WYSIWYP and Other Alternative Notations

The deficiencies of traditional notation have been well-recognized and documented in modern times. In the last century there have been many proposals, implementations, and US Patents to redesign it. However, a universally accepted new standard has yet to be identified. What follows is a brief and incomplete summary of some of the notable contributions to the redesign “movement” and how WYSIWYP relates to them. It also differentiates between the goals of defining a new standard that satisfies the goals of professional musicians and musicologists and a new standard that makes it as easy as possible for beginners to learn to read music.

**Klavarskribo**

Probably the most successful alternative to date Klavar Music Notation, or Klavarskribo (Note 1), was invented in the 1930’s. It is a “piano roll” type approach with a vertical time line with lines and spaces mapping directly to the black and white keys of a keyboard. It also has a graphical representation of note duration. So it solves all of the major issues of traditional notation but is clearly aimed at keyboard instruments as evidenced by explicit left-hand right-hand notation. Since the 1970’s, selected pieces of church music for piano and organ have been produced for purchase. In recent years, an app has been under development that may make a wider range of sheet music available (however it remains in a beta phase). According to Wikipedia there are over 10,000 users of this approach worldwide. It is so different from traditional notation that the two have virtually nothing in common. Thus I believe learning to read traditional notation afterwards would be a total reset.

Like Klavarskribo, the very first design of WYSIWYP had a vertical timeline and a “track” for each of the twelve chromatic degrees. After trying to use this approach I found that it didn’t work as well as I expected. I think that my “Western” brain is used to reading left to right and also used to seeing horizontal axis timelines in general. So I abandoned the vertical timeline and explored horizontal ideas. The other visual and intuitive benefit of the horizontal timeline is that higher notes are higher on the vertical axis.

To date, Klavarskribo is the only alternative notation for which I can find an evaluation test (note 2) by subjects who cannot already read traditional music. The study was conducted with participants who had a wide range of experience reading music. The study focused on the ability of participants to accurately identify notes presented in both Klavarskribo and traditional notation as well as the amount of time needed to do so. The results showed that accuracy across the board was high for both systems and all participants. However, the time to identify notes among participants with less experience in reading music was lower with Klavarskribo. Thus, the visual presentation of Klavarskribo was easier to read by beginners than traditional notation. The study did not include an evaluation of the ability to read and interpret note duration.

**Dodeka**

The Dodeca system was started in the 1980s. It not only redesigns the notation but also the keyboard to match it. The keyboard is based on a polymorphic octave which is to say that instead of the traditional unequal seven white and five black keys, there are twelve equal sized keys and aligned in the same way. To differentiate, the keys are color coded to match the notation. It also uses a visual approach to note duration. The approach is based on a quarter note so that a note’s total duration is based on multiples or fractions of it. There are spaces in between the notes so the horizontal axis is not a totally proportional timeline.

Although this system also solves the basic issues with traditional notation, it is totally aimed at its own keyboard design. I cannot find how widely sold and used are the keyboards. There is also an app that supports this system on screen devices.

Like Dodeka, the WYSIWYP approach has a horizontal stripe of a length corresponding to the note duration. However, WYSIWYP length is based on the number of beats or fractions thereof of the note. In this approach, the concept of whole, half, and quarter notes is replaced with notes that are whole, half, and quarter beat notes. In addition, the WYSIWYP timeline is fully proportional so that four single-beat notes in a four beats per measure work would fill up the entire measure. Because of this and because of the explicit beat marks, it is clear how notes relate to each other across all staves. WYSIWYP also has a notehead at the beginning of the stripe which visually helps to emphasize the starting point of the note.

**The Music Notation Modernization Association**

From 1985 to 2007, the Music Notation Modernization Association (MNMA) was an international attempt to find a new standard to replace traditional notation. The MNMA conducted a research project to collect, screen, and evaluate alternative proposals from around the world. The evaluation of the finalists of the screening process was performed by trained musicians. In the end, no single proposal was universally accepted as the new standard.

