Linguistics 121: Historical Linguistics
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By submitting this essay, I attest that it is my own work, completed in accordance with University regulations.— Robert Yaman

A Diachronic Perspective on Semantic Maps

by Robert Yaman

A promising new approach in the analysis of semantic poly-functionality is that of semantic maps. As this new tool has gained popularity in the last two decades, two distinct approaches have evolved: what Auwera (2013) calls the "connectivity" approach, and what will call the "proximity" approach. There has been much literature devoted to discussing the relative merits of the two approaches including van der Auwera (2013) and Croft and Poole (2008). In this paper I approach this debate from a new perspective, considering the two approaches' ability to predict semantic change. Specifically, I argue that the connectivity approach has a distinct advantage over the proximity approach in this regard. In the first section, I present an overview of indefinite pronouns, and in the second section I give an overview of semantic maps, along with the methodology of the two approaches. In the third section I discuss the main arguments from the two sides of the semantic map debate. Finally, in the fourth and fifth sections I look at diachronic factors, and argue that the connectivity approach is superior to the proximity approach in this area. Throughout all of the sections I use indefinite pronouns as a case study since they have been modeled using both approaches, and because something is known about the way they change over time. Although this paper does not present the final verdict on the debate, I do believe that the connectivity approach's ability to predict semantic change is an important factor in the consideration of the relative merits of the two approaches.

1: The Types of Indefinites

Before moving into a discussion of semantic maps, I will first present an introduction to the analysis of indefinite pronouns, particularly from the perspective of Haspelmath's 1997 work, Indefinite Pronouns. Through his detailed study of indefinites in the world's languages, Haspelmath comes up with a list of 9 different indefinite functions[1] which I list here. I first present the name of the function, then a brief description of the context in which the function would be employed, and finally an example from English where the actual indefinite is marked with italics.

Figure 1: the types of indefinite functions (Cysouw 2001)

1: Specific known
    When an indefinite has a specific referent that the speaker knows, but the identity of which the speaker wishes to conceal.
    "Somebody called while you were away, guess who."

2: Specific unknown
    When an indefinite has a specific referent which is not known to the speaker.
    "She said something, but I couldn't make out what."

3: Non-specific, irrealis
    When an indefinite does not have a particular referent, but is it used to pick out some general class.
    "Someone ought to fix this light."

4: Question
    When an indefinite is used in a question.
    "Do you want to get something to eat?"

5: Conditional
    When an indefinite is used in a conditional.
    "If anything happens, let me know."

[1] Following Haspelmath, I use the word 'function' instead of 'meaning' or 'use' in order to sidestep the debate about whether multifunctional words have multiple meanings, or a single ambiguous meaning but multiple uses. I do this mainly because semantic maps also deal with multi-functionality in a way which sidesteps this debate.

6: Indirect negation

When an indefinite appears in a negated clause where the negation is already indicated elsewhere (Haspelmath 1997: pgs. 31-33)
"I don't think that anybody can go with you."

7: Direct negation

When an indefinite itself marks the negation of a phrase. (Hasplemath 1997: pgs. 33-37)
"Nobody can go with you."

8: Comparative

When an indefinite is used to make a comparison.
"This dinner is better than anything I've ever eaten"

9: Free choice

Approximately, when an indefinite is used to indicate the possibility of a number of different cases (in the example below, a case being going somewhere) (Haspelmath 1997: pgs. 48-52).
"Now that I have a car, I feel like I can go anywhere."

Haspelmath comes up with this list by analyzing a large dataset of indefinites in the world's languages. If there is a term in any language with a crucial distinction between two of these functions, then they become distinct functions on this list. That is to say, if any term can be employed in one of these functions but not another, then the two functions become distinct on the list. For example, the English indefinites 'some-' can be employed in either function 1 or 2 (among others), but there is a Russian indefinite '-to' which can only be used for the specific unknown function. Haspelmath would have concluded from this that there is a valid semantic distinction between functions 1 and 2. The idea is then that any indefinite term can be described by enumerating the specific subset of these functions in which it can be employed.

