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# The Digital Tool *Pygmalion* and its Interactive Maps: Visualising Modal Verbs in the Classroom

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Francesca Dell'Oro

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## Introduction

- 1 The role of visualisations in the processes of learning, teaching and sharing knowledge has been acknowledged by many studies (for different domains and approaches, see Arcavi, Fernandes *et al.*, Jessop, Klerkx *et al.*, Nazemi *et al.*, Rattya, among others; for concrete applications, see, e.g., Dahm, Mills, Olmedo). Thanks to the diffusion of the Internet and the development of new technologies, there is a fair number of easy-to-use and free electronic resources designed for allowing non-IT experts to create their own visualisations<sup>1</sup>. However, such tools are often not very well known. Furthermore, tools designed for a specific public, such as linguists or teachers, are rare. The main goal of this note is to present one such tool. *Pygmalion*<sup>2</sup> (Dell'Oro *et al.* *Pygmalion-simple*, *Pygmalion-modal*, *Pygmalion-colour*) is a user-friendly and free digital tool which allows anyone to design and customise interactive maps illustrating word meanings and other relevant information, such as their uses, the constructions in which they appear and semantic relations. For example, the word 'log' has the following meanings, among others: 'a thick piece of tree trunk or branch' and 'a full written record of a journey, a period of time, or an event'<sup>3</sup>. These meanings are in a metonymic relationship of the type "container (logbook or -board) – content (records)": the records were originally written on a wooden log-board, then transcribed in the log(book). The semantics of the English modals "can" and "may" and their uses are outlined here as a use case of *Pygmalion* for setting up interactive maps to be used in the classroom<sup>4</sup>.

- 2 In the next section, (1) I will briefly present the tool, then (2) I will illustrate the notion of “modality” and some preliminary work on drafting maps with *Pygmalion*. I will showcase the drawing of the contrastive maps of “can” and “may” by adopting a synchronic (3.1) and then a diachronic perspective (3.2). For both examples, I will outline the goals of the envisaged map and the filling of the relevant fields in *Pygmalion*’s forms. Finally, I will suggest some possible uses of the tool and of the map in a learning/teaching context. I will conclude by mentioning the advantages of the tool and pointing out some limitations and possible further improvements.

## 1. *Pygmalion*

- 3 *Pygmalion* was created as part of the linguistic project *A World of Possibilities (WoPoss)*, *Modal pathways over an extra-long period of time: the diachrony of modality in the Latin language* ([woposs.unine.ch](http://woposs.unine.ch)) and funded by the Swiss National Science Foundation. The main goal of the WoPoss project is to investigate the evolution of Latin modal markers over a millennium, from the 3<sup>rd</sup> century BCE to the 7<sup>th</sup> century CE. The *Pygmalion* tool – under the form *Pygmalion-modal* (cf. below) – was originally meant to illustrate in an interactive way the diachronic modal maps of the markers annotated in the WoPoss corpus of Latin texts (see Marongiu and Dell’Oro, *From static to interactive* and Marongiu and Dell’Oro, *debeo* for an example of a map). However, such a tool has potential applications outside the study of modality (see, e.g., the maps in the example gallery: [woposs.unine.ch/pygmalion.html#gallery](http://woposs.unine.ch/pygmalion.html#gallery)). Therefore, the team set up two other versions of the tools called *Pygmalion-simple* and *Pygmalion-colour*, which are not related to modality. Both versions work exactly like *Pygmalion-modal*. *Pygmalion-simple* is the basic version. *Pygmalion-colour* allows the user to code categories they want to introduce in the map with colours, while in the case of *Pygmalion-modal* the colour-coded categories are modal types and sub-types (for the definition of modality, cf. below). It is important to stress that any of the three versions can be used with any language and any script. The three versions and the code are freely available online (for the code: [github.com/WoPoss-project/Pygmalion](https://github.com/WoPoss-project/Pygmalion)). *Pygmalion-colour* provides maximum performativity and flexibility. Therefore, it was chosen to illustrate the English modals in diachrony and in synchrony.
- 4 The WoPoss team has provided clear and concise guidelines for learning to use the three versions of *Pygmalion* (see [woposs.unine.ch/pygmalion.html#howTo](http://woposs.unine.ch/pygmalion.html#howTo)); there is therefore no need to illustrate the process of creating a map in detail here<sup>5</sup>. Some basic information and the outline of the application to the case of two English modal verbs will suffice.
- 5 The tool works on the basis of two forms. The first form collects semantic information and contains mandatory fields and subfields – such as ‘headword’ (i.e., the dictionary entry), ‘etymology’, ‘date format’ (i.e., years, decades or centuries), ‘meaning(s)’ containing the subfield ‘description’ – and non-mandatory subfields – such as ‘collocation’ (for specific constructions or idioms) and ‘semantic group’. The second form describes the semantic relations between meanings (cf. the example given above for two meanings of ‘log’) and is not mandatory. The user can specify the semantic relationships between the meanings and/or the collocations entered in the first form and their directionality. The relevant fields and sub-fields will be illustrated below. All entered data results in two interactive visualisations, a map and a graph. Due to space

