1. Semantic maps

1.1. Introduction

Semantic maps are a way to visualize regular relationships between two or more meanings or grammatical functions of one and the same linguistic form. With regular, it is meant that these relationships can either be observed cross-linguistically, in a language sample of a certain size,\(^1\) or within one language with a certain number of markers or constructions which exhibit the same kind of form-meaning relationship. The first semantic map is usually attributed to Anderson (1982, 1986), who offered maps of the perfect and related categories and of evidentials.\(^2\) It was only in the late 1990s, however, that this approach took hold. Recent research using semantic maps includes Haspelmath (1997, 2003, 2004) on indefinite pronouns, reflexives, dative functions and coordinating constructions, Malchukov (2004) on adversatives, van der Auwera and Plungian (1998) on modality, van der Auwera and Malchukov (2005) on depictive adjectivals, and Narrog & Ito (2007) and Narrog (2009a,b) on case, particularly the area of instrumentals and comitatives.

The evidence that is normally, but not necessarily, used as the basis for the construction of semantic maps is polysemy data. Consider a form which has three uses (functions or meanings). Since we are dealing with polysemy rather than with homonymy, the uses are related, but they are all related to each other in a similar way or one use is intermediate between the other uses. The two constellations are represented in Figure 1 and both constitute semantic maps. The semantic links are symbolized by lines.

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\(^1\) Haspelmath (2003: 217) claims that a dozen of “genealogically diverse” languages are sufficient. Wälchli (2009) shows that sample size has considerable influence on the outcome of a map and argues in favor of large sample sizes. Note, though, that Haspelmath (2003) is referring to ‘classical’ maps (see below), while Wälchli (2009) is referring to statistically-plotted maps.

\(^2\) One can, of course, find predecessors. For the indefiniteness map of Haspelmath’s (1997), for instance, one can go back to Aristotle and the Aristotelian Square of Oppositions (van der Auwera & Van Alsenoy forthcoming).
Of these two constellations the second one is the more interesting one. If use B is truly semantically intermediate one would not expect there to be a form which has uses A and C, but not B. This is an empirically testable hypothesis. The strength of the hypothesis depends both on the plausibility of the semantic analysis positing B as semantically intermediate and on the linguistic evidence, typically cross-linguistic, showing that in language after language forms either have just one function or all three and if two, then either A and B or B and C but never A and C.

Figure 2 gives a real example of what this kind of map may look like.

The map says that there is a relationship of direct meaning extension between those meanings/functions connected by a line. It is also claimed that there is no relationship of direct meaning extension between meanings/functions not connected by a line. The map thus posits various implicational universals, e.g. if a linguistic marker or construction has the functions of comitative and agent, it must also have the function of instrumental. The map can in principle also be construed deductively without cross-linguistic empirical evidence. One can think of a map of color terms or of body part terms, where some kind of conceptual space is already given from outside language (cf. Zwarts 2009), but a map can in principle also be a product of pre-empirical conceptual analysis, as for example the famous network analysis for the English preposition *over* by Brugman and Lakoff (Lakoff 1987). However, ultimately the claims made in the map must be empirically testable. Thus, the validity of a map can always be challenged by bringing up examples of direct meaning extension not represented the map, or by empirically...
rejecting the evidence that has been brought up in favor of a connection represented on the map.

1.2. Types of semantic maps
The maps as in Figure 1 and Figure 2 are not the only way to conceive of, or to draw a semantic map. At least the following distinctions can be made. These are

1) (a) Maps which explicitly depict connections between meanings through lines vs. (b) maps that represent a similarity between meanings by spatial adjacency, and

2) (a) Maps which are construed based on semantic analysis complemented by knowledge of cross-linguistic data vs. (b) maps that are plotted on the basis of data alone (usually on the basis of statistical methods), and do not involve semantic analysis.

