Language is a complex adaptive system

Explorations and evidence

Edited by

Kristine Lund

Pierluigi Basso Fossali

Audrey Mazur

Magali Ollagnier-Beldame

Conceptual Foundations of Language Science 8

language science press

Conceptual Foundations of Language Science

No scientific work proceeds without conceptual foundations. In language science, our concepts about language determine our assumptions, direct our attention, and guide our hypotheses and our reasoning. Only with clarity about conceptual foundations can we pose coherent research questions, design critical experiments, and collect crucial data. This series publishes short and accessible books that explore well-defined topics in the conceptual foundations of language science. The series provides a venue for conceptual arguments and explorations that do not require the traditional book-length treatment, yet that demand more space than a typical journal article allows.

In this series:

1. Enfield, N. J. Natural causes of language.
2. Müller, Stefan. A lexicalist account of argument structure: Template-based phrasal LFG approaches and a lexical HPSG alternative.
3. Schmidtke-Bode, Karsten, Natalia Levshina, Susanne Maria Michaelis & Ilja A. Seržant (eds.). Explanation in typology: Diachronic sources, functional motivations and the nature of the evidence.
4. Morley, Rebecca L. Sound structure and sound change: A modeling approach.
5. Asoulin, Eran. Language and scientific explanation: Where does semantics fit in?
6. Boeckx, Cedric. Reflections on language evolution: From minimalism to pluralism.
7. Archangeli, Diana & Douglas Pulleyblank. Emergent phonology.
8. Lund, Kristine, Pierluigi Basso Fossali, Audrey Mazur & Magali Ollagnier-Beldame (eds.). Language is a complex adaptive system: Explorations and evidence.

ISSN: 2363-877X

Language is a complex adaptive system

Explorations and evidence

Edited by

Kristine Lund

Pierluigi Basso Fossali

Audrey Mazur

Magali Ollagnier-Beldame

language
science
press

Kristine Lund, Pierluigi Basso Fossali, Audrey Mazur &
Magali Ollagnier-Beldame (eds.). 2022. *Language is a complex adaptive system: Explorations and evidence* (Conceptual Foundations of Language Science 8).
Berlin: Language Science Press.

This title can be downloaded at:
http://langsci-press.org/catalog/book/334

ISBN: 978-3-96110-345-4 (Digital)
978-3-98554-041-9 (Hardcover)

ISSN: 2363-877X
DOI: 10.5281/zenodo.6546419
Source code available from www.github.com/langsci/334
Errata: paperhive.org/documents/remote?type=langsci&id=334

Cover and concept of design: Ulrike Harbort
Typesetting: Amy Amoakuh
Proofreading: Amir Ghorbanpour, Amy Amoakuh, Brett Reynolds, Cathryn A. Yang, Christopher Straughn, Craevschi Alexandru, Daniela Schroeder, Eden Bradshaw Kaiser, Elen Le Foll, Elliott Pearl, Janina Rado, Jeroen van de Weijer, Lachlan Mackenzie, Lisa Schäfer, Ludger Paschen, Marten Stelling, M. Chiara Miduri, Tom Bossuyt, Valeria Quochi
Fonts: Libertinus, Arimo, DejaVu Sans Mono
Typesetting software: XeLaTeX

Language Science Press
xHain
Grünberger Str. 16
10243 Berlin, Germany
http://langsci-press.org

Storage and cataloguing done by FU Berlin

Freie Universität Berlin

Contents

Acknowledgements

The authors are grateful to the people who accepted to be recorded for the diverse corpora analyzed within this book and to those who made data collection, post-production, and analysis possible. We also appreciate reviewers' careful comments and the crowdsourced proofreaders' diligent work. We thank the educational and research institutions that have supported us, namely the *Centre National de la Recherche Scientifique* (CNRS), *Ecole Normale Supérieure de Lyon*, and *Université Lumière Lyon 2*. Finally, this work could not have been completed without the funding from the ASLAN project (ANR-10-LABX-0081) of the Université de Lyon, within the French program "Investments for the Future" operated by the National Research Agency (ANR).

Introduction to language as a complex adaptive system

Pierluigi Basso Fossali[a,b,c,d] & Kristine Lund[a,b,c,d]

[a]UMR 5161 ICAR [b]Centre National de la Recherche Scientifique [c]Ecole Normale Supérieure [d]Université Lumière Lyon 2

In this introductory chapter to the book, we argue that the notion of complexity has not reached its full potential in reconceptualising the field of language sciences. Others have argued that language use and language acquisition are in a mutually influencing relationship, but additional empirical evidence from a variety of authentic human interactions is needed. Indeed, the structural complexity of a language cannot be immediately matched to its learning complexity, or to the complexity of its use in context. We discuss alternative – yet compatible – complexity explanations for the self-organisation of languages, the first pitting redundancy against economy, and the second focusing on environmental variables. The book examines the place of language in relation to interactive, pragmatic, multimodal discourse processes, but also in relation to cognition, argumentation and meaning-making, and to social structures and education. In doing so, our goal is to illustrate how complexity emerges as a network of functions which are organised differently and rooted in variable ways and which question each other.

The notion of complexity was introduced in linguistics a long time ago, but generally from an autonomous reflection compared to the theoretical developments that have characterised other scientific fields and have transformed complexity into a new research paradigm with a transdisciplinary vocation (Piaget 1972, Gray 2021, Richardson et al. 2014). The imperviousness of this paradigm merits some apparently contradictory remarks: on the one hand, one can appreciate the refusal to import a conceptual elaboration rooted in other fields of investigation, such as biology, in order to avoid metaphorical uses; on the other hand, one can seriously doubt that the contribution of a general epistemological change based on complexity theory has so far been fully beneficial for an internal critical reflection in the field of linguistics, in order to reconceptualise, at least in part, its ambitions, its objects and its methodological approaches (cf. La Mantia et al. 2016).

Pierluigi Basso Fossali & Kristine Lund. 2022. Introduction to language as a complex adaptive system. In Kristine Lund, Pierluigi Basso Fossali, Audrey Mazur & Magali Ollagnier-Beldame (eds.), *Language is a complex adaptive system: Explorations and evidence*, v–xv. Berlin: Language Science Press. DOI: 10.5281/zenodo.6620103

Positioning themselves from a language learning perspective, the "Five Graces Group" (Beckner et al. 2009) have argued that patterns of language use on the one hand and language acquisition, its use and development over time on the other, are in a mutually influencing relationship. But since then, this view has not been extensively supported in the literature. It is our aim in this volume to explore and give evidence for such a notion of complexity. We will examine evidence for the set of characteristics of language as a complex adaptive system that these authors put forth, such as distributed control and collective emergence, intrinsic diversity, perpetual dynamics, adaptation through amplification and competition of factors, non-linearity and phase transitions, and finally sensitivity to and dependence on network structure. These arguments will be brought together in the conclusion of this volume.

Instead of this broader view, that can extend into frontiers with other disciplines, linguistics has up to now primarily conceived complexity as a factor that unifies or differentiates languages as far as the organisation of their morphologies and syntaxes is concerned. In this sense, complexity has been used as a distinctive quality of the object under study, which has created ambiguity between, on the one hand, the scientific observation (typological view) of a factor of complexity that can be common or divergent between one language and another and, on the other hand, ethical implication (suspicion of ethnocentrism). Typological studies have addressed the question of the more or less complex nature of the languages that were studied and compared, yet the epistemological issue of complexity emerges every time that the diachronic approach is adopted, thus imposing a specific questioning on the reasons leading to the complexification or simplification of languages.

While complexity is a historical factor, the assumption that the evolution of languages, which are subject to practices, is based on simplification (cf. Culicover 2013) cannot explain the initial establishment of complexity and even less its resistance to time. The latter appears as an almost enigmatic phenomenon and is clearly contrary to an apparently "normal" historical evolution.

Nowadays one can notice that the asynchronous evolution of languages can only call into question the *equi-complexity of* languages (Hadermann et al. 2017: 9); but also that the presence of the grammatical complexity of languages can be conceived "as the outcome of natural processes of self-organisation whose motivation is largely or entirely system-internal" (Gil 2009: 33).

Two requirements seem to emerge: (i) the establishment of parameters to determine the different complexities of languages; (ii) a reconsideration of the role historically played by complexity, which can be neither a general quality nor the result of a single evolutionary factor.

This necessarily implies a reconceptualisation of the notion of *complexity*. Moreover, the structural complexity of a language cannot be immediately matched to its learning complexity, or to the complexity of its use in context. Each of these specific notions of complexity call for establishing relations with other disciplines: for example, structural complexity with the ontologies of computer science, learning complexity with educational sciences and didactics, and complexity of use with at least sociology and anthropology. Keeping to a strict linguistics view, it can seem that simplifications lead to more language learning difficulties. For example, apparent simplifications in syntax, such as allowing simple juxtapositions (verbal serialisation in a number of Asian languages), can affect the learning difficulty of managing potentially long verbal sequences. Moreover, the difference between *overt complexity* and *hidden complexity* must be considered (Bisang 2009: 48), since the former is grammaticalised, or at least explicit in discourse, and the latter, on the other hand, concerns implicit forms and invites interactants to make sophisticated pragmatic inferences.

It should be noted that *overt* complexity is also the manifestation of a meaningful tension that seeks to fill or hide the *blanks* that each enunciation inevitably leaves, given that it is impossible to saturate all the internal links and to make explicit all the external conditions for it to assume its linguistic functions. Complexity emerges according to a negative profile, as a frame for raising awareness of the limits of meaning management, which is the most authentic characteristic of this notion from an epistemological point of view.

The self-organisation of languages in the development (or reduction) of their complexity raises questions for linguistics because two heuristic formats are possible:

1. the "internalist" explanation can envisage research on the balance that would characterise each language between two divergent tensions: redundancy, as a factor that reduces indeterminacy, and economy, as a factor that reduces the exploitation of resources;

2. the "externalist" explanation can consider that complexity is strictly related to environmental variables, particularly societal ones. In this sense, the complexity of a language can be correlated to the internal differentiation of society into autonomous domains, the density and frequency of communications, relations with other linguistic communities which are close or share the same territory,[1] etc.

[1]Trudgill (2009: 98) considers that there are social factors that need to be examined in order to understand their correlation with trends leading to the complexification or simplification of a language: (a) degree of contact vs. isolation, (b) denseness vs. looseness of social networks, (c) small vs. large community size.

The two explanations cannot be considered to be in total opposition, since redundancy and economy are pragmatic factors and are therefore linked to communicational action, and societal pressure cannot influence language without translating its dynamics into tensions within the structural organisation of a semiotic system. While the two explanations are assumed as two sides of the same heuristic hypothesis, it is clear that the relevance of a theory of complex systems becomes not only relevant, but necessary. This volume intends to contribute to the ways in which complexity theory is relevant to the language sciences.

The way in which the language system is viewed is at stake, its coupling with the environment, its dynamics related to the absorption of external irritations through internal rearrangements, and its capacity to offer symbolic forms in interaction domains that seem to lack sufficient organisation. Such a description sets the stage for examining the place of language in relation to interactive, pragmatic, multimodal discourse processes, but also in relation to cognition, argumentation and meaning-making, and to social structures and education. That said, adopting a theory of complexity that was developed outside the linguistic domain cannot erase the problem of clarifying and detecting the linguistic clues and rules of this complexity. This is why one should emphasise the efforts of current linguistics to overcome reductionist views on complexity. In this regard, it is worth quoting the study by Biber & Gray (2016), which aims to challenge the idea that grammatical complexity is identifiable with the extensive use of subordinate clauses. On the contrary, one should see alternative complexity in "maximally compressing structures" (ibid, p. 18). In these compressed structures, there is no explicit indication of the intended semantic relations between the different elements of the sentence. The complexity of subordination and thus of embedding (*clausal complexity features)* is indeed recognised, however on the other hand, embedding within the sentence itself (*phrasal complexity features*[2]) can also be observed.

In fact, Givón (2009) had already attributed two dimensions to structural complexity: it can be *recursive*, with the addition of subsequent constituents or syntactic levels, or *condensatory*, in which case it aims to make syntactic connections implicit, up to the point of maximum integration (desententialisation of subordinates[3]).

[2]According to Biber & Gray (2016: 246), the figures of complexity are: (1) pre-modifying nouns (e.g. *cell membrane*), (2) attributive adjectives (e.g. *preparative treatement*), (3) prepositional phrases as post-nominal modifiers (e.g. *a basis for the interpretation*), (4) appositive noun phrases (e.g. *the strongly oxidising fixatives: osmium tetroxide and potassium permanganate*).

[3]See Lehmann 1989, Havu 2017: 87.

Complexity asserts itself as a "generative power" that can no longer be described through the classic principle of *compositionality*, since the interplay between several strategies of use and the local adaptation to the environment of use leads to an increase in the linguistic system's internal entropy and, consequently, to a certain degree of unpredictability concerning enunciative realisations and their normative stabilisation. It is no longer possible to observe "transparency" in the derivational and inflectional declension of a language through the "historical accidents" feeding the complexification of languages: semantic continuity in the generativity of a lexical or verbal paradigm is no longer accompanied by an "iconic" (diagrammatic) morphotactic relation highlighting the family resemblance between forms belonging to the same paradigm. There is therefore a rupture, a "strong substitution" (Dressler 1985) of a new form with respect to the initial morphological base (e.g., "ponots" or "aniciens" as demonyms designating the people of Le Puy en Velay).

As a result of the pressure of change in social areas, the paradigmatic organisation of languages must constantly adapt to an environment full of heterogeneous rationalities in order to master the extensional scope of words, although this does not prevent resistance or the mobilisation of proper morphosyntactic resources. The unpredictability of the evolution of languages is due to the multiplicity of their criteria and to the suppletive alternation of the rationales used.

Beyond biological metaphors, the life of complex systems cannot be linear and their reciprocal interpenetration forces language sciences to step aside from the dichotomy between "internalist" and "externalist" approaches. Complexity theory encourages the recognition of a dialectics between internal orders and indeterminacy factors, and external orders and indeterminacy factors. The paradoxical internal tension may find metastability through the linking, or even coupling, with an environment full of systems characterised by the same internal laceration. The interpenetration between different instances of enunciation as well as the interpenetration between languages in contact show the dialectic emergence of value forms that are for example, valid in a given ecological situation. Normally, the "art of bringing together" (*dialektikḗ*) indicates not only the search for homologies (*logoi*) between the internal and the interactional management of the instances concerned, but also the complementarity of different approaches and parameters. That being said, complexity theory no longer allows for any *Aufhebung*, any surpassing towards a higher integration. Managing complexity means:

1. on the one hand, becoming familiar with the boundary intervals between order performances (structuring) and the acceptance of external irritations arising from competitive orders;

2. on the other hand, establishing areas where endogenous and exogenous indetermination factors can give rise to other forms.

The encounter between two systems, which are at the same time organisations aiming at an optimal internal order and epicentres of indeterminacy in inter-observation, creates a productive *double contingency*, i.e. beams of co-determination that impose coordinated, albeit controversial, limits and orientations on each other. Finally, complexity theory can assert itself as a commensurability of functional deficiencies and structural fragilities between languages, which explains at the same time the unresolved dualities of their internal criteria (dialectics), the confrontation of singular solutions (translations) and the application of regulatory principles in the management of interaction (maxims).

The complexity of a system is not directly related to the internal presence of complex solutions. This can be demonstrated by the fact that a language in limited contact with other language communities tends to preserve its original complex solutions (Hadermann et al. 2017: 9). Moreover, if its society is solid and exclusive, the spoken varieties of this language subsequently begin to reinforce the instability and heterogeneity of enunciative choices, but probably to reassert the common language as a stabilising element of belonging.

Complexity is part of the strategy of engaging difference in order to enhance a possible stability, even if such a stability has been implicitly attacked by its shortcomings or inaccuracies through its varieties. In short, complexity emerges as the negative trace of complex solutions adopted to remedy internal paradoxes and as the positive opening towards metastability based on external couplings and supports.

The overload of syntagmatic structures is the symptom of an uncontrolled complexity, *complex elements* being only iconised by phrasal nesting or accumulations. On the other hand, true *complexity* can emerge when blanks in propositional connections immediately show the support of local elements on the global structure and when interpretative stability indicates a diastematic search, i.e., an informed observation of deviations and intervals.

Research in linguistics on factors of complexity (syntactic structures, grammatical markers, etc.) and the focus on language learning also suggest the appealing to a related notion, that of *complexification*. But once again, if we take the example of Michel Pierrard's (1988) research on *free relative clauses* (without an

antecedent) we can see that complexity does not concern syntactic overload, but a qualitative aspect: the search for an antecedent must be performed in another plane of consistency (e.g. a pragmatic situation where the indefinite pronouns of the relative clause without antecedent finally become assignable, but always thanks to a paradigmatic class of competing scenarios).

The interpenetration of systems can only be achieved in the perspective of a tensive complementarity without a definitive integration (totalisation), where the evaluation of differences (intervals) becomes a diastemic area of deviations that locally require a value according to a dialectical and tactical future. Language itself must be conceived as a "dress made of patches" (de Saussure 1996: 132).

This may help to explain why a language system is at the same time a principle of order and a principle of variation, a rational economy and a "clinamen" of apparently supernumerary forms. Contacts between languages and, more generally, interactions call for an adaptation of the order promoted to the situation, which can take internal blanks as a primary measure of the distances between proper forms and "other" forms.

Thus, the evolutionary complementarity between order and variants[4] is not expressed in terms of historical accidents, but in terms of ad-hoc catalysts of[5] their potential, triggered by encounters with other systems. The systems use the differences exemplified by their internal variants as the possible redefinition of a suffered competition and thus of blanks that are "vital" for their existence in time.

The tendency to select less complex and more general solutions can only be contrasted by exogenous principles, even though the latter may in many respects be the *raison d'être* of a linguistic heritage as symbolic field. In our opinion, complexity is thus the very resistance to decomplexification, a dynamics that has no internal "reasons". If each deviation entails a cost with regards to the pressure of change towards simplification, social stakeholders are the only ones who perceive the reasons for a contrary tension, a preservation of, or even an increase in the critical gap between order and variance.

Culicover (2013), on the other hand, considers that the co-option of more complex forms can occur locally, only on the condition that the internal complexity

[4]See Gershenson & Fernandez (2021).

[5]As Barthes (2002: 814) pointed out, "there is no (structural) way to finish a sentence. All completed catalysis narratives reveal voids, zero-*signifiers* that still go through the plane of discursive manifestation. Explicit catalyses are only the paradoxical attempt to hide the voids that affect language games, even if they do try to saturate the combinatorial potentialities. Catalysis thus becomes a meta-observation factor: the sign of signs that are missing, the sign of an implication-squared or of an element that needs to be translated and that reveals a lack in the target language" (cf. Basso Fossali 2016).

of the system has been reduced more globally in grammar (ibid, p. 207). Thus, "such increases in complexity are the by-product of changes that reduce complexity elsewhere" (ivi, p. 209).

One may wonder whether this vision of complexity is not linked to the idea of a progressive saturation of language and its pragmatic functions, which contrasts with other theoretical positions, such as the one stated by Gil (2009: 32): "Language is hugely dysfunctional [...], comes remotely close to providing the necessary expressive tool [...] and forces us to say things that we don't want to say".

Complexity theory suggests that linguistic organisations are looking for subsequent functions, which avoids the need to conceive of their prior and fixed, or even universal, encoding, which is reflected in the very morphology of a language. "Purpose is a property 'revealed' by the behaviour of the system" (Dauphiné 2003: 93), given the retroactions from the *global level* to the *local level* and vice versa. In fact, from a praxeological perspective, the global level is *opened up* by the very fact that linguistic practices have other organisational systems which guide the course of action. Linguistic action thus transits through the environment and finds areas that are modalised according to heteronomous trends. As a result, complexity emerges as a network of functions which are organised differently and rooted in variable ways and which question each other.

As soon as a multitude of individuals assimilate the language, immediate asymmetries appear in terms of competence and purpose, which is incidentally the symbolic conversion of the very reason for communication: negotiating identities and the degree of involvement in the management of values. In interaction, competition and cooperation are co-present, which already illustrates the paradoxical interweaving of the ways in which stakeholders get involved in social complexity. In addition, attractor-values are innumerable and heterogeneous; thus, choices can no longer identify a balanced assortment, which generates bifurcations, or dramatisations concerning the difference between life forms, or diverging destinies. This is why the choice of a word can appear to have important consequences and immediately shape a vision of the world and the future (a kind of *butterfly effect* applied to the semiosphere). This inference based on a detail is admittedly unbridled, but it shows how complexity is also experienced at the epistemic level as a constant suspicion, even a sceptical attitude.[6] The interweaving of the reference spaces of linguistic practices, where self-communication, interaction and the involvement of instances that are not immediately questionable

[6]Scepticism turns out to be the willingness to know one's own aporia and blindness. More generally, proactive scepticism avoids prophecies and conspirational reconstructions by accepting an *ecology of non-knowledge* (Luhmann).

(e.g., institutions) constantly alternate a role of pre-eminence over each other, can only generate complexity.

These musings guide our exploration within this volume of the following sections. Part I is introduced by Ollagnier-Beldame and proposes three epistemological views on complexity. Whereas Basso Fossali focuses on the contribution of semiotics to complexity theory, Ollagnier-Beldame takes a phenomenological view of the role of experience in knowledge. Lund connects systems of different orders in a model of the co-elaboration of knowledge. This section addresses the interpenetration of systems. The notion that non-linear interactions cannot be separated from their environments is brought into tension with the notion that a temporary separation may be needed in order to do initial research. Finally, complex systems lead to a description of complex behaviours, also rendering necessary a transdisciplinary approach that will include different epistemological foundations.

Part II is introduced by Basso Fossali and deals with complexity, pragmatics, and discourse. In this section, Rabatel proposes a simplex account of discourse complexity using the pragma enonciative theory of points of view, Bondì focuses on the morphogenesis of language action and defines complexity in relation to the rhythmic synchronisation of enunciation. Nowakowska & Constantin De Chanay write about dialogism for daily interaction, and Halté proposes a complex system of the modalities within a written interaction. In each of these chapters, the complexity of discourse practices is shown through different levels of organisation that they involve, touching on contingent and dynamic meaning, the restraining of indeterminacy and interweaving points of view.

Part III views complexity through interaction and multimodality and is introduced by Mazur and Traverso. Polo, Lund, Plantin, and Niccolai describe collective reasoning as the alignment of self-identity footings. Chernyshova, Piccoli, and Ursi highlight multimodality within interaction to discuss adaptivity and emergence. Baldauf-Quilliatre and Colon de Carvajal focus on the multimodal practice of participation within a dynamic framework. And Griggs and Blanc consider second language use and development in an immersion class as a complex adaptive process. In all of these chapters, multiple relationships are noted between elements of language and the ways in which they change over time are described, often giving rise to emergent interactive phenomena, sometimes unpredicted and unexpected.

Finally, Lund, Basso Fossali, Mazur, and Ollagnier-Beldame revisit the volume, draw conclusions on advancements that can be claimed in relation to language as a complex adaptive system, and plan for future initiatives.

Acknowledgements

The authors are grateful to the ASLAN project (ANR-10-LABX-0081) of the Université de Lyon, for its financial support within the French program "Investments for the Future" operated by the National Research Agency (ANR).

References

Barthes, Roland. 2002. Sade, Fourier, Loyola. In *Œuvres complètes*, nouv. éd., vol. III, 699–868. Paris: Seuil.

Basso Fossali, Pierluigi. 2016. From paradigm to environment: The foreign rhythm and punctual catalysis of culture. *Sign Systems Studies* 44(3). 415–431.

Beckner, Clay, Nick C. Ellis, Richard Blythe, John Holland, Joan Bybee, Jinyun Ke, Morten H. Christiansen, Diane Larsen-Freeman, William Croft & Tom Schoenemann. 2009. Language is a complex adaptive system: Position paper. *Language Learning* 59(1). 1–26. DOI: 10.1111/j.1467-9922.2009.00533.x.

Biber, Douglas & Bethany Gray. 2016. *Grammatical complexity in Academic English*. Cambridge, UK: Cambridge University Press.

Bisang, Walter. 2009. On the evolution of complexity: Sometimes less is more in East and mainland Southeast Asia. In Geoffrey Sampson, David Gill & Peter Trudgill (eds.), *Language, complexity as an evolving variable*, 34–49. Oxford: Oxford University Press.

Culicover, Peter W. 2013. *Grammar & complexity: Language at the intersection of competence and performance*. Oxford: Oxford University Press.

Dauphiné, André. 2003. *Les theories de la complexité chez les géographes*. Paris: Anthropos.

de Saussure, Ferdinand. 1996. *Premier cours de linguistique générale d'après les cahiers d'Albert Riedlinger*. Eisuke Komatsu & George Wolf (eds.). Oxford & Tokyo: Pergamon.

Dressler, Wolfgang U. 1985. Sur le statut de la suppléance dans la morphologie naturelle. *Langages* 78. 41–56.

Gershenson, Carlos & Nelson Fernandez. 2021. Complexity and information: Mesuring emergerce, self-organization, and homeostasis at multiple scale. *Complexity* 18. 29–44.

Gil, David. 2009. How much grammar does it take to sail a boat? In G. Sampson, D. Gill & P. Trudgill (eds.), *Language, complexity as an evolving variable*, 19–33. Oxford: Oxford University Press.

Givón, Talmy. 2009. *The genesis of synctactic complexity: Diachrony, antogeny, neuro-cognition, evolution*. Amsterdam: John Benjamins.

Gray, Wayne D. 2021. Great debate on the complex systems approach to cognitive science. *Topics in Cognitive Science* 4(2). 1756–1765.

Hadermann, Pascale, Alex Housen & Dan van Raemdonck. 2017. Présentation. In Pascale Hadermann, Alex Housen & Dan van Raemdonck (eds.), *Complexités*, 9–16. Bruxelles: Peter Lang.

Havu, Eva. 2017. La complexité syntaxique dans les productions écrites d'étudiants de français finnophones. In Pascale Hadermann, Alex Housen & Dan van Raemdonck (eds.), *Complexités*, 85–100. Bruxelles: Peter Lang.

La Mantia, Francesco, Ignazio Licata & Pietro Perconti (eds.). 2016. *Language in complexity: The emerging meaning*. Cham: Springer.

Lehmann, Christian. 1989. Towards a typology of clause linkage. In John Haiman & Sandra A. Thompson (eds.), *Clause combining in grammar and discours*, 181–225. Amsterdam & New York: John Benjamins.

Piaget, Jean. 1972. L'épistémologie des relations interdisciplinaires. In *L'interdisciplinarité: problèmes d'enseignement et de recherche dans les universités*. Paris: OCDE. http://www.fondationjeanpiaget.ch/fjp/site/textes/VE/jp72_epist_relat_interdis.pdf.

Pierrard, Michel. 1988. *Les relatives sans antécédent en français moderne*. Paris: Peeters.

Richardson, Michael J., Robert Dale & Kerry L. Marsh. 2014. Complex dynamical systems in social and personality psychology: Theory, modeling and analysis. In Harry T. Reis & Charles M. Judd (eds.), *Handbook of research methods in social and personality psychology*, 2nd edn., 253–282. Cambridge, UK: Cambridge University Press.

Trudgill, Peter. 2009. Sociolinguistic typology and complexification. In G. Sampson, D. Gill & P. Trudgill (eds.), *Language, complexity as an evolving variable*, 98–109. Oxford: Oxford University Press.

Part I

Epistemological views on complexity

Chapter 1

Introduction to epistemological views on complexity

Magali Ollagnier-Beldame[a,b,c,d]

[a]UMR 5161 ICAR [b]Centre National de la Recherche Scientifique [c]Ecole Normale Supérieure [d]Université Lumière Lyon 2

In this first section of the book, the authors examine a selection of epistemological approaches provided by a complexity framework. They touch on the notions of boundaries between systems and ways in which systems interact, on the implications of different scales of analysis, and on the limits of the descriptions and models used in order to study phenomena. The authors argue for a plurality of approaches, in particular those that allow for integrating across theories and across methods within a transdisciplinary context or those that accept coexistence with knowledge other than the formal, with dimensions of history, and with subjectivity.

The notion of complexity has not a precise and a formal definition, it is rather drawn from everyday language, even if the use of this notion is more and more frequent in research. According to Israel (2005), complexity is particularly resistant to a precise definition because 1) it is often confused with the word "complication", and 2) both terms are mostly used to mean the opposite of "simple". The "incompressibility" of complex systems implies that they cannot be simplified, i.e. the representation of a complex system is as complex as the system itself (Partanen 2015). Thus, for Israel (2005), the notion of complexity is related to something possessing characteristics that are resistant to any attempt at simplification, and the topics of complexity are related to "a style of theorizing" rather than to "a specific subject matter".

For Partanen (2015), complex systems are by definition constituted through a large number of non-linear interactions and cannot be separated from their environment, this usually leading to a holistic approach of the studied phenomena (as

Magali Ollagnier-Beldame. 2022. Introduction to epistemological views on complexity. In Kristine Lund, Pierluigi Basso Fossali, Audrey Mazur & Magali Ollagnier-Beldame (eds.), *Language is a complex adaptive system: Explorations and evidence*, 3–7. Berlin: Language Science Press. DOI: 10.5281/zenodo.6620105

also mentioned by Israel). This holistic approach to phenomena is the one Magali Ollagnier-Beldame claims to be the case in her text entitled "What knowledge owes to experience: Complexity and first-person epistemology". She defends the idea that for the study of the ways of knowing, a complex approach is necessary to better understand knowledge processes as it attempts to integrate and to go beyond the dichotomies that are most often used in cognitive sciences. She also supports the idea that such an approach must take into account subjective experience as a prism to challenge these dichotomies.

Complexity science provides a global philosophical foundation and combines different epistemological views. It provides a shared framework for both objective and subjective positions in knowledge production. This project of the complex approach, to consider in a distinct but unique manner the objective and subjective positions in knowledge production, is pointed out in Kristine Lund's text, entitled "Modelling the co-elaboration of knowledge: Connecting cognitive, linguistic, social and interactional systems". In her text, the author explains how constructing knowledge with others is fundamental to all human activity. She presents the "Multi-grain" knowledge-building model, proposing a framework that allows systems within different disciplines to "speak" to each other and defines the space in which explanatory models can be proposed about the different forms of knowledge co-construction. In her paper, methods used for study include both emic and etic approaches (Headland 1990, Pike 1967) and illustrate how they can be combined through the articulation of different levels of analysis. The study proposed by Lund mobilizes intermediate variables for the study of multifactorial phenomena appearing within cognitive, linguistic, interactional, and social systems, thus additionally arguing for viewing complex behaviour as a system of interrelated systems (Levinson 2005). This raises questions of scale in the study of phenomena, which is an important issue in the study of complex systems. Indeed, Partanen (2015) reminds us that, since there are no absolute boundaries in the universe (except for perhaps some fundamental strings), the question to derive knowledge – and especially from different scales – of a system if no actual "system" exists is a crucial one. Despite the non-existence of boundaries, this author claims that we can assume that certain relatively resilient and stable temporary structures or patterns emerge. These can be treated as if they had a "limited existence", as if they almost existed (Richardson 2005), or were substantially real (Partanen 2015). In practice a certain reduction (temporary "closing" of the system) is often needed to enable any research. The system must be defined, or framed for description – "separated" temporarily from the environment which it is inherently a part of. Indeed, as mentioned by Pierluigi Basso Fossali in his chapter entitled "Semiotic mediations and complexity man-

agement: Paradoxes and regulative principles", a theory of complexity is a kind of assumed reductionism, each theoretical practice necessarily having to "decomplex" relations with its environment to enable research. These issues concerning boundaries and limits raise some questions of empirical data analysis, and can be partially solved by software (including visualization and simulation), playing the role of macroscope not producing knowledge as such, since for data to become knowledge, meaning given by a human is required.

The question of passages, related to the notion of scaling, is also mentioned by Basso Fossali. In his text, he shows that the crucial epistemological problem is not the study of complex systems, but that of complex behaviours (Prigogine 1983) – as Lund also points out in her proposal – which forces us to recognize the existence of "qualitative passages" that require a conceptualization not only beyond the description languages already mastered, but transversally to the hierarchies of relevance plans. For Basso Fossali, this requires clarifying the roles of semiotic mediations, whose purpose is to ensure the correlation of value domains with autonomous organizations and dynamism, in the same way as the "multi-grain" knowledge-building model presented by Lund. He proposes a series of guiding principles for these qualitative passages (analogical approach, recursivity, emergentism) as well as two possible movements for these passages: an opening movement and a circular movement. This focus on complex behaviours echoes the work of Beckner et al. (2009) who present the language as a complex adaptive system, using conventions – as regularities of behaviours – to support communication as a joint action, and allowing the building of human culture.

As Basso Fossali reminds us in his text, complexity is pluralizing in terms of approaches, asking for transdisciplinarity and recognition of the limit-points of the languages of descriptions and models used. Thus, typically mixed methods are used in the study of complex systems, implying a combination of quantitative and qualitative approaches from different epistemological foundations. Faced with the pluralization of approaches, the science of complexity, to get stronger, should aim at adopting an integrative point of view and thus accept the coexistence and collaboration with other forms of knowledge having a different nature to formal knowledge, and that are essential, especially in order to account for the dimension of historical time and subjectivity (Israel 2005). Taking into account the experiential dimension of phenomena is defended by Ollagnier-Beldame in her text, which proposes an approach considering the experiential dimension of the act of knowing, both as being where we go from and what we have to bond to in return (Cohen Varela 2017: 26).

Acknowledgements

The authors are grateful to the ASLAN project (ANR-10-LABX-0081) of the Université de Lyon, for its financial support within the French program "Investments for the Future" operated by the National Research Agency (ANR).

References

Basso Fossali, Pierluigi. 2022. Semiotic mediations and complexity management: Paradoxes and regulative principles. In Kristine Lund, Pierluigi Basso Fossali, Audrey Mazur & Magali Ollagnier-Beldame (eds.), *Language is a complex adaptive system: Explorations and evidence*, 9–22. Berlin: Language Science Press. DOI: 10.5281/zenodo.6620107.

Beckner, Clay, Nick C. Ellis, Richard Blythe, John Holland, Joan Bybee, Jinyun Ke, Morten H. Christiansen, Diane Larsen-Freeman, William Croft & Tom Schoenemann. 2009. Language is a complex adaptive system: Position paper. *Language Learning* 59(1). 1–26. DOI: 10.1111/j.1467-9922.2009.00533.x.

Cohen Varela, Amy. 2017. *Le cercle créateur: Écrits (1976–2001).* An anthology of works by Francisco J. Varela. Paris: Seuil.

Headland, Thomas N. 1990. Introduction: A dialogue between Kenneth Pike and Marvin Harris on emics and etics. In Thomas N. Headland, Kenneth L. Pike & Marvin Harris (eds.), *Emics and etics: The insider/outsider debate*, vol. 7, 13–27. Newbury Park: Sage.

Israel, Giorgio. 2005. The science of complexity: Epistemological problems and perspectives. *Science in Context* 18(3). 479–509. DOI: 10.1017/S0269889705000621.

Levinson, Stephen C. 2005. Living with Manny's dangerous idea. *Discourse Studies* 7(4–5). 431–453. DOI: 10.1177/1461445605054401.

Lund, Kristine. 2022. Modelling the co-elaboration of knowledge: Connecting cognitive, linguistic, social and interactional systems. In Kristine Lund, Pierluigi Basso Fossali, Audrey Mazur & Magali Ollagnier-Beldame (eds.), *Language is a complex adaptive system: Explorations and evidence*, 35–48. Berlin: Language Science Press. DOI: 10.5281/zenodo.6620111.

Ollagnier-Beldame, Magali. 2022. What knowledge owes to experience: Complexity and first-person epistemology. In Kristine Lund, Pierluigi Basso Fossali, Audrey Mazur & Magali Ollagnier-Beldame (eds.), *Language is a complex adaptive system: Explorations and evidence*, 23–33. Berlin: Language Science Press. DOI: 10.5281/zenodo.6620109.

Partanen, Jenny. 2015. Complexity: An epistemological review. *Plurimondi* 8(16). 203–222.

Pike, Kenneth L. 1967. *Language in relation to a unified theory of the structure of human behavior*. The Hague: Mouton.

Prigogine, Ilya. 1983. La lecture du complexe. *Le Genre Humain* 7-8. 221–233. DOI: 10.3917/lgh.007.0221.

Richardson, Kurt. 2005. The hegemony of the physical sciences: An exploration in complexity thinking. *Futures* 37(7). 615–653. DOI: 10.1016/j.futures.2004.11.008.

Chapter 2

Semiotic mediations and complexity management: Paradoxes and regulative principles

Pierluigi Basso Fossali[a,b,c,d]

[a]UMR 5161 ICAR [b]Centre National de la Recherche Scientifique [c]Ecole Normale Supérieure [d]Université Lumière Lyon 2

Semiotic mediations have a number of roles in managing complexity. We review how they lead to paradoxes, but also how regulative principles emerge from them. We propose three complexity principles that researchers can successively apply when they must establish through language games how a new research domain will function: 1) the analogical approach, 2) the recursivity of distinctions, and 3) emergentism. We discuss tensions between open and closed systems, individual identities and cultural norms, and between characteristics of linguistic complexity. Using a language games lens, double binds and paradoxes are presented in regards to communication, language structure, and the theory-practice relation. Nevertheless, we argue that semiotic mediations are the solution for exploring relations between complex systems and the environment despite two noteworthy systemic ambitions of language.

1 Wise decomplexification

All things considered, a theory of complexity involves a commitment to reductionism. This starting point may be unexpected, but rather cautious and modest, compared to what is sometimes erroneously claimed in popular science literature. As a matter of fact, even before negotiating its epistemological relevance, each scientific approach should present itself as a theoretical practice that must necessarily "decomplexify" relations with its reference environment in order to

Pierluigi Basso Fossali. 2022. Semiotic mediations and complexity management: Paradoxes and regulative principles. In Kristine Lund, Pierluigi Basso Fossali, Audrey Mazur & Magali Ollagnier-Beldame (eds.), *Language is a complex adaptive system: Explorations and evidence*, 9–22. Berlin: Language Science Press. DOI: 10.5281/zenodo.6620107

display its ambitions of reorganising a restricted domain. We know that the *horizon of testability* of a theory sets restrictive conditions for its falsifiability (Popper 1972); this precaution openly denounces a kind of lateral "blindness" with respect to the relevance of the theoretical view. By following the Kantian lesson, a theoretical view can discover *founding principles of* the observed domain, but its perceptive experience must take gaps into account (out of field, out of size, etc.), which requires the elaboration of *regulative principles* (by *analogy*, one acts *as if* the environment that has not yet been mapped is composed similarly to its already "territorialised" parts).

The progressive precision of the *horizon of testability* of scientific approaches correlates with an increase in their number – hence the fragmentation of specialisms and the epistemological complexification of a field of study. This leads to a multiplication of descriptive re-commitments on the same subject-area, which makes it increasingly difficult to adopt an integrative point of view. Complexification is the progressive adaptation of a view to its local limits (a sort of semantic "jurisdiction"), which prevents any *totalisation of* the frame and makes value conversions necessary. This is the first role that can be given to semiotic mediations: the interconnection of fluctuations in the values[1] of two or more domains investigated[2] and the ensuring of some form of translatability between them within a *confidence interval*.[3] Languages allow for the transformation and differentiation of the "cultivation" domains of values (and thus the correlative loss of generality[4]) into *federation*. The latter exploits semiotic mediations in order to:

[1]De Saussure (2002: 333) had already pointed out that through the comparison between linguistic value and economic value, one can grasp the correlation between the fluctuations of two counter-values (referential counterparts): the quantity of gold that corresponds to the nominal value of a currency can vary in the stock market independently from fluctuations in the value of a commodity in a competitive product market, but the two dynamics are sensitive to their correlation (purchasing power). In a parallel manner, the semantic autonomy of a language is then subject to fluctuations in its own intentional valencies, but these will not be assessed independently from fluctuations in the valencies of extensional domains (Basso Fossali 2007: 49–50).

[2]A *domain* is a frame for the *life form of* a system, which cannot "live" just with its internal organisation: the system depends on one or more couplings with other systems, and therefore with an environment. Every life form necessarily involves an identity in a critical state (productive imbalance).

[3]Basically, data interpretation practices must take responsibility for appreciating and assuming margins of error (the range of fluctuation of external variables is known to be uncontrollable). At the social level, the attribution of semantic values can be thought of as a statistical distribution that requires us to evaluate locally the confidence interval between a canonical or idiolectal meaning, a literal or rhetorical use, a *ratio facilis* (conventional) or a *ratio difficilis* (creative) (cf. Eco 1986: 133).

[4]The differentiation of social domains allows an autonomisation in the treatment of values (scientific, artistic, religious, etc.) but it also implies a loss of generality (science does not explain

- Ensure that all the members of the federation are sensitive to the initial conditions of any locally emerging variation (*contingency networking*);
- Reorganise the distinctive and translational retroactions of domains that are in interaction into a redefining circuit for the identities and purposes of federation members. Thanks to languages, *circular causality* rises to the level of reciprocal reinterpretation for systems and their couplings. For example, government policies regarding the university, fund emerging research projects that particular academic circles of universities themselves have helped to select by influencing the way the criteria for institutional recognition of scientific value have been written.

To summarise, in every epistemological approach, one can notice a negative thematisation of complexity, as a series of hypothetical sketches of what goes unnoticed for the promoted theoretical view. This is why, from a scientific point of view, *decomplexification is acceptable only if it is made suitable for a type of complexity that was never seen before.* As a result, complexity is pluralistic in terms of approaches, and requires both the federating of trans-disciplinarity and the recognition of the endpoints of the description languages and models used.

This invites clarifications regarding the roles of semiotic mediations in the structuring of federations constituted by domains of research (that stand in opposition to generalities and prior hierarchies between type and occurrence, *de jure* and *de facto* models, theoretical approaches and field approaches). Their purpose of achieving correlation between value domains with autonomous organisations and dynamics does not entail that they have the privilege of maintaining a stable and neutral descriptive organisation, as a kind of all-purpose representational language. On the contrary, complexity is a principle that must "fit" into the very purpose of semiotic mediations, so that each descriptive gesture should preserve the distinction between its metalinguistic organisation and its protention towards the *characterisation* of a local model (the "labour" of a language is to spend its structural potentialities to catalyse the recognition of other organisations). Thus, conceptualisation corresponds to the management of the distance between the language of the theory and the semiotic life form of the object under study, in order to build a movable hinge (familiarisation) between two systems with complex behaviours, which are sensitive to their future divergence. Com-

art or religion jurisprudence). Secondly, translations between domains are agreements on an equivalence of meaning that is not valid beyond the socio-cultural framework that justifies it. This is why there is always the need for new translations of the classics.

plexity theory only knows recalcitrant objects[5], and its heuristic grasp emerges from the dissociations recorded in relation to the models inherent to the description language, which invites reconceptualisation. Thus, the scope of the *semantic* dimension reveals itself as the impossibility to continue the syntactic computation on the same computation field.[6]

2 Complexity principles

The autonomy of a domain implies the establishment of its own language games, its own semiotic mediations. Every disciplinary doubling of a description plan (*map*) requires a new semiotisation of the scientific field (*territory*) and indicates qualitative crossings in the observed, split domains; in short, a "decomplexifying" tactic must be used when faced with an order of complexity that is higher than expected. This has led to the identification of a certain number of guiding principles and, for our purposes, it is important to specify at least three of them, already mentioned in the first paragraph:

- the *analogical approach*, which explains how the internal mereological economy of a system (self-similarity[7]) can, in the autonomising tension of the latter (autopoiesis), rise to a general *configurational paradigm* according to the adjustment of proportions and by diagrammatic projection from one domain to another;[8]

[5]The object must be conceived as an alterity endowed with a complexity not yet fully described. In this sense, the object resists the projection of the theoretical model and it is from this resistance that the research advances, refines its hypotheses, understands that it must not only interpret the reactions of the object but reconceptualise the positions of observation and attestation of the phenomena.

[6]A classic way to present this problem is to insist on the difference between map and territory. The issue that Bateson has highlighted is not only of an ontological nature, because this would still allow, once an accurate denotative plan has been established, to describe equivalent syntactical operations on the map, without controlling the behaviours that can actually be implemented in the territory. Bateson's problem is that there is still "play" possible between the signs of both the map and the territory, and therefore also the margins of play in the translation between map and territory. The value of the signs in the respective domains is susceptible to autonomous semantic interpretations: "In the Andaman Islands, peace is concluded after each side has been given ceremonial freedom to strike the other. This example, however, also illustrates the labile nature of the frame *This is play* or *This is ritual*. The discrimination between map and territory is always liable to break down, and the ritual blows of peace-making are always liable to be mistaken for the "real" blows of combat. In this event, the peace-making ceremony becomes a battle" (Bateson 1971: 187–188).

[7]Self-similarity is a reverse recursivity where the global mereology begins to reorganise contained mereologies.

[8]The example of the interpretative play between territory and map can still well illustrate the issue of proportionality and diagrammatic projection.

- the *recursivity* of distinctions and in particular the *re-entry*[9] *phenomenon* which enables self-reflexive organisational phenomena[10];
- *Emergentism* (Alexander 1920), as it is envisaged within the *order from noise* paradigm (von Foerster 1960), which enables to design interactional organisations based on the convergence of contingent lines of transformation.

The sequence in which these principles are presented is not innocent; we consider that the quality of each passage (from *i* to *ii* and to *ii* to *iii*) should be characterised according to two movements:

(A) a movement of openness that goes (a1) from territorialisation (a2) to the awareness of edges to finally arrive (a3) at the inter-subjectivity of scientific challenges and discoveries;

(B) a circular movement that explains how (b1) from the application of internal functions (*exercises*) (b2) one moves to functional differentiation to respond to dysfunctional external influences (*irritations*), (b3) to finally achieve a restructuring of the coupling with the environment that takes advantage of emerging trend lines (*modal reloading*[11]).

The two movements draw, through (A) *social complexity* and (B) *structural complexity*, a dynamic model for redefining the identity of all the instances involved in the domain, a model which is sensitive to space (*coupling through symbolisation)* and of circular causality that is sensitive to time (*coupling through retroaction*). On the one hand, systems are interrogated by *serial couplings* - the operations of one are restricted to the operations of the other – on the other hand,

[9]The notion of *re-entry* corresponds to the reintroduction of the founding distinctions within the system, which has already benefited from them with the paradoxical qualitative result of a distancing. Instead of blocking the rule, its reapplication to what one might think has already been settled causes a kind of insolvency of the meaning, which was seemingly already guaranteed.

