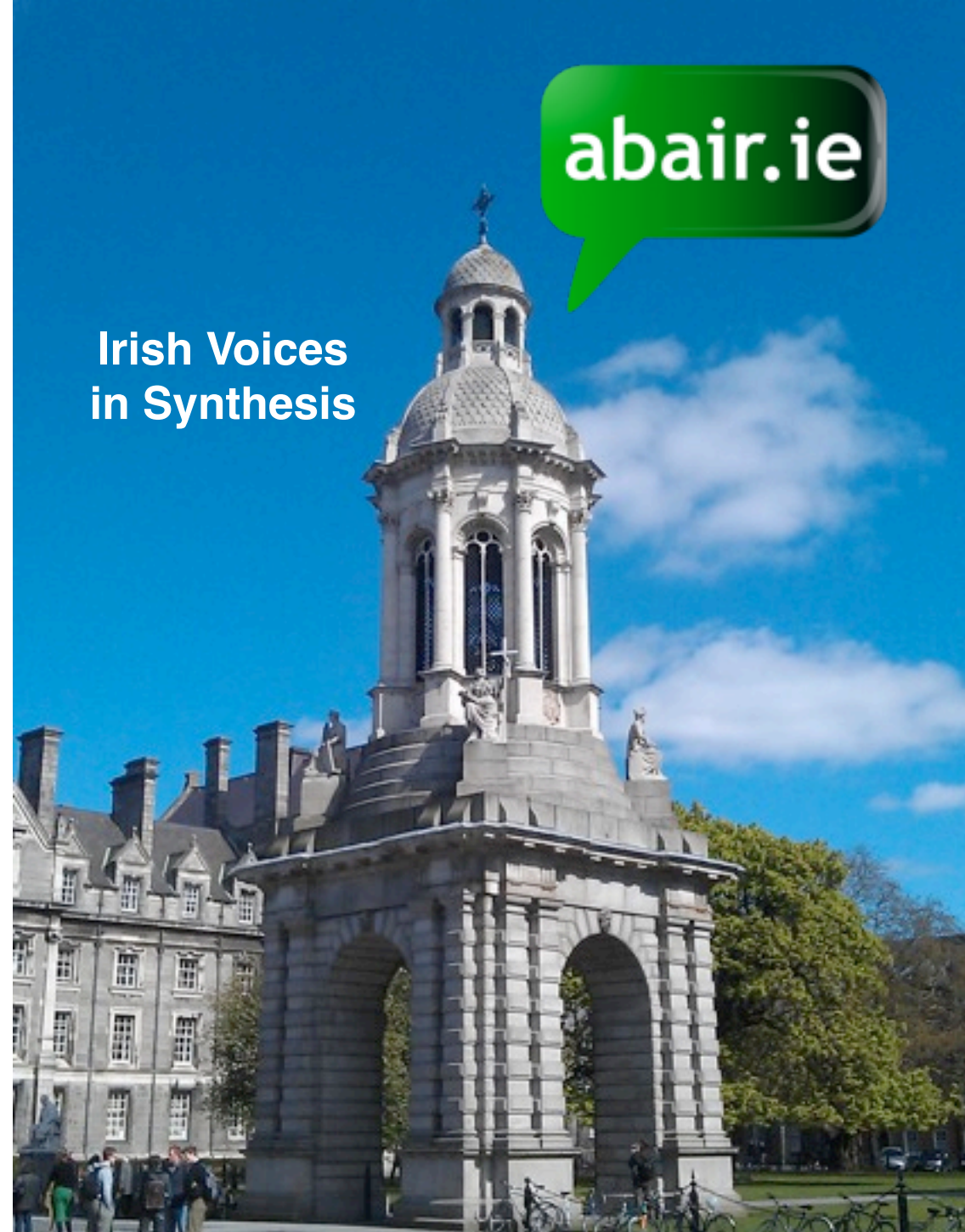


abair.ie

Irish Voices in Synthesis



TRINITY COLLEGE DUBLIN
COLAISCE NA TRÍONÓIDE, BAILE ÁTHA CLATH

THE UNIVERSITY
OF DUBLIN

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Contents

What is ABAIR?	4
Background	5
Public Web Facility	6
Educational Applications	8
Disability & Access	10
Apps & More	12
Basic Research	13
Future Vision	14
The ABAIR.ie Team	15

What is ABAIR?