2: What are Semantic Maps?

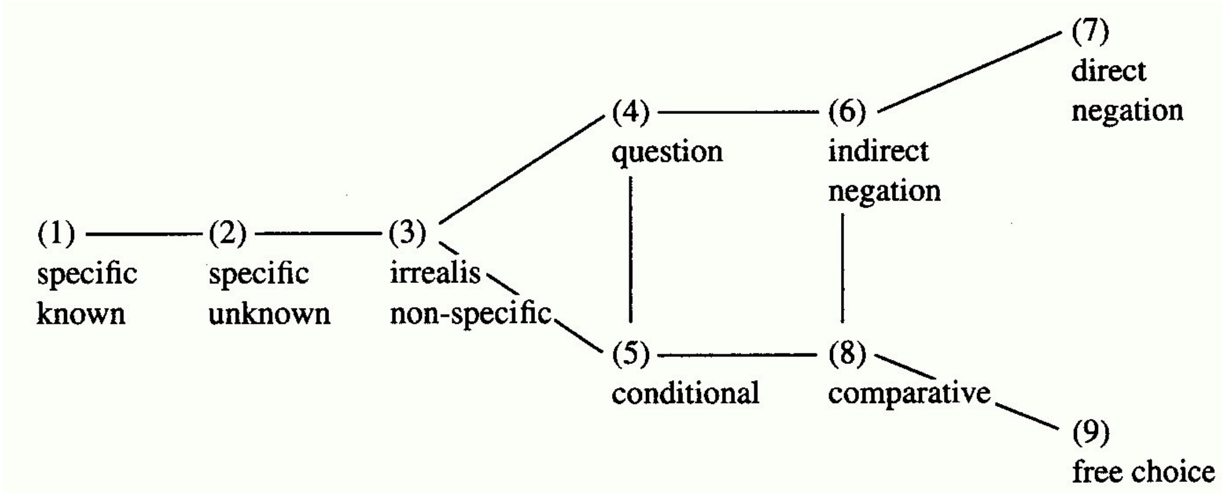
I will now move on two discuss the general idea of a semantic map, after which I will go over the two competing approaches. Generally, a semantic map is a way to graphically represent the different functions of a certain type of term, such as indefinite pronouns. The functions on the map are graphically arranged so as to draw out certain qualities about their connectedness or relative similarities. One is then able to represent particular terms as encompassing a certain subset of the functions under consideration. There are many reasons why one would want to make a semantic map. For example, it is a convenient and useful way to compare common features of a wide array of languages. Additionally, it can used to describe the semantic relatedness of certain functions, or as a template on which to frame linguistic universals (Haspelmath 2003).

1. The Connectivity Approach

Semantic maps created by what I will call the 'connectivity' approach are sometimes referred to as 'classical' semantic maps (Croft and Poole 2008) because they predate proximity maps by about a decade. They are also the maps used by Haspelmath in his analysis of indefinites. The main idea is that certain functions are represented as being connected on the map only if they are semantically related in some way.[2] A connection between two functions on the map has a number of linguistic implications which I will discuss later. For now, I present the connectivity map for indefinites from Haspelmath (1997: pg. 64).

[2] The exact nature of this relatedness is an interesting question, but not one which is relevant for creating semantic maps. There is a debate on whether this relatedness could simply be cognitive similarity, but I will not get into this debate here. See Haspelmath (2003) for an exposition of this idea, and Cristofaro (2010) for an argument against it.

Figure 2: a connectivity map for indefinites



Here one can see that each function is connected only to certain others, and is separated from the rest by a certain number of steps.

