

Faoi Gheasa: an adaptive game for Irish language learning

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Abstract

In this paper, we present a game with a purpose (GWAP) (Von Ahn, 2006). The aim of the game is to promote language learning and 'noticing' (Skehan, 2013). The game has been designed for Irish, but the framework could be used for other languages. Irish is a minority language which means that L2 learners have limited opportunities for exposure to the language, and additionally, there are also limited (digital) learning resources available. This research incorporates game development, language pedagogy and ICALL language materials development. This paper will focus on the language materials development as this is a bottleneck in the teaching and learning of minority and endangered languages.

1 Introduction

The primary aim of the research is to develop a game which learners (players) will want to continue playing for enjoyment which will also improve their vocabulary and grammar skills through noticing, reading and writing in a novel and fun way. From our point of view, the language learning aspect is paramount, but from the player's point of view it should appear to be a side effect of playing the game, rather than the purpose of the game. Therefore the 'game' narrative and game 'world' are of utmost importance. The inspiration for this game is the Cipher game (Xu & Chamberlain, 2020) which was developed to find errors in English Corpora through 'game with a purpose' (GWAP) methodology and crowdsourcing. In the process of annotating errors in text some players remarked that they felt this would be an effective way to learn a language. This current research seeks to test that hypothesis. To do

this, we create a game environment that is conducive to language learning, where the learning challenges and trajectory conform to sound pedagogical principles and where the learner experience is adapted to the individual learner's needs. We also strive to make the game culturally relevant, and complementary to the school curriculum.

In this paper we describe the game, the linguistics challenges and the material development challenges.

2 Game aspects

The game world is a magical one in which ancient evil spirits are attempting to deny access to the ancient mythological tales by placing them under a spell, to cause people to lose their memory of their past. The player's challenge is to decipher these spells in order to restore the tales before they are sealed and lost forever. There are many different spells (ciphers) and stages before all the evil spells can be lifted and the story is restored.



Figure 1 Game Interface

Players accumulate points when they correctly identify ciphered words and lose points when they fail to spot a ciphered word or incorrectly identify

a ciphered word. Players can use their points to buy hints if they wish, which means that players with a minimal amount of Irish can enjoy playing the game. If a player cannot find all of the ciphered words on a page, they are given the choice to 'change the ending' by writing some text in Irish, or to abandon the attempt in which case they will be presented with the same page but with easier ciphers. The game is developed using Unity (client) and Photon (server).

Previous work on language learning games for Irish include multi-media games such as Fios Feasa¹, and CALL applications (Monica Ward, 2016; Monica Ward, Mozgovoy, & Purgina, 2019), (Neasa Ní Chiaráin & Ní Chasaide, 2016; Neasa Ní Chiaráin & Ní Chasaide, 2019). The *Faoi Gheasa* (Under a spell) game is different in terms of its adaptive educational content and game elements and its reuse of existing language materials.

For many years it has been known that games can contribute to learning (Dixon, Dixon, & Jordan, 2022; Prensky, 2003). They can be motivational for students and they encourage self-efficacy. Motivation is especially important in any language learning context (Dörnyei & Ushioda, 2013) and there has been a lot of focus on motivation in the language learning literature, e.g. (Hattie, 2008; Lightbown & Spada, 2021). Self-efficacy is important in learning contexts as it promotes student engagement and learning (Linnenbrink & Pintrich, 2003). Our *Faoi Gheasa* game leverages these motivational and engaging aspects of digital games to make the game playing (and learning) more enjoyable for learners.

3 Pedagogical aspects

This game employs the pedagogical technique of using storytelling as a means of language learning. According to Harris, Ó Néill, Uí Dhufaigh, and Ó Súilleabháin (1996:9:9) it is important that authentic materials be used, and that stories, songs, poems, and proverbs are of particular importance as they have cultural and traditional value. They also state that when suitable authentic material is not available then there is no alternative but to compose Irish versions of materials that children enjoy. Tierney and Dobson (1995) cited in (Mhic

Mhathúna, 2004) also recommend listening to familiar stories in the second or foreign language.

Regarding the difficulty levels of stories, Harris et al. (1996:16-17) remind us that young learners who are acquiring Irish as a second language are still in the process of acquiring their first language. Therefore, they are generally not concerned about understanding every word they hear (in their first or second language), as long as there are sufficient hints in the context to allow them to get the general meaning. Harris et al. (1996) recommend that rather than focusing on simplifying the language, it is more important to provide a sufficient quantity of language input with the necessary contextual clues. They also suggest that the input needs to be challenging to provide opportunities for learning. Furthermore, they caution that over-simplification of written texts can result in stories that are somewhat bland and unnatural, and that there is scope for using more complex language particularly in the context of stories which are already familiar to the learners. We believe that these principles can also apply to written language in our game where learners will be familiar with some of the stories.

