

William Croft, University of New Mexico  
**“Using quantitative methods for semantic maps”**

The semantic map model has been used in typology to look for patterns in linguistic diversity. The classic semantic map model represents typologically supported relations between concepts as a graph structure, which can be called the conceptual space; a semantic map proper is the mapping of a language-specific category on the concepts in the space). Recently, quantitative methods have been developed to make it possible to find such patterns in the sometimes quite noisy data of large-scale and even small-scale cross-linguistic surveys.

Regier, Khetarpal and Majid (2013) develop a model from epidemiology that implements the graph structure representation of the classical semantic map model. The graph structure is useful if there are not many concepts to be linked, but becomes difficult to read when there are many concepts to be linked, as with the Bowerman-Peterson spatial relations picture set.

An alternative model that proceeds from the same theoretical basis as the semantic map model is multidimensional scaling (Croft and Poole 2008; Croft 2010). Multidimensional scaling produces a continuous conceptual space, which allows the dimensions of the conceptual space to be given a qualitative semantic interpretation. In this talk, I will focus on the use of multidimensional scaling for typological analysis, comparing it to other similar methods and clarifying certain misunderstandings about its use in typology.

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Alexandre François, LACITO (CNRS) & A.N.U.

### “Lexical travel maps: A spatial view of semantic change”

While initially developed for grammatical notions (e.g. Haspelmath 2003), semantic maps have been extended to the lexicon, and used to represent cases of lexical polysemy (François 2008, Georgakopoulos *et al.* 2016). Lexical maps can be built with the aim of capturing networks of senses that are colexified in the synchrony of one or several languages. In that case, they may serve as a descriptive tool, by displaying an etic grid from where the linguist can outline the emic categories specific to a given language (Evans 2010).

Based on firsthand data from Oceanic languages – as well as other families – this paper focuses on the potential of lexical maps for diachronic studies. Attested and reconstructed cases of lexical change allow us to identify semantic paths {s1@s2} within the history of individual languages (Koch 2016), but also observe the most recurrent ones cross-linguistically (cf. Georgakopoulos & Polis 2017). A given trend can be universal (e.g. *hand–five*; *man–husband*...) or areally restricted — e.g. *smell–kiss* in SE Asia (Schapper n.d.), *fire–camp–country* in Australia (Evans 1992:490), *land–village–house* in the Pacific (Pawley 2005)... Based on a large enough typological database of lexical change or colexification (e.g. Zalizniak *et al.* 2012, List *et al.* 2014), one could contrast graphically on a map the more frequent vs. the rarer paths of change – as with a travel map that displays highways, smaller roads and neglected trails.

Finally, building on the spatial analogy inherent to the map, I will propose to visualise the evolution of lexical meaning on an animated lexical map. By exploiting the potential of animation technology, linguists could provide empirical tools to represent the travel of meaning across semantic space. Ultimately, this line of research would attempt to mimic the cognitive processes of semantic change as they take place in the minds of speakers.

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Thanasis Georgakopoulos, University of Liège &  
Stéphane Polis, F.R.S.-FNRS & University of Liège  
**“Lexical Diachronic Semantic Maps (Le Diasema)  
From simple networks to mixed multi-edge graphs”**

The aim of this talk is threefold. First, it shows that – using synchronic polysemy data from large language samples, such as CLICS (List et al., 2014), the Open Multilingual Wordnet (<http://compling.hss.ntu.edu.sg/omw/>), or BabelNet (<https://babelnet.org/about>) – one can infer large-scale weighted lexical semantic maps. These maps, which are constructed with the help of an adapted version of the algorithm introduced by Regier, Khetarpal, and Majid (2013), respect the connectivity hypothesis (Croft, 2001) and the ‘economy principle’ (Georgakopoulos & Polis, 2018). As such, they generate more interesting implicational universals than regular colexification networks. Additionally, the automatically plotted semantic maps can be examined using standard network exploration software tools. These tools reveal much information otherwise ‘hidden’ in the graph — such as the modularity of the network, the centrality of meanings, etc. — and are essential when it comes to interpreting large-scale crosslinguistic datasets.

