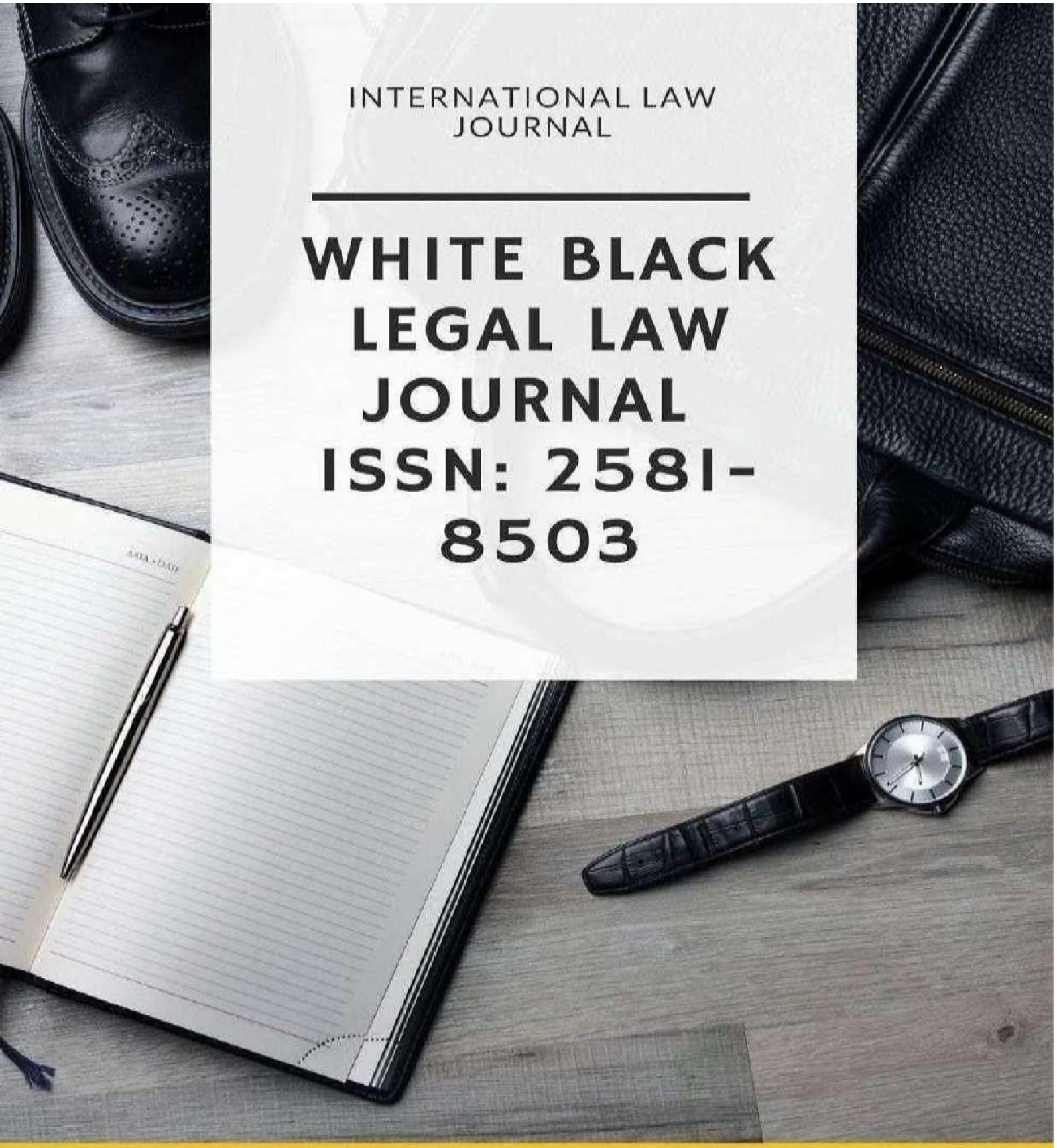

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ISSN: 2581-8503

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DECODING BRAILLE: A CRITICAL ANALYSIS OF THE BRAILLE CODE & APPLICATION OF BRAILLE IN THE RPWD ACT 2016

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Text or literary Braille has two forms: non-contracted or alphabetic Braille and contracted Braille, for saving space Braille. Alphabetic Braille, formerly called Grade One, writes out each letter and word exactly as it is spelled out in print. However the contracted Braille is a notation which represents an assumed meaning. For example

We will consider the following sentence, to be translated in to Braille in (UNCONTRACTED BRAILLE)

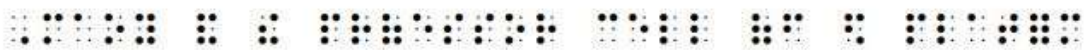
Mary and the Professor fell off the platform

In Standard Alphabet Braille, this sentence is as follows

Mary and the professor fell off the platform

(Mary and the professor fell off the platform)

In Contracted Braille this is as follows



(Mary "**and**" "**the**" pr "**of**"essor fell "**of**"f "**the**" plat "**for**"m

This is because, the Contracted Braille provides the following notations

 = And

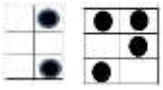
 = The

 = of

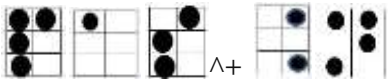
 = For

And many more contractions such as “Partial and Whole word contractions

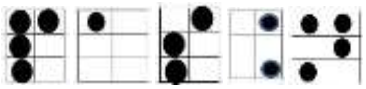
The term “sion” is reprented through Multicell Representation

“sion” =  which is a combination of the First Cell which represents [4 6] with the next cell representation for the ;letter [N].

