Review Article

Conversation analysis in Computer-assisted Language Learning

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Abstract

The use of Conversation Analysis (CA) in the study of technology-mediated inter-actions is a recent methodological addition to qualitative research in the field of Computer-assisted Language Learning (CALL). The expansion of CA in Second Language Acquisition research, coupled with the need for qualitative techniques to explore how people interact in technology-mediated environments, has stimu-lated a small but growing body of research. This article reviews CALL research that employed a CA approach to the collection, microanalysis, and understanding of the data in a variety of technology-mediated fields (text, audio and video SCMC, email, forums and bulletin boards, social networks, and games), with participants from different contexts and languages, interacting in an L2 either among themselves or with native/more expert speakers of the language. Most research up to now has been descriptive in nature, illustrating the sequential organization of interaction, inter-actional and linguistic resources employed by the participants, and affordances and challenges of the media to promote language learning. In addition, a few studies have directly explored 'learning' through the microanalysis of longitudinal data for any changes in the learners' linguistic and interactional patterns of engagement. The review of studies is followed by those challenges that affect the implementation of CA in CALL research and a vision of the future of CA for CALL in the larger field of Applied Linguistics.

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Introduction

The use of Conversation Analysis (CA) as a methodology in the study of computer-assisted language learning (CALL), and in Second Language Acquisition (SLA) research in general, is new in comparison to other qualitative methods commonly used in CALL. Raffaella Negretti's (1999) article in *Language Learning & Technology* 'Web-based activities and SLA: A conversational analysis approach' was the first to apply a CA framework to study language learners interacting online. Since then, CA for CALL has started to take a more prominent place in CALL research. Although still quite a new field, we can now look at a modest body of accumulated research that feeds from two different, still new but growing, fields that use Conversation Analysis as their main methodological approach to their data: First, research on computer-mediated social interaction that follows CA principles to investigate how people interact on the Internet, how the turn-taking system and sequential structure of this new medium are constructed and understood by participants (Garcia & Jacobs, 1999; Herring, 1999; Markman, 2005; Morán, 2008; Murray, 1989) and how do well-known sequences in face-to-face interaction compare to those in the new medium; Among these, openings and closings (e.g., Markman, 2009; Rintel, Mulholland & Pittam, 2001); repairs (Lazaraton, 2014; Markman, 2010; Schönfeldt & Golato, 2003; Tanskanen & Karhukorpi, 2008); non-responses (Rintel, Pittam & Mulholland, 2003;); advice giving (Vayreda & Antaki, 2009); and humor and play (Danet, Ruedenberg & Rosenbaum-Tamari, 1996; Lazaraton, 2014). Although most CA in CALL research has focused on text as the most common form of computer-mediated communication, studies have also explored audio CMC (e.g., Jenks & Brandt, 2013; Jenks & Firth, 2013); video CMC (e.g., Fischer & Tebrink, 2003); as well as other online environments such as games (e.g., Collister, 2008; Moore, Ducheneaut & Nickell, 2006), social networks (e.g., Meredith & Stokoe, 2014) and mobile applications (e.g., Arminen & Leinonen, 2005; Arminen & Weilenmann, 2009). This strand of descriptive studies constitutes the majority of the research. The second area of study that greatly influences CA for CALL is CA-for-SLA, which employs CA as the main methodology for tracking language learning and development.

CA-for-SLA

CA was developed by sociologists Harvey Sacks and Emanuel Schegloff in the early 1960s as a 'naturalistic observational discipline that could deal with the details of social action rigorously, empirically and formally' (Schegloff & Sacks, 1973: 289). CA started as an approach to the analysis of social interaction for the study of ordinary conversation, although it soon spread to other forms of talk-in-interaction. CA focuses on how participants understand, orient, and

construct each other's actions during ordinary conversation as well as during interaction in institutional contexts. CA's attention to the description of the organization of interaction is based on the idea that interaction is structurally and systematically organized, and mediated or accomplished through the use of sequential patterns which can be discovered through a bottom-up, inductive, data-driven microanalysis; patterns which are not the result of pre-formulated theoretical conceptions but rather emerge from the participants themselves during the interaction. For an introduction to the basic concepts of CA see Kasper and Wagner (2014) or introductory texts by ten Have (2007), Hutchby and Woofitt (2008), Liddicoat (2007), Markee (2000), Schegloff (2007), or Sidnell (2010).

The growth of CA in fields such as sociology, anthropology, communication, linguistics, and computer sciences is testament to the robust findings of earlier studies that furthered CA methodology growth for five decades (Kasper & Wagner, 2014). What is now understood as 'Applied Conversation Analysis' is conducted in many areas and types of studies such as clinical talk, the study of macro-societal issues, or different types of institutional talk (Antaki, 2011).

