Learning on Country
A Game-Based Experience of an Australian Aboriginal Language

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ABSTRACT

Nginya naa-da banga-mari dalang wingaru-dane. Ngyina diya-ma murri dalan-wa dalang-ra[1]. This paper presents the design of Learning on Country an immersive, Indigenous language learning game aimed at the reclamation of oral language within community oral traditions. The context of the language use is recreated through visual and audio effects and the choreography of the characters within the game. The design process is described covering the interaction between game developers, animators and the language speaker. The prototype is currently being tested to improve aspects of the design, the language structure and the learning support and initial results are included.

Keywords: Embodied communication, Language Learning on Country, Cultural aesthetics.

1. INTRODUCTION

The Learning on Country project is a direct response to a strong desire voiced by the main speaker and teacher of the Sydney Aboriginal Language (Australia) to have his language Dharug spoken by people in the community. Due to the historical treatment of Aboriginal people in Australia, the Sydney Aboriginal Language is a reclamation language. The reclamation of this language that was considered dead, only existing in books for many years, was a major achievement, but the small number of limited speakers suggested the need for new strategies. Lewis and Simons [16] point to the necessity to support an oral language community in order to bring a language back into usage. The decision to design the project as a serious game, took into account the manner in which games can contribute both to social learning and to creating a community.

When developing games for social learning there is a broad range of skills required which requires a tight interdisciplinary collaboration to achieve the final product. The creation of the learning environment requires the interweaving of the aspects of sound, scenery, animation, culture, gestures and voice to create a mood and aspect that reflects and reinforces the material being taught. Added to this, is the need to respect the cultural aspect of language and the cultural aspect of community engagement. To achieve this in a productive way is a challenge and can be a great reward.

The Learning on Country game described in this paper is a prototype which has been designed for a number of platforms, in particular the UTS Data Arena, a 360° immersive interactive display screen, and as an online game now shared on the Dharug website [7]. The project is designed as a transferable model to support language learning through games with other Australian Aboriginal and Torres Strait Islander communities, relying on existing language learning approaches used by community on country and embedding these in online renditions of that environment, rather than proposing new learning and teaching approaches to be imposed.

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[1] We look to make material to teach language to all. We do this in a way that all languages can talk this way (Dharug)

2. BACKGROUND

There were at least 350 languages in Australia when Cook first landed in Australia 250 years ago. The National Indigenous Languages Survey [18] estimated that of the 120 Indigenous languages still spoken, 100 were considered critically endangered and at risk of not being spoken. Aboriginal people did not choose to give up their languages. The loss of the Sydney Aboriginal Language as a living language was a direct result of a political, social and economic penalty system instigated by the British and Australian governments, that had as its goal, the eradication of Aboriginal peoples and their culture. After years of quashing Aboriginal Language speaking, the Australian government is now supporting various projects for communities to attempt to collect sufficient language material to reclaim and relearn at least part of their languages.

The Declaration on the Rights of Indigenous Peoples, to which the Commonwealth Government agreed in 2009, enshrines Indigenous peoples' fundamental right to protect, use, revive and learn their own language [21]. Article 14 states that "Indigenous peoples have the right to establish and control their educational systems and institutions providing education in their own languages, in a manner appropriate to their cultural methods of teaching and learning". This paper also acknowledges the Indigenous perspective of invasion rather than British perspective of colonisation.

Figure 1 Tindale's Tribal Boundaries in Aboriginal Australia 1974[2] [24].

While there have been efforts to include languages in the school curricula, language teaching is also being conducted outside the school setting for Australian Aboriginal languages. This is partly as the requirements for teaching an oral language based around teaching knowledge of country, does not fit well with the written curriculum of schooling and also due to the diversity of age groups across the community that are engaged in language learning and reclamation.