Second, this talk seeks to demonstrate how information on the paths of semantic extensions undergone by content words may be incorporated into synchronic lexical semantic maps. We illustrate the principle with the semantic extension of time-related lexemes (e.g. TIME, HOUR, SEASON, DAY) in Ancient Greek (8<sup>th</sup> BC– 1<sup>st</sup> c. AD) and Ancient Egyptian – Coptic (26<sup>th</sup> c. BC – 10<sup>th</sup> c. AD). Both languages give access to significant diachronic material, allowing us to trace long term processes of semantic change within the lexicon. From a methodological point of view, we argue for the use of various types of graphs, including mixed multi-edge ones, which can capture bidirectionalities in semantic change and cases when information about pathways of change are not available (see already van der Auwera and Plungian, 1998 for the use of directed graphs).

Third, in an effort to address some critiques that are voiced against the classical semantic maps approach, we suggest that this type of map can be used conjointly with (1) statistical techniques for dimensionality reductions (such as MDS, t-SNE, etc., see already Croft & Poole, 2008) and (2) Formal Concept Analysis (FCA, see Ryzhova & Obiedkov 2017). Based on a case-study on verbs of perception and cognition, we illustrate the complementarity between the three approaches for revealing universal areal and language specific patterns within the lexicon.

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Maria Koptjevskaja-Tamm, Stockholm University  
Volker Gast, Friedrich Schiller University Jena  
**“Arealty in colexification patterns”**

Semantic maps reflect similarity in meaning on the basis of identity in linguistic form or distribution (Georgakopoulos & Polis 2018). In the lexical domain they are crucially based on instances of colexification, i.e. the encoding of two concepts with one form (François 2008). Colexification may result from different processes of semantic shift, for example metaphor (e.g. <‘feather’, ‘hair’>), metonymy (e.g. <‘darkness’, ‘night’>) and other types of generalization (e.g. <‘coin’, ‘money’>). Moreover, languages may vary in the way they segment entities, with colexification reflecting the absence of internal differentiations made by other languages (e.g. <‘arm’, ‘hand’>).

In this talk we discuss areal patterns of colexification that emerged during a study based on the Database of Cross-Linguistic Colexifications (List et al. 2014, Gast & Koptjevskaja-Tamm forthcoming). After explaining the (bottom-up) method and presenting some of our results, we will zoom in on selected colexification patterns which showed interesting areal distributions, in particular:

1. the colexification of ‘difficult’ with ‘heavy’ or ‘hard’;
2. the colexification of ‘language’ with articulation or a speech organ (‘voice’, ‘tongue’), linguistic action (‘speech’) or basic linguistic units (‘word’) (cf. Radden 2004);
3. the colexification of ‘money’ with ‘silver’ or ‘coin’;
4. the colexification of ‘day’ and ‘night’ with ‘sun’ and ‘darkness’.

The type of colexification in 1. is relatively clearly differentiated within Europe and Eurasia, with ‘hard’ being prevalent in the West and ‘heavy’ being prominent in the East. The patterns in 2.-4. vary at a global level, e.g. insofar as the <‘language’, ‘tongue’> colexification is particularly widespread in Europe and Eurasia.

After discussing the individual colexification patterns and their areal distributions we will address some more general questions as well as implications for the semantic map methodology, in particular:

- To what extent is metaphorical colexification analogical or symmetrical within domains? For instance, do languages using ‘hard’ for ‘difficult’ tend to use ‘soft’ for ‘easy’? How could such analogies be systematically integrated into semantic maps?
- To what extent can areally shared and, presumably, borrowed, colexification patterns be regarded as evidence for conceptual similarity, e.g. in the case of cultural artefacts such as money, often resulting from generalization that is neither metaphorically nor metonymically motivated?

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Natalia Levshina, Leipzig University

## “Semantic maps of causative constructions: Data types and methods in contrast”

In this talk I want to compare different types of evidence for synchronic semantic maps of causative constructions in typologically diverse languages, as well as different methods and tools for induction and visualization of semantic maps. Causation is understood here broadly, including factitive and permissive, direct and indirect, natural and forceful causation, etc., as illustrated in (1).