The MNMA project screened all proposed alternative notations according to a set of eleven criteria initially and then later another six were added. Foremost, was requirement number 8 which is to have a “fully proportional pitch axis”, i.e., a vertical axis of the staff with positions for each of the twelve degrees of the chromatic scale. This results in a look that is referred to as "piano roll" strategies as they have a dedicated physical "track" for every key on the piano keyboard. An advantage to this approach is that the vertical distances between degrees correspond to their actual tonal differences. It makes it easier to see and analyze tonal relationships by accomplished musicians and musicologists.

The chromatic octave also solves the problem of having to have sharps and flats because all notes are explicit on the staff. As a result, there is no need for a key signature at the beginning of the work and no need for the musician to memorize it in order to play notes appropriately real-time. In addition, they also solve the problem of staves not being the same for every octave, that is, a note will always have the same relative position within an octave. However, when multiplied by multiple octaves per staff and multiple staves, the total array of lines and spaces can be difficult to read by a beginner.

MNMA requirements No. 10 and No. 11 suggest that the researchers recognized that the number of lines and the amount of vertical space required were important considerations in their evaluations:

* No. 10: "No more than five identical, successive, and equidistant staff lines are shown, so that staff lines can be quickly identified without counting lines."
* No. 11: "Both the lines and spaces of a staff are used as positions for notes on the pitch coordinate in order to economize on paper space and therefore on eye movement."

With respect to requirement number 5, “the notation is relatively simple so as to be practical for both children and adults”, I find that requirement number 8 to be in contradiction to it by definition. By requiring twelve positions to interpret, I believe it is not simple for beginners whether they are children or adults.

The following excerpt from the final evaluation report sums up the overall results of the MNMA (note 3).

“If the evaluators had been close to unanimous in their opinions of the best systems, interpreting the results would be straightforward. As it turned out, they were far from unanimous, meaning that one must examine the results carefully before drawing conclusions. If one must choose an existing system based on the test results, with none of the improvements suggested by the evaluators (and not allowing for future proposals), I see two candidates, depending on the criteria one uses.

Only one system was chosen as a final preferred system by two evaluators: LP #15, Parncutt 6-6 Tetragram. The fact that this system is a minor variant of LP#14, Brennink, which was chosen as a third evaluator’s final system, strengthens its position considerably. Taken together, Brennink’s system and Parncutt’s variation of it won three of the seven final “votes” by evaluators, which is a strong plurality. Unfortunately, these three evaluators were not wildly enthusiastic about the system. One rated it somewhat worse than traditional, another about the same, and the third somewhat better. This is not the kind of ringing endorsement that would convince the world at large to bother learning the system as an alternative to traditional notation, much less as a replacement for it.

Only one system among the final choices received an evaluation of “much better than traditional”: LP#6, Tom Reed’s Twinline. This is the kind of ringing endorsement one would hope for, but unfortunately it came from only one out of seven evaluators, far from a consensus. However, if one examines the overall numerical results instead of only looking at the final choices, the position of LP#6 does become somewhat stronger: it receives the highest numerical rating in all the analyses of the scores, higher than LP#15 (or LP#14). The final report will include all evaluators’ numerical responses to all questions in the test, so that readers can verify my analyses if desired.”

In my view (but apparently not the MNMA’s), Twinline violates requirement number 8 as there are only seven vertical positions in the octave. Notehead shape differentiates among those on the same position. In fact, three of the thirty-seven finalists do this. Twinline is called a variant of the Chromatic Twinline of Leo de Vries (Note 4). This approach uses ovals for every other degree that are fully proportional wherein the symbol fills up the vertical space position on the staff (as required). However, the other symbols are half-ovals that fill up about one half of the vertical position. This allows three symbols to use the same full vertical position. I believe this also violates requirement number 8 although not as flagrantly as the former Twinline.

The Brennink approach looks just like traditional notation except that the octaves have 12 positions. This is accomplished by adding two ledger lines to five continuous staff lines. Requirement 10 specifies that “No more than five identical, successive, and equidistant staff lines are shown, so that staff lines can be quickly identified without counting lines”. It appears this approach and several others avoid violating requirement number 10 by using ledger lines instead of continuous lines.

Requirement number 13 is as follows. “The time coordinate must provide for proportional (or approximately proportional) graphic spacing of notes, rests, and other events, and must also provide for mathematically understood symbols for the divisions and multiples of time values, except optionally in children’s music and situations where graphic representation of time values alone may be adequate.”

