Collaborative Remembering, Temporal Cement of Collaborative Learning: An Exploration

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Abstract: This theoretical paper explores the relations between two fields of research: collaborative remembering and collaborative learning. We argue that collaborative remembering processes scaffold collaborative learning and that both unfold over multiple and complementary timescales. These timescales help to maintain joint focus and continuity over successive learning sequences. In conclusion, we discuss implications of integrating collaborative remembering research into the design of CSCL situations.

Introduction

Collaborative learning emerged as an independent field of research (e.g. Dillenbourg, Baker, Blaye & O'Malley, 1996; Dillenbourg, 1999) during the 1980's. On one hand, it can be understood as a reaction against the dominant psychology of learning and education focused on the individual, which gave rise to new theoretical perspectives, focused on the group (such as the theory of socio-cognitive conflict) or social practices (such as Cultural-Historical Activity Theory, Situated Learning). On the other hand, societal changes, such as globalisation, going hand in hand with the rise of Internet, emphasized the possibility and necessity of working in teams. But educational research was not the only field to be influenced by what might be termed the "collaborative turn": it also influenced the study of social arenas such as the workplace (CSCW) and the study of psychological functions such as (group) creativity and memory.

Whilst it is necessary for their development for fields of research to be pursued in a largely autonomous manner, the present short paper is based on the conjecture that establishing links between them, within the "collaborative turn" may be fruitful. We thus explore here synergies between research in two fields, Collaborative Learning ("CL") and Collaborative Remembering ("CR") (e.g., Meade, Barnier, van Bergen, Harris, & Sutton, 2018). There are good *prima facie* reasons for this choice. The most basic reason is that, across diverse theoretical frameworks, in some sense, learning *is* remembering. Secondly, there are many parallels between the two fields, for example: (i) embodied communication (Hollingshead, 1998), rather than typewritten communication over the network, produces superior CR; (ii) just as creating a "sense of community" is important in online educational communities (Jones & Issroff, 2005), collective memories are means to create shared identities and community (Hirst & Echterhoff, 2012); (iii) CR sequences in interaction (e.g. Bietti & Baker, 2018b) are triggered by questions and have a structure analogous to collaborative problem sequences (Baker, 1995) and more generally, exchange structures of grounding (Clark & Schaefer, 1989).

. Collaboration involves taking the intentions, plans and goals of others into account (Knoblich, Butterfill, & Sebanz, 2011). Therefore, collaboration plays a central role in guiding acts of going back in time in our minds in social interactions. During shared remembering, collaboration influences the action and planning of interacting partners and shapes interactive outcomes, such as when partner A asks "Do you remember the name of the steakhouse we had lunch at last week?" B replies: "Yes, I do, its name was Cambalache", and A acknowledges B: "Yes you're right, the place with the nice terrace near the river". This short collaborative remembering sequence (Question => Answer => Acknowledgement) illustrates how interacting partners' intentions, plans and goals come into play during collaborative remembering.

We focus here on a single aspect that establishes a fundamental link between CL and CR: that of *temporality*. Remembering with other people involves re-evoking and re-creating a shared or partially shared past, distributed amongst interacting partners (Meade et al., 2018). Such re-evoking of past experiences involves the human capacity for mental 'time travel', the "faculty that allows humans to mentally project themselves backwards in time to re-live stages of their lives, or forward, to pre-live events" (Suddendorf & Corballis, 2007, p. 299). Within the Learning Sciences, from a sociocultural perspective (Lemke, 2001), learning is understood in terms of intersecting timescales of activity — the *hic et nunc*, hours of a lesson, years, historical time — and trajectories of participation (Ludvigsen et al., 2011). In practical terms, from a longitudinal perspective, learning sequences must build on previous ones and therefore on remembering them. Although such remembering is not necessarily a collaborative enterprise, we explore here what combining CR into CL could bring to the latter. Our main proposal is that *collaborative remembering is the 'cement' of collaborative learning* — that the former could help to maintain joint focus and continuity over successive learning sequences. We firstly centre discussion on timescales in CR, since this is less well represented in the CSCL research community. This leads to a concluding

discussion on temporality in CL and CR and proposals for integrating CR into (CS)CL.