[10]A typical example of re-entry is the application of the right vs. wrong category to the local application of the category itself (is it right to apply the law in an exceptional situation?). Less trivial is the phenomenon of the re-entry of consciousness into the perceptual data that it itself has elaborated within what William James has called the specious present.

[11]The restructuring of the coupling with the environment is an opportunity to restart the modal charges (*epistemic, alethic, deontic*, etc.), i.e. the forms of involvement of the system in the environment (desire, knowledge, capacity, etc.). For example, the new coupling of the art world with the economic market has restructured the powers of the artist and the objects in which his or her practices can find an end.

systems must recognise a common ecology and therefore *parallel couplings*.[12] The combination of these types of couplings gives rise not only to *non-linear operations*, but also to a tension of cultural systems that work on *gaps*[13] and promote inventions as a response to the initial conditions for progressive emancipation. It is from this responsive attitude that complexity stratifies its own history of emancipation in relation to the previous "order/random" balances. Cultural stratification implies a diachronic differentiation of organisational structures and a synchronic coexistence of axiological and semiotic paradigms; the emancipatory tension explains the non-causal arrangement of cultural solutions to historically encountered problems.

Thus, despite the existence of prior semiotic organisations (the origin is already the fruit of a complex reconstruction that cannot be detached from the self-referential definition of systems), complexity theory seems to encourage the recognition of the unsuspected emergence of inventive solutions to the downgrading of certain meaning institutions and the protention towards a space that has not yet been territorialised. Every mapping, every model proposed can only be incomplete, but cultural complexity also signals that every meaning project is "unfinished" and non "resettable":[14] the dual foundation of the historicity of systems lies in the fact that there is a coupling of memories. Sometimes the environment reminds us, with the traces left over time, of our interpretations concerning the domain, despite false leads or lost trails. Essentially, the *extended mind* is simply the other side of the memory of a coupling between system and environment.

3 Complexity and semiotics of cultures

One can recognise at least three different orders of complexity in a semiotics of cultures: (α) the systemic complexity that concerns all forms of dynamic organisation; (β) the complexity of cultural systems as such (which therefore characterises anthropogenic life forms); (γ) the complexity of semiotic mediations, which characterises language games.

[12] The distinctions we use for coupling are inspired by Walliser (1977).

[13] The term "gap" is preferred to "difference" because in social domains and between them one has to work on distances of position and value which also determines the meaning of confrontation and dialogue.

[14] This interpretation of the meaning project comes into critical tension with Grice's intentionalistic perspective: "Grice's meaning project was to explain what "non-natural" meaning is by defining expression meaning in terms of speaker meaning and speaker meaning in terms intention" (Davis 2007: 41).

Despite their qualitative differences, systemic, anthropogenic and linguistic complexities are organised in a series of embedded homologies from one order of relevance to another. This requires some coordination for definitions:

(α) After a long debate on whether systems should be conceptualised as either *open* or *closed*, it has become increasingly apparent that there is a tension, in biological life forms, and even more so in cultural life forms, between: (α_1) a physical opening due to border permeability and inter-organic collusion and (α_2) the closing of internal self-structuring codes.

Every living heritage reproduces in itself this contradiction between tensions at the opening and tensions at the closing, according to unstable mereological frames (content and container, integrated totality and partitive totality, etc.). This contradiction stems from the tensive articulation between the appropriation of a subsistence domain and the adaptation of interactions to the forms of distinctions and correlations that are coded within the system. A language tries to constitute itself as a system of internal difference (semantic autonomy) but its historical evolution is solicited by contacts with other languages; that is why it can only try to adapt translations and imports to the formats of its own structures.

(β) With regard to the complexity of cultural systems, the non-trivial behaviours of cultural systems are characterised by the reinterrogation of the identities of subjects and objects; in this sense, symbolisation is a form of constant feedback from the linguistic figure projected in discourse (i.e. a pronoun) on the actor of utterance (i.e. the identity of the social actor). This reinterrogation is carried out from a shared environment, from agreement on a specific language game, but it bears non-trivial fruits because it accepts exposure to violations of norms and competitive inventions. Basically, intuitions or analogical reasoning redraw the purposes of the systems themselves.

(γ) With regard to the specific characteristics of linguistic complexity, attention should be drawn to three fundamental factors: (γ_1) the *multimodality of* expression, given that speakers' bodies are involved, which implies the management of all their expressive potentialities beyond intentional aspects; (γ_2) *second order observation on meaning*, given that one must always assume an asymmetry of competence between speaker and interlocutor, and an autonomous semantisation of linguistic productions; (γ_3) the conquest of a *distal dimension* (Rastier 2001), namely the use of linguistic mediations enables to return the basis of negotiated values to the institutions of

meaning that lay the foundations and ensure the regulatory effectiveness of language games beyond their structural defects or voids.

4 Duplicating language games

Multimodality, second-order observation and the conquest of *distality* can only contribute to the complexification of frames for the use of linguistic resources. Yet, this complexification is expressed above all as the appealing to several language games at the same time. The simplest case is apparently that of *mise en abyme*, where there is an interpretative dialectics between the "framing" and the "framed" language game (e.g. a parable within an academic essay or a legal trial within a play). The problem is that, in a cultural space with a symbolic purpose, nesting cannot be read as a hierarchisation prejudice, and so even the smallest possible world (an anecdote in a novel, a blazon in a painting) can rise to the level of a key that interprets an entire life form.

More generally, communications that establish and support social domains always involve "double play" from their participants, meaning that interaction takes place on several fields of play at the same time. The first consequence of a semiotic regime that is always split according to several competitions played at the same time is the non-linear (expression plane) and non-consequential (content plane) nature of the semiotic choices made in a praxeological frame. The second consequence is that the strategic articulation between several discursive instances and different organisational frames can only lead to the local emergence of new "remedial" forms of organisation.

The systematic nature of interactions probably feeds on prior organisations (frameworks), but it is still the product of modal asymmetries (e.g., different desires) that motivate communication. It is therefore the product of a *double contingency* (Luhmann 1984). While one can invent games that regulate other games (a "meta-game"), there is never a meta-rule to choose the order in which the games should be embedded for interpretation. The design of a model is in fact the first demonstration of a hierarchical reversion between the global frame and the local scenario of meaning issues (see §1). Furthermore, one must consider that there is always some form of "play" in language games, and therefore random factors and flexibilities, which makes exchanges fascinating.

5 Double binds and paradoxes

Doubles in games also give rise to double constraints on communication, which inevitably ends in paradoxes. The pragmatic *double bind of* making oneself understood, for the maxim of *manner,* and to say at the same time what the reader has not yet understood, for the maxims of *quantity* and *relation* (content plan), or the double constraint of simplifying pronunciation in front of a foreign interlocutor and at the same time ensuring the distinctive perceptibility of phonetic features (expression plane), raise the question of whether it is simply necessary to find a balance or whether one should accept the paradoxes created by inscribing them in a "reframing" capable of mitigating the contradiction. With the notion of *simplexity*, Alain Berthoz (2009) has shown that simplification is not necessary, but that "it is necessary to present issues in a different way"[15] through the restructuring of relevance and therefore of the conditions of observation.

In cultural sciences, epistemological reflection has enabled the recognition of insoluble dialectical tensions exemplified by the organisational shape of languages. Thus, the competition between semiotic density (the constitution of the substance of linguistic expression tends to be similar to a perceptual inquiry) and notation (language emancipated from the material conditions of inscription and from the contingencies of a sensitive approach[16]) has been projected on two epistemological dualities strictly associated: between *emic* and *etic* et between characterisation through *thick description* and generalisation through grammar extraction.

Theory cannot emancipate itself from the paradoxical conditions of practice. Moreover, it is also a victim of circular causality since it must take into account, in its practice strategies, the disturbance created by its observation activity in the field under analysis (i.e. the challenges of participant observation in ethnographic research are linked to the potential influence of the researcher on the data because of its anomalous presence in the foreign cultural context, its means of recording practices, etc.). Furthermore, the complexity of scientific culture concerns a disproportion of the research horizon in relation to the process of operations that can already be applied in a series according to an approved procedural syntax; reconceptualisations are required, even in the most formal theories.

More generally, one can observe the continuous deparadoxalisation of every culture, through (i) situated decomplexifications that go from the global to the

[15] Personal translation.

[16] On the notion of *density* and on the theory of *notation* (allographic languages), see Goodman (1968), while the concept of "substance of expression" refers to Hjelmslev's work.

local, according to a principle of meaning compartmentalisation;[17] (ii) agentive decomplexifications that begin with local initiative and lead to the homogeneous configuration of an entire scenario, according to a principle of unilateral proceduralisation of meaning;[18] (iii) the taking into account of hyper-complexity linked to the effects of observation itself on the field serving as a frame for the ongoing operations.

Beyond the aporetic recursivity of distinctions ("is the distinction between inclusive and exclusive inclusive?"), one discovers that, for a semiotics of cultures, there are only regulative principles: we act *as if there were* non-contradictory rules but in reality, there are only *imbalances provided with regular decomplexed responses* in relation to persistent double binds.

In this respect, *metastability* – the struggle of systems against entropy conducted by constantly new means and measures – cannot be described as the discrete transition from one balance to another (i.e. the paradoxical coexistence of liberty and law). On the one hand, it should be added that it is always shared by one or more couplings and, therefore, cannot be only examined at the self-referential level; on the other hand, the oscillations between balances invite the formulation of a description of emerging forms according to an oscillation range between the phases of *fluidisation* and *coagulation*. The two remarks are expressed in the idea that there is a reciprocal moulding between forms promoted by the system and forms promoted by the environment, and that formative initiatives are in competition. Local coagulation occurs when one tends to prevail over the other. That said, fluidisations do not only take precedence in transitions; they even persist in conditions favourable to coagulation as inhibiting factors. Thus, breaks in symmetry in couplings give rise to resistant flows capable of opposing the crystallisation of relationships between structures and functions in correlated systems. On the one hand, it is clear that this dialectics between coagulation and fluidisation can explain the reciprocal determinations between the *global* and the *local*: the semantic consistency of a sentence – attributability of actantial roles – does not prevent the spread of remote semantic values in the discursive *co-text*[19]

[17]The court system has to handle general principles about many areas of law, but it is not capable of resolving disputes in specific topics because these are not sensitive to the general criteria. So, jurisprudence sets up administrative tribunals to make less formal decisions that are reasonably expected to not be in opposition with the "common" law.

[18]This is the typical case of emergency procedures where any discussion of principles and rules is no longer compatible with the need to act immediately as a compact and supportive community.

[19]Eco (1991: 215) has "reserved the name of *co-text* for the actual environment of an expression in the course on an actual process of communication".

nor, on the contrary, the reception of distant *semes* in an utterance that is apparently already semantically saturated. On the other hand, this dialectics seems to respect *imbalance as a* promoter of renewed order, which is expressed through the tensive relations between *flow*, *function* and *structure* (Prigogine 1983). We propose to assign flow to *couplings* in their reversible polarisations, function to interacting *devices*, and structure to *systems*. The three instances concerned are mutually influenced by evolving *feedbacks* and *feedforwards*. For example, the prolonged application of a function – driving a car – releases energies, thanks to the flexibility gradually acquired, in order to take into account fluctuations in values (flow) in a new field of operation – conversation with a passenger –, and thus to consider new tasks (bifurcation of functions), which promotes the ambition of restructuring the practice – prove to be a good cicerone – and a restructuring of ambitions (non-linear qualitative leap) – playing the role of Don Juan.

6 Between concessivity and limitation: The semiotic proportion

Although *complicated items* are normally the result of an over-codification that seems to defy interpretation, they can still potentially be analysed, given the commensurable nature of assessment parameters (*problem solving*). On the other hand, *complex items* display a partial indeterminacy and/or an irresolvable, unintegrable heterogeneity that challenges us to change the conditions of observation: decomplexification is a point of arrival in the management of relations that are not yet coded, a kind of scale abduction that allows us to later surmount a complexity that remains out of reach.

Compared to previous paradigms, complexity theory does not rely on a conceptual architecture that is capable of branching out infinitely, according to a "constructionist" perspective on knowledge. Every advancement corresponds on the other hand to the acknowledgment of the "concessivity" of an exploration field that remains partly impenetrable and obscure. The conceptual distance between creativity and discovery is thus filled by the reciprocal mouldings between gesture and hosting space, by the ecological niches where the positive form of the semiotic construction is given together to the negative form of the space that remains secluded behind the concessive nature of its response to our investigation. Thus, the *redundancy of* organisational constraints and the recursivity of gnoseological attacks[20] can only lead to local reductions in complexity. The latter

[20]The term "attack" is employed here as it is used in music, i.e. to indicate the initial run-up of musical gesture, the start of a given note or of a solo. Every silence dramatises the subsequent musical attack.

indicates at the same time the negative condition of immediately available meaning: science's fascination paradoxically constitutes the continuous "creation" of the "yet unknown".

Convergent determinations of instrumental reason (optimisation of calculations) are surpassed by the negotiation of a sensible coalescence of eccentric options (lateral thinking), which can characterise the significance of choices. In fact, even from an ergonomic point of view, an adequate hesitation system[21] must be left between the prosthesis[22] (free modal fusion between subject and instrument) and the interface (strict modal coding), in order to envisage a creativity/discovery capable of restructuring the identities of the subject and the object and the space relevant for their coordinated actions.

An isolated system, which is omnipotent in its environment, can only experience modal vertigo, and thus evolve according to a progressive increase in the insignificance of these acts, while at the same time seeking a definitive stabilisation of its connections with its surroundings, i.e. absolute power. Admitting randomness is an apotropaic solution to the obsession to always present a one-sided complexity. Thus, the subjects of an interaction are reciprocal "black boxes" that begin to include each other's selections as restrictions on the entropic vertigo of solipsism. In this sense, conflictuality is already a form of modal restriction and channelling. That said, coordination remains uncertain, and indeterminacy will affect all attempts at code-based stabilisation.

As for possible "neuroses" when confronted to heterogeneous or self-generated complexity, social stakeholders find a compensatory balance in the impossibility of observing all relations between systems and the environment, which means that the purposes remain open with respect to the functions already coded. But this balance and this search for further purposes can only be promoted through semiotic mediations, where the relations between expression and content are a dialectical laboratory between memory and innovation. Languages are our environment and the *semiosphere* (Lotman & Clark 2005) perfectly

[21] A hesitation system is qualified by the idea to leave some "game" between the bolt and the nut, a mechanism that conceives some room for action. At the same time, it obliges the user to interpret his conditional freedom, which is a time to hesitate before deciding on the mode of "attack". Leroi-Gourhan (1964: 305) has always stressed the importance of aesthetic "approximation" in culture, that involves a certain freedom in the interpretation of the relationship between form and function.

[22] "In a strict sense, a prosthesis is an apparatus replacing a missing organ (an artificial limb, a denture); but, in a broader sense, it is any apparatus extending the range of action of an organ. This is why we can also consider hearing aids, megaphones, stilts, magnifying lenses, periscopes as prostheses" (Eco 1991: 208).

reproduces this reciprocal moulding between creation and discovery, scale abduction and response from a cultural space of reception.

Of course, one cannot erase the systemic ambitions of language as an institution of meaning. Two concluding remarks are thus necessary:

- there is a shift from quantitative complexity to qualitative complexity through: (i) the offer of non-redundant varieties of semiotic features (extension of choices); (ii) the emergence of innovative combinatorial potentialities (actualisation of the reconfiguration possibilities of the system); (iii) the plurality, the translatability and the syncretic use of available linguistic systems; (iv) the constitution of institutions of meaning (domains) without prior hierarchy (*heterarchy)* and whose interconnection density gives rise to a network of mutual influences and non-linear causes;

- the linguistic environment cannot dissociate *langue* (language as a system) and *parole* (speech acts), which means that the system emerges, in synchrony, as the latest reciprocal moulding between discourse practices and the responding *semiosphere*; and in diachrony, as a partial crystallisation of linguistic habits that are regulatively elevated to the level of *norms*.

Acknowledgements

The author would like to thank Kris Lund for her critical remarks and suggestions. The author is grateful to the ASLAN project (ANR-10-LABX-0081) of the Université de Lyon, for its financial support within the French program "Investments for the Future" operated by the National Research Agency (ANR).

References

Alexander, Samuel. 1920. *Space, time, and deity*. London: Macmillan & Co.

Basso Fossali, Pierluigi. 2007. Di mediazione in mediazione. Spazi esperienziali, domini culturali e semiosfera (De médiation en médiation. Espaces expérientiels, domaines culturels et sémiosphère). *Visible* 3. 11–55.

Bateson, Gregory. 1971. The cybernetics of "self": A theory of alcoholism. *Psychiatry* 1(34). 1–18. DOI: 10.1080/00332747.1971.11023653.

Berthoz, Alain. 2009. *La simplexité*. Paris: Odile Jacob.

Davis, Wayne A. 2007. Grice's meaning project. *Teorema: Revista Internacional de Filosofía,* 26(2). 41–58.

de Saussure, Ferdinand. 2002. *Écrits de linguistique générale*. Paris: Gallimard.
Eco, Umberto. 1986. *Semiotics and the philosophy of language*. Bloomington: Indiana University Press.
Eco, Umberto. 1991. *The limits of interpretation*. Bloomington: Indiana University Press.
Goodman, Nelson. 1968. *Languages of art: An approach to a theory of symbols*. Indianapolis: Bobbs-Merrill.
Leroi-Gourhan, André. 1964. *Gesture and speech*. Trans. by Anna Bostock Berger. Cambridge, MA: The MIT Press.
Lotman, Yuri M. & Wilma Clark. 2005. On the semiosphere. *Sign Systems Studies* 33(1). 205–229. DOI: 10.12697/SSS.2005.33.1.09.
Luhmann, Niklas. 1984. *Social systems*. Stanford: Stanford University Press.
Popper, Karl R. 1972. *Objective knowledge: An evolutionary approach*. Oxford: Oxford University Press.
Prigogine, Ilya. 1983. La lecture du complexe. *Le Genre Humain* 7-8. 221–233. DOI: 10.3917/lgh.007.0221.
Rastier, François. 2001. L'action et le sens: Pour une sémiotique des cultures. *Journal des anthropologues* 85-86. 183–219. DOI: 10.4000/jda.2941.
von Foerster, Heinz. 1960. On self-organizing systems and their environments. In Marshall C. Yovits & Scott Cameron (eds.), *Self-organizing systems*, 31–50. London: Pergamon Press.
Walliser, Bernard. 1977. *Systèmes et modèles: Introduction critique à l'analyse de systèmes*. Paris: Seuil.

Chapter 3

What knowledge owes to experience: Complexity and first-person epistemology

Magali Ollagnier-Beldame[a,b,c,d]

[a]UMR 5161 ICAR [b]Centre National de la Recherche Scientifique [c]Ecole Normale Supérieure [d]Université Lumière Lyon 2

Definitions of "complexity" or "complex systems" are numerous, and research concerns both modelling and empirical works. Our proposal is part reflexive in which the complexity sciences question their foundations and their methodologies. We postulate that a complex approach is necessary to better understand knowledge processes as it attempts to integrate and to go beyond the dichotomies that are most often used in cognitive sciences. We also support the idea that such an approach must take into account the experiential dimension of the act of knowing, considered as a starting and an ending point. (Cohen Varela 2017).

1 Introduction

Research in the field of "complex systems" is vast and it concerns as much modelling as empirical studies. Bertin et al. (2011) define the complexity sciences not by their objects but by their way of questioning objects. They associate complexity with the observer's perspective on her object, classifying complexity research in three categories:

- Studies of specific systems within a discipline or at the intersection of several disciplines
- Transverse theoretical studies on the generic characteristics of certain classes of systems

Magali Ollagnier-Beldame. 2022. What knowledge owes to experience: Complexity and first-person epistemology. In Kristine Lund, Pierluigi Basso Fossali, Audrey Mazur & Magali Ollagnier-Beldame (eds.), *Language is a complex adaptive system: Explorations and evidence*, 23–33. Berlin: Language Science Press. DOI: 10.5281/zenodo.6620109

- Reflexive works in which the complexity sciences question their foundations and their methodologies.

Our proposal is part of the third group. In order to integrate and to go beyond the dichotomies most often used in cognitive sciences, we claim a complex approach is necessary to better understand knowledge processes as they unfold. We also support the idea that such an approach must take into account the experiential dimension of the act of knowing, both as

> being where we go from and what we have to bond to in return (Cohen Varela 2017: 26).

2 Ways of knowing and the paradigm of 4-E cognition

Over the last thirty years, research within the cognitive sciences has massively grown in the field of the Ways of Knowing (Suchman 1987, Varela et al. 1992, Hutchins 1995, Clark 1997). In recent years, the paradigm of 4-E cognition (for embodied, embedded, enactive and extended cognition) suggests that cognition involves the whole body, as well as the situation of the body in the environment (Newen et al. 2018). The term "embodied" is actually the most general term, encompassing the other three. Indeed, the idea is to take into account the way the body contributes to cognitive processes, body being always located in a physical, social and cultural environment (embedded), body allowing us to perceive our environment according to its "affordances" (enactive), and body mobilising objects and instruments of the environment (extended). Studies within this paradigm rely on different methodologies but they all reject or radically reconfigure traditional cognitivism considering cognition as a manipulation of representations in the brain. The principle of cognition rooted in an embodied subject, situated into a particular setting, is the foundation of the theory of enaction (Varela et al. 1992). This theory considers cognition as an "embodied action", i.e. as a phenomenon rooted in the constant interactions between the subject and her environment and by which these two realities co-occur. And while the aim of research within the 4-E cognition paradigm is to understand Human "in situation", it mobilises various dualisms (subject vs. object, action vs. cognition, interior vs. exterior, body vs. psyche, innate vs. acquired) – often seen as contradictions and considered by science as antagonisms or aporias – with a view to their integration.

3 Complexity and first-person science

According to Morin (1990a), the non-integration of these contradictions leads to a "blind intelligence", a simplifying scientific thought that disfigures and mutilates reality through disjunctions (separating what is linked), reductions (unifying what is diverse) and abstractions (isolating objects from their environment). According to him, on the contrary, it is necessary to move on to a complex generalised thought – in the etymological sense of *complexus*: "what is woven together" – integrating these contradictions and linking what seems to be opposed. In the same vein, Varela et al. (1992) and Depraz et al. (2003) argue for taking into account these dualities, without seeking to go beyond them by synthesising them, but recognising them the possibility to co-occur. For them, subjective experience, as a research material, is the possible place where these dualities can be integrated because, owing to its "intermediate" nature, experience questions the relevance of these dualities. In this direction, we defend the need for a new paradigm for the study of the Ways of Knowing rehabilitating and reintegrating lived experience at the core of the process (Petitmengin et al. 2015).

Indeed, the irreducible complexity of cognitive processes needs an open interrogation method, considering their phenomenal manifestations, i.e. the way they are from a "first-person" – subjective – perspective. Phenomenological approaches differentiate first-person, second-person and third-person points of view distinguishing the perspective of the subject living the experience from that of another subject, e.g. the researcher (Depraz et al. 2003). The first-person point of view deals with the experience as it is accessed by the subject. In the case where the researcher collects data about her own experience, the "radically first-person" point of view denotes the idea that the data are drawn from the researcher's own lived experience. The second-person perspective implies

> enabling the gathering of "first-person" data, i.e., data that express the viewpoint of the subject herself, in the grammatical form "I...". But since the data have been gathered through another person (a "You"), the method has been dubbed "second-person" (Petitmengin 2006: 230–231).

This perspective suggests a combination of empathic resonance and heterophenomenological observation (Depraz 2012)[1], i.e. an inference from behaviours – language, gestures or other forms of semiosis. The idea is that a second-person

[1]According to Depraz (2012: 419), the heterophenomenological observation is that of the researcher who studies the experience of another subject without identifying with it.

perspective is an indirect point of view on the subjective perspective. The first-person and second-person points of view rely on a first-person epistemology that considers subjectivity as it is experienced by the subject herself (Varela & Shear 1999, Depraz 2014).[2] Such an epistemology is often undervalued in comparison to third-person approaches, on the assumption that an external point of view offers greater objectivity. The limits of this last statement have however been stressed, and the epistemic validity of first-person approaches has been analysed in detail (Petitmengin & Bitbol 2009). Especially, claims denying subjects' introspective abilities (Nisbett & DeCamp 1977) have been rebutted (Petitmengin & Bitbol 2009, Petitmengin et al. 2013). Moreover, external observations based on third-person epistemology leave aside entire facets of the studied phenomenon, which simply cannot be accessed since they occur "within" individuals, "behind" physical movements and "in front" of patterns from neuronal imagery. These classically inaccessible facets of the subject's activity, her experience, can, however, be reported by her; hence, the benefits of accompanying her to do so with a particular method. As for reducing introspection to solipsism (Zahavi 2017: 10), we contend that gathering authentic descriptions of lived experiences is the first and necessary step to ground our research in the things themselves and access the invariant structure of experience (Bitbol & Petitmengin 2011: 36). As we wrote in Petitmengin et al. (2015), once a corpus of singular descriptions of experiences has been collected, a whole work of reorganisation, analysis and formalisation is necessary in order 1. to identify the possible structure of the described experiences, i.e. a network of relationships between descriptive categories, independently from the experiential content, and 2. to detect any generic structures, progressively extracted from the initial descriptions thanks to a succession of operations of abstraction (Ollagnier-Beldame & Coupé 2019, Petitmengin et al. 2018, Valenzuela-Moguillansky & Vásquez-Rosati 2019).

4 Micro-phenomenology as a way to explore the richness of experience

At the heart of first-person epistemology, micro-phenomenology (Petitmengin 2006, Bitbol & Petitmengin 2016) is based on enaction and neurophenomenology (Varela 1996). It is close to Morin's co-constructivist vision of "human facts"

[2] They are defined this way as opposed to the third-person point of view that does not allow studying the experience as it focuses on behaviours and examines them according to predefined categories. This point of view implies a third-person epistemology in which subjectivity and lived experience are generally viewed as epiphenomena or as being beyond the reach of science (Vermersch 2000).

(Morin 1990b) for which the subject is constructed by the outer world at the same time as the outer world is constructed by the subject, by a recursive loop. Interested in "what it is like to be" (Nagel 1974), the micro-phenomenology seeks precisely to understand the complexity of the human experience with an emic approach, i.e. using data from the "discourse" of subjects as opposed to an etic approach, i.e. using observational data (Olivier de Sardan 1998).

This discourse is not a narration but relies on what Vermersch (1994) calls the "embodied posture of speech" (EPS), or "evocation", which is the verbalisation of experience in close contact with it. The "level of experiencing" (Hendricks 2002) is the degree of connection between what a person is saying and her experience when she says it. It is a quantifiable first-person process: there are low, medium and high levels of experiencing. The micro-phenomenological interview aims at a high level of experiencing in order to facilitate the experiential description. The experiencing scale (Hendricks 2009), which measures this process, is the third-person evaluation of a first-person process, based on specific linguistic and somatic indicators.

The micro-phenomenological interview relies on the explicitation interview, developed by Vermersch (2012) and Petitmengin (2006).[3] It consists in "guided retrospective introspections", aiming at accompanying an interviewee in recalling a past situation. It does not, however, guide the subject on the content she verbalises, which comes to her consciousness through a movement of letting go. This is possible thanks to a specific posture from the interviewer guiding the interviewee's attention with open and non-inductive questions but never inducing the content of what the latter says. During this movement, the interviewee is accompanied by the interviewer to suspend her judgment – the Husserlian *epoché* (Depraz et al. 2003)[4] –, which allows her to access her past lived experience. The main characteristics of the explicitation interview are:

1. The EPS within the interviewee, allowing her to initiate and to maintain an intimate contact with the evoked past situation;

2. The concept of "satellites of action", to help the interviewer be aware of the area of verbalisation to which the interviewee is referring to and to drive the interviewee's attention according to these areas;

[3] It has been supplemented by a method of data analysis and validation (Petitmengin et al. 2015, 2018).

[4] According to (Depraz et al. 2003: 25), one accomplishes the *epoché* in three principal phases: A0: Suspending your "realist" prejudice that what appears to you is truly the state of the world; this is the only way you can change the way you pay attention to your own lived experience; in other words, you must break with the "natural attitude." A1: Redirecting your attention from the "exterior" to the "interior." A2: Letting-go or accepting your experience.

3. The contact with a singular past situation (unique in time and space) in order to collect specific descriptions rather than generalisations (such as know-how or habits);

4. The holistic description of the lived experience in the entanglement of its cognitive and bodily dimensions, beyond the division;

5. The precise use of perlocutionary effects (Austin 1962);

6. The consideration of the temporality of the experience, carefully explored by the interviewer who is guiding the fragmentation of the interviewee experience into a series of very detailed phenomena through specific questions.

Like the explicitation interview, the micro-phenomenological interview aims to describe the experience in an intuitive mode (as opposed to a signitive, purely conceptual mode), i.e. based on a presentification of the past moment.

It is important to bear in mind that first-person epistemology is not an epistemology of immediacy since experience, although lived by the subject, is not immediately known by her, despite its apparent transparency and familiarity. Experience is not directly accessible to the subject and the first-person perspective should not be confused with immediate donation, i.e., for the subject, a sudden, clear and distinct illumination (Vermersch 2000).

> Indeed, being epistemically related to facts about oneself is not a sufficient condition for first-person perspective taking: You can also have an objective, third-person view on your headache. […] What is needed is a difference not in terms of the epistemic object but, rather, in terms of epistemic access – even if it may turn out to be necessary to refer to specific epistemic objects in order to clarify what the specific kind of access is. The decisive point seems to be that there are certain features of oneself that do require a specific kind of epistemic access (Pauen 2012: 37–38).

It is precisely an epistemic access to experience that is both unusual and privileged that the micro-phenomenological interview offers.

5 Towards a dialogical integration of emic and etic data

Micro-phenomenological descriptions can be enriched with third-person data, for instance as Depraz et al. (2017) did, crossing micro-phenomenological data

with third-person physiological data, in their study about the experience of surprise and depression. Precisely, it seems that a science questionning the cognitive processes with a complex approach must consider the relation between etic and emic data according to a dialogic mode. This is what Cohen Varela (2017) proposes when he distinguishes two main classes of scientific invariants. First, he specifies objective invariants (derived from third-person or etic research), which can be treated as if they were separable from the variety of experiences of which they are the focus[5]. He also characterises intersubjective invariants (coming from first-person or emic research), which are different from objective invariants, by the fact that it is generally impossible to separate them from the situations and concrete people they coordinate (Cohen Varela 2017). The project of neurophenomenology (ibid.), which micro-phenomenology joins, is precisely to define "generative mutual constraints" between objective and intersubjective invariants. From these two classes of invariants, the idea is to go back and forth between third and first person-person approaches, experience being from where one leaves and to which everything must be connected in return. This project is based on methods of guiding research towards invariants belonging to one of the two classes, relying on the invariants of the other class.

6 Conclusion

A first-person approach as described above aims to enrich the understanding of the Ways of Knowing in their complexity – particularly by seeking to re-question classical dichotomies – through the reintegration of subjective experience. It is in line with Berthoz & Petit (2014) for whom the modelling of reality complexity is always far from the complexity as it is lived in flesh and bone, and for whom

> the Living will always have the priority by to all models because it is the one who lives in the immanence of this real complexity (ibid.: 37).

Combined with a third-person approach, it can allow for the construction of new models of cognitive processes, more operative than models made solely from third-person data, which can not grasp the phenomenological dimension in which the living "dwells" and "decides" within the concret and embodied complexity.

[5]Regarding this point, Varela warns about the widespread temptation to forget the status of scientific objects, which is that of inter-situational invariants, as well as their origin, which is part of a situated experience. In a 1996 article, he had already stressed this temptation and the need to preserve it by recalling that third-person researches, as much as first-person ones, are made by people who are embodied in their social and natural world.

Finally, we claim a holistic approach to cognitive processes fully considering human subjectivity through experience, beyond the normativity of subjectivity. To achieve this goal, it seems essential to broaden our conception of the subject and the world and to accept to be obedient to the authority of the Living in its dynamic and processual dimensions, and in its contradictions. The challenge of such a proposal is not only epistemological, but also ethical and societal. Indeed, what gives the person the feeling of being the person she is, if not her experience? Is not experience "the only tangible reality of the person, at the forefront of the living being alive" (Lamboy 2003)? Leaving aside lived experience, does not that mean depriving oneself of a considerable source of knowledge?[6] Reintegrating the Living into the study of cognitive processes would help develop an ecosystemic vision of the person as a complex unit that shapes in the relationship between her organism and the environment. This vision also fosters an understanding of the relationship between humans and nature, allowing for both non-dissociation and differentiation, thus bringing together the seemingly contradictory notions of belonging and autonomy. Could we consider that the rehabilitation of subjective experience, as a material for research, could be a form of simplexity (Perrier 2014, Berthoz & Petit 2014)?[7]

Acknowledgements

The author is grateful to the ASLAN project (ANR-10-LABX-0081) of the Université de Lyon, for its financial support within the French program "Investments for the Future" operated by the National Research Agency (ANR).

References

Austin, John Langshaw. 1962. *How to do things with words*. Cambridge, MA: Harvard University Press.

Berthoz, Alain & Jean-Luc Petit. 2014. *Complexité-simplexité*. Paris: Collège de France.

Bertin, Éric, Olivier Gandrillon, Guillaume Beslon, Sebastian Grauwin, Pablo Jensen & Nicolas Schabanel. 2011. Les complexités: point de vue d'un institut des systèmes complèxes. *Hermès, La Revue* 2(60). 145–150. DOI: 10.4267/2042/45459.

[6]"Indeed nothing is as debilitating as a confused and distant functioning of experiencing" (Gendlin 1997: 15–16).

[7]Inasmuch as it is one of the fundamental properties of the Living to be able to invent simple answers to problems that the complexity of reality poses for its survival.

Bitbol, Michel & Claire Petitmengin. 2011. On pure reflection: A reply to Zahavi. *Journal of Consciousness Studies* 18(2). 24–37.

Bitbol, Michel & Claire Petitmengin. 2016. On the possibility and reality of introspection. *Mind and Matter* 14(1). 51–75.

Clark, Andy. 1997. *Being there: Putting brain, body, and world together again*. Cambridge: MIT Press.

Cohen Varela, Amy. 2017. *Le cercle créateur: Écrits (1976–2001)*. An anthology of works by Francisco J. Varela. Paris: Seuil.

Depraz, Natalie. 2012. Empathy and second-person methodology. *Continental Philosophy Review* 45(3). 447–459. DOI: 10.1007/s11007-012-9223-z.

Depraz, Natalie. 2014. *Première, deuxième, troisième personne*. Bucharest: Zeta Books.

Depraz, Natalie, Maria Gyemant & Thomas Desmidt. 2017. A first-person analysis using third-person data as a generative method: A case study of surprise in depression. *Constructivist Foundations* 12(2). 190–203.

Depraz, Natalie, Francisco J. Varela & Pierre Vermersch. 2003. *On becoming aware: An experiential pragmatics*. Amsterdam: John Benjamins.

Gendlin, Eugene T. 1997. *Experiencing and the creation of meaning: A philosophical and psychological approach to the subjective*. Evanston, IL: Northwestern University Press.

Hendricks, Marion. 2002. Focusing-oriented/experiential psychotherapy. In David Cain & Jules Seeman (eds.), *Humanistic psychotherapy: Handbook of research and practice*, 1st edn., 221–251. Washington, D.C.: American Psychological Association. DOI: 10.1037/10439-007.

Hendricks, Marion. 2009. Experiencing level: An instance of developing a variable from a first person process so it can be reliably measured and taught. *Journal of Consciousness Studies* 16(10–12). 129–155.

Hutchins, Edwin. 1995. *Cognition in the wild*. Cambridge, MA: The MIT Press.

Lamboy, Bernadette. 2003. *Devenir qui je suis*. Paris: Desclée De Brouwer.

Morin, Edgar. 1990a. *Introduction à la pensée complexe*. Paris: Seuil.

Morin, Edgar. 1990b. *Science avec conscience*. Paris: Seuil.

Nagel, Thomas. 1974. What is it like to be a bat? *Philosophical Review* 83(4). 435–450. DOI: 10.2307/2183914.

Newen, Albert, Leon de Bruin & Shaun Gallagher. 2018. *The Oxford handbook of 4E cognition*. Oxford: Oxford University Press. DOI: 10.1093/oxfordhb/35410.001.0001.

Nisbett, Richard & Timothy D. DeCamp. 1977. Telling more than we can know: Verbal reports on mental processes. *Psychological Review* 84(3). 231–259. DOI: 10.1037/0033-295X.84.3.231.

Olivier de Sardan, Jean-Pierre. 1998. Émique. *L'Homme* 38(147). 151–166. DOI: 10.3406/hom.1998.370510.

Ollagnier-Beldame, Magali & Christophe Coupé. 2019. Meeting you for the first time: Descriptive categories of an intersubjective experience. *Constructivist Foundations* 14(2). 167–180.

Pauen, Michael. 2012. The second-person perspective. *Inquiry* 55(1). 33–49. DOI: 10.1080/0020174X.2012.643623.

Perrier, Edith. 2014. De la simplexité et des systèmes complexes. In Alain Berthoz & Jean-Luc Petit (eds.), *Complexité-simplexité*. Paris: Collège de France. DOI: 10.4000/books.cdf.3359.

Petitmengin, Claire. 2006. Describing one's subjective experience in the second person: An interview method for the science of consciousness. *Phenomenology and the Cognitive Sciences* 5. 229–269. DOI: 10.1007/s11097-006-9022-2.

Petitmengin, Claire & Michel Bitbol. 2009. The validity of first-person descriptions as authenticity and coherence. *Journal of Consciousness Studies* 16(10-12). 363–404.

Petitmengin, Claire, Michel Bitbol & Magali Ollagnier-Beldame. 2015. Vers une science de l'expérience vécue. *Intellectica* 64. 53–76. DOI: 10.3406/intel.2015.1012.

Petitmengin, Claire, Anne Remillieux, Béatrice Cahour & Shirley Carter-Thomas. 2013. A gap in Nisbett and Wilson's findings? A first-person access to our cognitive processes. *Consciousness and Cognition* 22(2). 654–669. DOI: 10.1016/j.concog.2013.02.004.

Petitmengin, Claire, Anne Remillieux & Camila Valenzuela-Moguillansky. 2018. Discovering the structures of lived experience: Towards a micro-phenomenological analysis method. *Phenomenology and the Cognitive Sciences* 18. 691–730. DOI: 10.1007/s11097-018-9597-4.

Suchman, Lucy A. 1987. *Plans and situated actions: The problem of human/machine communication*. Cambridge: Cambridge University Press.

Valenzuela-Moguillansky, Camila & Alejandra Vásquez-Rosati. 2019. An analysis procedure for the micro-phenomenological interview. *Constructivist Foundations* 14(2). 123–145.

Varela, Francisco J. 1996. Neurophenomenology: A methodological remedy for the hard problem. *Journal of Consciousness Studies* 3(4). 330–349.

Varela, Francisco J., Eleanor Rosch & Evan Thompson. 1992. *The embodied mind: Cognitive science and human experience*. Cambridge, MA: The MIT Press.

Varela, Francisco J. & Jonathan Shear. 1999. First-person methodologies: What, why, how? *Journal of Consciousness Studies* 6(2-3). 1–14.

Vermersch, Pierre. 1994. *L'entretien d'explicitation en formation initiale et en formation continue*. Paris: Editions Sociales Françaises.

Vermersch, Pierre. 2000. Conscience directe et conscience réfléchie. *Intellectica* 31. 269–311. DOI: 10.3406/intel.2000.1609.

Vermersch, Pierre. 2012. *Explicitation et phénoménologie*. Paris: Presses Universitaires de France.

Zahavi, Dan. 2017. *Husserl's legacy: Phenomenology, metaphysics, and transcendental philosophy*. Oxford: Oxford University Press.

Chapter 4

Modelling the co-elaboration of knowledge: Connecting cognitive, linguistic, social and interactional systems

Kristine Lund[a,b,c,d]
[a]UMR 5161 ICAR [b]Centre National de la Recherche Scientifique [c]Ecole Normale Supérieure [d]Université Lumière Lyon 2

Language and multimodal human interaction in context are central in modelling knowledge co-elaboration. Cognitive, linguistic, social, and emotional aspects are closely imbricated within such interaction, and analyses can target individual, small group, organisational, or cultural level phenomena. Given that many research questions in this area lead to crossing boundaries, I argue for both an interdisciplinary and a complex systems approach in constructing a new descriptive model entitled the MULTi-theoretical and Interdisciplinary model of the GRoup And Individual (MULTi-GRAIN). This model allows for the study of different types of unidirectional and bi-directional causality and is meant as a guide for setting up empirical work where emergence is studied in systems of different orders.

1 Elaborating knowledge with others

1.1 Why use an interdisciplinary approach to modelling knowledge co-elaboration?

We elaborate knowledge with others in all areas of our lives. These others are people with experiences and views that are often different than our own. In the same way that accounting for a variety of perspectives leads to a broader understanding and perhaps better solving of the tasks we are confronted with in our

Kristine Lund. 2022. Modelling the co-elaboration of knowledge: Connecting cognitive, linguistic, social and interactional systems. In Kristine Lund, Pierluigi Basso Fossali, Audrey Mazur & Magali Ollagnier-Beldame (eds.), *Language is a complex adaptive system: Explorations and evidence*, 35–48. Berlin: Language Science Press. DOI: 10.5281/zenodo.6620111

lives, it makes sense to call upon different disciplinary views when we want to study and understand such knowledge elaboration.

Many disciplines have sought to understand how the individual, other people, and the context, all influence collaborative knowledge elaboration, be it individual or group knowledge. It is outside the scope of this chapter to review such a vast body of research, but see §5, *A cross disciplinary analysis of the individual versus the group in learning contexts*, in Lund (2016) regarding this topic at the frontiers of sociology and language sciences, and within psychology. This section also performs a meta-review of numerous studies of learning (assimilated to co-elaboration of knowledge[1]) regarding the individual, the small group, or a community during short, mid, and long-term timescales. These studies take place within behaviourist, cognitivist, sociocognitivist, or sociocultural paradigms and despite this variety, it is possible to pinpoint how disciplinary approaches may complement each other. For example, interdisciplinary work would be useful between conversation analysis and psychology in the sociocultural paradigm in order to combine analyses of interaction-in-context with characteristics of individuals. In the sociocognitive paradigm, work in organisational learning could be combined with microsociological studies of situated social practice that zoom in at different time periods. In the first example, the way a phenomenon is embedded in a process is combined with the study of individual behaviour as explained by these individuals' characteristics. In the second, different levels of analysis are combined (i.e. macro descriptions of organisational change and micro descriptions of localised human interactions). Achieving such a broad view requires a particular approach, developed in the next section.

1.2 Why use a complex systems approach to modelling knowledge co-elaboration?

Researchers may focus on particular and narrowed aspects of co-elaboration of knowledge due to disciplinary boundaries, epistemological assumptions, methodological approaches or even societal impact objectives. But in order to better understand a phenomenon of interest, its various characteristics need to be studied

[1]Learning has many different definitions: a physical response to a stimulus, or a mental process in the brain, possibly due to interactions with the environment. The definitions that can be more easily compared to co-elaboration of knowledge include learning as an interaction between a child's individual maturation and a system of symbolic tools and activities that the child appropriates from his or her sociocultural environment or learning as a set of processes at the small group level that take place through the weaving of semantic and indexical references within a group discourse.

in concert. Multiple levels of analysis need to be taken into account (individual, small group, organisation/community/culture) and multiple aspects (e.g. cognitive, linguistic, social and interactional) of the phenomenon need to be studied.

A complex systems approach allows researchers to consider these aspects as systems in and of themselves, yet also to unite them together. One definition of complexity puts it this way:

> Let us go back to the Latin root complexus, which means "entwined" or "embraced". This can be interpreted in the following way: in order to have a complex you need: 1) two or more distinct parts, 2) that are joined in such a way that it is difficult to separate them. Here we find the basic duality between parts which are at the same time distinct and connected. Therefore, the analytical method alone won't allow us to understand a complex, as by taking apart the components it will destroy their connections (Gershenson & Heylighen 2005: 48).

Many disciplines frame their empirical objects in terms of systems. There are linguistic systems (Grinevald 2001), cognitive systems (Woods 1985), social systems (Parsons 1951) and interaction systems (Vissers et al. 2016), just to name a few. Each of these systems has both distinct and connected parts, according to the researchers who study them. And in many cases, research questions arguably stay within the boundaries of the defined system. For example, in the case of linguistic systems, one could ask: do all languages in the same family have similar proportions of lexical meaning versus units that have grammatical meaning? Or given a cognitive system, one could ask: how does one model changes in a belief system when the initial state contains opposing, yet co-occurring beliefs?

That said, given the complex phenomena researchers are often interested in, it is usually difficult to stick to one system, and many questions lead to the consideration of hybrid systems such as socio-cognitive systems (Noriega et al. 2015), sociolinguistic systems (Hymes 1967), socio-emotional systems (Panksepp et al. 2002) and to attempts to integrate new elements into a single system.[2] Questions posed at the boundaries of systems include: how does the structure of an organisation change the way newcomers understand the way it functions? Or how is second language learning influenced by the professional expertise of immigrant groups?

It is therefore not surprising to argue that in order to broadly describe and understand the co-elaboration of knowledge in different contexts, versions of at least the above systems are necessary (though biological, neurological and other

[2] See the book *Action and Language Integration in Cognitive Systems*, edited by Angelo Cangelosi.

systems also come to mind). These separate systems need to be connected in order to meaningfully understand the forces behind knowledge co-elaboration. Our empirical object thus becomes a system of interrelated systems, but if such a complex object gives new opportunities for broader understanding, it also poses serious methodological challenges.

1.2.1 Methodological challenges of studying complex systems

A major risk of studying systems of systems is *conceptual chaos*. One definition of this is making errors during agglomeration of results. This latter can happen when two researchers use the same category name, but put different elements into it or when the same element is put into different categories. Both are a common occurrence in interdisciplinary work, but cause problems during agglomeration of results. Longino (2013) gives an example concerning the category "environment" for studying what affects a fetus in the prenatal stage. In the behavior genetic approach, what happens in the uterus (the "uterine effect") is independent of environment after birth, of neurological factors, and of rearing children. Yet it is still the environment because the uterus is a context within the body. But in the social environment approach, any effect of the uterus is rather a part of the biological category because their main search for causality focuses on social aspects of the environment. These researchers would not place the "uterine effect" into the causal space of the environment. So when another researcher is attempting to agglomerate results from studies of different disciplines, she must be careful to respect how the causal space was parsed in each study and not add effects to the category "environment" that were not meant to be there originally.

