Investigating chronotopes to advance a dialogical theory of collaborative sensemaking

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Abstract

The aim of this paper is to highlight the contribution offered by the dialogical approach in understanding the interconnectedness of the situated sensemaking and situation-transcending processes occurring during the collaborative finalization of a product. We propose a dialogical theory of sensemaking based on the concepts of chronotope, voice and artefact mediation, aimed at investigating how multiple space–time frames are interconnected in collaborative sensemaking. We argue that this analysis is complementary to both the semiotic and the institutional analyses of sensemaking, which constitute the basis of our theorizing. To concretely illustrate our proposal for a chronotopic analysis of collaborative sensemaking, we qualitatively discuss an excerpt taken from a meeting of a multidisciplinary professional team working on the finalization of a web platform meant for enterprises.

Introduction

In the last few years, interest in sensemaking has been growing. The human mind has been conceptualized as a sensemaking system, strongly interdependent with its sociocultural context (Linell, 2009; Märtsin, 2012). Thus, sensemaking has been considered crucial for psychological theories. Klein, Moon, and Hoffman (2006)

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briefly defined sensemaking as 'a motivated, continuous effort to understand connections (which can be among people, places, and events) in order to anticipate their trajectories and act effectively' (p. 3). Within this process, language has been conceptualized as an intersubjective phenomenon that is 'constitutive' of human sensemaking (Salvatore & Venuleo, 2008). Following this line of thought, sensemaking should be considered a ubiquitous process of making the 'ever-new moments' of experience 'familiar, understandable and even predictable' (Märtsin, 2012), achieved through semiotic devices used within the frame of social interactions.

While many authors have focused on the individual level of sensemaking, '(that is, the person is working on her relation to the world or to her own mind), it should also be considered how individuals use tools and signs to work on the minds of others' (Märtsin, 2012, p. 436). Furthermore, a particular case of sensemaking is accomplished in collaborative processes, where people not only 'work on the minds of others', but need to define a (partially) shared 'object of activity' (Engeström, 1987) necessary for engaging in collective action. In line with the dialogical approach, we maintain that sensemaking is always a polyphonic process involving multiple voices. However, we consider collaboration as prompting a special type of sensemaking because it involves not only a shared understanding of each other's intentions but also a need to develop a collective action, finalized in the construction of a shared object. A paradigmatic example of collaborative sensemaking is the collaborative design developed by professional teams working together to create a product. In these situations, team members – often having different professional backgrounds and different views – need to discuss the different perspectives associated with the creation of the artefact in order to negotiate collective action. We argue that the understanding of the sensemaking process during such collaborative tasks can be enriched by adopting the Bakhtinian concepts of chronotope and voice, and the concept of artefact mediation as developed within the cultural–historical framework.

In the following sections, we will first outline the general theoretical assumptions that inform our understanding of collaborative sensemaking. Second, we will discuss two current research programmes developing a semiotic analysis of sensemaking. Finally, we will show how a dialogical approach, based on chronotopes, voices and artefact mediation, can contribute to the advancement of understanding collaborative sensemaking by considering some interdependencies that have been so far not fully explored by current theories on sensemaking.

Theoretical background

To develop our dialogical theory of sensemaking, we will draw upon the Bakhtinian tradition and the cultural–historical framework. The combination of these two perspectives is particularly useful in considering sensemaking not as an individual, autonomous accomplishment, but as always involving interdependency between actors and contexts. In particular, dialogical theories 'always include dual

(or multiple) properties, each one irreducible to the other but unavoidably inter-
dependent, and this system of relations and its dynamics constitutes the focus of
dialogical analysis' (Salgado & Clegg, 2011, p. 430). Indeed, thoughts and utter-
ances are always responsive to those previous, and they anticipate those possible in
the future. Not only are utterances formed in the 'atmosphere' of the already
spoken; they anticipate and are oriented towards what 'has not yet been said'
(Bakthin, 1981). In addition, meanings are interdependent with contexts in terms
of concrete situations, co-text and background knowledge. Meanings in the here
and now of the interaction are also related to previous dialogues – including con-
versations and media – which in the long term constitute 'traditions' that may be
used as resources for sensemaking.

