

Development of technological tools for teaching and learning Catalan phonetics via the Internet

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1 Goal The goal of this paper is to present the project «The sounds of Catalan. Development of technological tools for teaching and learning Catalan phonetics», which is being carried out by a group of professors and researchers from different Catalan universities.¹ The general aim of the project is to design and develop Internet resources that may assist in teaching and learning the mechanisms of production, transmission and perception of Catalan sounds. In order to make this general purpose more precise, the following four specific aims can be sketched out: *a)* to furnish the learner of Catalan as L2 with the basic devices to learn efficiently the main features concerning the production and the perception of Catalan sounds; *b)* to provide the Catalan speaker with an Internet platform to improve his/her speaking and comprehension skills; *c)* to help Catalan (under)graduate students of degrees that have phonetics as the object of study or as a working means (*i.e.* Philology, Speech Therapy, Linguistics, Translation and Communication and Journalism, among others) in learning and acquiring this discipline autonomously, in accordance with the European Higher Education Area guidelines; *d)* to include the ICT applied to the Catalan phonetics education on a website with unrestricted access.

In order to contextualize this project, in § 2 an introduction to Catalan in the context of Romance languages is presented, and in § 3 a succinct review of some of the existing Internet tools for teaching and learning phonetics is outlined. The last two sections, § 4 and § 5, focus on the description of the project itself.

2 Context Catalan is a Romance language spoken by about 7 million people in Catalonia, most part of the Valencian Community (both located in the eastern part of Spain), the Balearic Islands (in the western Mediterranean), Andorra (in the eastern Pyrenees, flanked by Spain and France), the eastern regions of Aragon (in the northeastern Spain), the Roussillon (in the South of France), and in Alghero, a small town in the northwestern coast of Sardinia (Italy). In all these regions, except for Aragon, Alghero and Roussillon, Catalan is recognized as an official language. Catalan is classified as belonging to the western Romance languages, traditionally strongly associated to the Gallo Romance group (with languages such as French or Occitan), although more recently also connected to the Ibero Romance group (with languages such as Galician, Portuguese or Spanish) (see *fig. 1*). According to long-established approaches, Catalan is composed by two major dialect blocks, Western Catalan and Eastern Catalan. Despite the modest extension of the Catalan area, a vast number of

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linguistic differences can be observed among its domain; this results in a large number of dialects and subdialects, each one with its own particularities. At a preliminary stage, the project will focus on Central Catalan, and then will be extended to the rest of the dialects. The consonant inventory of Central Catalan is composed by about 34 sounds, 22 of which have a phonemic character (see *fig. 2*). The vowel inventory, on the other hand, is composed by 8 vowels (see *fig. 3*), all with a phonemic character, except for the schwa.



Figure 1. Catalan in the context of European Romance languages (Manipulated from *Encyclopedia Britannica*, 2003)

| Manner Place | Bilabial | Labiodental | Dental | Alveolar | Prepalatal | Palatal | (Labio)Velar |
|-----------------|----------|-------------|--------|----------|------------|---------|--------------|
| Plosive | p b | | t d | | | | k g |
| Approximant | | β | | ð | | | ɣ |
| Fricative | | f v | | s z | ʃ ʒ | | |
| Affricate | | | | ts dz | tʃ dʒ | | |
| Lateral | | | | l | ʎ | ʎ | |
| Nasal | | m | ɱ | ɲ | n | ɲ | ŋ |
| Trill | | | | r | | | |
| Tap | | | | r | | | |
| Glide | | | | | | j | w |

Figure 2. Central Catalan consonant inventory

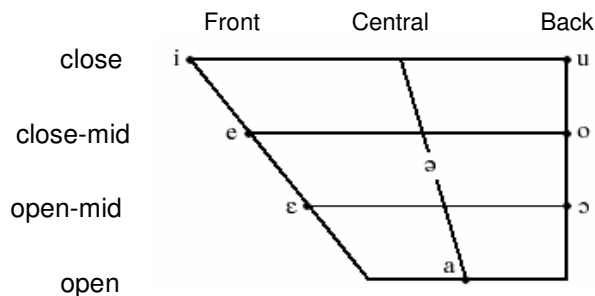


Figure 3 Central Catalan Vowel Inventory

3 Antecedents Internet-supported education is gaining more and more interest nowadays, and the phonetics discipline is no exception. Indeed, a vast variety of tools for teaching and learning phonetics and other speech sciences are currently available on the Internet. Tools like audio files, video players, dynamic illustrations, on-line courses, interactive glossaries, and programming languages are being used to improve the quality of phonetics education and to increase the efficiency of students' self-study and practical skills. Phonetic resources can be classified along these lines (due to space reasons, the list is merely illustrative and not exhaustive):

