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# **Leveraging Researcher Multivocality for Insights on Collaborative Learning**

**Alpine Rendez-Vous 2011, La Clusaz, France, March 2011**

## **Workshop # 8 White Paper**

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## **1. Introduction and motivation**

This workshop targets researchers in the Learning Sciences, Computer Supported Collaborative Learning (CSCL) and Technology Enhanced Learning (TEL) communities who are interested in how human interaction leads to learning. Such researchers come from many different disciplines (psychology, linguistics, cognitive science, computer science, didactics, etc.) and thus employ diverse methods in pursuing their specific research goals as well as hold diverse theoretical assumptions in relation to these goals. Many of us are interested in the richness that an interdisciplinary approach to studying learning in human interaction can provide, but in order to profit from this, we must find a systematic way of leveraging our diversity to further our understanding in spite of potential incommensurable differences that may occur across traditions. Recognizing this diversity as a necessary multivocality has led our group to reflect upon ways in which such multivocality can be productive for the communities involved. In particular our objective is to make progress towards better understanding the role of human interaction in learning, an understanding that should transcend disciplinary boundaries. This workshop proposes a systematic method for promoting fresh dialogue between the relevant research traditions with the objective of making new claims about learning.

This workshop proposal continues the trajectory of a series of prior workshops. At ICLS 2008 (“A Common Framework for CSCL Interaction Analysis”), we explored dimensions along which analytic efforts can be characterized, and attempted to identify a common framework that would enable comparison of analyses and building shared analytic tools. Confronted with the multivocality that makes such unification difficult, we shifted our focus at CSCL 2009 (“Common Objects for Productive Multivocality in Analysis”) to identifying the basis for dialogue between different traditions. One major conclusion was that multiple analyses of shared data sets provide a promising basis for discussion, these data sets constituting “boundary objects” (rather than “common objects”) that make discourse possible. At the Alpine Rendez-vous 2009 (“Pinpointing Pivotal Moments in Collaboration”), we followed up on this conclusion by having researchers from different theoretical and methodological traditions analyze the same data sets. The analyses were focused on the identification of “pivotal moments” in collaboration. Different conceptions of pivotal moments were identified, but in all cases they provided good starting points for further analysis of how learning arises from interaction. At ICLS 2010 (“Productive

Multivocality in the Analysis of Collaborative Learning”), we expanded the corpora on which researchers from different theoretical and methodological traditions performed their analyses and we proposed an initial structure for a book focused on the multiple analyses of shared data, arising from our different gatherings. The objective of this new workshop proposal “Leveraging Researcher Multivocality for Insights on Collaborative Learning” is twofold. First, we will discuss how the multiple analyses carried out on each paradigmatic corpus we chose from previous workshops contributed to specific new insights on collaborative learning. Secondly, we will build dialogue between complementary researcher views that can be introduced into the book.

## 2. Workshop description

The workshop was structured as a working meeting towards forming a consensus view of what the story will be in the book, which will be the final product of our workshop series. As in our earlier workshops, the structure of this workshop was organized around datasets. The book will include multiple analyses of 5 different datasets: Hajime’s fractions dataset, Wen Li’s Group Scribbles Electricity dataset, Carolyn’s 9th Grade Biology dataset, Nobuko’s Knowledge Forum dataset, and Keith’s Chemistry dataset. The workshop gave more time to all but the Chemistry dataset since the majority of researchers working on the Chemistry portion of the book were not able to participate in the ARV. However, this dataset was given some consideration in all but the initial session so that its message would figure into the integrated story that will be presented in the book. A draft version of the book was available to all workshop participants ahead of time in order to facilitate rapid progress during the workshop itself.

### *Wednesday Session 1 08:30-12:30 Within-Dataset Multivocality Discussions*

The goal of the initial session of the workshop was to welcome the participants, to introduce the book in its draft form, and then to divide into two parallel sessions, each focusing on two datasets. In those sessions, there was time to discuss the dataset as a whole and each draft analysis. Discussion focused on issues raised in the analysis, especially places where discrepancies between analyses came up in the drafts or presentations, or where participants who were not authors raised questions or objections. Not surprisingly, because our participants represent a broad spectrum of methodological and theoretical perspectives, there were challenges raised, especially relating to how analyses were set up, since many assumptions are made in this process that relate back to that range of perspectives. For example, in Parallel session 2, questions related to the setup of the Goggins social network analysis in terms of parameter settings were raised based on the Stahl ethnographic style analysis. Questions were also raised relating to the selection of the datasets themselves – especially with regard to whether it is beneficial to highlight what can be learned from what went wrong in the data, or whether it is more beneficial as a contribution to the CSCL community to focus on places where knowledge building was more ideal. The decision was eventually to place value both on the ideal examples of knowledge building as well as ones where things go wrong (as a reality check for the community, especially for young researchers with idealistic views of how to change the world with technology, and also as an illustration of how a multivocal approach to iterative, data-driven design and development is valuable as well as a multi-vocal analysis of data from more mature systems and interventions).