In the cultural–historical tradition, artefacts are considered historically devel-
oped cultural tools that mediate people's sensemaking and their participation in
socio-historical praxis (Cole, 1996). They constitute the link between here-and-now
sensemaking and the historical development of society. Artefacts, in this perspec-
tive, are at the same time material and ideal. 'They are ideal in that their material
form has been shaped by their participation in the interactions of which they were
previously a part and which they mediate in the present' (Cole, 1996, p. 117). They
are complex semiotic structures that can canalize trajectories of meaning (Gillespie
& Zittoun, 2013). In our perspective, the space–time organization of the material
world in which sensemaking takes place is in itself a cultural artefact able to medi-
ate semiotic processes of sensemaking.

In sum, in a face-to-face situation of sensemaking, three aspects work together:

> (a) the participants' moves (or gestures) in the here and now of the interaction and,
> more specifically, the fine attunements through which they anticipate the other's point
> of view; (b) the connection of the present situation with previous or anticipated situ-
> ations; (c) the dialogic relationships that unfold within a single speaker's discourse.
> (Grossen & Orvig, 2011, p. 497)

Moreover, as discussed by Daniels (2010), institutional structures are themselves
'cultural artefacts' that mediate social interaction: 'When we talk in institutions,
history enters the flow of communication through the invisible or implicit medi-
ation of the institutional structures' (p. 381).

We fully recognize the relevance of all of these aspects, which testifies that
scholars seek to account both for the interactional nature of situated processes
and for the interdependencies between micro-contexts (i.e. specific situations of
sensemaking) and broader sociocultural processes (Akkerman, Admiraal,
Simons, & Niessen, 2006; Linell, 2009). In agreement with others (e.g., Grossen
& Orvig, 2011), we maintain that the space–time of sensemaking – or chronotope,
to use Bakhtin's terminology (Bakhtin, 1981) – transcends the actual situations,
also encompassing past experiences, future events and imaginative (narrative)
space–times that are tied together through specific mechanisms. However, the inter-
connectedness of multiple space–time scales in collaborative sensemaking has not

yet been fully clarified. The question for a theory of sensemaking is, then, to investigate which space–time frames are tied together during collaborative sensemaking, and which mechanisms and principles regulate the interconnections between the different contexts and domains of experience involved. In other words, the analysis of sensemaking should concern how the space–time of sensemaking is organized by individuals, groups and institutions, both in terms of the space–time frames involved in semiotic processes and the space–time relations within the broader context of activities that exert 'invisible mediation' (Daniels, 2010) on sensemaking. Indeed, on the one hand, institutional structures generate more or less stable patterns of space–time organizations of activity, which function as invisible mediators of sensemaking. On the other hand, space–time relations are an intrinsic property of semiotic processes. For example, as previously argued, sensemaking involves the interconnectedness between the present situation and previous or anticipated events throughout the semiotic process. We call this field of investigation chronotopic analysis. Before presenting our approach, we will report two existing approaches that we use as starting points for our proposal.

The semiotic analysis of sensemaking

Semiotic analysis concerns the modelling of the 'semiotic landscape' that emerges during collaborative sensemaking (Salvatore, Gelo, Gennaro, Manzo, & Al Radaideh, 2010; Salvatore & Venuleo, 2013). Pierce's definition of sign is the centre of this approach, which argues that the meaning of any sign is not given by its semantic content, but rather it emerges as the domain of pertinence defined by the following signs. In this way, a dynamic and semiotic model of meaning is elaborated, which accounts for contextuality and situativity, in line with the dialogical approach. Meaning consists of two components:

> an observable side, the Significance in Praesentia (SIP), namely the portion of the world used as sign, and a latent side, the Significance in Absentia (SIA), namely the pertinent gestalt of linkages among signs defining the condition of interpretability of the former. (Salvatore & Venuleo, 2013, p. 211)