The approaches of action-based learning and student creation of their own learning are finding a place for these languages [5], as well as in training the teachers to be comfortable in a language that may be little spoken in the community now. Hence this reclamation work is to assist not just the students but also the teachers to relearn their own language to help them teach to a higher level. Various strategies are being used, including online learning as many people have been moved away from the area of the country where their language was spoken (see Figure 1).

The Learning on Country game is designed in conjunction with a Language speaker and teacher to support lessons developed in such a context, whether for school or community use, for Aboriginal and non-Aboriginal students interested in learning the Sydney Language. The lessons are constructed from a set wordlist, with a restricted vocabulary and set grammar components per lesson [23]. This keeps the language elements through each lesson or game level to a minimum, enabling users to master specific concepts before moving on [4]. This approach is used on the Dharug website [7] and is reinforced by practice in the game.

The project has evolved through stages. We commenced the digital support of this reclamation work with a website containing sentences around common greetings, description of country and kinship terms. In order to develop these resources for learning, we needed to evolve the singular words and sentences into a consistent flow of language development. We then linked these to an environment that suited that language use through the game.

The website acts as a source of phrases etc that can be linked into the game and we envisage further levels can continue to be added around the local environment and weather, two areas that the language was developed over centuries to describe. The aim of the work in reclaiming language is to gain some of this knowledge of country again from those living in Sydney and speaking this language again. As Nettle and Romaine [20] have shown, the loss of diversity in languages and the knowledge and practices contained within a language has accelerated the

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[2] This map is a reproduction of N.B. Tindale's 1974 map of Indigenous group boundaries existed at the time of first European settlement in Australia.

It is not intended to represent contemporary relationships to land

loss of diversity in the environment where these languages developed.

2.1 Game components

The final game was developed within the Unity Game system so that it can be exported in various formats for which suitable game controllers have been generated. The game consists of two scenes with a simple welcome introduction in language by Green, the Dharug speaker and teacher.

The first scene is in 3D extracted from Google Maps to show Sydney as a user-controlled magpie flies in, talking about the country below and then the weather above, as this changes. The next scene is in 2.5D where the magpie lands at a ceremonial ground near UTS and meets a kangaroo, an animal often associated with ceremonies. They are both in 2D format and talk about the surroundings. This forms a circular surround scene that the user rotates to view the activities of people in the scene, including a greeting and introduction section by a group of animated people.

3. INTERDISCIPLINARY TEAM

The project was developed across faculties at the University of Technology Sydney with lecturers and students from game, interaction, design, animation and sound disciplines. This allowed us to assemble an interdisciplinary team and a skills base that covered the many aspects of a game environment, including animations, sound, interaction, visual interface and learning support plus the language knowledge of the Dharug speaker and teacher. Added to this, the university has a proactive approach to Indigenous student participation. This enabled us to work with the talent and expertise of Indigenous animation students who brought their cultural perspective and skills to the project. The combination of these aspects work in synergy to design a game that assists the player to develop a sense of being in place, and provide gestures, sounds and imagery to reinforce the language spoken.

As with any interdisciplinary team, each member brought their different aspirations to the project, these included: an embodied communication approach to the sound and aesthetics of the project, authenticity of relationship and gesture to represent the context of the knowledge being shared, and the needs for learning of language around a variety of themes that always relate to country and kinship.

3.1 Learning Focus of development

Another component of the project that was interdisciplinary was the focus placed on learning. The game is directed a community use by those who wish to learn Dharug, who may or may not be Aboriginal, but will usually have not had long experience in Dharug. The games has been built in close collaboration with the language speakers and learners working on the Dharug website [7] for the language material and with Aboriginal students for the cultural material, as language cannot be taught without that cultural context.

Previous work in developing flexible language teaching apps to allow teachers to tailor material to the student environment [9] have shown great promise. These are usually based around languages with larger corpus and more language knowledge for creating variations in lessons [2], however for the situation we are interested in, the material that is available is limited to the website, and companion sites in neighbouring languages [6], which we are basing this work on.

