)
5 membrane and then ° (.) flow through (.) and washing step
6 and then this dilution=
- 7 Nick: =°°aha°°
- 8 Jihun: °and concentration° (2) and then this concentrated one was (.) re- (1)
+ moves both hands in circling motion
- 9 reincubated [with]
- 10 Nick: [is ten]
- 11 concentrated and nine is (.) just dilution?
- 12 Jihun: nine and ten >ten is actually concentrated one<, but the- it's not
13 the (unintelligible)
+showing a length with fingers
- 14 Nick: [[[polymerized]]]
- 15 Jihun: [yeah yes] so (.) then, the whole thing was incubated again, then
16 then this is flow through, after

Note that many verbal resources Jihun uses in this interaction depend on the spatial repertoires for their indexicality. The frequent deictics (“this”), adverbs (“then”), and numbers (“one. . . nine. . . ten”) depend on the visuals on the screen and Jihun’s synchronous activity of pointing with his gesture or the cursor for their meaning. Despite his frequent pauses and hesitations, and the low denotational value of his diction, his interlocutors do not register any failure of uptake.

In some instances, when Jihun hesitates for words, the spatial repertoires help his interlocutors to complete his turns. In line 13, there is hesitation as Jihun gestures when he looks for a word. Nick prompts “polymerized.” Note that Nick should be attuned to all the spatial repertoires in the setting (i.e., visuals, Jihun’s cursor, and gestures) in addition to the preceding text to infer the needed word. Nick adopts a footing of collaboration and demonstrates values of patience and tolerance in drawing from all the ecological resources

to help Jihun. While the movement and use of Jihun's body in the above instances might play a supplementary function to build indexicality for his verbal resources, there are other instances where the body agentively generates meaning. In line 8, Jihun gestures as he looks for a word. Perhaps the bodily movement provides a space for him to retrieve the word. It is possible that the word is also embodied with this gesture for him to recall the word. Some scholars have used the term "thinking with your hands" to indicate how gestures facilitate thinking (Van Compernelle & Williams, 2011). This is an example of embodied repertoires whose locus is the body.

The grammatical and lexical repertoires from his disciplinary community feature prominently in this interaction. Consider the following excerpt:

Excerpt 5:

- 1 Jihun: and then, the washing (1) for washing and then this is
 2 dilution >and then this is concentrated so,< this is histidine
 3 body so
 —>leans back, turns face to PI->
 4 histidine antibody
 +moves left hand away from his right hand once
 5 Nick: [°captured?°]
 6 Jihun: [right,] so:, (2.3)
 7 Nick: this was histidine antibody?
 +points at the screen
 8 Jihun: yeah both, yeah both histidine antibody somehow this one
 9 is very bad
 +waves hand in the direction of the screen, smiles
 10 dirty but they (.) but they- you see the band is actually >there are
 11 so many< smaller band still [°there like this°]
 12 Nick: [°more of antibody?°]
 13 Jihun: right

Note that terms such as *washing*, *concentrated*, *dilution*, *histidine*, *antibody*, and *band* belong to the repertoire of microbiologists. In my interviews with

international STEM scholars, they mentioned that such community repertoires were not dependent on their grammatical proficiency. They also did not treat these words as “English.” They mentioned that they used these disciplinary terms even in their own countries when they interacted with their fellow nationals in their first languages. They treated them as disciplinary register accessible to everyone in their professional community. A scholar stated: “I don’t think [. . .] people have different relationships just based on, you know, where they came from or or what their uhm mother tongue was. Because when you sit down talk about science, everybody is speaking the same language.”

Nick demonstrates alignment by doing turn completions for Jihun (see line 5 where he supplies “captured”). In 12 he performs a more complex speech act. In the preceding lines, Jihun adopts a circumlocution to explain a finding by using vague words such as *bad* and *dirty* (and smiles in line 9 as face saving gesture). Nick rephrases with “more of antibody” in line 12 to sum up Jihun’s explanation (as a gist formulation or upshot) employing the community repertoire. Nick is aided by the spatial repertoires (visuals and gestures) to perform this rephrasing. Also note that Nick is not being judgmental or condescending, as in “foreigner talk” (Ferguson, 1975). His rising intonation treats Jihun as enjoying epistemic authority. His contributions are collaborative, designed to move the conversation forward, demonstrating the ethical values deriving from this framing.