Although CA was not conceived for the study of language acquisition, recently an interest for its possible application to language learning has sprung. The methodological feasibility of CA to demonstrate learning was put into question in the early 2000s by authors suggesting that CA cannot address language acquisition because it is not a language learning theory (Egbert, Niebecker & Rezzara, 2004; Hauser, 2005; He, 2004). At that time other authors supported the use of CA, and the interactional practices that CA affords, for the study of SLA by combining CA with theories of learning such as Sociocultural and Activity theories (e.g., Mondada & Pekarek Doehler, 2004; Thorne, 2000) and Situated learning theory (e.g., Brouwer & Wagner, 2004; Hellermann, 2006) which view learning as a form of socially distributed cognition.

Other views (Markee, 2008; Markee & Kasper, 2004; Kasper & Wagner, 2014; Seedhouse, 2005, 2011; Wagner, 1996) recognized the potential of CA for the study of language learning on its own, independent of other theories of learning. This view of CA for SLA adopts a wide definition of 'learning' that includes not only the learning of linguistic items but also the participants' orientation to the organization of the interaction (e.g., turn taking, sequence organization, adjacency pairs, eye gaze, embodied actions), and evolution of the patterns of interaction. As Pekarek Doehler (2010) states:

> learning a language involves a continuous process of adaptation of patterns of language-use-for-action in response to locally emergent communicative needs, and the routinisation of these patterns through repeated participation in social activities … and the resulting *competencies* are adaptive, flexible and sensitive to the contingencies of use. (p. 107)

Learning is therefore understood as participation based, focused on the improvement of the learners' interactional resources. CA's potential as a theory for learning can be explored by 'extending the scope of CA itself from socially distributed cognition to socially distributed learning (Seedhouse, 2004)' (as cited in Kasper, 2006: 91), exploring the participants' social actions as they display them to each other in their interactional behavior. We can observe learning through episodes that make learning the focal point of the interaction (e.g., Koschmann, 2013; Zemel & Koschmann, 2011, 2014) or in the learner's development of 'intersubjective resources to co-construct with their interlocutors locally enacted, progressively more accurate, fluent, and complex interactional repertoires in the L2' (Markee, 2008: 406).This longitudinal learning behavior tracking shows learning as the difference between the structures and resources employed by the learner in early and later encounters. See Kasper and Wagner (2014) for examples of longitudinal CA research and Jenks (2010) for a discussion of CA-for-SLA in its relationship with cognitive traditional SLA.

A subset of research on CA-for-SLA focuses on the description of different types of interaction in educational setting, among students, among students and teachers and among language students and other speakers of the L2 language. From this research, we know that regardless of engagement happening outside of the classroom (e.g., Brower, 2004; Gardner & Wagner, 2004) or inside the educational setting (e.g., Hellermann, 2008; Seedhouse, 2004), learners engage in a variety of interactional patterns, deploying multiple resources to maintain successful interactions (Mori, 2004; Mori & Hayashi, 2006). Learners also orient to language issues minimally and maintaining interaction seems to be the main goal of their conversations (e.g., Mori, 2004; Wong, 2005). They are able to engage in different activities and membership categories to accomplish and co-construct understanding (Kasper, 2004; Kasper & Kim, 2007) and bring a full range of competences from their L1 to the interaction despite their lack of linguistic proficiency.

Since CALL research relies heavily on quantitative and qualitative methodologies from SLA, sociology, and social psychology, it is not surprising that the increased visibility of CA-for-SLA and the growing use of CA in computer-mediated discourse analysis would influenced its application to research on interactions produced in technology-mediated environments.

CA in CALL

The use of CA for the study of CALL may have also developed out of the need to identify appropriate methodologies to understand how people interact and how knowledge is built and transmitted in new learning environments, as well as to address a call for more theoretical grounded studies on technology-mediated language learning (Schulze & Smith, 2015; Thorne &

Smith, 2011). CA is an alternative theoretically grounded methodology that can help explain, if not everything about language learning through technologies, how individuals use language resources to manage interactions within and around digital environments and how technology environments affect, shape, and transform interactions.

The idea of using CA for the analysis of technology-mediated interactions (mainly text-based CMC) also derives from the thought that CMC is more like a conversation than a written text, a 'conversation in slow motion' (Beauvois, 1998), and therefore a perfect match for CA. Approaches perceiving CMC more as a written mode however, usually follow a discourse and content analysis methodology (Vayreda & Nuñez, 2010). Although close, computer-mediated language is not exactly the same as oral interaction and it may well be a different genre of its own, Brenda Danet suggests that digital writing 'is "oral", yet it lacks the social and physical cues accompanying speech, and although it is a form of writing, it has no physical substance' (1997: 5). In an attempt to legitimize it as its own form of communication, Crystal terms it 'Netspeak' (2006: 31), Yus calls it 'oralized written text' (2011: 19), and Baym (2010) states that it 'resembles both written language and conversation' (p. 63). If we see CMC as a new form of conversation, it is important to truly understand it since conversational structures 'are not fixed and hard-wired cognitive phenomena, but rather are normative and socially organized' (Wooffitt, 1990: 27).