constraints, it is not possible to illustrate the functionalities of the graph here. It is important to note that in the maps, certainty – for example, about an etymological step or about the attestation of a meaning – results in a continuous line, uncertainty in a dashed one.

- 6 With respect to the maps, the entered meanings appear inside arrows. With the menu ‘select sort method’ appearing below a map, the user can choose to organise the data by chronological order, by entered groups, or by the suggested collocations. When the user hovers the mouse over a meaning, the first attestation of that meaning appears. When the user clicks inside an arrow, the relationships between the meanings appear.
- 7 Once a user has created a map, it is possible to export the data in JSON format through the ‘Export data map’ button and/or save the map as an SVG file or as a PNG file through the dedicated buttons. In this way, the maps can be shared. Maps can be uploaded through the ‘Import map data’ button at: [woposs.unine.ch/map.html](http://woposs.unine.ch/map.html).

## 2. Modality and the preliminary work

- 8 The case of modal verbs was chosen for its complexity. Learning when and how to use modal verbs is a notoriously difficult learning task, as shown by Bella, Holmes, Sidiropoulou, among others. Learning how to use modal verbs requires the handling of real use examples, for example, through corpora or exposure to the language as used by native speakers. *Pygmalion* maps could help in the learning and memorising of the basic semantics of these verbs. The semantics of modal verbs is not at all simple. From a synchronic point of view, these verbs are an emblematic case of both polysemy – the same modal often conveys more than one meaning (cf. below) – and semantic proximity, e.g., both “can” and “may” convey the notion of possibility. Moreover, they are an exemplary case of grammaticalization, i.e., the diachronic process by which a lexical form acquires grammatical functions (see, e.g., Plank, Traugott). Knowing the historical evolution of the modals could help the learning process, making learners aware of similar patterns of evolution. Visualisations – such as semantic maps<sup>6</sup> – have proven to be powerful tools in illustrating and investigating both the synchronic and the diachronic dimensions of the phenomenon, as shown by the pioneering work by van der Auwera and Plungian.
- 9 With respect to the definition of “modality”, it must be emphasised that there is no agreed-upon and standard use of the term. For the purposes of this note and in line with the use of the term in association with the case of English modal verbs, “modality” can be defined as the notional domain of necessity and possibility (van der Auwera and Plungian, 80). Under the modal notion of “necessity” we find, for example, internal needs (e.g., *I need to eat something*), contextual necessity (e.g., *To be on time, he needs to take a taxi*), generic necessity (e.g., *All men must die*), obligations (e.g., *You must finish your homework*) and the expression of a relatively high degree of likelihood (e.g., *He must be sick, if he has not come to the party*). Under the modal notion of “possibility”, we find, for example, abilities (e.g., *He can stand on his head*), contextual possibilities (e.g., *If he agrees, you can park your car in his space*), generic possibility (e.g., *It can be very hot here in summer*), permissions (e.g., *You may go now*) and the expression of a certain degree of likelihood (e.g., *He may be sick, if he has not come yet*).
- 10 The first step for drawing a *Pygmalion* map is to collect information about the words – in our case, modal verbs – to outline. The choice of the sources depends on many

factors, such as the level of the learners, the available time, and the objectives to be achieved, etc. Two possibilities have been considered. Teachers and learners may be interested in showing or exploring the connections between the meanings and functions of modal verbs from a contemporary perspective (cf. the map illustrated in figure 1). They may also be interested in showing or exploring the historical development of modal verbs (cf. the map shown in figure 6).