08:30-08:45 Opening Remarks and Introductions (Carolyn, Ulrike, and Greg)

08:45-09:15 Overview of Book (Carolyn, Kris, Dan)

09:15-12:15 Parallel Corpus Break Outs

Time	Parallel Session 1	Parallel Session 2

09:15-09:25	Hajime Fractions Corpus Presentation (Hajime)	Bio Corpus Presentation and Analysis(Carolyn)
09:25-09:35	Analyst 1 (Stephan)	Analyst 1 (Ulrike & Joachim)
09:35-09:45	Analyst 2 (Ming)	Analyst 2 (Gerry)
09:45-09:55	Fractions Meta-Discussant (Kris)	Analyst 3 (Sean)
09:55-10:05		Bio Meta-Discussant (Cindy)
10:05-10:20	Coffee Break	Coffee Break
10:20-10:30	Group Scribbles Corpus Presentation (Dan)	Knowledge Forum Corpus Presentation (Nobuko)
10:30-10:40	Analyst 1 (Heisawn)	Analyst 1 (Chris)
10:40-10:50	Analyst 2 (Richard)	Analyst 2 (Nancy)
10:50-11:00	Analyst 3 (Kris)	Analyst 3 (Ming)
11:00-11:10	Group Scribbles Meta-Discussant (Dan)	Knowledge Forum Discussant (Nobuko)
11:10-11:25	Compare notions of pivotal moments (Kris)	Compare notions of pivotal moments (Carolyn)
11:25-11:40	Discuss roles of representations/ visualizations (Dan)	Discuss roles of representations/ visualizations (Chris)
11:40-12:15	Discussion of insights into Multivocality and Grand Challenges/ prepare afternoon presentation (Kris)	Discussion of insights into Multivocality and Grand Challenges/ prepare afternoon presentation (Carolyn)

12:15-16:30 Lunch and Free Time

***Wednesday Session 2 16:30-20:15 Multivocality within and across datasets***

In Session 2, the discussions from session 1 were summarized and reported back to the whole group since each parallel session was attended by only half of the workshop participants. In addition to reporting back, this session gave opportunity for the whole group to begin its consensus building process. What emerged from this session was deeper questions about the nature of multivocality itself. One realization was that despite the controversies that did come up, we found that we were more on the same page than we anticipated, even across apparently very different theoretical and methodological camps. We questioned whether we should have reached further out to include researchers more different from ourselves, or whether the experience of the workshop series had brought about a mind meld in such a way that the differences we started with had been lessened over time. Questions were raised about whether

very different perspectives were really as incommensurate as we initially believed. We began to see that some of us choose methodologies for pragmatic reasons rather than deeply philosophical ones, and in that case, the mind meld is more natural.

16:30-16:45 Hajime Fractions Report (Kris)

16:45-17:00 Productive multivocality discussion (Kris)

17:00-17:15 Group Scribbles Report (Dan)

17:15-17:30 productive multivocality discussion (Dan)

17:30-17:45 Bio Dataset Report (Cindy)

17:45-18:00 productive multivocality discussion (Cindy)

18:00-18:15 coffee break

18:15-18:30 Knowledge Forum Report (Nobuko)

18:30-18:45 productive multivocality discussion (Nobuko)

18:45-19:00 Chemistry Dataset Report (Carolyn)

19:00-19:15 productive multivocality discussion (Carolyn)

19:15-19:45 Full group discussion and summary of multivocality lessons (Kris)

19:45-19:55 Discussion about Grand Challenges (Ulrike)

19:55-20:15 Planning for day 2 (Kris)