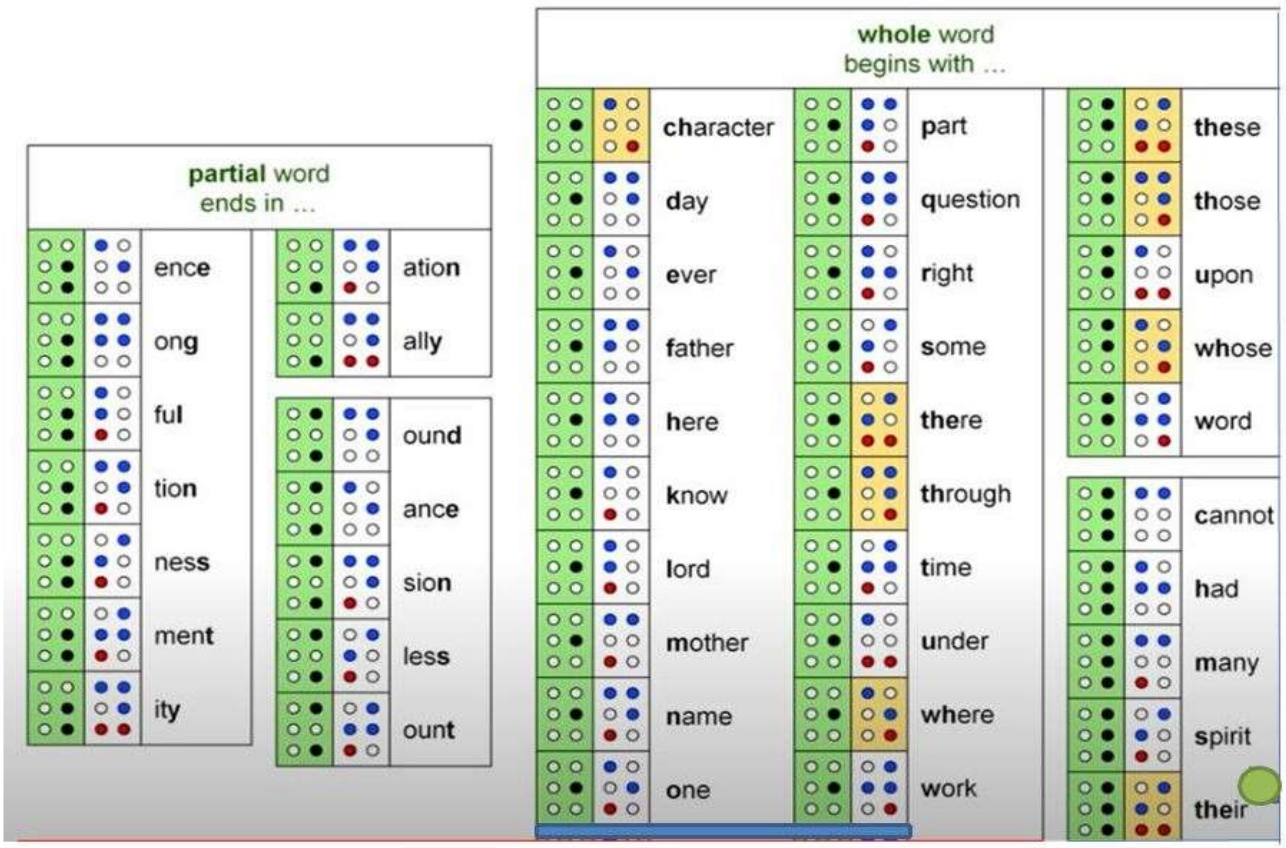
Then the word Passion becomes

pas+(**sion**) = 

gets assembled to be combined to be represented as



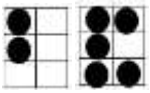
In this manner there are multiple combinations which uses numerical representations of [4 6], [5 6] & [6] used for partial word contractions and numerical representations of [5] [4 5] & 4 5 6] are used for whole word combinations

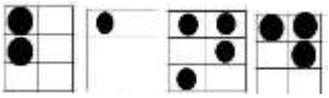


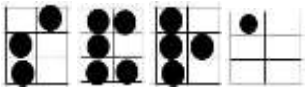
We will come to the means by which the words are represented in detail, at a later part of this work.

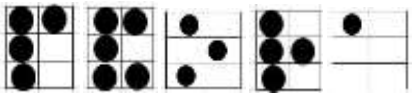
Contracted Braille allocates an abbreviated representation for a group of letters. As these letters are used as group signs, wherever these signs are used tha represents a combination of these notations corresponding to that word.

Then, the word

Band becomes B + "**and**". 

This is instead of Band in the Alphabet 

Sandra becomes S +"**and**"+ra. 

Pandora becomes P "and"ora 

These are not only **group signs** allocated in the Contracted Braille.

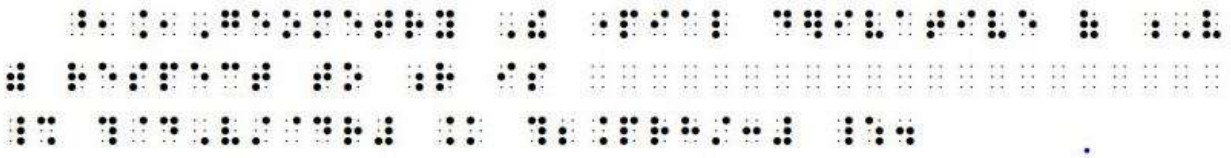
There are number signs 

There are Mathematical Equations such as a Geometrical Equation involving Volume & Radius

{Citation}

("https://www.brailleauthority.org/sites/default/files/2024-02/Nemeth_2022.pdf," n.d.)

The partial derivative of V with respect to r is $\frac{\partial V}{\partial r} = \frac{2\pi rh}{3}$.