ABAIR is a research initiative, based in Trinity College, Dublin, which aims to provide linguistic and speech technology resources for Irish. Its flagship project is an online Irish language text-to-speech synthesiser which is freely available to the public at www.abair.ie. This system speaks out any text in natural and fluent Irish, in either Donegal or Connemara dialects. The third major dialect, Kerry Irish, is currently under development. The website provides access to both these synthetic voices and to a growing suite of linguistic resources for Irish.

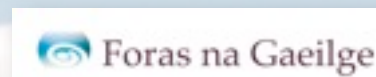
The development of state-of-the-art speech technologies and linguistic resources for Irish is crucial to ensure the language can benefit from the enormous possibilities that modern digital technology can offer. These new technologies are particularly important for minority and endangered languages such as Irish, making them visible to the world and attractive to the younger generation. ABAIR is making a significant contribution to a new generation of educational materials. These can help engage the learner, and specific synthesis-based tools should assist the development of literacy skills. For those with visual or vocal impairment, Irish synthesis is of fundamental importance, not only in terms of education, but also in terms of social inclusion and their right to their language and heritage.

ABAIR continues Trinity College's proud tradition in and strategic commitment to the maintenance and preservation of our language in all its diversity.



Background

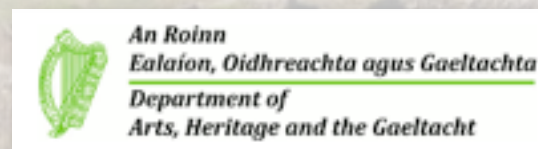
The website www.abair.ie serves as a window to ABAIR research, ongoing since 2004 in the Phonetics & Speech Laboratory, of the School of Linguistic, Speech and Communication Sciences in Trinity College, Dublin. Although it is the technological developments that are most visible on the ABAIR website, these aspects of our work are only possible because of the significant underpinning linguistic research. ABAIR benefits from the multi-disciplinary environment in the laboratory, which includes linguists, engineers and computer scientists.



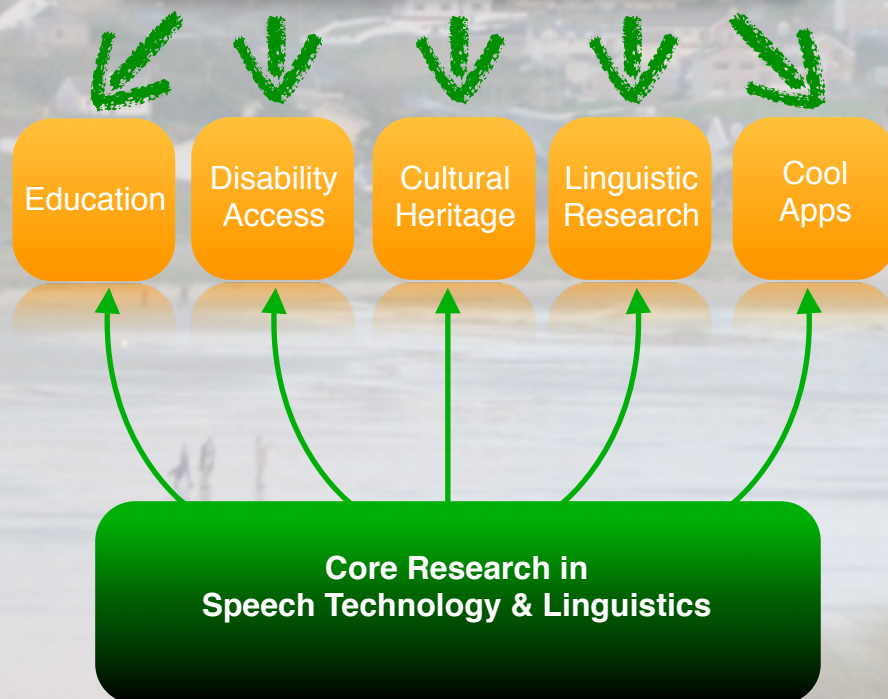
ABAIR research to date has been enabled through funding from the EU INTERREG programme (WISPR project), from Foras na Gaeilge (the Cabógín I and Cabógái II projects); and from An Chomhairle um Oideachas Gaeltachta agus Gaelscolaíochta (CabairE project). ABAIR also benefits from the close interaction with our other projects in the laboratory, particularly the SFI-funded CNGL and FastNet projects, as well from collaborations with other labs in Trinity and around the world. *Ní neart go cur le chéile!*



