# Braille Music in a Digital Age

Roger Firman: Presenter

UKAAF Vice-Chair; Vice-Chair UKAAF Music Subject Area; Lead, UKAAF Music Subject Area Braille Music Task Group; UK consultant on former BANA Braille Music Technical Committee; UK representative on ICEB Braille Music Committee; UK Lead on DAISY Braille Music Project; Chief Executive, Golden Chord.

Clare Gailans: Co-author

Member of UKAAF; Chair of UKAAF Music Subject Area; Former proof-reader and transcriber of braille music for almost 30 years; since 2004, braille music tutor both to individuals and as part of the provision for visually impaired students at the Royal College of Music and Royal Welsh College of Music and Drama.

# Braille Music in a Digital Age

We would like to express thanks to the ICEB 2020 Review Committee for selecting our submission to present at the 7th General Assembly, and publish this paper in its proceedings arising from the Assembly.

Where mention is made of specific companies/
organisations/software, this should not be regarded as an endorsement, rather as information which may be of benefit.

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Key theme of this ICEB Assembly: braille as an exciting and relevant code for the future. Braille music in a digital age presents many challenges and opportunities in a changing environment. In the past, braille music has enabled employment, learning and leisure opportunities. In the present age, new ways of working, studying and leisure pursuits are being created along with emerging technologies, which will surely build on more traditional approaches and offer a more diverse range of solutions.

## 1. Historical perspective of braille music

Those of you who were delegates at the ICEB 6th General Assembly in 2016 at Baltimore, USA, will have read a paper entitled "Braille music and UEB in Practice in the UK" co-authored by Sally-Anne Zimmermann and Roger Firman. The first section gave a detailed overview of the history of braille music which we do not intend to restate here. Rather, key facts will be summarised below in the hope the summary will place the paper in context. Should you wish to read the original paper, this can be located on the ICEB website.

• Louis Braille used his six-dot raised cell system, begun in 1829, to represent both the alphabet and musical symbols.

• Braille music was intended, from the outset, to enable blind musicians to access print music without sighted assistance.

• Importantly, the system allowed blind musicians to write both text and music themselves.

• In 1885, the Paris Institution published its first manual for the braille music code, whilst other countries were beginning to be interested in the method. As early as 1870, Dr Armitage, for example, commissioned the writing of a pamphlet in English explaining not the code itself but how it was taught in Paris. In 1871 Germany adopted braille music with some national variations. The UK however did not formally adopt braille music until the 1930s.

• There has been a series of meetings to develop the braille music code, key dates are: Cologne 1888, Paris 1929 and 1954, Moscow 1982, Prague 1985, Marburg 1987, Saanen 1992, Marburg 2002, Zurich 2004, and Leipzig 2008.

• Braille music primers date from 1901 and 1922, with many having been produced since then. The last two, Krolick: New International Manual of Braille Music Notation 1996; and BANA: Music Braille Code 2015.

• Braille music is developing as new musical situations arise. It is important that this work is unified as far as possible throughout the world. There is much which it is necessary to bring up to date. It is hoped this work will be realised via existing structures rather than informally.

## 2. Some factors which restrict or improve digital braille music access

One can easily fall into the trap of thinking all users will access braille music using digital technology. While it is unpredictable what the landscape may look like in years to come, we know there is a need for both hardcopy and digitally produced material.

The focus of this Assembly is naturally braille, though synthetic speech or output read by humans must not be forgotten.

While there are examples of braille displays with lower prices than has been the case until relatively recently, it cannot be over-emphasised that many throughout the world might find cost a barrier. Whether this gap can be bridged in imaginative ways remains uncertain.

Online availability of scores as either MusicXML or braille files will assist with digital access. Imagine a situation where a user wishes to acquire a braille copy of a piece of music. If an online MusicXML or braille file can be located from sources such as MuseScore, OpenScore or BrailleMuse, these can be translated online, downloaded and then read. This process could take a matter of minutes, but might sometimes take considerably longer. Having said that, it is important that the files are of good quality, from whatever source. The initiative being taken with the DAISY Braille Music Project should ensure that output from automated braille music programs is more accurate. As improvements are made with either MusicXML or MNX, this should enable more reliable transcriptions.

Looking at braille libraries and organisations globally, if agreements can be reached, the number of already existing braille files which could be made available would be greatly increased.

We should not forget that conversion of files between different character-sets is an issue to resolve, perhaps an online tool could take care of this process.

## 3. Music on braille displays, advantages and problems

When teaching students, using braille note-takers for written work has many advantages. For example, teacher and student can stay at the piano and move easily between writing and playing as the occasion demands. Heavy equipment such as the Perkins makes this more difficult. It works well if correcting work on students' note-takers as they go along, pointing out why something does not work and showing them how it might be improved. This works well with such exercises as providing answering phrases, or taking down melodies or passages which have been played. It is helpful for students to see corrected work without finding blocking out (material being overwritten with cells of six-dots), as was so often necessary on paper.