A similar agglomeration danger around the term "multimodal" is present in work at the frontier of language sciences, computer science, and discourse analysis. In multimodal discourse analysis (Paltridge 2012), much of which is based on work from Halliday (1978) in social semiotics, words combine with pictures, film, video, images, and sound in order to make meaning. Computer scientists refer to human-computer interaction modalities and also include video, images, talk, and text, but add speech recognition, vision-based gesture recognition, eye-tracking, electroencephalographs, touchpad pointing, and pen use (Oviatt 2007, Sharma et al. 1998), including not only interaction, but interpretations and analyses of modes of human computer interaction. Interactional linguistics uses the term "multimodal resources" to include gesture, gaze, and talk (and its characteristics of prosody, lexis and grammar), but also entire bodies as well as multiple bodies interacting within a material and spatial environment (Mondada 2016). She argues for a view of modalities as "constitutively intertwined and language

as integrated within this plurality as one among other resources, without any a priori hierarchy" (Mondada 2016: 338), a view compatible with a science of complexity approach. Yet, the term multimodal is used to cover a large variety of phenomena, varying with the discipline, so a similar danger is present during the agglomeration of results.

Another way to court conceptual chaos is to switch haphazardly between levels (individual and groups of different sizes) and aspects (e.g. linguistic, cognitive, interactional, social) of analysis during exploration of causality. The elaboration of a framework for the study of individual and group knowledge elaboration can take a lesson from sociology:

> One important measurement problem in sociology concerns the two levels on which sociologists must work: the level of the individual and that of the group. We have observations at two levels, concepts at two levels, and relationships at two levels. Furthermore, it is necessary to shift back and forth: measuring group-level concepts from individual data; or inferring individual relationships from group-level relations (Coleman 1964: 84, cited by Singer 1968: 141).

This chapter proposes a complexity framework where shifting between levels and aspects is controlled by an intermediate variable, defined by the researcher, thus allowing for the description and the *prediction* of the connection between aspects and between levels of analysis, according to the researcher's objectives and assumptions.

Assuming that referring to systems of systems is a fruitful way for studying the co-elaboration of knowledge, this paves the way for the study of emergence, one of the central tenets of complexity theory. This is the claim that particular kinds of systems are capable of giving rise to radically new properties not present in the components of the system (Bechtel & Richardson 2010), a phenomenon that is inherent in human interaction. Another central tenet of complexity theory is that multiple, simultaneous, non-linear interactions can take place between components. How can these be studied? Some disciplinary areas have a variable-oriented view on causality while others have a process-oriented view. In the first view, one searches for the consequences attributable to deliberately varying a treatment. The second is operationalised by "clarifying the mechanisms through which and the conditions under which the causal relationship holds" (Shadish et al. 2002: 9). Decomposition and localisation (Bechtel & Richardson 2010) can help pull apart causality in either case. This includes differentiating component parts, identifying component operations and linking the operations with the parts (Bechtel & Abrahamsen 2005).

2 MULTi: Theoretical and interdisciplinary model of the group and individual

2.1 The grains of a tree in the forest: A metaphor

The MULTi-GRAIN model for the co-elaboration of knowledge stands for MULTi: Theoretical and Interdisciplinary model of the Group And Individual (Lund 2016, 2019). In a context where the objective is to model how individuals and groups co-elaborate knowledge together, the cognitive, linguistic, interactive, and social systems that compose this activity can be compared to interwoven grains in the bark or leaves of a tree (see Figure 1(a)). According to recent research on tree ecosystems (Bader & Leuzinger 2019), trees exchange water, carbon, mineral nutrients, and microorganisms through their roots, often keeping neighboring tree stumps alive or helping trees that are struggling (see Figure 1(b)). Such resources are both used to nourish the individual tree as well as the surrounding trees that are part of the larger forest. So if I push the metaphor further, if the tree is an individual and the forest the group, then the cognitive, linguistic, interactive, and social aspects of co-elaboration of knowledge are interwoven together in the fabric of the individual (i.e. in the wood or leaf grains of the tree), but also in the other trees in the forest. These interwoven aspects are mutually influenced by the exchanges between trees which can be compared at a large grain level to the constructs I have labelled as intermediate variables, in collaborative work on the study of knowledge co-elaboration, such as semiotic bundle (Lund & Bécu-Robinault 2013), procedural explanation (Mazur-Palandre et al. 2014), overall emotional framing of a debate (Polo et al. 2016), and level of collaboration in a community of practice (Eberle et al. 2013). But at a finer grain level, the exchanges between trees can also be compared to the various facets of human interaction, as described in the next section. Following Coleman (1964), the relationships we observe and the concepts we define occur both at the tree and forest level. But I propose to differentiate the component parts, identify the operations and link them to the parts, whether they be at the tree or forest level.

Given that the MULTi-GRAIN model is completely open-ended, resources (or intermediate variables and facets of human interaction) vary with the contexts studied and are chosen according to researchers' objectives, worldview and focus. Having up to this point argued for the interest of such a model, the next section presents the model's structure and its possibilities for interdisciplinary research that broadens the understanding of the co-elaboration of knowledge.

(a)

(b)

Figure 1: Figure 1a on the left is tree bark, the interwoven grains of which are a metaphor for the cognitive, linguistic, interactive, and social aspects of co-elaboration of knowledge. On the right, the forest is a metaphor for how these aspects of co-elaboration are instantiated at the group level.

2.2 Structure of the MULTi-GRAIN model

In his book *Monde Pluriel* (A Plural World), the French sociologist Bernard Lahire (2012) argues that although it is true that the diversity in the human and social sciences has part of its origin in the way that researchers construct their objects of study, this is not the only reason for the scattered and dissipated nature of the research in this field. It also is a result of the social division of scientific work into disciplines (e.g. the sciences of "language", "psyche" or "society") and further into specialties within disciplines. Such a division means that researchers of different ilk separately study each domain of practice or sector of social life and form parallel theories of the actor. Lahire asks three questions that emanate from this state of affairs (Lahire 2012: 11, my translation):

1. How can we obtain a global view of the social world if each researcher must keep his or her nose glued to the functioning of his or her small world parcel?

2. How can we conserve a complex conception of individuals in society when disciplinary boundaries and within those, internal specialties constrain re-

searchers to work on the dimensions that are particular to narrow practices?

3. How can we maintain a high level of scientific creativity when a narrow vision of professional research leads to hyper specialisation and a normalisation of research and researchers?

When Lahire asks – rhetorically – if it is possible to understand the invention of the economic market without taking into account how economy relates to law, religion, politics and culture, I take a similar stance and ask how it is possible to obtain a broad understanding of knowledge co-construction while considering only one specific discipline. These are approaches that take the stance of interdisciplinarity as types of integration between separate disciplines (Klein 1990).

In his own academic context centered in sociology, Lahire's goal is to obtain a global view of the social world and in order to do so, he asks the following question: why do individuals do what they do, think what they think, feel what they feel and say what they say? He works to answer this question by attempting at the origin, a combination of different research foci in sociology – those focused on actors' inherent proprieties and those who focused on context. He uses a "formula" to describe his approach, evolved from a criticism he makes of the one proposed by Bourdieu (1979): habitus + field = practices: Incorporated past of the actor (dispositions or competencies) + context of the present action = observable practices.

This formula corresponds to the interdisciplinary analytical model called MULTi-GRAIN that I propose below, standing for MULTi-theoretical and Interdisciplinary model of the GRoup And Individual. I built this model from work carried out over many years with colleagues in language sciences, education and psychology (Lund 2016). The human interactions I observed and analysed originally with colleagues were the result of both dispositions and competencies and the context of the action participants carried out their activities. The elements of this formula are found in various forms in the wider literature that treats the co-construction of knowledge.

The intermediate variable is at the center of this model (see Figure 2) and researchers define them according to their goals and focus. The criterion for an intermediate variable is that it can be qualified within at least two different systems in a way that connects them.

Researchers also define facets according to the goals and foci of their research questions. The collaborative work used to elaborate the MULTi-GRAIN model included the study of modes of expression such as talk and gesture, drawing, or

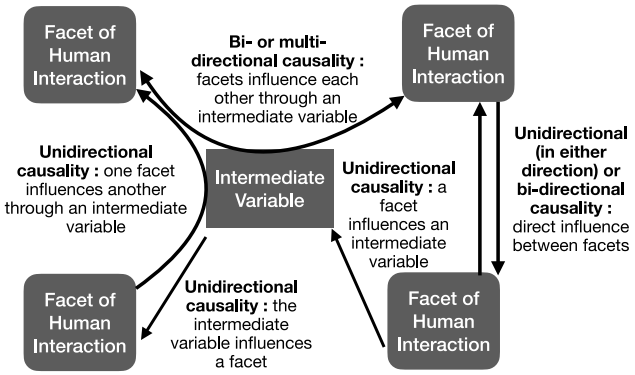


Figure 2: The structure of the model MULTi-theoretical and Interdisciplinary model of the GRoup And Individual

manipulation of experimental apparatus in physics labwork, choice of argumentative claim during socio-scientific debates, emotional positioning of such claims, self-identity footing (e.g. consensual, competitive), group talk type (following Wegerif & Mercer 1997: disputational, cumulative, or exploratory) schematisation (Grize 1996), tonality of discourse objects, facework (Goffman 1967), subjects' expressed feelings, propositions, lexical information, common ground, shared understanding, pragmatic competence, knowledge about an academic community, community participation, and duration of face-to-face interaction. These facets were all operationalised in research questions concerning the above intermediate variables and the co-elaboration of knowledge in human interaction (Lund 2016, Lund & Bécu-Robinault 2013, Polo et al. 2016, Mazur-Palandre et al. 2014, Eberle et al. 2021).

Both intermediate variables and the facets that compose them belong to one or more complex systems. The systems I consider are linguistic, cognitive, interactional, and social. Systems may overlap, depending on how researchers define them. For example, interacting facets can belong to the same system (e.g. talk and gesture belong both to the linguistic system and to the interactional system).

The MULTi-GRAIN model allows for the study of four types of unidirectional causality and two types of bi-directional causality as shown in Figure 2. The first of the unidirectionals is when one facet influences another through an intermediate variable (e.g. pragmatic competence influences shared understanding through explanation). The second is where an intermediate variable influences a facet (e.g. the quality of an explanation influences shared understanding). The third is where a facet influences an intermediate variable (e.g. the completeness of pertinent lexical information influences the quality of an explanation). The

fourth is where one facet directly influences another (e.g. reformulating content during problem solving across modalities (talk, gesture) influences success of manipulation of experimental apparatus). Bi-directional causality is where two facets directly influence each other (e.g. facework influences which of the subject's feelings will be expressed in the group) or where two facets influence each other through an intermediate variable (e.g. development of the pragmatic competence of making sure a listener is following and shared understanding are reciprocally influenced through explanation). Using the MULTi-GRAIN model as a guide, empirical work can be set up to study the extent to which these relationships are correlational or causal, and how they develop over time, both for the individual and group.

2.3 How the MULTi-GRAIN model informs thinking on language complexity

Taking the example of interactive finalised procedural explanation (Mazur-Palandre et al. 2014), the bi-directional causality of the co-construction of talk and gesture, be it individual or within interaction, is analysed from three system perspectives (linguistic, cognitive, and interactional) and we track the development of these three competencies in three different age groups.

In terms of modelling individual and group knowledge co-elaboration, the analysis of young children's talk and gesture showed that they had difficulties in managing the interaction with their peers when they gave an instructional explanation for a finalised task. For example, they rarely asked if their interlocutor understood the explanation, if he or she was paying attention, or if he or she had any questions about the rules. In more recent work, we illustrated (Mazur-Palandre et al. 2019) that both completeness of a procedural explanation for playing a collaborative game and information content conveyed in a multimodal manner increased with age, as did number of non-verbal verifications of shared understanding. In general, this approach proves useful for better understanding the feedback processes present during the emergence of cognitive and interactional competencies in procedural explanations as children's language develops.

Figure 3 illustrates how both speaker and listener behaviour is reciprocally influenced by perceptual, social, and cognitive constraints, as well as by social and cognitive motivations. In addition, such behaviour is reciprocally influenced by past speaker and hearer interactions, they being of course not equal (Beckner et al. 2009). This description closely echoes Lahire (2012) in terms of competencies, context, and observable practices, thus conforming to the MULTi-Grain model.

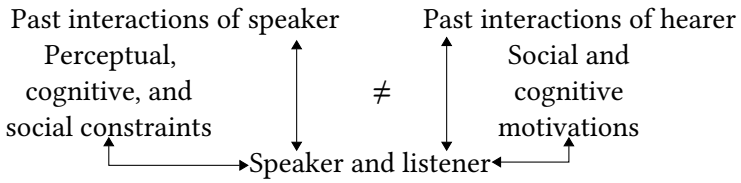


Figure 3: A representation of the complexity of speaker and listener behaviour including the possibilities for intermediate variables and facets of human interactions.

3 Conclusions and further work

In conclusion, the MULTi-theoretical and Interdisciplinary model of the GRoup And INdividual was developed as a general framework for understanding the co-elaboration of knowledge at the individual and group level. It is also adaptable to other topics of research that can be framed as a complex adaptive system and studied at both the individual and group level. The MULTi-GRAIN model takes on a complexity sciences framework where intermediate variables – chosen by researchers as a function of their assumptions and interests – connect systems of different orders: linguistic, cognitive, social, and interactional systems. These intermediate variables connect facets of human interaction, also defined by researchers as a function of their assumptions and interests. The MULTi-GRAIN model allows for the study of individual and collective emergence as well as perpetual dynamics within a system of systems of different orders.

Future work will focus on extending the reach of the MULTi-GRAIN model both by applying it to other datasets on knowledge co-elaboration in order to deepen understanding and to other types of human interaction in order to extend the model's application. In both cases, it is possible to pull apart causality by differentiating component parts, identifying component operations and linking the operations with the parts. In contexts where development is studied, the MULTi-GRAIN model can pinpoint emergence of aspects of human interaction within a system of perpetual dynamics.

Acknowledgements

The author is grateful to the ASLAN project (ANR-10-LABX-0081) of the Université de Lyon, for its financial support within the French program "Investments for the Future" operated by the National Research Agency (ANR).

References

Bader, Martin K.-F. & Sebastian Leuzinger. 2019. Hydraulic coupling of a leafless kauri tree remnant to conspecific hosts. *iScience* 19. 1238–1247. DOI: 10.1016/j.isci.2019.05.009.

Bechtel, William & Adele Abrahamsen. 2005. Explanation: A mechanistic alternative. *Studies in History and Philosophy of Science Part C: Studies in History and Philosophy of Biological and Biomedical Sciences* 36(2). 421–441. DOI: 10.1016/j.shpsc.2005.03.010.

Bechtel, William & Robert C. Richardson. 2010. *Discovering complexity, decomposition and localization as strategies in scientific research*. Cambridge, MA: The MIT Press.

Beckner, Clay, Nick C. Ellis, Richard Blythe, John Holland, Joan Bybee, Jinyun Ke, Morten H. Christiansen, Diane Larsen-Freeman, William Croft & Tom Schoenemann. 2009. Language is a complex adaptive system: Position paper. *Language Learning* 59(1). 1–26. DOI: 10.1111/j.1467-9922.2009.00533.x.

Bourdieu, Pierre. 1979. *La distinction: Critique sociale du jugement*. Paris: Éditions de Minuit.

Coleman, James S. 1964. *Introduction to mathematical sociology*. New York: The Free Press of Glencoe. DOI: 10.1093/sf/44.2.252.

Eberle, Julia, Karsten Stegmann, Alain Barrat, Frank Fischer & Kristine Lund. 2021. Initiating scientific collaborations across career levels and disciplines: A network analysis on behavioral data. *International Journal of Computer-Supported Collaborative Learning* 16(2). 151–184. DOI: 10.1007/s11412-021-09345-7.

Eberle, Julia, Kersten Stegmann, Kristine Lund, Alain Barrat, Michael Sailer & Frank Fischer. 2013. Fostering learning and collaboration in a scientific community: Evidence from an experiment using RFID devices to measure collaborative processes. In Nikol Rummel, Manu Kapur, Mitchell J. Nathan & Sadhana Puntambekar (eds.), *Proceedings of the 10th International Conference on Computer Supported Collaborative Learning (CSCL '13)*, vol. 1, 169–175. Madison, WI: International Society of the Learning Sciences.

Gershenson, Carlos & Francis Heylighen. 2005. How can we think the complex? In Kurt Richardson (ed.), *Managing the complex: Philosophy, theory and application*, vol. 1, 47–62. Greenwich, CT: Information Age Publishing.

Goffman, Erving. 1967. *Interaction ritual: Essays on face-to-face behavior*. New York: Doubleday.

Grinevald, Colette. 2001. Linguistics of classifiers. In Neil J. Smelser & Paul B. Baltes (eds.), *Encyclopedia of the social and behavioral sciences*, 1973–1978. Amsterdam: Elsevier.

Grize, Jean-Blaise. 1996. *Logique naturelle et communication*. Paris: Presses Universitaires de France.

Halliday, Michael A. K. 1978. *Language as a social semiotic: The social interpretation of language and meaning*. London: Edward Arnold.

Hymes, Dell. 1967. Why linguistics needs the sociologist. *Social Research* 34(4). 632–647.

Klein, Julie T. 1990. *Interdisciplinarity: History, theory, and practice*. Detroit, MI: Wayne State University.

Lahire, Bernard. 2012. *Monde pluriel: Penser l'unité des sciences sociales*. Paris: Seuil.

Longino, Helen. 2013. *Studying human behavior: How scientists investigate aggression and sexuality*. Chicago: University of Chicago Press.

Lund, Kristine. 2016. *Modeling the individual within the group: An interdisciplinary approach to collaborative knowledge construction*. Habilitation à Diriger des Recherches en Education. Grenoble: Université Grenoble Alpes.

Lund, Kristine. 2019. Building and regulating cognitive, linguistic, and interactional aspects of knowledge between the individual and the group. *Computers in Human Behavior* 100. DOI: 10.1016/j.chb.2019.04.013.

Lund, Kristine & Karine Bécu-Robinault. 2013. Conceptual change and sustainable coherency of concepts across modes of interaction. In Daniel D. Suthers, Kristine Lund, Carolyn Penstein Rosé, Chris Teplovs & Nancy Law (eds.), *Productive multivocality in the analysis of group interactions*, 311–330. New York: Springer.

Mazur-Palandre, Audrey, Jean-Marc Colleta & Kristine Lund. 2014. Context sensitive 'how' explanation in children's multimodal behavior. *Journal of Multimodal Communication Studies* 2. 1–17.

Mazur-Palandre, Audrey, Kristine Lund, Gerald P. Niccolai, Nathalie Blanc & François Pellegrino. 2019. *L'innovation sociale dans l'écosystème d'un laboratoire d'excellence en sciences humaines et sociales: L'exemple du labex ASLAN*. Lyon: ASLAN.

Mondada, Lorenza. 2016. Challenges of multimodality: Language and the body in social interaction. *Journal of Sociolinguistics* 20(3). 336–366. DOI: 10.1111/josl.1_12177.

Noriega, Pablo, Julian Padget, Harko Verhagen & Mark d'Inverno. 2015. Towards a framework for socio-cognitive technical systems. In Aditya Ghose, Nir Oren, Pankaj Telang & John Thangarajah (eds.), *Coordination, organizations, institu-*

tions, and norms in agent systems X (COIN 2014) (Lecture Notes in Computer Science 9372), 164–181. Cham: Springer. DOI: 10.1007/978-3-319-25420-3_11.

Oviatt, Sharon. L. 2007. Multimodal interfaces. In Julie A. Jacko & Andrew Sears (eds.), *The human-computer interaction handbook*, 20. New Jersey: Lawrence Erlbaum. DOI: 10.1201/9781410615862.

Paltridge, Brian. 2012. *Discourse analysis: An introduction.* 2nd edn. London: Bloomsbury academic.

Panksepp, Jaak, Nakia Gordon & Jeffrey Burgdorf. 2002. Empathy and the action-perception resonances of basic socio-emotional systems of the brain. *Behavioral and Brain Sciences* 25(1). 43–44. DOI: 10.1017/S0140525X0247001X.

Parsons, Talcott. 1951. *The social system.* Routledge & Kegan Paul.

Polo, Claire, Kristine Lund, Christian Plantin & Gerald P. Niccolai. 2016. Group emotions: The social and cognitive functions of emotions in argumentation. *International Journal of Computer Supported Collaborative Learning* 11. 123–156. DOI: 10.1007/s11412-016-9232-8.

Shadish, William, Thomas D. Cook & Donald T. Campbell. 2002. *Experimental and quasi-experimental designs for generalized causal inference.* Boston & New York: Houghton Mifflin Company.

Sharma, Rajeev, Vladimir I. Pavlovic & Thomas S. Huang. 1998. Toward multimodal human-computer interface. *Proceedings of the IEEE* 86(5). 853–860. DOI: 10.1109/5.664275.

Singer, J. David. 1968. Man and world politics: The psycho-cultural interface. *Journal of Social Issues* 3(24). 127–156. DOI: 10.1111/j.1540-4560.1968.tb02310.x.

Vissers, Chris A., Luís Ferreira Pires, Dick A. C. Quartel & Martin van Sinderen. 2016. *Architectural design, conception and specification of interactive systems.* Switzerland: Springer. DOI: 10.1007/978-3-319-43298-4.

Wegerif, Rupert & Neil Mercer. 1997. A dialogical framework for investigating talk. In Rupert Wegerif & Peter Scrimshaw (eds.), *Computers and talk in the primary classroom*, 49–65. Clevedon: Multilingual Matters.

Woods, David D. 1985. Cognitive technologies: The design of joint human-machine cognitive systems. *AI Magazine* 6(4). 86–92. DOI: 10.1609/aimag.v6i4.511.

Part II

Complexity pragmatics and discourse

Chapter 5

Introduction to complexity, pragmatics and discourse

Pierluigi Basso Fossali[a,b,c,d]

[a]UMR 5161 ICAR [b]Centre National de la Recherche Scientifique [c]Ecole Normale Supérieure [d]Université Lumière Lyon 2

This second part of the book is introduced by the notion of cultural semiospheres and how they lead to a system of double binds that inscribe paradoxes in the society in which culture is expressed. In the linguistic field, paradoxes are illustrated in paradigmatic, syntagmatic, and semantic terms. All identified forms of complexity occur in discourse practices, for example: structural, mereological, stochastic, and complexity in terms of scale (prospective or even political). Complexity is a mapping of the lines of resistance and of the reception boundaries of a cultural community coupled with its semiosphere. Aligning with this characterisation of discourse, the authors of this part propose a pragma-enunciative theory of points of view with a simplex approach, rhythmic synchronisation of enunciation as a complex system, dialogism for daily interaction, and a complex system as modalities within a written interaction.

The Russian semiotician Yuri Lotman was one of the first to integrate a systems theory into language sciences (Lotman & Clark 2005: 215). He considered each cultural *semiosphere* as a dialectics between differentiation and integration; "each of its parts creates its own whole, isolated in its structural independence. Its connections with other parts are complex and are characterised by a high level of deautomatisation".

Indeed, the problem on which complexity theory focuses is the non-trivial behaviour of systems (deautomatisation). On the one hand, a culture commits to promoting devices; on the other hand, it must continue to ensure forms of emancipation from them. This double commitment can be claimed because in most cases discursive practices are communications that seek to mediate contradictory constraints arising from "totalities" which are certainly independent

Pierluigi Basso Fossali. 2022. Introduction to complexity, pragmatics and discourse. In Kristine Lund, Pierluigi Basso Fossali, Audrey Mazur & Magali Ollagnier-Beldame (eds.), *Language is a complex adaptive system: Explorations and evidence*, 51–58. Berlin: Language Science Press. DOI: 10.5281/zenodo.6620113

but nevertheless connected by recursive inter-observation. In fact, these totalities are institutions of meaning that observe each other while they observe the others' operations, which brings out the interpenetration of their fields of action, despite the attempt to define distinct meaning jurisdictions. Thus, culture reveals to be a system of double binds that inscribe paradoxes in the society in which it is expressed. In the linguistic field, this has repercussions, on the double requirement of guaranteeing *varieties* and *redundancies* in paradigmatic terms (Atlan 1972), on the constant compromise between *agreement* and *discontinuity* in syntagmatic terms (cf. Harris 1945, Missire 2010), and on the tension between *implication* and *concession* in semantic terms (Zilberberg 2012).

On the other hand, the inter-observation of totalities, the overlapping of meaning jurisdictions, and conflictual or alternative norms are general issues which have specific repercussions on discourse practices, even if the latter seek to reduce this overabundant complexity. Knowing how to dose complexity constitutes the abstract prototype of virtues, which are normally acquired through training. Indeed, manageable complexity only reflects a reasonable compartmentalisation of the major complexity of the reference environment. A proportion is sought between complexity within the system and environmental complexity, but eventually complexity managed through acquired ease becomes transparent while complexity that is unrelated to the adopted linguistic techniques manifests itself as a negative scope of our hope to find later order. Thus, interactional complexity has the means to develop a double reduction of *both* the prophecy of order in the system (omnipotent unilateralism) *and* the disproportionate nature of the environment's random complexity (force exerted by local contingencies). In this modal frame, which is built by the reciprocal delimitation of ambitions and prostrations, interaction frees the meaning from such neuroses in order to restore an open significance within linguistic games that allow us to assume or claim the values negotiated during the communicative exchange. Deautomatisation, in relation to laws and environmental dependencies, builds an inter-world *of* exchanges (self-referential/hetero-referential communications) and *for* exchanges (import/export).

Semiotic mediations should simultaneously ensure metastable balances, which are internal to the systems, and imbalances that are profitable when passing through the environment. But this double performance can only be ensured through the reproduction of the same dualistic logic, where languages must appear both as systems and as an environment. It can be hypothesised that this double performance is only achieved through the shift from uniqueness to plurality and from self-reference to interpenetration; in short, linguistic culture would be a kind of internal dialectics between singular languages and semiospheres. The

heterogeneity of languages would then correspond to the maximal tension of culture in its mimesis of the environment's phenomenal complexity; this mimesis is reductionist and multi-criterial but it is at least regulatively shareable (all linguistic items are anthropic, all discursive items are potential communication, even in the case of the unavailability of translation manuals).

This mimesis, which enables the modelling of the phenomenality of environmental complexity, is the paradoxical result of anti-economy in languages (Babel as the mapping of *alternities of being* – to use George Steiner's expression). This symbolic expenditure (multiplication of linguistic mediations) allows discursive "postures" (self-descriptions) to be at the same time an enunciative stability (point of view) and a mimesis of overexposure to the environment (improbability of inter-subjective interpretation). Every semiotic mimesis of complexity is characterised by this in-between feature, which leaves speakers in the double, albeit contradictory, requirement to take some distance (to engage in discourse through avatars, which allows, for example, for irony) and to make themselves available to become the responsible and sensitive embodiment of meaning management (for example, laughing after the ironic assertion so as to reintroduce the proper body).

Discourse practices involve different levels of language organisation, in a proportion that is adapted to the regime of interaction. This is not limited to a simple use of expressive resources: on the one hand, *language* also constitutes a reference environment for the singular organisation of discourse that is locally established; on the other hand, it can recognise other semiotic systems (syncretisms) and other sources of values (perception, memory, institution, etc.). The interpenetration of the systemic horizons of reference, the change in the statutes of the organisations used and the impossibility of crystallising hierarchies and embedding, can already be seen as convincing clues of the complexity of discursive practices. If the anticipation of an enunciative production is sufficiently questionable, despite the norms and routines that characterise discursive praxis, predictions about its interpretation and its perlocutionary effects are all the more unlikely.

In short, in spontaneous and largely improvised interactions, two instances confront each other, which connect various reference spaces/times, appeal to different language games, and add to socialised scores (interaction frameworks) random complements or totally unpredictable detours from norms. All the forms of complexity identified are attested in discourse practices: deterministic (structural) complexity, which starts from a junction of rules and ends up reaching discontinuity points; aggregation (mereological) complexity, through the plurality of enunciative instances that are formed and dissolved; random (stochastic)

complexity, for the qualitative divergence between the organisations used and the unpredictable emergence of forms without a strategic paternity; complexity in terms of (prospective, or even political) scale, because discourses are always disproportionate to their ambitions and negotiate a purpose that is finally acceptable, even favourable. These four dimensions, although not exhaustive, illustrate that complexity is a mapping of the lines of resistance and of the reception boundaries of a cultural community coupled with its semiosphere.

It is no surprise that complexity theory is associated with the ecological paradigm of culture (cf. Bondì 2022 [this volume]); indeed, ecology is rooted in a rather basic aspect of experience: perception, enunciation and interpretation can only select a limited number of values (economy) in relation to the density of the (respectively) sensitive environment, the historical-social frame and the textual space. However, the intended meaning must also meet all the demands of the space in which it is included (dependency extends the grasping of values). Ecology shows a kind of double constraint on meaning: choosing to make a difference and accepting to be overwhelmed by the complexity of the environment, which is how the coupling between subjects and their ecosystem is qualified.

Speakers are also confronted with another environment: their proprioception and psychology. Language sciences have increasingly reintroduced the notion of body among the fundamental instances involved in the constitution of linguistic forms, the exercise of semiosis, and more generally in discourse practices. The problem is the same: directing meaning, imposing an ecological behaviour knowing that other competing inner "voices" will be listened to.

Taking complexity into account may however be a risk as it can lead to presenting an unmanageable framework for theoretical practices, which have difficulty dealing with indeterminate aspects and cannot be satisfied with solutions whose relative effectiveness remains unclear. This is why the enumeration of interconnections, recursive phenomena and gaps in meaning must be counterbalanced by a strategy enabling theoreticians to *simplexly account for complex* facts (cf. Rabatel 2022 [this volume]). This strategy, suggested by Alain Berthoz's research, seems to be well suited to language sciences as soon as the field accepts the need to position itself at the level of discursive practices themselves. Linguistic mediations, like the enunciative building of points of view, are an example of the management of self-ascribed or attributed modalities, which determine an inter-subjective and simplex frame of reference that goes beyond the clouds of cognitive and affective clues as well as the impenetrability of psychological states.

Modalities emerge both as an epicentre of complexity requiring here to to be managed discursively, and as an exemplary field for the observation of simplex mediations. On the one hand, modalities open up possible worlds; on the other

hand, they find verbal or iconic manifestations that paradoxically become clearer and more stable thanks to their dialogical dimension (cf. Halté 2022 [this volume]) and to the modalities that are already operational in a given institutional space for the interacting parties.

The complexity of exchanges emerges as non-linearity in the process of interlocution, where turns of speech constantly redesign the treatment of values and modal implications in concentrated or diffuse formats, in individualising or collectivising regimes, in retrospective or anticipatory postures (Nowakowska & Constantin de Chanay 2022 [this volume]). This non-linearity leads to a kind of "dissociative complementarity" of contributions to the conversational texture, in which one can distinguish different critical positions on the common and strategic background of an interlocutory dialogue; on the other hand, non-linearity brings out, through the encounter between several contingencies, true forms of exchange, with a complex organisation in terms of the distribution and interdependence of roles, the rate of turns of speech, and the management of conversational pressures and thematic focus. The bonding of expectations (anticipations) and the rhythmic pattern of dissociative movements (choices) must lead to the emergence of a reliable treatment of indeterminacy: (i) an institutionalised organisation, (ii) trust based on a relational history, (iii) a belief that is freed from contingencies, (iv) a plastic and extemporaneous harmonisation.

Non-linearity is strongly related to the circularity of double contingency (Luhmann 1984: §3), because the treatment of indeterminacy, which has provided a stable regime to a discursive practice, becomes the element that must be confirmed in a more effective and conclusive version, which can only make it subject to risks of failure (e.g., can an initial belief become loyalty or a concessive harmonisation become a sustainable agreement?).

Complexity shows us which road was taken by societies that do not accept to be confined in coded systems, therefore meaning cannot be equivalent to law. On the contrary, the latter is a necessary organising principle in order to deal with the desire to leave the doors open to contingency: a contingency given by the presence of otherness, of the foreigner, by some possibilities that are not yet mapped by the systems used by the actors involved in the encounter. Possibility must move from system (virtuality) to environment, where contingency factors can bring out other sensible reasons for developing values and destinies.

Although a very wide range of language games are known in advance, the field of language practice is in constant building because comprehension cannot be reduced to the categorisation and subsumption of occurrences (*tokens)* within standardised classes (*types*). This is why an epistemology of language sciences can give importance to the notion of narrativity (Bondì 2022 [this volume]), which is ultimately the framework, full of explanatory heterogeneities and gaps

in meaning, of a series of *impossible successful communications*. Forms of life are determined through local acquired skills and unpredictable encounters, and semiotic mediations are used to weave the experience of contingency, which explains the dynamisation of meaning. In this regard, each account or reformulation, with the recursive introduction of implicit or explicit enunciators and phrasal embedding (Nowakowska & Constantin de Chanay 2022 [this volume]), is a search for new distinctive determinations or productive improbabilities. Despite their baroque cycles, complex things can confine meaning to tautology; on the other hand, complexity even redetermines the reasons for restraining indeterminacy throughout the organisation.

Ratifying a conversation after someone's opening gesture is a way to both speaker and listener chances to reconsider identities, positions, ambitions, and vulnerabilities. At the same time, dialogue with a stranger is feared because it is well known that the productivity of the conversation is not predictable (what connection? what implication? what conclusion?) and that the motivations for conversational incursion may not be proportional to their effects.

Empathy, mediated through the discursive interweaving of points of view (Rabatel 2022 [this volume]), is an enunciative tension faced with an improbable grasp (penetrating the perception, thought, experience of others); but at the same time, it is the perfect example of a retroaction circuit that tests how each projection of affective and cognitive simulacrum influences itself: the conditions of my empathetic disposition are redesigned by the others' sensitivity to my sensitisation, by affecting it later or cooling it.

Fundamentally, the symbolic intervenes both as a treatment of this circular causality (on the reflexive level) and as a treatment of causes that cannot be isolated in a context composed of a series of other innumerable causes, and which are sometimes of an indeterminate and random nature (on the transitive level). But it is clear that the result of symbolic remediation only corresponds to the dramatisation of a responsible complexity (subjective system) and of a stochastic complexity (environment); this is why analogy, iconic transpositions, and games of forms can be used as an attempt to reduce the distance between these two types of complexity in order to consider the *re-entry* of one over the other. Paraphrasing Prigogine's lesson, Lucien Sève described this performance as that of a complexity theory applying its stakes to itself: "On the one hand, [...] there is *no chance without law*: contingency is permeated with necessity to its core. On the other hand, there is *no law without chance*: necessity only manifests itself within contingency" (Sève 2005: 186, personal translation).

Acknowledgements

The author is grateful to the ASLAN project (ANR-10-LABX-0081) of the Université de Lyon, for its financial support within the French program "Investments for the Future" operated by the National Research Agency (ANR).

References

Atlan, Henri. 1972. Du bruit comme principe d'auto-organisation. *Communications* 18. 21–36.

Bondì, Antonino. 2022. The morphogenesis of language action: Complexity and rhythmic synchronisation of enunciation. In Kristine Lund, Pierluigi Basso Fossali, Audrey Mazur & Magali Ollagnier-Beldame (eds.), *Language is a complex adaptive system: Explorations and evidence*, 71–79. Berlin: Language Science Press. DOI: 10.5281/zenodo.6620117.

Halté, Pierre. 2022. Modalities in written chat interactions: A complex system. In Kristine Lund, Pierluigi Basso Fossali, Audrey Mazur & Magali Ollagnier-Beldame (eds.), *Language is a complex adaptive system: Explorations and evidence*, 95–106. Berlin: Language Science Press. DOI: 10.5281/zenodo.6620121.

Harris, Zellig. 1945. Discontinuous morphemes. *Language* 21(3). 121–127.

Lotman, Yuri M. & Wilma Clark. 2005. On the semiosphere. *Sign Systems Studies* 33(1). 205–229. DOI: 10.12697/SSS.2005.33.1.09.

Luhmann, Niklas. 1984. *Soziale Systeme: Grundriss einer allgemeinen Theorie*. Frankfurt am Main: Suhrkamp.

Missire, Régis. 2010. Unités linguistiques à signifiant discontinu, du morphème au texte. Une approche néo-saussurienne. In Jean-Paul Bronckart, Ecaterina Bulea & Cristian Bota (eds.), *Le projet de Ferdinand de Saussure*, 289–312. Genève: Droz.

Nowakowska, Aleksandra & Hughes Constantin de Chanay. 2022. Dialogism for daily interaction. In Kristine Lund, Pierluigi Basso Fossali, Audrey Mazur & Magali Ollagnier-Beldame (eds.), *Language is a complex adaptive system: Explorations and evidence*, 81–93. Berlin: Language Science Press. DOI: 10.5281/zenodo.6620119.

Rabatel, Alain. 2022. Proposal for a simplex account of discourse complexity using the pragma-enunciative theory of points of view. In Kristine Lund, Pierluigi Basso Fossali, Audrey Mazur & Magali Ollagnier-Beldame (eds.), *Language is a complex adaptive system: Explorations and evidence*, 59–70. Berlin: Language Science Press. DOI: 10.5281/zenodo.6620115.

Sève, Lucien. 2005. *Emergence, complexité et dialectique: Sur les systèmes dynamiques non linéaires*. Paris: Odile Jacob.
Zilberberg, Claude. 2012. *La structure tensive*. Liège: Presses Universitaires de Liège.

Chapter 6

Proposal for a simplex account of discourse complexity using the pragma-enunciative theory of points of view

Alain Rabatel[a,b,c,d,e]

[a]UMR 5161 ICAR [b]Centre National de la Recherche Scientifique [c]Ecole Normale Supérieure [d]Université Lumière Lyon 2 [e]Université Claud Bernard Lyon 1

This chapter argues for an alternative to the difficulties that arise when studying interacting subsystems in isolation while using a complex systems approach. Conceiving complexity in terms of simplexity allows one to account for complexity through procedures which are integrated and economic because they are based on principles that simplify yet also account for the past and anticipate the future. Empathic complexity is analysed through points of view (POV) and used to illustrate a simplex account of what is complex. Four examples, from both literary contexts and recorded talk, are analysed to show the different POVs possible (speaker/enunciator, secondary speakers/enunciators, secondary non-speaker/enunciators), whether these POVs are explicitly or implicitly expressed, and whether they are with or without opinion or judgement. Such an analysis reveals the strategies that may lurk behind seemingly objective statements while forming the basis of a simplex account of relations between the primary speaker and others and between his or her POV and those of others, all within an empathetic, polyphonic and dialogical framework.

Most of the work on complexity highlights the fact that multiple level interactions between subsystems make it impossible to study one of these subsystems independently of other interaction and determination mechanisms, without taking into account self-organisation, non-linearity, regulation by feedback, and proaction aimed at accomplishing a particular task. Those studies generally consider

Alain Rabatel. 2022. Proposal for a simplex account of discourse complexity using the pragma-enunciative theory of points of view. In Kristine Lund, Pierluigi Basso Fossali, Audrey Mazur & Magali Ollagnier-Beldame (eds.), *Language is a complex adaptive system: Explorations and evidence*, 59–70. Berlin: Language Science Press. DOI: 10.5281/zenodo.6620115

that, if a particular function is not performed by a particular biological organ or through a particular display (concerning *language* – with words of a particular word class, according to the rules of the language in question and this is probably even more true at the level of discourse), then the function can be performed by others, in virtue of a principle of vicariance (Berthoz 2013).

But this research program faces difficulties in capturing the multiple determinations that come into play in a system, and, above all, in articulating them. This is a challenge for holistic approaches and perhaps even more so for emerging theories:[1] where should the search for determinations stop, between accidental and constitutive ones? There are many other difficulties, as Berthoz (2009: 8) points out ironically, as in our societies, "we are overwhelmed by complexity".

Therefore I propose the complementary (and perhaps alternative) hypothesis of conceiving complexity... in terms of simplexity, in order to set the objective of accounting for complexity through procedures, which are not *simple* but *simplex*, because they are integrated and economic. We will therefore agree that simplexity is not synonymous with simplicity, just like complexity is not synonymous with complicated. Berthoz (2009) stresses that "despite the complexity of natural processes, the brain must find solutions, and these solutions are based on simplifying principles. They allow for a quick, elegant and efficient processing of complex situations, taking into account past experience and anticipating the future. In intersubjectivity, they facilitate the understanding of other people's intentions. They maintain or favour 'meaning'. They are neither caricatures, nor shortcuts, nor summaries. They can involve detours, an apparent complexity, but they pose problems in an original way." (2009: 7; personal translation)

1 Looking through a simplexity prism from the point of view of enunciation in order to manage empathic complexity

This research program proposes to explore this hypothesis with an approach based on empathy, through the study of points of view (POV), and, on this basis, to show that the translinguistic issue of POV corresponds to a simplex approach to complexity, by proposing a global approach to a semantic issue that can be broken into several modules. To this end, my approach to empathy integrates primary somesthesic data into secondary empathy at the hinge of the sensory, sensitive, cognitive, and projective areas. This choice corresponds to

[1]Due to space constraints, I refer to the references given in the introduction.

the fact that empathy is not reduced to mirror neurons, or to proprioceptive phenomena, I am rather interested in more elaborate simulation movements, such as those mentioned below by Jouvent, which establish a continuum between the (micro) "events" to which we are exposed and the intentional, reflexive mechanisms, reflecting (on) the past and projecting towards the future:

- "When an animal is cold, it can only curl up, bristle its fur and seek shelter. We humans, in the same circumstances, have a multitude of alternatives.
- Because I am physically feeling cold, I can say that I am cold, and find some relief, or even comfort, in saying that, or I can say that I like this cold which stimulates me. I can decide, even under the cold, that what I feel is called "hot", or "warm". I can make fun of my sensitiveness to the cold, or conversely be proud of my resistance.
- To the first feeling of cold, I can associate memories:
  - pleasant: it reminds me of winter at my grandparents' house during the Christmas holidays;
  - or on the contrary traumatic: "It was on a day like this that my father had his accident".
- I can anticipate by saying that, as soon as I finish my trip, I will drink a large bowl of hot chocolate. I can add that next time I will cover up more warmly.
- This psychic dressing of reality can be turned into a game for two. If my friend is by my side, I can tell him: "It's not warm today", "You look frozen", or "I don't feel the cold" with a smile. I can put myself in his shoes: "I imagine, you who don't like the cold, what you can feel". I can say, in a serious way: "I'm too hot".
- In this game with the physical reality of the world, I do not only have language and mental images: I can connote all these maxims with a gesture, mimic that I shiver, whether or not I match my words with my gestures, mimic the other person... I can make a movement, a pout, imitating a third party, or imagine that I am the other person making this movement, this pout. I can play a character, imitate his peculiarities, I can play a multitude of roles." (Jouvent 2009: 12–13, personal translation)

Having insisted on the linguistic continuum between perception, thought and action, through the problem of (pre-)reflexivity (Rabatel 2008b: 417–420, 440–449, 464–469), I find it very interesting to observe that psychologists make a similar observation, even if they express it without insisting on the role of language in this process, which is obvious, in the examples mentioned by Jouvent. However, relating these psychological mechanisms to language does not imply that the linguist adopts de facto a subjectivist position that would make language a transparent means of expression serving a will to say that is external and prior to it. For the linguist such as myself, intentionality is essentially analysed based on the organisation of discourse, even if he/she cannot rule out the idea of articulating what is said with the will to say or with many other co-textual or contextual elements essential to the production and understanding of meaning (Rabatel 2014: 211–213).

Since my goal is not to discuss the notion of empathy from a psychological or philosophical point of view, but to carry out a linguistic analysis of the phenomenon, I propose an explicit reformulation of the common language definition of empathy ("putting oneself in the place of others") that is exploitable for the (enunciativist) linguist, based on my conception of points of view (POV). If we try to define the cognitive-linguistic components of this decentralisation, we will say that empathy, from the perspective of linguistics that I defend, consists in putting oneself in the place of others, in considering from their point of view what they *perceive* (from the place where they are), *feel*, *think*, *say*, *do*.... We hereby consider that points of view first correspond to a given spatio-temporal location, then to a much more abstract one, consisting in considering things according to a given notional framework, with given values and concerns, without necessarily making explicit judgments.

- This very general conception of empathy is constantly at the intersection with my theory of POV, because it immediately provides linguistic concepts to account for how a speaker is able, in discourse, to imagine, in a global and articulated way, what another person can "do[2]", that is to say:
  - *perceive*: hence the linguistic study of the various forms of perception (to see, hear, feel, touch...), of their relationships;
  - *feeling*: hence the linguistic analysis of affects, emotions, feelings;
  - *think, say*: hence the articulated study of the expression of thoughts, words, their relationships, especially internal wording, the various

[2]I intentionally use this term to mean that doing is not limited to the action-oriented module; it is rather the horizon of the other modules.

forms of represented hybrid discourses that cannot be reduced to reported discourses;

- *to do*: hence the linguistic expression of action, its values, its motivations, and therefore its intentionality.

- The tools[3] used are largely of an enunciative nature, since POV are a projective phenomenon; the speaker imagines situations with the eyes, sensitivity, values, knowledge, and needs of others. Points of view are instantiated in predications, which enable to hear the POV of an enunciator (the one which is in syncretism with the speaker, or another speaker) on the subject denoted by the discourse, by the choice of words, and their order, regardless of the explicit presence of a judgment (Rabatel 2009, 2016). In other words, a POV occurs when the referenciation[4] denotes the discourse object(s) while providing information about the enunciator's point of view on the same object(s).

  - First, the tools are based on the locutor/enunciator distinction.[5] Indeed, the attentive reader can ask: but who does this "other person" correspond to, from a linguistic point of view, in the above statement, "the way in which a speaker is able to imagine what this other person can"? In terms of linguistic instances, this *other person* may be a secondary *speaker or locutor* in a hetero-dialogical context[6], but only if he speaks. On the other hand, if the aim is to account for the enunciator's POV through his/her perceptions, feelings, thoughts, or actions, it can only concern a non-speaking source, in sentences without words, as Veken (1995) says: a *secondary enunciator*, corresponding to intratextual actors, at the origin of POV (Ducrot 1984).