### ***Thursday Session 1 08:30-12:30 Methodological Insights and Book Theme***

Session 3 was a whole group working session divided into two parts. In the first part, we set aside one table for each of the 5 datasets, where the discussant for that dataset sat. All other participants divided up into traveling cohorts who visited each table in a round-robin/speed-dating style. In each of the rounds, the traveling cohort group at each table provided feedback based on the discussion from the day before about the current analyses under discussion for that dataset. These notes were collected and integrated by the discussant and then reported back to the whole group. These sets of notes will be used by those discussants in their writing of the discussion chapters for the book. These summaries also fed into the next phase of the group work, which was an affinity diagramming activity designed to identify issues that were not adequately discussed so far for the book as a whole. What came out of this discussion is that we need some high level, cross-cutting chapters that discuss the concept of pivotal moments and multivocality, a best practices methodology chapter for researchers just getting in to a multivocal style approach, and a lessons learned chapter that recaps what we take away from the experience of this workshop series. We also chose to delete two planned chapters that seemed less important than the chapters that emerged from the affinity diagramming discussion. One of those was a tools chapter that has been “rebirthed” in the form of a chapter about representations for data analysis and how these are embodied in analysis technology. As a wrap-up, the editors of the book worked out a plan with deadlines for moving forward to the final preparation of the book, which we plan to submit to a publisher in Fall of 2011.

08:30-08:40 Opening remarks on today's work (Carolyn)

08:40-09:30 Feedback to discussants, "Speed dating" style (one discussant per table)

09:30-09:35 Discussants prepare response

09:35-10:00 Discussants report back (Carolyn, Cindy, Nobuko, Dan, Kris)

10:00-10:15 Coffee break

10:20-10:40 Affinity Diagramming Part 1: Participants write thematic comments on sticky notes

10:40-11:20 Affinity Diagramming Part 2: Participants put up notes round robin style

11:20-11:30 Affinity Diagramming Part 3: Identification of Themes (Nancy, Chris, and Carolyn)

11:30-12:00 Group Discussion (Carolyn)

12:00-12:30 Wrapup discussion of themes and STELLAR Grand Challenges (Carolyn)

12:30-13:30 Lunch

***Thursday Session 2 13:30-15:00 Final Book Planning and Commitments***

13:30-15:00 Closing Discussion (Dan)

### **3. Emerging Research Questions**

Summarizing what came out of the discussions we realized several things during this workshop, which eventually became themes presented in the Symposium we presented at CSCL 2011. One was that through multivocal analysis, some things that we expect to look different based on our initial understandings can turn out to be much more similar than we had thought, while on the other hand, things that we assume are similar based on a high level understanding of operationalizations can turn out to be quite different in important ways when we examine them up close in the same dataset. In both cases, a multi-vocal analysis is valuable in that it challenges researchers to reconsider their assumptions, to sharpen their operationalizations, and to catch mistakes. After years of working together through our workshop series, and noticing how natural and easy it is now to communicate about our variety of analyses, we began to wonder if we learned to be too polite and accepting, or if perhaps our analyses seemed more compatible because we weren't digging deeply enough into the details. Beyond the issues discussed above, some additional questions that came out include the following:

What is the role of statistical methods in multivocal analysis? It's obvious what role it plays in quantitative approaches – but within our repertoire of datasets, we included one where complex statistical techniques were applied to a dataset that quantitative researchers would have considered too small for such techniques. In the spirit of multivocality, should we accommodate such an approach? If we do, are we relaxing our commitment to rigor? Do we then open up our community to a lower standard in terms of accumulation of ratified knowledge? Also, at the heart of qualitative research approaches is the idea that it takes human judgment and contextual understanding to identify those interesting interactions worthy of an up close investigation. Can we use statistical techniques to identify those instances that are unusual? Are these techniques really capable of identifying the ones that don't fit the statistical

distribution for the right reasons or in a theoretically interesting way? Are those instances that are important for theory building at least a subset of those instances that can be identified this way?

Questions related to falsifiability also came up with respect to the idea of a pivotal moment. In the fractions dataset, different analysts agreed on some pivotal moments and disagreed on others. What does this mean about the nature of the construct? Should all analysts agree? Is the multivocality then for the purpose of triangulation? If discrepancies are tolerated, does that mean we are not using multivocality for triangulation? Does it mean that the construct of pivotality cannot be falsified? Is it then just a tool for facilitating discussion rather than an indicator of something that has external validity?

#### **4. Grand Challenges**

Building a comprehensive framework for exchanging research data and analyses from different research teams in order to deepen the discourse, coming to a convergent interpretation and identifying further research questions.

##### ***What problems of the European education system are addressed, and what are the long term benefits for society?***

In TEL and CSCL different research groups focus on different aspects of collaborative learning. Some do small case studies, others have larger samples that allow for longitudinal studies or quasi-experimental designs. The teams focus on different teaching methods (scripting; co-operative learning; knowledge building), gather different kinds of data for their research (text data; video data, log files, performance tests) and apply different methods (interaction analysis; pre-post test designs; multi-level methods).

