Visualization of semantic shifts: the case of modal markers

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This proposal examines the importance of visual representations to convey semantic shifts while presenting a work in progress concerning the diachronic study of modality in Latin.[1]

A visualization is meant to aid the comprehension of data by taking advantage of our visual perception and its capacity to discern patterns, trends and atypical values (Heer et al. 2010: 59). A visual representation is more accessible, attractive and it can replace complex cognitive calculations. However, selecting the most efficient visualization can be challenging, especially when conceiving it as a scholarly resource (see Jessop 2008) for the representation of abstract concepts. In our case we would need to:

- condensate pages and pages of dictionaries and historical grammars;

- add information to previous models to better convey the multidimensionality of modal semantic shifts;

- update the traditional visualization models incorporating motion, color and user interactivity.

The semantic map visualization method was introduced by Haspelmath (2003)[2] to describe and illustrate the multifunctionality patterns of linguistic elements. The semantic map appears as a geometric representation of functions connected together in a semantic space. Semantic maps were employed in various ways, cross-linguistically or on individual languages,[3] and synchronically or diachronically.

Van der Auwera and Plungian (1998) apply this resource to visually represent and predict universal patterns of modalisation.[4] They build on the single patterns of modalisation for possibility and necessity of the cross-linguistic study by Bybee et al. (1994) (see Fig. 1),

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[2] For earlier conceptualizations of semantic maps see Hjelmslev (1963), Lazard (1981), Anderson (1982).

[3] For both a single-language approach and a cross-linguistic one see François (2008).

[4] Semantic maps had been already applied (amongst others) to tense and aspect (Anderson 1982), evidentiality (Anderson 1986), conditionals (Traugott 1985), voice (Croft et al. 1987).

complementing them with lexical information from other languages. An overview of the modalisation paths is achieved by including pre- and post-modal meanings (Fig. 2).[5]

Our proposal follows this model[6] but our aim is to produce a digital visualization, having these features:

1. Diachrony: Addition of a timeline to visualize when a new meaning appears.
2. Synchrony: Visualisation of coexisting meanings by combining shape and color.
3. Chronology: Enrichment of each meaning with its first attestation that will be displayed by clicking on that concept.
4. Polyfunctionality: Working with empirical data does not imply unambiguous findings, therefore our proposal will visually codify multiple modal values of the same marker.
5. Legibility: Points 1-4 extend the contents of previous models. To guarantee legibility, certain information will be color-coded and others will appear by user demand. Colors, for instance, will be employed to identify and distinguish pre-, post- and modal meanings.[7] The first attestation of each concept will be displayed by clicking on that specific step of the path. Users can highlight a specific path of modal shift just by hovering over one of its markers or concepts. A combination of shape and color can render the coexistence of meanings. Motion will be employed to visualize the modal path of a specific marker interacting with the chronological attestations.

As a first step we will present the modal maps of some Latin modal markers. However, the principles can be easily applied to any other language. The visualization will be realized using *draw.io*[8] to create the basic SVG that will be enhanced by manually including the animation elements. The selection of open-source software guarantees an open development. Therefore, not only the results, but all the data and methods will be made publicly available, thus contributing to both the Open Data movement and Public Digital Humanities.

We claim this model to be versatile: it would be useful to researchers, but also appropriate for vehiculating complex semantic concepts in an educational environment thanks to its readability and immediacy. Besides its possible implementation with other languages than Latin, any type of semantic shift could be visualized following our template. Semantic maps aid in the understanding of meaning so any fields working with natural language, like History or Philology, would benefit from our results.

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[5] The model by van der Auwera and Plungian (1998) and Bybee et al. (1994) has been reviewed by Magni (2005).

[6] The modal maps on Latin modal markers were drafted based on the *Thesaurus Linguae Latinae* (1900–), and are susceptible of change against corpus-based evidence.

[7] Being conscious of the challenges that discernity of color entail for people with visual disabilities, color will not be used as the only visual means of conveying information. Thus, it will be combined with other visual cues, like shape and texture. In addition, the size will be customizable and color contrast will be checked (see <https://webaim.org/resources/contrastchecker>).