[3]These tools are linguistic *observables*, composed of discourse markers or non-grammaticalised markers, the re-occurrence and the co-occurrence of which contribute to sense making.

[4]Danon-Boileau (1982: 34) refers to the linguistic construction of referents. The link between referencing and enunciation is consubstantial, because the choice of words and of their order gives information about the PDV of the enunciator concerning the object-of-speech.

[5]The locutor is at the origin of utterances, their pronouncing/writing; the enunciator is at the origin of the POV. These two parts often go hand in hand, but not always (Rabatel 2009). Many secondary enunciators can be involved in L1/E1's discourse, and can refer to anonymous, indefinite (doxal or not) or clearly identified sources. The enunciator, at the origin of the POV, has therefore nothing to do with the notion of enunciator at the origin of the production of an utterance, which is a parasynonym of the notion of speaker.

[6]I will come back to the auto-dialogical context, when the speaker plays with his own POV, in the conclusion.

– Secondly, the preferred tool concerns everything that enables to account for the subjectivity of the POV, in particular the modal values, which are essential in the perspective of intentionality analysis. Subjectivity is understood as a subjective source on the one hand, and as a manifestation of subjectivity on the other. These explicit linguistic manifestations operate through diverse expressions of subjectivity, or *subjectivemes* (Kerbrat-Orecchioni 1980), which can be centred on the enunciator or on the object. However, even if they are centred on the object, they refer to the enunciator's POV on the object. The analysis of subjectivity must integrate the phenomena of enunciative self-effacement and objectification, because despite the absence of *subjectivemes*, subjectivity can be seen through communication strategies: thus, a speaker/enunciator may have an interest in expressing his/her POV in a generic manner that makes it less questionable.

2 Analysis

I illustrate this approach with hetero-dialogical examples, which I will use as a base to draw some conclusions regarding simplexity.

(1) (1 Samuel, 17, 42–43)
Le philistin regarda et, quand il aperçut David, il le méprisa : *c'était un gamin au teint clair et à la jolie figure.* "Suis-je un chien pour que tu viennes à moi armé de bâtons ?"

'The Philistine looked and, when he saw David, he despised him: *he was a light-skinned kid with a pretty face.* "**Am I a dog so that you will come to me armed with sticks?**"'.

In this excerpt[7] three forms of POV (see below) follow one another from the character's point of view, i.e. Goliath (= le Philistin) as it is indeed his contemptuous perspective that the narrator adopts, which cannot be shared by the first speaker/enunciator, in syncretism with the prophet Samuel who views David as the symbol of the rebirth of Jewish royalty[8]. At first, Goliath is only a secondary enunciator at the origin of a point of view, in verse 42, before becoming a secondary speaker/enunciator with the direct speech in verse 43. The represented

[7]The analysis provided here is based on the French version of the verses.

[8]The hypothesis is not only based on knowledge external to the extract, it is based on the fact that L1/E1 names David by his first name, while Goliath is only mentioned by the name of the people of whom he is the champion, thus demonstrating a distance *vs* proximity opposition.

POV, in italics, clearly emerges through its opposition to the embryonic PDV (underlined), with which it is in strong contrast, because of the opposition between the foreground, with the prototypical tense of the *passé simple*, and the *imparfait*, in the background. The part in italics, announced by the colon and the presentative *c'était*, expands the overall impression of contempt by detailing the characteristics that justify this judgment on David. This explanatory commentary, which has a secant aim, presents an internalised perception that combines apparently objective perceptual elements and judgments attached to these descriptions despite the absence of explicit judgment. The term *gamin* 'kid' pejoratively expresses Goliath's contempt for an opponent who is so far from his expectations. As an aggravating circumstance, he is *un gamin au teint clair et à la jolie figure* 'a light-skinned kid with a pretty face': these stereotypical qualifiers, ameliorative when they describe women, see their polarity reversed if they describe a man.

The asserted POV, in bold, corresponds to direct speech, which expresses an explicit opinion, referred to a source of speech (a secondary speaker). This POV verbalises in a rise of anger all of Goliath's indignation, offended because his opponent is not worthy of his rank. On that basis, we can consider, using backward chaining, that the indignation that explodes with strong reflexivity in the asserted POV is already announced in a minor way in the represented POV. This indignation is also implicit in the embryonic POV. Contrary to what Benveniste (1966: 240–241) may have said about its objective character, the first sentence of the excerpt, which is linked to the *passé simple* and to narratives in the third person, also contains traces of subjectivity, because it describes the Philistine's movements by associating them with thoughts and by bringing out their immediate, almost reflexive character: the *quand* 'when' could be replaced by (*aus*)*sitôt que,dès que* 'as soon as, as' in accordance with the original. This first sentence is already subjective because it renders an *immediate* reaction of contempt, which unfolds in the represented POV before being expressed with Direct Speech and then with the action.

Thus, the theory of POV enables to account, in a unitary approach, for the fact that the POV can correspond either to that of the speaker/enunciator (cases of conjunction of instances) or to those of secondary speakers/enunciators, or to those of secondary non-speaker enunciators (by a distinction of enunciative instances); and it also enables to account for POV which are explicitly or implicitly expressed, with or without opinions or judgments. The advantage is therefore to read, behind what might appear to be objective statements by the narrator, the strategies by which the primary speaker/enunciator can adopt the POV of

internal enunciators, and also the degrees of expression of their POV, depending on the form of the POV and the nature of the markers.

All things being equal, the same is true in (2): the superintendent commits to the elliptical link established between the decided (*franche* 'straightforward') handshake and the gaze, the blue eyes (= *franche comme son regard bleu glacier* 'as straightforward as his steel blue eyes'):

(2) (Quadruppani, *The Sudden Disappearance of the Worker Bees*, Gallimard, Folio Noir, [2011] 2013: 144)
La commissaire lui tendit la main. La personnalité, ici, c'est vous il me semble, dit-elle [elle = la commissaire Tavianello]. La poignée de l'homme était franche comme son regard bleu glacier.
'The superintendent held out her hand to him. "It seems to me that the personality here is you," she said [she = the superintendent Tavianello]. The man's handshake was as straightforward as his steel blue eyes.'

One could argue that this interpretation is forced, and that in reality, the text merely talks about the superintendent without adopting her POV, and therefore that the POV that connects straightforwardness, handshake and gaze belongs to L1/E1. The problem is that extract (2) is not complete, and that the rest of the text, quoted in (3), completely invalidates this hypothesis:

(3) (*Ibid.*) La commissaire lui tendit la main. La personnalité, ici, c'est vous il me semble, dit-elle [elle = la commissaire Tavianello]. La poignée de l'homme était franche comme son regard bleu glacier. (et ne critique pas cette phrase de roman sentimental, cher lecteur, car elle convient parfaitement à la douceur ingénue qui serra soudain la gorge de Simona [Simona = la commissaire Simona Tavianello]).
'The superintendent held out her hand to him. "It seems to me that the personality here is you," she said [she = the superintendent Tavianello]. The man's handshake was as straightforward as his steel blue eyes. (and do not criticise this sentence coming from a sentimental novel, dear reader, because it perfectly suits the ingenious sweetness that suddenly appeared as a lump in Simona's throat [Simona = the superintendent Simona Tavianello]).'

The meta-enunciative commentary in brackets shows that the narrator is playing with the beliefs of readers unfamiliar with the cunning of the POV, who believe that speakers are at the origin of all the POV that they express, especially

when these POV are not part of the reported discourse. This transparent and non-problem-oriented way of reading is usual for those who underestimate, or even ignore, the theories of enunciation, or only relate them to the speaker who initiated an enunciation act. I deliberately quote a non-literary example, in oral form, to show that the previous issue is not reduced to narrative literary writings.

(4) (Bernard Joly, author of *A history of alchemy*, France Culture, 11/09/2013)
Les mathématiciens, les physiciens, ils n'ont pas besoin de laboratoire, ils théorisent, ça leur suffit (pause), disent-ils
'Mathematicians, physicists, they do not need a laboratory, they theorise, it is enough for them (pause), so they say'

The extract is delivered by a researcher, in the context of a scientific programme, and the judgment, *ça leur suffit* 'it is enough for them', does not correspond to his judgment: it is the POV of mathematicians and physicists, as confirmed by the *verbum dicendi*, after the pause. But one must admit that we are not dealing with "classical" Direct Speech ("it is enough for us"), nor with equally "classical" Indirect Speech ("they say it is enough for them"). Nevertheless, this empathic reconstruction does correspond to a shift from the primary speaker towards the secondary enunciators' POV. The question as to whether or not the speaker agrees with this POV – which the extract does not allow to decide – can only be asked after the attribution of this POV to the secondary enunciators.

3 Conclusion

These four examples all illustrate the interest of the locutor/enunciator distinction; they also illustrate to varying degrees the fact that the sensorial is associated with what is sensitive, to affects, thoughts, possibly language and action, without it being necessary to summon them all in all situations, by virtue of a principle of reality that is primarily scriptural, and which results from the stakes and needs of enunciators in this kind of situation, and with this kind of co-text. Finally, they also illustrate the fact that this referenciation, carried out by the primary speaker, is able to verbalise, and even show, multimodal attitudes and interactions, which contributes to an additional level of complexity, that of represented and shown complexity in discourse (Rabatel 2013).

In reality, *if one agrees that there is a continuum between pre-reflective and reflective, between sensory and sensitive, between intelligibility (what can be imagined, consented, said) and praxis, this amounts to thinking in terms of complexity.*

Accounting for this continuum using the theory of POV is a way of giving a simplex account of what is complex: indeed, based on the speaker/enunciator distinction, one can simplexly account for a set of complex facts which are articulated within the framework of a unitary approach. In other words, my POV approach positions the locutor and enunciator in relation to complex and heterogeneous data, that is sensorial, emotion-based, reasoned, and praxeological, resulting in a method that is unitary and economical:

- The fact that a primary locutor/enunciator can change his or her enunciative position, change place, temporality, theoretical framework, or value system to comprehend objects of the world, through their discursive construction and thus the referentiation operations, on behalf of others, whether they speak or not, formulate opinions or judgments or not.
- The fact that the inferential analysis of referentiation enables the discrimination of the source of the POV and the nature of the relationships, the path between the various modules (perceptual, sensitive, etc.) and, ultimately, the nature of the intentional link within them.
- The fact that this same referentiation, which combines truth value, modal values and direct or indirect language acts, refers to two levels of modality and modalisation[9], the first one being concerned with the primary locutor/enunciator, the second one with the secondary locutor/enunciators or the secondary non-speaker enunciators – this second level is largely underestimated, but partially taken into account by Gosselin (2010).
- The fact that, in parallel with this phenomenon of modal diffraction, one must consider an equal phenomenon of commitment and quasi-commitment for secondary enunciators' POV, for which one presupposes that it took place before the scene of the text (Rabatel 2009).

It has yet to be shown that empathic dialectics works on the relationships between otherness and identity, without reducing otherness to the hetero-dialogical persons *that are not* oneself, but by opening up to other auto-dialogical aspects *of* oneself (Rabatel 2016), which would imply the study of utterances in the first person. At the same time, simplexity would open up a new field, that of relations between the primary/speaker and others, between his/her POV and those of others, in a polyphonic and dialogical framework (Rabatel 2008a: 361–380).

[9]It follows that modality is not reduced to the modus, it also crosses the dictum, as clearly shown by Ducrot 1993.

But it seemed strategic to start by highlighting utterances in the third person, which may seem objective in terms of denotation and subjective in accordance with the disjunction of the modal values they express and enable to infer.

Acknowledgements

The author is grateful to the ASLAN project (ANR-10-LABX-0081) of the Université de Lyon, for its financial support within the French program "Investments for the Future" operated by the National Research Agency (ANR).

References

Benveniste, Émile. 1966. *Problème de linguistique générale*. Vol. 1. Paris: Gallimard.

Berthoz, Alain. 2009. *La simplexité*. Paris: Odile Jacob.

Berthoz, Alain. 2013. *La vicariance: Le cerveau créateur de mondes*. Paris: Odile Jacob.

Danon-Boileau, Laurent. 1982. *Produire le fictif*. Paris: Méridiens-Klincksieck.

Ducrot, Oswald. 1984. *Le dire et le dit*. Paris: Éditions de Minuit.

Ducrot, Oswald. 1993. A quoi sert le concept de modalité? In Norbert Dittmar & Astrid Reich (eds.), *Modality in language acquisition/Modalité et acquisition des langues*, 111–129. Berlin: De Gruyter. DOI: 10.1515/9783110856996.111.

Gosselin, Laurent. 2010. *Les modalités en français: La validation des représentations*. Amsterdam: Rodopi. DOI: 10.1163/9789042027572.

Jouvent, Roland. 2009. *Le cerveau magicien: De la réalité au plaisir psychique*. Paris: Odile Jacob.

Kerbrat-Orecchioni, Catherine. 1980. *L'enonciation: De la subjectivité dans le langage*. Paris: Armand Colin.

Rabatel, Alain. 2008a. *Homo narrans: Pour une analyse énonciative et interactionnelle du récit: Les points de vue et la logique de la narration*. Vol. 1. Limoges: Lambert-Lucas.

Rabatel, Alain. 2008b. *Homo narrans: Pour une analyse énonciative et interactionnelle du récit: Dialogisme et polyphonie dans le récit*. Vol. 2. Limoges: Lambert-Lucas.

Rabatel, Alain. 2009. Prise en charge et imputation, ou la prise en charge à responsabilité limitée… *Langue française* 2(162). 71–87. DOI: 10.3917/lf.162.0071.

Rabatel, Alain. 2013. Les relations dire/montrer au prisme du point de vue représenté. In Hugues de Chanay, Marion Colas-Blaise & Odile Le Guern (eds.), *Dire/montrer, au cœur du sens*, 137–157. Chambéry: Université de Savoie.

Rabatel, Alain. 2014. Quelques remarques sur la théorie argumentative de la polyphonie. *Arena Romanistica: Journal of Romance studies* 14. 204–222.
Rabatel, Alain. 2016. Diversité des points de vue et mobilité empathique. In Marion Colas-Blaise, Laurent Perrin & Gian Maria Tore (eds.), *L'enonciation aujourd'hui, un concept-clé des sciences du langage*, 137–152. Limoges: Lambert-Lucas.
Veken, Cyril. 1995. *Phrases sans parole: Théorie du récit et du style indirect libre*. Trans. by Ann Banfield. Paris: Seuil.

Chapter 7

The morphogenesis of language action: Complexity and rhythmic synchronisation of enunciation

Antonino Bondì
Università di Catania

In this chapter, we will discuss two consequences of the fact that speech is both an object of study and a theoretical concept. First, observing its functioning leads to contemplating the limits of linguistic knowledge as necessary elements fall outside of the dimension of language. Secondly, questioning speech as a complex spatiotemporal phenomenon or event raises questions about what is indeed knowable within the frame of a linguistic description and theory. Our focus on two orientations of the scientific description of linguistics allows us to take enunciation as an example and use it to argue for epistemological reductionism, and a morphodynamic approach that promotes an intersection between descriptive and explanatory levels of analysis. This discussion allows us to propose language action as an instance of a complex microsystem that can be modelled and the example of enunciation as a complex synchronisation.

1 The problem of complexity in linguistics between *knowable* and *unknowable items*

In his *Introduction à la littérature fantastique*, the linguist and narratologist Tzvetan Todorov (1970) reflects upon the epistemological issues of semiolinguistic disciplines when dealing with an apparently common phenomenon such as the exercise of speech. For Todorov, the study of speech in practice forces linguistic theories to ask two major questions. On the one hand, since speech is both an object of study and a theoretical concept, the observation of its functioning,

Antonino Bondì. 2022. The morphogenesis of language action: Complexity and rhythmic synchronisation of enunciation. In Kristine Lund, Pierluigi Basso Fossali, Audrey Mazur & Magali Ollagnier-Beldame (eds.), *Language is a complex adaptive system: Explorations and evidence*, 71–79. Berlin: Language Science Press. DOI: 10.5281/zenodo.6620117

as well as the study of its formation and constitution phases, entails as a consequence an investigation on the limits, or better on the perimeter itself, of linguistic knowledge. Todorov noted that speech would not only enable to make a series of useful epistemological distinctions in order to capture the constant and invariant dimensions proper to the activity of speaking. It would also be able, as a theoretical concept, to play an important role in the design of an observation and analysis method, which could go beyond the simple observation of the phenomenological density of enunciation and the complexity of its manifestation in the concrete occurrence of an utterance. Consequently, the analysis of speech in practice would enable to discern the features exhibiting a regularity dimension, in relation to the other parameters which, even though they are necessary to the instantiation of the enunciative scene, do not fall within the language dimension. On the other hand, the questioning of speech as a complex spatiotemporal phenomenon or event also raises questions about the status of what is actually knowable, within the frame of a linguistic description and theory.

Language activity, as reconstructed from the praxis of interlocution, can be characterised in the first instance as a connection between two or more participants in the game of interlocution. This game cannot be captured and described independently of the praxeological frame by which it is oriented. Such a connection is also a way to set the context: its deployment takes place in one or more phases and within one or more spaces. The enunciation process consequently consists in the construction of a complex web of linguistic elements alluding to these two parameters (space and time), as well as to other modalities that organise the enunciative scene. Todorov draws an instructive conclusion from this, when he writes:

> The exercise of speech is not an individual and chaotic activity, and hence unknowable. There is an irreducible part in enunciation, but next to it there are others which can be conceived as repetition, play, convention. Our object is therefore constituted by the rules of enunciation and the different scopes of their application. (Todorov 1970: 3, personal translation)

Linguistic theories have always favoured the investigation and description of forms whose nature is phenomenological (Piotrowski 2018): they are perceived and distinguished by the speakers themselves, in the spontaneous course of action, within the semiolinguistic use, which is concrete, transmitted and socialised. This epistemological preference is possible provided that these forms can acquire the rank of object. In other words, such forms must be objectivised and, by virtue of this gnoseological operation, assume the status of a fully knowable object.

Consequently, the scientific description of linguistics could have been oriented towards at least two directions:

- predict the potential for the usage, updating and use of such object-forms, with the belief that *all occurrences*[1] can be explained and described;
- collect the diversity of uses and variations, according to observable occurrences.

Only then can a second-order observer – such as the linguist – engage in interpretative hypotheses and refute others considered as less plausible.

2 On the need for epistemological reductionism

Like any scientific approach, linguistics has understood the advantages of introducing a set of epistemological reduction operations: first, the identification of the levels in which linguistic objects and language operations are organised. A cutting operation for analytical purposes of this type[2] is based on the idea that a phenomenon such as enunciation is organized around two typologies of components, which govern its construction and emergence:

- elements that can be reduced to regular forms (or formants), which can in turn be objectivised and delimited;
- dynamics of constitution which, even if they are essential for the semiological life of the interactive and praxeological games, remain unknowable from the linguistic point of view, because of their psychological (or even subjective) and chaotic (i.e. *non-deterministic*) nature.

The above-mentioned remark of Todorov explains the reductionist[3] attitude that is necessarily assumed when confronted with the phenomenological complexity of semiolinguistic action. Through this, the distinction is made between linguistic traces – and the symbols with which they are carried and transmitted – and the spontaneous phases (or moments) of creation and constitution of the

[1] It is the structuralist dream of glossematics. See Bondì (2011b).

[2] For a discussion on the semiotic epistemology of *cutting*, see Paolucci (2010, 2017), Bondì (2011a).

[3] This attitude could be defined as *necessarily reductionist*.

language action itself. From Todorov's[4] point of view, only the former would deserve to be analysed, because they are regular, social and conventional elements, whereas construction phases would constitute, to use Jean Petitot-Cocorda's (1985, 1992) famous formula, the *partie maudite* of the language experience. These dynamic or chaotic phases are related to the spontaneous morphogenesis of linguistic action, i.e. the putting into words of a network of communicative intentions. These are the general aspects of the implementation of enunciation, which are rooted in the nature of the various substrates that constitute the dynamic matter for language formation. Such a distinction between the forms of objects and the forces that affect their constitution reflects that enunciation is conceived as an exercise or application of pre-established (Ingold 2013) rules. Incidentally, in the history of linguistic theories, enunciation theory has advocated since Benveniste (and at least up to Culioli) an almost absolute distinction between the formal apparatus of enunciation and communicative agreements, where the chaotic dimensions of meaning and its expressiveness overflow (see Bondì 2016, Ducard 2012, Longhi 2012).

Therefore, such a separation is certainly justified from an epistemological point of view; but, when the phenomenological complexity of a language act in the ordinary experience of one or more speakers is pointed at, two theoretical problems appear. First, it is necessary to specify and define what is meant by complexity. Are we targeting linguistic forms (and their stratified organisation)? Or is our interest more focused on social behaviour? The two questions open onto two different conceptions of semiotic and linguistic complexity. The first approach focuses on forms and forces in terms of dynamic objects, which can be modelled by using an imaginary world that is derived from the theories of complex systems, while the second one focuses on taking into account the heterogeneous domains that explain any given semiotic behaviour.[5] The first interpretation will be favoured here.

3 The morphodynamics of spontaneous speech: Epistemological remarks

A perspective oriented towards morphodynamics focuses on the semiogenetic phases of language action. According to the linguist and semiotician Wolfgang

[4]The remark is here caricaturised as an example; it is not a specific interpretation of Todorov's position, which is in fact much finer.

[5]On the first option, which brings together theory of dynamic systems and semiolinguistic theory, see Bondì (2015, 2017), Piotrowski (2018). The second option, which rather belongs to semiotics, is discussed in Basso Fossali (2018).

Wildgen, this perspective questions the distinction between the recognisable dimension of enunciation (regular, social and conventional), and the more subjective and chaotic one, which, on the contrary, would remain unknowable, because it is at stake in the spontaneous morphogenesis of speech. Two arguments support this idea.

First, the morphodynamic approach emphasises the necessity of the intersection between analysis levels and object sizes, in order to hold together the study of forms and also the forces that organise them. This intersection should take place at both the description and explanatory modelling levels, as objects are constantly differentiated – by size, construction rate, etc. – as the thematic rises and the wording progresses. From this point of view, the morphodynamic epistemological orientation guarantees the possibility of echoing a number of purely quantitative approaches with qualitative studies. While the former focus their attention on the more regular aspects of enunciative construction (such as nominal schematisation, index construction, modalisation, etc.), qualitative approaches are more oriented towards the description of the processes of morphological emergence and stabilisation (such as illocutionary and perlocutionary forces, motor or rhythmic coordination, and various forms of synchronisation). As Wildgen says:

> Some problems, such as the production of utterances and language choices, can be continued by making accurate observations (even quantitative and statistical) and by building mathematical models that will then be evaluated using quantitative results. Other problems, such as perlocution effects, rhetorical functions, and index dynamics, require qualitative research. In all cases, the approach must implement multidisciplinary methods (...). Morphodynamic modelling, which is immediately transdisciplinary, allows us to move in the right direction without having to leave the scope of applicability of morphodynamic concepts. (Wildgen 1999: 295, personal translation)

Morphology is understood here as one or more linguistic and socio-cultural forms or *gestalts* (i.e. patterns), which are stabilised as the speech and the conflicts of manifestation progress. The main characteristic of semiotic and linguistic morphology is to be immediately prominent and/or significant for a speaker (or for a social group). A form is prominent when it has the property (or dynamic capacity) of triggering (without any particular mediation) two things: (i) an economy of morphological and cultural values at stake, which direct the attention and movements of subjects; (ii) a proto-actantial distribution of syntactic roles, which

enable the orienting and guiding of the perception and movements of speakers, as well as the socialisation of the forms themselves. Morphology is therefore prominent because it is penetrated by forces. It is a complex and dynamic organisation, which becomes a cognitive material of motivation and reuse in order to constantly generate new linguistic forms.

But what does complex mean? To answer this question, one must put forward the second argument, which is still of epistemological nature, concerning the knowable nature of the chaotic aspects of enunciation. They can be understood by models directly inspired by theories of complex systems. Indeed, enunciative action is no longer merely analysed in terms of rule application or of the actualisation of a predetermined potential, as is still the case in some linguistic approaches. On the contrary, (Wildgen 1999: 295, personal translation) states that "the constraints of the spontaneous genesis of enunciation that define the frame within which the rules of the game are formed and interpreted in usage". The theory of complex systems appears here because the chaotic conditions of spontaneous enunciation become known within this frame. They also acquire the status of a space that may be controlled, i.e. a (a priori *unstable*) parameter that guarantees and regulates the emergence and temporary stabilisation of a given enunciative form, as well as its reformulation and solicitation systems, its reorganisation and even its possible disappearance. In order to characterise the morphogenesis of linguistic action in terms of a complex system, one must specify that the latter is a "system of interacting forces, each consisting of several interacting factors whose identity is not known initially and whose values may continuously change while the states of the global system remain globally constant" (Virole 2019: 91, personal translation).

> According to the generalised model of catastrophe theory, this system manifests itself in apparent states. It is assumed that an internal dynamic exists within this system, which is also unknown and unobservable, and which defines the states that this system can hold in a stable way. These states (...) are considered as system attractors. These states virtualise each other. They do not exist in isolation. They are bound by mutual determination relationships and thus fulfil the conditions of a structural system in the sense of Deleuze. (Virole 2019: 91, personal translation)

To describe language action as a case of a complex microsystem that can be modelled, it is first necessary to identify the multiple factors that control the system, by continuously changing in an external space in which observable qualities are manifested. An utterance can therefore no longer be taken into consideration

only in terms of a space in which it may manifest or of the actualisation of a series of given possibilities in language. A morphodynamic analysis approaches all enunciative structures as control spaces for a series of variable dynamics, which are dedicated to the temporary stabilisation of interactions. From this point of view, while these dynamics are at the same time corporeal, psycho-physiological, psycho-social, and also phenomenological, rhythmic, semantic, pragmatic, etc., utterances are only temporarily stabilised dynamic fragments, destined to be deformed:

> When a complex dynamic system, driven by its need for self-organisation, is led to achieve its effects using the elements received in input, it ultimately develops a process of self-regulation that requires the emergence of an internal representation of itself and leads to a complete reorganisation of its structure. (Virole 2019: 91–92, personal translation)

4 A temporary conclusion: Enunciation as a complex synchronisation

While for Benveniste enunciation was an appropriation process submitted to an accomplished and previously given form, namely language (which the speaker assimilates during elocution), for morphodynamic theory enunciation is, on the contrary, a transition between the non-linguistic and the linguistic areas. The consequences of such a theoretical and epistemological difference also concern the representation models and the description of the phenomena taken into consideration.

In particular, the morphodynamic approach conceives utterances as an epiphenomenon or manifestation of a *set of dynamic coordinations*. Instead of simply describing linguistic traces that are organised in corpora, focus is made on the temporal dimensions organising the life of an utterance, that is, the internal rhythms of the life of a form. But what kinds of coordination are we talking about? Wildgen proposes a list in his study. These coordination types contribute, at different and sometimes heterogeneous levels, to the enunciation process as a transition from the linguistic to the non-linguistic area, i.e. as an action that modifies the mental space of the subjects participating in the event, the cultural space of groups and the real space of environments and habitats. For the semiotician, there are five rhythmic coordination types:

- coordination between speaker and addressee;

- coordination between language resources and communication needs
- coordination, within the speaker, between memory processes (long-term, short-term), thought and transposition into words;
- coordination during vocal production between different rhythms (breathing, sound production, articulation);
- coordination in the articulation between different muscle groups.

We do not have time to go into depth into Wildgen's phenomenological description and mathematical semiotic model, nor can we propose a case study. Suffice it to say as a conclusion, that the morphodynamic perspective intersects with linguistic approaches that are currently interested in the phenomenon of *languaging*, the psycho-physiological and social coordination process that drives language experience (Bottineau 2017). In this contribution we modestly aimed to give an insight into the potential and relevance of connecting linguistic theory and the theory of complex systems. Further ad hoc research in this direction is necessary in order to propose a semiolinguistic approach to complexity.

Acknowledgements

The author is grateful to the ASLAN project (ANR-10-LABX-0081) of the Université de Lyon, for its financial support within the French program "Investments for the Future" operated by the National Research Agency (ANR).

References

Basso Fossali, Pierluigi. 2018. *Vers une écologie sémiotique de la culture: Perception, gestion et réappropriation du sens:* Limoges: Lambert-Lucas.

Bondì, Antonino. 2011a. *La parola e i suoi strati: La semiotica dinamica di Louis Hjelmslev*. Catania: Bonanno.

Bondì, Antonino. 2011b. *Louis Hjelmslev: Fra lingua e linguaggio*. Rome: Carocci.

Bondì, Antonino. 2015. Pour une anthropologie sémiotique et phénoménologique: Le sujet de la parole entre cognition sociale et valeurs sémiolinguistiques. *Intellectica* 63. 125–148.

Bondì, Antonino. 2016. Altérité de la parole et socialité du sens. In M. Colas-Blaise & G.-M. Tore (eds.), *L'enonciation aujourd'hui, un concept clé des sciences du langage énonciation et perception d'autrui*, 381–394. Lambert-Lucas: Limoges.

Bondì, Antonino. 2017. Hjelmslev and the stratification of signs and language: The morphodynamical approaches to semiotic complexity. In Francesco La Mantia, Ignazio Licata & Pietro Perconti (eds.), *Language in complexity: The emerging meaning*, 99–118. Cham: Springer. DOI: 10.1007/978-3-319-29483-4_6.

Bottineau, Didier. 2017. From languaging to linguistic meaning. *Intellectica* 68. 19–68.

Ducard, Dominique. 2012. Comment le dire: A propos d'ajustement, en quelque sorte. *Tranel (Travaux neuchâtelois de linguistique)* 56. 43–60.

Ingold, Tim. 2013. *Marcher avec les dragons*. Trans. by Pierre Madelin 2018. Bruxelles: Points.

Longhi, Julien. 2012. D'où, de qui, ou comment vient le sens en discours. *Tranel (Travaux neuchâtelois de linguistique)* 56. 5–21.

Paolucci, Claudio. 2010. *Strutturalismo e interpretazione*. Milan: Bompiani.

Paolucci, Claudio. 2017. System and structure: Semiotics as encyclopaedic theory of complexity. In Francesco La Mantia, Ignazio Licata & Pietro Perconti (eds.), *Language in complexity: The emerging meaning*, 83–98. Cham: Springer. DOI: 10.1007/978-3-319-29483-4_5.

Petitot-Cocorda, Jean. 1985. *Morphogenèse du sens*. Vol. 1. Paris: Presses Universitaires de France.

Petitot-Cocorda, Jean. 1992. *Physique du sens: De la théorie des singularités aux structures sémio-narratives*. Paris: CNRS.

Piotrowski, David. 2018. *Morphogenesis of the sign*. Cham: Springer.

Todorov, Tzvetan. 1970. *Introduction à la littérature fantastique*. Paris: Seuil.

Virole, Benoît. 2019. *Catastrophes de l'inconscient*. Paris: Baghera.

Wildgen, Wolfgang. 1999. *De la grammaire au discours: Une approche morphodynamique*. Berlin: Peter Lang.

Chapter 8

Dialogism for daily interaction

Aleksandra Nowakowska[a,b] & Hughes Constantin de Chanay[c,d,e,f]

[a]UMR 5267 Praxiling [b]Université Paul Valéry Montpellier 3 [c]UMR 5161 ICAR [d]Centre National de la Recherche Scientifique [e]Ecole Normale Supérieure [f]Université Lumière Lyon 2

We build upon dialogism as practiced by praxematics and upon analysis of verbal interactions of multimodal corpora in order to propose a toolkit that is equipped to describe enunciative heterogeneity in verbal interaction. First, we present the principles and concepts of dialogism. Then, through a set of example enunciations taken from a recording of an aperitif between friends, we examine the extent to which these concepts function on selected instances, and then we discuss how they function on the discourses that are attached to these instances. The specificity of verbal interaction implies distinguishing between speaker and enunciator, defining interlocutive and anticipative interlocutive dialogism, and accounting for dialogic markers such as prosody, multimodality, but also for prototypic syntactic markers. Our analyses argue that although dialogism was conceptually developed on non-interactive discourse, specific adjustments show that it is also pertinent for describing interactive discourse.

We would like to propose the draft of a "toolkit" that is adapted to the description of enunciative heterogeneity in verbal interaction, and which is compatible with two theoretical approaches: that of dialogism as practiced by *praxematics* within the Praxiling research team (UMR 5267); and that of the analysis of verbal interactions on multimodal corpora as practiced at ICAR (UMR 5191).

Their theoretical compatibility is enabled by:

- the primacy given to observable forms in the analysis;
- the central position given to exchange in the study of discursive phenomena.

Aleksandra Nowakowska & Hughes Constantin de Chanay. 2022. Dialogism for daily interaction. In Kristine Lund, Pierluigi Basso Fossali, Audrey Mazur & Magali Ollagnier-Beldame (eds.), *Language is a complex adaptive system: Explorations and evidence*, 81–93. Berlin: Language Science Press. DOI: 10.5281/zenodo.6620119

This study is based on an interactional corpus consisting in the recording of an aperitif between friends.[1]

The first part of this chapter is dedicated to the presentation of the fundamental principles and concepts of dialogism; then we will examine to what extent these concepts can be functional in order to study the test-corpus, first by focusing on discursive instances, and then on the discourses attached to these instances.

1 Dialogism: The praxematic approach in the wake of Bakhtine

Dialogism (Bakhtine 1970, 1984) is the constitutive *orientation of* all discourses, regardless of their genre: *dialogal*[2] (interview, debate, etc.) or *monologic* (press article, novel, etc.) towards other types of discourse, in the form of *internal dialogue*. This orientation towards other discourses is achieved in three ways:

1. through *interdiscursive dialogism,* i.e. towards previous discourse produced by third parties on the same subject;
2. through *interlocutive dialogism,* i.e. towards the previous turn of speech of the addressee in dialogical genres and towards the "response" of the recipient that is anticipated in discourse;
3. through *intralocutive dialogism,* i.e. towards the speaker himself, as he/she is his/her first addressee.

We intend to grasp dialogism during verbal interaction in order to show its complexity, and to propose an adaptation of the descriptive principles that were elaborated based on monologic texts. The notion of interlocutive dialogism directly articulates dialogism and verbal interaction.

[1]Entitled "Apéritif entre amis – rupture" freely available from the CLAPI database at http://clapi.icar.cnrs.fr.

[2]Praxematics distinguishes "dialogal" (which has no correspondent term in English) to characterise the interactions between participants who are connected to each other, in other words the dialogue in its external form, marked by the alternation of speech turns produced by two or several speakers.

1.1 Interlocutive dialogism

Interlocutive dialogism indicates the fact that speakers adjust their discourse according to their interlocutor, the knowledge and discourse that they attribute to him or her, etc. These facts have been described by rhetoric, sociolinguistics, pragmatics or conversational analysis through the notions of *recipient design* (Sacks et al. 1974) or *audience design* (Clark & Murphy 1982, Bell 1984). The notion of interlocutive dialogism also reflects the following two facts, which are not taken into consideration by the notions of *recipient design* or *audience design*:

- the syntax of utterances can be analysed in its dialogical dimension.

Du Bois (2014) shows how a speaker uses his or her interlocutors' previous utterances to construct his/her own utterances ("syntactic parallelism").[3] Parallelism can be observed in the case of "diaphonic" recovery (Roulet et al. 1987):

(1) (e.g. 1, 00 : 01 : 01 : 28-00 : 01 : 39) The sequence focuses on the Moroccan slippers that Justine (JUS) shows to her guests Arnaud (ARN) and Albine (ALB)

JUS du coup vous avez fait quoi aujourd'hui/t' as vu mes supers babouches marocaines/
'So what did you do today/you saw my great Moroccan slippers/'

ARN ah elles sont coo:ls
'ah they're coo:l'

JUS *elles sont belles hein*[4]*/*
'*they're beautiful, huh*?'

ARN tu les sors: d'où à part du maroc évidemment/
'you got them from where apart from Morocco of course/'

JUS ben *du maroc* [((rit))
'well *from Morocco* [((laughs))'

[3]The notion of *parallelism* is particularly explored in J. W. Du Bois' recent research (2007–2014) on dialogical syntax in verbal interaction: "when speakers selectively reproduce aspects of prior utterances, and when recipients recognise the resulting parallelisms and draw inferences from them" (2014: 359).

[4]The parts in italics are indicated by us. We italicise the element that is studied in terms of enunciative heterogeneity, here the diaphonic repetition.

ARN [ouais mai:s tu r`viens pas du maroc que j' sache/]
‘[yeah, but you're not coming back from Morocco as far as I know.] ‘

JUS nan c'est une copine [qui::]
‘no it’s a friend [who:::]‘

In this excerpt partial diaphonic repetitions of the speaker’s turn follow one another with a change of modality (exclamation/question/assertion) and/or tone (seriousness/laughter);

- speakers interact with their interlocutor’s previous utterances and also with the potential subsequent response that they attribute to the latter, which they constantly anticipate (Bakhtine 1984: 303). This second aspect is addressed using the notion of *anticipative interlocutive dialogism* (Bres et al. 2016).

1.2 Anticipative interlocutive dialogism

The prepositional phrase *à part du maroc évidemment* ‘apart from Morocco, of course’ combines the anticipated response of the interlocutor JUS (they come from Morocco, as their name suggests) with the reaction of the speaker ARN (*à part évidemment* ‘apart, of course’) to this offbeat response. ARN knows that JUS has not been to Morocco, and since their manufacturing and commercialisation locations may be different, he would like to know the latter. This spoken anticipation, based on the speaker’s experiential knowledge, is precisely at the origin of the humorous nature of the exchange following it. ARN’s turn closely intertwines the response attributed to JUS in answer to his question and ARN’s reaction to that response.

2 Instances: The enunciative apparatus for the description of dialogism

2.1 Double enunciation

Any dialogic utterance implies enunciative discordance, i.e. two distinct enunciations that are not always consistent with respect to the situation. These enunciations are in a relation of incorporation: embedding enunciation [E] and embedded enunciation [e]. In other words, dialogical utterances are structured around

an internal micro-dialogue: they are the result of the interaction of an enunciation act [E][5] spoken by the enunciator with another enunciation act [e], resulting in their enunciative heterogeneity. The reported speech (which would correspond to *ton rapport d'étonnement est super* 'your astonishment report is great' in the example below) provides the emblematic structure for the representation of enunciative heterogeneity:

(2) (e.g. 2, 00: 03: 43-00: 03: 56) The sequence is based on the astonishment report prepared by Albine

ALB ah si j'étais contente parce que *mon père il m'a: il m'a DIT que: mon rapport d'étonnement était super [il a dit qu'il] était passionné et tout par c' que j'ai dit:*
'ah yes I was happy because *my father he told me: he TOLD me that: my astonishment report was great [he said he] was fascinated and everything about what I said:'*

JUS [parce qu'il a lu/]
'[because he read/]'

JUS donc c'est quoi en fait/rapport [d'étonnement/]
'so what is it in fact/report of [astonishment/]'

ALB [rapport] d'étonnement ouais
[report] of astonishment yeah'

ALB c'est:: comme un rapport de stage mais c'est plus toutes les questions que tu peux t' poser par rapport à c' qui s'est passé: 'it's:: like an internship report but it's more all the questions you can ask yourself about what happened:'

JUS donc pourquoi il appelle ça rapport d'étonnement/
'so why does he call it astonishment report/'

ALB bah parce que c'est d' l'étonnement\
'well because it's astonishment\'

JUS d'accord\ okay\

[5] [E] indicates the enunciation representation, and (E) the utterance that is produced.

The parameters of the embedded enunciation [e] are dependent on those of [E] (imperfect of *était* 'was', 1st person deictics). The participant ALB can be identified by [L_{ALB}] (which is therefore distinct from [L_{JUS}] and [L_{ARN}]). This [L_{ALB}] is by default co-referential with the main enunciator E_1 in the dialogical utterance, who is therefore called $E_{1ALB.}$ E_{1ALB} corresponds by default "to the actualisation instance of the utterance in its lexico-semantic, deictic, syntactic and modal dimensions" (*ibid.*); in other words, he is presumed to be intentionally responsible for making sensible choices with respect to the (lexical and grammatical) morphemes of the utterance, including the sequence presented as reported (*mon rapport d'étonnement était super*) 'my astonishment report was great'). He is also presented as the linguistic equivalent – and therefore as the relay to [L_{ALB}], which can only be represented in the utterance by E_{1ALB} – of the 1st person marker in the utterance (*j'*, *je* 'I', *mon* 'my', *m'* 'me'), including those in "indirect style" (IRS), and of the present of enunciation (here implicit) in relation to which the imperfect and perfect past tenses are defined. He is also the one who actualises the utterance as an assertion in the indicative mode and is made responsible for the indirect mode of the report. In this case, we can also identify a source for the speech reported in indirect style, here the enunciator e_1 who corresponds to the father of the speaker-enunciator [$L_{ALB\text{-}}E_{1ALB}$]. The lowercase letter indicates the hierarchy of enunciators in the dialogic utterance. One can also speak in this case of "enunciative recursivity" (Rosier 2008): X said that Y said, etc., concerning the enunciator $\sum_1$ of the reported speech ($\sum$), $\sum_1$ corresponding in our case to the speaker-enunciator [$L_{ALB\text{-}}$ E_{1ALB}]. In the turn of speech produced by the speaker [L_{ALB}], we outline the dialogic utterance (E) in italics. The instance assuming the enunciative responsibility for (E) is [$L_{ALB\text{-}}E_{1ALB}$]. In this dialogical utterance, we identify the reported speech in indirect style, indicated as (e), which is referred to the enunciator e_1 who reports himself in indirect style the utterance ($\sum$) of an enunciator $\sum_1$. Let us assume the embedding of utterances in the dialogical utterance ($E^{(e(\sum)}$), or by specifying the instances ($E^{(e}[e_{1père}]$ $^{(\sum}[\sum_{1fille}{}^{)}$ $_{[LALB\text{-}E1ALB])}$. Finally, let us specify that (e), in IRS, is a representation in (E), at a time T_0 of what was actually produced by e_1 at time t_0, when he had the status of speaker.

2.2 Instances, interaction and multimodality

The interactive and multimodal nature of verbal interaction corpora encourages us to propose theoretical adjustments that take into account their relation to real participants.

1. It is necessary to take into account the discursive nature of corpora: whatever the definition of utterances, most of the time, there will be several of

them in the discourse of a given participant. In order not to multiply the number of speakers, which would be counter-intuitive, it is necessary to postulate a federating instance such as the "textual speaker" of the ScaPoLine (Nølke et al. 2004), better designated as "discourse speaker" by H. Kronning (2014: 128).

2. As Dendale & Coltier (2005) point out, this instance corresponds to the lambda speaker of Ducrot, "the speaker as a being of the world", who considers by default that the interactant is the source of his representations. Since interactions are most often polylogic, it is necessary to plan as many speakers in discourse as interactive spaces, which correspond to the identities of the interactants (specification with indexes above).

3. Since the data are multimodal, one may wonder whether it is necessary to provide special instances for the correspondents of the speaker's verbal speech: postures, gestures, mimics; that is, in parallel with speaker (L-E), P, G, M instances. But if we assume that these various instances are convergent and associated in a single discourse by default, we can postulate a unifying instance D (as "discourse"; the notion of "speaker" targets linguistic discourse in priority) which takes into account the multimodal aspect of the discourse. Multimodality also leads to connecting the lambda speaker to the real participant, i.e. to the "being of the world" outside linguistic discourse, because he or she is really perceptible, through hearing (voice) and sight (postures, gestures, facial expressions). In other words, we would reintroduce in linguistics the notion of "speaking subject" that has long been excluded from the field in order to establish the specificity and relevance of enunciative subjects.

4. Ultimately, interactive corpora make it necessary to "untie" (Rabatel 2010) the speaker and enunciator – which are "matched" to a speaker, but can extend beyond their enuniciative scope. This fact was pointed out by (Perrin 2021) about what he calls "monologic dialogue" (two speakers, one enunciator), for example during two-way narratives. Our corpus contains many examples of "shared enunciators", who co-construct utterances, propositional contents, even a sequence forming a narrative (here through couple complicity). The sequences in italics below correspond to an enunciator shared by ARN and ALB:

(3) (e.g. 3, 00 : 09 : 09 : 46-00 : 09 : 52)
JUS ça y est vous avez décidé/
'that's it, you've decided/'

ARN *ouais mercredi on a même une date de: [de rupture]*
'yeah Wednesday we even have a date of: [of rupture]'
JUS [de rupture/]
'[of rupture/]'

ALB *ouais*
'yeah'

JUS c'est quand/
'when is it/'
(0.5)

ARN *nan c'est secret ça par contre/*
'No, that's secret, though/'

We will discuss more precisely the relevance of this theoretical adjustments in a future study.

3 Dialogical markers and the complexity of verbal interaction

We will address different markers of dialogism, whether they belong to linguistics or not, by focusing on enunciative instances and their discourse.

3.1 Echo

By echo, the speaker-enunciator L_1-E_1 reuses the utterance, or most often a part of the utterance (e), of the previous conversational turn of another enunciator, either to simply acknowledge receipt of what was just said or to comment, question, make fun of, even ridicule the echoed segment. In oral language, speakers can use a specific prosody that functions as the evaluative commentary. In the following example:

(4) (e.g. 3, 00 : 05 : 05 : 17- 00 : : 1805)
ALB euh oui j` leur ai dit: euh: c'est pas l` jour de l'an
'uh yes I told them: uh: it's not New Year's Day'

ALB puisque: toi t` as [t` es pas là]
'since: you have [you're not here]'

ARN [c'est pas LE] jour de l'an mais c'est pareil:
'[it's not THE] New Year's Day but it's the same:'

ARN marks an enunciative disassociation on the echoed sequence (*c'est pas LE jour de l'an* 'it's not THE New Year's Day') by the prosody, stress given on LE (THE), and by taking a enunciative non-engagement posture (looking straight in front of him outside the interaction, he moves his neck forward), and he keeps his postural disengagement, but not the forward position of his neck, on the corrective commentary *mais c'est pareil* 'but it is the same'.

