Introduction

The medium on which constitutive psychosocial patterns (legal texts) are articulated, or through which they are expressed, effectively continue to follow the ancient tradition of inscribing such directives or edicts "in stone".

The current evolution of software techniques for text parsing notably allows for its conversion into speech in text readers (for those disinclined to read text displayed on a screen). More complex translation software allows text to be converted into text in another language, possibly also output as speech. Voice recognition software adds to such possibilities. Experiments have long been undertaken with computer generation of poetry (one variant of digital poetry) and of music from seed elements. Music is itself commonly used to trigger dynamic visual patterns.

The concern here is with the computer-assisted systematic conversion of text into poetry, song or music. The processes described focus on the desirable options, the specific software challenges, and the useful applications associated with various stages of development -- irrespective of early fulfillment of all envisaged possibilities. The emphasis is on the "aesthetic enhancement" of texts of fundamental treaties, declarations and agreements. The object is to render the semantic content of such texts more widely comprehensible and memorable, without losing their essential significance, notably for the benefit of those who prefer non-textual communication modes. Many other applications may be envisaged, perhaps including inter-faith and pre-nuptial agreements.

An important reason for such conversion is that text processing is primarily a function of the left hemisphere of the brain whereas other modes vital to comprehension are a function of the right hemisphere. The conversion is therefore specifically designed as a means of transferring significance from one to the other as a means of benefiting from the particular integrative skills of the second. This facility is potentially of value as a feedback mechanism when endeavouring to articulate treaty-type texts. These depend in some measure on the manner in which their significance can be effectively communicated to people who may have little inclination to read texts -- even if they are not functionally illiterate. The facility is also intended as a means of offering various forms of summary or synthesis with ready appeal to the media.

It could be argued that legal texts, as currently conceived, represent what might be described as the "lowest common aesthetic denominator". It is not surprising that many are apathetic about them and are more highly engaged by other styles of presentation.

The essential practicality of the approach here is that it avoids the major problems of voice recognition and text translation, although these are now increasingly soluble. Nor is it directly concerned with creative generation of text, poetry or song. The challenge is constrained to enhancement of comprehension through introduction of aesthetic qualities into the existing semantic patterns provided by input text.
**Preamble**

**Aesthetic:** As noted by Gerald England *(Poetry and Computers. Fractal Report, 6, 1994, 31)*

There have been attempts to produce computer-generated poetry for over 30 years - most of these have been done to investigate problems in programming rather than serious literary endeavours. There are programs about that purport to generate poetry. Most rely on a pre-determined set of adjectives, nouns, verbs and adverbs randomly applied. The results are pretty dreadful! Fact is computers can't write poetry, only poets can.

However the challenge is whether existing (rather than computer-generated) prose can be manipulated ("massaged") by computer algorithms under user-supplied constraint in order to increase, using various devices, the aesthetic order (however this is to be understood) of the prose. England himself describes his experiments with a text generator programme called Babble.

Computer-based initiatives to produce poetry are associated with technical challenges that are of some interest in relation to solution of a range of problems with more obvious applications.

It is appropriate to note, for example, the interrelationships of the initiatives of the inventor Raymond Kurzweil (pioneer in optical character recognition (OCR), text-to-speech synthesis, speech recognition): Kurzweil Educational Systems develops reading-related technology for the academically challenged; KurzweilAI.net explores "the confluence of accelerating revolutions that are shaping our future world". Kurzweil CyberArt Technologies offers the (patented) Poet's Assistant, the Poet Analyzer, the Poet Creator -- that help write poetry (and song lyrics). [These have not been adapted since 2000 to the latest operating system environments]

As reported by Jordan Boyd-Graber *(Semantic Poetry Creation Using Lexicographic and Natural Language Texts, 2000)*, in a well-controlled test, the Kurzweil Cyberetic Poet managed to fool about half the people half the time. People with moderate computer and poetry experience usually fared the best, only being fooled 5% of the time. However, the overall average was about 44.5%. This is still better than blind luck, but the program does sometimes produce frighteningly realistic responses.