Regardless of the label given to technology-mediated interactions, CA is an excellent tool to discover the main characteristics of a medium, as well as the interactional practices that otherwise may not be revealed by 'attending to the minute details of the interactional conduct' (Kasper, 2004: 564). Tsai & Kinginger (2014) present an excellent example. Their investigation of advice giving and advise searching in text-based CMC peer-feedback interactions showed that students complimented rather than offered advice to maintain friendly relationships that would not threaten the student-recipients' negative face. Categorizing and counting student's moves as operationalized by the speech act of advising would had shown that students did not provide any and may have deemed the activity as unfruitful, while in reality students were using much more sophisticated techniques to engage in this type of institutional activity.

Technology is also a productive environment to find naturalistic L2 conversations. Innovations provide learners with engagement in talk that is more realistic, with conversational practices that are hardly ever experienced in classroom interaction (Chun, 1994) since classroom talk is heavily influenced by institutional patterns of interaction and highly structured turn-taking sequences (Tudini, 2013).

Most of the studies to date using a CA methodology for the analysis of technology-mediated interaction have focused on text-based CMC; not surprising since most online discourse is text-based and there seems to be a preference for the medium for 'authentic interpersonal relationship building' (Thorne, 2003: 48). These studies concentrate on describing the medium as used by native speakers, not language students. These studies mainly investigate the nature of sequence organization and the turn-taking system in CMC and compare them to well established findings of the sequence organization in oral communication proposed by Sacks, Schegloff, and Jefferson (1974), Schegloff (1996, 2007), and Schegloff, Jefferson, and Sacks (1977) (Garcia & Jacobs, 1999; Herring, 1999; Hutchby, 2001; Murray, 1989). In addition, a number of studies have employed a CA perspective to study distinctive sequences in SCMC such as openings (Rintel, Mulholland, & Pittam, 2001), lacks of response (Rintel, Pittam, & Mulholland, 2003), repairs (Schönfeldt & Golato, 2003), negotiations of face (Golato & Taleghani-Nikazm, 2006), and identity construction sequences (Stommel, 2008).

Results from these studies suggest that the sequential organization of CMC is not identical to that of face-to face interaction. Participants have more tolerance for 'split' adjacency pairs (Smith, 2003) and 'disrupted turn adjacency' (Herring, 1999; Schönfeldt & Golato, 2003). Turn-taking system seems chaotic and does not follow the rules of conversation, however we see participants orienting to face-to-face social and conversational norms by getting creative and making sure the interaction is coherent. They produce shorter turns to try to keep adjacency pairs as close to each other as possible, use different resources to signal co-presence and participation, and add new features to compensate for the lack of non-verbal communication clues (i.e., emoticons, orthographic symbols, word elongation).

A few studies have also employed a CA methodology for the analysis of CMC audio and video communication (Fischer & Tebrink, 2003), as well as other technology-mediated spaces for interaction such as a games (Collister, 2008; Moore, Ducheneaut & Nickell, 2006), and mobile devices, focusing on the role they play in the construction of location and social encounters (Arminen & Leinonen, 2006; Arminen & Weilenmann, 2009; Licoppe, 2009) to investigate how conversation is organized in these media and how patterns of interaction are similar or different from those in face-to-face interactions.

A number of studies that incorporate L2 speaker data do not focus on language learning but rather on the interactional features of the medium (using a common L2 as lingua franca). They follow closely interactional studies in CMC of speakers in their L1 (above), and are published in venues that focus on interactional practices rather than on second language acquisition or educational technology. For example Jenks and Brandt (2013) and Jenks and Firth

(2013) use data from non-native speakers but all the information provided is that 'English is the language of communication throughout the data set. Most interactants come from countries where English is not spoken as the official language' (Jenks & Brandt, 2013: 231). Nevertheless, most of the research using CA for technology-mediated interaction that incorporates L2 (or other language) does focus on the idea that the interaction may be different not just because of the media, but because the participants are using a language other than their L1 to interact, either among themselves or with L1 speakers of the target language.

Among these studies, we can differentiate two strands (parallel to other interactional studies in CMC): (1) those descriptive in nature that use CA to microanalyze and show what L2 interaction in the new media looks like, and (2) those developmental that use CA to look at linguistic and interactional learning. It is important to mention that although the field is growing, there are only about 15 researchers working on CA of technology-mediated environments, a small number compared to numbers in any other area of SLA or CALL.