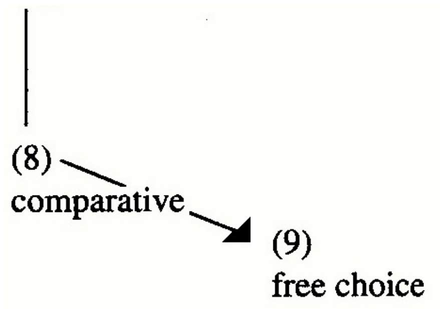
Haspelmath creates this map using the same data that he uses to create the typology of indefinites given above. However, instead of looking at cases in which there is a crucial distinction with respect to two functions, he looks at cases in which multiple functions are subsumed under one term. He then creates a graphic arrangement of the functions such that if two functions are subsumed under one term, then there has to be a continuous line connecting them. Therefore, from the way that Haspelmath set up his map, one can see that there is no attested term which encompasses functions 1 and 3 but not 2, nor one which encompasses function 7, 8, and 9, but not 6. As it turns out, one needs to consider only a few languages to come up with a connectivity map for indefinites which is universally applicable. Indeed, this is not uncommon for the connectivity approach, suggesting that there might be some natural legitimacy to the connection scheme that the approach yields.

From a map created in this way, one can derive a number of conclusions, or create a number of hypotheses. Mainly, such a map places non-trivial restrictions on possible indefinites, and thus defines a sort of hypothesis for a linguistic universal. Particularly, it says that any possible indefinite term must occupy a contiguous area on the map. Therefore, there could not be a language in which a term encompassed functions 1 and 3 but not 2, and there could not be a language with a term which encompassed only functions 7,8, and 9.

One can also use this semantic map to make a number of predictions about how indefinites will change over time. As will be discussed in more detail, a fairly intuitive predication about indefinites that comes from the connectivity approach is that a term can only take on a new function which is connected to one of its old functions. For example, if a term at one point encompasses 4, 5, and 8, then it could develop to also encompass 3, 6, or 9, but not 7. I note here such diachronic predictions are only hypotheses. Since a connectivity map is made using only synchronic data, one has no guarantee that it will also be accurate for diachronic aspects of language. However, in this paper I am primarily interested in the accuracy of these predictions, and I will show later that the connectivity approaches makes better predictions than the proximity approach.

Regardless, one can see that an adjacency between two functions on a semantic map has two implications: that it is possible for the two functions to be encompassed by a single term, and that it is possible for a term encompassing one of the functions to change to encompass both (van der Auwera 2013). Further than this, there are two other main uses for a connectivity map. Firstly, one can also use it as a template on which to represent other information that is already known about the linguistic type under consideration. For example, if one knows that it is possible for function 9 to develop into function 8 but not vice versa (as is actually the case), one could signal this graphically by simply connecting the two functions with an arrow like so:

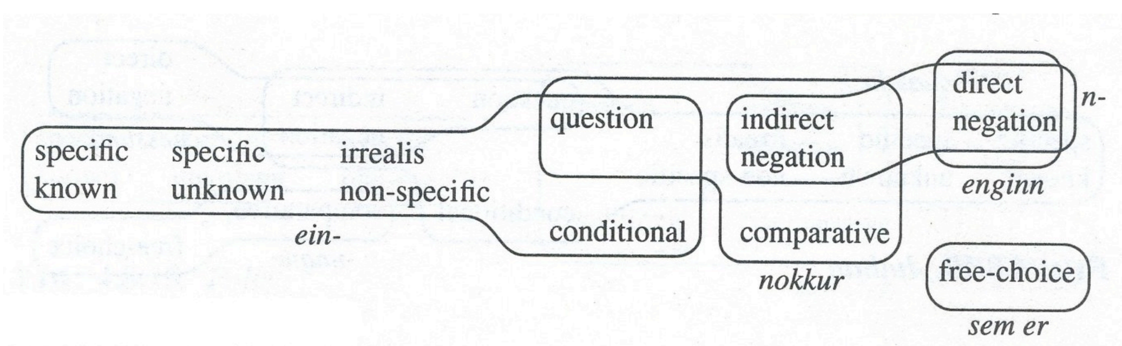
Figure 3: representing directionality of semantic change on a connectivity map



This modification to the connectivity map graphically represents the already known fact that function 9 can develop into function 8 but not vice versa.

