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| Cracking the Code |
| *UEB Implementation in a Braille Printing House* |
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**Cracking The Code**

**Abstract**

On January 6th 2016, an entire language system was recast—structures altered, letters removed, and rules reshaped. This date marked the United States’ implementation of Unified English Braille (UEB). This new system of braille coding has replaced English Braille American Edition (EBAE) in the United States, and has unified the braille system across the English-speaking world. Now that English braille has been standardized, readers will be able to share and enjoy a larger scope of literary resources.

As a high-volume braille printing house and member of the Braille Authority of North America (BANA), Clovernook Center for the Blind and Visually Impaired has closely followed UEB developments over the years. We were very aware of the fact that a change to the braille code would result in substantive changes to the work we produce. Thankfully, we were given ample time to prepare for these shifts in the braille code.

In this paper, we will outline the methods which were used to transition our EBAE-centric workforce to UEB—and how we handled the challenges that arose when working in one code, whilst training in another. The authors will elaborate on many necessary procedures—including the customization of in-house software, creation of instructive tactile graphics, the training of long-distance freelance transcribers and proofreaders, alterations made to educational programs, and other such changes. This paper will detail the methods with which a prominent braille printing house has embraced UEB—from initial preparations and impressions, to results of implementation. The authors will provide a printing house’s perspective of this fascinating juncture in braille’s storied history.

**Clovernook**

Clovernook has been serving patrons in the Cincinnati area since 1903, and the Clovernook Braille Printing House has been in operation since 1914. Braille production has evolved considerably over time. Today we are one of the largest global producers of braille—over 30 million pages are shipped from our doors to libraries and global consumers annually. Much of our work is on a contractual basis with the National Library Service (NLS), a division of the Library of Congress that provides accessible materials to their patrons. Clovernook also produces publications directly commissioned by publishers, as well as miscellaneous items such as menus and braille business cards. Publications we transcribe into braille range from magazines such as *Rolling Stone*, *ESPN*,and *National Geographic*, to bestselling novels such as *The Martian*, *Go Set a Watchman*, and *Gone Girl*. Every step of the printing process can be done in-house; we are able to transcribe, proof, emboss, press, and bind our braille products under one roof.

UEB has left its mark on nearly all aspects of Clovernook’s printing house operations. Amongst the inherently hectic work environment that accompanies strict printing deadlines, Clovernook has had to retrain its entire workforce. To further complicate matters, Clovernook continued to work with EBAE throughout this training, and did so for several weeks after the January 6th implementation date. But before we embark on a discussion of UEB’s impact on our operations, it is necessary to understand our print-to-braille process.

1. We receive the book or magazine in its original print form. The spine is removed, the pages are fed into a scanner, and these images are collected in a program. A pre-transcription specialist then goes through each individual page, selecting the text that is relevant to our transcription. Features such as advertisements and photo captions are ignored. When this has been completed, reading software is utilized which translates the selected print into a raw unformatted text document.
2. This text document is given to a transcriber who, using Duxbury translation software, shapes it into braille-appropriate formatting. The transcriber utilizes the ICEB rulebook and contract specifications as references during this process.
3. These transcriptions are embossed onto paper and passed over to our proofreading teams, which consist of braille proofreaders paired with print copyholders. They read through the entire publication and compare the braille against the print—making sure the text is identical, and that formatting and contraction use is consistent with braille rules and specifications. Any errors or discrepancies are logged and turned in to our transcribers, who make corrections to the file.
4. The file is then run through Quickpaw, an in-house program that highlights common errors and formatting mistakes, and organizes symbols for special symbol pages.
5. The braille file is then proofed and corrected a second time. Once corrected, the file is embossed onto zinc using Plate Embossing Devices (PEDs).
6. Impressions of the plates are made and compared to master files to ensure that no dots have been erroneously added or subtracted during the embossing process.
7. After this stage, the plates are taken out to our printing presses, pressed into sets, collated in our bindery, and shipped out to libraries and consumers.

When engineering a UEB implementation plan, we quickly became aware that every step of the transcription process would be affected by the code change.

**Proofreader & Transcriber Training**

The most pressing requirement was the training of our employees, many of whom have been EBAE readers for decades, in the UEB code. We believed it necessary that our proofreaders and transcribers gain their UEB proficiency—a professional certification administered by the Library of Congress. This process was aided by having a certified UEB instructor on staff, who nearly a year before implementation utilized such educational resources as the *ABC's of UEB, UEB Reader,* and the *Unified English Braille Manual New Zealand Edition.* The use of these materials allowed our employees to begin grasping key concepts well in advance of the switchover.But when the National Federation of the Blind (NFB) published the *Instruction Manual for Braille Transcribing 2015 UEB Edition,* this was adopted as our ultimate source of study and reference.