CA descriptive studies of technology-mediated L2 interactions

The majority of CA studies of technology-mediated L2 interaction focus on the description of conversational practices and interactional resources. This is parallel to CALL investigation in general, and CMC in particular, which started with descriptive studies to find whether the affordances of the environments and the pedagogical choices were conducive to language acquisition, and moved on to investigate whether language acquisition actually occurred in the media. Given that the CA for CALL body of research accumulated so far is much smaller, it is not surprising that it is still mostly in its descriptive stages. As Jenks (2009b) points out, the initial description of how participants adapt and transfer skills and strategies to a new media and how they handle cultural and linguistic differences is an important first step 'to investigate any other social-interactional practices that may emerge over time' (p. 34).

The technologies investigated so far are mostly synchronous and asynchronous CMC tools. Thirteen (40%) of the studies included in this review investigate text-based chat, followed by audio CMC (five studies), bulletin boards and forums (three studies), email (one study) and a MOO environment (one study). Most recent research has targeted other forms of technology-mediated activities such as gaming environments (five studies by the same author), augmented reality games (one study), and social networks (three studies). See Appendix 1 for a table of the studies.

The amount of research is still quite small to produce a strong body of accumulated results, but it can be grouped in four main areas of investigation:

(1) interactional structure of the technology; (2) how participants deal with trouble and need for repair; (3) affordances of the medium; and (4) social organization and other aspects.

(1) Interactional structure. Studies focusing on the interactional structure of the medium describe the sequential organization and turn-taking system produced by the participants as well as other interactional resources (Gibson, 2009b; González-Lloret, 2009, 2011; Kitade, 2000; Negretti, 1999; Tercedor Cabrero, 2013; Tudini, 2002, 2010, 2013). Other studies focus on specific types of sequences such as closings (Gonzales, 2012, 2013; Pojanapunya & Jaroenkitboworn, 2011), summons and answers (Jenks & Brandt, 2013), and advice giving (Tsai & Kinginger, 2014). From this body of research we know that L2 speakers are competent interactants, even when the sequence organization seems chaotic and the turn-taking system is disrupted (González-Lloret, 2008, 2009; Negretti, 1999; Tercedor Cabrero, 2013; Tudini, 2010), deploying multiple resources to compensate for the lack of nonverbal cues (Kitade 2000; Negretti, 1999; Tudini, 2002). Participants orient mainly to content and tend to maintain interaction rather than focus on misalignments of linguistic forms (Jenks, 2009b; Tudini, 2002). In order to establish mutual orientation and alignment, they employ highly organized, complex and collaborative interactional work (González-Lloret, 2009; Jenks & Brandt, 2013; Negretti, 1999; Tsai & Kinginger, 2014; Vandergriff, 2013a) including the use of emoticons (Vandergriff, 2013a, 2014), humor (González-Lloret, 2009), compliments (Tsai & Kinginger, 2014) and short simple sentences much like in face-to-face conversation (Tudini, 2002). Although learners are fully competent users of CMC, there seem to be some differences with native speakers (NSs). For example, Vandergriff (2013b, 2014) found that learners use double the amount, and more variety, of emoticons than NSs, which serve as contextual cues and display affect . They are used to mitigate disagreement or a face-threatening act, to orient to a dispreferred action, and display non-serious intent (although Negretti, 1999 found opposite results, no use of emoticons by the learners, only the NSs).

Focusing on one interactional sequence may be quite revealing when studied across media. Both Gonzales (2012, 2013) and Pojanapunya and Jaroenkitboworn (2011) focused their studies on closing sequences. Gonzales examined closings in the social network *Livemocha*, while Pojanapunya and Jaroenkitboworn investigated closings in *Second Life*. Both researchers found that closing sequences were almost always preceded by pre-closing sequences, signaling their way out of the conversations. This suggests that participants view the medium as a real form of communication, applying face-saving techniques, which are characteristic of the face-to-face medium, even when not applying them would not have been consequential for their interaction or that

of their avatars. The same finding across media suggests the strong influence of conversation normative patterns independent of the context as well as the commonalities between media.

(2) Trouble and repair. Although participants in interaction tend to not make repair work a priority, sometimes problems in understanding are made visible via the talk-in-interaction (Hellerman, Thorne, Lester & Jones, in preparation) and bring forward different repair work. In text-based CMC, we often found self-repairs (also common in regular conversation) most of them on vocabulary and spelling (Tudini, 2002) as well as meaning-conveying morphological markers (González-Lloret, 2009). Tercedor Cabrero (2013) for example, found 76% of the repairs in her videoconferencing data to be self-initiated self-repaired. It is also common to find other-initiated self-repair, where participants ask for clarification of a term used by the interlocutor (Tudini, 2010, 2013). An interesting finding is the abundance of other-repairs through embedded and exposed correction (González-Lloret, 2008; Tudini, 2010, 2013), which are not so common in regular conversation but common in face-to-face institutional interactions.