There are Chemical Formula Derived in Braille such as

1) $Fe^{2+} + 2e^- \rightarrow Fe$

,fe^2+"+2e^- $o ,fe (superscript minus unnumbered)

2) $Br_2 + 2e^- \rightarrow 2Br^-$

,br2+2e^- $o #2,Br^-(unnumbered, single superscripts)

3) $2Al \rightarrow 2Al^{+++} + 6\ominus$

#2, al $o #2,al^3+"+6$c_$-](3 plus signs in a row)

The Equations for Braille Professsionals states that

Braille readers need to understand the structures of an equationto solve it correctly. This requires tactile exploration, where the build up and overview b moving their fingertips from left to right over the Braille display , listening to the equation spoken aloud first can help gain initial understanding of the structure.

With such wide used effective Braille applications in operation throughout the English (and of course other languages) speaking world, India being a Commonwealth Country, with one third of the Blind Population of the world, and with its 1,300,000 people (10% of the population) in position to Read, write and Communicate in English, has not yet adopted the UEB (United English Braille). India is following a system known as Bharat Braille, which apparently accommodates most of the Indian languages, and it is this usage, that this author is critically examining in this paper.

This effort is a trial, to verify , if there is any WRONG , in the formation of the alphabets of "INDIAN BRAILLE", or in the "FRENCH BRAILLE" itself, which was invented by Louis Braille, or in the consequential 'ENGLISG BRAILLE' , and if, such wrongs exist, whether such can be rectified, so that there can be an appropriate utilization of Braille Code, in a logical, scientific manner, which could avoid, the confusions in the usage of the Braille System, in a UNIVERSAL manner.

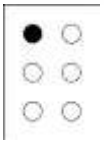
It is to an advanced reader of Braille, who would give the general meaning of what is experienced through her tactile perceptions, this document refers to.

To get an understanding of the matter in discussion, by spending less time and avoiding the search of data through a larger space of Braille notations, which the CONTRACTED BRAILLE has brought in to practice, it must be stated that the non application of logic has resulted in a wrong formation of the BRAILLE alphabet.

By the end of this paper we will additionally discuss, what is necessarily needed in a Law statute (embossed in Braille), to give effect to what could be perceived for a blind (or even a sighted persons) to get to understand, what is meant in the statute, and how quick that information may be inferred for a complete understanding, when the visual faculties do not function, and when the perception is limited to tactile and auditory perceptions. Author considers making this experiment in deciphering the Indian Act (Law) , created in 2016, by the Indian Parliament, titled Rights of Persons with Disabilties Act 2016.

All About Braille

What Is Braille?



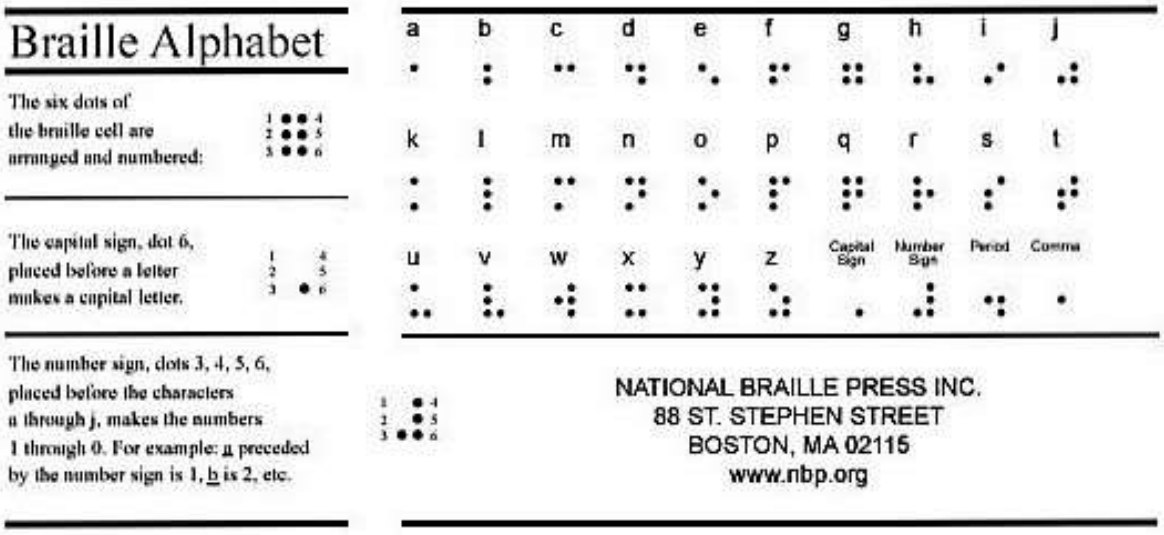
Braille letter "a"

Braille is a tactile reading system invented in France in the mid-1800s and named for its inventor, Louis Braille.

Braille enables children who cannot read print, to become literate and helps adults who lose the ability to read due to blindness or low vision in order to continue enjoying reading books, newspapers, and magazines.

The Braille alphabet is based upon a "cell" composed of 6 dots, arranged in two columns of 3 dots each. Each Braille letter of the alphabet or other symbol, such as a comma, is formed using one or more of the dots in the Braille cell. (The letter "a" is as pictured above.)

The following chart provides a good example of the design of the Braille alphabet.



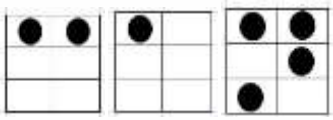
Types of Braille

Braille has codes for writing text, music notations, and even technical material for Mathematics and Science. Text or literary Braille has two forms: non-contracted or alphabetic Braille and contracted Braille for saving space Braille.

- **Alphabetic Braille**, formerly called Grade One, writes out each letter and word exactly as it is spelled out in regular print. For example, in Alphabetic Braille the word "can"

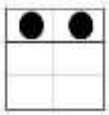
is written using three separate Braille cells—one cell for each of the three letters in the word "can."

It would resemble as follows



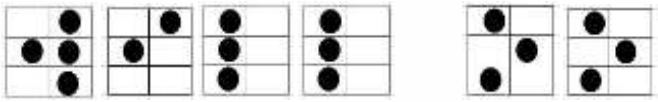
Suppose you're interested primarily in writing words for shopping purposes, keeping telephone numbers, identifying elevator buttons and room numbers, or writing labels or brief notes. In that case, Alphabetic Braille may meet your needs.