- 11 To illustrate the synchronic perspective, Leech et al. was used as a reference, but any other accessible grammar of the English language is fine. To show the historical perspective, Traugott was used as a reference. In the appendix, Traugott (197–199) offers synthetic diachronic visualisations of the history of some modal verbs, confirming the usefulness of transposing diachronic information in a visual form<sup>7</sup>. Both sources of information were chosen as they offer a synthetic and easily understandable presentation of the relevant data.
- 12 It is useful to start by drawing the planned map by hand – or at least by visualising it mentally – before filling in the forms (cf. the examples below). In fact, there are often many ways to illustrate the same phenomenon. The user can choose the best option only by knowing what they want to see displayed on the map.

### 3.1 The synchronic contrastive map

- 13 As mentioned above, the polysemy (or polyfunctionality) of English modal verbs can make them a difficult topic for both teaching and learning. The first term indicates that the same modal verb can convey more than one meaning (e.g., “possibility” and “permission”), while the latter stresses the association of such meanings with several functions or uses (e.g., requests or offers). An additional difficulty arises as a result of the semantic proximity of modal meanings (“permission” can be understood as a kind of “possibility”, a negated permission can be conceived as a “necessity” not to do something, and so on) and by the fact that different modal verbs can convey the same meaning (e.g., “permission” can be conveyed by both “can” and “may”, though there are differences in their uses). A map illustrating these meanings and uses associated with different colours could help the teacher illustrate the grammar points and enable learners to become familiar with them by comparing two or more verbs. In order to create colour-coded maps, the user needs to choose the version called “Pygmalion-colour” (Dell’Oro et al. *Pygmalion-colour*). This version allows users to introduce a suitable label for each category that the system automatically associates with a colour.
- 14 Based on the description of “can” and “may” in Leech et al. (74–78 and 282–283, respectively), I devised a map in which “can” is associated with the meanings of “ability”, “possibility” and “permission” and with its uses in requests and offers. In the same map, “may” is associated with the meanings of “possibility” and “permission”. Specific grammar points (such as negation and questions) are illustrated with examples that will appear only if the user hovers over the relevant arrow (cf. below). In fact, the content of a *Pygmalion* map is not displayed at once. The user discovers it gradually, by exploring both *the visual and the digital space*, as different spaces of the map are activated when clicking or hovering over certain elements. In other words, a *Pygmalion* map is conceived as a group of layers. Some of them are always visible, while others are displayed upon request. The preparatory sketch in figure 2 shows the selected content in an explicit or implicit way (e.g., with the label “example(s)”) and the colour-coded

categories. Figure 3 shows the organisation of the selected content with respect to *Pygmalion* fields. For example, I decided to use the field “first attestation and/or example” not only for contemporary examples, but also for some notes about how the verb should be used. A user familiar with *Pygmalion* can make such associations without drawing them.

- 15 *Pygmalion* can be used by teachers to present the content of a lesson, but also by learners. Though the effects of the use of *Pygmalion* on learners have not been tested yet, on the basis of previous literature (cf. the works cited in the Introduction) it seems likely that the process of selecting and organising knowledge by creating a map – as shown in the sketches – can help learners understand and memorise content and uses. This work can be done autonomously by the learners, for example, after having attended an introductory class on modal verbs.

Figure 1. Map outlining the main meanings and uses of English “can” and “may” (static view). The dark blue bar at the top indicates the centuries.

