

Polyglot Cubed: a Multidisciplinary Listening Comprehension and Recognition Tool

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Abstract: Polyglot Cubed is a language learning game designed to improve listening comprehension of unfamiliar vocabulary. As a system for the acquisition of Mandarin Chinese vocabulary, the game system has received international kudos. For educators, the application offers much more than previously documented. The game functions as a tool for the acquisition of various types of listened information, including music, other languages and specialized vocabulary. This game is worth the attention of a variety of educators that are interested in inspiring self-lead education among their students and themselves. This paper provides prototypical alternative uses for the Polyglot Cubed game in specific learning objectives.

Introduction

Polyglot Cubed is an educational game to facilitate listening comprehension skills for Mandarin Chinese vocabulary (Polyglot, 2010). The modular language learning game system works interchangeably with a variety of languages. The game relies on a matching mechanic intended to balance comprehension based language recognition with a casual game play mechanic. Vocabulary is presented using *thematic sets* (Tinkham, 1997) that assist comprehension and a binding process (Terrell, 1986) that compels learners to interact with the objects and the vocabulary. The game is an implementation of theories in motivation, education and entertainment (Gaither, 2006) explored at the University of Illinois's Electronic Visualization Laboratory and Miami University's Armstrong Institute for Interactive Media.

The game has been demonstrated to a variety of international audiences and has been praised for its potential. It has been awarded at Michigan State University's Meaningful Play Conference (2008), recognized at the National Training Systems Association Serious Game Showcase (2009) and exhibited at the 5th ACM Advances in Computer Entertainment Conference (2009) and DevLearn (2009). The novelty of its design as a tool to teach Mandarin Chinese has been recognized.

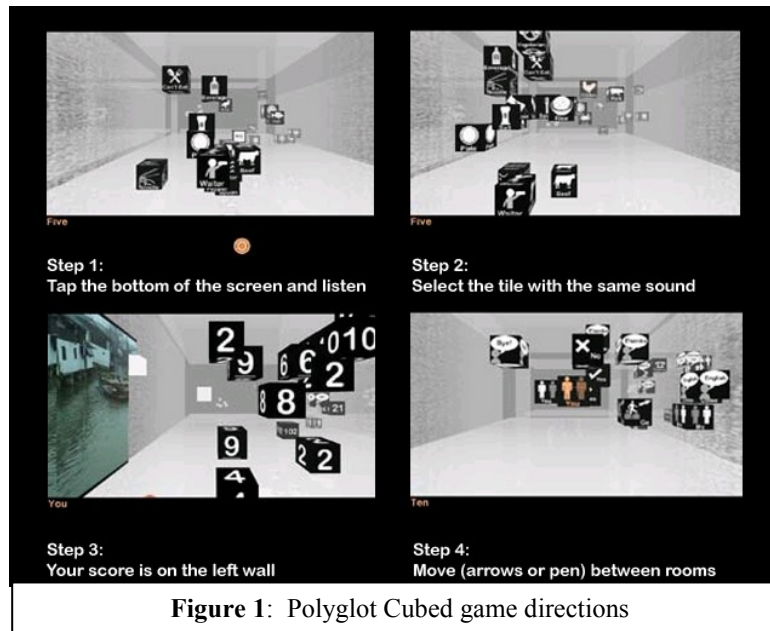
One area of untapped potential for the game is its use as a multidisciplinary listening comprehension tool. Until now, Polyglot Cubed research has largely focused on teaching Mandarin Chinese vocabulary. However, its potential as a tool to assist education in the sciences, in instructional technology, in visual and musical arts and in other languages has gone undocumented. This paper illustrates the opportunities to use this simple and effective game in multiple disciplines.

The Game

Polyglot Cubed is a visual and vocabulary matching game. It requires players to actively engage and interact with the vocabulary as they listen to high frequency words used to accomplish immediate needs and match