- **Literary Braille**, formerly called Grade Two, is called "contracted" Braille. For example, in Literary (or contracted) Braille, the word "can" is written in a highly condensed or contracted form, using only one Braille cell to represent the entire word as follows.

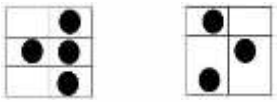


(Contracted form of Braille representing 'CAN" Similarly,

"WILL GO", which is represented in the alphabetic Braille as,



Will be represented in the Contracted Braille as follows



This contracted Braille terminology may be considered as a shortand expressions with the Alphabetical Braille characters

Contracted Braille Provides for combinations of letters in an altogether notation

For example

"….. ing"is expressed in Contracted Braille as

"…..tion is expressed Contracted Braille as

Most books and magazines are written in Literary Braille because it requires much less space than Alphabetic Braille. If you want to read novels, magazines, or newspapers in Braille, it is recommended that you learn to read and write Literary Braille.

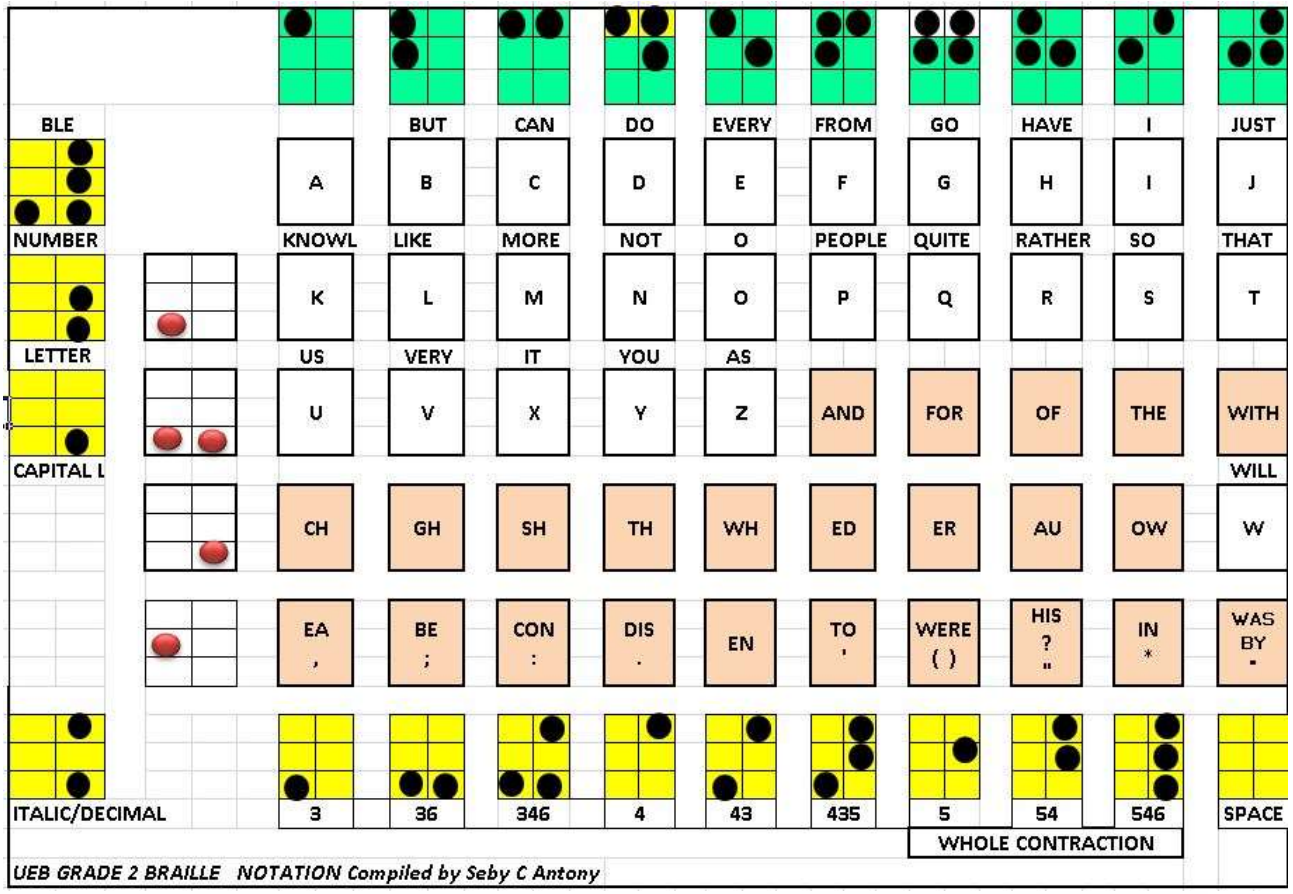
Unified English Braille (UEB)

On January 4, 2016, Louis Braille's birthday, Unified English Braille (UEB) was officially

implemented in the United States, replacing English Braille American Edition (EBAE).

Unified English Braille is a code developed by the International Council on English Braille (ICEB) to combine several existing Braille codes into one unified code for the English-speaking world. The proliferation of different Braille codes has long been recognized as a problem, and the adoption of UEB simplifies the issue by creating a standard code for Braille in the United States, Canada, the United Kingdom, Australia, New Zealand, Ireland, South Africa, Nigeria, and Singapore.

This author has complied a collection of the Contracted Braille (Grade 2) Notations, codified in to a single page as given below



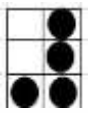
The method followed in this chart, is by following the UEB Rules and without altering any of the existing patterns in use such as

1) Contractions will not effect the pronunciation, without overlapping syllables.
2) Words, AND, FOR, OF, THE, and WITH; shall have preference over other words which are contracted.
3) Preference shall be given to word formations which saves the space more.
4) Words A, AND, FOR, OF, THE, and WITH should be used without space.
5) Partial Contractions CON & DIS are to be used at the beginning of the words.