Another advantage is that the Find command makes it easy to jump to a particular bar if the layout is known.

At the time of writing, it has not been possible to explore in depth how multi-line braille displays such as Canute, or other devices displaying more than a single line, perform in this field. We would expect vocal music and orchestral scores to be comprehended more easily, and other formats where it will be advantageous to display other than a single line.

Even now, the ability to read braille music on a braille display has interesting advantages. You don't lose your place, the braille display can by its nature show small amounts of the music in a comprehensible way. The ability to find your place can save time in a learning, studying, rehearsal or performing situation.

By way of example, if there is a requirement to adjust a score in a rehearsal, this can be accomplished easily.

Portability of a multi-line braille display could be an issue if it relies solely on being connected to an electrical outlet. Some users may prefer hardcopy even if both options are available.

As single line displays still predominate, using them for vocal music or orchestral score work is problematic. Note however, that learning keyboard music in a linear fashion from a single line display is very possible.

To summarise this section:

Advantages

\* Teacher and student can stay at the piano and move easily between writing and playing as the occasion demands.

\* It works well if correcting work on students' note-takers as they go along, pointing out why something does not work and showing them how it might be improved. This works well with such exercises as providing answering phrases, or taking down melodies or passages which have been played. It is helpful for students to see corrected work

\* The Find command makes it easy to jump to a particular bar if the layout is known.

\* You don't lose your place.

\* The braille display can show small amounts of the music in a comprehensible way.

\* The ability to find your place can save time in a learning, studying, rehearsal or performing situation.

\* An electronic display means that the musician can carry an entire personal music library, but need only carry the weight of the display itself. Any score from the library can be called up in seconds simply by pressing a few buttons.

\* It can be useful, when inputting onto an electronic braille device, to adapt conventional braille music formats to maximise the information that a single line, or small group of lines, can deliver.

Problems

\* Portability of a multi-line braille display could be an issue if it relies solely on being connected to an electrical outlet.

\* Some users may prefer hardcopy even if both options are available.

\* As single line displays still predominate, using them for vocal music or orchestral score work is problematic.

## 4. Fostering teaching and learning of braille music in a digital age

Fostering braille, braille music and musical competency for all abilities is something about which we feel passionately, and long for each person to realise their dreams and goals. How can this be achieved in an ever more fragmented education system, both in statutory provision and life-long learning? What is technology’s role in both the mainstream and specialised sectors of the market? Does the introduction of more affordable digital equipment present an opportunity for a special injection of interest in the use of braille music?

Both print and braille music systems have the same aim of conveying to the reader musical ideas within certain traditions from a composer or arranger who originally writes these symbols. The ultimate aims of the reader whether looking at print or touching dots are the same. However, the routes to achieve those aims, such as performance and analysis, are different. These differences have implications for how people are effectively taught to read and write the notations.

In section 3 above, we highlighted some practical advantages braille displays can provide. These allied with other approaches for learning could open new opportunities.

Interactive tutorials could help track progress, develop skills and could offer different routes to acquire braille music skills either as self-taught, or with input from a teacher.

While the possibilities just described are one approach, this must not rule out the learning experience of like-minded students having opportunities to meet, explore ideas, make music together and network rather than feel isolated.

## 5. Is the future Artificial Intelligence?

This last area may well be the most challenging of all. It is clearly going to take on increasing importance in the years ahead with implications yet to be determined. Perhaps it might be worth taking a few steps back and setting Artificial Intelligence in context.

Artificial Intelligence seeks to make computers do the kinds of things our minds can do.

AI uses many different techniques addressing a range of tasks and already it is everywhere from our homes, driverless cars, banks, offices, gadgets, the environment and even some clothes. Don't forget the emerging companion-robots too.

Making machines learn could be a helpful starting point. Some key features are: 1. Storing of information.
2. Recognising patterns. 3. Learning as a result.

How far machine intelligence will go is the great unknown. They act as they achieve an objective, but the question is, whose objective? Some believe that a machine has an internal model of what their objective is which can be used for good or ill.

Could such models be used or developed involving braille music, its production and use? In broad terms we suggest the answer is yes as it would not be too hard to imagine a situation where a process happens i.e. a piece of music is input to a model in some way which is then transformed from what it already knows into an output which is what is required.

Of course, you could say this is exactly what already happens in multiple stages but there is no Artificial Intelligence model learning from what is being achieved.

AI's aims are technological and scientific; however, the influence of AI stretches to psychology, biology and philosophy although dealing with questions of free will and consciousness cause much disagreement.

An important factor is going to be how businesses invest for their future. Activity might depend upon how much investment is made in specific sectors, which in turn will govern future products.

Were this development to be taken further and realised, then we could be talking about a very different braille music and musical landscape of the future.

You may be interested to know that the Handy Tech Actilino braille display has the ability to scroll automatically using "continuous read". An additional add-on when reading braille music would playback what you were reading.

In general terms, rather than braille music specific, the Library of Congress is investigating how machine learning might be appropriate for its work.

2,240 words

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