(2b) maps are basically a subset of (1b) maps. That is, maps of the (1b) type may or may not be statistical. If, for example, the connecting lines are removed from Figure 2, a map of the type (1a) results, the relationship between meanings/functions on this map would be represented exclusively by spatial adjacency, that is, it would become a map of type (1b). Its properties would change, though. While in the map in Figure 2 it is possible to place a meaning B relatively far from meaning A and still posit a connection, this would contradict the principles of a map based on spatial adjacency. But this example also shows that the borderlines between these types of maps are flexible. In the case of the map in Figure 2, the connecting lines can be removed, and, due to the fact that spatial adjacency happens to be observed in this map, it could also function as a map of type (1b). Likewise, as argued in section 3, statistically plotted maps are not necessarily incompatible with connections between meanings/functions. Also, while the very process of generating the map automatically excludes semantic analysis as a factor in the construction of the map, the input can be manipulated in a manner that reflects the judgments of the researcher, e.g. by deleting apparently semantically infelicitous or ungrammatical instances from the input data.

In the kind of map making illustrated so far, which has the features of (1a) and (2a), and is called ‘classical’ (van der Auwera 2008), ‘traditional’ (Malehukov 2009), or ‘implicationa’l’ (Wälchli 2009), the a priori analysis and the a posteriori analysis often go hand in hand. But it is clear that the two are independent. One may find out, for instance, that in languages with just two of the three uses we find either A and B or B and C, and indeed never only A and C. without having a semantic hypothesis of how B should be considered intermediate. This independence is very clear in statistical map making. The statistical method usually employed is multi-dimensional scaling (MDS). Figure 3 probably presents the first MDS semantic map that was produced and circulated, and eventually published in Croft and Poole (2008: 26).
Figure 3 Spatial model of tense and aspect with Dahl’s prototypes (Croft & Poole 2008: 26)

It is not necessary to explain this map in any detail here (this is done in the original paper). The letters stand for specific tense/aspect categories, e.g. U for future, D for predictive, V for perfective, and O for progressive. Each occurrence designates a context that is more (capital letter) or less (small letter) typical for the category in question. Thus, for example, typical future contexts cluster with typical predictive contexts in the lower left half of the figure. The two dimensions of this figure are not given a priori, nor are they set up by the researcher, but they are automatically calculated by the statistical program. In contrast, the two axes and their labels (IMPERFECTIVE, PAST etc.) are added by the researchers as a result of their interpretation of this spatial arrangement. Note that the map in Figure 3 has no lines. Similarity is now only symbolized by spatial adjacency.

The biggest gain in this type of map is that spatial adjacency can now reflect similarity, in this case, of contexts, in a much more fine-grained way than in the classical maps, and we can see the new maps starting to join and possibly replace the classical ones, especially those that purely relied on the representation of similarity through proximity. Figure 3 illustrates one further advantage. Statistically calculated maps can draw on a wide range of linguistic data, and are able to translate linguistic contexts directly into mappings. They are also not limited to the
representation of meaning extension, i.e. polysemy. Cysouw (2009: 1) has recently radically redefined maps of this kind as a “metric on meaning”. In other words, any data that are calculable and that provide insight into the similarity of meanings/functions can be utilized for the construction of a semantic map. Cysouw (2009) provided examples himself, and explored data on the (degree of) formal similarity of transitive/intransitive verb pairs, thus resulting in a similarity map for transitive/intransitive verb pairs, which does not represent possible polysemies. Cysouw (2009) even combines a dimension calculated through MDS with metrics gained otherwise in a single graph. Thus, this approach opens up new avenues of research that have not yet been fully explored (see also Wälchli 2009). However, these maps are strictly confined to the representation of similarity. Implicational universals, for example, are not represented in such a map. Nor are these maps designed to reflect the analysis of the researcher, who checks for and features out factors that lead to quirky polysemies (cf. Malchukov 2009). Thus, Malchukov (2009: 2, 20) contrasts “similarity maps” with traditional maps, which represent a “semantic residue of the similarity map”, and can be considered as “an important tool for semantic analysis.”