Whilst the following exploration does not preclude the generation of intriguing products that are challenging to simpler aesthetic preferences, the focus is on output that enhances comprehensibility for larger numbers of people of a wider variety of backgrounds.

**Fidelity:** As a Christian evangelical initiative the Jubilate Group provides songs and hymns for worship. The group has concerns which apply in some measure to the challenge of setting authoritative international treaties to poetry or music:

We could set a bible text to music, faithfully reproducing the text, but with a few exceptions people find this unsatisfactory. This is in much the same way that a preacher could quote a passage but not explain it or amplify it so that its meaning becomes clear. Could it be then, that a good hymn or song is rather like a good sermon, where a text or doctrine is set out and amplified?

Well, almost! Clearly the medium is not speech, so we are not producing texts for sermons or poetry. The medium is music and so this dictates the kind of text we must use. It has to be sung, either to one another or to the Lord. Nevertheless, there needs to be a development of thought that expands that truth or doctrine with singable memorable words.

One of our standards, then, is that the text must convey biblical truth in such a way that it builds up the congregation that sings it. It must mean something, and something that is intelligible. Hence we have a commitment to updating texts, whilst retaining the weight and strength of the original.

In reporting on the work of Jewish composers (R M Campbell, *Jewish music exploration widened composer's palette*, September 2002) notes a statement of Daniel Asia:

Setting a text to music demands a kind of reading of the text that is much deeper than when you quickly read them. I am with the words for a bunch of days, figuring out what their speed is and their relationship to one another.

Fidelity in pattern recognition is a concern central to the challenge of sonification of scientific data as explored by the International Community for Auditory Display (ICAD) which was notably responsible for the *Sonification Report: Status of the Field and Research Agenda* (1997) on behalf of the US National Science Foundation. One current approach is that of iSIC using information music as an alternative to remotely monitoring complex systems like communications networks -- by exploring the use of musical rules as a way to convey information.

It is appropriate to note that a number of experiments have been made in representing molecular structures as music. In one case, as noted by M. A. Clark *(Transcriptions: the music of protein sequences, 2001; A Protein Primer: a musical introduction to protein structure; Genetic Music: an annotated source list, 2005)* all of the musical sequences are "simple linear readouts of the amino acid sequences of the proteins indicated. However some sense of the protein's higher order structure emerges from the alternation between the higher-pitched polar amino acids and the lower-pitched nonpolar amino acids". A point to be made is that if the structures constitutive of the human body lend themselves to useful musical representation, there would appear to be a case for seeking to represent the legal instruments purportedly constitutive of the human community to music -- as has been characteristic of many faith-based communities of the past.

**Distinguishing modes of aesthetic sonification**
The possibilities to be discussed can usefully be distinguished in terms of their position within the following table. The unexplored zones of value are Zone A preceded by Zone B.

<table>
<thead>
<tr>
<th>4 Zones of exploration and associated dimensions</th>
<th>mnemonic gestalt/integration</th>
<th>cognitive entrainment</th>
</tr>
</thead>
<tbody>
<tr>
<td>potentially &quot;interesting&quot;</td>
<td>content fidelity</td>
<td></td>
</tr>
<tr>
<td>[B] semantic signature tune</td>
<td>[A] mnemonic/semantic</td>
<td></td>
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<tr>
<td>(&quot;tonal barcodes&quot;)</td>
<td>enhancement gestalt</td>
<td></td>
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<tr>
<td>content image maps</td>
<td>comprehension</td>
<td></td>
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<tr>
<td>[D] encoding</td>
<td>[C] &quot;setting to&quot; poetry/music</td>
<td></td>
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<tr>
<td>semantic analysis/mapping</td>
<td>accompaniment</td>
<td></td>
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<td></td>
<td>inspirational celebration</td>
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<td></td>
<td>EU: Ode to Joy</td>
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<tr>
<td>technical representation</td>
<td>linear/sequential</td>
<td>aesthetic appreciation</td>
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<tr>
<td></td>
<td>unmemorable as a whole</td>
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Notes:
- Zones
* D: immediately feasible but fails to engage
* C: widely used but only inspirationally associated with semantic content
* B: feasible experiment to determine viability and possibilities of refinement
* A: dependent on creative combination of B, C and D
- Axes (extremes labelled in outer part of table)
* Vertical (bottom to top): from linear/sequential to gestalt/synthesis
* Horizontal (left to right): from reductive compression to aesthetic elaboration
* Diagonal (lower left to upper right): from technical encoding to cognitive entrainment
* Diagonal (upper right to lower left): from "interesting" to aesthetic appreciation