Timescales in collaborative remembering

CR in CL situations involves students engaged in recalling past experiences, which may themselves have been shared. Remembering with other people in collaborative learning situations often takes place in social interaction unfolding over multiple and complementary timescales (Bietti & Sutton, 2015), from a *micro* timescale involved in behavioural coordination processes (e.g., interactive behavioural matching) and a *meso* timescale responsible for the co-construction of shared memories to a *macro* timescale that drives the transmission of cultural information and skills between students over longer periods of time.

Micro timescale: Coordination

When students jointly recall shared events in CL situations in the service of shared goals, there are complex bodily, linguistic and cognitive processes unfolding in synchrony over a micro timescale. Research on specific aspects of behavioural matching in dialogue (Pickering & Garrod, 2006) suggests that priming effects play a central role in successful communication. In this context, successful communication refers to "the development of similar representations in the interlocutors" (Pickering & Garrod, 2006, p. 203). Only recently has research on interactive behavioural matching focused on CR (Cienki, Bietti, & Kok, 2014). Bietti and Baker examined the CR of a previous interactive encounter in which groups had to collaboratively design its dream house under certain constraints relating to number of occupants, relationships, and funds (Bietti & Baker, 2018a). It was shown that participants collaboratively remembered better those moments of collaborative creativity when they were more jointly involved in elaborating the features of their design. That is, they remembered better what initially generated most joint activity during the previous co-design phase. Based on these results, it was concluded that participants did not necessarily collaboratively remember what was more important, but rather what initially generated most joint activity during collaborative design.

Meso timescale: Collaboration

CR in CL goes beyond the coordination of verbal and non-verbal resources in synchronized fashion over time. At some point during the collaborative activity, interactants have to collaboratively create a shared account or expression of the past in order to actually remember together, as distinct from doing something else (e.g. imagining together). When paying particular attention to the outcomes of collaboration occurring at meso timescale, evidence suggests that communicative strategies and expertise determine recall performance in task-oriented communication in collaborative tasks (e.g., Peltokorpi & Hood, 2018). For example, an experimental study that compared collaborative recall performance in groups of nonexpert and expert pilots (Meade et al., 2009), collaborative facilitation was found in groups of expert pilots. This is to say that the performance of the groups of expert pilots was better than the sum of the performances of each of their members working separately. This positive effect was not found in the non-expert groups where collaborative inhibition was observed. Meade and colleagues analysed the verbal interactions in both types of groups and discovered that one key factor in successful collaboration for the expert group was the repetition of one's partner's contributions in order to make explicit common ground and support further elaboration (Meade et al., 2009). This communicative strategy was absent in the groups of non-experts that showed collaborative inhibition. The authors suggested that the effective communication found in the groups of expert pilots came from training and expertise in which the exchange of information is crucial. The collaborative inhibition effect observed in non-experts' collaborative recall is a robust finding well documented in the literature (e.g., Barber, Rajaram & Aron, 2010). The 'retrieval disruption hypothesis' (Basden, Basden, & Henry, 2001) has been the typical way of explaining the collaborative inhibition effect: seeing or hearing other people's responses disrupts the way each individual organizes his/her retrieval sequences and strategies, thus causing the collective failure to achieve potential (Barber et al., 2010).

Macro timescale: Cooperation

CR in CL over a macro timescale (days, weeks and months) is grounded both in residual traces of social interactions occurring over micro and meso timescales. Such a macro timescale deals with the transmission of cultural information (Sperber & Hirschfeld, 2004) and social learning (Bandura, 1977) in groups and larger networks. Bartlett's (1932) seminal research on how individual recollections change over repeated retelling provides a general framework for understanding the transmission of information and skills over time. A recent study examined the influence of coordination (micro timescale) and collaborative (meso timescale) processes in transmission chains (Tan & Fay, 2011) using the method of serial reproduction (Bartlett, 1932). In an interactive condition, chains of participants interacted freely with one another to transmit narrative information from one generation to the next. In a non-interactive condition, receivers of the information had to listen to audio-recordings of narrations produced by senders (previous generation) and then recorded their own accounts of what they had

listened to, which were passed on to a new generation of receivers for the same procedure. Transmission was more accurate in the interactive condition than in the non-interactive condition, due to the effect of receivers' behaviours, including backchannels or clarification questions.

