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# A combinatorial creativity approach to composing traditional Irish reels.

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# Enabling Access to Irish Traditional Music Archives on a PDA

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## Abstract

This paper describes TunePal, a tool which facilitates convenient audio access to archive transcriptions of traditional tunes on a PDA. The main feature of TunePal is its ability to locate a tune by name or musical phrase from thousands stored on a PDA. TunePal enhances not only the recall of a musician using TunePal in a traditional music session, but also the acquisition of new repertoire. In this paper we briefly describe the sources of music that TunePal works on, present its main features, give a technical description and present efforts at disseminating TunePal to the wider traditional music community.

## 1 Introduction

Current estimates suggest there are at least seven thousand traditional Irish dance tunes in existence [1]. Irish traditional musicians typically have a repertoire of several hundred tunes. Many musicians play a thousand or more tunes over a lifetime of playing traditional music [1]. Musicians typically gather in informal settings known as *sessions* to play together [2, 8]. Sessions take place in shared spaces such as a pub or open house. Often sessions are anchored by several

core musicians who may be paid to play, though sessions are usually open in the sense that any musician of appropriate standard can join in [1, 2, 8]. Although many sessions are attended by regular musicians, it is not uncommon for participants at sessions to have never played together prior to meeting at a session. This is particularly true of sessions that take place at music festivals such as the Willie Clancy Summer School [12]. Tunes are commonly grouped into “sets” of two or three tunes which are each repeated twice or three times and played in sequence. Given such a large repertoire, a common problem encountered by musicians is that of needing to hear the first few notes from a tune or set in order to start the tune. Musicians will often recall the name, composer or player of a tune, but be unable to recall the tune itself.

In order to address this problem, we have developed TunePal, a program that runs on a PDA (Personal Digital Assistant) that can store and play back transcriptions of tunes in the ABC format [6]. A PDA is particularly suited to this application due to its small, unobtrusive size in a session environment. TunePal supports several unique features that make a useful tool for learning and recalling traditional music in a session environment, such as the ability to quickly locate a tune among thousands stored on the device, the ability to play a section of a tune and the ability to speed up or slow down a tune. Figure 1 depicts traditional musicians using TunePal in a traditional music session.



Figure 1: Musicians in a session compare tunes using TunePal

Section 2 of this paper describes the sources that TunePal works with. Section 3 presents the main features of TunePal and gives a brief technical description. Section 4 describes dissemination of TunePal and plans for user validation of the system we have developed. Section 5 presents a summary and conclusions.

## 2 Traditional Dance Music Archives

The most common forms of traditional dance music are reels, double jigs and hornpipes. Other tune types include marches, set dances, polkas, mazurkas, slip jigs, single jigs and reels, flings, highlands, scottisches, barn dances, strathspeys and waltzes [13]. These forms differ in time signature, tempo and structure. For example a reel is generally played at a lively tempo and is in 4/4 time (4 crochets in a bar) while a waltz is generally played at slower pace and is in 3/4 time. The time signature, tempo and structure of a tune form are determined by the dance it accompanies.

There have been several significant initiatives made to catalogue the cannon of Irish traditional music [4, 5]. Around the turn of the twentieth century, Francis O'Neill, the then police chief in Chicago, transcribed and documented a large body of dance tunes from immigrant Irish musicians. In 1903, he published a book of his collected tunes entitled *The Music of Ireland*. The 1,850 tunes presented in the collection were classified according to tune-type (airs and songs, Carolan compositions, double jigs, slip jigs, reels, hornpipes, long dances, marches and miscellaneous). In 1907, he published *The Dance Music of Ireland – 1001 Gems*. This collection focused entirely on the dance music repertoire and contained many tunes published in his previous col-

lection. Until the publication of Brendan Breathnach's *Ceol Rince Na hÉireann* in the 1970, O'Neill's second book was considered the definitive reference for traditional musicians and musicians would often refer to a tune by its reference number in the book [2].

### 2.1 Electronic Archives

ABC is a music notation language introduced by Chris Walshaw in 1991 [6]. The format was designed primarily for folk and traditional tunes of Western European origin which can be written on one staff in standard classical notation [6]. ABC files are ASCII text files and so can be edited by any text editor, without the necessity for special software. Each file (known as a *tune book*) can contain multiple tunes. File sizes are typically measured in kilobytes and this facilitates easy transmission by electronic means. The small size of ABC files also makes them an ideal medium for the storage of tunes on a memory constrained mobile device.

Figure 2 is the tune "Contentment is Wealth" in the ABC format. Each tune consists of a header section and a tune body. The header section contains amongst other fields, the title, composer, source, tempo, key signature, geographical origin and transcriber [7]. As tunes can have several titles, the title field can be repeated for a given tune [1].

```
X:11
T:Contentment is Wealth
R:jig
M:6/8
K:Edor
GFG Eed|BAB EFG|FAF DdB|AFD D2f|gfe
edB|BAB ~d3|BdB DFA|GED E3:|
|:ede Beg|bge gfe|dcd Adf|afd fed|ede
Beg|bge gfe|BdB DFA|GED E3:|
```

Figure 2: The tune "Contentment is Wealth" in the ABC format.

The tune body contains the notation for the tune. The body encoding supports such features as ornaments, bar divisions, sharps, flats, naturals, repeated sections, key changes, guitar chords, lyrics and variations. There is an active and vibrant community supporting the ABC format and a range of tools have been developed for a variety of platforms and purposes.