Also the project engages Aboriginal design students in generating cultural artefacts for the game, including both animation and expressions to visualise the language. The engagement of Indigenous people in IT through animation and cultural game making is part of an important development as seen in AbTeC workshops [15] and remote media productions [22], particularly for sharing language.

While we aim to incorporate indigenous ways of learning into the game, such as immersive, on country and using storytelling techniques, this is more to create an authentic learning environment for Indigenous knowledge, than to suit any particular style of learning that may predominate within the Aboriginal students in Sydney schools [5].

4. DEVELOPING THE DESIGN

We now discuss some of the components of the design and how they developed over time, particularly from player feedback. This was initially in the large Data Arena and the second version was the online prototype which is being developed with feedback from individual contacts with language workers, students and those interested in learning the local language.

4.1. Cultural Perspective on Language Learning

The lived experience of the Dharug language speaker was the inspiration for the design. He had been a language teacher at a school level however, the program was discontinued. Other anecdotal findings from workers at Aboriginal language centres around Australia indicated that when creating learning material for such an environment, it was hard to provide resources for the learning, even when based on storytelling about country [3]. This cultural learning insight was an important factor in the way we approached game design.

In order to provide structure and reduce the cognitive load from each scene we first developed themes and collected phrases around each theme, working with the speaker and the animators to determine what could be spoken and how it would play out in the environment, what was a priority, and what concepts might be possible to communicate through the animations or environmental effects. The aim was that players can slowly build up their understanding of the audio through the repetitions or words or phrases that are experienced in a specific context, such as in the opening sequence where the bird narrates the landscape:

I am seeing clouds: *Ngaya naa-ni burrah*

The clouds are black: *Nin burrah-wa nand*

The clouds are full with rain: *Nin burrah-wa-ga wallin wullum-ma*

The design aims for the player to experience the language in the context of country, as Aboriginal people acknowledge that the language and the knowledge it embodies comes from the country, and the storytelling is designed to be done on country, where the features and the animals reinforce the teaching of knowledge through stories [27].

Language learning is generally a social process and this aspect of learning is also being supported with formal lessons online, where recorded material can be shared with many people [4]. The Learning on Country game uses the same idea of themes used in such structured classes, to progress the learner through various language vocabulary and constructs.

4.2. Game Structure

The game was designed around the Indigenous practice of travelling to country, with the introduction narrated by a local totem, the magpie who journeys across the landscape which is Sydney. The initial landscape was developed with a Google maps extraction of the area around the university to resemble the land as it is now. After flying across the contemporary landscape, the magpie, and the player, land in an area near the university designed from archival images from around early invasion to show life as it was pre-European invasion.

Within this pre-invasion landscape the animal and the people interact with the landscape and each other using dialogue which refers to animals and plants and how to meet and greet people. The travelling sequence provides a view of travelling back in time to when the language was strong, and to an environment where the language is relevant for knowledge sharing, but at the same time it retains relevance today through the topics of conversation.

Figure 2 Magpie introduces the kangaroo by name

By having many speaking characters (including animals, see Figure 2) we aim to create a more social environment where the player can immerse in the discussion between those they are listening to and watching. They can also interact with the system through selecting the speed of progress to suit their ability to gather information from the game.

5. GAME DESIGN FRAMEWORK

Wittgenstien's concept of Language-Game was intended "to bring into prominence the fact that the speaking of language is part of an activity, or a form of life," [26] which gives language its meaning. The game project epitomizes this approach to bringing language to life through a language's interconnectedness to social practices, in that it aims to emulate both the original context, and present-day activities where the language can now be used. Thus, our focus in the prototype was on bringing the language to life through an immersive and context specific approach rather than working to a formal system of different competency levels, such as beginners, intermediate etc. We envisage over time the system will be a good test of immersive and contextual learning, especially if we get the opportunity to scale up the project to expand the themes and content of the game.