- a. On-line phonetic courses with exercises, e.g. A Course in Phonetics website, P. Ladefoged, UCLA: <http://www.phonetics.ucla.edu/>
- b. Glossaries with phonetic, phonologic and linguistic terms, i.e. Electronic Glossary of Linguistic Terms website, J. Albert Bickford, David Tuggy, ILV-México; University of North Dakota: <http://www.sil.org/mexico/ling/glosario/E005ai-Glossary.htm>
- c. IPA fonts and charts, e.g. The International Phonetic Association website: <http://www.arts.gla.ac.uk/IPA/ipa.html> / IPA charts with sound in Flash Animation, e.g. Paul Meier Dialect Services website, e.g. <http://www.paulmeier.com/ipa/charts.html> / Files of speech sounds from the IPA: <http://www2.arts.gla.ac.uk/IPA/sounds.html>
- d. Dynamic vocal-tract diagrams, video clips and animations, e.g. The Sounds of Spoken Language website, University of Iowa: <http://www.uiowa.edu/~acadtech/phonetics/> or The Interactive Sagittal Section website, Daniel Currie, University of Toronto: <http://www.chass.utoronto.ca/~danhall/phonetics/sammy.html>
- e. X-Ray images and real movies of the vocal tract and the vocal folds, e.g. Artikulatorische Phonetik und Physiologie Kursunterlagen, Phil Hoole, Institut fuer Phonetik und Sprachliche Kommunikation, U Muenchen: <http://www.phonetik.uni-muenchen.de/~hoole/kurse/movies/>
- f. Fundamentals of Acoustics, e.g. Acoustics and vibration animations website, Dan Russell, Kettering University: <http://www.kettering.edu/~drussell/demos.html>
- g. Acoustic phonetics, spectrograms and speech synthesis, e.g. Source-filter model of vocal tract, with duck call-source, Exploratorium in San Francisco: http://www.exploratorium.edu/exhibits/vocal_vowels/
- h. Speech perception, e.g. Promenade 'round the cochlea, Rémy Pujol *et. al.*, Centre Régional d'Imagerie Cellulaire: <http://www.iurc.montp.inserm.fr/cric/audition/english/index.htm>
- i. Dialects, accents, world language sounds and the like, e.g. The Speech Accent Archive, George Mason University: <http://accent.gmu.edu/>; Dialectoteca del Español, Carlos-Eduardo Piñeros, The University of Iowa: <http://www.uiowa.edu/~acadtech/dialects/>.

It should be noted that none of these websites and others available on the Internet are focused on a minority language such as Catalan. Indeed, the Internet resources for Catalan segmental phonetics are truly scarce: there only exists a website with general information about Catalan phonetics (Joaquim Llisterra's Home Page, U Autònoma de Barcelona, <http://liceu.uab.es/~joaquim/home.html>), a phonetic correction guide (Gabriel Bibiloni's Home Page, U Illes Balears <http://www.bibiloni.net/correcciofonetica/>) and some world-wide libraries that include Catalan speech recordings (e.g. Edinburgh IPA <http://www.ua.ac.be/main.aspx?c=EDINBURGHIPA&n=34916>) or the sounds of Catalan e.g. Artikulatorische Phonetik und Physiologie Kursunterlagen <http://www.phonetik.uni-muenchen.de/~hoole/kurse/artikul/Catalan/Consonants/>). This highlights the need of a specific website for Catalan segmental phonetics.

