**Braille Literacy Canada 2023 Virtual Braille Symposium: Boundless Braille (June 2, 2023)**

About Braille Files

James Bowden

**Daphne Hitchcock** 00:00

Okay, let's go. Without further ado, I would like to welcome our first speaker, James Bowden whose talk is called About Braille Files. James joins us from the UK. He works at RNIB Royal National Institute of blind people, as the braille Technical Officer handling queries about braille and then is involved in various braille related projects, both in the UK and internationally. You can read more about James on our symposium webpage. A lifelong braille reader, James is passionate about all things braille. He is familiar with several braille codes, including technical aspects of UEB, braille music and some foreign languages. But right now, he is going to talk all about braille files. So, James, thank you. I'll turn things over to you now.

**James Bowden** 00:55

Thank you so much, Daphne. And what a wonderful symposium. Thank you, once again, for inviting me to speak. It's an absolute honor and a privilege. And I hope this will be of interest to folks.

So, we're going to talk about demystifying some of the different types of braille. What is 6 dot, 8 dot, computer braille, literary braille all these terms? What are braille files? What do they actually contain? How do you make one, etc? Why would you want one? How do you navigate one. And finally, I'm hoping to touch on a new project, the E braille project, which is kind of going into the future of braille files.

So, to start with, I'm hoping this will all be really familiar to most of you, if not all of you. Most people who learn braille use a 6 dot braille cell, 3 high 2 wide, and then either grade 1 or grade 2, or as we sometimes say, uncontracted and contracted braille. I'll use those terms interchangeably. And grade 1, or uncontracted is letter by letter, you write every single letter out. And grade 2 you add lots of interesting contractions, as they're called, to represent common letter combinations and common words. In English, the contracted braille code reduces the size of the braille by about 20%, and that means the fluent braille reader gains a speed increase corresponding to that. Both grade 1 and grade 2 are meant for ordinary text; words primarily and typical punctuation signs. And you could say it's therefore for literature, and therefore we use the term literary braille. There’s the first piece of jargon – literary braille covers grade 1 and grade 2. As we know, there are not special signs for capitals and numbers. So unlike print, we have the same sign for a capital A, or a small a, or even a number 1. And we have special prefixes, which go before that to say, this is a capital, or this is a number. So a capital A is actually two braille characters in literary braille, dot 6 and dot 1. And the number 1 is the number prefix, 3 4 5 6, and then a dot 1. I'm sure all of that is very familiar, but I'm mentioning it to contrast it with what's coming next.

So traditionally, braille has mostly been embossed onto paper. But it can also be shown on a braille display. These are devices which typically raise and lower plastic pins to form a single line of braille. Now I know there are nice new products in the market, which will give us multiple lines, but for this, traditionally, they’re 1 line. You can almost think of a braille display a bit like a little braille screen. And traditionally, these have been used with computers, and have been particularly useful when programming computers. Ah, there's a problem. If you look at a typical QWERTY keyboard, there's lots of interesting symbols like ~, {, up arrow, \, |. And if you're programming a computer, you're almost bound to need some of those somewhere along the line. And the problem is, in traditional literary braille, some of those characters simply did not have a braille sign for them. They don't occur in literature. And there's another interesting thing about programming. In some languages, the layout of the code is very important. In some languages it’s absolutely critical, it won't work unless you get the layout right. So it would be nice perhaps to have a 1 to 1 print to braille kind of code. Okay, well, that's quite easy to program, if you're writing a screen reader driving a braille display with a simple 1 to 1 code. Say this print character, okay, it's those braille dots. This print character, okay, it's those braille dots.

But we hit another problem. There are not enough unique 6 dot braille characters to do this for a computer. There are 63 different 6 dot braille combinations – 64 if you count space. I'll leave the mathematicians to work that one out. And the answer was to build an 8 dot display. So instead of having 3 dots high, we now have 4 dots high. And the dots 7 and 8 go below dots 3 and 6. So down the left, 1 2 3 7, and down the right, 4 5 6 8. And these bottom dots can be used for certain special characters. And they can also be used to show where text will be input, that is the cursor, and also can be used for showing highlights. So in 8 dot braille, the basic letters, they're the same. But other characters use other combinations of braille dots, and they’re not always related to the literary code. Because it's a 1 to 1, there are no prefixes, so no capital sign, no number sign etcetera, you just use different combinations of dots. So for example, a lowercase a, in 8 dot computer code, is dot 1, no surprises. But a capital A is dots 1 and 7. So it's 2 dots, and they're quite wide apart. If you're new to reading computer braille, be very careful of some of these characters. So for example, don't mistake a capital A, dots 1 and 7, for a lowercase k, dots 1 and 3.