3.2 Syntactic marking: left dislocation of an adjectival phrase in the superlative of superiority

Many syntactic markers of dialogism (cleft and pseudo-cleft sentences, concession, negation, interrogation, dislocation, subordination, comparison, etc.) are described in Bres et al. (2019). Dislocation is the most frequent syntactic marker in the corpus. Let us examine a case of left-dislocation of an adjectival phrase in the superlative of superiority. This syntactic structure is usually analysed (Nowakowska 2009, Bres et al. 2019) as a marker of anticipatory interlocutive dialogism, based on monologic writings; however, its functioning is more complex in verbal interactions:

(5) (e.g. 4, 00 : 14 : 43-00 : 15 : 01) Arnaud and Albine are in a relationship, at least for the moment, Albine acknowledges calling her companion by the name of a mutual friend Sébastien, Arnaud then confesses that this confusion goes further than a slip of the tongue on the name

ALB j` dis toujours euh sébastien à la place de: d'arnaud
'I always say uh sebastian instead of: arnaud'

ARN ouais c'est: ça finit par être emmerdant parce qu'elle veut qu` je mettre son parfum/(.) elle elle veut qu` j` mette les mêmes chaussures
'yeah it is: it ends up being annoying because she wants me to wear his perfume/(...) she wants me to wear the same shoes'

ALB hein/
'right/'

ARN [elle m'appelle sébastien]
'[she calls me sebastian]'

JUS [les mêmes chaussures/]
'[the same shoes/]'

ALB n'im:porte quoi\
'nonsense\'

ARN oh j'en rajoute un peu mais c'est pour (inaud.) le truc tu vois .h mais elle m'appelle sébastien nan mais *le pire l- le plus chiant c'est l` parfum quoi* (.) sébastien son parfum `fin moi dans ma tête il est vachement associé à lui le: hm le récent là la nuit de l'homme/

'I'm exaggerating a little but it's for (inaud.) the thing you see.h but she calls me sebastian no but *the worst l- the most annoying is the perfume you know* (..) sebastian his perfume `well me in my head it's really associated with him the: hm the recent one there la nuit de l'homme ((name of the perfume))/'

This dislocation can be analysed as follows:

1. *interaction with the previous turn of the same speaker: ça finit par être emmerdant* 'it ends up being annoying'

   The dislocated element on the left (*le pire le plus chiant* 'the worst the most annoying') establishes a relation of superiority comparison with the adjective "annoying". Dislocation is used, from the point of view of intralocutive dialogism, to establish a relation of comparison and hierarchy between two elements enunciated by the same speaker in two distant turns of speech in the same interactional thematic sequence;

2. *interaction with the anticipated reaction of the interlocutor*

   The left-dislocation of the adjective establishes a relation of superiority comparison with the evaluation attributed to the interlocutor: [c'est terrible 'it is terrible'], in reaction to *elle m'appelle sébastien* 'she calls me Sebastian' above.

   Arnaud's turn is simultaneously in a dialogic relation with his previous discourse and with the anticipated reaction-response of the interlocutor. Turns of speech are not only produced in relation to one's or others' previous turns, they are sometimes simultaneously oriented, through the same marker, towards the expected discourse that they constantly anticipate.

3.3 Prosodic and verbal marking

(6) Let us consider the case of reformulation when it is introduced by an intra-turn pause: (e.g. 5, 00 : 00 : 00 :12-00 : 00 : 13) Sequence of interaction opening

JUS <((très aigu)) coucou::>
‘<((very high-pitched)) hi::>’

ALB bon:jou::r ((rires))
‘he:llo:: ((laughs))’

JUS [ça a été pour l'étage/] *(.) tu t'es pas plantée/*
‘[was it okay for the floor/] (.) *you didn't get it wrong/*’

The question *tu t’es pas plantée/* ‘you didn’t get it wrong/’, after a short intra-turn pause, is a specifying self-reformulation of the previous question. This reformulation anticipates and responds to a potential request for an explanation from the addressee [i.e. what do you mean/can you explain] following the imprecise wording of the first question.

The intra-turn pause indicates the cognitive activity corresponding to the speaker’s consideration and treatment of the discourse attributed to the interlocutor, to whom she responds using reformulation.

4 Conclusion

For the description of dialogue, the specificity of verbal interaction implies:

- An adaptation of the enunciative frame: the distinction between speaker and enunciator is of crucial importance in oral language to differentiate uttering instances from instances of deictic, syntactic and modal actualisation, which enables to analyse the purely spoken dimension of speech in verbal interaction and its dialogical functioning;
- The study of specific enunciative features: interlocutive and anticipative interlocutive dialogism is inherent to the cohesion of discourse in verbal interactions; the enunciative level is also the level at which associations or dissociations between participants are linguistically made (sharing of enunciators);
- The specificity of dialogic markers: on the one hand, there are markers specific to the resources available for verbal interaction (prosody, multimodality of markers) and, on the other hand, the more complex functioning of prototypic syntactic markers, often described on the basis of monologic writing, in the case of dislocation.

It can be assumed that speakers have an open-ended range of discursive skills, including an enunciative competence with respect to the discursive and non-situational functioning. The dialogic enunciative level has mainly been conceptually developed based on non-interactive discourses, but with some adjustments to redefine the concept, dialogism is obviously adapted to describe the interactions from which it is derived.

Acknowledgements

The authors are grateful to the ASLAN project (ANR-10-LABX-0081) of the Université de Lyon, for its financial support within the French program "Investments for the Future" operated by the National Research Agency (ANR).

References

Bakhtine, Mikhail. 1970. *Problèmes de la poétique de Dostoïevski*. Trans. by I. Kalitchef. Lausanne: L'âge d'homme.

Bakhtine, Mikhail. 1984. *Les genres du discours: Esthétique de la création verbale*. Trans. by A. Aucouturier. Paris: Gallimard. 263–308.

Bell, Allan. 1984. Language style as audience design. *Language in Society* 13(2). 145–204. DOI: 10.1017/S004740450001037X.

Bres, Jacques, Aleksandra Nowakowska & Jean-Marc Sarale. 2016. Anticipative interlocutive dialogism: Sequential patterns and linguistic markers in French. *Journal of Pragmatics* 96. 80–95. DOI: 10.1016/j.pragma.2016.02.007.

Bres, Jacques, Aleksandra Nowakowska & Jean-Marc Sarale. 2019. *Petite grammaire alphabétique du dialogisme*. Paris: Classiques Garnier.

Clark, Herbert H. & Gregory L. Murphy. 1982. Audience design in meaning and reference. *Advances in Psychology* 9. 287–299. DOI: 10.1016/S0166-4115(09)60059-5.

Dendale, Patrick & Danielle Coltier. 2005. La notion de prise en charge ou responsabilité dans la théorie scandinave de la polyphonie linguistique. In Jacques Bres, Pierre P. Haillet, Sylvie Mellet, Henning Nølke & Laurence Rosier (eds.), *Dialogisme et polyphonie: Approches linguistiques*, 125–140. Bruxelles: De Boeck Supérieur.

Du Bois, John W. 2014. Towards a dialogic syntax. *Cognitive Linguistics* 25(3). 359–410. DOI: 10.1515/cog-2014-0024.

Kronning, Hans. 2014. Pour une théorie modale de la polyphonie. *Arena Romanistica: Journal of Romance studies* 14. 124–138.

Nølke, Henning, Kjersti Fløttum & Coco Norén (eds.). 2004. *Scapoline: La théorie scandinave de la polyphonie linguistique*. Paris: Kimé.
Nowakowska, Aleksandra. 2009. Thématisation et dislogisme: Le cas de la dislocation. *Langue francaise* 3(163). 79–98.
Perrin, Laurent. 2021. Modalisations diaphoniques de l'énonciation dans le discours. *Cahiers de Praxématique* (75). 1–14. DOI: 10.4000/praxematique.7263.
Rabatel, Alain. 2010. Retour sur les relations entre locuteur et énonciateur: Des voix et des points de vue. *Recherches linguistiques* 31. Metz, 357–373.
Rosier, Laurence. 2008. *Le discours rapporté en français*. Paris: Ophrys.
Roulet, Eddy, Antoine Auchin, Jacques Moeschler, Christian Rubattel & Marianne Schelling. 1987. *L'articulation du discours en français contemporain*. Paris-Berne: Peter Lang.
Sacks, Harvey, Emanuel A. Schegloff & Gail Jefferson. 1974. A simplest systematics for the organization of turn-taking for conversation. *Language* 50(4). 696–735. DOI: 10.2307/412243.

Chapter 9

Modalities in written chat interactions: A complex system

Pierre Halté
Université de Paris

Expressing judgement about what one says is accomplished with modalities. Even if modalities are considered as a primarily linguistic phenomenon (e.g. semantically inscribed in particular lexemes or inferred from uttered propositions), the parameters required for determining modality cover all traditional fields of linguistics and can easily be considered to be a complex system. In this chapter, we reveal aspects of this system that have not yet been taken into account but that indicate a speaker's emotion and thus bear modality, such as the iconic pictograms that represent mimics or gestures in the case of chat conversations over written, (a)synchronous, on-line communication. I argue that in addition to utterance level and speech turn modalities, linguists should include modalities at the level of exchanges. I illustrate a complex system that is a non-linear and unpredictable succession of (in)validations of ex/implicit contents, marked by different semiotic systems that relate to each other while determining subsequent turns of speech.

1 Introduction

Modalities, in linguistics, are ways to express the speaker's judgment about what she is saying. Whether in formal semantics (Portner 2009) or in Gosselin's (2010) cognitive semantics, they are most often considered at the level of utterances, or even lexemes. Furthermore, they are systematically considered as a primarily linguistic phenomenon, whether they are semantically inscribed in certain lexemes (such as the verbs *must*, *can*, etc.), or inferred from uttered propositions. At this level of analysis, the complexity of modalities is already evident: the parameters required for its determination are numerous, cover all the traditional fields

Pierre Halté. 2022. Modalities in written chat interactions: A complex system. In Kristine Lund, Pierluigi Basso Fossali, Audrey Mazur & Magali Ollagnier-Beldame (eds.), *Language is a complex adaptive system: Explorations and evidence*, 95–106. Berlin: Language Science Press. DOI: 10.5281/zenodo.6620121

of linguistics, and are determined by different elements that interact with each other in the sentence. They are part of what can be called a "system", following Larsen-Freeman & Cameron (2008):

> In the abstract and as a broad definition, a system is produced by a set of components that interact in particular ways to produce some overall state or form at a particular point in time. (p. 26)

My purpose here is to explore the complexity of this system, and to reveal aspects of it that have not yet been sufficiently taken into account in standard analyses. A system can be considered "complex" when it meets several criteria. The first criterion is the presence and interaction of agents which are heterogeneous by their nature, within the system:

> One way in which complex systems often differ from simple systems is in having many different types of elements or agents: i.e. they are "heterogeneous". […] The complexity of a complex system arises from components and subsystems being interdependent and interacting with each other in a variety of different ways. (Larsen-Freeman & Cameron 2008: 26)

The second criterion is as follows: to be considered complex, a system must have an evolutionary and dynamic nature. It is characterised by a change comparable to a flow.

> In the type of complex systems that we are concerned with, everything is dynamic: not only do the component elements and agents change with time, giving rise to changing states of the system, but the ways in which components interact with each other also change with time. (Larsen-Freeman & Cameron 2008: 29)

Finally, the third and last criterion states that within a complex system, this constant change is not linear, due to the heterogeneous nature of its components and the interactions that bind them:

> In a non-linear system, the elements or agents are not independent, and relations or interactions between elements are not fixed but may themselves change. (Larsen-Freeman & Cameron 2008: 31)

I will work on a short conversation held via chat, a form of written, synchronous, and online communication: users are simultaneously present in a virtual chat room and produce written utterances that constitute their turns of speech. This corpus will be explored from the three angles mentioned above. First, I will show that modality is a complex system composed of heterogeneous subsystems and elements. Chat conversations, which first appeared in the 1970s, make the aforementioned heterogeneity clearly visible, and certainly to compensate for the lack of a posturo-mimo-gestural system in writing, they are filled with iconic pictograms representing mimics or gestures. They are intended to indicate the speaker's emotion[1] , and thus bear modality. I will therefore present in more detail what I mean by "modality" in the first part, before describing this iconic semiotic subsystem which bears modalities and does not belong to a linguistic system per se. Then, we will study the evolutionary dynamics of modalities as the conversation progresses and show, amongst other things, that modalities interact with each other to form a global and ever-changing frame.

2 Modalities as a heterogeneous system

2.1 What I mean by "modality"

There are several ways of conceiving the notion of modality, which has its source in Aristotle's early work on logic and is historically linked to the notions of possibility and necessity. Nowadays, two major approaches address this notion. The first one, formal semantics and the semantics of possible worlds (see for example Portner 2009, 2018), is based on a purely descriptivist approach to linguistic meaning: in this context, a linguistic utterance always bears, at a more or less deep level, an absolute and verifiable truth about the world. This position is directly derived from analytical philosophy and formal logic: behind every linguistic utterance, there is somewhere a proposition or a system of propositions (called "conversational background" in Kratzer 1977, for example), which can be said to be true or false. In this perspective, modality is understood as "the linguistic phenomenon whereby grammar allows one to say things about, or on the basis of, situations which need not be real" (Portner 2009: 1). This approach

[1]The speaker is the instance that takes responsibility for the propositional content of utterances. This instance is built in and by utterances and is committed to the "truth" of what is said (the term "truth" should not be understood here in its usual sense in formal logic, but rather as an implicit intersubjective agreement concerning the truth values of the proposition uttered – on this subject see the work of Berrendonner 1981 or Anscombre 2005). The speaker is the source of a "voice" (Perrin 2009) and takes responsibility of the propositional content (Rabatel 2009).

aims to describe everything related to the expression of possibility and necessity, especially the tense and mode systems of verbs (see for example Mari 2015).

For our part, we follow the second approach, which adopts a "broad" interpretation of modality, as defined, for example, by Gosselin (2010) who states that modality is the "validation [or invalidation] of a predicated representation" (Gosselin 2010: 50, author's translation). This approach is in line with the work of Bally (1944) and Berrendonner (1981: 59). In addition to the famous "modus/dictum" distinction (the *dictum* being the "representational" part of the utterance – i.e. its propositional content, and the *modus* the judgement of the speaker who relates to it, whether it is semantically conveyed or pragmatically inferred), Bally (1944) introduces the notion of modal subject, an instance that reacts to the enunciation of a truth-conditional representation: when I say something, I automatically position myself in a certain way with respect to the truth of what I say. As for Berrendonner (1981: 59), he proposes to redefine what is meant by "truth" when analysing linguistic utterances. In particular, he shows that even assertions are based on an intersubjective truth, shared by a community of speakers (this is what he calls "on-vérité" or "we-truth"). In this context, he considers that it is more appropriate to speak about the "validation" or "invalidation" of a content than about "truth" and "falseness". Modality is therefore understood as the positioning of an enunciative instance (the modal subject) with respect to the relative "truth" of the utterance. This second view of modalities is much broader than the first one, and is not limited to the analysis of phenomena explicitly encoded in the language system, such as temporal or modal morphemes. In this perspective, modalities can be defined according to nine parameters: "validation instance, direction of adjustment, strength of validation, level in the syntactic hierarchy, scope in the logical structure, enunciative commitment, relativity, temporality, marking" (Gosselin 2010: 60, author's translation). These parameters concern most fields of classical linguistics: syntax, semantics, pragmatics, and enable us to define the traditional categories of modality.

2.2 Different subsystems to express modalities

Below is an exchange, taken from a chat corpus. The speakers (<L1> and <L2>) mention a poker game. The ten turns of speech are indicated using T1, T2, etc.

(1) T1 [14:54] <L1> alors t as gagné ?
so you won?

T1 [14:54] <L1> :p

T2 [14:55] <L2> pfff m'en parles pas
pfff tell me about it

T3 [14:58] <L1> :o
T3 [14:58] <L1> t'as perdu combien ?
how much did you lose?

T3 [14:59] <L1> épanche-toi mon petit
spill it out, kid

T4 [14:59] <L2> bah je dois en être à -100$
well I must be at -100$

T5 [14:59] <L1> ah ça va encore
ah it's still okay

T5 [14:59] <L1> je pensais que ça se chiffrait en milliers
I thought it was thousands

T6 [14:59] <L2> mais bon c'est que des gains que j'ai perdu :)
but I only lost money I had won :)
T7 [14:59] <L1> ah ok

T8 [15:00] <L2> ca va ca vient...
it comes and goes

T8 [15:00] <L2> mais bon en ce moment ca vient pas trop :S
well right now it's not coming too much :S

T9 [15:00] <L1> :(

T10 [15:03] <L2> non pas que je joue mal, mais j'ai pas de chance, je perds souvent avec le meilleur jeu
not that I play badly, but I have bad luck, I often lose with the best game

I will not analyse here all the modalities of the excerpt above, due to a lack of space, but I will mention some observations that will allow us to further broaden the notion of modality. First, it is possible to identify two ways of expressing modalities, as already described elsewhere (see Gosselin 2010). Some modalities are marked: they are semantically coded and integrated in certain linguistic forms, for example verbs. Thus, in T4, the verb *devoir* 'must' semantically bears an epistemic modality: the speaker indicates that he is not sure that he is "at −100$" but that it is probable. Other modalities are rather inferred and implicit:

in T2, an idiomatic expression such as *m'en parles pas* 'tell me about it' triggers an inferential process that leads to the conclusion that L2 has lost, but also that he is disappointed (appreciative modality). In addition to these two systems of meaning – semantics and pragmatics, which are well described in the literature on modalities (see for example Portner 2009, Gosselin 2010, etc.) there are other lesser-studied elements in digital writings: pictograms, here emoticons (T1, T3, T8 and T9), which also bear modalities (on this subject see Halté 2018, 2019a). They constitute a new "subsystem" for the expression of modality. Indeed, we believe that beyond linguistic phenomena, other utterances belonging to various semiotic systems allow the speaker to validate or invalidate predicated representations. This has already been shown by a number of publications on speech/gestures interactions, such as McNeill (2005) or, more recently, by Roseano et al. (2016), who deal with the coding of speech and gesture patterns in face-to-face interaction regarding the expression of epistemicity and evidentiality. We dare to go a bit further by considering that pictograms in digital writings can be seen as forms of written gestures, see Halté (2019b).

2.3 Iconic modalities

In addition to the already complex system of expressed or inferred linguistic modalities, *iconic* modalities are therefore at work in digital interactions in writing. These modalities are identified and interpreted according to an *iconeme*: a minimal unit of iconic meaning, based on the recognition of the resemblance to an object. The emoticons of this excerpt[2] are composed of two minimal units: first, the colon represents the eyes and constitutes what can be called a "positional" iconeme (its only purpose is to help understand how the icon is spatially organised); second, the shapes of the mouths, which are modal iconemes since they are the sole bearers of modality. This can be illustrated with the following test, which simply consists in switching these "iconemes":

(2) `T8 [15:00] <L2> mais bon en ce moment ça vient pas trop :S`
`*but right now it's not coming too much :S*`

Replacing the "S", an "iconeme" representing a mouth twisted with disgust, by a closing parenthesis changes the orientation of the modality (here appreciative), which shifts from undesirable to desirable:

[2]To be read by tilting your head to the left, to recognise: 1) :p sticking one's tongue out, 2) :o a mimic of surprise, 3) :) a smile, 4) :S a mimic of disgust, and 5) :(a sad mimic.

(3) (1') T8[15:00] <L2> mais bon en ce moment ça vient pas trop :)
but right now it's not coming too much :)

The modalities borne by "iconemes" interact with the modalities borne by the linguistic part of utterances, and produce effects (irony, emphasis, empathy, etc.) depending on whether they are in opposition or in agreement with the latter (see Yus 2011).

To sum up: the interpretation of linguistic modality is based on nine parameters (seen in §2.1); modalities can be marked or inferred; and finally, modalities can be borne by different semiotic systems interacting more or less linearly with each other as the conversation unfolds. Rather than using the term modality, I propose that from now on we talk about "complex modal system". Here, we will try to describe its evolution over the course of a conversation. Indeed, it seems plausible to imagine that all these elements would constitute a global modal configuration, which would condition the uttered contents and the successive behaviours adopted by speakers as their conversation unfolds.

3 Dynamics of modalities in conversation

3.1 Monological modal sequences

We will defend here the idea that modality is not only the reaction of a modal subject to a content that he/she utters, but rather a co-construction based on conversational parameters: sequences of turns of speech, enunciation situation, knowledge shared by the interlocutors, etc. From this perspective, following Bres & Nowakowska (2006) in particular, I consider that modality can relate not only to a content uttered by the speaker (monological modality), but also to a content uttered by the interlocutor (dialogical modality). Our purpose here is to describe sequences of monological modalities, then of dialogical ones, and finally that of an exchange, which will help to show the dynamic, changing and non-linear aspect of the complex modal system that I am trying to characterise here.

At a first level, modalities can be distributed and they interact within an utterance produced by the speaker. It is sometimes possible to identify modalities locally, at the level of one or more lexemes, but these local modalities generally contribute to the construction of a global modality, which is interpreted at the level of utterances. This is the case, for example, in T4, which is globally uttered in an epistemic manner:

(4) T4 [14:59] <L2> bah je dois en être à -100$
well I must be at -100$

Here, the epistemic modality, which is semantically borne by the verb *devoir* 'must', is combined with an appreciative modality expressed by *bah* 'well' (which has also an epistemic value here). In T6, the speaker combines an alethic modality, by presenting a content as an objective truth using an assertion centred around the verb *être* 'to be', and an appreciative modality borne by the emoticon:

(5) T6 [14:59] <L2> mais bon c'est que des gains que j'ai perdu :)
well I only lost money I had won :)

The appreciative modality, unlike other modalities, can easily be combined with all the other modalities.

Modalities can also explicitly show their fundamentally interactional nature. Thus, in T1, the question mark, with an epistemic modality, and the "sticking one's tongue out" emoticon indicating that the utterance previously produced is a provocation have one thing in common: they make explicit the fact that these modalities are addressed to others.

(6) T1 [14:54] <L1> alors t as gagné ?
so you won?
T1 [14:54] <L1> :p

The question mark indicates a real question, asked to the interlocutor; and the "sticking one's tongue out", which relates to the previously uttered proposition (it indicates that, in some way, the speaker expects a negative answer to the question asked), can only be explicitly addressed to the interlocutor. The epistemic modality, which expresses doubt or questioning, necessarily triggers an attempt by the latter to answer this doubt or question, whether it is explicitly (as is the case here) or implicitly addressed to the interlocutor. These sequences of monological modalities come into contact, at a second level, with modalities assumed by the interlocutor: they thus become dialogical modalities.

3.2 Dialogical modal sequences

Let's look at an example taken from our conversation:

(7) T8 [15:00] <L2> mais bon en ce moment ça vient pas trop :S
well right now it's not coming too much :S
T9 [15:00] <L1> :(

In T8, L2 produces an utterance with a modality that gives an appreciation (positive or negative), materialised by the emoticon ":S", which indicates disgust. T9 is produced by L1 and only consists of an emoticon representing a mimic of sadness. It is clear that the modality expressed by L2 in T8, which is an appreciative modality oriented towards the "undesirable" pole (see Gosselin 2010 for more data on appreciative modalities), determines which modalities can be used in T9. The question is how. Two hypotheses can be suggested:

- By producing T9, L1 implicitly takes up the content (or *dictum*, which is therefore not modalised) produced by L2 in T8 and modalises it in turn;
- By producing T9, L1 assigns an appreciative modality to a complete and already modalised utterance, produced in T8 by L2.

We believe that the second option is the least costly and most defensible. It is difficult to imagine that the emoticon in T9 would relate to anything other than T8, that is to say, a complete utterance, which is therefore already modalised by L2. We agree here with Bres & Nowakowska's proposition when they define dialogism in the following way:

> (a) I will consider as dialogical an utterance (or fragment of an utterance) in which the modalisation of E1 [enunciator n°1] applies to a dictum presented as already having the status of utterance, that is, a dictum that has been modalised by another enunciator, whom I refer to as e1 (Bres 1999: 72, author's translation).
>
> (b) We assume that dialogical utterances differ from monological utterances in the following way: in monological utterances, deictic and modal actualisation applies on a dictum; in dialogical utterances, this operation is not carried out on a dictum, but on (what is presented as) an already actualised utterance (Bres & Nowakowska 2006: 29, author's translation).

The framework set by Bres & Nowakowska changes the scope of application of modalities, as defined by Gosselin (2010). Indeed, this view on dialogism presupposes that it is possible to have modalities on something other than a predicated representation: an already modalised utterance. Monological modality thus sets a kind of modal background, to which other modalities can be added – dialogical ones – which are expressed later. These dialogical modalities, which apply to a previously fixed modal domain, have effects: it is because L1 expresses in

T9 an affective modality along the same lines as that expressed in T8 that T9 is interpreted as an expression of empathy.

Furthermore, it is possible not only to infer modalities, but also to make implicit contents bear modalities, still within the context of dialogue. Thus, in the sequence from T1 to T3:

(8)
```
T1 [14:54] <L1> alors t as gagné ?
                so you won
T1 [14:54] <L1> :p

T2 [14:55] <L2> pfff m'en parles pas
                pfff tell me about it

T3 [14:58] <L1> :oY
T3 [14:58] <L1> t'as perdu combien ?
                how much did you lose'

T3 [14:59] <L1> épanche-toi mon petit
                spill it out, kid
```

The surprise emoticon that appears at the very beginning of T3 brings an epistemic modality to an implicit content. Indeed, in T2, L2 produces *pffff m'en parles pas* ('pfff tell me about it'). This utterance, consisting of an idiomatic expression preceded by an onomatopoeic interjection[3] indicating disappointment, cannot be interpreted literally, but it triggers an inferential process leading to a conclusion that can be glossed as follows: 'I have lost and I am disappointed'. The epistemic modality, borne by the surprise emoticon, relates to this implicit conclusion and not to the literally uttered proposition *ne m'en parle pas* (lit: 'don't talk about it to me'). Subsequently, the conversation develops on the basis of this epistemic modality, and in T3 a request for explanation is indeed provided by L2.

4 Conclusion

While the definition of modality as the "validation of a predicated representation" appears as quite simple and easily isolable in the context of monological utter-

[3]Interjections are discursive markers that have a deictic meaning and have specific functions in interactions (see for example Baldauf-Quilliatre (2016), who deals specifically with *pff* in French). From a semiotic point of view, they are often divided in two groups that have strong semiotic differences: primary (or onomatopoeic) interjections (such as *ouf!*, for example), which come from sounds; and secondary interjections, which derive from symbolic (in the peircian frame) words (such as *Mon Dieu!*, or *Merde!*). For a definition of interjections and their semiotic categorisation, see for example Świątkowska 2006, Kleiber 2006, Halté 2018.

ances, the analysis of dialogical utterances shows that the notion needs to be extended, or at least to be considered at different levels of the conversation: we are dealing with a complex modal system, which is rather a frame where predicated, and sometimes already modalised representations, appear. We propose that, in addition to the modalities studied at the level of utterances or turns of speech, research should also include the study of modalities at the level of exchanges, as a complex system: a non-linear and unpredictable succession of validations or invalidations of explicit and implicit contents and/or already modalised contents, marked by signs belonging to different semiotic systems (not only linguistic but also posturo-mimo-gestural), interacting with each other, which determine subsequent turns of speech.

Acknowledgements

The author is grateful to the ASLAN project (ANR-10-LABX-0081) of the Université de Lyon, for its financial support within the French program "Investments for the Future" operated by the National Research Agency (ANR).

References

Anscombre, Jean-Claude. 2005. Le on-locuteur: Une entité aux multiples visages. In Jacques Bres, Pierre P. Haillet, Sylvie Mellet, Henning Nølke & Laurence Rosier (eds.), *Dialogisme et polyphonie: Approches linguistiques*, 75–94. Bruxelles: De Boeck Supérieur.

Baldauf-Quilliatre, Heike. 2016. "pf" indicating a change in orientation in French interactions. *Journal of Pragmatics* 104. 89–107. DOI: 10.1016/j.pragma.2016.07.006.

Bally, Charles. 1944. *Linguistique générale et linguistique française*. Bern: A. Francke.

Berrendonner, Alain. 1981. *Éléments de pragmatique linguistique*. Paris: Éditions de Minuit.

Bres, Jacques. 1999. Vous les entendez ? Analyse du discours et dialogisme. *Modèles linguistiques* 20(40). 71–86. DOI: 10.4000/ml.1411.

Bres, Jacques & Aleksandra Nowakowska. 2006. Dialogisme: Du principe à la matérialité discursive. In Laurent Perrin (ed.), *Le sens et ses voix*, 21–48. Metz: Université Paul Verlaine–Metz.

Gosselin, Laurent. 2010. *Les modalités en français: La validation des représentations*. Amsterdam: Rodopi. DOI: 10.1163/9789042027572.

Halté, Pierre. 2018. *Les émoticônes et les interjections dans le tchat*. Limoges: Editions Lambert Lucas.

Halté, Pierre. 2019a. Iconicité et signification modale: L'émoticône, de l'icône du corps au geste énonciatif. *Médiation et Information* 47. https://hal.archives-ouvertes.fr/hal-02148085.

Halté, Pierre. 2019b. Les gestes à l'écrit dans les interactions numériques: Description et fonctions. *Pratiques* 183-184. DOI: 10.4000/pratiques.7123.

Kleiber, Georges. 2006. Sémiotique de l'interjection. *Langages* 161(1). 10–23. DOI: 10.3917/lang.161.0010.

Kratzer, Angelika. 1977. What 'must' and 'can' must and can mean. *Linguistics and philosophy* 1(3). 337–355. DOI: 10.1007/BF00353453.

Larsen-Freeman, Diane & Lynne Cameron. 2008. *Complex systems and applied linguistics*. Oxford: Oxford University Press.

Mari, Alda. 2015. *Modalités et temps: Des modèles aux données*. Bern: Peter Lang.

McNeill, David. 2005. *Gesture and thought*. Chicago, IL: University of Chicago Press.

Perrin, Laurent. 2009. La voix et le point de vue comme formes polyphoniques externes. *Langue française* 4(164). 61–79. DOI: 10.3917/lf.164.0061.

Portner, Paul. 2009. *Modality*. Oxford: Oxford University Press.

Portner, Paul. 2018. *Mood*. Oxford: Oxford University Press.

Rabatel, Alain. 2009. Prise en charge et imputation, ou la prise en charge à responsabilité limitée... *Langue française* 2(162). 71–87. DOI: 10.3917/lf.162.0071.

Roseano, Paolo, Montserrat González, Joan Borràs-Comes & Pilar Preto. 2016. Communicating epistemic stance: how speech and gesture patterns reflect epistemicity and evidentiality. *Discourse Processes* 53(3). 135–174. DOI: 10.1080/0163853X.2014.969137.

Świątkowska, Marcela. 2006. L'interjection: Entre deixis et anaphore. *Langages* 161(1). 47–56. DOI: 10.3917/lang.161.0047.

Yus, Francisco. 2011. *Cyberpragmatics: Internet-mediated communication in context*. Amsterdam: John Benjamins.

Part III

Complexity interaction and multimodality

Chapter 10

Introduction to complexity, interaction and multimodality

Audrey Mazur[a,b,c,d] & Véronique Traverso[a,b,c,d]
[a]UMR 5161 ICAR [b]Centre National de la Recherche Scientifique [c]Ecole Normale Supérieure [d]Université Lumière Lyon 2

The third and final section of this book is based on the observation that interactive processes involve a large number of elements, related to language, but also to other semiotic fields. Interactions are embedded in contexts and contain activities and actions. Participants are characterised in a multitude of ways and their objectives unfold over time. These heterogeneous elements are also linked by multiple relationships that may also evolve thus satisfying one criterion of a complex system. Emergence is also key as researchers describe unexpected or unpredictable phenomena, either fleeting or that provoke a complete restructuring of the interaction. The chapters in this section focus on a variety of interactional and linguistic analyses on empirical data that question models or will otherwise elaborate on the theme of complexity, interaction, and multimodality.

The chapters in this section demonstrate above all that interaction, whatever its nature, context, objectives, or role in a broader whole, constitutes, as such, a complex process. In simple terms (if we dare in this context), interactive processes are complex first and foremost because, if considered as composite systems, they involve a very large number of elements: resources related to languages (syntax, lexicon, words, sounds, etc.) as well as to other semiotic fields (gestures, gaze, face expression, manipulation of objects and artefacts); different senses (sight, hearing, touch, smell); contexts, activities and actions; objectives (that can be local, global, and that evolve as the exchanges unfold); stakes of different levels; participants, to whom are attached numerous possible characterisations, such as ongoing social relations, identities, cultures, emotions, etc.

This Prévert-style inventory, though partial, highlights the heterogeneity of the elements which an attempt to describe the functioning of interaction should,

Audrey Mazur & Véronique Traverso. 2022. Introduction to complexity, interaction and multimodality. In Kristine Lund, Pierluigi Basso Fossali, Audrey Mazur & Magali Ollagnier-Beldame (eds.), *Language is a complex adaptive system: Explorations and evidence*, 109–114. Berlin: Language Science Press. DOI: 10.5281/zenodo.6620123

at one time or another, consider. Indeed, the number and heterogeneity of elements that play a role in interaction are not sufficient to speak of complexity (see Basso Fossali & Lund (2022 [this volume])). However, other characteristics make it possible to attribute to interaction this qualification. Foremost is the fact that these elements are linked by multiple relationships, which are forms of organisations ("gestalts" as conversation analysts sometimes say), but which are not necessarily stable. To echo Génelot (2014) taking over Morin's view on complexity, it can be said that these elements do not add up (talking about "everything" and "parts" does not make sense), but are organised in different ways, which – and this is another reason for complexity – change throughout the temporal course of the interaction. We can also add that these organisations do not necessarily include all the elements that could possibly be involved, and that from one organisation to another, and from one moment to another of the interaction, it is necessarily the same elements that combine in a relevant way in order to understand the interactional process.

In terms of temporality, interaction as a process is characterised by the fact that each new action carried out is likely, either to continue the current trajectory, or to redefine it and therefore to requalify the previously constructed whole.

These organisations are describable and recognisable, but they remain unstable in the sense that they also give way to local emergences, unexpected follow-up conducts or unpredictable phenomena, which may be only fleeting or, on the contrary, provoke complete restructuring.

Over the past 50 years, research on interaction has grown increasingly, and much has been done to understand these processes, shedding light on their hitherto unsuspected complexity, on the verbal, vocal and gestural levels, as well as in the fine-grained weaving of these different dimensions. Some scholars have tried to establish a general model of human interaction (see for example in France Roulet 1991, Trognon 2003). Others have sought to highlight local orders at certain levels of interactive functioning (starting with Sacks et al. 1974 on the turn-taking system). Many others have worked on descriptions of an extremely fine degree of granularity for highlighting local orders that characterise certain levels of interactional functioning over a short temporal span (an example would be Goodwin's descriptions of interactions with an aphasic man, Goodwin 2018, 2003).

The chapters in this part of the book, which refer to different fields of research and approaches (discourse-in-interaction analysis (DIA), Kerbrat-Orecchioni 2005; argumentation studies, Plantin 2016, Doury 2016; conversation analysis and interactional linguistics, Sidnell & Stivers 2012, Traverso 2016; second language acquisition, Coyle et al. 2010, Ellis & Larsen-Freeman 2009; multimodal-

ity, Streeck et al. 2011, Mondada 2014; research in education, Kress et al. 2001), position themselves in different ways in relation to the proposals referred to above. They give more or less space to a reference model and to predetermined categories. Most of them on the other hand develop a mixed approach (be it cross-disciplinary, multidisciplinary or interdisciplinary, Falk-Krzesinski 2016, Narcy-Combes 2018), considering that only hybrid theoretical and methodological frameworks are able to help us understand and conceptualise complexity in human activities (Suthers et al. 2013). It is therefore necessary to examine the conditions under which decision-making trajectories from science, practitioners, politicians and other actors can be carried out together (Scholz 2017), leading to cross-disciplinary or even transdisciplinary projects (Mazur-Palandre et al. 2019).

All the chapters are based centrally on empirical data in which recurrences are sought, which will confirm or question the chosen models, or which will lead to an elaboration on the theme: complexity, interaction and multimodality.

The paper by Polo et al. (2022 [this volume]) deals with "interaction and complexity" through the issue of how to assess the quality of students' reasoning in the specific context of a "scientific café" at school. The authors choose a mixed methodology, articulating argumentation studies, discourse-in-interaction analysis, and research in education. Their analysis of a stretch of debate among students leads them to argue that grasping the quality of argumentation in dialogue necessitates multiple units of analysis.

Griggs & Blanc (2022 [this volume]) address the issue of "interaction and complexity" in the field of second language acquisition, on the basis of a view of language development as a co-adaptive and iterative process, the study of which interaction is the natural site of observation. They examine how "constructions", as language resources, go through the process of consolidation and generalisation of language through their recycling in classroom interaction. The main objective of the paper is to contribute to a better understanding of the link between patterns of verbal interaction in this classroom setting and the development of second language competence. The analysis, which includes multimodality, mixes a qualitative and quantitative approach to the data, and shows how task-based approaches integrating language and content learning in an immersion classroom setting creates good conditions for a second language acquisition and development.

The paper by Chernyshova et al. (2022 [this volume]) deals with the issue of "interaction and complexity" through discussing the balance between "regularity" and "recognisability" on the one hand, and "irregularity" and "unexpectedness" on the other hand. The paper questions two different types of routinised turns, contrasting a well-known and expected one with an emerging one.

Through examining the repeats of these routines in interaction, it shows that a reverse process is at work in the two cases: the "regular" routine becomes used unexpectedly (both syntactically and actionally); and the emergent routine ends up being a stabilised turn format shared by the participants in the given interaction. Using conversation analysis methods, the authors show that conversational routines can be a resource for mutual understanding between speakers from different cultures with different languages, in addition to constituting vernacular forms facilitating interaction.

Baldauf-Quilliatre & Colon de Carvajal (2022 [this volume]) focus on participation frameworks in a particular situation of multiactivity: the interaction of five members of a family during a card game. Four extracts are analysed using interactional linguistic methods. The analysis of this very common and apparently simple context (card game in family) highlights how the collaborative and temporally organised character of interaction might be a good indicator of complexity and contribute, on a broader level, to the thinking about language complexity.

This third part of the book offers an interesting panel of interactional and linguistic contexts analysed with different types of tools, via different scientific methods. This richness permits the authors to discuss the theoretical, methodological and analytical conditions in which interactional practices, including dimensions, can be observed and interpreted in their complexity, and to propose ways to better understand how interactional complexity works in various contexts.

> *Our warm thoughts go to Peter Griggs who has just passed away at the moment we edit this manuscript. We won't forget Peter's passion for research, his rigor and the finesse he brought to analyses. He always had a kind word for others, and the quality of his presence facilitated collaborative work.*

Acknowledgements

The authors are grateful to the ASLAN project (ANR-10-LABX-0081) of the Université de Lyon for its financial support within the French program "Investments for the Future" operated by the National Research Agency (ANR).

References

Baldauf-Quilliatre, Heike & Isabel Colon de Carvajal. 2022. Multimodal practice of participation in a complex and dynamic framework. In Kristine Lund, Pierluigi Basso Fossali, Audrey Mazur & Magali Ollagnier-Beldame (eds.), *Lan-*

guage is a complex adaptive system: Explorations and evidence, 147–162. Berlin: Language Science Press. DOI: 10.5281/zenodo.6620129.

Basso Fossali, Pierluigi & Kristine Lund. 2022. Introduction to language as a complex adaptive system. In Kristine Lund, Pierluigi Basso Fossali, Audrey Mazur & Magali Ollagnier-Beldame (eds.), *Language is a complex adaptive system: Explorations and evidence*, v–xv. Berlin: Language Science Press. DOI: 10.5281/zenodo.6620103.

Chernyshova, Elizaveta, Vanessa Piccoli & Biagio Ursi. 2022. Multimodal conversational routines: Talk-in-interaction through the prism of complexity. In Kristine Lund, Pierluigi Basso Fossali, Audrey Mazur & Magali Ollagnier-Beldame (eds.), *Language is a complex adaptive system: Explorations and evidence*, 131–146. Berlin: Language Science Press. DOI: 10.5281/zenodo.6620127.

Coyle, Do, Philip Hood & David Marsh. 2010. *Content and language integrated learning*. Cambridge: Cambridge University Press.

Doury, Marianne. 2016. *Argumentation, analyser textes et discours*. Paris: Armand Colin.

Ellis, Nick C. & Diane Larsen-Freeman (eds.). 2009. *Language as a complex adaptive system*. Oxford: Wiley-Blackwell.

Falk-Krzesinski, Holly J. 2016. *Team science tools for research development professionals*. Slides from Annual NORDP (National Organisation of Research Development Professionals) Research Development Conference. Orlando. https://www.nordp.org/assets/RDConf2016/presentations/nordp-2016-falk-krzesinski.pdf.

Génelot, Dominique. 2014. *Responsabilité éthique dans l'action en complexité*. http://www.intelligence-complexite.org/fileadmin/docs/1408dg.pdf.

Goodwin, Charles. 2003. Conversational frameworks for the accomplishment of meaning in aphasia. In Charles Goodwin (ed.), *Conversation and brain damage*, 90–116. New York: Oxford University Press.

Goodwin, Charles. 2018. Why multimodality? Why co-operative action? (transcribed by J. Philipsen). *Social Interaction: Video-Based Studies of Human Sociality* 1(2). DOI: 10.7146/si.v1i2.110039.

Griggs, Peter & Nathalie Blanc. 2022. Second language use and development in an immersion class considered as a complex adaptive process. In Kristine Lund, Pierluigi Basso Fossali, Audrey Mazur & Magali Ollagnier-Beldame (eds.), *Language is a complex adaptive system: Explorations and evidence*, 163–178. Berlin: Language Science Press. DOI: 10.5281/zenodo.6620131.

Kerbrat-Orecchioni, Catherine. 2005. *Le discours en interaction*. Paris: Armand Colin.

Kress, Gunther, Carey Jewitt, Jon Ogborn & Tsatsarelis Charalampos. 2001. *Multimodal teaching and learning: The rhetorics of the science classroom*. London & New York: Continuum.

Mazur-Palandre, Audrey, Kristine Lund, Gerald P. Niccolai, Nathalie Blanc & François Pellegrino. 2019. *L'innovation sociale dans l'écosystème d'un laboratoire d'excellence en sciences humaines et sociales: L'exemple du labex ASLAN*. Lyon: ASLAN.

Mondada, Lorenza (ed.). 2014. *Corps en interaction: Participation, spatialité, mobilité*. Lyon: ENS Éditions.

Narcy-Combes, Jean-Paul. 2018. Ouvertures transdisciplinaires en linguistique appliquée… À partir d'une réflexion en acquisition des langues. *Éla. Étude de linguistique appliquée* 2(190). 229–240.

Plantin, Christian. 2016. *Dictionnaire de l'argumentation: Une introduction aux études d'argumentation*. Lyon: ENS Éditions.

Polo, Claire, Kristine Lund, Christian Plantin & Gerald P. Niccolai. 2022. Collective reasoning as the alignment of self-identity footings. In Kristine Lund, Pierluigi Basso Fossali, Audrey Mazur & Magali Ollagnier-Beldame (eds.), *Language is a complex adaptive system: Explorations and evidence*, 115–130. Berlin: Language Science Press. DOI: 10.5281/zenodo.6620125.

Roulet, Eddy. 1991. Vers une approche modulaire de l'analyse du discours. *Cahiers de linguistique française* 12. 53–81.

Sacks, Harvey, Emanuel A. Schegloff & Gail Jefferson. 1974. A simplest systematics for the organization of turn-taking for conversation. *Language* 50(4). 696–735. DOI: 10.2307/412243.

Scholz, Roland W. 2017. The normative dimension in transdisciplinarity, transition management, and transformation sciences: New roles of science and universities in sustainable transitioning. *Sustainability* 9(6). Article 991. DOI: 10.3929/ethz-b-000190481.

Sidnell, Jack & Tanya Stivers (eds.). 2012. *The handbook of conversation analysis*. Oxford: Wiley-Blackwell.

Streeck, Jürgen, Charles Goodwin & Curtis LeBaron (eds.). 2011. *Embodied interaction: Language and body in the material world*. Cambridge: Cambridge University Press.

Suthers, Daniel D., Kristine Lund, Carolyn Penstein Rosé, Chris Teplovs & Nancy Law (eds.). 2013. *Productive multivocality in the analysis of group interactions*. Boston, MA: Springer. DOI: 10.1007/978-1-4614-8960-3.

Traverso, Véronique. 2016. *Décrire le français parlé en interaction*. Paris: Ophrys.

Trognon, Alain. 2003. La logique interlocutoire: Un programme pour l'étude empirique des jeux de dialogue. *Questions de communication* 4. 411–425.

Chapter 11

Collective reasoning as the alignment of self-identity footings

Claire Polo[a,b], Kristine Lund[c,d,e,b], Christian Plantin[c,d,e,b] & Gerald P. Niccolai[c,d,e,b]

[a]Laboratoire Education Culture Politiques – ECP [b]Université Lumière Lyon 2 [c]UMR 5161 ICAR [d]Centre National de la Recherche Scientifique [e]Ecole Normale Supérieure

Assessing student interactions during socio-scientific debates requires an interdisciplinary theoretical background involving linguistics, argumentation, and collaborative learning. Such controversies involve techno-scientific knowledge, but also values and emotions and therefore there is no one correct answer. In this paper we revisit three types of talk (exploratory, disputational, and cumulative) used to assess the quality of students' argumentation in small groups. Authors have mainly used this typology in a mutually exclusive way in problem-solving contexts and our contribution is to show how the three intertwine in authentic interactions, focusing on the construction of complex dialogic arguments. We argue that group talk is a dynamic construct resulting from individuals unceasingly adjusting to each other. We thus propose a theoretical interpretation of how group talk is shaped by and reciprocally shapes individual communicative behaviour, through a process of (non)alignment where self-identity footings are imbricated with face-work within either the ordinary or argumentative politeness system.

1 Introduction: Linguistics applied to group reasoning

The aim of this study is the assessment of the educational quality of student-student interactions during a "scientific café" at school. Our corpus allowed us to consider 76 group dialogues about water management, videotaped in 4 schools of 3 countries, in 2011–2012. In particular, we present an in-depth analysis of a

Claire Polo, Kristine Lund, Christian Plantin & Gerald P. Niccolai. 2022. Collective reasoning as the alignment of self-identity footings. In Kristine Lund, Pierluigi Basso Fossali, Audrey Mazur & Magali Ollagnier-Beldame (eds.), *Language is a complex adaptive system: Explorations and evidence*, 115–130. Berlin: Language Science Press. DOI: 10.5281/zenodo.6620125

complex dialogue among French students, making sense of its apparent disorganisation thanks to an interactional linguistic approach. Such perspective help us build a new analytical toolkit including a thinner analytical grain, and taking an emic standpoint, trying to understand how each student makes sense of the ongoing activity. Going beyond the description of this specific dialogue, we propose a renewed theoretical view on group reasoning.