- (1) a. *I raised the cup.*  
b. *I caused the cup to float in the air.*  
c. *I let him play in the yard.*  
d. *I had to pry the jammed door open.*

Cross-linguistic variation in expression of causality by causative constructions has been studied extensively. A few typological generalizations have been formulated, such as the correlation between the degree of syntactic and conceptual integration of the causing and caused events (e.g. Comrie 1981; Haiman 1983; Dixon 2000). However, to the best of my knowledge, no semantic maps of causation have been proposed (Levshina 2015 being an exception, but based only on European languages). In this talk I want to fill in this gap and propose several semantic maps of causation using different computational approaches and data.

First of all, I compare two types of data: a typological database with causatives from more than 100 languages and a parallel corpus of film subtitles in typologically diverse languages created by myself. The second comparison is between different traditional, link-based, or first-generation semantic maps, and proximity-based, or second-generation maps (cf. van der Auwera 2013). The third comparison is between token-based and type-based semantic maps (the latter including semantic functions or formal types of constructions). For link-based maps I will use tools available in R packages *igraph* and *networkD3*. Proximity-based semantic maps will be created with the help of Multidimensional Scaling (token-based maps), following Wälchli & Cysouw (2012) and Multiple Correspondence Analysis (type-based maps). The strengths and limitations of each of the methods and data types will be discussed.

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Johann-Mattis List, Department of Linguistic and Cultural Evolution, Max Planck Institute for the Science of Human History, Jena

**“CLICS 2.0: A computer-assisted framework for the investigation of lexical motivation patterns”**

In 2014, the Database of Cross-Linguistic Colexifications (CLICS, <http://clics.lingpy.org>) was published, offering not only a large dataset on cross-linguistic lexical associations but also an interactive interface which allowed scholars to explore the data in great detail. The original CLICS database, however, suffers from a couple of shortcomings that call for a relaunch and renewal. Apart from the well-known theoretical obstacles of semi-automated enterprises, the major practical obstacles are (a) the limited number of concepts and languages represented in the database, (b) the insufficient display of the original sources and languages upon which the database was built, (c) the intransparency of the source code underlying the database, (d) the difficulty of extending the data by additional sources, and (e) the inflexibility of the project, preventing an easy re-use of source code for visualization and analysis in other projects. With CLICS 2.0, we hope to resolve most of these shortcomings by offering not only a much larger database with an enhanced web-application, but also an integrated framework for data curation and analysis. The CLICS 2.0 framework is based on a close integration of standardized exchange formats for lexical data as provided by the CLDF initiative (<http://cldf.cldf.org>). The strict adherence to reference catalogues like Concepticon (<http://concepticon.cldf.org>) for concepts and Glottolog for language varieties (<http://glottolog.org>) guarantees the extensibility and comparability of the data underlying CLICS 2.0. Furthermore, a Python package which we use for data curation, validation, and analysis, allows scholars to reuse the CLICS framework in their own projects or to collaboratively expand it by sharing additional data or revising and expanding the code.

Silvia Luraghi, University of Pavia

**“Incorporating diachronic information in semantic maps: pros and cons”**

Semantic maps are meant to capture the semantic distance between concepts that can account for coding similarities. In the field of grammatical forms, semantic maps have been widely used to provide a visual representation for patterns of polysemy displayed by partly similar morphemes cross-linguistically. Diachronic information has been incorporated into semantic maps to provide evidence as to the direction(s) of semantic extension that can explain the rise of polysemy patterns. Diachronic research on semantic extension also highlights some relatively frequent developments that do not result in synchronic polysemy. A case in point is the tendency for ablative morphemes that develop a locative meaning to lose their original meaning. A well-known example is French *dedans* ‘inside’ originally from *de dans* ‘from inside’, which already contained an ablative morpheme *de* and originated from Latin *de intus*. The latter was based on *intus* ‘inside’ that also originated from an ablative adverb *in-tus* where *-tus* was an ablative suffix. Such cyclical change whereby an ablative form becomes locative, loses its original ablative meaning, and needs the addition of a new ablative morpheme to indicate a source is known from other genetically unrelated languages, and has been described as being in some way connected with other peculiar features of source (Mackenzie 1978, Bennett 1989, Nikitina 2017). Another case of semantic extension that is not reflected in synchronic polysemy concerns cominatives. While comitative markers may arise from locative markers (Luraghi 2005, Stolz, Stroh, Urdze 2006; German *mit* is an example), the original meaning seems to be dropped as soon as the comitative meaning becomes established (Luraghi 2014). These two examples show that in diachrony there is a connection between the semantic roles of source and location and between location and comitative: for this reason, they seem to occupy contiguous areas in the conceptual space that serves as a background for the semantic map of a specific morpheme. However, this contiguity is not reflected in synchrony, hence it does not emerge from synchronic semantic maps. In my paper, I will elaborate on mismatches between diachronic semantic extension and synchronic polysemy, and will address the issue of how one should make the most of diachronic information while giving a synchronic representation of meaning.