Now, 8 dots, there are 255 different dot combinations, or 256 if you count the space. And this really corresponds very well to the 256 possible characters that you used to have in traditional computing. You’ve probably heard the term ASCII, ASCII basically was a system of numbering characters to a computer. So computers, they store numbers, and the computer would just interpret this number is that character. And there were 256 of them. Now the USA computer code is related to the Nemeth code. So remember, there are no prefixes in computer code, no prefixes in 8 dot braille. We have dots 3, sorry, dots 2 3 5 and 6, they're used for the different numbers. So number 1 is dot 2. Number 2 is dots 2 3, and so on and so forth. + is dots 3 4 6. The period, or full stop, is dots 4 6. But there are plenty which are not the same as Nemeth. The left square bracket, for example, is dots 2 4 6 and 7.

Well, enough about that. What about storing braille? So remember that this 8 dot braille, or computer code, is a 1 to 1 mapping. So one character in the file is one braille character. So instead of storing a computer program, you could actually use exactly the same system to store a series of braille characters. In other words, braille text. The advantage is it doesn't take a great deal of space, certainly a lot less than storing the physical braille volumes. So using computer braille, ignoring the dots 7 and 8, just ignore them, you can store any 6 dot braille code in a computer file. And this has become known as a BRF file.

Let's give you an example. The word beginning, written in contracted English braille, dots 2 3, g, dots 2 5, sorry excuse me 3 5, n, dots 3 4 6. B e, g, in sign, and ing sign.

**James Bowden** 10:55

Now, in the USA computer code, the numbers represent those dots 2 3 5 6 combinations. So number two, as dots 2 3, G, that's the same, dots3 5, that's the number 9, in, and then + is dots 3 4 6. So beginning would be written in the file as 2g9n+

It doesn't make much sense with a screen reader, makes perfect sense when you read it on a braille display. So BRF files really just contain characters which represent braille dots, spaces, and new lines. You can store ready formatted pages of braille, and they'll come out exactly the same when you emboss. You can also read them on a braille display, or you could apply what's called a braille font, and then a sighted person can read those dots as dots on a screen. The key thing is the encoding in the file, and the font or the braille display or the embosser, must match. It's just a file containing braille characters. To a computer, you can store anything, it's just text. And therefore, you can store any pre-translated braille that you like. It could be contracted English, it could be French uncontracted, it could be a mixture of both. It could be mathematics. It could be partially contracted. Say you're halfway through learning the contracted braille code, you can store that in a BRF file. You can even do music, it's just lines of text to the computer. What happens is it gets interpreted as braille dots when it's displayed on your braille display, or sent to your embosser. Now many modern braille displays can store these BRF files, either in memory or on a memory card or memory stick. And it's a really convenient way of having a whole braille library, at your fingertips, in a fraction of the space.

Well, how about making these files? How do you make them? Well, in fact, as they're basically text files, just characters spaces and new lines (I guess I could mention the form feed character as well). You can basically write one of these in almost any standard text editor, even a word processor and then save as plain text. So in Windows for example, you could use the Notepad utility to write one of these things. Just remember that every character that you type with 1 braille character. No contractions. If you type in t h e, you will get t h e in the braille. You need to write in the USA computer code, for example, ignoring dots 7 and 8, and you get out exactly what you write in. So if you typed in the figure 8, you will get in the braille dots 2 3 6. If you actually wanted a braille number 8 in the literary code, you'd have to type two characters into your BRF file. The first one is the number sign, and the second one is the letter H. Just set your screen reader, if you're using one, to the USA braille code, and hopefully, it'll look very good.

Just for interest, what about braille transcription software? Many braille books and documents are created with braille translation or transcription software. And these basically have a series of rules saying if you see this, you braille that under these conditions. And all these rules are collectively known as a braille translation table. So I've got a few rules here. The letter o, okay that's dots 1 3 5. And that applies anywhere. Yep, okay, that's easy. Ah but we have a problem. There's a contraction o u. Okay, so we better tell it that o u is dots 1 2 5 6, and that also applies anywhere. Okay, oh, hang on, there's a word out. That's dots 1 2 5 6, but only if it's a whole word. And if you've got that, then what happens if you have the word o u? Well, that has to be written out. So that's a fourth rule we need to put in, o u is 1 3 5, 1 3 6, and that only applies if it's a whole word. And so you build up these list of rules. Now, that's incredibly incomplete, and I've deliberately picked only a few. Otherwise, I could be here probably for a few hours going through all these kinds of rules, and exceptions to rules, and exceptions to exceptions to rules. And yes, there really are. So there are literally hundreds of these rules typically for English contracted braille. And, you know, computers are very good at running through lists of things and finding the best match, and they can do it really quickly. And we kind of got used to that.