(3) Affordances of the medium. The affordances of the medium to promote interaction are always present in CA studies of CALL, even if not the focus of investigation. This is probably the case because of the strong influence of the context in sequentially structuring our interactions and the fact that in CMC the medium is the major determinant of context. Three media however are the central focus of a few studies focusing on how interaction is constructed in them and how this compares to face-to-face as well as text-based CMC interaction: email, audio-based communication and the *Final Fantasy* game.

Kitade (2000), proposes that email creates a positive environment for noticing errors (through self-correction and recasting parts from others' utterances) although it may not include sufficient feedback to promote learning. Email communication negotiations have low rate and are only responded to when the problem is more explicitly stated, the trouble source repeated and there is explicit asking for clarification. Although she does not discuss the possible reasons why the amount of negotiation is low, we can presume that the low level of interactivity of the medium makes it closer to a written genre than to spoken communication. On the other side, work by Jenks (Brandt & Jenks, 2013; Jenks, 2009a, 2009b, Jenks & Brandt, 2013) suggests that in multi-party voice CMC (Skypecast) there are plenty of opportunities for feedback since participants experience many instances of interactional trouble. This happens mainly when identifying their interlocutors, allocating next speakers, or joining ongoing talk. They propose that these troubles are not only due to technical issues but they are also interactional in nature. Participants seem to be fully aware of difficulties of the medium, especially to maintain the 'one speaker

speaks at a time' principle of turn-taking (Sacks *et al.*, 1994) in conversation and deploy ways to compensate by strategically using pauses that avoid overlapping talk.

When a new form of technology-mediated interaction surfaces, CA seems to be an ideal methodology for its exploration to find how participants construct knowledge and behavior in or around the innovation and what pedagogic consequences this may have for language learning. This is the case of Hellerman, Thorne, Lester and Jones' (in preparation) work. Their research focuses on understanding how language learners interact with a mobile digital augmented reality game played in groups around one mobile phone (a pedagogically-driven decision to promote collaborative work and negotiation in the L2). The study investigates how participants orient to the mobile device (the phone), the physical world around them, and to each other for the completion of the task. The importance of the device and the holder of the device is demonstrated by how frequently participants orient to them for instruction and leadership, by how the device was the center of most interactions, and how information from the device was made public and available through talk. Hopefully, more research would bring us more understanding of this media and its potential for language learning.

Examining a different medium, Arja Piirainen-Marsh and Liisa Tainio (Piirainen-Marsh, 2011, 2012; Piirainen–Marsh & Tainio, 2009, 2014) focus on a game environment (*Final Fantasy*) to investigate how participants construct, manage, and change their epistemic social positions as novice and expert players. They draw on multiple sources of knowledge (e.g., joint game experience) as well as interactional resources (e.g., prosodic and verbal repetition of game characters, use of their L1 and L2, collaborative turn-sequences with game characters). During the two years of the research, the novice player eventually became more experienced as he acquired resources for showing independent access to game knowledge and language, and both players displayed more interactional synchrony which allowed them to better coordinate their collaborative game actions. Their research shows that game environments can be a site for situated learning of a second language.

(4) Social organization and other aspects of CMC. One result common to several studies and different media is that, when the activity (regardless of the media) is pedagogical in nature (inside or outside of the classroom but part of their learning activities), students clearly orient to the institutional nature of the activity (Gonzales, 2012; González-Lloret, 2008, 2009; Jenks, 2009b; Suzuki, 2013; Tsai & Kinginger, 2014; Tudini, 2010). This is important to consider because when participants orient to the activity as institutional, some principles of regular conversation may not hold true. For example, although disagreements are mostly a face-threatening act (Brown & Levinson, 1987)

which are seen as a socially dispreferred disruptive practice in regular conversation (Schegloff, 2007; Pomerantz, 1984), they may not be considered dispreferred when expected as part of a didactic task. The same holds true for corrections/repairs. Although correction in regular conversation may be perceived as a face-threatening act that implies lack of competence by the participant, in a learning context they may be seen as pedagogical interventions and therefore more acceptable. However, it is important to note that participants still orient to them as somehow dispreferred. As illustrated by excerpts 1 to 3 (personal data), participants ask permission to engage in correction and confirm whether it is acceptable by the other party to do so (which they would not do if they did not consider it relevant). Similarly, Tudini (2010) found in her data that instances of other-repairs were often accompanied by an invitation of the learner to repair and a variety of politeness mitigators such as explanations, encouragement, compliments, and use of emoticons (pp. 132–134), commonly accompanying dispreferred acts. This mix of what is acceptable or not seems to point at the newness of the medium as a tool in learning contexts. Without a set parameter of engagement, participants are still figuring out its interactional norms and meanwhile keep borrowing norms from other contexts more familiar to them.