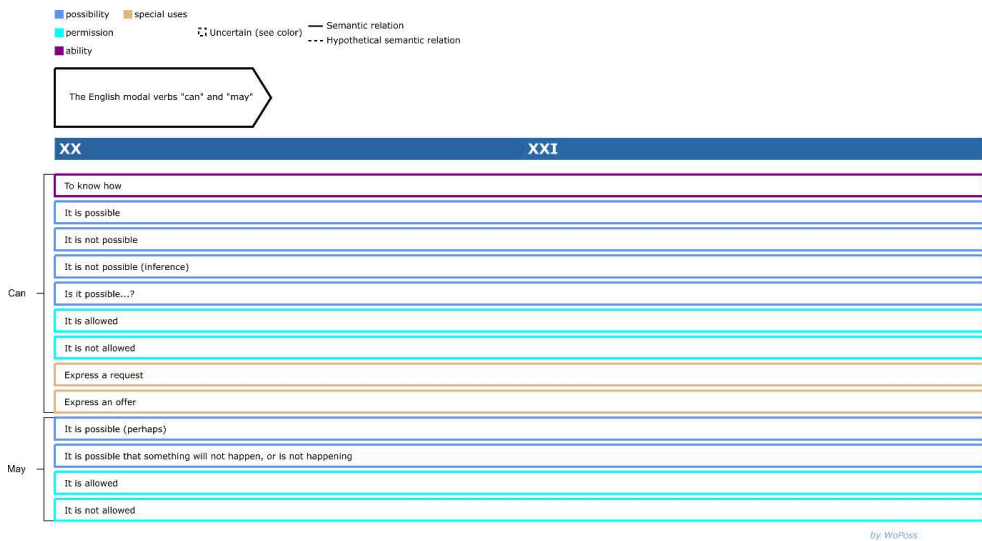


Figure 2. First version of the sketch showing the selected information from Leech et al.

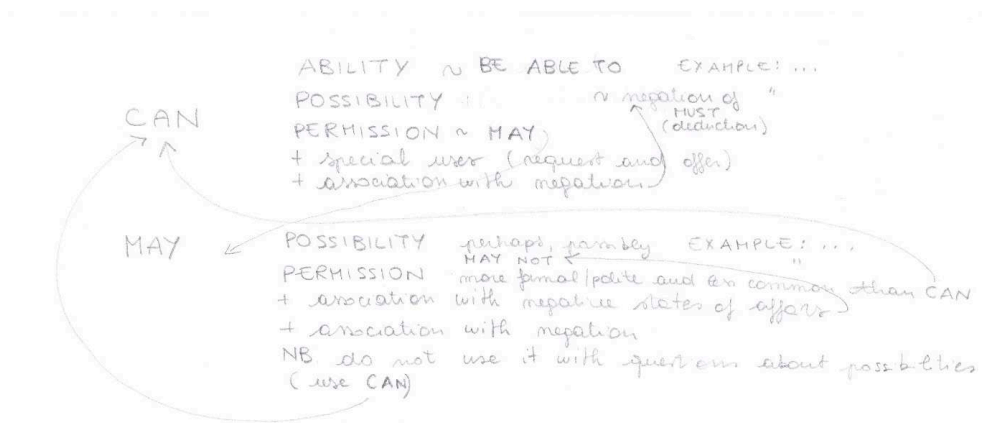
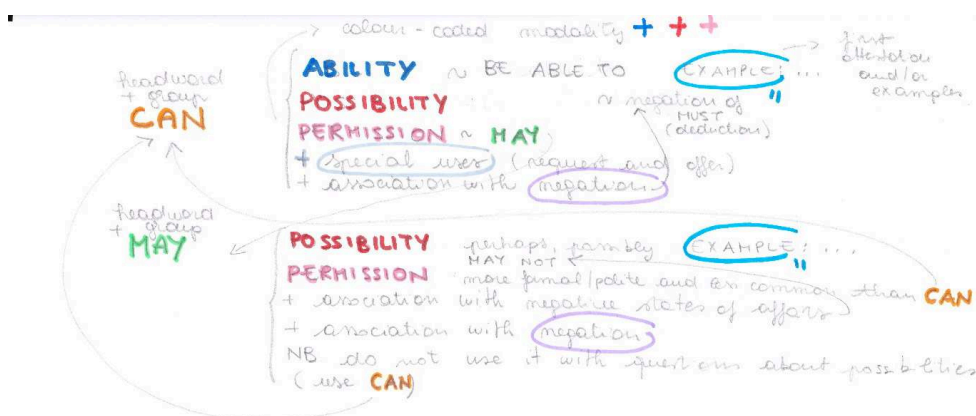


Figure 3. Second version of the sketch showing the association of the content with the functionalities offered by *Pygmalion*.