Now another part of the translation software will be what we call the formatter. And it will say, Okay, I know that this part of the text, it is a paragraph. So that means I need to put 2 spaces at the beginning of the first line. Or it could say, Ah, this piece of text, that's a centered heading, so I need to put loads of spaces at the beginning to make it look centered. It's really quite easy because you just push spaces to make something go over to the right, and you just do new lines to make something go down the page.

So we can store all these braille files on a braille display these days, how do you navigate one? It’s just basically a plain text file. So really the answer is exactly the same as what you would do for a text file on your computer. You have arrow keys to move left, right, up or down. Some braille displays have a command to go to the next or previous paragraph. Now that is a little bit fuzzy, but basically what they tend to do is they say, well, typical paragraph start with a line which has got a couple of spaces at the beginning. So let's look for a line which is indented. That works perfectly well if you have an ordinary paragraph, but if your paragraphs are, say 1 3 instead of 3 1, that is the first line is not indented and all the other lines are indented, then of course it will not work quite so well. Some displays have a page up page down command, but that can also be a bit vague, especially if you don't have the form feed characters in the file. So it might just jump 1000 characters and hope.

But the most powerful command that we have when navigating a BRF file is the find command. Typically, it's space and the letter f, and you press the two together. So it's space and dots 1 2 4, press them all together. Type in what you're looking for, and then press the Enter key on the braille display, which is very often dot 8 on the right. Now if you do this, you must match exactly what dots you're looking for. So if you're looking for a word like chapter, and it's written in contracted braille, you must use the c h and the e r sign. If you write c h a p t e r, even if the word chapter with contractions is there, it will not be found, because it's not a translator. It's just matching on those braille signs that you write. So remember also to include capital signs, number signs, etc, etc.

Now find is great if you know what you're looking for. But if you Don't, then there are a few general tips which may be helpful. First up, many books contain a contents page. So you can search for contents with a capital C and hopefully you can read what's in the contents page. That will give you a good clue how chapters are written, or you could look for the chapter name, or even the number of the page where that chapter starts. Do a second search and you go right to that chapter. Brilliant. Or, if you want to just look for a chapter and move by chapter, you could look for the word chapter, and maybe the number as well. You could search for chapter 3, or chapter 4, or whatever. But, be careful. Some books write digits, 1 2 3,

**James Bowden** 20:56

other books will write Roman numerals, i, ii, iii, iv. And other books might use words, o n e, t w o, t h r e e, Etc. And the word chapter may or may not actually appear. You can get clues about this from the contents page, and you can read up to the first chapter heading to find out what they're going to be like. Because if it reads just Roman numeral 1, on its own, on a line that's centered, you can pretty much guess that the word chapter is not there, and the rest of the chapter numbers are going to be written in Roman numbers as well.

Next up, you can search for a new print page number. Now in BANA countries, the USA and Canada, new print pages are normally denoted by a long line of dots 3 6 right across the page, immediately followed by the new print page number. So you could always search for 3 6 3 6 3 6 3 6 and then the number. In the UK, we use a different sign, we use dot 5, dots 2 5, and the number. Either way, you can jump to a new print page. But bear in mind that a section that you're looking for may not always start at the very top of the page, so you might have some reading still to go. Also bear in mind that some automated systems in particular may not use those standard conventions, the lines of dots 3 6, etc. They might for example, put new page numbers just in square brackets. Lists, you could search for a bullet point, dots 4 5 6 dots 2 5 6, or even a number preceded by some spaces perhaps.

Tables, Now there's an interesting one. Some tables might have a transcriber note at the top, describing the column headings. So you could search for the sign for a transcriber note, which varies depending on your braille code. It's not an exact science, any of this. But you can try these tricks, and see which work for you. You could look for any old heading just by typing a load of spaces and a dot 6, most headings will start with a capital. So that might well work. One I like, you could search for the number of a hymn in a hymn book. Assuming each hymn starts with a centred number, you could search for several spaces and then the number of the hymn. Recommend at least four spaces to avoid finding things which are just a number or a capital sign at the beginning of an ordinary paragraph, or a side heading. Important to remember that the find command normally starts looking from your current position. So if you're in chapter 7, and you want to find the beginning of chapter 4, and you're looking forward from 7 you're not going to find it. So you have to go to the top of the file first, if you're going backwards, or indeed there might be a command to search backwards.