The final use of a connectivity map is that one can give a fairly informative description of a specific indefinite by drawing out the space on the semantic map which it occupies. For a specific example, I present here a graphic representations of the uses of indefinites in Icelandic (Haspelmath 1997: pg. 69)

Figure 4: indefinites in Icelandic

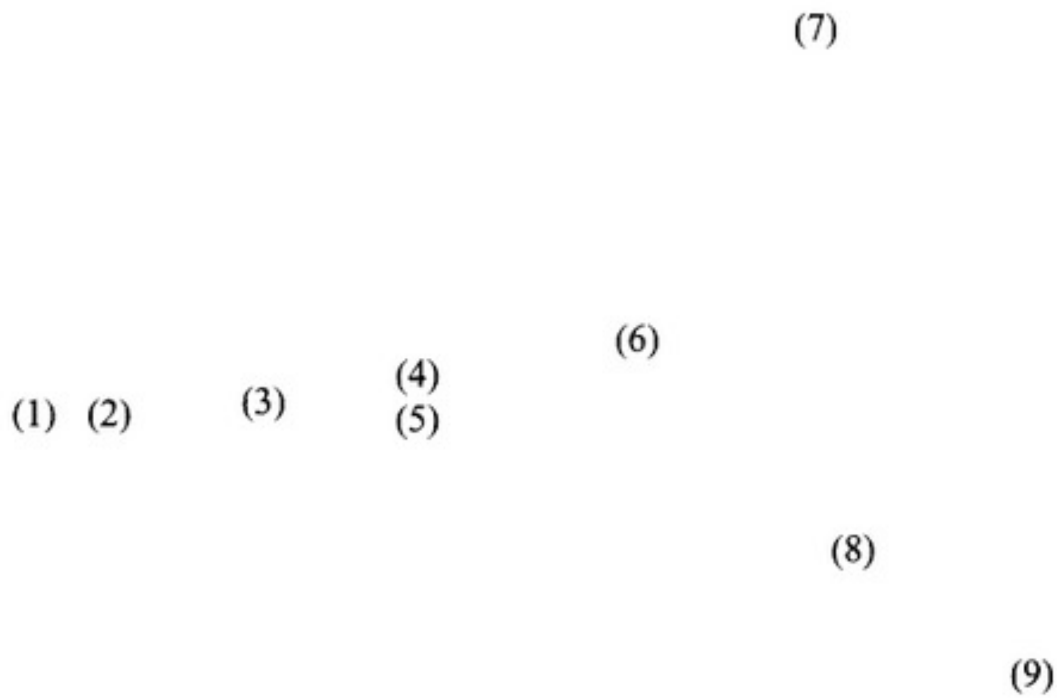


On this connectivity map, the five main Icelandic indefinite terms are described with regard to the space that they occupy on the connectivity map.

2. The Proximity Approach

I will now discuss the newer proximity approach so that the two approaches can be compared. As opposed to the connectivity approach where functions are either connected or not, the proximity map represents the relatedness of functions by spatial proximity. To give an example of a proximity map, I here present the indefinite map from Cysouw (200: pgs. 611-612) which uses the same data as the Haspelmath connectivity map.[3]

Figure 5: a proximity map for indefinites



Here one can see that, for example, functions 1 and 2 are more closely related than functions 2 and 3, and 2 and 3 are more closely related than 6 and 7.

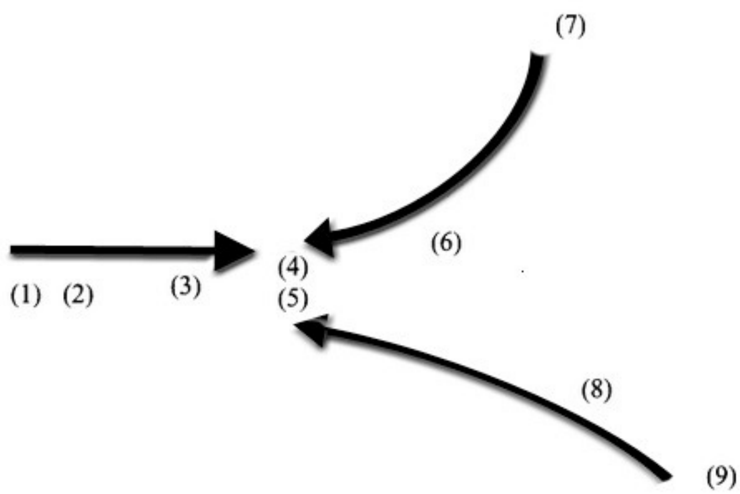
Such proximity approaches generally use a mathematical procedure to determine the spatial arrangement of the functions under consideration. In Cysouw's map in particular, there are two criteria by which the space between any two functions is determined. First, The number of instances in which two functions are encompassed by one term should be inversely