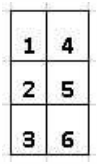
6) Partial Contractions EN,IN,CH,GH,SH,TH,WH,ED,ER OU,OW ST,and AR may be used anywhere in the word.
7) BLE, & ING should not be used to commence a word.

The Pattern used in the chart may be summarized as follows

1) 10 sets of cells as shown in the First Row of the chart, are not to be counted in the 64 Character UEB Format. [The 64 Cells are the white cells, the Yellow Cells and the Maroon Cells, altogether counting 64]. This Green cells are given in order for the reader to have an understanding that, when the proper selction and application is made, a desired cell should look like a green set cell with proper selection of Dots. This green Cells may be stansferred to the Cells beneath them, to read as ABCDEFGHIJ , exactly in the same order
2) The Cells in YELLOW are indicators. These YELLOW cell gives the Reader an indication as to what comes next

For Example when a Reader comes across a symbol  this may be considered as a Number sign,for a number which follows. At the same time it such a symbol is observed in continuation of a word, it may also assume the postion of the partial Contraction, ….." able", when used between words, without spacing.

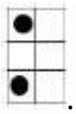
3) The purpose of the Reader must be to create a 6 cell group for all the blocks which are either in white or in Orange colored blocks . So to start with, the First cell in Green is  which stands for A.
4) The Cell which is lying just below the Green Cell A is going to be K.

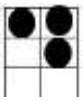
How this will happen is by adapting the instruction in the Cells which are given with RED Dots. Considering the prime numbers of the cells to be 

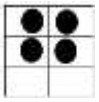
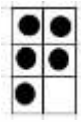
following the number pattern as given here, we may applysome rules now.

5) The A Cell, which had a representation of a DOT in Sub Cell 1 only.

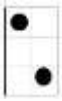
The Second Row Cells, all of them would be provided with a DOT in Sub Cell 3. This is what the RED DOT in the Corresponding ROW instructs. Then the Cell just beneath the Cell A

becomes a J  .

6) Similarly, the one Beneath the Letter D  Takes an addition of a RED dot in Sub Cell 3, and becomes an N 

A G which is like this  takes an additional RED Sub Cell 3, and becomes a Q which is  .

7) This way, al the Cells ina Corresponding ROW are Created by adding the RED Cells, as given in RED DOTS< to the Primary Pattern, given in GREEN cells.

8) Then, in the 4th ROW, The Predecessor A  will Change in to the First Cell CH  will take a RED Dot in the Sub Cell 6. Like wise, all the First 8 Letters, A B C D E F g H I J will add the corresponding RED Cell to it ad will become the Cells as given in the WHITE or MAROON Cells.

9) This procedure is followed for 50 Cells. About the last Row 10 Cells (Partial & Whole Contracting Indicators) and the remaining 4 Indicators Cells, one may refer to UEB Rules 2016.(UNIFIED ENGLISH BRAILLE Rules 2016). UEB also shall provie insights to partially Contracted words such as …TION, SION, …ATION, and how the Last Row Numbers represent these Partial Contracted words, and Wholly Contractd words (whichare apart from AND, FOR, OF THE & WITH) such as Such as words, TIME, UNDER, WORK; etc.

Problems with Braille

The main focus of this paper is in this Chapter, and the Author shall go in to details

Before we would consider to inspect a colour chart given in this chapter, let us assume that we are aware about the Decimal / Binary Conversions, and we would safely arrange any sequence as follows from our Decimal /Binary conversion

Decimal	Binary
32	10000

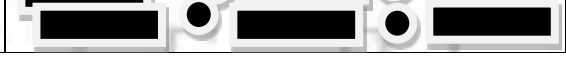
33	10001
34	10010
35	10011
36	10100
37	10101
38	10110

And so on, and we would safely conclude that there is a pattern in the given table.

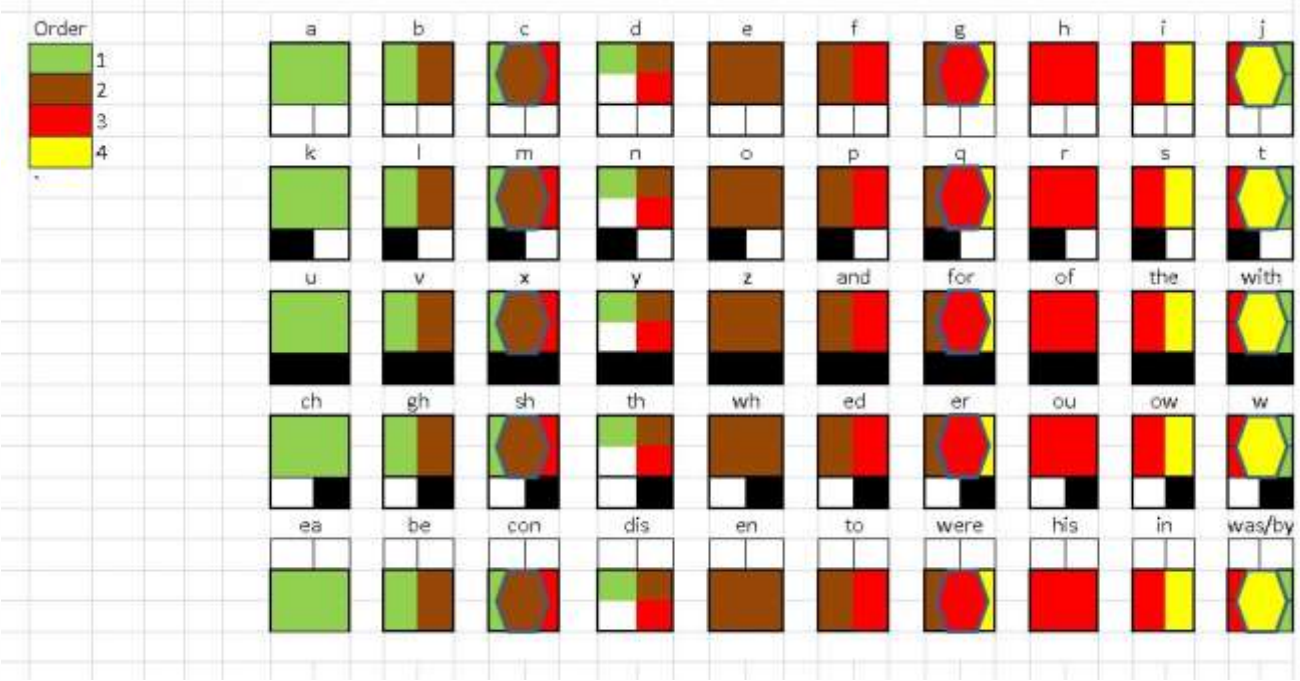
If the idea of the above notations were applied to generate the " Morse Code" (Samuel Morse,1791, Inventor of Telegraph)), the Morse Code which is as represented below,