Now as another interesting trick, some braille displays might have Book Notes, sorry bookmarks, that you can use. And that's particularly useful for example, when you're reading footnotes. So you reach the footnote reference, you set a bookmark where you are, you search for the section called footnotes if there is one, and then you look for the footnote number. You read the footnote text, You go back to your original bookmark, and you can continue reading just where you left off. Footnotes might be indicated by a superscript, or an asterisk number. There are several different ways. Might all sound daunting all of this, and yes, there are quite a number of tips and tricks that you can try, and sometimes it requires a bit of patience.

What about the future? Well, there's a new project, it's called the ebraille project. It's under the auspices of the American Printing House, under the DAISY Consortium. And it aims to try and hopefully fix some of the limitations of BRF files, like all these interesting tricks you have to use to navigate. There are representatives from braille organizations all around the world. And meetings are happening very regularly, and it's really interesting to see how things are developing.

So what are some of the advantages of ebraille files? I've picked out a few, I'm sure there are others. So in no particular order, the first one is tactile graphics. Currently, if you're producing a book the tactile graphics have to be produced completely separately. And then you have to, in the production process, include those tactile graphics in the right places, between the right pages, and it leads to more complex production, etc. It's hoped that the ebraille file will be able to contain the tactile graphics, just as you can insert a picture into, say, a Word document or a PDF file, or a webpage. So hopefully, we’ll be able to include tactile graphics in an ebraille file as well. Now for those braille displays which cannot display graphics, we should also be able to have alt text, just like we would in a Word document or a webpage.

Some of you may have been to the CSUN exhibition earlier this year, and you might have seen the Monarch device being developed by Humanware. And it's a device able to show both braille text and braille graphics on one surface. We eagerly await to hear of future developments.

Now the next one I'm going to talk about, I call it reflow. So assume you have a BRF file, and it was originally written for a line length of 40 characters which is typical for hardcopy braille, particularly in the States and Canada I understand. Now, this may or may not be an issue on your particular braille display, but assume your braille display’s only got 32 cells, not the full 40. Or maybe it only has 20 cells, not the full 40. What happens? Sometimes you get what I call long line short line syndrome. Sounds like a horrible medical condition, but actually, it means you get one long line and then one little tiny bit left over. And it's very uncomfortable to read, and it wastes a lot of space if you try to emboss it. Now I've actually written a couple of sentences here. Actually, it's less than a sentence, it's a few lines. And I'm going to try and read it, and I'm going to say when I'm pressing the Advance button on my braille display.

It was the right one, ah, try again. It was the White Rabbit, trotting, new line, slowly, new line, back again, and looking anxiously about as it, new line, went, new line, as if it had lost something. And she heard it, new line, muttering, new line, to itself.

You can tell it was very irregular to read that, and you really can't get into a nice braille reading rhythm when you get this long line short line problem. Now ebraille hopes to be able to let the braille display reflow the text to the available space. So even if you have a whopping 80 cell braille display, you'll be able to use all available cells for the text, for ordinary text. Now of course there are cases where You do want a particular layout, and hopefully that will be accommodated as well.

**James Bowden** 30:08

Now, what about internationalization? We've talked about the USA computer code as the basis for BRF files, and that's the code used in most English speaking countries. But around the world there are lots of other braille codes. And the problem is the letters tend to be the same, but all the other signs will vary. So if for example I got a piece of braille music from Germany, and tried to read it on my English braille display, all the letters would be the same, but all the other signs would be completely different, and the whole thing becomes rather unreadable very very quickly. Just to give you an example, the % sign, in the US encoding, is dots 1 4 6 or sh sign. If I was in France, % would represent dots 3 4 6 8. And in Germany, it would be all 6 dots. So, you know, if you had a file from one of these other places, you'll soon find incorrect dots. And you think, I can't read this.

I wrote the phrase, on account of the weather, in grade 2 braille. And I put it in a different braille table, I got the following:

Dot 2 o n space a, sh sign, dot 3 t, lower h, dot 5, w c h dot 5 r, th sign.

It makes no sense at all, you really have to have the right tables. And that is a source of big frustration, particularly in countries where they don't use English. Now, ebraille hopes to solve this one by having a single standard encoding for braille dots, and it's proposed to use the Unicode braille patterns.