In some instances, the interlocutors are able to locally renegotiate indexicality and adopt a resource as part of their substrate for ongoing conversation even if it violates the grammatical norms of the “native speaker” community. Consider the following instance:

Excerpt 6:

- 1 Jihun: °right and then° there is two bands still there
 2 like maybe- it’s not quite clear as in this one.
 3 Nick: °right.°
 4 Jihun: but it seems like there are two: bands
 5 or something like two=
 +moves hand toward the screen
 6 Nick: =two sets of bands

- 7 Jihun: °right right two sets of band° so it looks very similar to each other
- 8 Nick: °and so which band do you think we're going after?°
- 9 Jihun: a::m I think
—>puts hand on the cursor—>
- 10 Nick: =so if you use your (.) a::: other antibody just's just
11 to the CeSa=
- 12 Jihun: =yes=
- 13 Nick: =which band might-
- 14 Jihun: I- I usually get this two band, (1) not this smaller two band °but this°
15 top band and °maybe this band=°
- 16 Nick: =so those could be the CeSa

Jihun refers to “two band” in lines 1 and 4. Nick corrects him in line 6 (“two sets of band”—i.e., four bands) as this has implications for how the findings are understood. Jihun demonstrates uptake of the correction in line 7. However, in line 14 he forgets the correction and reverts back to “two band.” This time, Nick does not correct him, but adopts the “let it pass” strategy, and demonstrates uptake by suggesting a possible interpretation for the question posed by Jihun. This phrase becomes shared in that spatial ecology as a resource for that activity, with an understood meaning. The atypical phrase gains indexicality and becomes a spatial repertoire relevant for that setting.

In the next excerpt, we will see how the shared frame and ethic sometimes help participants with intelligibility when for those outside the activity (including researchers) some turns or words might appear to violate design preference:

Excerpt 7

- 1 Nick: #°so you're seeing these° three bands
>>points at image with right hand->
((see Figure 2))
- 2 #come up
+moves pointing finger up and down+

- 3 °(xx)° or four bands
+moves pointing finger up and down+
- 4 °[right here]°
- 5 Jihun: °[yeah. °
- 6 (0.5)
- 7 Nick: and those (.) #+two line up?+
+points at two objects, turns to Jihun+
- 8 Jihun: #°>i can actually +show you<°
+reaches to keyboard+
- Nick: +retracts pointing gesture+
((see Figure 3))
- 9 Jihun: °some because-°
+looks at screen and search through files until L13, and then opens a PowerPoint file->
- 10 #+(8.0)
((see Figure 4))
All: +fixate eye gaze on screen
until the end of excerpt->
- 11 Nick: uh:m
- 12 (18.6)
- 13 Jihun: and this is CeSa antibody,
+points at corresponding image with cursor+
- 14 and this is histidine antibody,
+points at corresponding image with cursor+
- 15 (2.0)
- 16 Nick: so this is histidine,
+points at lower image right hand+
- 17 Jihun: °yeah.°
- 18 Nick: #this is CeSa.

+points at upper image with right hand+

19 Jihun: yes.

((Nick and Jihun continue to discuss images))



Figure 2. Pointing at image with right hand (excerpt 7).

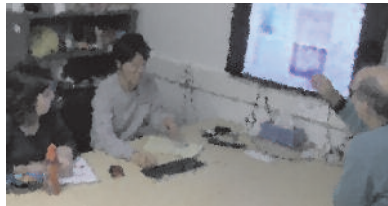


Figure 3. Retracting pointing gesture (excerpt 7).

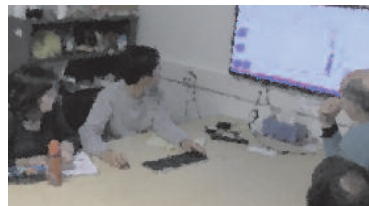


Figure 4. Looking at screen and searching through files (excerpt 7).

In lines 1 to 3, Nick asks Jihun to clarify what Jihun is seeing in the images. Nick's utterance is part of a larger course of action (i.e., clarifying what emerged in the experiment) signaled by the practice of *so* prefacing. As Nick makes his second question (line 7), he turns his head to Jihun specifying the addressee and perhaps also expecting a more elaborate response than a minimal token *yeah*. It is only when Jihun starts to look through his files that Nick retracts his pointing gesture (line 8), marking a shift in activity. Jihun's physical activity and gaze on the images serve as a contextualization cue for Nick about Jihun's response and decision to take the turn (though it is not articulated in words).

Jihun's response to Nick's question in line 7 merits close examination. Here, instead of providing a minimal response (i.e., yes or no), Jihun resorts to working on the monitor to gather other images and expand current images. Following this, Jihun searches his computer folders for the relevant file, leaving lengthy gaps in the stream of verbal interaction. From a logocentric and sequential perspective, Jihun's actions might be seen as *dispreferred* (Pomerantz & Heritage, 2013) since they do not conform to the type of response projected by Nick's question in line 7. However, despite the dispreferred, non-type-conforming nature of his actions, there are no observable signs of hesitation or dysfluency in Jihun's speech and in the interaction. Nick and the rest of the research group also seem to take Jihun's actions as adequate, as they do not pursue a response further. As Jihun searches for the images, all of the participants fixate their eye gaze on the monitor which serves as a shared locus of attention in the ecological huddle. The shared attention to the monitor, and more specifically to Jihun's publicly-observable search, suggests that intersubjectivity and progressivity of the RGM are maintained despite the break in speech exchanges. It is evident that the visual features here are serving as contextualization cues, and the absence of speech is treated as irrelevant to the activity at hand, pointing to the local framing for making situated inferences. Participants infer the meaning of the turn based on the framing rather than depending on indexicals such as words.