- 16 In order to create the colour-coded map shown in figure 1, the user must open the web page [woposs.unine.ch/pygmalion.php](http://woposs.unine.ch/pygmalion.php) and choose the version of *Pygmalion* called “Pygmalion-colour” (Dell’Oro et al. *Pygmalion-colour*). After clicking on the corresponding link, a form appears and the user can add the name of the map, e.g., *The English modal verbs “can” and “may”*. As historical development is not the focus of this map, the user must click on the ‘Proceed without etymology’ button. Then they must set the time format choosing between centuries, decades or years (this is due to the fact that the tool was originally conceived to create diachronic maps). The user can describe several aspects of the selected linguistic item. Relevant fields are “meaning/function/use” (henceforth “meaning”) to describe the meaning of each verb, “analysis” to associate each meaning with a notional category such as “possibility” or “permission”, “group” to group the meanings of each verb, and “first attestation and/or example” to give some examples and add useful information. To illustrate (cf. figure 4), in the case of the epistemic possibility reading of “may”, the meaning is “it is possible (perhaps)” (cf. below about a more fine-grained distinction of the types of possibility), the notional category for the field “analysis” is “possibility”, the group is “may” and the suggested example in the field “attestation” is “He may be ill”<sup>8</sup>.

Figure 4. Screenshot illustrating the form in which the user describes the selected linguistic item (here the English modal verb “may”).

The screenshot shows a web form titled "The English modal verbs 'can' and 'may'". At the top, there are two buttons: "Proceed with etymology" (highlighted in blue) and "Flag etymology as unknown". Below these is a "Centuries" dropdown menu. The main form area is divided into several sections:

- Meaning / function / use:** A text input field containing "it is possible (perhaps)".
- Collocation:** A dropdown menu with a hyphen "-" selected.
- Semantic group (or other kind of groups):** A dropdown menu with a list of options: "✓ may" (highlighted in blue), "can", and "Add a group...".
- Description:** A text input field with "No additional analysis" selected, and a "Delete description" link to the right.
- Analysis:** A dropdown menu with "XX" selected.
- Date of meaning emergence:** A text input field with "Century (II BC, I BC, I, II) or Year" as a placeholder.
- Date of meaning disappearance:** A text input field with "He may be ill" as a placeholder.
- First attestation and/or example:** A checkbox labeled "Analysis is certain" which is checked.

At the bottom of the form is a blue button labeled "Add a new description".

- 17 Once all the meanings have been added and all the relevant fields have been filled in, the user clicks on the ‘submit form’ button and a new form appears. The second form is dedicated to the description of the relationships between meanings (or functions) and is not relevant here (cf. 3.2). The user can click on the ‘submit form’ button and the map automatically appears.
- 18 As shown in figure 1, the suggested meanings appear inside arrows with a coloured outline. Each colour is associated with one of the categories introduced in the field “analysis”. A legend appears above the map.
- 19 As the meaning of “can” and “may” with respect to permission (and its negative counterpart) is very close, I have used the same meaning description “it is allowed”. On the other hand, the meanings of “possibility” associated with “can” and “may” are more distant. In order to stress this difference, I have added extra information for “may” in the field “meaning” after the common string “it is possible”: the addition “perhaps” should help the reader understand the epistemic meaning of “may”, i.e., the fact that the speaker indicates how probable he considers that something can happen. In a similar way, the addition “that something will not happen” should help the reader understand that the negation ‘not’ covers the state of affairs introduced by the modal verb (i.e., the idea of “something not happening”).
- 20 With regard to “can”, the meaning of “(im)possibility” is shown with four arrows. By hovering over each arrow, the reader can discover the specific meanings and uses (cf. figure 5). Besides generic possibility (e.g., *The weather can be hot in Delhi*), we find the negation version of possibility/ability (e.g., *People can’t live on nothing*), the inferential use (e.g., *She lives in Paris, but she speaks with a German accent. She can’t be French. She must be German.*) and questions (e.g., *Could they have lost their way?*).