Extract 1

	120.	Meme: oye	*hey*
	121.	Chisu: que	*what*
→	122.	Meme : te importa si nos corregimos el uno al otro?	*do you mind if we correct each other?*
	123.	Meme: creo que así es mejor para nosotros, no?	*I think that would be better for us, don't you think?*
	124.	Chisu: oh um momento, tengo que leer	*oh one second, I have to read*
	125.	Chisu: jjajaja	*hahaha*
	126.	Meme: ok	*ok*
	127.	Chisu: ah si	*oh yes*
	128.	Chisu: es bien	*is good*
	129.	Meme: ok	*ok*

Extract 2

| → | 100. | reme (9:22:26 AM): si tu quieres, puedo corregir tu español | *if you want I can correct your Spanish* |
| | 101. | amaris (9:23:29 AM): por favor!! Necesito apreder a espanol | *please!! I need to learn Spanish* |

Extract 3

	29.	Cid (8:42:14 AM): una cosita: en "lloré", no se pone el pronombre "me", ok?	*a small thing: in "lloré", you don't write the pronoun "me", ok?*
	30.	Jay (8:42:24 AM): gracias..	*thank you..*
→	31.	Cid (8:42:37 AM): si te molestan mucho estas correcciones, dímelo… y dejo de hacerlas, pq te entiendo, ok? ;)	*if this corrections bother you, tell me… and I will stop doing it because I understand you, ok? ;)*

Another topic that has received some attention is the creation and maintenance of identity in or around digital environments. One example is the work mentioned above by Arja Piirainen-Marsh and Liisa Tainio which focuses on how participants construct and negotiate (and with time change) their epistemic social positions as more or less experienced game players. Another example is Vandergriff 's (2013) research on how participants (NS and NNS) in text-based chat orient to differences in language competence by indexing identity through the use of categories and labels, displaying evaluative orientation to the L2 task, using linguistic resources to create an L2 social identity, and by building rapport and maintaining social presence. This suggests that digital environments are complex social spaces in which participant membership and social position influence the participants use (and possible learning) of a L2; worth exploring further.

Finally, in line with Schegloff *et al.*'s, (1999) proposal that 'CA studies of speaking practices across languages and cultures can provide a basis for comparison of L2, or language learner, speaking practices with native speaker norms in both L1 and L2' (p. 16), Gibson (2009a) explores the use of CA for the study of cultural practices and cultural differences in online forums by L2 speakers of English, concluding that CA and in particular membership categorization, are valuable approaches to the study of intercultural discourse.

CA studies of CALL focusing on learning

As discussed before, most of the investigations up to now are descriptive in nature. There are however a few studies that microanalyzed longitudinal data for evidence of language learning; 'Learning' understood as either an evolution of linguistic resources or a development of interactional competence (following the CA-for-SLA trend discussed above). Arja Piirainen-Marsh and Liisa Tainio gathered data from four young players (although most of their studies focus on two of them) for two years playing *Final Fantasy*. They discovered an evolution of the players' roles as the novice player gained knowledge

of the game and a variety of interactional resources that they used to play, such as repeating utterances from the game characters, reading L2 text out loud, code-switching between Finnish (L1) and English (L2), etc. As the participants became more proficient players they were able to attend to and display language resources 'in ways that make sense locally in the actions through which they manage the trajectory of the game and co-construct shared stances towards it' (Arja Piirainen-Marsh, 2010: 3027).

The other two authors with developmental studies have focused on the progress of interactional (pragmatic) competence. Gonzales (2012, 2013) explored politeness and the development of closing sequences in *Live-mocha*, a social network for learning languages, while González-Lloret investigated the development of addressivity (2008) and troubled-talk sequences (2011) in text-based CMC. Results from these studies suggest that technology-mediated environments are a worthwhile source for natural, authentic interaction which provides linguistic resources not easily available in all language classrooms; among these, real, rich input, pragmalinguistic and sociopragmatic feedback from more advance speakers, a variety of speech act sequences, and space for engagement. As the use of CA-for-SLA grows, we will probably see more studies that try to account for learning in technology-mediated spaces.