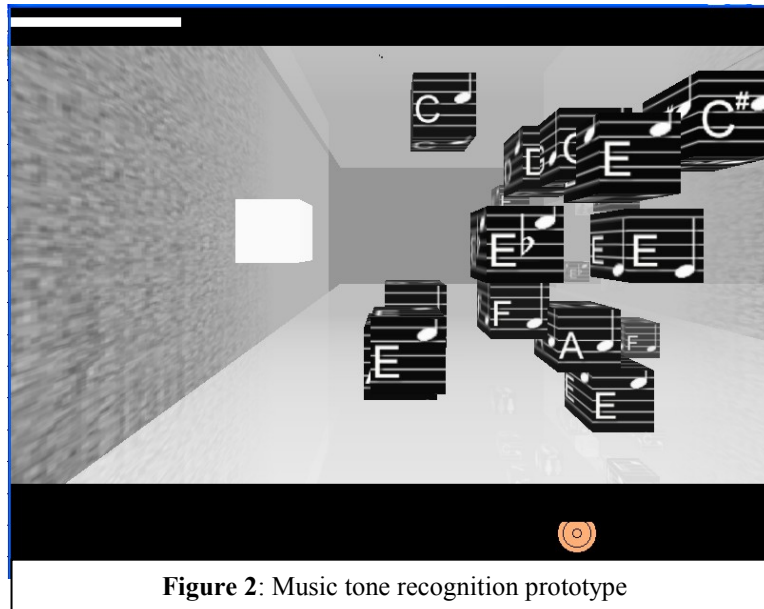
these to the pictographic equivalent. The environment is populated with 3D cubes which are clustered by topic, usage, or form of speech to encourage contextual recognition and aid visual memory. The player must match the spoken word with the cube that corresponds to it. The word clusters are placed in rooms using thematic groupings of the vocabulary in order to position it in context. The game is also provided with a free modification tool that allows non-technically oriented teachers to create a new version of the game that meets their goals and objectives. Educators need only supply a sound and an image for each unit they create.

The game is playable on traditional personal computers and touch-enabled devices. Figure 1 illustrates how the game is played.



Music Education

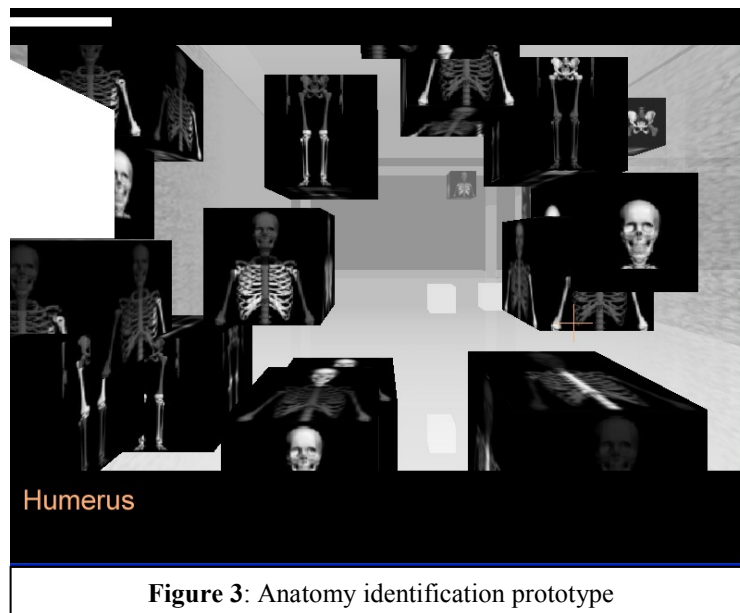
The fundamental mechanics of the Polyglot Cubed game are based on a simple gameplay cycle. The cycle is listen to a set of sounds, find the equivalent visual representation, and if matched correctly, listen again. This cycle can be easily applied to musical training. Consider a situation where a music educator would like to help a student improve their tonal awareness. The educator can build a tone-to-music notation game within the Polyglot Cubed framework. Using the modification tool, the educator can construct an environment where players practice listening to tones and identify their musical notation equivalent. As demonstrated (Fig 2), the pictographic representations of vocabulary are substituted with music notations. In the first room players may need only match a tone to its common notation, hearing a C# would require the player to find the cube that sounds like a C#. Subsequent rooms could offer simple score notation, score notation with pacing, octave transitions, chords and other common music expressions.



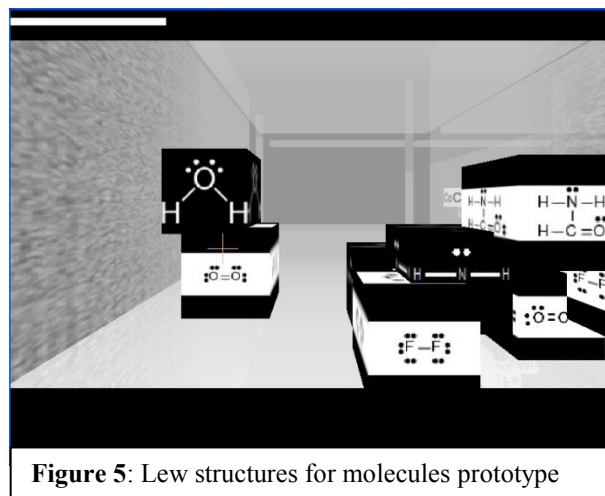
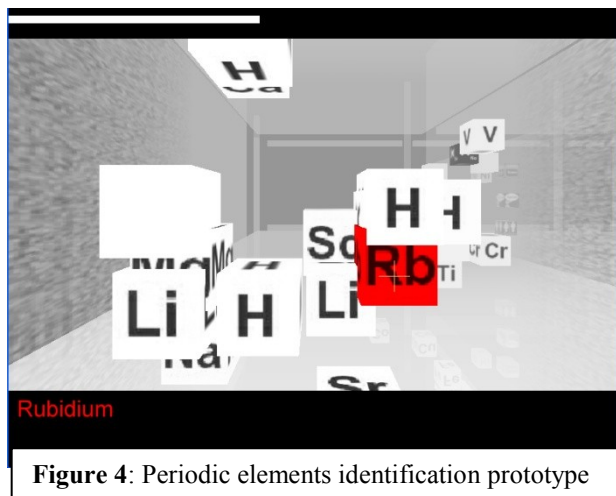
This prototype version of a music listening game demonstrates the fundamental innovation of the game's design. It functions well as an educational tool for the transposition of aural experience to visual meaning. This structure can be used to help middle school students identify instruments or biology students identify bird calls by species.