Early on we decided to standardize our tutoring methods so that all of our employees would experience the same training process. Under our instructor’s guidance, with assistance from IT staff, we created a Braille Technology Lab so that braille reading employees could work on their educational exercises digitally. We utilized a Freedom Scientific braille display and QWERTY keyboard as input devices, which were paired with JAWS screen-reader capability and Perky Duck braille entry software. This system’s use of electronic file preparation provided us with several benefits over manual braille writing. Editing time was vastly decreased as students could now simply backspace when fixing errors rather than having to start from scratch when making a mistake on a Perkins Brailler. Additionally, through using the Tech Lab, our students improved their proficiencies in word processing and file management—allowing them to bolster their skill sets.

Utilizing digital input training was also extended to our freelance transcribers and proofreaders, who assist us on an as-needed basis. These individuals are spread out across the United States, and we wanted to extend to them the same UEB training opportunities as our full-time employees to ensure that they would be up-to-date on our production formats and coding. For our long distance learners, email was the main method of correspondence, with the occasional teleconference to resolve problem areas. Students submitted their exercises digitally, and were sent back graded results. Exercise feedback was detailed, with UEB reference citations and instructor input enclosed in parentheses for each error listing. As a general standard, complete re-submission was suggested if the exercise in question contained ten or more errors.

As our proofreaders became more confident with their UEB skills, we introduced the concept of “shadowing.” This process entailed several proofreaders reading a sample of UEB material together as a group, in which they would assist each other in identifying errors and familiarize themselves with the aspects of UEB that they would come across in a typical publication. This exposure to UEB text prior to implementation was a valuable educational supplement and helped our proofreaders relate to their UEB coursework through the lens of their typical professional responsibilities.

To individualize the training process we began performing “spot checks.” The purpose of the spot check process was to strengthen a student’s areas of weakness with supplementary exercises. Identifying a student’s lesser strengths began with identifying areas in their submitted lessons in which they struggled, which we defined as “concept deficiencies.” To create a spot check, a student’s concept deficiencies were extrapolated from their performance on regular exercises. These concepts were then assimilated into an original series of sentences, customized to focus on the key areas that needed strengthening. For instance, if a student was having problems with the new rules concerning omissions, a spot check might run as follows:

*Transcribe* the following sentences or phrases into UEB code.

1. Fill in the missing letters: th \_ \_ r.

2. Which’ll it be, this or \_\_\_\_.

3. Mr. G \_\_ is an awesome Biology teacher.

4. We will go to the \_\_\_\_ t’night.

These concept exercises would continue until the UEB instructor was satisfied that enough progress had been made, and that the concept had been grasped.

Some areas demanded different tactics. UEB introduced new braille characters for individual modified letters, as opposed to EBAE’s singular accent mark identifying an accented letter. To assist our proofreading teams, our braille instructor printed out Section 4.2 [Modifiers] of *Rules of Unified English Braille Second Edition 2013* for copyholders, and created a tactile graphic representation of this section for our proofreaders. These resources contained a complete listing of all modifier symbols, and assisted our teams in their identification of correct braille symbol use during the proofing process.

**EBAE & UEB Overlap**

Our approach to ensuring that our employees were UEB-proficient before implementation day required a certain degree of delicacy. Our contracts with the National Library Service required that any materials we received on or after January 6th be transcribed into UEB. Anything received before this date would fall under EBAE transcription standards. With this in mind, we anticipated that there would be a period of time where codes would overlap—that we would be working on both EBAE and UEB materials at the same time. How would we be able to work on both concurrently without confusion?

The answer to this question was a division of labor; on implementation day we divided our workforce. We created a sliding scale of UEB program installation, which increased as the level of EBAE work began to wane. We separated our proofreaders into EBAE and UEB teams, strictly dividing proofing materials between them based on braille code. Much like the proofreaders, our transcribers transitioned from EBAE to UEB as the proportions of production work between the codes began to widen. By the beginning of February, all of our transcribers and proofreading teams were working solely with the new UEB code.

**UEB Meetings & Study Time**

To further assist our transition, we began holding monthly UEB meetings. Our meetings became more frequent as the implementation date approached, and by the end of 2015 they were being held every week. These sessions were wholly dedicated to UEB implementation, and allowed us to share information as a group without the risk of overlooking an employee. This time was used to discuss and disseminate code revision updates, and to troubleshoot student and transcriber problem areas. The following is a typical UEB meeting agenda:

***5-26-15 Agenda:***

* *Saul brought updated pages for lessons 5, 6 & 7 to distribute.*
* *UEB Digital: Saul reported that our tech is back to full functionality & outlined the goal of the program. Sam created a workstation schedule, and is working on Perkins OBR functionality to enable progress both manually and digitally.*
* *Rudaki: Sam updated the group on current progress regarding our Quickpaw replacement.*
* *UEB Spot-checks: these were discussed, and it was generally agreed that it will be a useful tool to have people proof error-ridden UEB braille, to identify areas of relative weakness to strengthen with study.*
* *Copyholder Cheat Sheet*
* *Translate order of punctuation marks and composition signs into braille for proofreader reference.*
* *Tactile accent cheat sheet concept discussed.*
* *Lisa noted that she is keeping up to date with UEB updates via an iPhone application & also reminded the group that print and .brf changes to the UEB manuals often differ.*

These UEB meetings were a crucial supplement to our intensive study sessions. One of the biggest challenges in educating our employees in UEB code was finding study time during their regular working hours. Due to the weekly influx of publication projects, there was a constant flow of production work. We managed each employee’s schedule flexibly to allow them to study UEB without negatively impacting their regular responsibilities. The scheduling plan we ended up with guaranteed each employee at least one shift per week to study UEB, under the tutelage of our UEB instructor. Additional shifts were scheduled when available, or when an individual required additional sessions. Having dedicated shifts to UEB study minimized confusion between the codes. Throughout this period, we posted an open offer of overtime hours for UEB study during the work week or on the weekends. All of this was to ensure that our employees had all the time they needed to become UEB proficient, without jeopardizing the efficiency of their day-to-day roles.

**Software and Computing Evaluation**

Another major aspect of our UEB preparation was the consideration of our software needs relating to UEB. It was apparent that we would have to adjust our production software to fit the desired UEB formats. But it wouldn’t be as simple as purchasing the new Duxbury or tweaking Quickpaw. We realized we would have to completely evaluate any new Duxbury installation—replicating our NLS specs in the program, and making adjustments to Duxbury’s default settings. Quickpaw, on the other hand, was rigidly coded in reference to EBAE; no in-program alterations would make it functional with UEB.

Before we installed the new versions of Duxbury on our various workstations, we felt it important to evaluate the program beforehand to ensure that templates could be implemented smoothly, and to troubleshoot any potential deviations from our NLS specifications or the ICEB Rulebook. This evaluation was performed by one of our senior transcribers at a specialized testing station. Using examples from each section of the ICEB rulebook, we ran every key concept through the Duxbury translator, and made adjustments when necessary.

Quickpaw, as mentioned earlier, is an in-house program developed to evaluate special symbol usage and to highlight various common errors. With the advent of UEB, it was immediately apparent that this program would not function with the new codes. With the removal of certain contractions, and the addition of new characters, we realized that we would have to completely replace this step of our process with a new piece of bespoke software.

We worked with a programmer to design and upgrade Quickpaw into a new program, Rudaki, which sorts and collects codes according to UEB formats and NLS specifications. Rudaki was programmed with a new navigational system to ensure that our features would be as intuitively accessible as possible. Keystrokes were mapped to functions in the new program, making sure that there were no cross-compatibility issues with JAWS keyboard input. During this process, it was vital that we get user feedback to ensure intuitive use so that by January 6th, all of our users would be comfortable using the new software. Rudaki testing continues, but all signs point to successful implementation and, with the use of updated features, improved quality control.

**Other Aspects Affected**

Changes in our methods were not just restricted to our transcription processes. Bindery and Pressroom associates, who use page numbers as a reference to collate materials, were educated on the changes to Roman numeral representation, and the addition of “t-numbered” transcriber pages on certain NLS contracts.

The scanning process was also affected. Pre-transcription specialists were instructed to insert an introductory paragraph into their raw text documents:

“Beginning January 2016, Unified English Braille (UEB) is being implemented in the United States. NLS will produce all books and magazines in this code. UEB eliminates nine contractions, changes some spacing rules, and adopts some new symbols. For more information or to receive a reference sheet with frequently used new UEB symbols, contact your local network library.”

This paragraph has now become a standard feature of our NLS publications, inserted after the contents page to inform the recipient of the new UEB code.

**Looking Ahead**

January 6th came and went, and Clovernook is now a fully integrated UEB printing house. Through the past year, contacts at the NLS and BANA were extremely helpful in facilitating certain aspects of the switchover, and we owe them our thanks. This is an historic juncture in braille’s history, hopefully leading to an increase in literary and educational exchanges across borders. It is an exciting time to be working in the braille industry, and Clovernook has relished the opportunity to be at the forefront of providing quality UEB materials. To say that the past year has been an easy one would be a gross mischaracterization. It has been a challenge—but one worth standing up to, for the cause is vital. Braille is a crucial factor in the fight for equal accessibility, and the unification of English braille will make our communities that much stronger. We hope that this paper has not only proved of interest, but that the techniques described may be of use in other fields or printing facilities—for, in the words of Helen Keller, “alone we can do so little; together we can do so much.”