[8] Available at <https://www.draw.io/> (consulted on 16/10/2019).
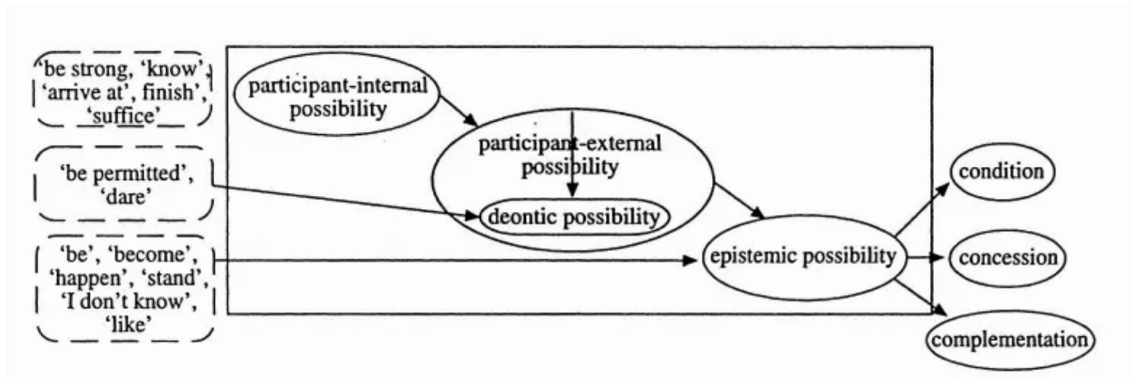
Acknowledgments

Figures

Fig. 1: "To possibility and beyond" (van der Auwera and Plungian 1998: 91).
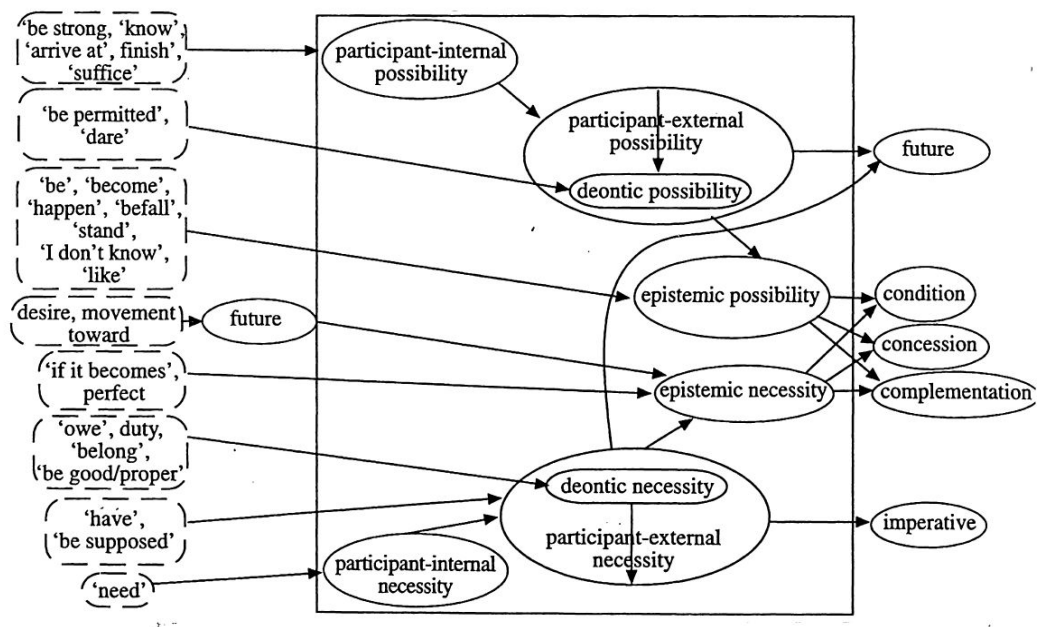

Fig. 2: "Unifying the possibility and necessity paths": Example of a semantic map representing the shifts of possibility and necessity (van der Auwera and Plungian 1998: 98).

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