I don’t have the full results document of the report but the summary provided of the MNMA results (now on the MNP website) does not mention evaluation of time duration. The samples of the finalist shown on the website do not show any approach for duration but only staff positions and noteheads. I can only infer the noteheads are supposed to be augmented by the traditional staff plus flags, etc. in order to satisfy requirement number 13.

I point out the violations to requirement number 8 because I think these demonstrate that a number of designers found this requirement proves to lead to difficult reading. I also note that at least in the summary, little attention is paid to requirement number 13 which relates to tempo and which I believe is of equal importance to note identification. There may be further information on this in the complete final report that I do not yet have.

The WYSIWYP design proposal satisfies all of the design criteria of the MNMA research project except requirement number 8 because of concerns over excessive vertical space. Figure 1 shows the traditional notational range of (20) notes for the combined treble and bass staves (without extra space between the staves) for the Brennink approach and WYSIWYP (note that the WYSIWYP noteheads appear smaller but that is just a limitation of my graphic tools). Notes representing naturals only are shown for the former. This illustrates the difference in vertical space required by the twelve position chromatic approach and the seven position diatonic approach. Not only does the former require 71% more space, but also it has no easy mapping the keyboard. Whereas with WYSIWYP, the amount of vertical space is the same as traditional notation and the red and blue lines provide a clear map to the white keys of a keyboard.

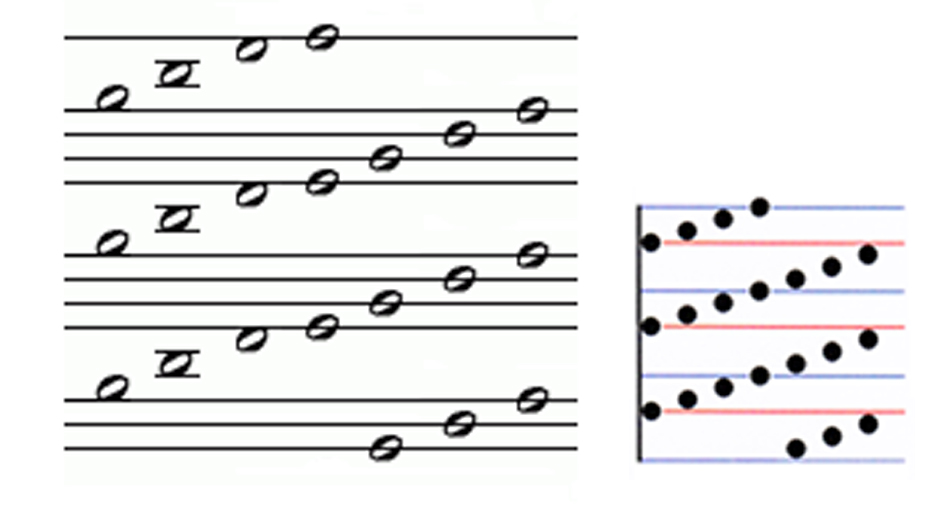


Figure 1. Chromatic octave staff vs WYSIWYP diatonic octave staff

Key signatures are eliminated but not by expanding the vertical axis to a chromatic scale. A trade-off was made between the extra vertical lines and spaces vs. explicit naturals, sharps, and flats. As a result, the seven available positions on the diatonic octave are augmented by the explicit sharp and flat noteheads to access the remaining five degrees of the chromatic scale. The judgement was made that beginners are more interested in a simpler staff (fewer lines and spaces to evaluate) than appreciating proportional relationships among tones. The price of adjusting from natural to sharp or flat was deemed worth the trade-off especially because the notehead shapes consistently indicate naturals, sharps, and flats. And mitigating the adjustment even more, with the application, musicians can optionally choose to use only sharps or only flats making the adjustments consistently the same for all works. Finally, I believe WYSIWYP clearly satisfies requirement number 5 as it is as simple a solution as is possible. Although it is simplified, it still retains all of the functionality of the traditional system.

While the MNMA evaluations were performed by trained musicians, what is also needed is an evaluation project that views alternative notations from a beginning student’s perspective. This should include not only note identification but also note duration. The goal of this project would be to identify the best candidates for providing simplicity to beginners.