[3] There is another proximity map for indefinites in Croft and Poole 2008 which uses a different methodology and therefore looks very different. Even though I do not present this map here, I believe that one can easily tell that it supports the conclusions I come to section 5, perhaps more so than the Cysouw map. I choose to present the Cysouw map in this paper in order to make a stronger claim – even on a proximity map which can predict semantic change better than the other, the connectivity map is still superior.

proportional to the distance between the two functions. Second, The number of instances in which one function is encompassed by a term but not another should be directly proportional to the distance between the two functions. These are not the only two criteria that can be used to make a proximity map, but Cysouw's idea was that one could measure the semantic relatedness of two functions by the frequency of their co-occurrence. Cysouw plugged Haspelmath's data into a computer program and found the spatial arrangement which had the least mean error (in this case 4%) between the spatial distance of two functions and the distance between them as determined by two criteria above. This is what one sees in figure 4.

A proximity map also yields a number of linguistic conclusions and hypotheses, some similar to a connectivity map, but some different. Although one cannot form definite conclusions about which combinations of functions are possible or impossible, one can conclude that certain subsets of functions are more common than others. For example, Cysouw's map yields the conclusions that functions 1,2 and 3, are much more likely to be grouped together than functions 7, 8, and 9. This sort of conclusion is not possible with the connectivity approach because in using it one can only determine whether two functions are connected or not connected. Therefore there is a trade-off between the two approaches. Using the connectivity approach one can see that it is impossible for a term to encompass functions 1 and 3 but not 2, but one would not be able to see that a term encompassing 1, 2, and 3 would be more likely than one encompassing 7-9. The opposite is true for the proximity approach. One can also come to conclusions about the relative semantic relatedness of different functions, which is interesting in its own right. In terms of diachronic change, the obvious prediction is that a term will more often obtain functions which are more closely related to the functions that it already has. However, as stressed above, this is merely a hypothesis which would need empirical verification. Finally, as in the connectivity approach, one can use a proximity map to represent linguistics information that one already knows. For example, if one knows that a certain path of semantic change is more likely than another, then one can represent this by superimposing an arrow onto the map in the direction of change:

Figure 6: representing directionality in semantic change on a proximity map



Interestingly, the arrows imposed on the proximity map tell us something slightly different than the one imposed on the connectivity map. Similarly to other conclusions which are inferable from the two types of map, one could infer from figure 3 that a certain semantic shift was possible, while one could infer from figure 6 than certain semantic shifts were probable based on the shifts that had come before.

3: The Debate

It is not hard to see the similarity of the maps that the two approaches yield. This is because there is a large overlap in the goals and methods of the two approaches. However, there is still a debate in the literature about which approach is more useful. In this section I will present the most important arguments from the two sides. This will put section 5 in context, where I will add to this debate by taking into account diachronic considerations.

3.1 From the Connectivity Side

The most important argument for the connectivity approach is that it represents a falsifiable hypothesis. One of the distinguishing features of a connectivity map is that two functions are either connected or not connected – there is no in-between. Since a connection between two functions has definite linguistic implications, a connectivity map defines a hypothesis about language which is predictive and falsifiable. That is to say, once one has created a semantic map, one can make a theory enumerating all of the possible combinations of functions which can be encompassed by one term. Of course, this theory could be wrong – new data could contradict the map and therefore cause one to create a new map embodying a new hypothesis. However, that this move is possible at all suggests a functional advantage of the connectivity approach over the proximity approach. A proximity map can never be falsified by new data, because it only makes predictions about which combinations of functions are more likely. This is so even if the new data goes radically against what the map shows. If such a deviant data point was indicative of a fundamental flaw with the map, then only a connectivity map could change accordingly. An advocate of the connectivity approach could cite this as a functional advantage over the proximity approach.