A		Random
B		Random
C		Random
D		Random
E		Random
F		Random

would have been more effectively logically generated (logically) as follows

A		10000
B		10001
C		10010
D		10011
E		10100
F		10101

Now let us consider and inspect a Colour Chart

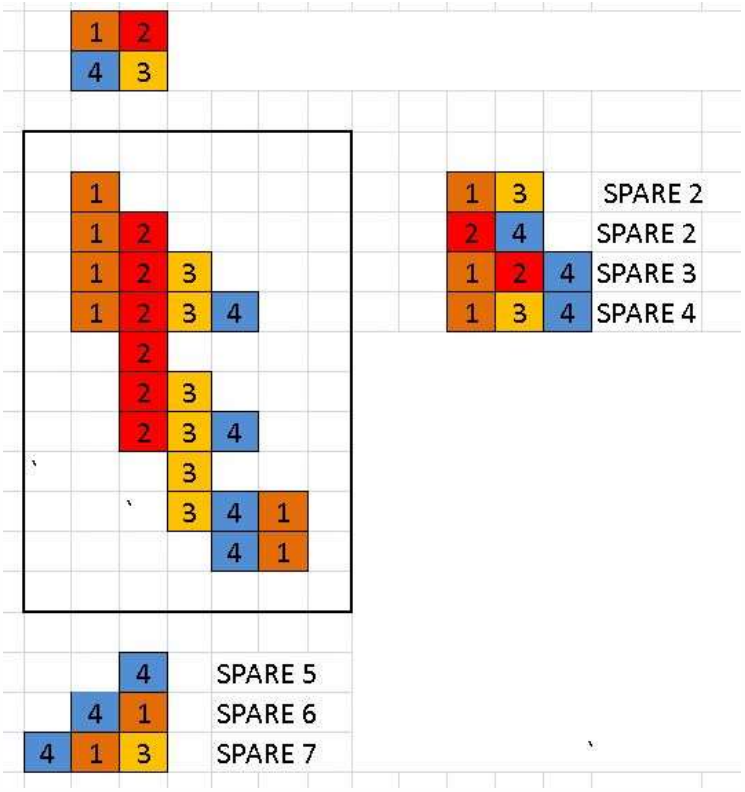


We will see that this shall be the most appropriate distribution of the given colours taking them in an alphabetical order, and in a clock wise distribution.

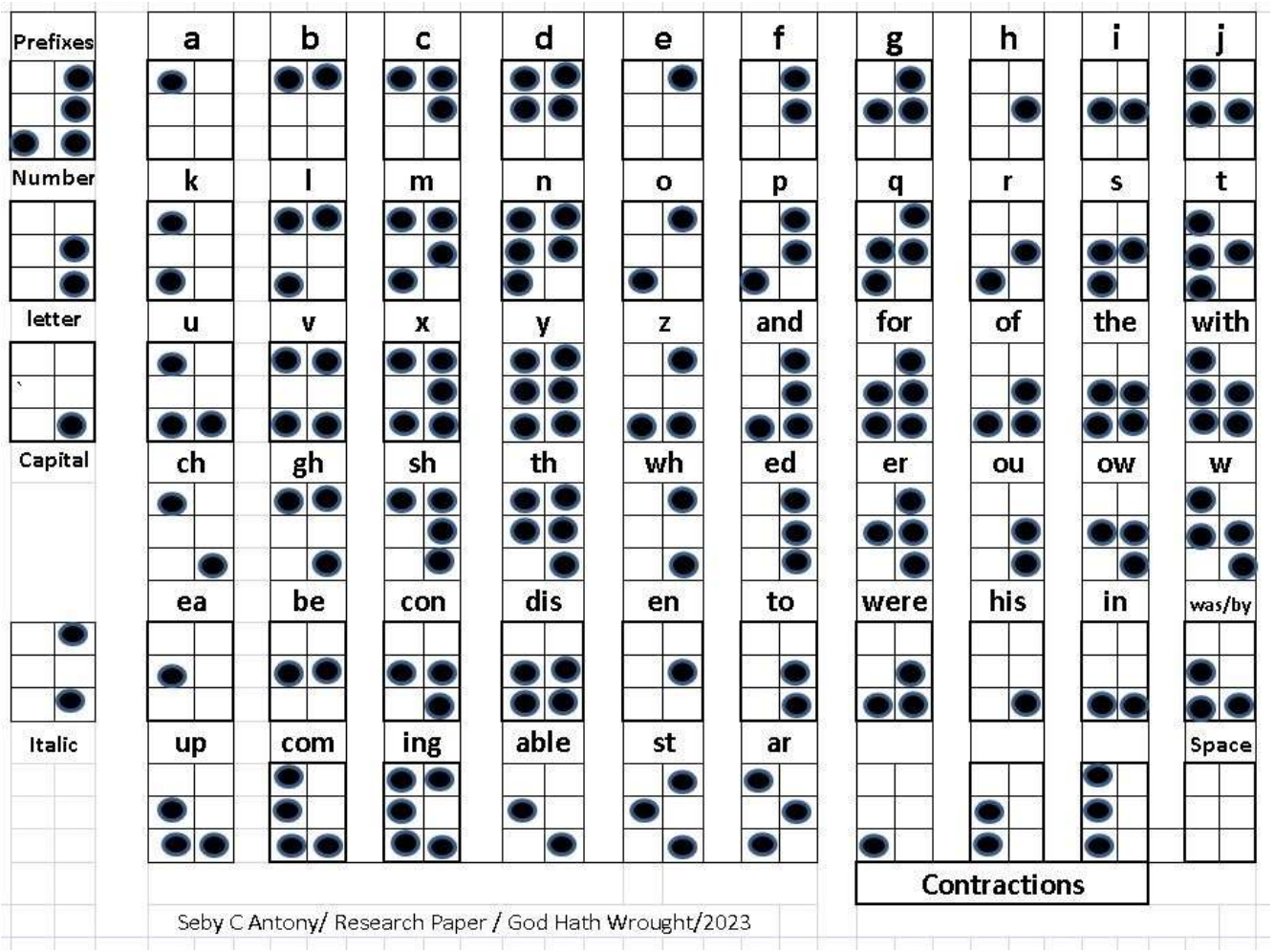
If the same distribution is applied on 4 (four) numbers which are given in a clock wise direction as given below