Therefore, the 'standing-for relationship' between a sign and the world requires the interpretative intervention of other signs (the interpretants). Sensemaking is found, then, in the temporally layered relationship between co-occurring signs. This definition leads Salvatore and colleagues to develop a methodology able to map the structure of the patterns of co-occurrent signs, theorizing that this structural property of sensemaking as such reveals the latent side of meaning (the SIA). In particular, the SIA corresponds to a 'scenario of experience', namely a 'redundant domain of life characterized by a somehow stable dynamic network of co-occurring signs, and therefore a particular distribution of the probability of their being related' (p. 212). Salvatore and Venuleo (2013) developed a method for modelling the semiotic landscape as the 'phase space' of the trajectory of signs shaped by the

dynamics of the SIA. The structure of this semiotic landscape – that is, the patterns of the co-occurrence of signs – is considered the condition of the interpretability of the signs, consisting of the 'scenarios of experience' that constitute the latent side of meaning. This approach is applied to analyse psychotherapeutic communication, and its scope is limited to the structural features of discursive interaction.

This semiotic analysis – although highly significant – takes into account only the 'intra-textual context' of sensemaking, excluding other levels of context. How the semiotic landscape is connected to the 'real world of social praxis' (Daniels, 2010) is not investigated. The 'scenario of experience', in our perspective, is not only a property of the semiotic structure of sensemaking, but it is a feature of the multi-level contexts – both semiotic and material – in which the sensemaking is embedded. Social positions, in our view, function as an interface between the semiotic landscape and the contexts of social praxis. In particular, we argue that during situated sensemaking, people enact social positions that do not emerge only in accordance with the local conditions of the discursive exchange. Rather, they emerge as psychological resources connected to specific space–time frames external to the situation. Such social positions are continuously transformed during the sensemaking (through semiotic processes), although they pre-exist situations of sensemaking as the crystallization of social practices.

Furthermore, the 'scenario of experience', which determines the significance of signs during the situated sensemaking, does not reside exclusively within the discursive processes. The institutional processes are relevant as well, as we will discuss in the next section.

The institutional analysis of sensemaking

Daniels (2010) uses Bernstein's sociolinguistic theory in connection with the cultural–historical approach to analyse how the development of innovation is associated with the mutual shaping of individuals and institutions. In order to reach this goal, the author discusses the crucial concept of 'invisible or implicit mediation' through which institutions can 'mediate mental dispositions, tendencies to respond to situations in certain ways' and 'put in place beliefs about the world one lives in' (p. 379). In this perspective, invisible mediation is ubiquitous as it is an intrinsic property of everyday discourse that occurs in relation with institutional structures. Interestingly, Daniels (2010) connects his theorizing on social structures to the concept of social position, arguing that an important qualification of mediation in social practices is the relationship between contexts and social positions:

> whilst the context for mediation is always the social practices of discourse an important qualification is that in such practices individuals take up specific social positions and are themselves positioned. The same context offers different possibilities for socially positioned actors. (Daniels, 2010, p. 379)

Therefore, an investigation of social mediation involves the analysis of how institutions structure social practices. This allows relating the cultural–historical context to semiotic processes. Following this line of thought, the analysis of sense-making is focused on detecting the invisible mediation that institutions exert on social practices through discourse analyses.

Social analysis should not be reduced to semiotic analysis, because it would fail to examine the 'real world of social praxis' in which activities occur (Daniels, 2010). Developing this claim further, we argue that the 'invisible mediation' of social practices takes place also through the space–time organization of activities. Such processes are not detected by analysing only the institutional categorization of professionals and power relations. An analysis of the interconnectedness between the situation of sensemaking and the events taking place there and then is needed to fully grasp the sensemaking dynamic, as we will discuss in the next section.

The chronotopic analysis of sensemaking

Our approach is based on the Bakhtinian concepts of chronotope and voice. The concept of chronotope was introduced by Bakhtin (1981) to analyse how space and time are shaped in narratives, and how emergent configurations of space and time define literary genres. For Bakhtin (1981), not only narratives, but meanings in general, are always tied to chronotopes: 'Every entry into the sphere of meanings is accomplished only through the gates of the chronotope' (Bakhtin, 1981, p. 258). We consider chronotopes as particularly relevant for analysing sensemaking because space–time relations are an 'emergent property' (Sawyer, 2005) of sensemaking, simultaneously related to the semiotic processes that constitute sensemaking and to the activities in which it is embedded. A chronotopic analysis of sensemaking can help to understand how the here and now is connected to the multilevel space–time frames of the collaborative activity.