The longterm plan from the outset of ABAIR was to build synthetic voices for the different dialects of Irish, including the lesser spoken, endangered varieties. Our language is one of our most important cultural treasures but native speakers of a disappearing dialect cannot be preserved in the same way as physical artifacts. Facilities such as those of ABAIR present one way we can help pass on this heritage in all of its richness to future generations.



Public Web Facility



Who uses ABAIR.ie?

Up to 40,000 people a year across the globe have accessed the Donegal voice on a regular basis. We expect these figures to rise with the launch of the Connemara voice. Almost half of the visitors to

“www.ABAIR.ie takes Irish to the heart of modern day technology. It opens up a whole new vista for teaching applications and for promoting Irish across the globe.”

– Minister of State Dinny McGinley, T.D.

abaire.ie came from North America, many more from Ireland, both North and South, and as far away as Australia and Mongolia! Regular users include teachers and learners of the language using the synthesisers both in classroom and at home, as well as those with visual impairments who rely on the *abair.ie* voices as their only means to access electronic texts in Irish. Many others use *abair.ie* as an initial introduction to Irish as it gives them the opportunity to listen to the sounds of the language.

ABAIR.ie as a Virtual Resource Centre

The website is a public window into ABAIR's activities. It provides the voices and linguistic resources and it will, in the future be the home of a growing suite of applications for different possible users. Since our Irish synthesis became

“Our goal is to provide linguistic and technological resources for Irish speakers. The technology is crucial in the educational sphere as well as for disability and access.”

– Professor Ailbhe Ní Chasaide

publicly available, there has been a growing demand from educationalists, disability groups and general users for

specific synthesis-based applications. In response, we have been developing some such applications to proof-of-concept level, in tandem with our core research. (These are described in the following pages.) It is our plan that ABAIR may eventually serve as a virtual resource centre, that will provide access not only to a wide range of Irish voices (a variety of dialects; female, male, children's voices), but also to a growing menu of synthesis-based resources.

Educational Applications

The ABAIR voices and facilities are being used by teachers, parents and language learners worldwide to overcome the limitations of text-based language learning. ABAIR is particularly valuable where learners have limited access to native speakers of the language, or where pronunciation of specific texts is required. Users can connect to ABAIR from any online text in Irish, from online newspapers to a child's homework assignment, and listen to it being read out in the dialect of their choice.

Using ABAIR 'as-is' can support the learning of pronunciation, reading, comprehension and writing skills. Further applications of ABAIR will target the development of specific language skills and learning goals.

CabairE – A Literacy Aid

For those learning to read and those who have trouble with reading, we are currently developing *CabairE*, a literacy training tool. *CabairE* will highlight words and phrases as they are being read out. Users can control the speech tempo, they can have single words or phrases repeated and the text as needed.



Interactive Learning Games

Interactive language learning games exploiting ABAIR voices offer exciting new possibilities for delivering educational content in an engaging manner. We are actively developing prototypes such as the following in collaboration with other research groups in Trinity College, Dublin:

Digichaint is a dialogue-based interactive language learning game, in which players use their language skills to win the game.