1	2
4	3

That will give us the following sequence, if the distribution is made in a clock wise direction



When this pattern is applied on a cell which has six chambers, it would give us a code as follows and this could have beenthe ideal BRAILLE code, which stands no chance of alterations nad adultrations



We will examine the scope of this chart in comparison with the Chart made by Louis Braille in 1850.

Details to follow

Learning Braille As an Adult

Learning Braille as an adult is similar to learning a new language. In addition to memorizing the dot configurations of the alphabet, numbers, punctuation, and contractions, you also need sufficient finger sensitivity to feel the dot combinations.

Do you enjoy reading for pleasure? Do you like taking educational courses? Do you have a job that requires reading? Are you interested in reading for religious or spiritual purposes? If so, you might enjoy the challenge of learning **Literary Braille**. Like any new skill, it can take a while to learn—perhaps a year or more of weekly lessons—but it can be worth investing time if you are an avid reader.

If one has a minimal need for extensive reading and writing, except for preparing shopping

lists, labeling items, and taking brief notes, you may find that **Alphabetic Braille** is sufficient to meet your daily reading and writing needs.

The choice always belong to the user. Learning and using Braille can be a wonderfully liberating experience if you want to learn it, need it, and are willing to invest sufficient learning time.

Finger Sensitivity

Good finger sensitivity is essential if you are thinking about learning Braille; it's equally important to memorize new information, have a good reason for using Braille, and have the patience to master a new reading method.

Finger sensitivity varies from person to person. Most adults (unless they have repeatedly injured their fingers in occupations that have caused calluses, burns, or other damage) usually have sufficient finger sensitivity to read Braille.

Some health conditions, such as diabetes, and some medications can cause neuropathy (loss of sensation) in the fingers, making it difficult to read Braille. Both over-the-counter and prescription drugs can cause neuropathy and/or a "tingling" sensation in the fingers.

Braille is often read with the pad of the index finger, but other fingers can be used and might be more sensitive than the index finger. Although some reading materials are also available in **"jumbo dot"** Braille (which can be helpful to Braille readers with reduced finger sensitivity from diabetes, for example), the range of books and magazines available in this format is limited.

Many of the newer Braille instructional books now begin with sensory exercises that can help you assess your ability to feel raised or embossed shapes and discriminate between different patterns of dots and sizes of symbols. You can also be tested for "finger sensitivity." Tests include the two-point touch test, the pressure anesthesia meter, and the Roughness Discrimination test. Healthcare professionals and vision rehabilitation professionals use these tests and others.

Family and Friends

As with learning anything new, having a family member or friend learning Braille with you is always a plus. By learning together, you can provide mutual moral support and make learning the Braille alphabet enjoyable. You can write notes, check each other's progress, and celebrate together when you gain new skills.

I'm not blind, but I can't see very well. Should I learn Braille?

The answer to this question depends upon your reasons for wanting to learn Braille, which is always a personal choice. Some people have usable vision, but their eyes tire easily or become irritated or uncomfortable when reading for extended periods.

Depending on their eye condition or conditions, other individuals can see better on some days than others. During those times, these individuals can use Braille as a backup or secondary system for reading or writing.

If you have usable vision, consider having a low vision examination conducted by an ophthalmologist or optometrist with a special low vision qualification. A low-vision examination can help you learn if low-vision optical devices, such as magnifiers or magnifying reading glasses, or non-optical devices, such as task lighting, absorptive lenses, or electronic video magnifiers, can help you read or write more comfortably and efficiently.

After a low-vision examination and exploring low-vision optical and non-optical devices, you may still feel you could benefit from learning Alphabetic or Literary Braille. Again, the decision is yours to make.

Resources for Braille

The following resources can help one to get started in learning more about Braille:

- Hadley Vision Resources | Free Resources For Living with Low Vision offers courses in Braille via correspondence and online education.
- Burns Braille Guide: A Quick Reference to Unified English Braille, Second Edition
- If children in your family want to learn Braille along with you, the American Printing House for the Blind's Braille Bug Site is a good (and fun) way to begin.
- One can also contact your state or local vision rehabilitation agency (Associations of Blind or Federations) and learn about the options studying Braille at home or in a rehabilitation center.

Rights of Persons with Disabilties Act 2016.