It transpires that Jihun is elaborating on the context of image generation rather than answering Nick's question about protein. Having located the file, Jihun resumes the verbal explanation in lines 13 and 14, and Nick makes confirmation checks in lines 16 and 18, designed similarly to the one made in lines 1 to 4. Note that from an outsider's perspective, the images Jihun shows here do not seem to give direct answers to Nick's confirmation check which called for a yes-or-no response. However, the participants do not problematize it and, instead, proceed with the ongoing activity. In other words, what Jihun seems to be doing is not simply following the turn-by-turn sequence of verbal exchanges; rather, Jihun is emplacing relevant images in front of the participants of the RGM who share the frame of treating visuals as critical for this activity.

5. Discussion

What I have demonstrated in this analysis is the way the framing of this interaction motivates multilingual STEM scholars to exercise collaborative ethical values and enact distributed practice to make meaning from the translanguaging semiotic repertoires enregistered for this activity. Though Jihun claims limited grammatical proficiency in English, what matters for RGM is his expertise in the enregistered repertoires of his discipline. We can distinguish the resources that makes up this genre in terms of their functional importance as follows:

Community repertoire: i.e., the scientific terms Jihun shares with his disciplinary community, in addition to nonverbal resources such as scientific texts, artifacts, and instruments. This repertoire emerges as more significant and permanent in this communicative activity.

Spatial repertoire: the words and multimodal resources embedded in the setting, such as body positioning, mouse, screen, images, texts, seating arrangement, and other spatial features serving as the substrate that is currently available and shared through ongoing activity in that room. These are less permanent, as they will change, based on the spatial configuration of different RGMs and meeting places.

Personal repertoire: the English grammatical items Jihun brings, together with his habituated gestures, nonlinguistic utterances, and bodily practices. These are more variable and secondary for this activity.

The community, spatial, and personal repertoires interact dynamically in the generation of meanings through distributed practice. For example, the English deictic items are mediated by diverse embodied resources for their denotational meanings. Note also that these repertoires are not static. They are changing and expanding as the community engages in its activities. For example, a community repertoire might become a spatial repertoire, and then become appropriated as one's personal repertoire. We see this happening when Nick offers "step" as the appropriate term when Jihun uses "gradient" in excerpt 3. This word is part of the community repertoire for his field. It is not part of Jihun's personal repertoire at this time, as he had difficulty producing it. Once it is deployed in the RGM, it becomes part of the substrate that Jihun can use for the activity. We can understand how the word can become part of Jihun's personal repertoire over time as the group

continues to use it. Through the corrections in the RGM, Jihun might be expanding his personal repertoire in the fashion of language socialization.

Note also how certain semiotic resources that are part of the communicative ecology become sedimented into spatial repertoires. For example, atypical verbal resources that are brought to the setting as part of someone's personal repertoire can then become spatial repertoires when they become sedimented through repeated use in that setting. Consider the phrase "two set" in excerpt 6. Though it is grammatically idiosyncratic, it develops a situated indexicality. It then becomes embodied and embedded in the setting for participants to build on. However, the phrase might not become part of the community repertoire. Nor would it become personal repertoire for other interlocutors. It might be used only by this RGM in this setting, as participants might adopt the "let it pass" strategy based on their rules of relevance.

For all these resources to make meaning by mediating each other in ongoing complex relationships, the participants need dispositions of relationality. My analysis demonstrates the critical role of ethical dispositions if diverse semiotic repertoires are to be valued and people draw from all of them to mediate their interactions. These repertoires will not be functional without a suitable language ideology or interactional ethics framing the communicative activity. Nick and the other interlocutors bring a solidarity ethic to engage in distributed practice in this interaction. They are willing to collaborate with the other participants in the RGM and draw from all the resources in the communicative ecology to make meaning. As we discussed earlier from Jihun's interview data (in excerpt 1), the members of the RGM adopt a suitable language ideology, as framed by the nature of their research activity. As a community of practice, where the participants are engaged in joint activity with mutual interests, they demonstrate dispositions and values that favor distributed practice to collaborate with each other and with the diverse enregistered resources beyond English language.