Specialized Vocabulary

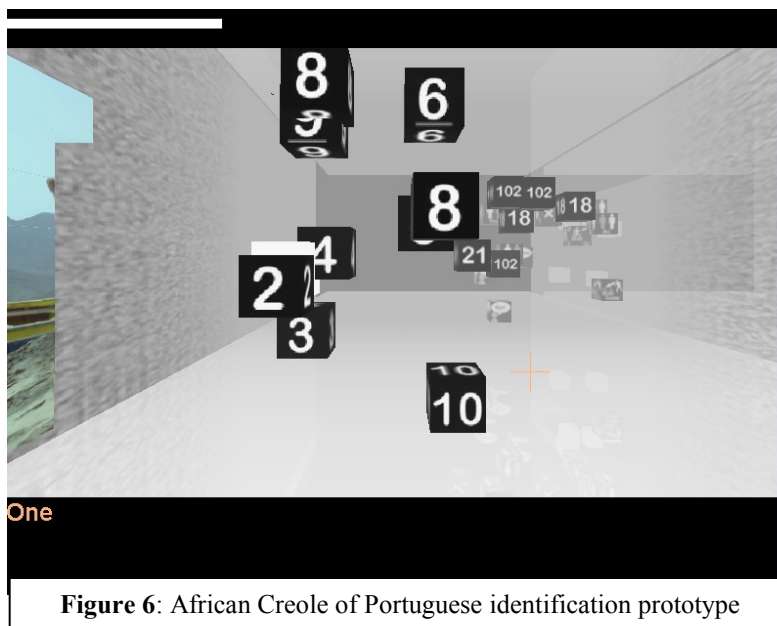
Specialized academic and industry vocabulary training pervades native language mastery. Students acquire specialty language at all levels, from advanced adjectives in primary school to technical terminology in medical school. The Polyglot Game tool can be used as an engaging way to practice reading and spoken comprehension of specialized vocabulary. A version of Polyglot Cubed for learning English language anatomy terminology is demonstrated (Fig 3).



In this anatomy game, the player is given the spoken and written word, but they must identify the body part. This type of practice is particularly appropriate for terminology that is largely visual. Examples of apt terminology also include the language of film, architecture, and other visual arts. It is also reasonable to conceive of versions of the game that assist practice of specialized vocabulary in science and technology. These versions might have players match the names of specific periodic elements to their symbols (Fig 4), or molecular structures with their illustrated examples as provided (Fig 5). In the former case, the resulting image might be the complete list of periodic elements.



Because the game's design is highly modular, it lends itself well to the archiving and practice of other foreign languages. It is clear that the tool could be used for other languages such as Spanish, French, German or Portuguese because the game's scale is appropriate for specialized subsets of these languages. For this reason the game is well suited for situations in which a person wants to practice their understanding under specific contexts. Perhaps a Spanish speaking doctor would like to familiarize themselves with localized vocabulary before visiting a remote clinic where the patients speak a slightly different language. Other players may be interested in learning a vocabulary required to accomplish immediate needs before travelling to a particular region. Figure 5 illustrates a version of the game design to teach an African Creole of Portuguese. Such specific versions can be designed to train listeners to specific phonetics or slang terms as well.



Conclusion

In an environment where educators must work diligently to engage students, the opportunities for game-based education seem evident. The Polyglot Cubed game is an easily applied solution for a variety of disciplines in which aural recognition is imperative. As demonstrated there are clear potentials in music, visual arts and science. Few open gaming environments offer such a wide range of applications.

It is also important to note that such efforts are supported by existing repositories of vocabulary lessons provided through websites and academic initiatives. The polyglot cubed game provides an opportunity to bring new life to these projects by converting their resource into a more interesting game based experience.

These demonstrated prototypes are simply an illustration of the potential for this game tool. It is clear such designs must also be vetted for their efficacy. Subsequent research could evaluate specific solutions against traditional means of imparting this knowledge. From these prototypes it is also apparent that a repository of such games could benefit researchers, students and educators. Ideally, this repository would allow people to download similarly constructed lessons to suit their needs.

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