Figure 5. Screenshot of the previous map showing the content that appears by hovering over an arrow

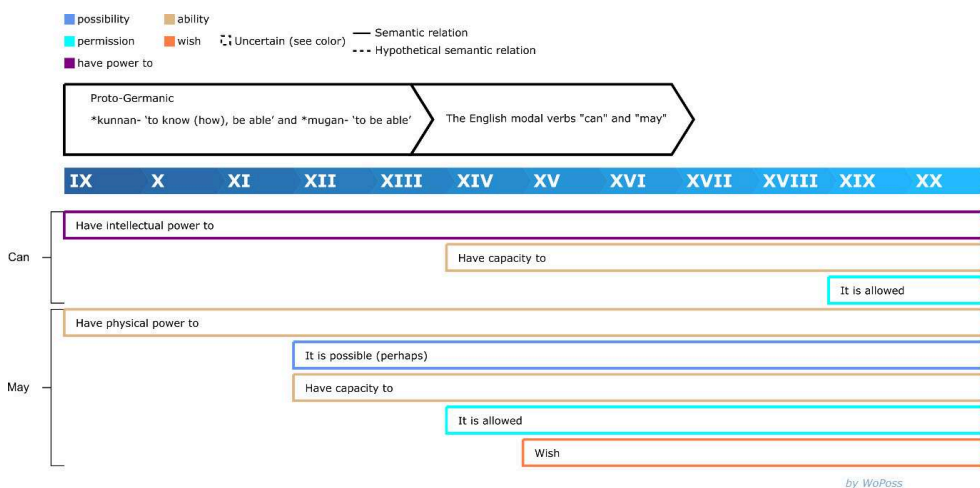


- 21 In order to see the groups, the user must select the sort method 'group'. This way the user can see which meanings are associated with 'can' and which ones are linked to 'may' and the map is easier to read.
- 22 The map data can be downloaded with the 'export data' button appearing below the map. The user can also import a previously created map using the 'import map' button located below the map too. The map is also available in the example gallery of the WoPoss project: [woposs.unine.ch/maps/can-may-syn.html](http://woposs.unine.ch/maps/can-may-syn.html).

### 3.2 The diachronic contrastive map

- 23 As well as being fundamental in any class devoted to the history of the English language, the diachronic dimension can also be useful in other learning contexts to help interested learners become aware of the reasons behind the similarity and differences between the uses of words.
- 24 In order to create a diachronic map (see figure 6), the user will follow the same procedure as illustrated above. Therefore, I will focus only on the main differences.

Figure 6. Diachronic map illustrating the development of the English modal verbs "can" and "may".

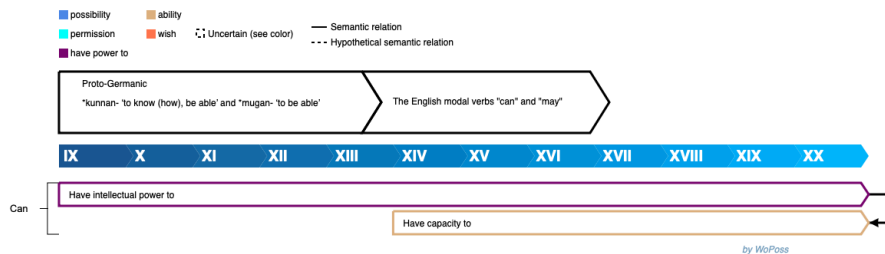


- 25 As expected, the etymology can be relevant in this case. To add etymological information, the user needs to click on the "proceed with etymology" button and then on the 'add etymological step' button. The reconstructed roots of the two verbs have a very close meaning: \**kunnan-* 'to know (how), be able' and \**mugan-* 'to be able' (Kroonen 2013: s.v. *kunnan-* and s.v. *mugan-*). I filled in the 'meaning' and 'date of first emergence' fields, following Traugott's diagram (198). The purpose of the 'date of first emergence' field is to specify the earliest date from which a meaning is attested with certainty. Traugott uses a dashed line and then changes it to a continuous (non-dashed)

line to indicate that the emergence of the new meaning is progressive, but *Pygmalion* does not offer this possibility (yet). The outline of an arrow can only be entirely dashed or entirely non-dashed. However, it goes without saying that the first (often non-written) emergence of a new meaning may date back earlier than the first written attestation of that meaning by many years or even decades.