Transmission chains have also been used to simulate social learning (i.e. learning by means of observation of, or interaction with, another animal or its products) and the continuous improvement of cultural artefacts (e.g. woven baskets, knots, paper airplanes, and stone tools) from one generation to the next (e.g., Caldwell, Atkinson, & Renner, 2016). Morgan et al. (2015) used an Oldowan tool-making task and six conditions (reverse engineering; imitation; emulation; basic teaching; gestural teaching and verbal teaching) to investigate the effectiveness of multiple teaching methods in social learning. The authors found that teaching helped to improve transmissions. When compared the two conditions that involved instructed teaching (gestural and verbal teaching), Morgan et al. reported that co-present verbal teaching promoted a much faster transmission of information than gestural teaching. The facilitative effect of social interaction on the accuracy of narrative information and skill information transmission shows that coordination and collaborative processes unfolding over micro and meso timescales affect longer-term cooperative processes.

Concluding discussion: Temporality in collaborative remembering and learning

Time is crucial to the analysis of learning from a Cultural-Historical Activity Theory ("CHAT") perspective (Leont'ev, 1981), but is therein theorised somewhat differently from the account of time in CR presented above. The micro, meso and macro levels considered above are part of "chronological" time. The link with "mental time travel" in CR, mentioned above, is clear on this level, in that activity analysis seeks to understand how interactive events on the micro/meso levels relate to—possibly widely separated—past and future events (Ludvigsen et al., 2011). If complex activity systems can be considered as complex systems, this implies that learning 'effects' may (or may not) occur in a future that cannot be predicted beyond a short time-window. Lemke (2000) expresses such a non-linear perspective as time itself becoming "folded" (ibid. p. 276). Similarly, Engeström and Toivainen (2011) criticise most approaches to analysing interaction in learning situations as being concerned with narrowing down analysis to the here-and-now, to very short slices of interaction with "no history and no future" (ibid. p. 35). Furthermore, such (non-linear) chronological time in learning is distinguished from "cultural-historical" time, which is embedded in the (knowledge) artefacts that we use and is the site of conflicts, ruptures and resulting realignment of activity systems, corresponding to "learning by expanding" (Engeström, 1987). In sum, from a CHAT perspective, analysing different types of learning requires relating events on different timescales and conceptions of time. From the subjects' perspectives, too, "learning occurs when different timescales meet and intersect, and meaning potential becomes transformed to common objects (physical and discursive)" (Ludvigsen et al., 2011, p. 110). In collaborative situations, therefore, one way of creating such confluence of temporalities, i.e., learning, is by collaborative remembering, that we characterise as the "cement" of collaborative learning.

Returning to our above discussion, on the micro-level, just as CR has been shown to be an *embodied*, phenomenon, integrating gesture, gaze and behavioural resonance, the same conclusion follows for CR in CL. Furthermore, one implication would be that in *computer-supported* CL/CR across the Internet, facilitating *embodied* social interaction would be important. On the meso-level, group memories do not go beyond the sum of individual memories, in the case of non-experts, i.e. learners. This would imply that the possible value of CR in CL should *not* be seen as simply promoting 'better remembering', but rather in the elaboration of 'zones' of collective activity in which timescales coalesce. Finally, with respect to the macro-level of CR, research on social learning via 'transmission chains' and social networks would have implications for the organization of CL between groups and possibly age-levels in schools (e.g., horizonal transmission between children). To conclude, we have sought to establish and deepen possible links between research in CR and in CL. This has opened up possibilities for future research on studying the integration of specifically organized collaborative remembering sequences into CSCL, within a longitudinal approach. Since CR in the workplace enables team projects to stay 'on track', a similar function for CR in CL could occur within Project-Oriented Pedagogy.

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