Moreover, in line with the dialogical perspective, we consider the concept of voice (Bakhtin, 1981) relevant for a dialogical account of sensemaking, because its dynamic evolution is visible in that it is situated both in the here and now of the interaction (the voices of speakers) and in the tradition of historically developing cultures (virtual participants). We use the concept of 'voice' as a 'speaking person-ality' (Akkerman, Admiraal, & Simons, 2012, p. 230), voicing a particular perspec-tive on a topic. Topics are 'issues' or 'themes' addressed during a conversation, and their sequence reveals the emerging structure of the interaction (Linell, 1998). Indeed, as Grossen and Orvig (2011) point out, examples of the 'Others' in dialogue can include a real person who may react in ways that are not fully predictable, an absent virtual individual or an abstract social entity. Abstract entities participate in here-and-now sensemaking especially through 'generalized voices' (Linell, 2009) or 'cultural voices' (Wegerif, 2012), that is, virtual participants that are not necessarily human beings but can be institutions, professions, social categories, etc. voiced by participants as socially recognized views on the topic under discussion. The 'voice' is a heuristic concept that allows the tracking of multiple perspectives in dialogue

during the process of sensemaking, which can embody either participants' personal perspectives or a socioculturally constructed, generalized perspective.

Voices, according to Bakhtin, live in dialogues that are multi-voiced or polyphonic, since their meaning is the result of their interrelations with other voices, responding to and anticipating each other, or opposing or sustaining each other. Analysing collaborative sensemaking as a dialogue of multiple voices – a polyphony – overcomes the problem of typifying it in terms of emergent consensus and obliterating the tensions and breakdowns that typically characterize collaboration, where shared meaning can be difficult to reach (Talamo & Pozzi, 2011).

As Gillespie and Zittoun (2013) point out, 'people don't live in just one context (Dreier, 2009); rather, they move between contexts (both social and fictional). Such movement between domains, we argue, is crucial to meaning making' (p. 527). In our view, shifts in the voices are paired with movements between meanings that belong to other contexts and experiences, activating the chronotopic mechanisms through which the space–time configurations of sensemaking are shaped: 'positions are called up, typically in their combination, at particular places-at-regular-times, and, as connected to such time-spaces, they contribute to the organization of human experience' (Hermans, 2001, p. 350). Therefore, we consider the concept of chronotope helpful in giving an 'account for the various times and places that are concentrated in a given situation' (Grossen & Orvig, 2011, p. 498).

By switching from voice to voice, participants move across multiple (real or imagined, instantaneous or long-lasting) experiences of the world which, in turn, provide the semiotic resources for the ongoing sensemaking. We maintain that the interplay between the meanings 'located' in other space–times and the emergent polyphony of voices is crucial for sensemaking in general, but especially for collaborative sensemaking:

> Each new social position we take up constitutes a differentiated domain of experience. But the movement between these social positions might also help to integrate them, weaving together these otherwise disconnected domains of experience, such that the integration forms an intersubjective structure, enabling people to participate in differentiated but integrated perspectives within a social activity. (Gillespie & Zittoun, 2013, p. 526)

While a semiotic analysis of sensemaking proves to be useful in modelling the semiotic landscape of sensemaking and can allow detection of the movements between social positions, a theory of sensemaking should also explain how such a semiotic landscape connects to social praxis:

> Different social structures give rise to different modalities of language which have specialized mediational properties. They have arisen, have been shaped by, the social, cultural and historical circumstances in which interpersonal exchanges arise

and they in turn shape the thoughts and feelings, the identities and aspirations for action of those engaged in interpersonal exchange in those contexts. (Daniels, 2010, p. 380)

Our view complements Daniel's analysis by considering the relationships between the organization of the tasks and activities performed by participants and their discourse. The principles of social regulation partially overlap, and to some extent complement, the chronotopic analysis we propose. Institutions exert an invisible mediation not only by means of principles of communication – which can be considered an element of the semiotic process – but also by means of the space–time organization of activities (Foucault, 1977). Social categorization is not exclusively enacted in discourse. Institutions can organize the space–time of activities in ways that afford different types of categorizations. For example, the various arrangements of physical or virtual spaces can be considered indicators of the type of social categorization dominant in an institution.