In order to make use of this variety of research data across the different research groups these relevant data sets should be shared and made accessible. The data sets and related analyses could serve as boundary objects and stimulate fruitful discussion across the different research approaches. This would not just show the multivocality in CSCL research, but could also serve as a means for converging evidence about the potentials and effectiveness of TEL and CSCL. This allows not just an overview about the effectiveness of CSCL in teaching and learning for researchers and the scientific community, but also for stakeholders and practitioners.

Furthermore, sharing of datasets and analyses would ensure that results be easier to validate and replicate, facilitating peer-review and leading to more generalisable results to be shared with stakeholders and practitioners.

##### ***What are the main activities to address this Grand Challenge Problem?***

Development of a *technical infrastructure* for supporting open data.

Development of a *framework* for data sharing. This framework consists of recommendations for technical formats, ethic standards and metadata. It describes the needed preparation of data and the documentation of analyses and results.

Development of a framework of how to exchange results (both the analyses as replicably performed and their interpretation) and “lessons learned” among researchers, practitioners and stakeholders.

Build a supportive structure for a dialogical interpretation of the data in order to make the community and stakeholders aware what results converge among the different data sets and different interpretations and in order to identify open questions.

Implementation and formative evaluation of this infrastructure.

### ***What is the timeframe for the Grand Challenge Problem?***

About 3 years are needed in order to develop and implement the infrastructure and achieve a critical mass of relevant data. Existing infrastructures such as PSLC Datashop<sup>1</sup> (Koedinger et al., 2010), MULCE<sup>2</sup> (Reffay & Betheder, 2009), CAViCoLa (Harrer et al., 2007), and Tatiana<sup>3</sup> (Dyke, Lund & Girardot, 2009) might potentially be improved upon, adapted or adopted to lessen this timeframe.

### ***What are measurable progress and success indicators?***

- Development of an infrastructure (not just a database, but also communication opportunities, meetings, events etc.).
- Number of shared data sets and different kinds of analyses on each of them.
- Involvement of representative groups
- Quality of the stimulated discourse.

### ***How can funding be attracted?***

Some core EU-research teams which also integrate research teams from North America and Asia should be funded (by a Network of Excellence or an Integrated Project) which develop the infrastructure, share own data and take the responsibility to make the infrastructure sustainable.

Many funding agencies (e.g. NSF) are increasingly requesting projects to submit a data management plan which describes how data will be persistently warehoused. A platform and infrastructure for sharing could synergistically be funded with such a goal.

One of the challenges – experienced by all existing projects – lies in infrastructure sustainability beyond the funding period.

## **5. Researchers and Communities**

In short, our Grand Challenge is building a comprehensive framework for exchanging research data and analyses from different research teams in order to deepen the discourse, coming to a convergent interpretation and identifying further research questions in the spirit of multivocality. Multivocality requires a multi-disciplinary community to make it work. First, we need the different orientations brought by different fields to challenge one another. We need psychologists who study the connection between discussion behaviour and cognitive processes to challenge ethnographic researchers who focus on group cognition, and vice versa. We need computer scientists who build computational models of discourse to allow interaction analysts to dig into their data so that they can grapple together with the tensions between overly simplistic generalizations represented by statistical distributions and overly complex contextualized representations that arise from a qualitative approach. We need a community where multivocal collaborations are happening in order to ensure that any infrastructure we build will have the proper affordances for facilitating and not hindering that process.

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<sup>1</sup> <http://pslclatashop.org/>

<sup>2</sup> <http://mulce.org/>

<sup>3</sup> <http://code.google.com/p/tatiana/>



From a practical standpoint, in order to move forward in a sustainable way we also need the involvement of multiple fields. We need computer scientists to build and maintain the infrastructure for storing and analysing data, but they can't do it effectively without a close partnership with the researchers who will use those tools. Some of the technology we need is still under development, such as the technology to pre-process interaction data in order to prepare it for visualization, sequence analysis, etc. While strides towards developing and improving this technology have been made in the CSCL community as well as in the language technologies community, more work is needed to make this technology more effective. That effort itself is interdisciplinary, involving experts in linguistics, sociology, philosophy, and machine learning. We need experts in visualization to help us design representations that people can interpret. But we need interaction analysts involved in that process to ensure that the impressions conveyed by the visualizations have face validity.

In order to make this vision a reality, we also need some non-research staff with the skills to make things happen in a professional way, including people with marketing expertise, people who have experience developing financial models that work at an international level, people who know how to build and maintain databases that run properly and keep data safe, and people who can offer technical support.

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