In van der Auwera (2013), multiple other arguments for the connectivity map are discussed. However, for reasons that I will explain in section 3.3, many of these arguments are not convincing. Therefore I have chosen not to include them here.

3.2 From the Proximity Side

One of the most important aspects of the proximity approach is that it is mathematically well defined. That is to say, the way by which one arrives at particular spatial arrangement of functions is by taking a data set and applying some mathematical formula to it. The particular mathematical formula used for Cysouw's indefinite map is discussed in section 2.2. Although the procedure that one uses to create a connectivity map is well defined, the mathematical underpinning of the proximity approach gives it an extra set of tools with which to analyze the data. The process used by the connectivity approach is also much more labor intensive. This means that there is a much higher change of human error than in the proximity approach. Finally, and most importantly, the proximity approach allows one to analyze much larger data sets. Since the procedure of the connectivity approach is so labor intensive, one is restricted to relatively small maps. The proximity approach avoids this problem because it can relegate the work to a computer. For example, in Croft and Poole (2008), there is a detailed analysis of tense and aspect which would have been too complex to model with a connectivity map.

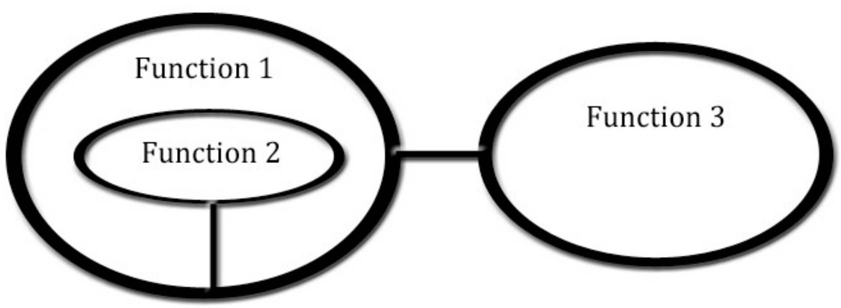
3.3 Remarks on the Debate

Given these arguments, it does not seem like either approach is clearly better than the other. However, it is important to note that one's choice of which approach to use will also be influenced by what one hopes to accomplish. This is because there are some types of conclusions for which one approach is simply better suited than the other. For example, if one wants to know about the relative likelihood that a certain grouping of functions will occur, then one would obviously use a proximity map, however if one wants to know which groupings are possible and which are not, then one would obviously use a connectivity approach. These do not count as arguments for either side because their relevance merely depends on what one is interested in.

To conclude this section I will discuss one more important point which I mentioned briefly in section 1. There is a large range of factors which are not directly represented by a basic semantic map of a certain approach, but which can be expressed with some graphic modifications. This is especially the case if one wishes to represent facts about language which one already knows. For example, Croft and Poole 2008 illustrate the ability of a proximity map to represent what is discovered by a connectivity map simply by connecting the appropriate functions with lines. However, it is important that one must have already made a connectivity map for this move to work. Therefore, this sort of move does not entail an argument for or against either approach. To represent an additional fact about language using either approach, one needs only a little graphic ingenuity.

As it turns out, this point is sometimes not fully appreciated in the literature. For example, in van der Auwera (2013), it is argued that only the connectivity map can express that a certain function is an extension of another. According to Auwera (2013: pg. 10) this can be done by simply circumscribing one function inside another, like so:

Figure 7: graphically representing hyponymy on a connectivity map



This would then have some linguistic implications such as that if a term included the hypernym then it would also have to include the hyponym. That is, if a term encompasses function 1, then it would also have to encompass function 2. However, if a term encompasses only function 2, then it could only change to encompass function 1. Further, according to Auwera, this sort of move is not possible in the proximity approach, since there are not distinct divisions between the functions. However, I see no reason why this must be the case. For example, on Cysouw's indefinite map, if one wanted to express that the specific known function was an extension of the specific unknown function (this is not actually the case, but suppose for the sake of argument), one could simply modify the semantic map like so:

Figure 8: graphically representing hyponymy on a proximity map

One could also then posit certain rules such as that if a term encompassed the specific known function then it would also have to encompass the specific unknown function but not vice versa.