2. From grammaticalization paths to semantic maps

Most semantic maps have so far dealt with particular areas of grammar rather than of the lexicon (see Perrin (2009) for an exception), and only a few maps have integrated relationships between lexical and grammatical meanings and functions. Thus, if grammaticalization is strictly viewed as being confined to the pre-emption of erstwhile lexical units or constructions for grammatical functions, the potential overlap between grammaticalization research and semantic map research would be relatively small, but if change “from already grammaticalized to more grammatical structures” (Heine et al. 1991: 148) is also understood as part of grammaticalization, as is usually the case, the overlap becomes much larger.

Decisively for the topic of this chapter, classical semantic maps can be “dynamicized” by incorporating diachronic information. They can thus include information on semantic change, a central component of grammaticalization. Consider the map on the right of Figure 1 again. If a marker has each of three uses, use A could have been the original one, then use B developed and then use C. This directionality of meaning extension, usually believed to be unidirectional (cf. also Heine 2003; Traugott & Dasher 2002) can be represented in the shape of an arrows in a classical map.

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3 Arguably, classical maps are not restricted to polysemy mapping either. At least, the imperative map in van der Auwera, Dobrushina & Goussev (2004) is not.
If two or more markers on a so-called “grammaticalization path” are not taken to be synonymous (as e.g. formally different expressions of the future), but as related, then these paths can already be conceived of as semantic maps, or at least as their building blocks.\(^4\) Cf. the following grammaticalization paths in the area of possibility, as proposed by Bybee et al. (1994: 240):

![Figure 5 Grammaticalization paths starting from ability (Bybee et al. 1994: 240)](image)

Van der Auwera & Plungian’s (1998) map of modality, as reproduced in Figure 6, stands out from previous semantic map research in a number of respects. It includes an account of connections between lexical and grammatical categories as well as connections between grammatical categories. It further represents the directionalities of these connections, and thus aims to represent an entire semantic area (to the extent that this area is defined by the authors). It also shows how the addition of ovals allows the representation of specialization (from general participant-external possibility to its subtype of deontic possibility) and generalization (from the subtype of deontic necessity to general participant-external necessity).

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This map incorporates the grammaticalization paths represented in Figure 5, thus illustrating the possibility of utilizing grammaticalization research for semantic maps. In principle, lexical source categories are placed on the left of the map, and grammatical categories to the right of them. Grammaticalization proceeds to the right, with the most grammaticalized categories at the right end\(^5\). Lexical categories do not normally occur to the right of grammatical ones, but it is not excluded, in which case one can speak of ‘degrammaticalization’. One should stress that semantic maps in principle only involve representation of the semantic aspect of grammaticalization. In traditional ‘grammaticalization paths’ as those by Bybee et al. 1994, it is tacitly assumed that semantic change is the core of grammaticalization, optionally accompanied by a variety of phonological and morphosyntactic changes. For purely morphosyntactic (or phonological) changes, however, there is no need for semantic maps.

### 3. Future possibilities of semantic maps for grammaticalization research

Semantic maps and grammaticalization studies are both relatively young enterprises with rapidly expanding results. Concerning grammaticalization, the constant accumulation of

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\(^5\) One category, namely future, is placed both to the left and the right of the modality area. This is the result of the decision to exclude future from modality (cf. Narrog 2005: 712-3 for a discussion).
knowledge about cross-linguistically recurring semantic changes into the area of grammar and within grammar is reflected in publications such as Heine & Kuteva (2002). As to semantic map research, it is providing information on the relationship of meanings and functions in core areas of grammar, and this at an increasing rate. Indefiniteness (Haspelmath 1997), tense/aspect (see above; also Croft & Poole 2008), modality (see above; and also Boye 2009, van der Auwera, Kehayov & Vittrant 2009), mood (see van der Auwera, Dobrushina & Gusev 2004), irrealis (De Haan 2009), coordination (see above; Mauri 2009) and case (Luraghi 2001, Narrog & Ito 2007, Malchukov & Narrog 2009; Narrog 2009b), and ditransitive constructions (Malchukov et al. (to appear)) have been covered, at least partially.