The team of staff and students on this project worked to reinforce each other's work in supporting the player's learning in the game environment and the following sections present how the design developed. One ambition was to have some aspects of the design framework as reusable so that such a system could be available to many different languages and contexts. In particular given the object-oriented nature of programming, we have been able to have material derived from external sources to the game, with the hope of regenerating the game with new resources slotted in:

1. The work links to a python api on a dictionary website for the Dharug language allows some flexibility for future growth of the gaming content.

2. The contemporary background scenery in the 3D scenes is based on a Google earth extraction and for the 2.5D scenes we used a diorama of local images painted around the time of invasion.

3. The animations of animals and humans are able to be revoiced for similar topics of discussion in different languages

4. The environmental sounds were developed at high quality as these can be reused as they are applicable for many coastal areas of Australia, or they can easily be replaced with sounds relevant to the specific area.

With this in mind, we still needed to produce a game that in itself is a useful learning tool for the initial language. The difficulty in designing a game around learning a language that is still hardly spoken included:

1. Keeping the complexity of the examples to a reasonable level, while respecting the ambitions of the teacher to derive a community of speakers

2. Provide player support to navigate the scenes using only language and other cues

3. Provide interested interactions to allow players to have some control over the speed of their learning and the support they get

4. Providing suitable timing of avatar interactions, linked to player selection and

5. Rendering high quality graphics in an online game to engage the player with an authentic representation of the period.

5.1. Language Structure

The phrases were recorded by Green, a Dharug speaker, and a student who has some proficiency in the language. The script of the game was designed to practice specific features of the language organised under themes. The sentences were structured to provide a gradual development of language around these themes at each location [23] either selected by the player or controlled by the game.

The scenes are:

1. **Welcome:** A welcome to country is a highly personalised process but has some standard components. The existing English versions of welcome do not always translate well into language so providing one in language is a benefit of the game, and the location is set for this language. We use this to open the game and credit the makers of the language resources and animations.

2. **Country:** We use an overview of the landscape to talk about country. This scene discusses language for naming country; simple verbs for movement; pronouns and locatives as animals move around country, in this case a flying magpie as a totem.

3. **Weather:** As a common topic of conversation, a short prototype on cloudy weather was included. This can also be repeated at night time with expressions around the night sky and then the seasons as plays re-enter scenes to reinforce language. This introduces some nouns, adjectives and continuous tense as required by the topic.

4. **Local environment**: When the bird lands the words are of the immediate world around us, part of which is a bora ground or place to educate young boys and the community about caring for country. This scene is designed to focus on animals and plants both near and far to develop directions and imperatives.

5. **Kinship:** In an introduction to any language or community we put the learners in a relationship to the others. This is again a prototype of an extended introduction to the full family group and introduces names of family and the form for asking questions

5.2. Visual Design and Animation

Our language is sacred to us. Every Aboriginal language is sacred for those who speak it. Words are given to us by the land and those words are sacred. What does it mean to an Aboriginal culture? The land needs words, the land speaks for us and we use the language for this. Words make things happen—make us alive [25].

The resilience and strength that Indigenous Australians continually harness to keep culture alive, and the importance that connection to country and culture play in identity and wellbeing is key to understanding Indigenous people and their languages. It was important to design the country of Sydney to resonate with Indigenous culture and language and serve as a context for understanding language. Therefore 'country' and the design of the landscape became a 'character' within the game.

From the start, it was decided to take an embodied communication approach to both the visual design and animation in the game to represent country and culture as living and sharing. This encompassed working with aspects such as embodied aesthetics, memory, the role of bodily gestures in communicating meaning, and the effect that a user's prior experience and knowledge brings to their own bodily experience of a situation.

Aesthetics, in this case, the visual 'look' of characters and environments within the game space, play an important role in sensory perception; in the meanings people attach to an object or experience and in the ability to communicate with a user [11],[13],[14]. Embodied aesthetics takes into account how visual design can

influence the form of emotions experienced within the body and the role this plays in human interaction. Dinkla notes that "all the senses in our body work simultaneously, interwoven in a system that unites sensual impressions, neuronal processes, memory, imagination and momentary mental activity." [8]. The animation and visuals were designed to subtly provoke mind and body to work in unison in the learning experience.