2 Theoretical background

2.1 Assessing student-student interactions in socio-scientific debates

Literature in education research raises the role of argumentation both for learning new concepts and as skills to develop (e.g. Andriessen et al. 2003). In the science classroom, argumentative tasks are often associated with solving scientific controversies and the introduction of frontier science topics and socio-scientific issues (e. g. Driver et al. 2000).

Such issues can be defined as social controversies involving techno-scientific knowledge as well as values, emotions and stakes (e.g. Albe 2006, Legardez 2006, Oulton et al. 2004, Simonneaux & Simonneaux 2009). They challenge typical science classroom practices due to four specific features: interdisciplinarity, use of information of diverse epistemic status, inclusion of subjectivity, and controversy. Students are expected to argue, but in a different way than they do in traditional problem-solving tasks, since they do not necessarily reach one single answer and may experience strong disagreement.

Nevertheless, little is known about how to assess the quality of student debates about socio-scientific issues. Most studies agree that four factors influence the quality of debates about a socio-scientific issue: students' knowledge about the topic (e.g. Lewis & Leach 2006), their understanding of the controversial and interdisciplinary nature of the issue (e.g. Driver et al. 1996), their epistemic values (e.g. Désautels & Larochelle 2005, Sandoval 2005), and the quality of students' interactions during group debates (e.g. Albe 2006, Mercer 1996). This paper aims at contributing to a better understanding of this last, interactional factor.

2.2 Face-work and the specificities of argumentative interactions

Insights from linguistics help us understand students' interactions. One key result of interactional linguistics is showing that politeness rules largely structure interactions. Politeness is defined as anything that someone does to make sure to preserve his own and others' face, or positive social value (Goffman 1967). The

term "face-work" stands for the discursive elaborations produced during interactions that embody this concern for politeness. It consists in avoiding speech acts that might be face-threatening (FTAs), and, when they cannot be avoided, in softening them (Brown & Levinson 1987). Speech acts conforming to the politeness code are therefore considered as "preferred moves" while FTA, for instance, are "dispreferred". In ordinary conversation, linguistic politeness implies a preference for agreement over disagreement (Pomerantz & Heritage 2012).

Argumentative interactions, however, are characterised by the explicit expression of disagreement. It has been claimed that disagreement then does not correspond to a breaking of the general face-work rules, but rather fit as a normal communicative act in another politeness system specific to argumentative contexts (Plantin & Blair 2018).

2.3 Collaborative learning & group talk

Research on collaborative learning has studied group argumentation as a way to learn in a diversity of settings (school, workplace, informal education, etc). Such a focus led to considering the group as a cognitive unit (e. g. Stahl 2006), and to analysing discussion features as markers of collective reasoning (e. g. Osborne et al. 2004). Mercer and Wegerif, in the context of the mathematics classroom, defined a specific talk valuable for learning referred to as exploratory talk (Mercer 1996, Wegerif & Mercer 1997):

> First it is talk in which partners present ideas as clearly and as explicitly as necessary for them to become shared and jointly evaluated. Second, it is talk in which partners reason together – problems are jointly analysed, possible explanations are compared, joint decisions are reached. (Mercer 1996: 363)

Later on, the concept of "exploratory talk" was adapted to analyse argumentation about socio-scientific issues. Then, the focus is not on consensus building but rather on students' understanding of alternative viewpoints, building up complex dialogic arguments (Albe 2006, Lewis & Leach 2006). Exploratory talk was distinguished from both cumulative talk and disputational talk, considered of less educational value. Disputational talk is "characterised by disagreement and individualised decision making" and "short exchanges consisting of assertions and counter-assertions"; whereas in cumulative talk "speakers build positively but uncritically on what the other has said" (Mercer 1996: 369). Each type of talk is related to a specific social recognition, associated to the self (disputational talk), the group (cumulative talk) or more balanced (exploratory talk) (Wegerif & Mercer 1997: 54–56). So far, authors only used this typology in a mutually exclusive

way, at the scale of a whole small-group dialogue, identified as corresponding to either exploratory, cumulative or disputational talk and no previous study has addressed whether or how the three could intertwine in authentic interactions.

3 Methodology

3.1 Pedagogical situation and corpus

Our data consist in videotaped scientific cafés about drinking water management implemented in Mexico, the US and France (Polo 2014). After giving an overview of the analysis of group talk among the 76 student-student dialogues of our corpus, this paper focuses on a debate among French high school students.

The students are in groups of 3 or 4 around a table. The activity (110 minutes long) is organised around a multiple-choice questionnaire and oriented towards a main question. The students are first asked to answer it individually with anonymous electronic devices. Then, three subtopics are explored, providing students with basic information through quiz-type questions. Each subtopic ends with a socio-scientific type question, called an "opinion question", that the students must discuss in group, arriving at a common answer. This collective vote is made public and a classroom debate begins, ending with an individual electronic survey. At the end of the activity, the main question is asked again and treated as an opinion question. During the class debate, the students can freely defend their group answer or another viewpoint, or even change their mind.

3.2 Indicators of the quality of group talk

We used five indicators, which, when all positive, define exploratory talk.

1. *Justification of opinions*: Any assertion accepting or rejecting a proposition is supported by a justification, either produced by the student who makes it or by another group member, spontaneously or after the idea was challenged. As in Toulmin's (2003 [1958]) pattern of an argument, a diversity of linguistic forms can embody justifications, often but not always introduced by causal connectors such as "because".

2. *Topical alignment*: Do the students elaborate on the argumentative content of previous turns? Linguistic markers of topical alignment are typically referential verbal or gestural repetitions.

3. *Critical examination*: Exploratory talk requires all the ideas to be truly investigated, and critically but constructively appraised, even the ones that end up discarded. In some cases, such examination relies on the *ad hoc* establishment of a specific discussion procedure consisting in going through the six options as they appear on the slide. In other groups, the dialogue focuses on the ones pre-selected by its members as they introduce them into the discussion (either directly or after each opinion was expressed). Still, this indicator does not only apply to the options of an answer: critical examination of any spoken alternative idea is expected in exploratory talk, such as competing justifications for a single option.

4. *Cooperative decision-making process*: When they are really engaged in a high-quality cognitive collaboration, the students try to have every member of the group agree on the collective vote, even if there is no consensus. For instance, a joint decision that is fairly common in our corpus is to overpass the exercise's rules and to display two group answers instead of one.

5. *Dialogic strengthening of arguments*: Do the individual contributions gradually integrate the rest of the group's arguments? Such an indicator relates to the extent to which the whole group feels responsible for the decision made. In the context of our study, this means that during the class debate, any of the group members can bring up any argument developed during the group discussion, and not only his own initial ideas. This last indicator emphasises the role of multivocality in the elaboration of an argumentative discourse.

4 Empirical studies and interpretation

4.1 Global inventory and typical cases

Table 1 presents the results of the global inventory of exploratory, cumulative and disputational cases in our corpus.

Since the indicators allowed us to identify exploratory talk sequences among Mexican, American and French students (Polo 2014: 123–155), we believe that those indicators are little dependent on culture and language. Surprisingly, we found no cases of cumulative talk in the French data while cases of disputational talk were only identified among French students. Nevertheless, excerpts of some French dialogues were similar to cumulative talk, and in each school, some cases comprised parts of dialogues with the characteristics of disputational talk. These

Table 1: Inventory of the type of talk among our 76 small-group debates about socio-scientific issues related to water management.

School type	Expl.	Cum.	Disp.	Hybrid	Total
US public	4	6	0	8	18
FR public	4	0	3	11	18
MX public rural	3	3	0	14	20
MX private urban	8	2	0	10	20
Total	19	11	3	43	76

findings led us to distinguish between "typical" cases corresponding as a whole to one category and "hybrid" cases, in which students seemed to alternate between different types of talk or develop intermediate, hybrid talk. Such hybrid cases prevailed (43/76).

We have no space here to detail the typical cases studied (Polo 2014: 156–198), but a few comments on emblematic cases of cumulative and disputational talk are necessary in order to better understand how they differ from exploratory talk. Such differences are specified along the five indicators of the quality of talk in Table 2. Cumulative talk is characterised by a negative third indicator: the lack of critical appraisal of arguments, resulting in a partial exploration of the space of debate, limited to its uncontroversial side. The typical disputational case investigated shows (1) repetitions rather than justifications of opinions; (2) limited topical alignment; (3) rejection of others' ideas without true examination and (4) individual decision-making. In both disputational and cumulative talk, the 5th indicator is negative: in the end, the students repeat their own initial ideas instead of building more complex arguments integrating the diverse perspectives.

Interestingly, the group engaged in the typical cumulative dialogue (about opinion question 1) proves capable, later on, to display rich exploratory talk during opinion question 3. Such a fact shows that engaging in a specific group talk is not only a matter of cognitive skills, but also of contextual relevancy. During the first discussion, the students might have understood the task as a display of their knowledge about the environment, and adopted the corresponding consensual self-identity attitude. When they came to opinion question 3, they had realised that the task consisted in challenging each other's ideas for the sake of group achievement.

Table 2: Characteristics of the type of group talk: five indicators.

ID	Exploratory	Disputational	Cumulative
1	Justification of opinions	Repetition instead of justifications	Justification of opinions
2	Topical alignment	Limited	Topical alignment
3	Critical examination	Rejection without examination	Acceptance without examination
4	Cooperative decision-making	Individual decision-making	Cooperative decision-making
5	Dialogic strengthening of arguments	Absent	Absent

4.2 Hybrid case & the topical and sequential nature of group talk

Three French students, Jérémie, Julie and Laurent, are discussing the main question, namely what would access to drinking water in the future depend on, displaying hybrid talk. Most of their dialogue is transcribed and translated below.

(1)
1 JUL euh: i found F xxx but i don’t remember what it is

2 JER i am sorry but it’s going to be A\

3 JUL no it’s [C\

4 JER [à because: nowadays it’s based on A

5 LAU yeah because water is gonna become more and more expensive

6 JER it’s gonna become more and more expensive and the people are
capitalists and it won’t change it has always been like that and it will always be like that=

7 LAU =water has nothing to do with capitalism\=

8 JER =yeah because [it's: the people when)

9 LAU [because water is vital so it's gonna automatically become more expensive [even

10 JER [it's vit- it's vital

11 LAU [would they be communist or whatever it'd be the same

12 JER it wouldn't\

13 LAU it would\

14 JER no\

15 LAU water would become expensive anyway

16 JER no\

17 LAU sure it would how would it work otherwise/

18 JER because

19 LAU the less there is the the scarcer it becomes and the more expensive it becomes that's logical\

20 JER of course the less there is the more expensive it it becomes

21 LAU what\

22 JER yeah but there'll always be the same amount of:

23 JUL of water

24 JER of water\=

25 JUL =[but after yeah but it=

26 LAU =[yeah but after ya gotta find ways exactly for uh: for uh:

27 JUL to make it [clean/=

28 LAU =get the water the water from the sea and all that

29 JER sure yeah and the ways what are they it's cash

30 JUL no\ it's scientific [progress

31 LAU [yeah it's cash\)

32 JER and how do you make scientific progress [how/

33 LAU [no but there's no need\=

34 JUL [it's not gonna work if you put bills on the waterfront scientific progress is needed

35 JER [cash is needed\ cash is needed so [it's A:

36 LAU [no but we they already know how to do you know uuhh unsalt the water desalinate [the water\

37 JER [but it's expensive\

38 LAU yes but it's also vital so you don't give a shit about [money\

39 JER [((pretending to count bills))

40 JUL [if you do scientific inventions in a few years you find a cheap way to euh to:

41 JER you find a way/ go ahead find one\

42 JUL no but i'm not a [scientist thanks anyway\

(...)

98 JUL cash AND scientists are needed but scientists are also needed

99 JER but cash is needed

100 JUL [yes but if you have scientists it's euh logical they must be paid

101 LAU [yes but the scientists don't worry they're relaxed

102 JUL yeah but they won't pay out of their own pockets euh to euh:

103 LAU [and euh it's okay yeah\ no but the scientists i think they earn enough not to break our butts)

104 JER [for su:re)

105 LAU [they're not gonna stop working oh shit it's a shame i'm not paid bad luck everybody dies\

```
106 JER  ((puts letter A on the stand))
107 MO1  on three you put it up one two three go ahead
108 LAU  ((takes letter A off))
109 JER  ((takes it from him and puts it on the stand again))
110 LAU  °yeah we have to put this\°
111 JER  °but:°
112 LAU  °we have to put it right now°
113 JER  °what do YOU wanna put/°
114 LAU  °A\°
115 JUL  °no but it doesn't matter\°
116 JER  °the scientists°
117 LAU  NO we have to put A dude two of us said so\
118 JER  [we put both <((putting F next to A)) we put both:>)
        (...)
124 JUL  °i promise it's okay and i don't wanna talk anyway\°
```

We first qualified their discussion as alternating between disputational and exploratory talk, through 6 distinct episodes. The students are engaged in disputational talk at turns 1–4: they oppose each other with non-supported assertions that they keep on repeating. At turn 2, Jérémie shows no concern for what the others think of option A (access will depend on economic income), which he raises as a definitive choice. Indicators 1 to 4 are negative. Jérémie and Laurent are also conducting disputational talk at turns 11–16, even if they seem to agree on option A: the disagreement is about the reasons supporting their choice. Turns 29–31 show similar patterns, but on the opposition of A to F (access will depend on scientific progress). Similarly, we identified 3 episodes of exploratory talk. At turns 4–10, Jérémie and Laurent are deeply collaborating. Laurent formulates two arguments supporting Jérémie's assertion, which he immediately repeats: water is going to become more expensive and is "vital". Indicators 1 and 2 are positive. Indicator 3 is partly positive: there is a critical look at the other's argument but no justification of the counter-assertion. The exploration of Jérémie's reason only starts at turn 17 when Laurent asks him for more explanation, beginning

another episode of exploratory talk. Laurent also develops one of the reasons he gave before about water scarcity (turn 19). This idea is co-criticised by Julie and Jérémie, who reject the premise with the argument that there will always be the same amount of water on Earth (turns 22–24). Julie then reintroduces option F in the discussion, with Laurent's help. Indicators 1, 2 and 3 are positive. From turn 32 onwards, the students are also engaged in exploratory talk. Jérémie uses a causal argument to justify that money precedes scientific progress, to which Julie opposes first a refutation by absurdity (turn 34) and then a refutation of the direction of causality (turn 40). Finally, Laurent goes beyond this materialistic opposition by referring to the fundamental norm that "you can't put a price on life" (turns 38, 105). Indicators 1, 2 and 3 are positive. The 4th indicator is also completed: Jérémie shows great concern for taking everybody's vote into account (turns 110, 113, 115), even if Julie chooses not to make her opinion visible (turn 124).

Nevertheless, considering the 5th indicator led us to proposes a deeper, alternative interpretation of this dialogue. The contributions to the class debate reveal which content from the table debate was actually shared by all the group members. This content-orientated criterion prevents quick judgment based on style effects, for instance considering that a confrontational rhetorical stance necessarily indicates disputational talk. Members of the studied group contribute to the class-debate twice. In the first contribution, the moderator asks Julie to justify her opinion. She seems pretty confused at speaking in front of everybody and cannot even remember the letter of the option that she defended. Jérémie and Laurent then help her, rephrasing an argument that she used during the group debate. Julie's main contribution is based on their previous collaboration: she concedes that money is necessary to do science, but not sufficient. A few minutes later, Laurent contributes to the discussion, then only reporting on his own idea, showing that in the end, when discussing the reasons for A, the students were not effectively cooperating.

On the contrary, the first contribution reveals that the students were actually debating efficiently when discussion centered on A vs F. Therefore, all the turns concerning this issue can be interpreted as a global topical sequence of exploratory talk. The two parts of disputational talk opposing options A and F, occurring at the very beginning of the discussion, and when the topic is reintroduced (respectively at turns 1–2 and 30–32) can be understood as opening sub-sequences, serving a function of exhibiting the different viewpoints before exploration. On the contrary, we can reinterpret part of the dialogue as a global topical sequence of disputational talk, still embedding two collaborative subsequences. The first one (turns 4–10) is an opening sub-sequence that allows Lau-

rent and Jérémie to understand what they agree and disagree on before disputing. The second one (turns 18–29) can be qualified as a transition sub-sequence during which each participant goes back to a behaviour that makes possible the following exploratory sequence. Notably, during this transitional sub-sequence, Julie steps into the dialogue again, reintroducing option F, and therefore producing a topical shift back to the A vs F debate. Such deeper analysis emphasises the topical and sequential nature of group talk. Figures 1 and 2 summarise our final interpretation of this dialogue.

1–3	Disputational > Expository pre-sequence about the competing options (A vs F)
4–11	Exploratory > Expository pre-sequence about what they disagree on about reasons for A
11–16	Disputational, about reasons for A
17–28	Embedded transitional sub-sequence, gradual alignment to constructively critical footing
29–31	Disputational > Expository pre-sequence of still competing options (A vs F)
32–60	Exploratory, about A vs F
61–90	Embedded disputational sequence, about reasons for A
91–110	Exploratory, about A vs F
110–146	Closure, with gradual disalignment of individual footings

Figure 1: Exploratory topical sequence concerning the opposition between options A and F.

5 Conclusion

In the hybrid dialogue analysed, we identified both sequences and sub-sequences of typical talk playing specific functions and a transitional sub-sequence of hybrid talk. The latter reveals that the process of engaging, as a group, in a typical form of talk may take time and work. Those findings raise two methodological concerns: the need for multiplying the units of analysis and the importance of considering group talk as a dynamic construct resulting from individuals unceasingly adjusting to each other. These methodological concerns call for adequate conceptual categories.

We propose to use of the terms “dialogue”, “sequence” and “sub-sequence” to address the first point. “Dialogue” corresponds to an actual interaction starting

1–3	Disputational > Expository pre-sequence about the competing options (A vs F)
4–11	Exploratory > Expository pre-sequence about what they disagree on about reasons for A
11–16	Disputational, about reasons for A
17–28	Embedded transitional sub-sequence, gradual alignment to constructively critical footing
29–31	Disputational > Expository pre-sequence of still competing options (A vs F)
32–60	Exploratory, about A vs F
61–90	Embedded disputational sequence, about reasons for A
91–110	Exploratory, about A vs F
110–146	Closure, with gradual disalignment of individual footings

Figure 2: Disputational topical sequence about reasons for A.

with the students being prompted by the moderator to carry out discussions in small groups, and ending when they are asked to stop. A "sequence" encompasses a topical unit of talk within a dialogue. A whole dialogue may consist in a single sequence, as in the first two cases. But a dialogue may also consist in several sequences of different group talk. Getting to a finer analytical grain, sub-sequences are parts of sequences that serve specific interactional functions, and therefore may differ from the rest of the sequence. Sub-sequences generally comprise several speech turns.

To make sense of hybrid talk, we also propose a theoretical interpretation of how group talk is shaped by and reciprocally shapes individual communicative behaviour, through a process of alignment. As the emotions associated with face preservation play a crucial role in group reasoning (Polo et al. 2016), we hypothesise that politeness strongly affects the perceived social relevancy of communicative behaviour, and therefore the type of talk developed. In small-group settings, the students must choose the appropriate politeness system, whether ordinary or argumentative. Therefore, they ensure face preservation by choosing a specific self-identity footing. When individuals display different self-identity footings, they fall into hybrid group talk. When all the members of a group are aligned

on the same self-identity footing, they may engage in any of the three types of talk (Table 3). In cumulative talk, face preservation relies on displaying a consensual footing, as in ordinary conversation. In disputational talk, face is attached to individuals' own ideas, everyone displays a competitive footing. What is very special to exploratory talk is that the matter of face preservation is transferred to the group level, face being associated with group achievement. This need for recognition so satisfied, individuals can use a constructively critical footing, shifting from the relational to the cognitive dimension of the interaction.

Table 3: Self-identity footing and face preservation system associated with each type of group talk.

	Group talk		
	Cumulative	Exploratory	Disputational
Self-identity footing	consensual	constructively critical	competitive
Face-preservation system	preserving consensus by not expressing disagreement	focusing on group achievement	searching for victory of one's own ideas upon others'

Acknowledgements

The authors are grateful to the ASLAN project (ANR-10-LABX-0081) of the Université de Lyon, for its financial support within the French program "Investments for the Future" operated by the National Research Agency (ANR).

References

Albe, Virginie. 2006. Procédés discursifs et rôles sociaux d'élèves en groupes de discussion sur une controverse socio-scientifique. *Revue Française de Pédagogie* 157. 103–118. DOI: 10.4000/rfp.604.

Andriessen, Jerry, Michael Baker & Dan Suthers (Eds.) 2003. *Arguing to learn: Confronting cognitions in computer-supported collaborative learning environments*. Dordrecht: Springer. DOI: 10.1007/978-94-017-0781-7.

Brown, Penelope & Stephen C. Levinson. 1987. *Politeness: Some universals in language usage*. Cambridge: Cambridge University Press.

Désautels, Jacques & Marie Larochelle. 2005. The epistemology of students: The "thingified" nature of scientific knowledge. In Barry Fraser & Kenneth G. Tobin (eds.), *International handbook of science education*, 115–126. Dordrecht: Kluwer Academic.

Driver, Rosalind, John Leach, Robin Millar & Phil Scott. 1996. *Young peoples's images of science*. Philadelphia: McGraw-Hill Education.

Driver, Rosalind, Paul Newton & Jonathan Osborne. 2000. Establishing the norms of scientific argumentation in classrooms. *Science Education* 84(3). 287–312. DOI: 10.1002/(SICI)1098-237X(200005)84:3<287::AID-SCE1>3.0.CO;2-A.

Goffman, Erving. 1967. *Interaction ritual: Essays on face-to-face behavior*. New York: Doubleday.

Legardez, Alain. 2006. Enseigner des questions socialement vives: Quelques points de repères. In Alain Legardez & Laurence Simonneaux (eds.), *L'école à l'épreuve de l'actualité: Enseigner les questions vives*, 19–32. Paris: ESF.

Lewis, Jenny & John Leach. 2006. Discussion of socio-scientific issues: The role of science knowledge. *International Journal of Science Education* 28(11). 1267–1287. DOI: 10.1080/09500690500439348.

Mercer, Neil. 1996. The quality of talk in children's collaborative activity in the classroom. *Learning and Instruction* 6(4). 359–377. DOI: 10.1016/S0959-4752(96)00021-7.

Osborne, Jonathan, Sibel Erduran & Shirley Simon. 2004. Enhancing the quality of argumentation in school science. *Journal of Research in Science Teaching* 41(10). 994–1020. DOI: 10.1002/tea.20035.

Oulton, Christopher, Vanessa Day, Justin Dillon, Marcus & Grace. 2004. Controversial issues-teachers' attitudes and practices in the context of citizenship education. *Oxford Review of Education* 30(4). 489–507. DOI: 10.1080/0305498042000303973.

Plantin, Christian & John Anthony Blair. 2018. *Dictionary of argumentation: An introduction to argumentation studies*. Rickmansworth: College Publications.

Polo, Claire. 2014. *L'eau à la bouche: Ressources et travail argumentatifs des élèves lors de débats socio-scientifiques sur l'eau potable. Etude comparée de 10 cafés scientifiques menés au Mexique, aux USA et en France, en 2011–2012*. Lyon: University Lyon 2. (Doctoral dissertation).

Polo, Claire, Kristine Lund, Christian Plantin & Gerald P. Niccolai. 2016. Group emotions: The social and cognitive functions of emotions in argumentation. *International Journal of Computer Supported Collaborative Learning* 11. 123–156. DOI: 10.1007/s11412-016-9232-8.

Pomerantz, Anita & John Heritage. 2012. Preference. In Jack Sidnell & Tanya Stivers (eds.), *The handbook of conversation analysis*, 210–228. Oxford: Wiley-Blackwell. DOI: 10.1002/9781118325001.ch11.

Sandoval, William A. 2005. Understanding students' practical epistemologies and their influence on learning through inquiry. *Science Education* 89(4). 634–656. DOI: 10.1002/sce.20065.

Simonneaux, Laurence & Jean Simonneaux. 2009. Students' socio-scientific reasoning on controversies from the viewpoint of education for sustainable development. *Cultural Studies of Science Education* 4(3). 657–687. DOI: 10.1007/s11422-008-9141-x.

Stahl, Gerry. 2006. *Group cognition.* Cambridge, MA: The MIT Press.

Toulmin, Stephen E. 2003 [1958]. *The uses of argument.* Cambridge: Cambridge University Press.

Wegerif, Rupert & Neil Mercer. 1997. A dialogical framework for investigating talk. In Rupert Wegerif & Peter Scrimshaw (eds.), *Computers and talk in the primary classroom*, 49–65. Clevedon: Multilingual Matters.

Chapter 12

Multimodal conversational routines: Talk-in-interaction through the prism of complexity

Elizaveta Chernyshova[a], Vanessa Piccoli[b,c,d,e] & Biagio Ursi[b,c,d,e]

[a]Skilder [b]UMR 5161 ICAR [c]Centre National de la Recherche Scientifique [d]Ecole Normale Supérieure [e]Université Lumière Lyon 2

Analyses of multimodality within human interaction showcase adaptivity and emergence in that the nature of talk is both context-shaped and context-renewing. While recurring structures and patterns illustrate order in natural conversation, unpredictable elements point to the importance of the particular setting of the conversation under study. In this chapter we discuss the balance between such expectations and emergent practices and argue for talk-in-interaction as a complex adaptive system. In two separate everyday contexts (doctor's office and grocer's), we show how a multimodal conversational routine emerges and plays different roles while satisfying the criteria of being variable, emergent, collaborative, and recognisable by the participants.

1 Introduction

From its very beginnings, conversation analysis (CA) has been interested in discovering the unwritten laws of social interaction, in order to show how participants handle the delicate task of communicating with each other. Since the seminal work of Sacks et al. (1974), many studies have contributed to show that in natural conversation, much like in every other social activity, there is "order at all points" (Sacks 1984: 22). Individual actions, social meaning, and ac-

Elizaveta Chernyshova, Vanessa Piccoli & Biagio Ursi. 2022. Multimodal conversational routines: Talk-in-interaction through the prism of complexity. In Kristine Lund, Pierluigi Basso Fossali, Audrey Mazur & Magali Ollagnier-Beldame (eds.), *Language is a complex adaptive system: Explorations and evidence*, 131–146. Berlin: Language Science Press. DOI: 10.5281/zenodo.6620127

tivities are co-constructed and recognised through the use of recurring structures and observable interactional patterns and designs. As a matter of fact, several mechanisms underlying talk-in-interaction have been shown: among others, turn-taking (Sacks et al. 1974) as the universal infrastructure for conversation, repair (Schegloff et al. 1977) and overlap onset (Jefferson 1984) as pervasive processes for the management of troubles. However, these mechanisms can only be observed in unique instances, since every stretch of talk features emerging elements, situated in a context (see Heritage 1984: 242, on the "doubly contextual" nature of talk in being both "context-shaped" and "context-renewing"). There is a part of social interaction that cannot be described or predicted using universal patterns, and is solely attributable to a particular setting or framework. The tension between the regular and the unpredictable is what seems to be the driving force of social interaction.

The aim of this chapter is to discuss this delicate balance between what is contextually expected on the one hand, and what emerges given the elements of a particular setting and framework, on the other. In order to underline this twofold feature, we will focus on the local and situated co-construction of a conversational routine[1] in different contexts of everyday life. Within the CA framework, we offer a qualitative and fine-grained multimodal analysis[2] of two instances of the conversational practices of multimodal repetition. The analysis provides evidence for the crucial role of collaboration and emergence in talk-in-interaction, two features that allow us to consider conversation as a complex adaptive system.

2 Complexity in the study of language

In the last decades, several studies have applied the notion of complexity to the study of language(s). However, as Mufwene et al. (2016) notice, few studies have questioned the nature of what is called *complexity*. A landscape of approaches to complexity is proposed by Edmonds (1999), who shows that five main concepts are traditionally named using complexity as a paradigm: (1) the size of a system in terms of composing elements, (2) the degree of ignorance of a system, (3) the minimum description size of a system (the Kolmogorov complexity), (4) variety and variations present in the system, and (5) its hybrid organisational nature. As Edmond puts it, "[c]omplexity is sometimes posited as a mid-point between

[1]Here, the expression "conversational routine" is to be intended as an emergent and shared array of verbal, vocal and multimodal resources, which are recurrently mobilised for practical purposes, and not necessarily as "conventionalised prepatterned expressions" in interaction (Coulmas 1981: 2–3).

[2]For methodological challenges of interactional multimodal analysis, see Mondada (2018).

order and disorder" (1999: 5), this point interestingly echoes with our general observations on conversation above.

Some studies in linguistics have adopted a more quantitative approach, by estimating the complexity of the different components of a language in terms of its size, variation and minimum description size (e.g., Newmeyer & Preston 2004, Ackerman & Malouf 2013, Bisang 2014). Others have focused on the evolving nature of complex systems to describe how speakers learn second and foreign languages (Oxford 2017, Oxford et al. 2018), how languages change over time and space (Kusters 2008, De Groot 2008), how language choices evolve in society (Loureiro-Porto & Miguel 2016). Complexity theory has been applied to many different sub-fields of research in linguistics and these studies have shown that all these different aspects are connected. For example, when studying the emergence of linguistic patterns "we cannot understand these phenomena unless we understand their interplay" (Beckner et al. 2009: 18).

Studying talk-in-interaction as a complex system has to include a systematic account of sequentially positioned conversational turns, as well as relevant temporalities of multimodal resources in context (Deppermann & Günthner 2015). This analytic dimension remains primordial both for the observation of the multimodal organisation (including gestures, gaze, body movements, facial expressions) and for the semiotic complexity of talk-in-interaction. It is relevant for practical purposes and the accountability of social actions, routinised practices, and recognisable emerging *gestalts* grounding on the domain of intersubjectivity and co-operative engagement (Levinson 2013, Goodwin 2018).

2.1 Talk-in-interaction as a complex adaptive system

Despite a growing interest for complexity in language in the last two decades, to this date, little or no work has been done on naturally occurring talk-in-interaction through the prism of complexity. By referring to the key components proposed by Johnson (2007) to describe a complex system, we argue that:

- Talk-in-interaction features a collection of many interacting agents, i.e. participants that are competing for a limited resource, the floor of conversation.
- Participants' behaviour is affected by their memory, i.e. their interactional history.[3] Therefore, participants can adapt their strategies according to their history.

[3]The term of *interactional history* has been discussed by Deppermann (2018) referring to the establishment of a *common ground*, while the interaction between participants unfolds through time (within one single encounter or over several encounters).

- Talk-in-interaction exhibits emergent phenomena that arise from the participants' situated actions and are not prewritten by an "invisible hand".
- Talk-in-interaction shows a mix of ordered and disordered behaviour.

The paradigm of complexity appears to be relevant when describing conversational phenomena, since the central concepts related to the paradigm according to Edmonds (1999) can be considered:

- The size of interaction as a system is hardly definable in terms of composing elements.
- To this day, no formal model of talk-in-interaction based on naturally occurring data[4] has been elaborated. Hence, it is difficult to estimate the minimum description size of such model.
- The great number of variations present from one conversational setting to another, as well as from one singular interaction to another in a same setting, makes it difficult to grasp exhaustively stable and unstable elements.

Furthermore, studies in CA show that conversational resources are profoundly adaptable "because of the reflexive relationship between action and context" (Heritage & Clayman 2010: 21). As a matter of fact, each "conversational move" impacts and supplies the interactional context. It is thus of a particular interest to consider how conversational practices emerge and are locally and interactively achieved.

2.2 The collaborative nature of talk-in-interaction

The collaborative nature of talk-in-interaction has been accounted for through a variety of concepts: the cooperative principle (Grice 1975), interactional synchrony (Condon & Ogston 1966), joint actions and common ground (Clark 1996),

[4]The regularity of certain conversational mechanisms allows for providing models of talk-in-interaction, such as it is done within CA (e.g., the infrastructure of the turn-taking machinery). However, these models only account for a limited number of dimensions of conversation (see §2). In order to provide a formal and predictive model of conversation, the CA framework is necessary but not sufficient for methodological reasons. Interesting work has been done in the domain of dialogue modelling; for example, the information-state based approach to dialogue developed by Traum & Larsson (2003) has been discussed with insights from CA by Ginzburg (2012). Being profoundly multidimensional (see, for example, the role of syntactic structures, prosodic clues and visual-embodied resources in action formation), modelling talk-in-interaction is a real challenge that, to our knowledge, has not yet been overcome.

and, more generally, co-operative engagements relying on a large variety of available semiotic resources that are collaboratively indexed by participants for practical purposes (Goodwin 2018). Studies in CA have been particularly focusing on the microanalysis of the turn-taking system, which is at the heart of the conversational device. Studying the human *interaction engine*, Levinson (2006) argued that talk-in-interaction is essentially cooperative, since participants intend their actions to be interpretable and to contribute to some larger joint venture (e.g. having a conversation).

Moreover, in talk-in-interaction, participants continuously adjust to one another, adapting their actions/turns to the other and to the interactional contingencies. Through these adjustments, participants can either *align* or *disalign* with the others' actions/turns (Stivers 2008).

3 The collaborative construction of multimodal conversational routines

As mentioned before, the conversational practices are on the one hand recognizable and, on the other hand, unique and displayed in singular contexts. It thus seems particularly interesting to consider moments in interaction where participants focus on a new element and turn it into a shared resource within their interaction.

In what follows, we focus on multimodal accomplishments of the conversational practice of repetition (previously described as a verbal practice by Traverso 2005, Schegloff 2007, Bazzanella 2011, among others). Among the very large variety of functions that repetition can implement in talk-in-interaction, it has been shown that it can express both agreement and disagreement (Traverso 2012). In both cases, repetition contributes to the overall coordination of the conversation, since it operates on the common ground (Clark & Bernicot 2008). The practice under study here is a particular kind of multimodal repetition:

1. A participant produces a verbal item in combination with some specific multimodal features – as a *multimodal gestalt* (Mondada 2014, 2018);
2. Other participants reuse the same multimodal configuration in the following exchanges.

Our analysis shows how, through this repetition, the item acquires a special situated meaning that is shared by all participants. The practice of repeating the verbal item together with multimodal elements contributes to the constitution of its locally shared meaning, and illustrates the emergence of a conversational routine.

3.1 Data

The examined data consists of video-recorded naturally occurring interactions in French. For the present paper, two examples have been chosen, representing two situations of everyday life: a medical consultation (1) and a greengrocer's shop (2). All data have been transcribed using ICOR conventions.[5] Multimodal annotations and screenshots have been added in order to account for all practices relevant in interaction, with an emic perspective (i.e. from the perspective of the participants themselves, Pike 1954). All data have been anonymised.

3.2 Analyses

In the following excerpt, Vera and her son, Anton, talk about the health problem of the latter with a physician in France. The two visitors are Albanian, and do not speak French fluently; having lived in Italy, they speak Italian.

(1) (1) *atchoum* [Corpus REMILAS[6] (see Figures 1 and 2)]

In this excerpt, a multimodal conversational routine emerges. It involves the onomatopoeia *atchoum* and the combined movements of the head (down) and the hand (up, towards the head) acting out a sneeze. This configuration is at first carried out as an adequate response (l. 06–07) to the doctor's question, which is initially addressed to the boy (l. 01). The mother solicits a reactive move from her son (l. 03); following his hesitation (*bah::*, l. 04), she self-selects herself as a responder (im. 1, open-palm gesture) and produces repeatedly the multimodal configuration, echoing the verbal repetition (*beaucoup*, l. 07). This configuration is accomplished in line 07 through four instances of a head tilt and a hand movement down (im. 05–08), after *atchoum*. Missing the lexical item that designates Anton's symptom, Vera illustrates it through a corporeal manifestation, which becomes a recurrent resource exploited by both the mother and the physician.

In line 11, the doctor formulates a question about the presence of the symptom in the past, when the family lived in Italy. The onomatopoeic *atchoum*, accompanied by the multimodal configuration, is used as a turn-expansion (im. 10), in order to secure the questioned referent, with a gestural and verbal framing (*en Italie*, im. 9 and 11). The negative answer is verbally produced by the mother (l. 14), and multimodally by her son (l. 15). In line 25, the doctor reuses this multimodal configuration for asking confirmation about the presence of *atchoum* as the only symptom that Anton presents (*juste (.) atchoum*, im. 12–13).

[5] http://icar.cnrs.fr/documents/2013_Conv_ICOR_250313.pdf. For multimodal transcription, we use the conventions developed by Mondada: https://www.lorenzamondada.net/multimodal-transcription. See also the transcription conventions at the end of the chapter.

[6] See REMILAS Project (http://www.icar.cnrs.fr/sites/projet-remilas).

```
01  DOA  Anton (0.3) qu'est-ce qu'i` [se passe]
         Anton       what is going on
02  VER                              [Anton   ]
03       <((VER touches ANT's shoulder))(1.0)>
04  ANT  bah::
         we::ll
05       (0.4)*(0.3)#01
    ver       *open palms in front of her
06  VER  *c'est *mieux#02 (.)* <((It.)) ma> beau*coup#03 beau*coup#04(0.3)  *
         it is better                  but a lot        a lot
    ver  *......*------------*(open palms towards her body, hands down)
    ver                      *...................*-----------*open palm away
    ver                                                       *frozen gesture*
```


```
07       #05*atc*choum#06 *(.) pff*#07 (0.3)*(0.4)*(0.7)*(0.3)*#08*beaucoup hein/*
             achoo                                                  a lot PART
    ver     *---*(head down)
    ver                 ....*-------*.........*-----*(hand down, head tilt x2)
    ver                                              *......*----*...*--------------*
             (hand down, head tilt x2)
```


```
08  DOA  la nuit/
         at night
09       (0.8)
10  VER  la nuit:: la journée la toute la journée et toute la nuit:
         at night  at day     all day long        and all night long

[some omitted lines]
```

Figure 1: Multimodal transcript, *atchoum* (part 1)

```
11  DOA  Italie\ (0.4) @.h en I@ta#09lie (0.3)@(0.2)@ il y avait le même (.)
         Italy          .h in Italy                  there was the same
    doa               @.......@--------------@,,,,,@pointing at ANT
12       problème (0.2)@(0.1)@ atch#10@oum (0.2)@
         problem               achoo
    doa               @.....@--------@,,,,,,,,,@head down, closed fist up
13       @en I@ta#11@lie/=@
         in Italy
    doa  @....@-----@,,,,,@pointing at ANT
```


```
14  VER  =[non](.) non non
15  ANT  <[t  ] ((head shake))>
16       (0.7)
17  DOA  [non  ]
18  VER  [t t t]
19       (3.4)
20       <((DOA types on the computer))(10.3)>
21  DOA  <((looks at ANT)) euh (.) tu as mal quelque part/>
                           ehm     do you have pain somewhere
22       (0.5)
23  ANT  <tsk ((shaking his head))>
24       (0.6)@(0.2)
    doa       @head shake-->
25  DOA  non@ juste#12 (.)@atchoum/#13
         no   only          achoo
doa      -->@
doa         @.............@hand in front of her head-->l. 27
doa                       @head down---->
```


```
26       <(0.5) ((ANT nods))>
27  VER  >@*oui@ et* beau@coup@=
         yes and a lot
    ver    *nods--*
    doa     -->@,,,,,,,,,,,,,@(head down)
    doa  >@,,,,,,,,,,,,@(hand in front of her head)

28  DOA  =est-ce que@:=
         INTERROGATIVE STRUCTURE
    doa              @....>

29  VER  =comme ça ((mimics runny nose))=
         like this
30  DOA  =le@ nez@ est bouché\
         the nose stuffy
    doa  >..@----@,,,>>(touches her nose)
```

Figure 2: Multimodal transcript, *atchoum* (part 2)

In this excerpt, the embodied accomplishement of *atchoum* becomes a multimodal conversational routine that participants use throughout the whole exchange to refer to a precise symptom. Participants mobilise it as a shared resource for preserving the successful nature of the communication, ensuring mutual understanding. Significantly, the accomplishement of the multimodal configuration that accompanies the onomatopoeic item is not exactly the same across the two participants: even though the bodily resources mobilised in a multimodal conversational routine are subject to individual implementation, participants keep a recognisable shape of these mobilisations as part of the social construction of actions. The illustrative character of the sneezing gesture is evident at the end of the excerpt, when the mother introduces it by an explanatory device: *comme ça* (l. 29).

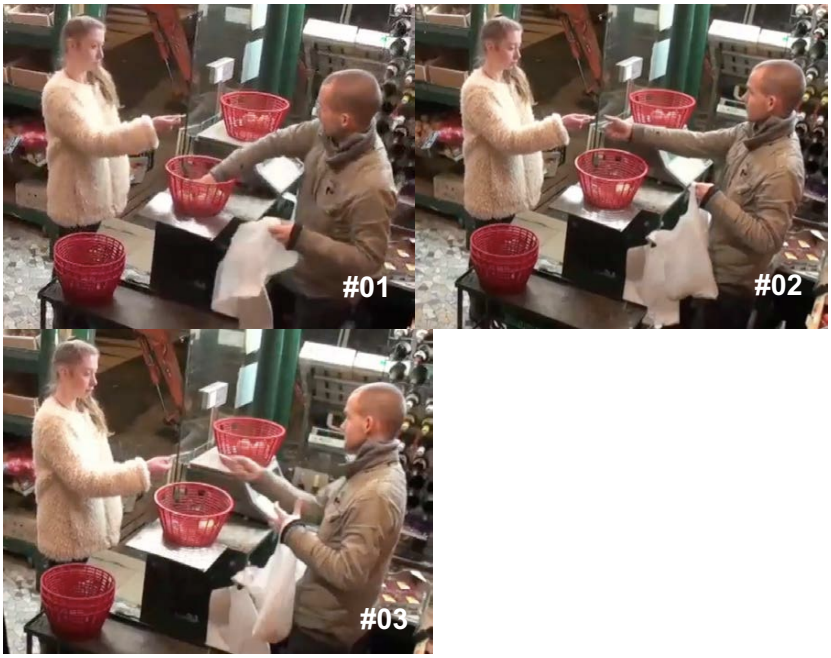
In another setting, multimodal conversational routines can punctuate some context-dependent phases of the interaction. The following excerpt is issued from an exchange recorded in a greengrocer's shop (see also Traverso 2016).

(2) (2) *tadam* [Corpus Primeur] (see Figures 3 and 4)

Here, *tadam* does not convey a specific meaning (unlike the onomatopoeic item *atchoum*). Instead, it embodies a practice that is proper to the commercial setting, i.e. handing money before the leave-taking. More precisely, the seller stretches out his arm and says *tadam* (l. 03, im. 2) in order to take the money from the hand of the client, who has previously responded to the announcement of the payment by stretching out her arm with the money (l. 02, im. 01). She then reproduces the vocal accomplishement (l. 04, im. 03), but it is once again the seller who utters this item while giving the change to the client (im. 04–05). He produces *tadam* three times, corresponding to the actions of leaving the money and the banknote in her hand.

In this case, the multimodal conversational routine is mobilised by one participant, i.e. the seller, and is repeated by the client, who recognises this emergent configuration as a resource to highlight the money exchange within the context of a commercial transaction. Similarly to the previous case, the multimodal conversational routine presents a variety of accomplishements. Namely, the seller produces the last three occurrences (l. 06 and 09) with a falling intonation contour *versus* the rising intonation of the previous one (l. 03). Here, the falling intonation signals the closing projection of the routine, which is followed by the closing statement of the seller (*tout est là*, 'everything is in here', l. 13) and the leave-taking.

```
01  SEL  deux euros +s'il vous plaît #01
         two euros   please
    cli              +stretches out arm with money-->
02        (1.6)+
    cli     -->+
03  SEL  %tadam:/#02%
    sel  %stretches out arm and takes money%
04  CLI  +%tadam:#03+%
    cli  +removes arm+
    sel   %moves down to the cash register%
```




```
05       %(4.3)%
    sel  %takes the change and stretches arm towards cli%
06  SEL  +% #04 tadam:\
    cli  +stretches out arm -->
    sel   %puts part of the change in cli's hand -->
07       (0.2)%
    sel    -->%
08  CLI  et mer[ci:]
         and thank you
09  SEL        %[ ta]dam\ #05 tadam\%
    sel        %puts coins and a banknote in cli's hand%
10       +(1.9)+
    cli  +removes arm and puts the change in her pocket+
```

Figure 3: Multimodal transcript, *tadam* (part 1)


```
11  SEL  je vous en prie
         you are welcome
12       (2.4)
13  SEL  tout est là
         everything is in here
14  CLI  merci/
         thank you
15  SEL  bonne soirée
         have a nice evening
16  CLI  bonne soirée
         have a nice evening
```

Figure 4: Multimodal transcript, *tadam* (part 2)

In this excerpt, the participants orient to the activity of money exchange as an accountable activity, which can be delimited within the unfolding of the interaction: "doing being exchanging money" (cf. Sacks 1984).

4 Multimodal conversational routines as an illustration of interaction complexity

In this paper, the CA theoretical and analytical standpoints have led us to propose a new look on talk-in-interaction through the prism of complexity. We have offered an analysis of the conversational practice of reproducing a multimodal *gestalt* by different participants within the same interaction; thanks to its repetition, it acquires a situated meaning. We have called this practice a *multimodal conversational routine*. The practice is relevant in order to illustrate talk-in-interaction as a complex adaptive system. As a matter of fact, our analyses of naturally occurring data show that these routines feature both recognisability and uniqueness at each instance: even though the verbal element of the repetition is accurately reproduced, multimodal accomplishements may slightly vary from one occurrence to another, from one speaker to another.

This reproducibility allows for example overcoming interactional troubles. In the first case, *atchoum* accompanied by hand gestures and head movements is a resource to achieve mutual understanding between speakers who do not share the same language (or, at least, do not have a sufficient competence of one language). Participants crystallise and express a referent, not relying on lexical resources: the potential referential trouble is thus solved and the linguistic gap between speakers is filled.