While only a small portion of the semantic map research has been concerned with diachronic issues, as was seen above in Figure 5 and Figure 6, one can in fact take any synchronic map and try to dynamicize it with results from grammaticalization work. Figure 7 shows how diachronic directionalities can be added to most of the links on the conjunction map (the diachronic information is provided in Haspelmath (2004: 24), Heine and Kuteva (2002), and Narrog (2009b)).

![Figure 7 A semantic map for conjunction and related functions (Haspelmath 2004: 21) with added diachronic directionalities](image)

Map 7 contains a number of diachronic hypotheses, for example, that a morpheme with comitative function may acquire instrumental function but not vice versa. The hypothesized directionalities should ideally be backed up by historical evidence. The directionalities given above are in this respect relatively unproblematic. However, as the number of historically well-documented languages is rather limited, they may also be posited on the basis of internal or comparative reconstruction, as is not uncommon in grammaticalization research (cf. Givón (2000, this volume).

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6 The directionality from comitative (source) to instrumental (target) is also a fine example that there can indeed be ‘more’ and ‘less’ grammaticalized functions within the area of grammar. As Stolz et al. (2006; ch. 10) found in a large language sample, in languages where comitatives and instrumentals are expressed distinctly, the comitative is almost always formally more complex than the instrumental. More complexity can be taken as a parameter of a lower degree of grammaticalization (cf. Lehmann 2002; 4.2.1.).
Semantic maps are primarily a means of representation, but they can lead to new questions and they can illustrate where clarification is needed, both with respect to the semantic maps themselves and to grammaticalization. For example, if information on specific directionalities in a semantic map cannot be found in previous grammaticalization research, this can become a motivation to investigate those directionalities. This is for example the case for the relationship between ‘also’ and ‘even’ in Figure 7. There is also the important question of apparent mismatches between semantic maps and empirical data. For example, contradicting the map in Figure 7, a form X in language L may have the functions of N-conjunction and instrumental, but not comitative. Such a case can lead to the revision of a map. On the other hand, it may also be due to ‘noise’, for example, the historical loss of the comitative function of form X, due to the emergence of a new, more expressive, morpheme Y in language L. Or the N-conjunction and instrumental function may have in fact different historical sources, which have come to resemble each other through phonological change, or other non-semantic reasons. Such cases are not uncommon; see discussions of more concrete examples in van der Auwera (2008), Malchukov (2009), and Narrog & Ito (2007). In this manner, it can be the semantic map itself which leads to question of how the synchronic polysemy of a specific form has come into being.

Another issue not fully explored yet is the compatibility of the representation of a diachronic dimension with statistical maps. The common assumption so far has been that they are incompatible with each other. Van der Auwera (2008) and Narrog (2009) both present the easy integration of a diachronic dimension - and thus easy harmonization with grammaticalization research - as one of the important advantages of ‘classical’ maps. However, depending on the nature of the input data, there are some statistical maps, although few, where the points on the map are distinct enough, that is, where there is no substantial overlap and clustering of points, to allow lines to be drawn and, consequently, also directionalities to be represented (e.g. the map of indefinite pronoun functions in Croft & Poole (2008: 17)). Also, very simply, the raw frequency of co-occurrence of two meanings can be represented by the thickness of the linking arrow, for example.

It is also conceivable to formulate the following hypothesis: On a statistical map, the closer two meanings are placed to each other, the more likely there is a diachronic relationship between them. This hypothesis would involve the parallel construction of classical-diachronic and statistical maps in one area, and would need to be tested on a certain number of semantic maps in order to empirically corroborate its validity.

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