A theory of sensemaking needs to account for the 'social, cultural and historical circumstances' that constitute the multilevel context shaping sensemaking. We need to model not only the semiotic landscape, but also the circumstances in which that landscape is grounded. We use the concept of chronotope to investigate which space–time scales function as relevant context for the emergence of a semiotic landscape and what mechanisms regulate their interdependence concerning the sensemaking.

Chronotopes are at the same time semiotic and material. They are *represented in discourse*, but they are also *enacted* in social practices as space–time organizations of bodies and things: 'different social activities are also defined by various kinds of fused time and space: the rhythms and spatial organization of the assembly line, agricultural labor, sexual intercourse, and parlor conversation differ markedly' (Morson & Emerson, 1990, p. 368). This does not mean that we defend a dualistic notion of space–time. Chronotope invokes a whole; the distinction between enacted and discursive chronotopes is analytical, not ontological. Chronotope is here considered a quality of human action that can be investigated both in discursive and non-discursive activities.

Hence, we define chronotope as the organization of the space–time frames in sensemaking, emerging as movements between space–time frames in discursive interactions (e.g. connections between the here and now and previous and anticipated events; the discursive envisioning of the space–time organization of activities) and as the material organization of bodies and objects (e.g. the physical organization of buildings).

Therefore, we need to develop methods for detecting movements between multiple space–time frames in discourse – the semiotic aspect of chronotope – as well as for analysing patterns of the organization of space and time enacted in social practices – the socio-material aspect of chronotope. Analysing the

discursive side of chronotopes concerns understanding how previous and anticipated events are connected to here-and-now sensemaking, how participants discursively construct the space–time of their activities and how they perceive the space–time constraints of the activities, interpret them discursively and organize the collaborative process. The socio-material aspect of chronotope involves the investigation of the organization of workspaces and schedules of activities, and how these patterns of the organization of activities affect sensemaking processes. Issues such as the possibility of physical co-presence, asynchronous communication, the distribution of tools and semiotic resources within the environment, predetermined or emerging schedules of activities, etc. concern this side of chronotope.

Building on these ideas, we maintain that sensemaking involves three levels of analysis:

1. The micro level: This level involves the analysis of the interactional aspect of sensemaking through tracking both participants' moves in the here and now of the semiotic process and the dynamic, situational organization of the physical and virtual space–time. For example, the dynamic movements of bodies and artefacts during conversations and the discursive construction of the space–time of the interaction belong to this level of analysis.
2. The meso level: This level involves analysing how space and time are organized within an activity, both in terms of the semiotic connection of the present situation with previous and anticipated events and in terms of the patterns of organizations of the space–time.
3. The macro level: This level concerns wide societal and institutional processes aimed at detecting typical configurations of space and time that characterize a society in specific historical moments. For example, Renshaw (2014) approached this task by analysing the chronotopes of schooling typical of different historical moments.

Even though we recognize the relevance of all these interdependent levels, so far our investigation has mainly addressed the meso level, discussing the organization of space–time within activities. To concretely illustrate our proposal for a chronotopic analysis, we qualitatively discuss an excerpt taken from a meeting of a group of professionals (composed of researchers in psychology and computer science, and entrepreneurs) working on the finalization of a web platform meant for promoting environmentally and socially sustainable practices within a consortium of small and medium enterprises. We provide an anecdotal account based on ethnographic discourse analysis as an example of the aspects of social interaction that can be uncovered by investigating chronotopes. In particular, we show how the meanings emerging in the here and now of the sensemaking are interdependent with the space–time organization of the activity at the meso level, both in terms of semiotic processes and socio-material circumstances.