Andrej L. Malchukov, University of Mainz

### **“Semantic maps, attractor networks and typological hierarchies”**

Following up on (Malchukov 2010), the talk raises some general questions related to the methodology of semantic maps and its conceptual underpinnings. In the first part I will discuss some results from the recently completed Leipzig Valency Project (Malchukov & Comrie 2015; Hartmann, Haspelmath & Taylor 2013), concerning transitivity hierarchies and hierarchies for voice alternations. In particular, I discuss contribution of semantic vs syntactic information to the architecture of the semantic maps for voice construction, as well as address a question of directionalities on synchronic, diachronic and ‘panchronic’ semantic maps (attraction networks). The second part draws on some preliminary results from the ongoing project on interaction of verbal categories (Malchukov 2011; Xrakovskij & Malchukov 2016), pertaining to interaction of actionality with aspect and tense. In particular, I discuss the contribution of local markedness to the shape of hierarchies in this domain, as well as a more general question of how typological hierarchies relate to semantic maps.

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Tatiana Nikitina, LLACAN (CNRS)

**“Building an amphichronic semantic map for closely related languages:  
Insights from Southeastern Mande**

The field of lexical studies has recently seen an upsurge of interest in semantic maps as a means of modeling lexical polysemy patterns (Georgakopoulos & Polis 2018). This study addresses two issues that remain particularly important for future development of semantic map models: the need for exploring the potential of amphichronic maps, which would bring together information on attested synchronic states and predictions of the system’s diachronic development, and the need for accommodating, within the same model, different types of meaning relationships, including polysemy, metaphorical relations, and pragmatic inference. The study addresses these issues at a micro-scale level, focusing on two meaning clusters in a small group of closely related languages: four of the best-described Southeastern Mande languages, spoken in West Africa (Tura, Dan, Mwan, and Wan). At the center of the study are the categories of diminutivity and singulativity.

Nikitina (forthc.) applies to Southeastern Mande the Radial Category model developed for diminutives in Jurafsky (1996). Three of the SE Mande languages are shown to make use of a well-behaved diminutive marker: the remarkably wide range of its different uses centers around the core meaning of ‘child’. One of the languages, however, presents a strikingly different picture: the corresponding marker is associated with disintegrated clusters of synchronically unrelated meanings. The semantic map model helps to make sense of this difference and sheds light on the way diminutivity developed in these closely related languages.

Unlike the diminutive markers, which are clearly cognates, singulative markers derive, in the four languages, from apparently unrelated words. Yet they share a similar set of uses, centered on the meaning ‘grain’ (Erman 2005). Differences in the use of the markers are surprisingly minor in light of their lack of common ancestry. The semantic map model helps to make sense of the parallels in the use of historically unrelated markers as well as to identify possible gaps in the existing lexical descriptions of the languages in questions.

Comparison of the two semantic domains, explored at the micro-scale level, highlights the strengths of the semantic map model when applied to lexical and semi-lexical meanings. First, the model can capture cross-linguistic diversity without making assumptions about the synchronic status of specific meanings or relationships between meanings. Second, it can yield insights into relationships between languages, as we learn to reconstruct lexical networks and to detect in them effects of language contact. Third, semantic maps have the potential of accounting for the ways expressions compete with each other and take over new territory or recede over time. There is a point where the use of diminutive and singulative markers converge: both markers are attested in SE Mande with the meaning “conventional unit of a material”. The semantic map model provides a useful tool for accounting for this sort of variation.

At the same time, the comparison points to the aspects of the model that call for improvement. Lexical restrictions on the marker's distribution, for example, can hardly be accounted for within the semantic map models of the modern type. Further work is needed to integrate this type of information within a lexical model.