In relation to classroom teaching Harris et al. (1996:10:10) say that in order to cultivate a positive attitude to the learning of Irish, the teaching materials should be attractive, interesting, funny and that game-playing should be part of the process. We believe that our *Faoi Gheasa* game fulfils these criteria and that it can complement both classroom and non-classroom based learning. It leverages aspects of noticing (Skehan, 2013), consciousness raising (Smith, 1981), research on error correction (Chaudron, 1988) and incorporates elements from Games with a Purpose (Von Ahn, 2006).

3.1 L1-L2 learning issues

Irish has a complex role in Irish society. While not all members of society value the language for cultural and heritage reasons, for many Irish citizens and the Irish diaspora around the world, the Irish language has great cultural significance and they have a strong desire to acquire and improve their Irish language skills, and to ensure that their children are confident users of the language.

In learning a second language (L2), features which are not present in their first language (L1) often

¹<https://fiosfeasa.com/>

present additional challenges for the learner (Laufer & Eliasson, 1993; Schepens, Van Hout, & Van der Slik, 2022; Vainio, Pajunen, & Hyönä, 2014). The majority of L2 learners of Irish have English as their L1. There are many linguistic differences between Irish and English, all of which can create barriers to the learning of Irish, a minority language in the shadow of English.

One difficulty for L1 English language speakers learning Irish is that orthography system is different from English yet uses the same Latin alphabet. While the Irish orthography system is opaque, it is more regular than English. However, the rules of the orthography system are not generally taught to students, and they are often left to decipher it themselves. Often, students do not see the patterns, and this hampers their learning. They automatically ‘map’ the English sound-orthography system to Irish, which is not always a successful approach. For example, the word *teach* meaning 'house' in Irish is pronounced quite differently from the word 'teach' in English.

Another difficulty for Irish language learners is that Irish has a complex system of initial mutations. This is a defining feature of the Celtic languages, which affects the initial phonemes of verbs, nouns, pronouns, adjectives, and some functional categories. The initial mutations on nouns, (and the word classes which modify and agree with a head noun), vary according to the gender of the noun i.e., whether the noun is masculine or feminine. At the level of morphology, Irish verbs are inflected for tense/mood, person and number, and nouns are inflected for number and case, the formation of which varies according to the gender of the noun. Features of Irish such as initial mutation, gender agreement, and case marking will be unfamiliar to learners whose first language is English.

Often Irish language learners are oblivious to the morphological and grammatical information encoded in a word and therefore lose vital clues when trying to understand written and spoken language. For example, in (1) *Bhí* 'was' has an initial mutation for past tense, *mhór* 'big' has an initial mutation to signal agreement with a feminine noun *tine* 'fire', *mbradán* 'salmon' has initial mutation as it is the object of the preposition and definite article *faoin* 'under the', and *feasa*

'knowledge' is in the genitive case to signify its relationship to *mbradán* 'salmon'.

- (1) *Bhí tine mhór faoin mbradán feasa.*
 Was fire big under.the salmon knowledge.
 'There was a big fire under the salmon of knowledge'

In this game we encourage noticing of spelling orthography by introducing cipher errors into the stories. Most cipher errors are not errors which a learner would naturally make e.g., swapping the first half of a word with the second half, doubling the last letter, or removing all vowels. These types of errors encourage noticing, are relatively easy to spot, and minimise the risk of familiarising the learners with misspellings. In Figure 2 we have an example of the "Double Tail" cipher which doubles the last letter of a word, e.g. *Is* 'is' has become *Iss* and *mé* 'me' has become *mée*.



Figure 2 Example of a cipher and noun gender colour coding

In this experiment we encourage the noticing of noun gender which is a central feature of the morpho-syntax of Irish. English language speakers are generally unfamiliar with this grammatical feature of Irish. We do this as part of the game narrative by presenting nouns in distinct colours depending on their gender. In this way we facilitate the noticing of the two distinct types of noun. Some of the more complex ciphers remove the colour coding from nouns, and certain ciphers affect nouns of one gender or the other. Therefore noticing and remembering that individual words are affiliated to either the Water Spirit (blue, masculine nouns) or the Fire Spirit (red, feminine nouns) is an advantage in later stages of the game. In Figure 2 we see that *marúch* 'mermaid' is red and *dúlachán* 'dark one' is blue.

4 Materials development

As the game centres on stories which have been made unreadable by an evil spirit and which must be restored, an important requirement of the game is a bank of suitable stories. We decided on the theme of magic and mythology, for several reasons. Firstly, we hope that it has universal appeal to both young and old – all generations can enjoy a good story. Secondly a mythological theme can be made culturally relevant in different language settings, which should make the stories more interesting and significant for learners. Thirdly, some folklore stories can raise learners’ cultural and heritage awareness which can motivate learners through reconnecting to the spirit of indigenous languages (Restoule, Archibald, Lester-Smith, Parent, & Smillie, 2010). A culturally responsive approach to learning is usually discussed in the context of marginalization e.g., (Sleeter, 2012), but it is relevant in all learning contexts, including Irish. Finally, we prefer stories and tales which are free from copyright restrictions.