An example of a meso-level chronotopic analysis: An interdisciplinary team designing a web platform

We consider the creation and finalization of a web platform to be an interesting case of collaborative sensemaking that involves a dialogue between different perspectives for the collaborative construction of a cultural object. In our case, entrepreneurs and researchers have different visions about how the platform should work and what it should do, so the conversations occurring during the meetings can be considered culturally dense. The participants engage in rich collaborative sensemaking, aimed at reconciling the different (professional) cultures and sustaining collaborative actions, at the service of the common goal.

The excerpt we analyse is extracted from a session where the team discussed possible improvements in the design and the strategy for encouraging entrepreneurs to use the web platform they were designing. Before arriving at this meeting, the team had been individually testing the platform for three months, so during the meeting they were able to offer informed opinions about how it works and what needs to be improved. During the testing, the members of the team communicated mainly by means of a shared document where each of them wrote his/her reflections regarding the functionalities of the platform, and they also commented to each other online. The document was finally edited by a researcher and brought to the meeting.

During the meeting, some doubts about how the platform would work emerged. Before proceeding further in the design, the team attempted to clarify the procedure through which an entrepreneur would use the platform. Different views regarding the functioning of the platform emerged, and an at least partially shared understanding of how the platform would work in practice for the final users was reached. The virtual voice of a very active entrepreneur, Victor, was used. Voicing a potential user allowed the team to clarify the procedure for using the platform, and the problems emerging on the users' side at this stage could be anticipated and solved.

> Excerpt 1
> Irene (researcher): let's take the example of Victor with the water dispenser
> Fabrizio (computer scientist): Victor who today accesses the platform because someone told him why don't you access the platform? He says well I'll try, I mean Victor . . . the process I have in mind is that he accesses the platform from the new homepage, the one that now is not visible yet, he is in front of the five areas so he can surely see himself in one of these five areas. So, the water dispenser I would put it in 'Limiting consumption' or. . .
> Daria (entrepreneurs' representative): no reducing
> Fabrizio: reducing the production of waste, I mean it can be in either one, I don't know
> Daria: no reducing the production of waste because with the water. . . you don't use bottles anymore. . .

Fabrizio: ok let's say that I end up in 'waste production', then I immediately have the various types of best practices, I mean then we have 'eliminating the use of plastic bottles', 'the re-use of ink cartridges', these two are the cases, either Victor recognizes himself in one of them

Daria: yes in this case he recognizes himself

Fabrizio: in this case let's assume that he doesn't

Daria: ok he doesn't

Fabrizio: he doesn't recognize himself, let's go to the branch... a jump in the settings... I mean he has to create a new type

Daria: yes insert the...

Irene: new type but why don't we make the creation of the new type a more direct thing?

Daria: yes we should do that

The introduction of the water dispenser is an action undertaken by Victor in his company to reduce the use of plastic bottles. The reference is to a past action, occurring elsewhere, not directly experienced by the participants. Fabrizio, the computer scientist, takes the opportunity to clarify the 'process he had in mind', both by pretending to be in Victor's shoes while reporting this action in the platform and by using his previous experience with the platform. Both these perspectives are used as resources for collaborative sensemaking. Indeed, the subject of the narrative that Fabrizio is building shifts between pretending to be someone else ('Victor') and the 'I' position (the personal experience with the platform). In this excerpt, we can also recognize a future orientation of sensemaking: Fabrizio is using the water dispenser case to clarify how the platform will work when functionalities he has 'in mind' will be implemented.

Voicing the users as a resource for sensemaking allowed the group to identify design issues to be addressed, such as how to create a new category for classifying the practices to be entered into the platform. Consequently, the team was able to reach a shared understanding about how to improve the platform, making it easier to create a new category. This is a process of cultural mediation similar to what Cole (1996) calls prolepsis, which is what parents do when they use memory from their past to imagine how their kids will be. Imagining the future (of a child) in the present by recalling the past (of the parents) is, ultimately, a cultural 'materialized constraint' (Cole, 1996, p. 184). In our example, we can retrieve the same trajectory: depicting the future design of the platform based on imagined actions by potential users and past experience with the platform. We consider particularly interesting that this process was activated by means of a virtual voice that creates a link between the past, present and future.