The language learning game *Digichaint* is based on the "Language Trap" game developed by the Knowledge & Data Engineering Group, at Trinity College.

A virtual reality scenario, featuring the Front Square of Trinity, allows the user to navigate a scene and eavesdrop on groups of virtual conversers, speaking with ABAIR voices.



The virtual reality scene, whose characters speak with ABAIR voices is intended to provide a framework which allows teachers to introduce content for specific groups of learners. The scene was created as part of the "Metropolis Project" by the Graphics, Vision and Visualisation Group, TCD.

Disability & Access

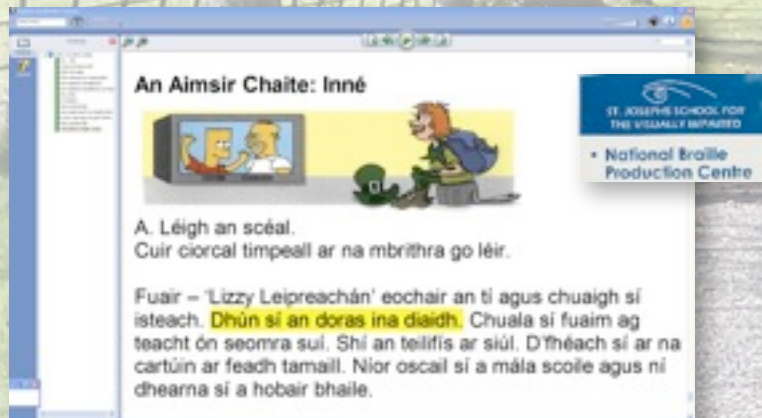
Irish synthetic voices are crucial for the social inclusion of the visually impaired in the world of Irish and for access to Irish in education. Until now, the large numbers of visually impaired learners have only been able to access Irish text through an English language text-to-speech system. This unacceptable obstacle results in many pupils opting out of the study of Irish in school. It is virtually impossible to pursue their education in Irish medium schools.

Screen Readers

This crucial facility allows visually impaired users to navigate any text on their computer screen, e.g. on the web, and to hear it spoken. We are currently developing a facility that will allow screenreading capabilities for Irish.

First Irish Language DAISYBook

This is a pre-prepared multimedia version of a book, which allows the user to navigate the text, and listen to any portion while the text is simultaneously being highlighted. Text may also be magnified for the partially sighted. In collaboration with the National Braille Production Centre, at ChildVision, we have pioneered the first Irish language DAISYBook.



The first DAISYBook in Irish.

CabairE

DAISYBooks require an investment of time and money in their preparation, and are thus ideal for targeted books, such as textbooks. Our *CabairE* project will provide many of the DAISYBook functions, and will be used to read aloud texts that have not been prepared in advance. *CabairE* will benefit all users and will be an important resource for the visually impaired (see page 8).

Augmentative Communication Devices

Augmentative communication devices allow those who are vocally impaired to communicate through synthetic speech. Such devices are not available for Irish: defacto, a subset of the population is denied these possibilities of communication through Irish.

Apps & More

There is potential for commercial spin-offs that exploit both the ABAIR resources and voices. One such application already in use is a smartphone app *Get the Focal*. This is an Irish–English dictionary which includes the extra feature of having the Irish translation spoken out with an ABAIR voice. Many further such apps can now be envisaged.