- 26 In order to have the categories colour-coded with the same colours as in the previous, synchronic map, the user must follow the order of the categories in the first map. In fact, *Pygmalion* attributes the same colours in the same order. E.g., the first category is always cornflower blue, the second aqua and so on.
- 27 Unlike the first use case, the relations between meanings are relevant here. From a teaching point of view, it can be interesting to point to two parallel developments, the one from “to have power to” to “ability” and the one from “ability” to “permission”, even though the role of the (epistemic) possibility meaning of “may” in this development is not completely clear (cf. van der Auwera and Plungian 89)<sup>9</sup>. These relationships can be introduced by filling in the second form. Here users find all the definitions in two mirrored drop-down menus, one on the left and one on the right. Thanks to a third central drop-down menu, they can indicate the relationships between the meanings in terms of directionality. For example, “have intellectual power to (can)” is at the basis of the meaning “have capacity to (can)”. This can be done by selecting the option ‘to’ in the central menu. Figure 7 shows one of the relationships between the meanings.

Figure 7. View of the diachronic map showing the relationship between the meaning “have physical power to” and “have capacity to”.



- 28 Like the previous map, this map is also available in the example gallery of the WoPoss project: [woposs.unine.ch/maps/can-may-dia.html](http://woposs.unine.ch/maps/can-may-dia.html).

## Conclusion

- 29 This note has shown how the free digital tool *Pygmalion* draws interactive maps of meanings and their relationships. The tool has some innovative features. First, it is user-friendly. No particular computer skill is required to use it. An important consequence is that *Pygmalion* can be used by everyone: researchers, teachers, pupils or students. Second, *Pygmalion* maps are interactive and readers can explore their content in a controlled way. In fact, certain information is displayed only by user demand enabling the method “learning by exploring” (Nazemi et al.). Third, the tool is very flexible. Besides the fact that there are three versions (*Pygmalion-simple*, *Pygmalion-modal* and *Pygmalion-colour*) corresponding to different needs of the users, its functionalities can be easily adapted. In this contribution, I have shown that although

the tool was originally designed to draw diachronic maps of single words (or of etymologically related words), it can also be used not only to draw synchronic maps, but also to draft contrastive maps. Moreover, teachers and learners can adapt the use of the tool to their needs. For example, teachers could design a simple map to introduce the basic uses of a word and then provide more complex versions of the same maps, enriching them with new data progressively. On the other hand, *Pygmalion* can also be autonomously used by learners. Organising information in a visual form enhances the learning and memorisation process, while exploring a map can help learners consolidate knowledge. The map could also be used as a reference tool for revision before an exam or in case of doubt. Fourth, *Pygmalion* maps can be easily shared between users and they can display them on their computers.

- 30 With regard to the tool, I would like to point out the following two limitations:
1. the impossibility of changing the format of a line (from dashed to non-dashed). This functionality would provide more precision, showing that meanings emerge gradually;
  2. the impossibility of choosing the colour for the categories introduced by the user. In fact, colours are attributed automatically. It would be ideal if the same category could be associated with the same colour in maps related to the same project<sup>10</sup>.
- 31 Finally, testing the tool would be interesting in order to evaluate its impact in the classroom or in autonomous learning and to understand the role of the digital dimension in learning and teaching. In fact, it offers a way of organising and displaying/hiding content that is not possible with traditional hand-written notes or hand-drawn diagrams. However, as we have shown above, even digital visualisations can be based on hand-drawn sketches (or at least mental ones).