Moreover, the context matters: in medical settings the participants have urgent practical purposes, i.e. communicating symptoms in order to let the physician express the diagnostic outcome. In the second case, *tadam* is an interjection that is accompanied by transactional gestures (giving money, taking money, money exchanging), it punctuates the phases preceding the closing of the interaction. Once this resource is mobilised by one participant, the co-participant suddenly aligns with him. This case is interesting for its unexpected and emergent character, as opposed to the first example, illustrating the exploitation of a multidimensional accomplishement of an onomatopoeic item, which is issued from a shared linguistic (but non-lexical) *repertoire*. There is no contextual pressure in the second example; the practical purpose for using the conversational routine could be the playful nuance that is added on a specific phase of the transactional script in a commercial setting.

More generally, the mobilisation of these lesser known conversational objects is treated as unproblematic by all participants, who can reuse them with a certain degree of variability (amplitude of gestures, additional facial expressions, specific prosodic contours of the verbal item, etc.). Thus, there is a degree of recognisability for multimodal conversational routines implemented by participants as vernacular forms for interaction in given contexts, to which participants can easily adapt their interactional style. All the features that we have highlighted for the characterisation of multimodal conversational routines – recognisability, variability, emergence, collaboration – illustrate successfully the multidimensional and complex nature of interaction.[7]

As prospective research, it would be interesting to track the evolution over time of the *gestalts* that are used as multimodal conversational routines, i.e. style specificities and the appropriation of other's way for indexing referents and moments in interaction (through bodily conduct and verbal resources). Once defined as an analytic category, multimodal conversational routines would be retrieved and mapped, across languages and interaction types, as a key for exploring interaction as a complex adaptive system, and a locus of creativity and intersubjectivity.

[7]This is our main contribution to the plea in favour of overcoming reductionist views on language complexity (see Basso Fossali & Lund 2022 [this volume]).

Acknowledgements

The authors are grateful to the ASLAN project (ANR-10-LABX-0081) of the Université de Lyon, for its financial support within the French program "Investments for the Future" operated by the National Research Agency (ANR).

Transcription conventions

[oui]	Overlapping talk
/	Rising or falling intonation of the prior segment
°oui °	Lower voice
:	Prolongation of the prior sound
p'tit	Elision
trouv-	Truncation of a word
=	Latching, turn continues on new line
(peut-être)	Uncertain transcription
((laughter))	Comment, transcriber's description
<(2.4)((laughter))>	Delimitation of described phenomenon
&	Turn of the same speaker interrupted by an overlap
(.)	Micro-pause (<0.2 s)
(0.6)	Timed pause in seconds and tenths of second
**	delimit gestures done by VER
@@	delimit gestures done by DOA
+ +	delimit gestures done by CLI
% %	delimit gestures done by SEL
#	indicates the exact point where a screen shot (image) has been taken within a turn or a time measure
*- - ->	gesture continues across subsequent lines
*- - -»	gesture continues after the excerpt's end
- - ->*	gesture continues until the same symbol is reached
. . . .	gesture's preparation
- - - -	gesture's apex is reached and maintained
, , , ,	gesture's retraction

References

Ackerman, Farrell & Robert Malouf. 2013. Morphological organization: The low conditional entropy conjecture. *Language* 89(3). 429–464. DOI: 10.1353/lan.2013.0054.

Basso Fossali, Pierluigi & Kristine Lund. 2022. Introduction to language as a complex adaptive system. In Kristine Lund, Pierluigi Basso Fossali, Audrey Mazur & Magali Ollagnier-Beldame (eds.), *Language is a complex adaptive system: Explorations and evidence*, v–xv. Berlin: Language Science Press. DOI: 10.5281/zenodo.6620103.

Bazzanella, Carla. 2011. Redundancy, repetition and intensity in discourse. *Language Sciences* 33(2). 243–254. DOI: 10.1016/j.langsci.2010.10.002.

Beckner, Clay, Nick C. Ellis, Richard Blythe, John Holland, Joan Bybee, Jinyun Ke, Morten H. Christiansen, Diane Larsen-Freeman, William Croft & Tom Schoenemann. 2009. Language is a complex adaptive system: Position paper. *Language Learning* 59(1). 1–26. DOI: 10.1111/j.1467-9922.2009.00533.x.

Bisang, Walter. 2014. Overt and hidden complexity: Two types of complexity and their implications. *Poznań Studies in Contemporary Linguistics* 50(2). 127–143. DOI: 10.1515/psicl-2014-0009.

Clark, Eve V. & Josie Bernicot. 2008. Repetition as ratification: How parents and children place information in common ground. *Journal of Child Language* 35(2). 349–371. DOI: 10.1017/S0305000907008537.

Clark, Herbert H. 1996. *Using language*. Cambridge: Cambridge University Press. DOI: 10.1017/CBO9780511620539.

Condon, William S. & William Ogston. 1966. A segmentation of behavior. *Journal of Psychiatric Research* 5(3). 221–235. DOI: 10.1016/0022-3956(67)90004-0.

Coulmas, Florian. 1981. Introduction. In Florian Coulmas (ed.), *Conversational routine: Exploration in standardized communication and prepatterned speech*, 1–18. The Hague: Mouton.

De Groot, Casper. 2008. Morphological complexity as a parameter of linguistic typology: Hungarian as a contact language. In Matti Miestamo, Kaius Sinnemäki & Fred Karlsson (eds.), *Language complexity: Typology, contact, change*, 191–215. Amsterdam: John Benjamins.

Deppermann, Arnulf. 2018. Changes in turn-design over interactional histories: The case of instructions in driving school lessons. In Arnulf Deppermann & Jürgen Streeck (eds.), *Time in embodied interaction: Synchronicity and sequentiality of multimodal resources*, 293–324. Amsterdam: John Benjamins.

Deppermann, Arnulf & Susanne Günthner (eds.). 2015. *Temporality in interaction*. Amsterdam: John Benjamins.

Edmonds, Bruce. 1999. What is complexity? The philosophy of complexity per se with application to some examples in evolution. In Francis Heylighen, Johan Bollen & Alexander Riegler (eds.), *The evolution of complexity*, 1–18. Dordrecht: Kluwer.

Ginzburg, Jonathan. 2012. *The interactive stance: Meaning for conversation*. Oxford: Oxford University Press.

Goodwin, Charles. 2018. Why multimodality? Why co-operative action? (transcribed by J. Philipsen). *Social Interaction: Video-Based Studies of Human Sociality* 1(2). DOI: 10.7146/si.v1i2.110039.

Grice, Herbert P. 1975. Logic and conversation. In Peter Cole & Jerry L. Morgan (eds.), *Speech acts*, vol. 3, 41–58. New York: Academic Press.

Heritage, John. 1984. *Garfinkel and ethnomethodology*. Cambridge, UK: Polity Press.

Heritage, John & Steven Clayman. 2010. *Talk in action: Interactions, identities, and institutions*. Malden, MA: Wiley-Blackwell.

Jefferson, Gail. 1984. Notes on some orderlinesses of overlap onset. In Valentina D'Urso & Paolo Leonardi (eds.), *Discourse analysis and natural rhetoric*, 11–38. Padua: Cleup.

Johnson, Neil. 2007. *Two's company, three is complexity*. London: Oneworld.

Kusters, Wouter. 2008. Complexity in linguistic theory, language learning and language change. In Matti Miestamo, Kaius Sinnemäki & Fred Karlsson (eds.), *Language complexity: Typology, contact, change*, 3–22. Amsterdam: John Benjamins.

Levinson, Stephen C. 2006. On the human "interaction engine". In Nicholas J. Enfield & Stephen C. Levinson (eds.), *Roots of human sociality: Culture, cognition, interaction*, 39–69. Oxford-New York: Berg.

Levinson, Stephen C. 2013. Action formation and ascription. In Jack Sidnell & Tanya Stivers (eds.), *The handbook of conversation analysis*, 103–130. Oxford: Wiley-Blackwell. DOI: 10.1002/9781118325001.ch6.

Loureiro-Porto, Lucía & Maxi San Miguel. 2016. Language choice in multilingual society: A view from complexity science. In Salikoko S. Mufwene, Christophe Coupé & François Pellegrino (eds.), *Complexity in language: Developmental and evolutionary perspectives*, 187–217. Cambridge: Cambridge University Press.

Mondada, Lorenza. 2014. The local constitution of multimodal resources for social interaction. *Journal of Pragmatics* 65. 137–156. DOI: 10.1016/j.pragma.2014.04.004.

Mondada, Lorenza. 2018. Multiple temporalities of language and body in interaction: Challenges for transcribing multimodality. *Research on Language and Social Interaction* 51(1). 85–106. DOI: 10.1080/08351813.2018.1413878.

Mufwene, Salikoko S., Christophe Coupé & François Pellegrino. 2016. Complexity in language: A multifaceted phenomenon. In Salikoko S. Mufwene, Christophe Coupé & François Pellegrino (eds.), *Complexity in language: Developmental and evolutionary perspectives*, 1–29. Cambridge: Cambridge University Press.

Newmeyer, Frederick J. & Laurel B. Preston (eds.). 2004. *Measuring grammatical complexity*. Oxford: Oxford University Press.

Oxford, Rebecca L. 2017. *Teaching and researching language learning strategies: Self-regulation in context*. 2nd edn. New York: Routledge.

Oxford, Rebecca L., Roberta Z. Lavine & Carmen M. Amerstorfer. 2018. Understanding language learning strategies in context. An innovative, complexity-based approach. In Rebecca L. Oxford & Carmen M. Amerstorfer (eds.), *Language learning strategies and individual learner characteristics: Situating strategy use in diverse contexts*, 5–30. London: Bloomsbury Academic.

Pike, Kenneth L. 1954. *Language in relation to a unified theory of human behavior*. The Hague: Mouton.

Sacks, Harvey. 1984. On doing "being ordinary". In John Maxwell Atkinson & John Heritage (eds.), *Structures of social actions: Studies in conversation analysis*, 413–429. Cambridge: Cambridge University Press. DOI: 10.1017/CBO9780511665868.024.

Sacks, Harvey, Emanuel A. Schegloff & Gail Jefferson. 1974. A simplest systematics for the organization of turn-taking for conversation. *Language* 50(4). 696–735. DOI: 10.2307/412243.

Schegloff, Emanuel A. 2007. *Sequence organization in interaction: A primer in conversation analysis*. Cambridge: Cambridge University Press. DOI: 10.1017/CBO9780511791208.

Schegloff, Emanuel A., Gail Jefferson & Harvey Sacks. 1977. The preference for self-correction in the organization of repair in conversation. *Language* 53(2). 361–382. DOI: 10.2307/413107.

Stivers, Tanya. 2008. Stance, alignment, and affiliation during storytelling: When nodding is a token of affiliation. *Research on Language & Social Interaction* 41(1). 31–57. DOI: 10.1080/08351810701691123.

Traum, David R. & Staffan Larsson. 2003. The information state approach to dialogue management. In Jan van Kuppevelt & Ronnie W. Smith (eds.), *Current and new directions in discourse and dialogue*, 325–353. Dordrecht: Springer.

Traverso, Véronique. 2005. Quelques formats intégrant la répétition comme ressource pour le développement thématique dans la conversation ordinaire. *Rivista di Psicolinguistica Applicata* 4(2-3). 153–166. DOI: 10.1400/19211.

Traverso, Véronique. 2012. Organisation du cadre participatif, accord et répétition dans l'interaction. *Actes du 3e Congrès Mondial de Linguistique Française – CMLF 2012* 1. 663–679. DOI: 10.1051/shsconf/20120100203.

Traverso, Véronique. 2016. *Décrire le français parlé en interaction*. Paris: Ophrys.

Chapter 13

Multimodal practice of participation in a complex and dynamic framework

Heike Baldauf-Quilliatre[a,b,c,d] & Isabel Colon de Carvajal[a,b,c,d]
[a]UMR 5161 ICAR [b]Centre National de la Recherche Scientifique [c]Ecole Normale Supérieure [d]Université Lumière Lyon 2

Based on the argument that the resources we use in conversation are highly adaptable, we focus on the collaborative and temporally organised character of interaction in order to describe how speakers display participation. Drawing especially on Goffman's and Goodwin's work, we analyse how players of family board and card games use different resources to indicate shifts in participation frameworks. Moreover, our sequential analysis of four excerpts focusing on describing talk, gaze, body posture, gesture, and the handling of artefacts reveal an overlapping of participation frameworks. Participants orient to gaming as an overall structuring activity, but they will simultaneously accomplish individual actions and form ephemeral groups in order to co-construct specific action trajectories that will nevertheless interact with the overarching activity. Our results illustrate both the patterns in interaction as well as its non-linear and emergent character.

1 Introduction

In their paper *Language is a complex adaptive system* (CAS), Beckner et al. (2009: 1) state that "language has a fundamentally social function", a claim shared by other methodological approaches such as conversation analysis and interactional linguistics which show that language has to be considered as *talk-in-interaction*, as *situated* and *embodied*. Chernyshova et al. (2022 [this volume]) argue from a conversation-analytic point of view that not only language, but *interaction* can be described within the framework of complexity and adaptability since conversational resources are "profoundly *adaptable*" (p. 134). Based on this argumentation, we show through a detailed interactional analysis how different features

Heike Baldauf-Quilliatre & Isabel Colon de Carvajal. 2022. Multimodal practice of participation in a complex and dynamic framework. In Kristine Lund, Pierluigi Basso Fossali, Audrey Mazur & Magali Ollagnier-Beldame (eds.), *Language is a complex adaptive system: Explorations and evidence*, 147–162. Berlin: Language Science Press. DOI: 10.5281/zenodo.6620129

described with regard to the complexity of language coincide with key concepts of conversation analysis (CA), and how a consideration of the collaborative and temporally organised character of interaction might be fruitful for further reflexions on complexity.

Our paper deals with the way speakers display participation in interactions. As was shown very early in interactional research (by Goffman 1981), gatherings do not become automatically social encounters and speakers can participate in different ways in interaction. Drawing on Goffman's observations, Goodwin & Goodwin (2004) show very convincingly that these different types of participation are not defined categories, which draw on the speakers' *footings.* Speakers and hearers continuously display their footings and how they participate in the sequential construction of interaction (see also Polo et al. (2022 [this volume])). Participation is considered as *practice* "through which different kinds of parties build action together by participating in structured ways in the events that constitute a state of talk" (2004: 225); in other words, a participation framework (Goodwin & Goodwin 1992) is strongly related to the sequential organisation of activities. The growing interest in multiactivity (e.g. Haddington et al. 2014) has further highlighted the *dynamics* of a participation framework: accomplishing simultaneously different actions and being engaged simultaneously in different activities means also participating simultaneously in different courses of (inter)action and therefore displaying different ways of participating.

We focus on the participation framework in a particular situation of multiactivity: the interaction of five members of a family during a card game. After presenting our data and the methodology we adopt (§2), we show a case analysis in which we point to different practices of participation (§3). We then relate our findings to several features presented in the CAS approach (§4).

2 Data and methodology

Our study follows an emic approach to complexity: we are interested in the way in which interaction is constructed by the simultaneous and sequential emergence of multiple elements on different levels and in the way these elements are related to and respond to each other (Mondada 2019, Keevalik 2018, Imo & Lanwer 2016). We consider interaction as ingeniously multimodal and we are interested in the multimodal practices used to indicate shifts in participation framework (Cobelas Cartagena & Priego-Vázquez 2019).

The paper draws on seven hours of board and card game data, recorded in 2015 within the project *JouEs!: Playing Together – Interactional practices of gam-*

ing, funded by the Laboratory of Excellence ASLAN (Advanced Studies on Language Complexity). It shows excerpts of one gaming situation[1] where the parents AMA and NOE play together with their three daughters ELI, JEN and LEA different board games, sitting around a large table in the living room. The first game they choose is *Mistiboo*, an Old Maid card game where the odd card is a cat (the *Mistigri*). Though all participants are engaged in the gaming activity, the interaction is not straightforward: different ephemeral groups occur, sequences overlap and the players switch constantly between individual actions and interactions to co-construct the gaming situation.

3 Case analysis

We propose a sequential analysis of four excerpts from the very beginning of the game, adopting an interactional approach and focusing on the emergent construction of turns and (action) sequences. All data have been transcribed using ICOR conventions,[2] but see our specific transcription conventions at the end of this chapter, before the references.

Once the game is chosen and the cards distributed, JEN, ELI and NOE (who forms a team with LEA) take their cards and arrange them in their hands. Meanwhile AMA reads the rules on the rule card. After having collaboratively identified LEA as the youngest player who has to start the game, AMA finally also takes her cards and NOE explains to LEA how to arrange them best in her hands. The start of the game is slightly deferred while ELI orients to another pre-gaming activity: searching matching pairs. All of the participants show that they are looking for matching pairs and announce that they don't have any, except AMA who silently puts two matching cards on the table. At this moment, all participants are engaged individually in their own activity. Although these individual activities are part of the game and thus "authorised", the participants verbalise what they are doing and indicate the end of their search. These very minimal turns maintain the joint focus on the gaming interaction as a shared and collaborative co-construction and orient to the participation framework of *gaming* as a general and overarching activity.

The activity of searching is overlapped by different sequences involving different participants:

[1]For a detailed literature review of gaming from an interactional perspective see Hofstetter & Robles (2018).

[2]http://icar.cnrs.fr/documents/2013_Conv_ICOR_250313.pdf. For multimodal transcription, we use the conventions developed by Mondada: https://www.lorenzamondada.net/multimodal-transcription,

1. NOE twice instructs ELI, who sits beside him not to show her cards (and thus to change her posture).

2. AMA retakes the rule card and reads the rules partly silently and partly aloud. She structures the ongoing game and is answered by other participants who interpret this reading aloud differently.

3. LEA responds to some of the turns addressed to all participants but sometimes with a delay or by answering only parts of the turn. She keeps going on sequences that have already been closed. These overlapping sequences are generally very short and respond to different micro-problems which have emerged locally. They involve different participants and form different ephemeral groups.

In our analysis, we focus on two aspects concerning the complexity and the entanglement of this overlapping participation framework. We first show how participants use different modalities to interact within different participation frameworks. Then we describe how the categorisation and construction of groups emerge in this interaction.

The first extract (Figure 1) starts with AMA, NOE, JEN and ELI, who are searching for matching pairs. LEA is first looking out of the window but soon comes back to the cards, too. AMA, ELI and JEN announce what they are doing in different ways (l.28, 29, 30), while NOE searches silently.

While looking at his cards and thus being involved in an individual gaming activity, NOE addresses an instruction to ELI (l.31): "don't show me your cards". The turn is accompanied by an arm gesture in ELI's direction, marking a border between the two of them. The instruction is followed by an account, explaining how to carry out the instructed action ("turn away a bit", l.32). Simultaneously, ELI effectively turns her upper body and accompliswhat ELI does by an evaluative post-completion musing (Schegloff 2007), indicating that ELI's change in posture has been understood as a responding action to his instruction and therefore closes the sequence ("that's it", l.32).

NOE's verbal turn and his arm gesture together construct the instruction turn. They are produced simultaneously and amplify each other: the gesture makes the space relevant; the verbal turn specifies it as part of an instruction. ELI's response is completely nonverbal (Keevalik 2018): she interprets the turn as an instruction to change posture and accomplishes the instructed action. However, during the whole sequence NOE and ELI do not gaze at each other; they continue looking at their cards, indicating that they are still acting within the actual gaming activity:

28 AMA #[alors est-ce que] j` peux
well can I
fig #1

#1

29 ELI attends j` £regarde juste si jamais
hold on I just want to see if
leaGa £towards the window-->31
30 JEN [j` regarde si euh j'ai des paires]
I'm looking if uh I have any matching pairs
31 NOE @#[me montre pas tes £cartes] @elise
don't show me your cards elise
noeGe @moves his arms to ELI @
leaGa £
fig #2

#2

32 *$#tourne toi un p`tit peu $#(.) voilà*
turn away a bit (.) that's it
eliGe *turns her upper body *
amaGe $puts her first matching pairs on the table$
fig #3 #4

#3

#4

Figure 1: Extract 1

searching for matching pairs. Gaze is therefore used in a competitive sense with regard to gesture and language. The extract shows how different elements can be used together in order to amplify an action as well as how they can be used in a more conflictive way to accomplish different things (in other words, it shows its complexity): while gaze indicates the continuity with the on-going participation framework, language and gesture make it possible to open a new sequence in overlay with the ongoing activity which involves only two of the players.

This kind of conflictive use of different elements is rather frequent in our corpus since it allows a response to very local problems ("local sensitivity", Bergmann 1990) by continuing the ongoing gaming activity. Extract 2 (Figure 2) which occurs shortly after is very similar.

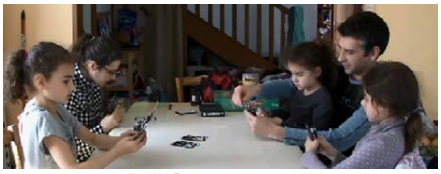
AMA is reading out loud one of the rules of the game. She hereby closes the searching sequence and opens the following activity: "the game can then begin" (l.45). The beginning has already been anticipated by ELI (l.41): she leans forward so that LEA, the youngest player and identified as the one who starts, may easily take one of her cards. ELI's change of posture does not request a (verbal) action of another participant. Nevertheless, NOE responds to this change: he produces an instruction and simultaneously points to ELI. Again, the use of different modalities makes it possible to amplify and to single out the instruction as relevant at this moment while the gaze at the cards shows the continuity with the on-going gaming activity. ELI responds to NOE's turn by silently accomplishing the instructed action: she leans backwards so that her cards become invisible for NOE.

The third extract goes back to the beginning of the game and occurs directly before Extract 1. All players are looking at their cards, except AMA who is reading aloud the rules of the game. The extract starts when AMA reads the rule that the youngest player begins (l.21).

ELI is the first participant answering AMA's turn (l.22; "it is lea"); she considers the reading as an interactive turn which requires an answer and orients to the ongoing game. Meanwhile NOE turns to LEA who is looking at the cards in her hands. He initiates a new sequence (l.25; "you've to put together what goes together") and a new action trajectory explaining to LEA how to arrange cards. Though LEA does not respond, NOE's turn initiates a new activity in the game in which all players are involved ("searching matching pairs", see Extract 1). But simultaneously, in l.26, ELI seems to initiate a repair, starting a turn which uses the same syntactic structure as in l.22 ("it is lea", l.22 vs. "it is uh::", l.26) and therefore going back to an unsolved problem – her orientation to the start of the game has not been ratified.

The reaction of LEA in lines 26–27 (see Extract 3) is particularly interesting with regard to two elements of her turns and to the adaptability of semiotic and

40 AMA #$les joueurs regardent si dans leur jeu
the players look if within their hand
amaGe $reads the rules out loud-->46
fig #4



41 #[s'ils peuvent constituer *#des paires]&
if they can form matching pairs
eliGe *leans forward with her cards-->44
fig #5 #6

#5 #6

42 LEA [---]
43 ELI [---]
44 AMA &si oui ils les posent *#devant eux
if so they lay them down
eliGe *leans backwards-->>
fig #7

#7

45 [face découverte le jeu] peut alors commencer\$
face up the game can then begin
46 NOE @[ne montre pas tes @cartes elise]
don't show your cards elise
noeGe @points to ELI @
amaGe $

Figure 2: Extract 2

21 AMA le joueur le plus jeune commence (.)
the youngest player starts
22 ELI bon ben [c'est lea alors]
well okay so it is lea
((---transcription not shown---))
25 NOE @*£#faut mettre £#ensemble* ceux qui vont £ensemble@£
you 've to put together what goes together
noeGe @his head on the right of LEA, holds his cards @
eliGa *to LEA's hands *
leaGe £collects some cards in her hands £
leaGa £to JEN £
fig #8 #9

#8 

#9 

26 ELI @c'est: euh#££::
it is uh
noeGe @pick up a card to put in his hands
leaGa £to ELI-->27
leaGe £makes a closed packet with her cards-->27
fig #10

#10 

27 LEA nous c'est q- [c'est nous]£
we it is w- it's us
leaGa £

Figure 3: Extract 3

interactional resources. First, she orients her gaze towards ELI immediately at the end of the repair, foreshadowing her identification as the one who starts (l.26). Her gaze precedes a change in posture in order to draw the first card. Second, LEA answers verbally "we it is w- it's us" (l.27) and thereby shows a categorisation of herself as "us" (LEA and NOE). She reorients the category "youngest player" towards her team and to that extent re-negotiates the category of what is meant by "youngest player".

The negotiation of categories (Stokoe 2012), e.g. "speaking as an individual player" or "speaking as member of a team", is rather frequent. Shortly after the previous excerpt, NOE initiates a question–answer sequence in Extract 4, asking LEA if she sees any identical cards (l.35). His question is accompanied by a gesture separating the cards in LEA's hand in order to compare them more easily.

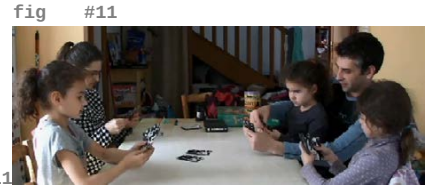
At this moment, LEA starts to gaze successively at the cards in her and NOE's hands. She does not answer a polar question but produces a responsive action to a request (searching silently for matching pairs). Meanwhile, JEN and ELI announce that they don't have any matching pairs. In l.39, NOE pursues this announcement series, in overlap with ELI. Without waiting for LEA to answer his question, he responds as an individual (" well I don't think") for their team ("we have any either"). AMA then terminates the "searching for matching pairs" activity by reading aloud the rule (see Extract 1).

During all this time, LEA continues gazing at her and NOE's cards. She then produces a responsive turn in overlap with AMA (l.42). This turn takes into account elements of the previous turns and seems to be a post-completion of the sequence. She positions herself as somebody who also "knows how to make matching pairs". Finally, in l.48, after the instruction sequence between NOE and ELI (analysed in Extract 2), LEA confirms NOE's announcement concerning the matching pairs in their team ("we don't have any") and hereby finally indirectly answers NOE's polar question (l.35). Her categorisation as a team is simultaneously illustrated by NOE assembling all their cards in his hands.

4 Discussion

The extracts have shown some aspects which seem to be particularly interesting with regard to the complexity of interaction and the adaptability of semiotic and conversation resources: on the one hand, a very common and apparently simple scene of life reveals a dynamic and fluctuating participation framework with different ephemeral groups, overlapping sequences and multiple trajectories of action and interaction. On the other hand, different types of resources are used

35 NOE £@est-ce que t` en vois £qui sont pareilles toi/@
do you see some which are identical
leaGa £to NOE's cards £to her cards-->36
noeGe @separates cards in LEA's hand @
36 JEN #@ah mais moi £j'ai pas d` paires£
oh but I don't have any pairs
leaGa £to NOE's cards £
noeGe @holds LEA's cards with his right hand-->38
fig #11



#11
37 £(0.5)
leaGa £to her cards-->38
38 ELI mh. £[moi aussi j'ai @pas d` paires]£=
mh. me neither I don't have any pairs
39 NOE [ben j` crois qu` nous non plus]
well I don't think we have any either
leaGa £to NOE's cards £
noeGe @
((---transcription not shown---))
42 LEA £[moi aussi j` sais faire des paires]£
me too I know how to form pairs
leaGa £to NOE's cards £
((---transcription not shown---))
45 AMA [face découverte le jeu] @#peut alors commencer\
face up the game **can then begin**
noeGe @collect all the cards in his hand
fig #12

#12
46 NOE [ne montre pas tes cartes elise]
don't show your cards elise
47 **(0.4)@**
noeGe @
48 LEA £#on n'a pas d` p-
we don't have any p-
leaGe £put her head on both her hands
fig #13

#13

Figure 4: Extract 4

in different ways and allow participants to interact simultaneously in different participation frameworks.

When Beckner et al. (2009) characterise language as a CAS, they draw mostly on seven different arguments. They argue for instance that language structures are intertwined with and dependent on local particularities. This approach seems to be complementary to general claims and findings of CA, such as the conception of interaction as co-construction of the participants, the emergence of structures in the process of interaction or the multiplicity of interconnected elements and modes participating in the organisation of interaction.

According to CA, interaction is organised in sequences, whether they are constituted of verbal turns or verbal and nonverbal ones (Keevalik 2018). Different sequences can show an *overall structural organisation* (Robinson 2013) and constitute a more or less extended activity (Heritage & Sorjonen 1994). In our example, the opening phase of the card game is constituted by different *sequences of sequences* (Schegloff 2007) and *sequences of actions*. Some of them are *a priori* done individually (e.g. searching for matching pairs), others have to be accomplished interactionally (e.g. establishing the person who starts playing). The players do not always progress in the same way, since sequences as well as *sequences of sequences* may overlap. At the same time, extra-linguistic elements or events can locally become important and relevant for interaction. Changes in posture, for instance, can be identified as strategically positive or negative and to that extent are addressed as interactionally relevant. Participants, then, have to deal with different overlapping trajectories and with a non-linear interactional structure by constantly adapting their practices and the resources they use.

The emergent character of structures is closely related to the co-construction of turns, sequences and *sequences of sequences*: each turn has to take into account prior turns and activities, the (multiple) participation framework, and the constraints and opportunities of the interactional site as well as the speaker's entitlement to take the turn and the type of action they are asked to produce. While AMA and ELI focus on the identification of the one who starts the game (Extract 3, l.21–22), NOE opens another sequence, including LEA and himself as members of a team (l.25). His turn treats the previous sequence as closed and goes on with other gaming activities. ELI and LEA nevertheless come back to the previous sequence and show that it has not been closed yet.

Since turns emerge in interaction and draw attention to what happened previously, sequences and activities do not always proceed in linear ways: ELI's and LEA's turns draw attention to AMA's reading aloud, while NOE's turn draws attention to the way LEA arranges the cards in her hand. The "searching for

matching pairs" activity shows how participants nevertheless orient to progressivity (Stivers & Robinson 2006), not in a linear way, but by constantly paying attention to local changes.

Sequence organisation, as well as *sequential* organisation, are closely related to the projection and ascription of actions: turns and actions are constantly adapted to local micro-problems. AMA for instance is reading aloud the game rules, gazing at and focusing on the rule card. While the reading in Extract 3, l.21–22 ("the youngest player starts"), is interpreted as an interactive turn and answered by ELI, the following rule read by AMA l.23 ("we go clockwise", not reproduced in the transcript) is not being answered at all; the other players are engaged in other, individual activities, looking at their cards and arranging them in their hands. AMA's reading has been considered as reviewing the game rules on her own.

The analyses have also oriented to the importance of considering interaction as a *multimodal* achievement. *Multimodality* here includes the elements – other than speech – produced during the turns or during a silence: gaze, gesture, non-vocal actions, but also elements related to speech such as prosody or voice quality. When Beckner et al. (2009: 16) argue that "multiple interacting elements, […] may amplify and/or compete with one another's effects", interactional analysis can show not only how this is carried out in concrete interactions, but also how it is achieved collaboratively. When AMA, in Extract 2, begins to read aloud the rules of the game, her reading is aligned with her gaze on the rule card and with her posture, holding the card in her hand: different resources are used to construct the turn as "reading aloud". In extract 4 (l.35 "do you see some which are identical"), different resources design the turn as particular action addressed to one particular participant (and therefore construct an ephemeral group): while NOE simultaneously to his question separates the cards in LEA's hands, LEA alternates her gaze between her and NOE's cards. Gesture and gaze specify NOE's turn as a question addressed to LEA which implies a search that LEA accomplishes. NOE's turn takes into account LEA's actions and LEA responds to NOE, even if her responsive actions are not verbal ones.

Whereas in these examples the different resources specify or amplify each other, other examples show that they can also be used competitively, for instance to interact simultaneously in different participation frameworks: in Extract 1, NOE points his arm towards ELI and produces a verbal turn, advising her not to show her cards (and forming an ephemeral group NOE/ELI). His gaze remains focused on his cards (and maintains the participation framework he forms with his team member LEA). In a similar way, in Extract 4, NOE advises ELI in a verbal turn not to show her cards (forming an ephemeral group NOE/ELI), but

at the same time he gazes at his cards and continues collecting all the cards in his hand (acting within the NOE/LEA team). Such examples show not only the importance of considering language as one resource among others, but also the complex ways in which these resources work together, particularly in terms of sequence organisation (overlapping, non-linearity, local vs. global organisation, emergence of ephemeral groups, etc.).

5 Conclusion

While Chernyshova et al. 2022 [this volume] draw on conversational routines and multimodal *gestalts* to illustrate the complex nature of interaction through a CA analysis, we discussed the notion of complexity in interaction with regard to multimodal practices of constructing a dynamic and fluctuating participation framework. Our paper showed that the concept of *complex adaptive system* and the arguments developed by Beckner et al. (2009) can be useful for describing the complexity of interaction and that a conversation analytic approach can complete and specify these arguments.

Our analysis has focused on the construction of participation frameworks: whereas participants orient to *gaming* as an overall structuring activity, they interact in different overlapping sequences, accomplish individual actions, follow different action trajectories and form different ephemeral groups. They hereby point to interaction as non-linear and turns as emergent though well organised.

Our study is based on a sequential and multimodal analysis and considers language as an important but not the only resource for interaction. It therefore aims to highlight how the notions of sequentiality, temporality and multimodality can be used to complete the CAS approach. By treating turn and sequence production as inherently emergent and as a joint achievement in interaction, conversation analysis adds another perspective to an emic approach of complexity.

Acknowledgements

The authors are grateful to the ASLAN project (ANR-10-LABX-0081) of the Université de Lyon for its financial support within the French program “Investments for the Future” operated by the National Research Agency (ANR).

Transcription conventions

`[oui]`	Overlapping talk
`/`	Rising or falling intonation of the prior segment
`°oui°`	Lower voice
`:`	Prolongation of the prior sound
`p`tit`	Elision
`trouv-`	Truncation of a word
`xxx`	Incomprehensible syllable
`=`	Latching, turn continues on a new line
`( )`	Uncertain transcription
`((laughter))`	Comment, transcriber's description
`&`	Turn of the same speaker interrupted by an overlap
`(.)`	Micro-pause (< 0.2s)
`(2.6)`	Timed pause Timed pause in seconds and tenths of second
`*- - ->12`	gesture continues until line 12
`*- - ->>`	gesture continues after the excerpt's end
`ff`	delimit LEA's gestures and gazes
`**`	delimit ELI's gestures and gazes
`$$`	delimit AMA's gestures and gazes
`@@`	delimit NOE's gestures and gazes
`#`	indicates the exact point where a screen shot (image) has been taken within a turn or a time measure

References

Beckner, Clay, Nick C. Ellis, Richard Blythe, John Holland, Joan Bybee, Jinyun Ke, Morten H. Christiansen, Diane Larsen-Freeman, William Croft & Tom Schoenemann. 2009. Language is a complex adaptive system: Position paper. *Language Learning* 59(1). 1–26. DOI: 10.1111/j.1467-9922.2009.00533.x.

Bergmann, John. 1990. On the local sensitivity of conversation. In Ivana Markova & Klaus Foppa (eds.), *The dynamics of dialogue*, 201–282. London: Springer.

Chernyshova, Elizaveta, Vanessa Piccoli & Biagio Ursi. 2022. Multimodal conversational routines: Talk-in-interaction through the prism of complexity. In Kristine Lund, Pierluigi Basso Fossali, Audrey Mazur & Magali Ollagnier-Beldame (eds.), *Language is a complex adaptive system: Explorations and evidence*, 131–146. Berlin: Language Science Press. DOI: 10.5281/zenodo.6620127.

Cobelas Cartagena, Maria Ángeles & Gabriela Priego-Vázquez. 2019. Participation frameworks and socio-discursive competence in young children: The role of multimodal strategies. *Discourse Studies* 21(2). 135–158. DOI: 10.1177/1461445618802656.

Goffman, Erving. 1981. *Forms of talk*. Philadelphia: University of Pennsylvania Press.

Goodwin, Charles & Marjorie H. Goodwin. 1992. Context, activity and participation. In Peter Auer & Aldo Di Luzio (eds.), *The contextualization of language*, 77–99. Amsterdam: John Benjamins. DOI: 10.1075/pbns.22.07goo.

Goodwin, Charles & Marjorie H. Goodwin. 2004. Participation. In Alessandro Duranti (ed.), *A companion to linguistic anthropology*, 222–244. Malden, MA & Oxford: Blackwell.

Haddington, Pentti, Tiina Keisanen, Lorenza Mondada & Maurice Nevile. 2014. *Multiactivity in social interaction: Beyond multitasking*. Amsterdam: John Benjamins. DOI: 10.1075/z.187.

Heritage, John & Marja-Leena Sorjonen. 1994. Constituting and maintaining activities across sequences: And-prefacing as a feature of question design. *Language in Society* 23(1). 1–29. DOI: 10.1017/S0047404500017656.

Hofstetter, Emily & Jessica Robles. 2018. Manipulation in board game interactions: Being a sporting player. *Symbolic Interaction* 42(2). 301–320. DOI: 10.1002/symb.396.

Imo, Wolfgang & Jens Lanwer. 2016. Sprache ist komplex. Nur: Für wen? *Sprache Interaktion Arbeitspapierreihe (SpIn)* 60. http://arbeitspapiere.sprache-interaktion.de/arbeitspapiere/arbeitspapier60.pdf.

Keevalik, Leelo. 2018. What does embodied interaction tell us about grammar? *Research on Language and Social Interaction* 51(1). 1–21. DOI: 10.1080/08351813.2018.1413887.

Mondada, Lorenza. 2019. Contemporary issues in conversation analysis: Embodiment and materiality, multimodality and multisensoriality in social interaction. *Journal of Pragmatics* 145. 47–62. DOI: 10.1016/j.pragma.2019.01.016.

Polo, Claire, Kristine Lund, Christian Plantin & Gerald P. Niccolai. 2022. Collective reasoning as the alignment of self-identity footings. In Kristine Lund, Pierluigi Basso Fossali, Audrey Mazur & Magali Ollagnier-Beldame (eds.), *Language is a complex adaptive system: Explorations and evidence*, 115–130. Berlin: Language Science Press. DOI: 10.5281/zenodo.6620125.

Robinson, Jeffrey D. 2013. Overall structural organization. In Jack Sidnell & Tanya Stivers (eds.), *The handbook of conversation analysis*, 257–280. Oxford: Wiley-Blackwell.

Schegloff, Emanuel A. 2007. *Sequence organization in interaction: A primer in conversation analysis*. Cambridge: Cambridge University Press. DOI: 10.1017/CBO9780511791208.

Stivers, Tanya & Jeffrey D. Robinson. 2006. A preference for progressivity in interaction. *Language in Society* 35(3). 367–392. DOI: 10.1017/S0047404506060179.

Stokoe, Elizabeth. 2012. Moving forward with membership categorization analysis: Methods for systematic analysis. *Discourse Studies* 14(3). 277–303. DOI: 10.1177/1461445612441534.

Chapter 14

Second language use and development in an immersion class considered as a complex adaptive process

Peter Griggs[a,b,c,d] & Nathalie Blanc[a,b,c,d,e]

[a]UMR 5161 ICAR [b]Centre National de la Recherche Scientifique [c]Ecole Normale Supérieure [d]Université Lumière Lyon 2 [e]Université Claud Bernard Lyon 1

We used a mixed methods approach in this chapter to show the strong relation between the development of second language competence and how language is (re)used and analysed within various discourse settings. Building on theory that explains learning as a progression from the social and interactive planes to the cognitive, the term "proceduralisation" is proposed to denote the gradual development of language learning as a cyclical process. Results show that the trajectories of language use and learning are closely intertwined. On the one hand, language constructions are consolidated and generalised through their use in different contexts. On the other hand, the regulation and structuring of language use is mediated by the multimodal resources of the classroom.

We fondly remember Peter Griggs who passed as we edit this manuscript. Peter never counted the time he spent with his students and he was devoted to helping teachers build a strong, research-based practice.

1 Introduction

This study explores second language acquisition in a fourth year science class in a French immersion primary school in Minnesota composed of pupils (8–9

Peter Griggs & Nathalie Blanc. 2022. Second language use and development in an immersion class considered as a complex adaptive process. In Kristine Lund, Pierluigi Basso Fossali, Audrey Mazur & Magali Ollagnier-Beldame (eds.), *Language is a complex adaptive system: Explorations and evidence*, 163–178. Berlin: Language Science Press. DOI: 10.5281/zenodo.6620131

years old) from principally monolingual American families. Recent research in this field (Carol 2005, Coyle et al. 2010, Dalton-Puffer 2007, Lyster 2007, Serra & Steffen 2010) emphasises the importance of relating the development of language competence to the way in which language is used, analysed and recycled in different discourse settings in the course of content learning. The usage-based perspective adopted in the present study regards language not as a static system composed of top-down rules and principles but as a complex adaptive system emerging bottom-up from the interplay between multiple components of the discourse context (Ellis & Larsen-Freeman 2009).

2 Usage-based and complexity theories of second language learning

Usage-based theories consider language to be a dynamic set of patterns (or "chunks", "constructions") emerging from use, those that saliently, frequently and reliably occur stabilising over time in a complex system (Ellis 2001, MacWhinney 1987, Tomasello 2003). Complexity theory, as it is presented by Ellis & Larsen-Freeman (2009), focuses more particularly on the social and interactive dimensions of usage-based theory. Language development is considered to be a co-adaptive and iterative process whereby language resources are dynamically altered through learners interacting with one another and repeatedly revisiting similar discourse domains. Drawing on the work of Anderson (1996), Griggs et al. (2002) and Griggs (2007), we propose to use the term "proceduralisation" to denote the gradual development of second language competence through its use as a communicative tool in different discourse contexts. Proceduralisation is considered to be based on such processes as generalisation, discrimination, consolidation, and automatisation of language knowledge and the tuning of this knowledge to the norms of the target language.

3 A praxeological and multimodal context of second language use

Such a perspective needs also to include the whole ecological dimension of the classroom context by integrating into the analysis of language production the praxeological and multimodal aspects of classroom interaction. Much research has shown how joint social actions are built and interpreted on the basis of the simultaneous use of a heterogeneous collection of semiotic resources (eg. Goodwin

1981, Streeck et al. 2011, Kress et al. 2001, Kress 2019). Other researchers working in a sociocultural approach (Lantolf 2011, McCafferty 2002, Negueruela-Azarola & Lantolf 2008), have developed on the Vygotskyan notion of "internalisation" (Gal'perin 1967) to explain learning processes in terms of a progression from a social, interactive plane to a cognitive plane – the multimodal resources available in the learning context serving as mediation tools to control and regulate cognitive functioning.

4 Aims of the study and methods of analysis

The objective of this study is to explore the interplay between the discourse features of the pedagogical tasks, the verbal output of the learners and their exploitation of multimodal resources and to envisage these factors as a dynamic source of proceduralisation and internalisation of second language skills. The method used consists essentially in relating a finely grained analysis of multimodal interactions occurring locally to a more global analysis of the way emerging phenomena evolve on a larger temporal scale. We consider that articulating these two levels of activity should allow us to comprehend more clearly the links between patterns of verbal interaction in this classroom setting and the development of second language competence.

The corpus is based on a video recording of the last two lessons (about one and a half hours) of an eight-hour teaching module.[1] One camera recorded without interruption the different phases of classroom activity, focusing primarily on a group of three pupils (S, G and A).

An initial transcription was typed into the software package TRANSANA[2] and precoded according to the criterion of "discourse genre" which, in this classroom setting, corresponds to Dalton Puffer's definition (2007: 40) of a "sequence of discourse defined by a predominant communicative objective".

We defined five categories:

1. *Summary:* describe, discuss or evaluate previous activities;
2. *Instruction:* give, reformulate or discuss instructions;
3. *Explanation:* explain, or clarify knowledge, actions or diagrams;

[1]For more methodological details see Blanc & Griggs (2015).

[2]A software package for analysing video data developed by the Wisconsin Centre for Educational Research University of Madison (EU): www.transana.org.

4. *Commentary:* describe or justify actions in process;
5. *Negotiation:* discuss and argue proposals and decisions.

Using these criteria, we first identified interactive sequences representing important phases in the evolution of the scientific project. A qualitative study of these sequences was carried out on the basis of a more detailed transcription combining verbal and non-verbal signs and drawing on methods of conversational analysis. Quantitative analyses were then done on a more global scale, concerning the frequency and the evolution of the phenomena that occur.

5 Qualitative analysis of the group production of a diagram

The lessons are composed of a series of intermediary tasks, performed in semi-autonomous groups and scaffolded by teacher interventions, instructions, work cards and collective debriefing sessions, involving the production of a diagram and a model of an electric circuit. These tasks are at the service of a pedagogical objective which is to construct scientific knowledge and, incidentally, second language competence. In this first extract, the task in which a group of three students is engaged consists in drawing collectively the diagram of an electric circuit from rough drafts that they have produced individually.

Table 1: Extract 1 (see page 176 for a list of transcription conventions)

Turn	Speaker	Verbal and non verbal productions
1	G	Premier/ou la liste des mots \
2	S	**on va fai::re** ☻le dessin en premier 0 ☻***deictic*** **gesture** *: S points at G's drawing with her pencil* *G sits up and positions herself in front of the sheet of paper* ☻parce que on n'est pas ☻*S leans towards the sheet of paper* ☻sûres ☻***beat*** **gesture***: S punctuates the word with her two hands*

Turn	Speaker	Verbal and non verbal productions
3	S	*S draws* maintenant:: (…)
4	G	☻(……) ☻ G *moves her finger quickly towards the pencil*
5	S	oui
6	G	*G takes the pencil* [est-ce qu'on va::
7	S	[maintenant **on a** besoin ☻d'une ampoule ☻***deictic* gesture***: S points her finger towards the paper*
8	G	*G starts to draw* attends **je peux pas** (…) *G takes the sheet on her knees and continues to draw* *S snaps her fingerss* ☺et on besoin des euh ☺ *S takes the sheet and the pencil* ☻piles ☻***beat* gesture**: *G punctuates the word with her finger*
9	S	et **on va connecter** à la base \ ☻maintenant on a besoin d'un::e ☻*S leans over and draws* ☻et maintenant **on va connecter** 0 **je vais faire deux lignes** ☻*S traces a first line then a second*
10	G	*G takes the pen from S*
11	S	*with her right hand S traces 2 other connections to make in the diagram*
	G	*G takes the paper from her* ☻donc ça à ça ☻*she redraws the line with the pencil*
13	S	☻et 0 ça à ça et ça à ça ☻***deictic* gesture**: *S points her finger at the connections to make in the diagram*
14	G	*G draws the lines in the diagram*
15	A	Je pensais qu'on a deu(x) ampoules ou deux ampoules

Turn	Speaker	Verbal and non verbal productions
16	G	*G stops drawing* *G raises her head and looks at* S *S raises her head at the same time*
17	S	☻**on peut avoir deux ampoules** ☻*S shakes her head*
18	G	☻**tu veux deux ampoules** ☻*G looks at S*
19	S	☻**on va tester avec une ampoule** ☻ ***deictic*** **gesture:** *S shakes her finger towards a bulb* et après c'est::
20	G	☻**on peut ajouter une ampoule ici** ☻*G looks at S and* **(deictic gesture**) *points the pencil at her paper*
21	S	☻d'accord ☻ *S nods in agreement*

In this joint drawing activity, language has essentially an interactive function of task management. G and S take turns drawing the diagram, passing the pencil and paper from one to another, while A looks on. Speech production during the drawing task allows the pupils to make and justify decisions about the activity in progress and to confirm mutual understanding. It also serves to define roles, coordinate individual participation in the joint activity, consolidate links between different levels of the task and negotiate decision-making. Our analysis shows that the pupils perform these diverse interactive functions smoothly and effectively on the basis of the reiterative use of a set of 9 analogous language constructions (underlined in the transcription).