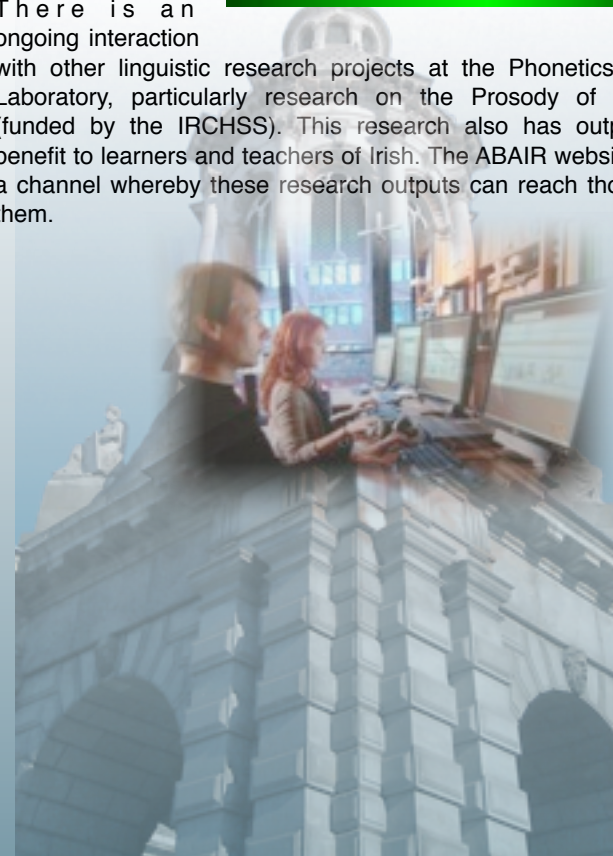


The smart phone app *Get the Focal* is an Irish–English dictionary that can also pronounce Irish words. This facility is powered by *abair.ie*.

Basic Research

None of the voices or applications would have been possible without substantial underpinning basic research, fusing linguistic and technological expertise. In the process, ABAIR is generating new, in-depth analyses of the linguistic structure of Irish. Our growing resources and corpora of spoken Irish will increasingly enable us to undertake large-scale dialect and cross-dialect analyses, of a kind which, until now, did not exist for the language.

There is an ongoing interaction with other linguistic research projects at the Phonetics and Speech Laboratory, particularly research on the Prosody of Irish Dialects (funded by the IRCHSS). This research also has outputs of direct benefit to learners and teachers of Irish. The ABAIR website will provide a channel whereby these research outputs can reach those who need them.



Future Vision

Our goal is to see ABAIR develop as a Virtual Resource Centre for all who are interested in the Irish language, including language learners, educationalists, and those with visual or vocal impairments.



The ABAIR.ie Team



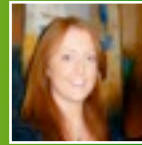
Professor Ailbhe Ní Chasaide

Ailbhe was raised in Luinneach, Gaoth Dobhair, in the Donegal Gaeltacht. As the Principal Investigator, Ailbhe is involved in all aspects of the project. She is a phonetician with a research interest in the prosodic and segmental systems of Irish.



Harald Berthelsen

Harald is an Irish speaking computational linguist from Sweden who has been with the *abair.ie* team from the outset. He is responsible for the computer programming involved in building and enhancing the Irish voices, contributing also to linguistic aspects of the project.



Neasa Ní Chiaráin

Neasa graduated with a B.Sc. in Computational Linguistics from DCU and holds an M.Sc. in Cognitive Science from UCD. Her present research is in Computer-Assisted Language Learning and specifically the application of synthesised speech for the teaching/learning of Irish.



Christoph Wendler

Christoph is a trained linguist from Munich and a fluent speaker of Irish. Before joining the *abair.ie* team, he worked on "The New English-Irish Dictionary". His research is focusing on the application and implementation of linguistic theory in digital language processing.

Co-Principal Investigators



Professor John Harris

As a psycholinguist John's research background is in bilingualism, Second-Language Acquisition and the teaching of Irish. He is interested in the preservation and revival of lesser used languages and provides support to ABAIR's pedagogical applications.



Associate Professor Elaine Uí Dhonnchadha

As a computational linguist Elaine's research is in the development of tools to analyse and generate Irish morphology (e.g. word forms). These tools allow the parsing of sentences and feed directly into the project. She is also involved in the collection of Irish spoken corpora.



Professor Christer Gobl

As a speech engineer, originally from Sweden, Christer has extensive research experience in both human and synthetic voices. He is assisting the engineering aspects that concern the quality of the synthetic voices.



The Irish language Synthesiser