Challenges of CA for CALL

It has been suggested that CA may not be appropriate for the study of text-based CMC (Garcia & Jacobs, 1999) because the analysis of only the textual data may not be enough to explain what happens in the process. From a CA perspective the need for video recording of the participants' interaction would be required depending on the subject of study. In CA, what happens before turns are posted is not relevant to the interaction unless it is 'brought into being by the actions people produce' (Pomerantz & Fehr, 1997: 70). Participants cannot see what is written on the other participants' screens before it is posted (or deleted) much like we cannot see in people's heads before they speak. However, video data may be necessary for a variety of topics (e.g., external uses of the media, the composition process, self-repairs, noticing) much in the same way that CA studies of embodiment (through gaze, intonation, gesture, etc.) require the use of video recordings (Egbert, 1996; Mori & Hayasi, 2006; Olsher, 2004). In these cases, a detailed analysis that includes visual and auditory clues (Beisswenger, 2008; Marcoccia, Atifi, & Gauducheau, 2008; Smith, 2008) should be employed or even more sophisticated tools may be needed such as gaze-tracking (Smith 2010; 2012) for which CA may not be the most appropriate methodology.

An important challenge for CA for CALL is the lack of visibility that it has both in the larger field of Applied Linguistics and among CA practitioners. For example, the *Wiley Encyclopedia of Applied Linguistics* (2013) includes 36 entries in the Conversation Analysis area, and only one is on CA of CMC communication (Tudini, 2014). In the over 800 pages and 36 chapters of the *Wiley Blackwell Handbook of Conversation Analysis* (Sidnell & Stivers, 2013) there is no chapter dedicated to anything technological. And Kasper and Wagner's (2014) extensive review of CA, with more than 200 references, does not mention any work on technology-mediated environments. Hopefully, with the recent increased visibility of CA-for-SLA in mainstream SLA venues of publication such as *Language Learning* (Burch, 2014; Markee and Kuniz, 2013, Hauser, 2013), research in CA for CALL will also be more widely accepted.

The future of CA for CALL

As technology becomes more affordable, more manipulable, smaller and easier to use, and more integrated in classroom activities, CA can take advantage of quality audio and video data to target verbal and non-verbal behavior (e.g., pointing, gaze, nodding, body positioning). The evolution from traditional video cameras to head-mounted cameras (Hellerman *et al.*, 2013) and smart spaces with sensory devices that understand participants' movements (e.g., the Digital Kitchen project at Newcastle University, UK < http://openlab. ncl.ac.uk/ilablearn/?page_id=26>) opens exciting possibilities for the application of CA to the study of interaction.

Another area of innovation in which CA may also grow is that of human-computer interaction. Already in 1991, Hirst speculated whether CA had a role in computational linguistics, and although the methodology is used today (e.g., Luff, Frohlich & Gilbert, 2014), there is significant room for growth, especially as English develops as *lingua franca* for human-computer communication in a variety of interactional contexts.

Finally, CA could take advantage of the affordances that technology offers for publication of research. Markee & Stansell (2007) pointed that Web 2.0 technologies and digital publishing could be improving the process of CA analysis by allowing readers to access primary and secondary data (audio and video of the interaction), and therefore increasing 'intellectual accountability' (p. 37) since readers would be able to inspect the data and decide for themselves whether they agree with the author's analysis or they could formulate alternative interpretations of the data. This is especially important for the study of behaviors which are not so easy to transcribe and understand in a written format such as embodiment, eye gaze, gestures, etc. In addition, Web 2.0 tools, according to the authors, could facilitate interaction among

scholars by building 'communities of scholarly practice' (p. 36) where data can be shared and analyzed remotely.

Judging by the interesting and informative results of the studies reviewed here, CA for CALL will certainly continue to grow and aide in the microanalysis of interaction, especially when initial exploratory detailed analysis may be needed. As CA develops as a viable methodological option for qualitative analysis in SLA more studies may also adopt it in the study of CALL.

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Appendix 1: Table of Research on CA in CALL

Study	Descriptive / Developmental	Topic	Technology	Language (L1/L2)	Data/ Participants
Brandt & Jenks (2013)	Descriptive	Interactive problems	Audio (Skypecast)	English as *lingua franca*	24 hrs of recording in 32 chatrooms. Anonymous participants (different L1s and ages)
Gibson (2009a)	Descriptive	Intercultural discourse	Forum	L2 English	Entries in postgraduate online course
Gibson (2009b)	Descriptive	Interactional sequence	Forum	L2 English	Entries in postgraduate online course
Gonzales (2012)	Developmental	Closing sequences	Social network (Livemocha)	L2 Spanish	7 participants- 1 academic year chat logs + interviews
Gonzales (2013)	Developmental	Closing sequences	Social network (Livemocha)	L2 Spanish	Case study (33 year old Sociology student). 1 academic year chat logs+ interview
González-Lloret (2008a)	Developmental	Development of addressivity	Chat -Yahoo messenger	L2 Spanish	Logs from 10 weeks of interaction of 14 L2 Spanish and 6 L1 Spanish speakers
González-Lloret (2008b)	Developmental	Development of addressivity	Chat -Yahoo messenger	L2 Spanish	Case study- 1 L2 learner-2 NSs. Chat logs of 10 weeks of interactions
González-Lloret (2009)	Descriptive	Sequential patterns and interactional resources	Chat –Laulima	L2 Spanish	St-St interaction chat logs of 3 sessions
González-Lloret (2011)	Developmental	Application of CA to CMC + development of troubled-talk	Chat - Yahoo messenger	Spanish L2	Case study: 1 L2 learner- 1NS. Chat logs of 10 weeks.
Hellerman, Thorne, Lester & Jones (in preparation)	Descriptive	Engagement and spatial movement on co-present mobile technology use	Mobile devices- Augmented reality games	L2 English	EFL University students – Video data of head-mounted cameras.