4 Contents In order to achieve the goals set out in § 1 and to complete the Internet tools for Catalan phonetics, a website with graphic and dynamic figures representing the

production, the transmission and the perception of Catalan vowels and consonants is being developed. The site includes a Flash-animated consonant and vocalic chart linked to: *a*) 32 dynamic articulatory diagrams with the representation of the vocal tract emulating the different moments in the articulation of all Catalan sounds (fig. 4); *b*) a video where a Catalan native speaker produces each of these sounds in different phonetic and structural contexts, so that the facial movement is visualized when articulating each sound and the sound itself is heard (fig. 5); *c*) a wave file containing each of these sounds; and *d*) a Praat file with the oscillogram and the spectrogram corresponding to each of these sounds (fig. 6). A provisional version of the website can be seen on the following address <http://pmid.proves.ub.edu/becari/sonscatala/> and the official website address will be <http://www.ub.edu/sonscatala/>.

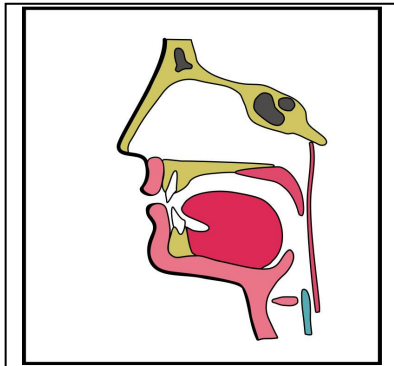


Figure 4. Flash-animated vocal tract

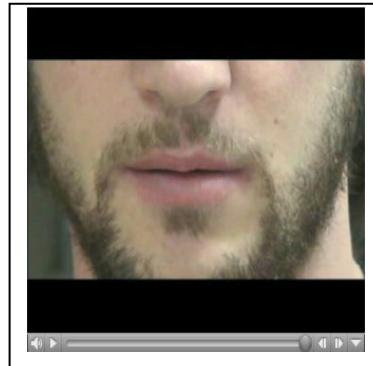


Figure 5. Movie with the facial movement (Articulation of *cap* 'head')

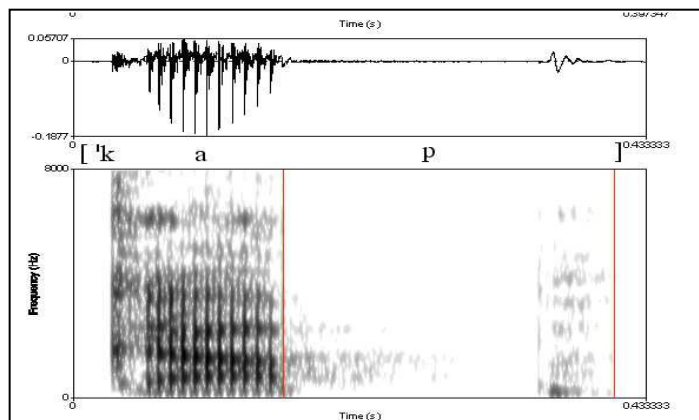


Figure 6. Oscillogram and spectrogram representation (*cap* 'head')

5 Phases The project is being developed in 3 phases. In the first phase, conceived for Catalan speakers with a few notions of Catalan phonetics and to foreign speakers, the website will contain *a*) the Central Catalan consonant sounds emitted in symmetric vowel contexts (before, after and between <*i*>, <*a*>, <*u*>) in word initial, final, and medial position, and in stressed and unstressed syllables; *b*) the Catalan vowel sounds in stressed and unstressed syllables, produced isolated and within the word, also in word initial, final, and medial position. In the second phase, devoted to Catalan speakers with phonetic knowledge and to foreign speakers also with phonetic knowledge and advanced notions of Catalan, the website will contain all the sounds of Central Catalan in all possible phonetic and structural contexts. Apart from the articulatory diagrams, video images, sound files, and spectrograms already mentioned, this section of the website will also include palatograms and mouth representations for each involved sound. Finally, in the third phase, a section focused on the comparison of the sounds of Central Catalan

with those of other Catalan dialects and other Romance languages, such as Spanish, Portuguese, Galician, Occitan and Italian, and also with Germanic languages such as English and German, will be added.

6 References Montoya, Brauli (2002) La llengua catalana. Presentació general. In: Solà, Joan et al. (ed.) *Gramàtica del català contemporani*, vol.1. pp. 37-87. Barcelona: Empúries.