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Loïc-Michel Perrin, INALCO (CNRS)

**“Cultural representations and semantic connections:  
the model of temperature terms in French and Wolof”**

The topic of this communication is a reflection about the influence of the temperature perception on the linguistic representations of temperature. With this end, this study will analyze the linguistic units referring to a temperature in Wolof (Atlantic, Niger-Congo phylum) and French (Romance, Indo-European family) from a semantic viewpoint. Such an approach will mostly concern the conceptual organization of these units, the particular semantic behaviors that they may involve as well as the polysemous or metaphorical patterns in which they can occur.

The temperature perception is a universal phenomenon. Nevertheless, the linguistic and cognitive representation of this concept depends on its experimentation. That is why what is warm for a French man is not what is warm for an Eskimo or a Wolof of Africa. Actually, what is relevant with this kind of experience is the variation of temperature; and it is the apprehension of this variation which introduces what Hensel (1981) called the *thermal comfort*. Consequently, the cultural and linguistic representations of temperature have to correlate with the thermal comfort (Koptjevskaja-Tamm & Rakhilina, 2006). Based on this claim, this communication intends to study the semantic organization of the lexical units referring to a temperature in French of France (characterized by a temperate climate) as well as in Wolof (spoken in a tropical country sited on the west of the African Continent).

Then, after a comparison of the scale of temperatures developed by these two languages, this study will examine the patterns of polysemy displayed by the temperature terms of each of these two languages and will compare them cross linguistically by the use of semantic maps in order to observe whether the cultural representations relating to perception of climatic temperature influence these patterns.

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Ekaterina Rakhilina, National Research University, Higher School of Economics, Moscow  
Daria Ryzhova, National Research University, Higher School of Economics, Moscow  
**“Lexical semantic maps in Moscow Lexical Typology Group (MLexT)”**

The talk presents the Moscow Lexical Typology Group (MLexT) methodology and experience in constructing lexical typology semantic maps. MLexT was organized more than 10 years ago for the purpose of cross-linguistic comparison of lexical semantics. Theoretically, it goes back to some ideas of Moscow semantic school concerning general semantic description, as well as to the tradition of functional grammatical typology in using diagnostic contexts and questionnaires to establish parameters which structure a semantic domain.

We assume that the cognitive reality behind these diagnostic contexts are prototypical situations (“frames”, in our terminology) that constitute a lexical semantic domain. We compare language systems according to their colexification patterns (François 2008). Lexical semantic maps provide visualizations of the corresponding results. However, they differ from traditional grammatical semantic maps (Haspelmath 1997, van der Auwera & Plungian 1998), since they privilege synchronic lexical data and mostly do not take into account the details of diachronic development.

However, a MLexT map can serve as a source for describing diachronic changes through linguistic interpretation of metaphors and semantic shifts as general semantic processes. The talk discusses examples of linguistic mapping of different semantic fields in the framework of MLexT.



Martine Vanhove, LLACAN (CNRS, INaLCO, USPC)

**“A semantic map of the so-called “Optative negative” in Beja”**

Building on a preliminary analysis of the so-called “Optative negative” (Vanhove 2011) which presented a synchronic semantic map of this verb paradigm in the central dialect of Beja, the sole North-Cushitic language (Afroasiatic), this presentation will discuss a diachronic semantic map of this verb form on the basis of a larger corpus of first hand data in the three main varieties (North, South and Centre), and a comparative approach with the other verb forms that constitute the verb system of Beja. The first part will briefly recapitulate previous syntactic and semantic findings and show how and to what extent they can be extended to the other two varieties by discussing the usages of the Optative in independent clauses with optative, hortative and jussive functions, as a dependent verb form in relative, completive and conditional clauses, and as a modality marker of capacity and necessity in exclamatory utterances. In a second part, I will present the historical development of the parts of the verb system relevant for the understanding of the origin of the Optative negative, and how this is also a necessary step in order to achieve a correct diachronic semantic map, which will be presented in the concluding part.

**Reference**

Vanhove, Martine. 2011. Towards a semantic map of the Optative in Beja (North-Cushitic). In Luca Busetto, Roberto Sottile, Livia Tonelli, Mauro Tosco (eds.). *Hebitaney lagge. Dedicato a / Dedicated to Marcello Lamberti*. Saggi di Linguistica e Africanistica. Essays in Linguistics and African Studies, Qu.A.S.A.R., pp.231-246.