However, a discursive analysis of the excerpt leaves many questions unanswered. For example, it is not clear if some circumstances external to the here-and-now sensemaking functioned as grounds for the emergence of these voices as semiotic resources for sensemaking. The overall examination of the group activity shows some further interdependencies at the meso level of analysis between the

space–time organization of the activity and the organization of the situated sensemaking.

When the team members individually tested the platform, they experienced it as users and as designers. They looked at the platform both from their own point of view – using their expert/professional position as designers of the platform – and from the users' perspective. During the meeting, this process became evident. They explicitly refer to the user's perspective, and they refer to an action – the introduction of the water dispenser – that everyone knew about. During this meeting, the participants' individual voices and the voice of the user played a major role in the sensemaking. The dominance of these voices was grounded in the experience of testing the platform and of providing individual comments in an online document. The document was often used during the meeting to activate these voices.

A similar relationship between voices and the space–time organization of the activity emerged during a subsequent meeting, where the expert group voice (in particular, the voice of the researchers) was often used. The emergence of this voice was grounded in a specific circumstance: the researchers had worked together the day before the meeting, and they used a collective voice in connection with the ideas that emerged during that session (the space–time of the meeting of the researchers). Furthermore, the expert group voice foregrounded the use of concepts deriving from a professional tradition (the space–time of long-term participation in professional practices). In this way, the here and now was linked both to the organization of the tasks within the projects and to the broader professional culture of the researchers.

An isomorphism can be singled out between the social positions that emerged during the activities of the project and the voices emerging in the here-and-now sensemaking. The space–time for the collaborative work that the researchers set up in preparation for the team meeting had an impact on the semiotic processes of sensemaking foregrounding the perspective of the professional subgroups. Indeed, in our interpretation, the social position of the professional sub-groups become relevant based on the shared understanding reached by the researchers during their preliminary session. Similarly, during the first meeting, the shared virtual space for collecting notes from the individual testing of the platform conveyed a collaborative sensemaking where the individual positions of the team members and the voice of the users – often recalled through the use of the document prepared online – constituted resources for sensemaking. Therefore, the 'invisible mediation' of social practices occurred also through the space–time organization of the activities.

In sum, we have discussed how the emergence of different voices can be grounded in specific experiences happening there and then, providing semiotic resources for ongoing collaborative sensemaking. During both meetings, the voices enacted by participants are related to the organization of work in a space–time frame that exceeded the here-and-now discursive interaction: the voice of the user is related to the individual testing of the platform by team members; the

expert-group voice is related to the previous collaborative work carried out by researchers.

Discussion and conclusions

In this paper, we use a dialogical approach to understand sensemaking during collaborative work, involving participants with different – although complementary – expertise who are interacting with the common scope of designing a product. We argue that looking at sensemaking in terms of chronotopes and voices helps to understand how different space–times are interconnected during the negotiation of a collective action. In particular, we found that cultural voices (e.g. the voice of the user, the voice of the expert group), often recalled through the use of artefacts, are crucial in creating connections between the ongoing sensemaking and the previous experience of the sensemakers.

We consider these social positions as an *interface* between situated collaborative sensemaking and situation-transcending processes. Uncovering how social positions are grounded not only by semiotic processes, but also by socio-material contexts is crucial for the investigation of sensemaking. In this article we maintain that a chronotopic analysis offers conceptual tools complementary to both the semiotic and institutional analyses of sensemaking.

Our argumentation is outlined in Figure 1. This figure indicates that semiotic, chronotopic and institutional analyses of sensemaking can play specific, complementary roles in the understanding of collaborative sensemaking.