This point is of course rather trivial, but it is important to keep in mind when considering the relative merits of these two approaches. The only factors which will set the two approaches apart are ones which follow directly from the differences in their methodologies, not ones which pertain to their specific method of graphic representation. Indeed, it seems that almost any relevant factor of language is representable on a semantic map given some graphic ingenuity. With this in mind, in this paper I will focus on the two approaches in their most "basic" form. That is to say, I will evaluate the approaches only with respect to factors which necessarily follow from their methodologies. One such factor is a semantic map's predictions about semantic change, and indeed, I will later argue that the connectivity approach has an advantage in this regard.

4: Diachronic Data

I will now discuss the ways in which indefinite pronouns change, as presented in Haspelmath's Indefinite Pronouns. However, before I do this I would like to address two points about the data which are potentially troubling. Firstly, as Haspelmath acknowledged, the amount of available data on semantic change for indefinites is unfortunately small. However, this should not stop us from drawing what conclusions that we can. Secondly, I acknowledge that the data I am using comes from an author who also advocates the connectivity approach. Obviously there is space for bias here, but I see no reason to assume that there is. Having acknowledged these issues, I will proceed to draw what conclusions I can based on the data available.

As it turns out, all attested cases of semantic change for indefinite pronouns are between adjacent functions on the connectivity map. Although this does not necessarily mean that leap-wise motion is impossible, it does suggest that there is some restricting factor for the development of indefinites which influences functions to move to adjacent functions. One should note that this is not necessarily an obvious result. The connectivity is made completely synchronically using data from modern languages. The fact that this also corresponds to the way language develops is a non-trivial and controversial fact.

There are a couple other ways in which the development of indefinites can be described. For one, there tends to be an upper limit to the number of functions that a term can encompass. The upper limit varies, but as a term takes on more and more functions, it tends to lose functions on the periphery of its semantic space. There are also a number of common paths which are a result of grammaticalization. It is already established fact that grammaticalization tends to follow predictable paths (Bowern 2013), and this is no different for indefinite pronouns. The most common of these paths is when a term grammaticalizes to obtain a free choice function (no.9) and then moves leftward along the map.[4] For example, the French expression “qui que ce soit,” meaning “whoever it may be” at some point grammaticalized to a free choice indefinite function

[4] This can be the result of the grammaticalization of a number of different constructions including ones which mean “it does not matter what.” For example, the French construction “n’importe qui” literally translates to “It does matter who,” now has a free choice function.

(Haspelmath 1997: pg. 135). Another common grammaticalization path is when a term takes on a specific unknown function (no. 2) and moves right. For example, the German phrase "wer weiß wer" literally means "who knows who," but at some point grammaticalized to take on a specific unknown indefinite function (Haspelmath 1997: pg.133). Finally, there are some function-specific restrictions that are apparent from the data (although there are not many). For example, it is unattested that the comparative function (no. 8) develops into the free choice function (no.9), but it is quite common in the other direction (since it is the first step on along the first grammaticalization path).

5: Remarks on the Diachronic Data

I will finally discuss why I believe that the connectivity approach is superior in predicting semantic change. In the previous discussion I discussed how the predictions of the connectivity approach match up quite nicely with semantic changes which actually occur. Given this, the question is then whether the proximity approach can accurately predict which semantic changes are more likely. If it can, then neither approach has an advantage over the other. However, if it cannot, then the connectivity approach has the advantage in this area. Unfortunately there is not sufficient data to tell in every case how common a certain change is. However, even without this data the proximity map for indefinites suffers from some problems. For example, the indefinite proximity map predicts that function 6 is more likely to lead to 5 than to 7 or 8, 5 more likely to lead to function 2 than to 8, and 6 more likely to lead 3 than to 7. In all of these cases, the predicted more common change is also the unattested one. There is obviously some disconnect when the proximity map predicts unattested semantic changes to be more common than attested ones.