6 Quantitative analysis of recurrent construction

Following our analysis of this and other extracts, we elaborated from the constructions isolated in the extract a more generalised, prototypical construction which we fed into the textometric software package TXM[3] in order to investigate its frequency:

[3]Developed by the research laboratory UMR 5191 ICAR, cf. presentation: http://textometrie.ens-lyon.fr/spip.php?rubrique96.

(1) PRONOUN+( )+*vouloir/pouvoir/devoir/aller*+( )+ VERB/NOUN

The method adopted involved, first of all, carrying out a quantitative analysis of the frequency with which the construction was used by the teacher and the pupils, and then charting the trajectory of use of the construction in the two lessons and the way it was recycled in the five pre-classed discourse genres (see Tables 1 and 2).

Table 2: Frequency of construction in teacher and pupil ouput

	n words	*n* construction	Words in constr.	
			n	%
Teacher ouput	3061	102	398	13.0
Native assistant output	84	1	3	3.6
Pupil output	3105	111	446	14.4
Whole corpus	6250	214	847	13.6

The first column in Table 1 gives the total number of words used in the whole corpus and their distribution into three categories – teacher output, pupil output and native assistant output – and shows approximately the same amount of teacher and pupil output during the three lessons.

The second column concerns the target construction, showing that it is used with a similar frequency by the teacher and by the pupils.

The third and fourth columns calculate the frequency of the construction in terms of the number of words used and in terms of a percentage of the total number of words used in the whole corpus. We postulate that these percentages (teacher 13%; pupils 14.4%; corpus 13.6%) are very high. The only measure of comparison we could carry out using TXM in order to verify this hypothesis was that of the frequency of the same construction in the corpus of a native language science class in a secondary school in France. This calculation revealed a rate of frequency of 0.09%.

Another interesting result was that the rate of use of the construction was about the same for the teacher as for the pupils.

Table 2 shows the distribution of the same structure in the different discourse genres.

The results show that the frequency of use is relatively high in all five discourse genres, varying nevertheless between 18.6% for the "negotiation" category and 7.8% and 9% respectively for "commentary" and "summary". The variance in rate

Table 3: Frequency of the construction according to discourse genre.

	n words	*n* construction	Words in constr.	
			n	%
Summary	1146	28	104	9.0
Instruction	1596	62	242	15.2
Explanation	1079	37	161	14.9
Commentary	1029	24	80	7.8
Negotiation	1400	63	260	18.6
Total	6250	214	847	13.6

of frequency between genre categories can be explained by the impact of the respective form-function patterns specific to the discourse of each category.

This analysis indicates, first of all, that there is a tendency for the pupils in this semi-autonomous immersive context to rely on a limited nucleus of language constructions in order to produce the speech acts necessary to carry out the scientific project. The quantitative analysis also reveals that the rate of use of the constructions by the teacher is similar to that of the pupils. The fact that the teacher functions on the basis of a reduced linguistic repertoire underlines the weight of the impact of the institutional context and the pedagogical format on teacher-pupil and pupil-pupil interactions. Finally, the results show that the high rate of frequency of the construction applies across the different genres, despite the effect of the specificity of the discourse related to each genre. The recycling and manipulation of the construction in different discourse contexts is thus optimised, which according to the usage-based perspective presented in the first part of this study should favour the processes of proceduralisation.

7 Regulation of language output through co-verbal gesture

In the second part of this study, which integrates a multimodal dimension into the analysis of classroom interaction, we envisage internalisation as a parallel and analogical process which interacts with proceduralisation in the development of second language competence. In the following analysis, we relate co-verbal gestures to the discourse context in which they occur.

7.1 Deictic gestures in commentary contexts

If we turn back to Extract 1, we can note that most of the gestures in this sequence are of a deictic nature (McNeill 1992), which can be explained by the fact that the interaction is geared towards the manipulation of objects in order to produce a diagram. Finger gestures reinforce speech acts by pointing at objects (e.g. T2: "on va faire le dessin en premier") or trace processes represented in the diagram (eg. T9 "on va connecter à la base") or complement speech acts by accompanying deictic expressions (eg. T13 "ça à ça et ça à ça"). In the corpus as a whole a large proportion of the gestures (68 out of 128) can be categorised as deictic, and this is particularly true in the commentary and explanation discourse contexts where the pupils are working autonomously in groups in the presence of pedagogical artefacts. Of the 68 deictic gestures observed in the corpus, 18 coincide with deictic expressions and 40 accompany specialised vocabulary introduced previously during the teaching module. We consider therefore that these deictic gestures have a dual role in this immersive context of both reinforcing the coordination of the joint activity and scaffolding second language production.

7.2 Beat, iconic and metaphoric gestures in summary contexts

During summary phases in which pupils report back on the scientific tasks that they have carried out in groups, it is essentially iconic, metaphoric and beat gestures that accompany their second language discourse. The absence of deictic gesture can be explained by the simple fact that during these phases the pupils' attention is not focused on the manipulation of objects.

The two following examples illustrate how gesture is regularly used by pupils to facilitate their production of lexical items that are in the process of proceduralisation.

In Extract 2 (Table 4), which takes place at the beginning of the recording, the class is summing up collectively the content of the previous lesson.

G's use of *chose de* to qualify 'balance' is a way of objectifying for better control a word which remains relatively unfamiliar to her. Her difficulty in retrieving the lexical item is indicated by the fact that her iconic gesture, in the form of a pivoting motion of her two hands, precedes its production and is then repeated after a slight pause at the same time as the word is pronounced. In the corpus as a whole, iconic gestures often precede pupils' productions of difficult words.

In another example occurring during a group monitoring phase (Table 5), the lexical search takes on a more interactive dimension.

First, a beat gesture, accompanying the word *dessin* after the repetition of *fait* indicates a certain cognitive effort in producing the targeted lexical item. Then

Table 4: Extract 2

Turn	Speaker	Verbal and non verbal productions
1	T	Oui tu peux ajouter G
2	G	On a parlé de le processus d'ingénierie et on a créé ☻un petit 0 ☻***iconic*** **gesture** ☻chose de balance ☻***iconic*** **gesture (repeated)** et 0 ça c'est tout
3	T	alors vous avez créé la balance et hier vous avez commencé à écrire à dessiner

Table 5: Extract 3

Turn	Speaker	Verbal and non verbal productions
1	G	On juste on fait fait ☻le dessin ☻***beat*** **gesture** maintenant on marque les : *turns her head towards the teacher* ☻mince ☻***metaphoric*** **gesture** + *turns her head towards the drawing*
2	T	matériels
3	G	On a ☻combiné ☻***iconic*** **gesture** ☻eh : ☻***iconic*** **gesture**
4	T	ok

G solicits the help of the teacher in order to find the word *matériels* with the utterance of *mince* accompanied by paralinguistic and kinetic markers. Next, G executes a clear iconic gesture to scaffold the production of the accompanying word *combiné*. Finally, she sketches another vaguer gesture seeming to announce the end of the sentence which she is manifestly unable to complete. This time the teacher does not offer help but simply closes the sequence with a ratifying *ok*.

Of the 60 examples of beat, iconic and metaphorical gesture in the corpus, 28 occur during summary phases of which 22 are linked to specialised vocabulary targeted in the science project.

7.3 Beat, iconic and metaphoric gestures in negotiation contexts

Of the remaining 32 examples of beat, iconic and metaphorical gestures, 22 occur in negotiation phases in which students argue and discuss aspects of the task in progress. In the following sequence (Table 6), G and S discuss the functioning of the electric circuit and, more specifically, the capacity of the black rock in their bag of materials to conduct an electric current.

Table 6: Extract 4

Turn	Speaker	Verbal and non verbal productions
1	S	et on est CERTAINES
2	G	oui je suis certaine parce que 0
		☻j'ai utilisé ça
		☻***deictic*** **gesture**
		une fois et
		☻l'ampoule a s'allumé
		☻***iconic*** **gesture**
		☻donc ça a du fer dedans
		☻ **beat gesture**
3	S	mais on ne va pas avoir
		☻la MÊME SAC que: 0
		☻***beat*** **gesture**
4	G	oui je sais mais le roche noir 0 c'est toujours

Turn	Speaker	Verbal and non verbal productions
5	S	oui pas
		☻TOUJOURS
		☻***beat*** **gesture**
		mais si on est
		☻CERTAINES
		☻***beat*** **gesture**
		que il y a du fer dedans
		☻ce ROCHE
		☻***deictic*** **gesture**
7	G	Oui Mademoiselle a dit
8	S	☻donc tous les roches
		☻***deictic*** **gesture**
9	G	pas tout 0 juste
		☻UN
		☻***iconic*** **gesture**
		des roches a du fer et
		☻les autres n'ont pas
		☻***metaphorical*** **gesture**
11	S	Mais on ne sait pas QUEL
12	G	oui c'est différent
		☻tu peux voir
		☻***metaphorical*** **gesture**
		comme c'est pas pas 0 c'est
		☻le seul roche
		☻***beat*** **gesture**
		qui est
		☻noir dedans
		☻***beat*** **gesture**

Despite the relative simplicity of the language they use, the two pupils manipulate effectively causal and logical connectors (e.g. *parce que*, *comme*, *donc*, *mais*) and modal markers (e.g. *certaine*, *toujours*) to structure their discourse and use stress to highlight strategically important words (eg. *MÊME SAC*, *ROCHE*, *UN*, *QUEL*) in order to give more force to their arguments. In this context, different gestures function, therefore, primarily on a discourse level, serving to punctuate and thus reinforce articulations within the argument structure and to draw

attention to operative words. The tendency for gesture to be used in these negotiation phases more as a means of structuring discourse than of facilitating lexical retrieval is indicated by the fact that in these contexts the majority of gestures (14 out of 22) focus on language items other than the potentially difficult targeted specialised vocabulary.

This analysis of co-verbal gesture illustrates the different ways in which multimodal resources fulfill the function of regulating and structuring language production in these three recurrent types of discourse context. In the first context (commentary, explanation) involving the performance of concrete tasks in groups, deictic gestures combine with pedagogical artefacts both to coordinate the joint activity and to scaffold second language production. In the second context (summary), in which pupils report back to the whole class on the work they have accomplished, without having recourse to pedagogical artefacts, iconic gestures compensate for the lack of concrete objects in the immediate discourse environment, replacing deictic gesture by evoking a physical representation of the lexical production they are scaffolding. In the third context (negotiation), a more diversified repertoire of gestures (beat, deictic, iconic, metaphorical) is used to structure language production on a higher discourse level. Such modulations between more or less concrete and abstract planes of second language activity can be theorised, we believe, in terms of Gal'perin's notion of internalisation, with multimodal resources contributing to this process in different forms and to variable degrees. However, while Gal'perin (1967) envisages internalisation as a gradual progression from a concrete to an abstract level of cognitive functioning, it presents itself in this institutional immersive setting rather as a cyclical process, structured according to the nature of the speech act and the discourse context in which it is performed in the course of the execution of the scientific project.

8 Conclusion

This study has shown how a task-based approach integrating language and content learning in an immersion classroom setting creates conditions favouring second language development as it is envisaged in a complexity theory of learning. According to this perspective, language use and language learning are considered to be interlinked, with language structure based on form-meaning mappings emerging in a multimodal context from an interplay between patterns of social interaction and cognitive mechanisms. Adopting the notions of proceduralisation and internalisation, we have theorised and explored the trajectory of language

use and development in terms of two parallel and interrelated processes: the consolidation and generalisation of language constructions through their recycling in different discourse contexts; the regulation and structuring of language use, at varying levels of abstraction, mediated by the multimodal resources of the immersion classroom setting.

Acknowledgements

The authors are grateful to the ASLAN project (ANR-10-LABX-0081) of the Université de Lyon for its financial support within the French program "Investments for the Future" operated by the National Research Agency (ANR).

Transcription conventions

1.	turn
0	short pause
00	long pause
[ ]	overlap
/ \	rising/falling intonation
(…)	inaudible passage
TOUJOURS	stressed word
et:	lengthened syllable
☻ deictic gesture	coverbal kinetic or paralinguistic behaviour
☺ turns her head towards the teacher	autonomous kinetic or paralinguistic behaviour

References

Anderson, John R. 1996. *The architecture of cognition.* New Jersey: Erlbaum.

Blanc, Nathalie & Peter Griggs. 2015. Tracer la procéduralisation dans le contexte interactionnel et multimodal d'une classe d'immersion: Méthodes et outils d'analyse d'un corpus vidéo. *Recherches en didactique des langues et des cultures* 12(3). Online. DOI: 10.4000/rdlc.1004.

Carol, Rita. 2005. Construction de savoirs mathématique et linguistique dans l'enseignement bilingue. In Pierre Bange (ed.), *L'apprentissage d'une langue étrangère: Cognition et interaction*, 183–210. Paris: L'Harmattan.

Coyle, Do, Philip Hood & David Marsh. 2010. *Content and language integrated learning*. Cambridge: Cambridge University Press.

Dalton-Puffer, Christiane. 2007. *Discourse in content and language learning (CLIL) classrooms*. Amsterdam: John Benjamins. DOI: 10.1075/lllt.20.

Ellis, Nick C. 2001. Memory for language. In Peter Robinson (ed.), *Cognition and second language instruction*, 33–68. Cambridge: Cambridge University Press.

Ellis, Nick C. & Diane Larsen-Freeman. 2009. Constructing a second language: Analyses and computational simulations of the emergence of linguistic constructions from usage. *Language Learning* 59(1). 90–125. DOI: 10.1111/j.1467-9922.2009.00537.x.

Gal'perin, Piotr Ia. 1967. On the notion of internalization. *Soviet Psychology* 3(5). 28–33. DOI: 10.2753/RPO1061-0405050328.

Goodwin, Charles. 1981. *Conversational organisation: Interaction between speakers and hearers*. New York: Academic Press.

Griggs, Peter. 2007. *Perspective sociocognitive sur l'apprentissage des langues étrangères: Situation naturelle ou guidée*. Paris: L'Harmattan.

Griggs, Peter, Rita Carol & Pierre Bange. 2002. La dimension cognitive dans l'apprentissage des langues étrangères. *Revue française de linguistique appliquée* 7(2). 17–30. DOI: 10.3917/rfla.072.0025.

Kress, Gunther. 2019. L'apprentissage en tant que travail sémiotique: Vers une pédagogie de la reconnaissance. In Véronique Rivière & Nathalie Blanc (eds.), *Observer la multimodalité en situations éducatives, circulations entre recherche et formation*, 23–48. Lyon: ENS.

Kress, Gunther, Carey Jewitt, Jon Ogborn & Tsatsarelis Charalampos. 2001. *Multimodal teaching and learning: The rhetorics of the science classroom*. London & New York: Continuum.

Lantolf, James P. 2011. The sociocultural approach to second language acquisition: Sociocultural, theory and artificial L2 development. In Dwight Atkinson (ed.), *Alternative approaches to second language acquisition*, 24–47. London: Routledge.

Lyster, Roy. 2007. *Learning and teaching languages through content*. Amsterdam: John Benjamins. DOI: 10.1075/lllt.18.

MacWhinney, Brian (ed.). 1987. *Mechanisms of language acquisition: Symposium proceedings*. Hillsdale, NJ: Laurence Erlbaum.

McCafferty, Steven G. 2002. Gesture and creating zones of proximal development for second language learning. *Modern Language Journal* 86(2). 192–203. DOI: 10.1111/1540-4781.00144.

McNeill, David. 1992. *Hand and mind*. Chicago & London: University of Chicago Press.

Negueruela-Azarola, Eduardo & James P. Lantolf. 2008. The dialectics of gesture in the construction of meaning in second language oral narratives. In Steven G. McCafferty & Gale Stam (eds.), *Gesture: Second language acquisition and classroom research*, 88–106. New York: Routledge.

Serra, Cecilia & Gabriela Steffen. 2010. Acquisition des concepts et interaction des langues et disciplines dans l'enseignement bilingue. In Rita Carol (ed.), *Apprendre en classe d'immersion. Quels concepts? Quelle théorie?*, 129–186. Paris: L'Harmattan.

Streeck, Jürgen, Charles Goodwin & Curtis LeBaron (eds.). 2011. *Embodied interaction: Language and body in the material world*. Cambridge: Cambridge University Press.

Tomasello, Michael. 2003. *Constructing a language: A usage-based theory of language acquisition*. Cambridge, MA & London: Harvard University Press.

Part IV

Conclusion

Chapter 15

Considering the complex adaptive system from multiple vantage points

Kristine Lund[a,b,c,d], Pierluigi Basso Fossali[a,b,c,d], Audrey Mazur[a,b,c,d] & Magali Ollagnier-Beldame[a,b,c,d]

[a]UMR 5161 ICAR [b]Centre National de la Recherche Scientifique [c]Ecole Normale Supérieure [d]Université Lumière Lyon 2

In this final chapter, our title plays on how vantage points highlight different visions of what occurs in a complex adaptive system. We look back on the ways in which this book gives credence to the view that language is such a system. We zoom out in order to situate our work in relation to a selection of focused work on complexity. We zoom in for specific results, taking each chapter in turn. We then zoom out again in order to address the current societal impacts of our work. Next, we summarise our contributions and, finally we turn to future research avenues.

1 Complexity in language sciences: The current state of the art

In addition to being analysed from within different disciplinary frameworks (biological, cognitive, social, cultural), language is fundamentally dynamic – regardless of the angle of analysis – and given this, lends itself quite well to conceptual constructs that are usually brought to bear in the science of complexity. In *Language and complex systems*, Kretzschmar (2015) mobilises constructs such as 1) continuing dynamic activity in the system, 2) random interaction of large numbers of components, 3) exchange of information with feedback, 4) reinforcement of behaviours, and 5) emergence of stable patterns without central control. Massip-Bonet (2013) notes the following as characteristics of language being a

Kristine Lund, Pierluigi Basso Fossali, Audrey Mazur & Magali Ollagnier-Beldame. 2022. Considering the complex adaptive system from multiple vantage points. In Kristine Lund, Pierluigi Basso Fossali, Audrey Mazur & Magali Ollagnier-Beldame (eds.), *Language is a complex adaptive system: Explorations and evidence*, 181–194. Berlin: Language Science Press. DOI: 10.5281/zenodo.6620135

complex adaptive system: 1) distributed control and collective emergence, 2) intrinsic diversity, 3) perpetual dynamics, 4) adaptation through factors of amplification and competition, 5) non-linearity and phase transitions, and 6) sensitive dependence on network structure.

While mobilising these concepts in some way, research on complexity and language has often taken approaches at the crossroads of linguistics and cognitive science where models are conceptualised to analyse different phenomena. The special issue of *Language Learning* is a case in point (Beckner et al. 2009), and it is mainly in relation to this work that the current volume took position. *Emergence* is a powerful construct and through this angle, papers in this special issue analysed emergent linguistic constructions during second language learning (Ellis & Larsen-Freeman 2009), emerging regularities during artificial language evolution (Cornish et al. 2009), specific types of emergent grammar (Beckner & Bybee 2009), language change that emerges from language behaviour (Blythe & Croft 2009), and the emergence of an individual's personalised meaning potential (Matthiessen 2009). *Interplay* as a catalyst for change within a complex system is another angle of analysis, for example between language, agent, and environment in the language acquisition process (Dörnyei 2009), the processes by which speakers acquire mappings between semantics and syntactic devices such as word order (Boyd et al. 2009), or more broadly, between culture and biology, giving rise to language itself (Schoenemann 2009).

Indeed, emergence is a strong and useful conceptual construct for applied linguistics (Ellis & Larsen-Freeman 2006), but also interactional linguistics (e.g. Mondada 2009, Deppermann et al. 2010), although in sociology, it has been used in contradictory ways (Sawyer 2001). In the introduction to their special issue on *Language emergence: Implications for applied linguistics*, Ellis & Larsen-Freeman (2006) describe research in 12 areas of applied linguistics, each time gleaning what they call a moral to the story (or lesson learned) that is a characteristic of an emergent system. For example, if language acquisition and language representation is exemplar based (e.g. based on memories of previously experienced utterances), then the moral is that regularities are emergent, growth is non-linear, and cognition is adaptive.

This volume has contributed in two ways to understanding language as a complex adaptive system. First, we have extended the field of application of some of the above conceptual constructs. This means that we have described new instantiations, for example of how language displays distributed control and collective emergence or how competition of factors contributes to the adaptation of language. Second, we have added a new conceptual construct that, to our knowledge, has not been named in the literature. In the following sections we give details on these two types of contributions.

2 Zooming in for specific results

This book has three main sections: 1) Epistemological views on complexity, 2) Complexity pragmatics and discourse, and 3) Complexity interaction and multimodality. In what follows, each section and chapter is briefly discussed in relation to the conceptual constructs they give rise to, where these constructs find an echo in other literature on complexity.

2.1 Epistemological views on complexity

Epistemological debates show how assumptions collide. Some of the collisions between theories and frameworks in the language sciences can be reconciled (e.g. accepting a way to frame cognition that is compatible with conversation analysis) and some seem incommensurable if one or the other must be chosen (e.g. internalising social norms versus co-construction of interaction as an explanation for linguistic phenomena). In *Language and complex systems*, Kretzschmar (2015) takes the recognition of emergence in language as a reason to put aside universal grammar in favour of a functionalist approach where "order in language emerges from the linguistic interactions of speakers, agents using speech" (Kretzschmar 2015: 2). Here, emergence – a fundamental construct in complex systems – helps us to decide between competing theories that explain the origin of order in language.

2.1.1 Semiotic mediations and complexity management: Paradoxes and regulative principles

It is well known that people confuse the map with the territory. In other words, they mistake a model for reality. Given that each disciplinary framework pays attention to different aspects of a phenomenon, it follows that researchers will make a different map of the territory, or come up with a different model for reality. Basso Fossali (2022 [this volume]) proposes that superposing the maps or combining the models is a way to operationalise interdisciplinarity. That said, whether a researcher considers the system studied as open or closed depends on their epistemological position and therefore affects attempts at combining maps or combining models. One of the paradoxes he points out is that, given the perpetual evolution of culture, any attempt at meaning-making can never be finished. However, despite these difficulties, language as a system combined with talk-in-interaction succeeds in producing practices that indeed become norms.

2.1.2 What knowledge owes to experience: Complexity and first-person epistemology

In a third-person approach, the researcher relies on external observables that reflect the subject's activity, such as digital traces of screen-based tasks, or recordings of pupil activity. In a second-person approach, the subject communicates his or her experience to the researcher by a variety of means, such as pressing a button in order to signal perception of a particular stimulus. Ollagnier-Beldame (2022 [this volume]) works on a first-person approach, based on microphenomenological interviews, the objective of which is to reintegrate the subjective experience into ways of knowing. Discourse analysis of such interviews allows for the discovery of subjective invariants that can then be compared to objective invariants from third-person data, leading to a more complete picture of the human experience.

2.1.3 Modelling the co-elaboration of knowledge: Connecting cognitive, linguistic, social and interactional systems

Any object of study is always approached from a particular vantage point, given the assumptions of the researcher, and the co-elaboration of knowledge is no different. Lund (2022 [this volume]) argues for an interdisciplinary model that proposes a system of interrelated subsystems where disciplinary views from language sciences, education, and psychology can be combined to describe and predict the co-elaboration of knowledge, especially regarding collective emergence and perpetual dynamics, both for individuals and groups. In addition, instances of proposed unidirectional causality and bi-directional causality illustrate how different vantage points may be connected through intermediate variables. Combining these varied views on the same object broadens understanding and increases explanatory power.

2.1.4 Epistemological contributions

The three contributions in this section of the volume (Basso Fossali, Ollagnier-Beldame, & Lund) all plead for epistemological plurality. Basso Fossali proposes to use semiotic mediations in order to interconnect the fluctuating values within the differing domains under study and aim for translatability between frameworks. Ollagnier-Beldame argues for surpassing the dichotomy of objective versus subjective methodologies in cognitive sciences, proposing to connect invariants from first-person and third-person approaches to ways of knowing. Finally,

Lund argues for using intermediate variables as a way to connect between particular vantage points that stem from different disciplinary frameworks and as a consequence, focus on different aspects of the co-elaboration of knowledge. Within a complexity science view of language sciences, these are all ways of increasing connections – be it between models, approaches, or vantage points – and thus all build a more comprehensive understanding of the phenomena under investigation. That being said, some frameworks are incommensurable for epistemological reasons, and this must be recognised as a limit to the goal of connecting across conceptual constructs.

2.2 Complexity, pragmatics and discourse

Discourse practices show convincing evidence of their complexity at different levels of description. Language itself provides a reference environment for discourse, but people mobilise the expressive resources of language and of other semiotic systems in local contexts. These contexts are in turn characterised by interlocutors' perception, memory, and their understanding of culture. The ways in which people use language in context shows us how speakers and listeners restrain indeterminacy and interweave points of view.

2.2.1 A proposal for a simplex account of discourse complexity using the pragmatic-enunciative theory of points of view

A complex system can be accounted for in an integrated and economical manner, deemed simplex. Rabatel (2022 [this volume]) proposes a pragmatic-enunciative theory on points of view that uses an empathy angle to consider how others perceive, feel, think, say, and do, both from their physical position, and in relation to their value system. A person speaking first on his or her own behalf and then on behalf of another person changes enunciative stance. Changing the place from which we speak and taking the stance of another allows us to understand the world from new points of view.

2.2.2 The morphogenesis of language action: Complexity and rhythmic synchronisation of enunciation

Bondì (2022 [this volume]) describes the complexity involved in the rhythmic synchronisation of enunciation. He combines biophysical vocal production with thought, memory, language resources, and the needs of communication between hearers and speakers. In the biophysical view, many muscles drive an internal coordination involving breath, sound, and articulation. But these phenomena are

also coordinated with our thoughts and how they are situated in memory, the ways in which we use language to convey such thoughts, and the interactional constraints of our communication contexts. Painting this picture of enunciation in the mind gives the reader a new appreciation for visualising a model that is capable of accounting for these connections.

2.2.3 Dialogism for daily interaction

Dialogism is the constitutive orientation of discourse, whether it is dialogical (e.g. debate, interview) or monological (e.g. newspaper article, novel). This orientation is toward other discourse in the form of internal dialogue. Nowakowska & Constantin de Chanay (2022 [this volume]) illustrate three types of dialogism with examples from everyday life. First, interdiscursive dialogism is oriented toward discourse that has already taken place regarding the same object, but with different interlocutors. Second, interlocutive dialogism is thinking what the person with whom we are speaking is saying and imagining what we are going to say next. Third, intralocutive dialogism occurs when the speaker orients her discourse to herself. Speakers must manage all of these dialogisms in daily life while in interaction with others.

2.2.4 Modalities in written chat interactions: A complex system

Incorporating emojis into text messages or on-line chats gives new possibilities for expressing modality in the form of a judgement such as likelihood, ability, permission, request, capacity, suggestions, order, obligation, or advice. Modality expression is already a complex system composed of heterogeneous elements and subsystems, and Halté (2022 [this volume]) studies the role of emojis as a written form of gesture and/or facial mimicry. He illustrates how this new expression of modality interacts with conversation to form a framework that is constantly changing. Halte argues that emojis allow us to track modality expression at the level of conversational exchange.

2.2.5 Contributions in complexity, pragmatics and discourse

The four contributions in this section of the volume (Rabatel, Bondì, Nowakowska & Constantin de Chanay, and Halté) all show how changing one's vantage point changes the salience of our world, both for researchers of language and in everyday human interaction. In addition, the methodological choice of thick description (versus a hypothetico-deductive approach) forces choices of focus

and decisions about what to include as greater context. In terms of complexity, coordination between heterogeneous elements is primordial and orientation to interlocutors, both present and absent, is varied and changing and described by enunciative stance. Finally, communications technology (e.g. emoticons) has added a new layer to modality expression thus illustrating the pertinence of a complexity science framework.

2.3 Complexity, interaction and multimodality

The multimodal expression of human interaction seems especially adapted to a complexity science framework, given that such expression is typically the focus of micro-analyses in the form of thick description (e.g. syntax, lexicon, prosody, gesture, gaze, body posture, etc.), but that human interaction is also part of composite systems at the local level (e.g. artefact manipulation within a task, interactional role, physiological reactions) and at a more global level (e.g. institutional role, relational history, culture). Indeed, there are different ways of interweaving between these levels of analyses, given one's vantage point and the extent to which different frameworks and disciplines are brought to bear on what is studied.

2.3.1 Collective reasoning as the alignment of self-identity footings

Polo and colleagues propose to model collective reasoning on the one hand as the alignment of *footings* (reflecting the posture that a person assumes during a debate) and on the other hand by taking into account *facework*, (involving discursive elaborations that aim to preserve the face of oneself and others). The politeness norm is often in tension with a debate situation. In the socio-scientific debates Polo et al. analysed, they saw three types of group discussion: 1) cumulative, in which *footing* is consensual and *facework* does not allow disagreement to be expressed, 2) exploratory, in which *footing* is critical, but constructive and *facework* focuses on the success of the group and finally 3) disputational, in which *footing* is competitive and *facework* aims to win over others. Studying how these different types of group discussion can intertwine renews the theorisation of group reasoning.

2.3.2 Multimodal conversational routines: Talk-in-interaction through the prism of complexity

Multimodal conversational routines are recognised parts of our repertoire, but they can also emerge. Chernyshova and colleagues show how there is a tension

– a delicate balance – between the expectations we have when talking with others and the emergence of the unexpected. The authors describe how a well-known conversational routine is used unexpectedly by one interlocutor, how that new usage is adopted by the other and how it thus emerges in the interaction with a modified, localised meaning that is now shared between the two speakers.

2.3.3 Multimodal practice of participation in a complex and dynamic framework

Baldauf-Quilliatre & Colon de Carvajal describe what is called the participatory framework in terms of multimodal practice. Using audio-visual data from a family card game with five players, their analyses show the formation of different ephemeral subgroups, overlapping sequences and multiple trajectories of action and interaction. Different types of resources are used, depending on the context, and the same interaction is shown to exist simultaneously in different participatory frameworks.

2.3.4 Second language use and development in an immersion class considered as a complex adaptive process

Language learning in an immersion class is considered by Griggs & Blanc to be an iterative process, where their analyses show a co-influence between the patterns of verbal action in the classroom and the development of competence in the target language. They mobilise Vygotsky's *zone of proximal development*, where an individual first develops her competence in interaction with more competent peers and then she internalises the competence with the help of mediation. This mediation is described as the construction and consolidation of language resources through repeated use in the classroom.

2.3.5 Contributions in complexity, interaction and multimodality

All of the contributions in this section of the volume (Polo, Lund, Plantin & Niccolai, Chernyshova, Piccoli & Ursi, Baldauf-Quilliatre & Colon de Carvajal, and Griggs & Blanc) highlight the power of the temporal lens for analysing human interaction. Each of the sections focuses on collaborative, emergent phenomena, while highlighting different tensions: between the regular and the unpredictable, between the contextually expected and the emerging, between the context-shaping and the context-renewing. Human interaction is multidimensional, characterised by interconnected elements that describe change and de-

velopment. Finally, implementing a complexity approach that connects new descriptive elements can renew theorising.

3 Zooming out for societal impact

The laboratory of excellence ASLAN (Advanced Studies on Language Complexity) has a specific approach to giving societal value to our research. Traditionally, such value is thought of as solely economic. In other words, how many companies have you created? Or how many patents do you hold? Although ASLAN has created a number of start-ups and works regularly with companies, we have a broader approach. First, we put in place tools to raise awareness of the culture of giving societal value to our work. For example, this involves inviting researchers who work for companies to present their trajectory during a seminar, which has led to collaborations. Second, a research project can be developed in response to societal needs. ASLAN is often solicited by both the public and private sectors, by associations, health professionals and families. Developing a project together with stakeholders outside of academia – as real partners – often leads to a redefinition of the boundaries of the themes on which the researcher is working. Third, our projects target outreach for the general public, and many of the projects in this volume have been presented during such events. Fourth, we create training programs for different audiences such as teachers or healthcare professionals.

4 Summarising our contributions

Beckner et al. (2009) consider seven characteristics of language as a complex system (distributed control and collective emergence, intrinsic diversity, perpetual dynamics, adaptation, non-linearity and phase transitions, sensitivity to and dependence on network structure, and locality of change). If the complex system can be considered as a model, we make two types of contributions. First, we extend in a number of ways the field of application of the model's elements. Second, we add a new element to the model.

Taking the second contribution first, we add collective control and distributed emergence (in addition to the current model element of distributed control and collective emergence). This phenomenon occurs in the work of Griggs & Blanc (2022 [this volume]) in the language immersion class where a relation is explored between patterns of verbal and multimodal interaction in the group and the development of individual language competence. That said, if one questions the

vantage point of observation, this is likely to be a case of reciprocal causation (cf. Bandura 1986).

In the second type of contribution, we extend the field of application through new examples of emergence, interplay of heterogeneous elements, intrinsic diversity, feedback, novelty, self-organisation, adaptation, multidimensionality, and indeterminism. Although not all of these concepts are part of the seven characteristics of language, as cited by Beckner et al. (2009), they are constructs cited by either Kretzschmar (2015) or Massip-Bonet (2013) in relation to language.

Emergence allows for two ways to extend the field of application. Self-identity footings emerge (Polo et al. 2022 [this volume]), as do conversational routines (Chernyshova et al. 2022 [this volume]), and they both involve the interplay of heterogeneous elements. In the former, interplay involves facework and argumentative interactions during debate and in the latter interplay involves talk, gesture, and gaze in an everyday commercial transaction. The data on conversational routines also illustrate novelty in human interaction.

It is argued that adaptation works through amplification and competition of factors. Polo et al. (2022 [this volume]) show the tension between politeness and argumentation, in other words, between the social and the cognitive. Another tension is shown by Chernyshova et al. (2022 [this volume]) between how we expect an interaction to play out and the novelty that can emerge. The examples discussed in these chapters illustrate how adaptation occurs through these forces.

Forms of coordination during enunciation (Bondì 2022 [this volume]) show both intrinsic diversity and self-organisation between the physical speed of the production system, language resources, thought, memory and communication context. Such is the case as well for the fluctuating participation frameworks and the use of multidimensional resources that allow their forming and un-forming (Baldauf-Quilliatre & Colon de Carvajal 2022 [this volume]).

Forms of dialogism (Nowakowska & Constantin de Chanay 2022 [this volume]) and points of view based on empathy of physical location and value systems Rabatel (2022 [this volume]) show intrinsic diversity, depending on the meaning-making the interlocutors engage in as the interaction evolves.

Building on distributed control and collective emergence, Halté (2022 [this volume]) shows how the expression of modality is changed by emojis and that such expression is now possible at the level of a conversational exchange. This example also illustrates the notion of feedback in that expressive needs have brought about new emojis which have then modified modality and allowed other needs to emerge.

Ollagnier-Beldame (2022 [this volume]), Lund (2022 [this volume]), and Basso Fossali (2022 [this volume]) propose to create spaces where epistemologies and

explanations can be compared, choosing methodologies based on the research questions posed and not the reverse. Their underlying motivation is to surpass dichotomies and dogma. Models are useful, but so is thick description and bridging between world views is the ultimate goal. Theoretical and methodological integration is pursued, but only insofar as it helps to reach objectives. Although not in the epistemology section, Rabatel's chapter (this volume) argues for such integration, proposing a paradigm involving enunciation and argumentation that links to other paradigms, using a simplex approach. He illustrates enunciators' and co-enunciators' intentions and interprets texts from linguistic, cognitive, and practical points of view.

5 Conclusions and perspectives

In conclusion, it is no longer questioned that a complexity science framework is a useful way to conceptualise language use, acquisition, and change. Beckner et al. (2009) have argued that perhaps the search for top-down linguistic universals is stagnating. We also know that behaviour can be described from two different standpoints, leading to results that shade into one another. "The etic viewpoint studies behavior as from outside of a particular system, and as an essential initial approach to an alien system. The emic viewpoint results from studying behavior as from inside the system" (Pike 1967: 37).

Maybe top-down linguistic universals are stagnating because a *change in vantage point* is necessary. This volume shows many candidates for potential *bottom-up* linguistic universals, but how is the universal quality measured in this case? In pursuing this thought, results in this manuscript lead us to consider the extent to which the bottom-up patterns we have uncovered may lead to more global changes at the group and community levels.

Acknowledgements

The authors are grateful to the ASLAN project (ANR-10-LABX-0081) of the Université de Lyon, for its financial support within the French program "Investments for the Future" operated by the National Research Agency (ANR).

References

Baldauf-Quilliatre, Heike & Isabel Colon de Carvajal. 2022. Multimodal practice of participation in a complex and dynamic framework. In Kristine Lund, Pierluigi Basso Fossali, Audrey Mazur & Magali Ollagnier-Beldame (eds.), *Language is a complex adaptive system: Explorations and evidence*, 147–162. Berlin: Language Science Press. DOI: 10.5281/zenodo.6620129.

Bandura, Albert. 1986. *Social foundations of thought and action: A social cognitive theory*. Englewood Cliffs, NJ: Prentice-Hall.

Basso Fossali, Pierluigi. 2022. Semiotic mediations and complexity management: Paradoxes and regulative principles. In Kristine Lund, Pierluigi Basso Fossali, Audrey Mazur & Magali Ollagnier-Beldame (eds.), *Language is a complex adaptive system: Explorations and evidence*, 9–22. Berlin: Language Science Press. DOI: 10.5281/zenodo.6620107.

Beckner, Clay & Joan Bybee. 2009. A usage-based account of constituency and reanalysis. *Language Learning* 59(s1). 27–46. DOI: 10.1111/j.1467-9922.2009.00534.x.

Beckner, Clay, Nick C. Ellis, Richard Blythe, John Holland, Joan Bybee, Jinyun Ke, Morten H. Christiansen, Diane Larsen-Freeman, William Croft & Tom Schoenemann. 2009. Language is a complex adaptive system: Position paper. *Language Learning* 59(1). 1–26. DOI: 10.1111/j.1467-9922.2009.00533.x.

Blythe, Richard A. & William A. Croft. 2009. The speech community in evolutionary language dynamics. *Language Learning* 59(s1). 47–63. DOI: 10.1111/j.1467-9922.2009.00535.x.

Bondì, Antonino. 2022. The morphogenesis of language action: Complexity and rhythmic synchronisation of enunciation. In Kristine Lund, Pierluigi Basso Fossali, Audrey Mazur & Magali Ollagnier-Beldame (eds.), *Language is a complex adaptive system: Explorations and evidence*, 71–79. Berlin: Language Science Press. DOI: 10.5281/zenodo.6620117.

Boyd, Jeremy K., Erin A. Gottschalk & Adele E. Goldberg. 2009. Linking rule acquisition in novel phrasal constructions. *Language Learning* 59(s1). 64–89. DOI: 10.1111/j.1467-9922.2009.00536.x.

Chernyshova, Elizaveta, Vanessa Piccoli & Biagio Ursi. 2022. Multimodal conversational routines: Talk-in-interaction through the prism of complexity. In Kristine Lund, Pierluigi Basso Fossali, Audrey Mazur & Magali Ollagnier-Beldame (eds.), *Language is a complex adaptive system: Explorations and evidence*, 131–146. Berlin: Language Science Press. DOI: 10.5281/zenodo.6620127.

Cornish, Hannah, Monica Tamariz & Simon Kirby. 2009. Complex adaptive systems and the origins of adaptive structure: What experiments can tell us. *Language Learning* 59(s1). 187–205. DOI: 10.1111/j.1467-9922.2009.00540.x.

Deppermann, Arnulf, Reinhold Schmitt & Lorenza Mondada. 2010. Agenda and emergence: Contingent and planned activities in a meeting. *Journal of Pragmatics* 42(6). 1700–1718. DOI: 10.1016/j.pragma.2009.10.006.

Dörnyei, Zoltán. 2009. *The psychology of second language acquisition*. Oxford: Oxford University Press.

Ellis, Nick C. & Diane Larsen-Freeman. 2006. Language emergence: Implications for applied linguistics – Introduction to the special issue. *Applied Linguistics* 27(4). 558–589. DOI: 10.1093/applin/aml028.

Ellis, Nick C. & Diane Larsen-Freeman (eds.). 2009. *Language as a complex adaptive system*. Oxford: Wiley-Blackwell.

Griggs, Peter & Nathalie Blanc. 2022. Second language use and development in an immersion class considered as a complex adaptive process. In Kristine Lund, Pierluigi Basso Fossali, Audrey Mazur & Magali Ollagnier-Beldame (eds.), *Language is a complex adaptive system: Explorations and evidence*, 163–178. Berlin: Language Science Press. DOI: 10.5281/zenodo.6620131.

Halté, Pierre. 2022. Modalities in written chat interactions: A complex system. In Kristine Lund, Pierluigi Basso Fossali, Audrey Mazur & Magali Ollagnier-Beldame (eds.), *Language is a complex adaptive system: Explorations and evidence*, 95–106. Berlin: Language Science Press. DOI: 10.5281/zenodo.6620121.

Kretzschmar, William A. 2015. *Language and complex systems*. Cambridge: Cambridge University Press.

Lund, Kristine. 2022. Modelling the co-elaboration of knowledge: Connecting cognitive, linguistic, social and interactional systems. In Kristine Lund, Pierluigi Basso Fossali, Audrey Mazur & Magali Ollagnier-Beldame (eds.), *Language is a complex adaptive system: Explorations and evidence*, 35–48. Berlin: Language Science Press. DOI: 10.5281/zenodo.6620111.

Massip-Bonet, Àngels. 2013. Language as a complex adaptive system: Towards an integrative linguistics. In Àngels Massip-Bonet & Albert Bastardas-Boada (eds.), *Complexity perspectives on language: Communication and society*, 35–60. Berlin & Heidelberg: Springer. DOI: 10.1007/978-3-642-32817-6_4.

Matthiessen, Christian M. I. M. 2009. Meaning in the making: Meaning potential emerging from acts of meaning. *Language Learning* 59(s1). 206–229. DOI: 10.1111/j.1467-9922.2009.00541.x.

Mondada, Lorenza. 2009. Emergent focused interactions in public places: A systematic analysis of the multimodal achievement of a common interactional

space. *Journal of Pragmatics* 41(10). 1977–1997. DOI: 10.1016/j.pragma.2008.09.019.

Nowakowska, Aleksandra & Hughes Constantin de Chanay. 2022. Dialogism for daily interaction. In Kristine Lund, Pierluigi Basso Fossali, Audrey Mazur & Magali Ollagnier-Beldame (eds.), *Language is a complex adaptive system: Explorations and evidence*, 81–93. Berlin: Language Science Press. DOI: 10.5281/zenodo.6620119.

Ollagnier-Beldame, Magali. 2022. What knowledge owes to experience: Complexity and first-person epistemology. In Kristine Lund, Pierluigi Basso Fossali, Audrey Mazur & Magali Ollagnier-Beldame (eds.), *Language is a complex adaptive system: Explorations and evidence*, 23–33. Berlin: Language Science Press. DOI: 10.5281/zenodo.6620109.

Pike, Kenneth L. 1967. *Language in relation to a unified theory of the structure of human behavior*. The Hague: Mouton.

Polo, Claire, Kristine Lund, Christian Plantin & Gerald P. Niccolai. 2022. Collective reasoning as the alignment of self-identity footings. In Kristine Lund, Pierluigi Basso Fossali, Audrey Mazur & Magali Ollagnier-Beldame (eds.), *Language is a complex adaptive system: Explorations and evidence*, 115–130. Berlin: Language Science Press. DOI: 10.5281/zenodo.6620125.

Rabatel, Alain. 2022. Proposal for a simplex account of discourse complexity using the pragma-enunciative theory of points of view. In Kristine Lund, Pierluigi Basso Fossali, Audrey Mazur & Magali Ollagnier-Beldame (eds.), *Language is a complex adaptive system: Explorations and evidence*, 59–70. Berlin: Language Science Press. DOI: 10.5281/zenodo.6620115.

Sawyer, R. Keith. 2001. Emergence in sociology: Contemporary philosophy of mind and some implications for sociological theory. *American Journal of Sociology* 107(3). 551–585. DOI: 10.1086/338780.

Schoenemann, P. Thomas. 2009. Evolution of brain and language. *Language Learning* 59(s1). 162–186. DOI: 10.1111/j.1467-9922.2009.00539.x.

Name index

Language is a complex adaptive system

The ASLAN labex – Advanced studies on language complexity – brings together a unique set of expertise and varied points of view on language. In this volume, we employ three main sections showcasing diverse empirical work to illustrate how language within human interaction is a complex and adaptive system. The first section – epistemological views on complexity – pleads for epistemological plurality, an end to dichotomies, and proposes different ways to connect and translate between frameworks. The second section – complexity, pragmatics and discourse – focuses on discourse practices at different levels of description. Other semiotic systems in addition to language are mobilized, but also interlocutors' perception, memory and understanding of culture. The third section – complexity, interaction, and multimodality – employs different disciplinary frameworks to weave between micro, meso, and macro levels of analyses. Our specific contributions include adding elements to and extending the field of application of the models proposed by others through new examples of emergence, interplay of heterogeneous elements, intrinsic diversity, feedback, novelty, self-organization, adaptation, multidimensionality, indeterminism, and collective control with distributed emergence. Finally, we argue for a change in vantage point regarding the search for linguistic universals.