And the last one that I'm going to talk about, navigation. We've talked earlier about all those wonderful tricks that you might need with the BRF file. ebraille hopes to include information about what kind of thing each bit of text is. So, this bit of text, that's a paragraph. This bit of text here, that's a heading. This here, that's a table. And then, the idea is hopefully we might be able to use something a bit similar to the quick navigation commands that we've become used to with screen readers. So hopefully you might press a button and go straight to the next heading. Or press another button and go, oh I don't know, straight to a contents page, or straight to the next table, etc. ebraille files can also contain links. So let's assume you were in a contents page, you could make all the different items in that contents page into links, click a button, and instead of having to manually find chapter five, and then press enter, you could just click one button, and you go straight to chapter five, because it's a link. Similarly, for footnotes, instead of having to find the footnote section and find the number, you can just press the button on the footnote, and go straight there. When you've read it, press a back button, a bit like you might do in a web browser, and you're back exactly where you started.

Now there's much much more still to do, But hopefully these will offer some very exciting possibilities. The vital thing to make this work is that equipment manufacturers, translation software houses, and braille production agencies all support the new standard when it's ready. We're currently at the technical design stage, and if you like things like acronyms and lots of interesting tags and symbols, that's the place to be. If you want to find out more about ebraille, you can go to the DAISY website, that's www.daisy.org, look for projects, and then braille file formats. And there's all sorts of information about the project, including how to find out more and how to get involved.

Now that's all I want to say, but I'm sure there are lots of questions. Thank you.

**Daphne Hitchcock** 34:55

Yes. Wonderful, James. Thank you. You've given us lots to go on. We'll have just a very short period of time for questions. Please raise your hand and we will go to them. Thank you, James.

**Anthony Tibbs** 35:12

And if anybody doesn’t know, on the computer, it'll be alt y or Command Y, and on the phone \*9 will raise your hand.

**Anthony Tibbs** 35:29

Oh, there we go. Debbie Brown.

**Natalie Martiniello** 35:45

So, Debbie, you might be muted. You might have to unmute with Alt A or Command A if it's a Mac.

**Debbie Brown** 35:51

Okay. Am I unmuted now? Yes. All right, there we go. Um, I'm a little worried about, you know, we have all this wonderful old braille that we've all done, and I'm sure there's going to be some way of translating, and some of them, some of it'll be a little rough, because you're guessing at formatting and all that. You know, and we've all used in the US we've used the ASCII table, and that's probably translatable. So how easy is it going to be to get our old braille into EBRF formats?

**James Bowden** 36:30

A really good question there, and I know it's something that APH has definitely been considering. As I said, we're still at the technical design stage, so I can't actually give you an answer on how easy it will be. But certainly it has been mentioned.

**Peg Mercer** 36:49

. Oh, thank you very much for this wonderful presentation. Just a quick question about the ebraille project. For the find navigation, finding things, would there also be the capacity for it to include like level, search by level or search by, I think you did say search by heading? Yeah, search by level and various things that you can do in a DAISY book?

**James Bowden** 37:20

So you're specifically referring to different heading levels, I guess?

**Peg Mercer** 37:24

Different heading levels, yeah. And because sometimes, a chapter may or may not be indicated by chapter 1 or whatever, it may just be a break. So sometimes, I think that’s shown as like level 1. You know, some of these DAISY books we have on our audio players have 2 or 3 different levels, right? Yeah. So I'm wondering if…

**James Bowden** 37:47

so ebraille is currently looking at 6 different levels of heading, and assuming that you have the quick navigation functionality on your braille reader or whatever, then hopefully, you'd be able to either jump to any level of heading, or a specific level. Just as you can with the quick navigation on your screen reader.

**Peg Mercer** 38:10

Oh, yeah. Okay. Thank you.

**Anthony Tibbs** 38:15

Any last questions for James? We have a question in the chat here. When is it appropriate or better to use 8 dot braille?

**James Bowden** 38:36

That's a really good question there. So traditionally, when we were in the land of standard English braille and English braille American edition, some of the signs simply did not exist in those codes that you need for computing. Now, the 8 dot braille was primarily devised for computing and programming specifically. So if I had a line of, for example, C code, you know,

if([i+j]|

it's complete gobbledygook in terms of language. But if you know the code, it makes perfect sense. The computer code was great for that kind of stuff, especially as there weren't those symbols in the previous literary codes. Now the distinction is a little bit harder, because there are specific signs. So it is kind of slightly personal preference nowadays. If you like the 1 to 1 mapping, if you like no contractions, then go for the 8 dot code if you like it. Otherwise, you can go for the 6 dot code. Personally I do use both, depending on what I'm reading.

**Anthony Tibbs** 39:52

Well, thank you very much, James. I don't see any other questions so we can wrap it up there. But I'd like to thank you on behalf of Braille Literacy Canada for being here and for sharing all this with everyone.