In considering the role of aesthetics in the visual design of the pre-invasion scenes and human and animal characters in the Learning on Country game we wanted to create an experience that embraced visuals that were designed in a culturally appropriate manner, were of a high professional quality; that authentically resonated with the subject matter and were capable of bringing context and an embodied experience to a range of users.

It was important to the whole team that Indigenous designers and animators were in control of the representation of Indigenous people within the game with the characters designed by an Indigenous designer. We had looked at a 3D CGi format however, to produce the project on our extremely limited budget would require the use of off the shelf models and there are no off the shelf Aboriginal 3D models, let alone ones that are designed by Indigenous designers.

These factors pushed us in the direction of 2D animation as we could achieve greater authenticity in this technique by working with an Indigenous designer. Similarly, with body gestures of both animals and people, we relied on Indigenous animators to direct the gestural expression in a way that they felt was culturally appropriate to the dialogue, the relationship between each character and with the character's relationship with the landscape. These considerations in the design and animation process were integral in situating the language culturally.

Figure 3 Joseph Lycett, A Contest with Spears, Shields and Clubs [17]

As there were no representational images of the landscape for pre-invasion Sydney, we looked to the work of convict artist Joseph Lycett (1775 - 1828), whose work contrasts those of his contemporaries (Figure 3). Lycett painted the Australian landscape objectively as he experienced it at the time, as an Aboriginal landscape, rather than a landscape that was a constructed simulacrum of Britain. His work has both sorrow and celebration. Sorrow for what has been lost and celebration of the richness of Aboriginal culture. Whilst the team was conflicted about using a British artist's work to represent a pre-invasion landscape, it is clear from Joseph Lycett's paintings that he not only had respect for Aboriginal culture but that this respect was reciprocated by Aboriginal people.

Lycett's observational paintings capture Aboriginal life and the natural environment. An embodied aesthetics approach was at the heart of stitching together over 50 sections of Lycett's paintings to construct the panoramic Sydney landscape of the game. There is still enough prevailing natural landscape around the Sydney foreshores for contemporary users of the game to be able to recognise natural phenomena that they have personally experienced with their own bodies and minds. The aim of taking this approach is to bring the user into an embodied connection to country whilst they learn the language of Sydney Aboriginal Language country.

5.2. Sounds

The approach to sound was similar to the approach to visual design and animation. It was important to anchor the sounds in country so that users could subconsciously access memory and feel the emotion in their body. Whilst the background sounds were created as environmental ambience to immerse in a bush scene in the Sydney Harbour area, to match the images, all sounds were taken from the Sydney region of the game. The audio quality was enhanced to ensure that listening to the language was an easy experience.

On a technical level, due to the scarcity of language speakers, we had one male speaker and a female student to record the voices, this meant that the voice pitch had to be changed across the animals and characters in the scene to create a clear narrative without introducing distortion to the voice. Each medium, 360° screen and online game format, required a different approach to sound and different outputs.

5.2. Game Interactions around learning

The initial interactions that the user or player can make are around the 3D navigation of the contemporary Sydney Google map scene. Players have the ability to play each audio phrase and repeat them with or without

subtitles, or just continue. The navigation in this scene triggers different audio based on the location of the player, giving the language a context to help comprehension. For example there are whales shown in the water when the player hears the word *Wulamulu,* the Sydney Aboriginal Language name for the place that is now known as Woolloomoloo - the place of whales (Figure 4).