We require the materials with difficulty levels ranging from beginner level to more advanced language learner levels. For younger children (6 to 8 years) who are just beginning to read, we use simple stories based on well-known fairy tales that they will be already familiar with in English. For more advanced learners we use more complex mythological stories and folk tales. For older children (10-12 years) we use simple versions of Irish mythological tales, and for the higher levels we use folk tales and legends with more sophisticated language constructions and vocabulary. This levelling of texts is currently a focus of our pilot study. Initially we have four levels of text difficulty: beginner, improver, intermediate and advanced. These are similar to CEFR levels A1, A2/B1, B2 and C1. When players sign up to play the game, they are asked for their age (we include the category 18+ for adults) and their school class/year and school type. Based on this information we assign them to an initial level, and they will move up or down levels depending on their performance in the game. Adults (18+) start in the improver category initially.

4.1 Sources of material

Ideally, we want to reuse resources where possible. However, while some stories are included in existing corpora (Kilgarriff, Rundell, & Uí Dhonnchadha, 2007) they are subject to copyright issues, which is also the case for published books and textbooks. In addition, we prefer that the stories (at the higher levels) are not already familiar to the game players. Where possible, we want to source texts which are already in electronic format, however some translating or composing of stories is envisaged.

One valuable source of online story material is the *Dúchas.ie* project which includes “The Schools Collection²”. This collection was initiated in the 1930’s by the Irish Folklore Commission in co-operation with the Department of Education. During that time, primary school children, aged approximately 12-14 years of age, collected folklore and tradition in their local areas and wrote it down in their school copybooks. The collection contains approximately 740,000 pages of handwritten pages compiled by pupils from 5,000 primary schools in Ireland between 1937 and 1939. Currently this collection is being transcribed through the *Dúchas.ie* crowdsourcing transcription project³ and the transcribed material is publicly available online. This collection contains material written in both English and in Irish. Of particular interest to us are the folktales and Irish mythology legends written down almost ninety years ago by children who were native speakers of Irish. These stories fit into the ‘intermediate’ and ‘advanced’ categories. The collection contains a wealth of valuable material at these levels which is ideal for our purposes. It does however require pre-processing as the texts are written down prior to the modern standardised orthography and they also contain some spelling and grammar errors. For the ‘beginner’ and ‘improver’ level we have translated some well-known fairy tales based on English versions, and we are currently seeking other sources of magical stories and tales. There is also a small amount of advanced level material dating from the early 1900’s available on *gutenberg.org*⁴, which also requires spelling standardisation.

² <https://www.duchas.ie/en/info/cbe>

³ <https://www.duchas.ie/en/meitheal/>

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<https://www.gutenberg.org/browse/languages/ga>

4.2 Preparation of materials

In the case of Duchas.ie and Gutenberg.org stories the language was normalised to the modern spelling and grammar standards. Fairy tales were composed based on English versions. In order to avoid applying ciphers to proper nouns, and to facilitate the highlighting of noun genders, all stories were tagged with part-of-speech (POS) categories using the Irish POS tagger by Uí Dhonnchadha and van Genabith (2006). The POS tagged text was manually checked. The XML formatted POS tagged texts are imported into Unity and stories are divided into numerous screens (pages) and displayed in game. The game engine applies ciphers automatically and randomly to the texts. This means that if a player retries the same story, they will not encounter the same ciphers (enchantments). Figure 3 shows the *Faoi Gheasa* pipeline.

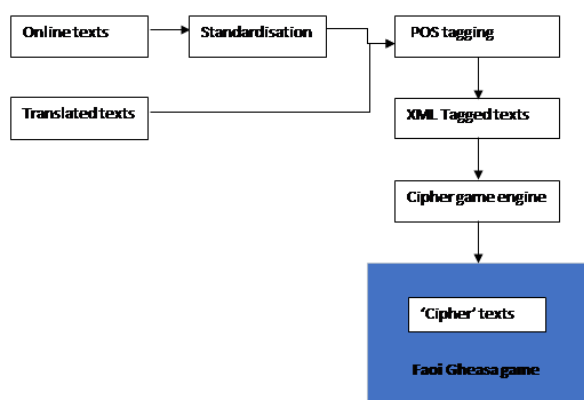


Figure 3 *Faoi Gheasa* pipeline

5 Conclusions and Future Work

In this paper we present a language learning game which will help players to improve their Irish language noticing skills and encourage reading for fun. The game is currently being piloted in a small number of primary and secondary schools and initial reactions are positive (74% of players who have filled in the survey questionnaire to date are interested in improving their language skills while playing a game). We are currently seeking new sources of material and fine-tuning the game adaptivity based on user feedback.

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