Jenks (2009a)	Descriptive	Overlapping	Audio (Skypecast)	English L2	30 hours audio data in 6 months
Jenks (2009b)	Descriptive	Social organization. English use as *lingua franca*	Audio (Skypecast)	English as *lingua franca*	30 hours audio data in 6 months
Jenks & Brandt (2013)	Descriptive	Summons–answer and verbal alignment.	Audio (Skypecast)	English as *lingua franca*	23 audio recordings
Kitade (2000)	Descriptive	Interactional features for a collaborative learning environment.	Bulletin board	L2 Japanese	4 advanced Jap. L2 + 3 NSs. 24 chats in 6 weeks + survey
Kitade (2005)	Descriptive	Affordances for LL and construction of social and linguistic knowledge with NSs	Email	L2 Japanese	Logs of 24 dyads of NS-NNS task-based e-mail interactions
Negretti (1999)	Descriptive	Sequential patterns and interactional resources	Chat	L2 English	19 NNS and 17 NSs. Chat logs for 3 hours over 4 days,
Piirainen-Marsh (2010)	Descriptive	Code-switching in the organization of game talk	Game (Final Fantasy)	L2 English-L1 Finish	13 hrs. video in 2 weeks, 2 adolescents (video of tv + video of player) + 3 weeks of recordings 25 months later.
Piirainen-Marsh (2011)	Descriptive + developmental	Coproduction of talk with virtual characters as interactional resource	Game (Final Fantasy)	L2 English-L1 Finish	Same as above
Piirainen-Marsh (2012)	Descriptive	Game-playing as social interaction	Game (Final Fantasy)	L2 English-L1 Finish	Same as above
Piirainen-Marsh & Tainio (2009)	Descriptive + developmental	Other-repetition as resource for participation and language learning	Game (Final Fantasy)	L2 English-L1 Finish	Same as above
Piirainen-Marsh & Tainio (2014)	Descriptive + developmental	Asymmetry in game tasks. Development of epistemic positions (novice–expert)	Game (Final Fantasy)	L2 English-L1 Finish	Same as above

Author (Year)	Type	Focus	Medium	Language	Data
Pojanapunya & Jaroenkitboworn (2011)	Descriptive	Closing sequences	Second Life (text)	English L2 in Thailand	32 pairs (university students and the people they met in SL)
Suzuki (2013)	Descriptive	Learners' off screen behaviors	Audio (Wimba) + Video of student	L2 Japanese	Case study: 17 weeks off-screen video recordings (20hrs)+ Audio from Wimba (27 hours)
Tercedor Cabrero (2013)	Descriptive	Interactional resources (turn-taking, repair, alignment)	Chat (IM Blackboard) + Screen capture	L2 Spanish (53% L1 English)	Logs of 59 NNS-NNS dyads+ questionnaire
Thorne (2000)	Descriptive	New form of communication?	MOO	French L2	Logs, bulletin board postings + interviews
Tsai & Kinginger (2014)	Descriptive	Advice giving and social solidarity	Chat	ESL(Arabic & Korean L1)	21 logs of 25"sessions of 14 stud during 8 weeks
Tudini (2002)	Descriptive	Interactional resources	Chat (UniSAnet)	L2 Italian	Logs of 10 students, 30 minutes, all in the same chat + surveys
Tudini (2010)	Descriptive	Organization, intersubjectivity. Orientation to activity	Chat (SharedTalk and etandem)	L2 Italian	Logs of 133 learners & 584 Ns
Tudini (2013)	Descriptive	Sequential organization of NS form-focused exposed correction	Chat (SharedTalks + MSN Messenger)	Italian L2-L1	Single case study- 2 interactions + Student written report
Vandergriff (2013a)	Descriptive	L2 social identity	Chat	L2English (18 L1 Swedish)	Logs from 23 advanced EFL in Sweden (from Sauro 2009)
Vandergriff (2013b)	Research	Use of emoticons	Chat	L2 German	Logs from 30" advancedSt-St groups of 3
Vandergriff (2014)	Descriptive	Emoticons	Chat	L2English (L1 Swedish)	Logs from 23 advanced EFL in Sweden (from Sauro 2009)