Figure 4 Magpie flies over Gadigal land towards Wulumulu - place of whales

In the 2.5D pre-invasion scene, the player interaction is limited by the need to keep the active part of the scene in view at all time, in order to assist them to follow the topic of the audio. However, the animations in themselves are interactions designed to give the player clues that relate to the context of the phrase. For example, when the magpie says *Wawa nin garriberri nura dah* (At the corroboree ground the people gather), it tilts its head to the people in the scene to indicate he is talking about them. Similarly in the phrase that follows, *Nin garriberri marri-da* (The corroboree ground is big), the magpie indicates the landscape and its size with a sweep of its wings. The repetition of the word for corroboree ground serves to reinforce both the word, and its cultural relationship to the people.

For the interactions we used following features (see Figure 5):

1. Animations are positioned in a series of overlays to the background, in which they can move around relative to the other animation overlays. In this way their relative position is maintained but they can be loaded at different stages to allow them to enter the scene when ready to speak or add to the context.

2. Then the player needs to be directed to look at the speaking animation through lighting and sound position (in larger displays) and camera movement (in web display).

3. The sequencing of the animations needs to follow the scripting to ensure that the speech makes sense in the context.

4. Any other environment effects that are referred to in the speech need to be generated (eg clouds forming, stars positioned)
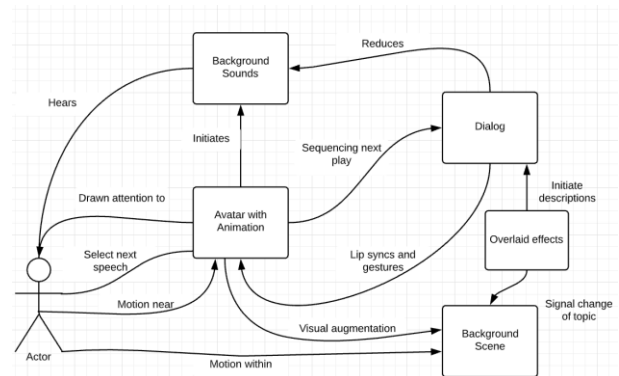

Figure 4 Object Interaction to create immersion

6. USER TESTING

We exported a web-based version of the game for people to review and is available at http://dharuggame.dalang.com.au. The user testing of players has come from this version, which is less immersive but still an embedded format of the knowledge and relies on a Chrome browser. The high quality of the graphics makes initial download slow.

We ran a survey on the user experience of the animations, gestures, sounds and subtitles, and how they reinforced the language. We received feedback from 10 participants from linguists to young language learners, although none were learning Dharug as there is no program at present. The game is designed to reinforce the online lessons, so the experience was a steep learning curve. However, some words were familiar and were noted as setting the context of homecoming and location (3d scene) and greeting (2.5D scene). The beauty of the environment, the immersive quality of the surrounding scenery and the background sounds was found engaging, and some noted the gestures brought the language to life. Participants commented on how the interplay of all these components created a sense of being there. Users participated in only one session and we feel it would take more repetition and experience to gain language competency.

Key feedback in both formats noted the value in seeing the language brought alive. From working with the language learners we saw that engagement in the development work had brought a shift from focusing on the need to express realistic conversation content to one of supporting learners who need a slower and more repetitive language progression. This could be strengthened within the game by extending and adding scenes.

7. CONCLUSION

A major challenge faced in designing this game was making the language intelligible to those who have probably never heard the language spoken. This was particularly hard as the language provided by the Sydney Aboriginal Language teacher was at times too complex for early learners.

In order to address this issue, we have approached the design of the game from a cultural, ethical and embodied communication perspective based on our research and experience with language learning.

User testing has been limited due to a combination of technical difficulties and COVID-19 restrictions. A very small sample of online tests were undertaken however we are reluctant to publish results as the user sample has not been enough to determine rigour around the results. Our aim is to rigorously user test the online and 360° formats of the project in early 2021 with a diversity of users, and to get community feedback on the game to iterate it to the next level. An achievement of the game is that it provides the ability for people to experience what was lost in Sydney with invasion and experience the language of the country of the Sydney region.

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