The semiotic analysis on the right side of Figure 1 concerns the formal/structural relations between signs (Salvatore & Venuleo, 2013) that traces the discursive process of sensemaking and its dynamics. Social positions are represented as the interface between semiotic processes and socio-historical contexts, analysed through both chronotopic and institutional analyses. Chronotopic analysis maps the interdependencies between situated sensemaking and the space–time contexts that are interconnected with the situation of sensemaking. This analysis allows detecting the emergence of meanings in relation to multiple events and non-discursive practices. Institutional analysis reveals the connections between social structures, power relations and the communication principles that regulate social exchange. These dimensions of analysis are strongly interdependent with each other. The arrows of the figure indicate the interconnectedness between the levels. Institutions can generate stable patterns of space–time relations, that is chronotopes, functioning as material crystallizations of institutional values or power relations. Chronotopes, in turn, can contribute to the maintenance or to the transformation of institutions and exert an invisible mediation on institutional practices (the arrows between institutions and chronotopes). Semiotic landscapes are interdependent – by means of social positions and artefacts – with the cultural–historical circumstances in which sensemaking is embedded, which are both chronotopic and institutional. On the one hand, as discussed by Daniels (2010), institutional processes are interdependent with semiotic processes, such as social categorization (the arrows
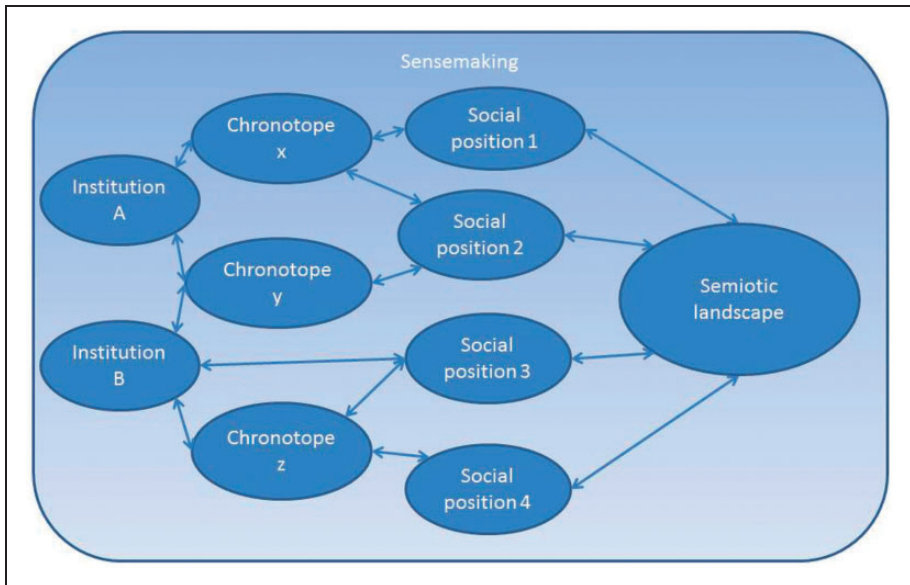
Figure 1. Interconnectedness between semiotic, chronotopic and institutional analysis.

between institutions and social positions). On the other hand, the social positions emergent in dialogical interaction are linked to specific chronotopes (the arrows between chronotopes and social positions), and such connectedness between social positions and chronotopes contributes to the emergence of the semiotic landscape and to the organization of collaborative sensemaking (the arrows between social positions and semiotic contents).

Although more application of this approach is needed to establish its validity, we believe it is very promising and has many practical implications. For instance, it allows investigating how the organization of tasks and activities may enhance or jeopardize sensemaking. In some cases, chronotopes could foster the emergence of multiple social positions, enriching polyphony and increasing the dialogic tension. In other cases, chronotopes could facilitate a shared understanding in situations where opposing perspectives slow down the decision-making process. As for the practical implications, managers can influence participants' social positions by providing different types of virtual or physical spaces. We argued that in the piece of data presented as an example of a meso-level chronotopic analysis, having an online space for individual contributions or preliminary working sessions for specific professional groups affects the sensemaking process at the subsequent team meeting in different ways. As Weick and his associates stated (Weick, Sutcliffe, & Obstfeld, 2005), sensemaking is 'a significant process of organizing' (p. 409).

Declaration of Conflicting Interests

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