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## NOTES

1. Cf., e.g., Canva ([www.canva.com/graphs](http://www.canva.com/graphs)), Diagrams ([app.diagrams.net/](http://app.diagrams.net/)), InfraNodus ([infranodus.com](http://infranodus.com)), My Maps ([www.google.com/maps/about/mymaps](http://www.google.com/maps/about/mymaps)), Palladio ([hdlab.stanford.edu/palladio-app/#/upload](http://hdlab.stanford.edu/palladio-app/#/upload)), Voyant ([voyant-tools.org](http://voyant-tools.org)), among others. I wish to thank Helena Bermúdez Sabel and Paola Marongiu for their advice on specific aspects of this paper. I am also grateful to the editors of this special issue for their kindness and helpfulness.
2. In Greek and Roman mythology, Pygmalion is an artist who has his statue brought to life by the favour of the gods. The digital tool *Pygmalion* is conceived to metaphorically give life to drawings by making them interactive.
3. See [dictionary.cambridge.org/dictionary/english/log](http://dictionary.cambridge.org/dictionary/english/log).
4. It is mandatory to point out from the beginning that the maps illustrated here have not been tested yet and are not addressed to a specific class. The main aim of this note is that of describing and making *Pygmalion* known to the potentially interested public.
5. The interested reader can find detailed information about the principles underlying the design of *Pygmalion* in Marongiu and Dell'Oro, "From static to interactive". For some examples of application of the tool to the classroom, cf. Dell'Oro et al., "*Pygmalion* in the classroom".
6. Unlike *Pygmalion* diachronic maps, semantic maps are often conceived as generalisations of relations between meanings (e.g., "possibility", "permission", etc. in the case of modal meanings) or functions (e.g., "future") and can work without a precise chronological anchoring. *Pygmalion* maps combine the presence of a chronological axis with that of the relationships between the meanings or functions. Cf. below.
7. The most complete, detailed and non-atomistic history of English modals and of the relevant grammatical features is probably still that outlined by Plank, who also offers a synthetic – though not easily readable – visualisation of their diachrony (cf. Plank 349).
8. All examples for the synchronic map are from Leech et al. 2011.
9. It is beyond the scope of this paper to discuss research issues on modality.
10. As explained above, in order to have the same association of a category with a colour, the user must introduce the categories in the same order. Another possibility is to change the order of the categories in the JSON file of the map.

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## ABSTRACTS

This contribution showcases the free digital tool *Pygmalion* and its application to the learning/teaching of English modals in both a synchronic and a diachronic perspective. This recently developed tool allows users to draw interactive maps of meanings, constructions and semantic relationships without requiring computer skills. While *Pygmalion* was originally designed to draw diachronic maps of single words (or of etymologically related words), I show how it is possible to draw synchronic maps as well as contrastive maps. After having presented the main features of the tool, I show how *Pygmalion* can be used to create a synchronic and a diachronic map to compare the modals “can” and “may”, illustrating the procedure step by step. Thanks to its user-friendly design, *Pygmalion* can be used by teachers, pupils, students not only in a classroom context, but also for autonomous learning.

Cette contribution présente l’outil numérique gratuit *Pygmalion* et son application à la didactique des modaux anglais dans une perspective à la fois synchronique et diachronique. Cet outil récemment développé permet de dessiner des cartes interactives des sens, des constructions et des relations sémantiques sans nécessiter de connaissances informatiques. Alors que *Pygmalion* a été conçu à l’origine pour dessiner des cartes diachroniques d’un mot (ou de mots étymologiquement apparentés), je montre qu’il est également possible de dessiner des cartes synchroniques et/ou contrastives. Après avoir présenté ses fonctionnalités principales, je montre comment *Pygmalion* peut être utilisé pour créer une carte synchronique et une carte diachronique pour comparer les modaux « can » et « may », en illustrant la procédure étape par étape. Grâce à sa conception intuitive, *Pygmalion* peut être utilisé par les enseignants, les élèves, les étudiants non seulement dans le contexte de la classe, mais aussi pour l’apprentissage en autonomie.

## INDEX

**Mots-clés:** apprentissage en autonomie, cartes interactives, cartographie sémantique, constructions, outil numérique, histoire de la langue, méthodes d’enseignement/apprentissage, modalité

**Keywords:** autonomous learning, constructions, digital tool, interactive maps, language history, learning/teaching methods, modality, semantic mapping

## AUTHOR

### FRANCESCA DELL’ORO

Francesca Dell’Oro is an Assistant Professor at the University of Neuchâtel and an Associate Fellow of the Center for Hellenic Studies at Harvard University. She currently leads the WoPoss project on modality in Latin in a diachronic perspective ([woposs.unine.ch](http://woposs.unine.ch)) and the ModMap project on modality and translation ([data.snf.ch/grants/grant/214102](https://data.snf.ch/grants/grant/214102)). She is particularly interested in the theory of modality and in the emergence and evolution of modal constructions. She is also interested in the teaching of ancient languages and innovative teaching methods. She has recently edited the volume *Méthodes et modèles de l’apprentissage des langues anciennes, vivantes et construites, hier et aujourd’hui* (Lausanne, 2020); [www.cahiers-clsl.ch/issue/view/79](http://www.cahiers-clsl.ch/issue/view/79).