In my view, to evaluate whether a participant can accurately describe note duration, the participant should complete a timeline showing note duration as well as relationships to other notes on the same and other staves. I suspect this would be a challenge for many people with traditional notation. However, for WYSIWIP the design is in itself the answer to this question on note duration and its relationships.

**The Music Notation Project**

The Music Notation Project (MNP) began in 2008 to capture and continue the work begun by the MNMA (Note 5). The MNP provides an online WIKI and forum for those interested in alternative notation. While interest continues, there still does not appear to be a front-runner for a new standard among the participants of the MNP web site.

Currently, the MNP web site continues to relax requirement number 8 in that it shows proposed alternate notations do not have the full twelve vertical spaces. These have distinctive noteheads on the same vertical space that distinguish among two or even three different chromatic degrees. So these designs are not so different from traditional in terms of space and real-time playing adjustments to a given vertical space on the staff. The difference being the implicit vs explicit noteheads to adjust the degree.

The WYSIWYP design also uses noteheads to differentiate among degrees just as the MNP alternative approaches that do not have twelve dedicated vertical positions for the chromatic scale. The alternative approaches use noteheads to adjust the degree indicated by its vertical position up or down one degree. However, the “base” degree (defined by its vertical position) for adjustment could be a natural, sharp, or a flat. So for beginners, the problem is that the notehead symbols are not consistent with respect to playing naturals, sharps, and flats. For example, a symbol (e.g., a triangle) could represent a natural in one position but elsewhere on the same octave it could be a sharp. With the WYSIWYP design, the noteheads are consistent with respect to being a natural, sharp, or flat.

**Conclusion**

WYSIWYP differentiates it from the others by its simplicity since it is designed for beginners. This is reflected in its design for uniform octaves, for elimination of key signatures, and for an intuitive approach to rhythm. It is also not such a far departure from traditional notation that a student would have to start completely all over to learn traditional notation.

Dodeka, Klavarskribo, and the proposals on the MNMA/MNP web site are visually based on a chromatic scale octave. When several octaves are stacked up for a complete staff, and when there are multiple staves, there are many, many lines and spaces to interpret. It is my view that these approaches are too complex to be easily read by beginners. Furthermore, there is no visual mapping of the other approaches to a keyboard. WYSIWYP has a simple mapping based on the two most visually obvious groups of keys that are separated by the black key “gaps”, C through E and F through B.

What those chromatic scale approaches do solve is the problem of key signatures by having space allocated to all twelve degrees. WYSIWYP solves that problem with explicit naturals, sharps, and flats. And since the diatonic scale octave maps to the keyboard white keys, the real-time playing adjustment for playing sharps and flats is to simply play an adjacent black key. Thus, it was deemed a worthy trade off of space for simplicity.

The designers of Dodeka and Klavarskribo recognized that a visual approach to rhythm was easier than translating one or more non-intuitive symbols into note duration as with traditional notation. It also makes more obvious the temporal relationships among notes on the same and different staves. WYSIWYP has this same basic concept but also includes an explicit mapping to the beat which eliminates the need for time signatures. In general, other notations on the MNP web site retain the traditional notation format for rhythm.

If WYSIWYP is successful, it will inspire some students of music to want to pursue their interests to a higher level. Today to be a “serious” musician, one will have to learn to read traditional notation. Hopefully, having learned the WYSIWYP approach will make it easier to learn it than starting from scratch. WYSIWYP retains several elements in common with traditional notation:

diatonic octave

horizontal timeline

noteheads

real-time playing adjustment for accidentals.

Furthermore, it is my hope that its app will be able to provide a step by step transition for the student to make it even easier.

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Note 1. Klavarskribo: <https://en.wikipedia.org/wiki/Klavarskribo>

https://www.klavarskribo.eu/en/

Note 2. “BetterNote: Evaluating Alternative Music Notation” by Jack Swiggett. https://pdfs.semanticscholar.org/812a/86075f6a1cce81af0db6d63a0f000c0cf0b6.pdf

Note 3. MNMA Research Project. http://musicnotation.org/mnma/research-project/

Note 4. Chromatic Twinline by Leo de Vries. http://musicnotation.org/system/chromatic-twinline-by-leo-de-vries/

Note 5. Music Notation Project. <http://musicnotation.org/>