However, we must be wary to observe that the enregistered translingual repertoires will differ for different communicative activities of the same disciplinary group. In an interview, Jihun narrated the challenges he experienced in a professional conference:

Excerpt 8

That's the most nervous time for me. The first talk in an international conference, I practiced a lot. Actually I made a script, then I know how to

start from the beginning to the end. Then during the Q and A session someone was asking me something, but I didn't get it quite well. Actually I didn't answer quite well. But I think it was obvious for the audience.

Though he memorized the conference talk, he feels that he failed to communicate effectively during questions. He fears that he came off as incompetent for the audience. It is important to note here that genres such as this (i.e., conference presentations) are differently framed, and feature different spatial repertoires and ethics, compared to the RGM. Jihun does not have familiar spatial resources in the conference venue (whose layout he did not know till he arrived there). Also the audience constitutes a less familiar social network. Some members of the audience may come with different interactional values, framed around agonistic or competitive relations. We can understand, therefore, that the personal (non-normative) repertoires Jihun brought with him index deficiency for the audience in this genre.

Note also that the footing of the members of this same research group will differ in activities outside the RGM. Jihun recounted to me institutional interactions where the PI imposed on him to meet publishing deadlines in an unreasonable manner or adopt his plans for publications. Also, in collaborative drafting of manuscripts for publication, other members corrected his rhetorical infelicities, being deferential to the enregistered norms of scientific journals. When Jihun applied for faculty positions, he asked me to edit his application documents carefully, respecting the norms for impression management. Grammatical norms seemed to thus matter more in other professional genres.

6. Conclusion

CSP needs more empirical studies on how the interactional framing differs in different activities, with different translingual repertoires gaining significance. We need the type of analysis conducted above for other genres of CSP. While all interactions involve the *range* of repertoires identified, it is possible that certain resources are more salient in certain genres of communication, constituting different “hierarchical constellations.” The framing and footing of interactions will also differ, explaining the unequal statuses of language resources (with English valued above other languages) and the possibility of communicative breakdown. These eventualities

depend on the enregisterment of semiotic resources and framing of dispositions in different communicative activities.

The shifts I identify above for the way we treat English in the future have profound implications for pedagogy. Teaching is intertwined with the knowledge we generate through research. Reversing the trend Mauranen (2022) observes of the past, when LSP research was constrained by pedagogy, we have to first expand our research activities to describe the semiotic repertoires of diverse genres. Whereas we assumed in the past that communicative activities required a single language, and competence was based on advanced grammatical proficiency in that language, we have to now broaden our perspective to how languages are entangled in material and social conditions. From this perspective, we have to study how translanguaging repertoires are enregistered for different genres. As illustrated above, this requires understanding the hierarchical constellation of resources based on the way different activities are framed. A second area of research is a clearer understanding of the dispositions needed for successful interactions, as we move from a sole focus on representational norms. What are the dispositions that would encourage collaborating with diverse participants and semiotic resources for distributed practice in meaning making? In reverse, what motivates people to refuse to change their footing or framing by insisting on their own language norms? More importantly, what are the discourse strategies people might adopt to renegotiate unethical dispositions and unequal footings for more inclusive interactions?

Since we cannot teach the constellation of translanguaging resources for each and every genre, we should focus on developing the dispositions that will help learners to engage with diverse translanguaging resources, social agents, and environmental ecologies for distributed practice. We must prepare students to be lifelong learners, in the fashion of language socialization and professionalization (Wenger, 1998), as CSP genres are constantly changing. In fact, the international STEM scholars in my research mentioned that their most consequential learning for professional and scholarly purposes occurred in their work itself. They learned the relevant repertoires and dispositions while engaged in scientific activities, far beyond what their language courses managed to teach them.

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NOTES

¹ Though I question the autonomy of the human individual following the embodied turn, I do not reject their qualified agency. Latour (1996) considers humans and nonhumans as enjoying “hybrid agency,” thus mutually mediating and shaping outcomes in activities.

² Transcription of vocal conduct (based on Jefferson, 2004)

[overlapping talk
=	latched talk
(number)	silence in seconds
(.)	short untimed perceptible silence
:	lengthened vowel sound, the more colons the longer the sound
>fast<	tempo of talk is faster than surrounding talk
<slow>	tempo of talk is slower than surrounding talk
bo-	abrupt cutoff of sound
?	strongly rising intonation
,	phrase-final intonation
.	falling intonation
word	lower volume
↑ ↓	sharp upward or downward change in pitch
<u>underline</u>	stressed syllables
(())	transcriber comments
Superscript	vowel insertion

Transcription of bodily conduct (based on Mondada, 2016)

- + indicates on- and offset of bodily conduct relative to vocal conduct in the enumerated line above it.
- > indicates that the preceding bodily conduct continues beyond the line until the specified point.
- >> indicates that the bodily conduct began before the beginning of the excerpt.
- name lower case letters are used when participants perform bodily conduct when they are not the current speaker.
- # indicates a moment at which a screenshot was taken