Between 1997 and 2000, a group of musicians under the leadership of Dan Beimbom and John Chambers, undertook a grass roots project to

transcribe three of O'Neill's books to electronic format using the ABC music notation language. As copyright had expired on O'Neill's original books, they made their work freely available on the internet [14].

Many of the tunes from O'Neill's books are played differently by musicians today, as is normal with a living tradition. Around the same period (the late 1990's) Henrik Norbeck collected nearly 2000 tunes in ABC format from various sessions and recordings. Again this collection was made freely available on the internet. This collection contains many modern settings of tunes from O'Neill's books [6].

TunePal was developed and tested on both the original collections of O'Neill's books and Norbeck's collection of contemporary settings.

### 3 TunePal

TunePal is software that runs on the Windows PocketPC platform that allows a traditional musician to access archives of traditional tunes in ABC format on a PDA (Personal Digital Assistant). A PDA is an ideal platform for this application for several reasons:

- Small size
- Ability to access data offline
- Ability to play back audio
- Unobtrusive form factor
- Backlit screen for use in dark environments

#### 3.1 Features

Figure 3 presents a screenshot of the main interface to TunePal.



Figure 3: TunePal main interface

The currently open file (tune book) is displayed along with the list of tune titles contained in the file. Title, alternative title, type, key and composer are displayed in sortable columns. From this screen, a musician can open a file, display a tune within a file or access the tune search facility.

Tapping a tune title displays the screen illustrated in Figure 4, displaying the musical notation in ABC format and controls for playback, transposition, tempo adjustment and so on.

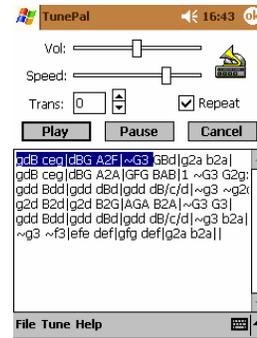


Figure 4: TunePal playback interface

Playback of tunes is the most essential feature of the program as most traditional musicians learn tunes by ear and not from notes [2]. Initially, the entire tune will be selected and hence played back, though it is possible for a user to select a subsection of a tune for playback. This may be required when learning a difficult phrase for example. TunePal will automatically repeat the selected phrase which further assists learning.



Figure 5: Searching for tunes with TunePal

Additionally, the tune may be speeded up or slowed down, or transposed up or down by an interval of semitones. Adjusting the tempo of a tune during playback without altering the pitch is

a unique feature of TunePal that makes it an ideal tool in a learning environment. TunePal can also playback using any one of 128 general MIDI instruments and it is sufficiently loud to be heard in a noisy session.

A PDA can hold many thousands of tunes in ABC format and so searching for a specific tune is facilitated as illustrated in Figure 5.

A user can enter search criteria and the program will display all matching tunes across all ABC files stored on the machine using a fast recursive text search. Searches can be by phrase, title or any part of the ABC notation of the tune. Searches of thousands of tunes (for example combining all of O'Neill's and Norbeck's collections – in total approximately 5000 tunes) are typically completed in under a second.

### 3.2 Technical Description

TunePal was developed using Microsoft embedded Visual C++ and contains approximately 4000 lines of C code. As there is no MIDI playback capability built into the PocketPC platform, playback in TunePal was initially achieved by programming “beeps” using sine waves. A special ornamentation playback algorithm was incorporated that facilitated playback of ornaments such as rolls and crans where transcribed [13]. This resulted in accurate though plain sounding output from the system.

More recently the playback engine has been replaced by one based on two open source projects ABC2MIDI and Timidity [15, 16]. ABC2MIDI is framework that accurately converts a tune in ABC format to a MIDI file. Timidity is a MIDI playback engine that uses wavetable synthesis to render realistic MIDI output. This means that TunePal can play back tunes using any of 128 general MIDI instruments. Using the new playback engine, playback in TunePal is accurate, realistic and ascetically pleasing, particularly where transcriptions contain detailed ornamentation [13].

## 4 Dissemination and Validation

TunePal was released for free download from prominent locations on the Internet. To date it has been downloaded over four thousand times [10] [11] and we have received positive feedback and

suggestions from users worldwide. We are currently undertaking a user acceptance study to establish what effect access to traditional music archives on a PDA in this format has on learning, teaching and the transmission of traditional music. The study involves musicians from various backgrounds logging usage of the software and answering an online survey. The musicians involved in the study are demographically diverse, covering a range of ages, skill levels, technical abilities and instruments. It is hoped to publish our findings from this study in future work.

## 5 Conclusions

This paper described TunePal, a tool which facilitates convenient audio access to archive transcriptions of traditional tunes in ABC format. The main feature of TunePal is its ability to locate a tune by name or musical phrase from thousands stored on a PDA. TunePal enhances not only the recall of a musician using TunePal in a traditional music session, but also the acquisition of new repertoire. TunePal has proved a popular tool, being downloaded by many thousands of musicians. In future work we will present our findings on the impact of TunePal on learning and teaching.

## About the Author



Bryan Duggan is a lecturer in the school of computing at the DIT in Kevin St. He holds a first class honours degree in computer science and software engineering from the University of Dublin (studied at the DIT) and a masters degree in Information Technology for Strategic Management (DIT). He is presently working on a PhD on the topic of creativity in traditional Irish flute playing. He is also a traditional flute player and has an interest in gadgets of all forms.

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