This problem with the indefinite map draws out a general problem that proximity maps have in dealing with semantic change. It is a general principle of semantic change that there are universal restrictions on the ways in which semantics can change (as is the case with all aspects of language) (Bowern 2013). The gradient way in which a proximity map makes predictions is at odds with this fact. Especially given that there is always a margin of error in a proximity map, one will never have assurance that a proximity map is not predicting non-attested (or even impossible) semantic changes as probable. To be clear, I am not claiming that a connectivity map achieves such certainty; as noted earlier, one has no guarantee that a map made with synchronic data will be diachronically accurate. Rather, the two approaches both present us with a set of predictions about the ways in which functions will develop, and the connectivity map's happens to be more accurate. This is true in the case of indefinites but also in general because of a proximity map's inability to rule out non-attested changes follows inevitably from its methodology.

Further, even if one could somehow tell from a proximity map which changes were possible and which impossible, there are other problems that the map would face in predicting semantic change. For one, it is a well-established fact in the study of semantic change that certain directions of change are more common than others (Bowner 2013). For example, the change from the free choice to comparative functions is much more common that the other way around (Haspelmath 1997: pgs. 149-152). This seems like an important factor in the description and understanding of semantic change, and indeed one that a proximity map would be blind to. Distance is a symmetric property, and therefore a proximity map cannot predict that one function is more likely to change into another than the other way around.

Another general problem for proximity maps is that they would not be able to predict the common paths of grammaticalization that one sees in the case of indefinites. This is because it can only predict the likelihood of one function changing into another. It cannot predict the likelihood of a change based on what changes have come before it. Therefore, the increase in likelihood of a change from 8 to 5 after a change from 9 to 8 would be impossible to predict using a proximity map. Additionally, as Haspelmath points out, these paths of grammaticalization represent some of the most common and important changes that indefinite pronouns undergo, and a proximity map cannot by itself predict any of them. Given both these general considerations, and the specific considerations about indefinites, it is fairly clear that the connectivity approach is superior to the proximity approach in predicting semantic change.

6: Concluding Remarks

Before concluding, I would like to reiterate one point from the end of section 3. In discussing the relative merits of the two approaches, it is easy to fall into the mindset that such discussions are trivial. One might think it is not useful to think about the approaches as completely distinct since different aspects of each approach can be easily represented on the other (c.f. Croft and Poole (2008: pg.17) proximity map with connecting lines). However, this mindset misses a crucial distinction between being able to represent a linguistic fact that one already knows, and being able to predict aspects that we do not. If we already know certain facts about how languages change over time, we can represent these facts on either type of semantic map using extra graphic elements. This basically changes the map from a predictive tool to a descriptive one. However, if one is unsure what types of semantic changes one sees for indefinite pronouns, but one has enough synchronic data to create a connectivity map, then one can look to the map for predictions about these changes. This is the aspect of semantic maps which I have restricted my attention to here. Each of the two approaches has a distinct methodology which results in distinct predictive power.

Indeed, in this paper I have argued that the predictive power of the connectivity approach is superior to that of the proximity approach with respect to diachronic factors. I began with a discussion of the different types of indefinite pronouns, and a presentation of two different semantic maps, yielded by two different approaches. I also discussed the different linguistic implications and predictions that the two maps yield. I then briefly presented the arguments from both sides of the debate about which approach is superior. I then weighed in on this argument by looking at the diachronic predictions of the two maps and comparing them to the attested changes for indefinite pronouns. Finally, I came to the conclusion that the connectivity approach was superior in predicting semantic change. This is the case for many reasons, but my main point was that in using the proximity approach, one has no guarantee that unattested changes would not be predicted as plausible. Therefore, in the overall debate over the relative merits of the two approaches, it is my claim that the connectivity approach gains many points in its favor for its ability to predict semantic change.

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