If you enjoy Braille and would like to go further, you can learn the complete Braille code which is known as contracted Braille. It was previously known as Grade 2 Braille.

But when a blind has to deal with a statutory expression, a non obstante clause, let's say an expression in an imagined statute, which states,

"not withstanding anything in the contrary, the application for bail shall not be accepted by the appropriate authority, unless the application is filed with a personal photo affixed on the Bail Application form"

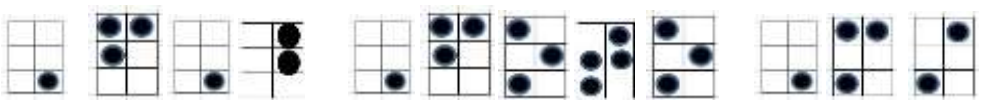
A print sentence with the words as given above, and what a Reader of Contracted Braille could or would infer from the Braille Script makes all the difference. Braille Grade 2 will not go for word by word replacement, verbatim, but would give a general impression, to the above statute, such as

"The Bail applicant must file an application with a Photo"

And, this may further be reduced to

"For Bail, Photo must"

Which may be expressed in Braille as



For B F o t o M

If

…"notwithstanding anything in the contrary, the application for bail shall not be accepted by the appropriate authority, unless the application is filed with a personal photo affixed on the Bail Application form"…

can be reduced to

For B Foto M

This is a good way of understanding, be it for a Blind, or for a sighted person and a whole lot of colonial nuances may be avoided in a statute.

And the contracted Braille equivalent shown below exhibits the difference between these two grades (one Verbatim and the other Sontracted) in the given illustration.

Contracted (Grade 2) Braille is used by more experienced Braille users. It uses the same letters, punctuation and numbers as uncontracted (Grade 1) Braille but adds a series of special signs to represent common words or groups of letters, a bit like a kind of shorthand.

For example, there are Braille contractions for words such as THE, FOR, WILL; and Braille contractions to represent common letter combinations such as ING, ER and SH. This means it's quicker to read and write than uncontracted Braille, and takes up less space.

Almost all new books and magazines are printed in contracted Braille.

If one person is enjoys learning Braille and wants to do a lot of reading and writing then it would be a good idea to learn contracted Braille.

However, everyone who has learned Braille will know uncontracted Braille, so that person won't need to learn contracted Braille script a second time, but how it is structured, to communicate with other Braille readers.

The investigation planned , is to explore the possibilities of setting up common notations of

many repeated structured language of the legal statute, to represent through a simple notation, such as replacing a "Non Obstante Clause" in its form (not in context) be represented by a notation, such as "[N" which would give the understanding to a Braille reader, that what she is going t encounter is a ""Non Obstante Clause", and if she knows , what a "Non Obstante Clause" is, she does not have to go through the entire statute , to get the imbedded information in the statute, so given.

Who should learn and use Contracted Braille?

Contracted Braille takes longer to learn than uncontracted Braille. Many people who learn uncontracted Braille go onto learn contracted Braille, so they can read all of the material available in Braille.

Books, magazines and other information tends to be produced in contracted Braille, by the western Countries, to cut down on size. Contracted Braille produces much less bulky books and magazines.

If a serious reader of this article is desirous of understanding why human beings make different opinion, under the given similar situations(for example a doctor finds a patient to be suffering from flue, while the other doctor finds the patient to be suffering from "fever" under the given similar situations) if the subject patient was subjected to be investigated on her ailment by a AI system, which would collect sample of blood or scan the skin DNA, to evaluate the bio Chemistry of the patient, will not make an error in defining the ailment. Because this AI system is programmed to read it's given task through a unique set of codes, exactly in the similar manner, as would be done by another similar AI machine. The problem with human beings is they are given the privileges of interpreting the information being given to them through a process known as 'INDIVIDUAL DISCRETION". And the "GRUNT NORM", prevailing among human beings, is one doctor is different from another doctor, so he can differ. But what when one Judge interprets the facts given is a given situation, by applying the given law to find the accused to be guilty, to pronounce a death sentence or any other sentence ,while the other Judge, by applying the same set of facts and law declares the accused to be free of guilt and may aquit him.

The hypothetical presumption is, if a set of facts and a given rule is applied through a system which is similar to the Braille system, as inputs, and the output of which is devoid of human intervention, all such output will be uniform, and there shall be no room for human error.

Braille (Contracted or un Contracted) and its Association in the interpretation of Legal Statutes and legal theory is the subject matter of this work which may be carried out under the guidance

of Expert researchers in a Reputed Law University In India.

Topics for Further consideration

1) Duxburry Software for Braille
2) What is a Legal Statute ?
3) How is a statute interpreted? [Ejusderm Generis, Nocitor A Soci]
4) What is understood from a statute, by a Sighted person?
5) What is understood from a statute by a Blind Person?
6) How is information from the Sensory Stimuli processed by the Brain?
7) Is the Visual Stimuli has advantage over the Auditory or Tactile stimuli?
8) How does a "NON OBSTANTE CLAUSE" leaves its impression, in the General understanding of Human Beings?
9) What are Negative Statements?
10) What is the minimal information required for the appropriate processing of Ideas?
11) How Braille could be used as a tool, to avoid lengthy expressions which have become an integral part of Legal Statutes?
12) Does the statutes made by English Language have any priority over statutes made in other languages?
13) Braille and Morse Code
14) "The Rights of Persons with Disabilities Act 2016 in Contracted Braille".

Conclusion

The Author is a Multiple Disabled Student Presently pursuing LLM studies in Government Law College rnakulam, under MG University (Mahatma Gandhi University Kottayam), and is very eager to continue with this research. The Author is in close touch with the Perkins School for the Blind, Water town, Massachusetts USA & Braillo Noway. If necessary support is made available from the concerned departments and authorities, be it the Government sector or otherwise, the Author will be gladly motivated to proceed further.

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