Conventional aesthetic enhancement and adaptation of constitutive documents

Under ideal circumstances, it is indeed clear that legal texts may be set to music (possibly with sung lyrics), adapted into poetic form, portrayed as an image or even dramatized -- Zone C in the table above. This exploration avoids consideration of these entirely feasible possibilities for a range of reasons -- previously articulated to some degree (Aesthetics and Informatics: the art of information for policy-making and community-building, 1999).

The challenge of this conventional mode may be described in terms of the following:
- necessarily idiosyncratic nature of individual aesthetic approaches (whether or not filtered by jury competition)
- psychodynamics of ego-attachment and self-promotion, understandably associated with this mode
- time required for such adaptations
- incentives required (notably financial or other rewards) to ensure timely execution of such adaptations
- limited aesthetic inspiration and motivation associated with legal texts, for those capable of making such adaptations
- issues of intellectual copyright associated with the aesthetic product and its dissemination
- the extent to which the particular enhancement is to be considered as exclusively representative of the aesthetic possibilities
- challenge of selecting amongst a range of enhancement proposals or executed works, given the challenge of aesthetic preferences in a multicultural environment
- challenges of specifying and mandating any aesthetic enhancement, notably with regard to desirable emphases and undesirable emphases (including to what degree it should be "sexed up" to render it more attractive)
- procedures and logistics of ensuring formal approval (and funding) for any enhancement process, necessarily perceived as an unconventional treatment of the texts of legal "conventions"
- definitive nature of any such aesthetic product, precluding its further adaptation or personalization

Especially interesting as a constraint is the dynamic debate within the arts between a work as an individual creation (including when a group is orchestrated by a director) and those contexts in which collective improvisation is cultivated -- as in some jazz and dance groups. An international legal text is typically the result of collective endeavour through which challenging collective dynamics are no longer the primary focus as they may well remain in the relationships between creative artists.

Interrelated modules, challenges and applications

Notably as demonstrated by the commercially successful approach taken to the various Kurzweil applications, there is a range of partially interdependent modules (many already developed) through which the challenges can be addressed and which may give rise to innovative products.

A distinction can be usefully made between applications which:
simply shift from text into sound or image, but without any meaningful aesthetic enhancement
offer a degree of aesthetic enhancement but only to be appreciated conceptually as a form of potentially interesting techno-art
offer a simple form of "sexed up" enhancement characteristic of inherently engaging advertising jingles and rhythmic political chants
aesthetically enhanced such as to enable recognition of a meaningful pattern of complex associations
invite user interaction to further enhance and personalize the aesthetic quality according to particular preferences

The modules to be considered are:

- **Text focus** (common applications, widely used):
  - Text parsing
  - Text grammar checkers
  - Text comprehensibility and readability assessment are relevant issues with respect to legal texts:
    - As noted in a study for the European Network of Policy Makers for the Evaluation of Education Systems (Culturally Balanced Assessment of Reading, 2003), there is no single instrument to assess text comprehensibility and readability. On the one hand, understanding a text is connected with the sociocultural and psychological characteristics of the reader, and on the other hand, with the semantic and syntactic qualities of the text. It further notes: Text comprehensibility and readability have been researched for a long time and from various angles. Klare (1969) has presented a bibliography of 482 titles with his study. In his bibliography of 600 titles, Biere (1991) lists the hermeneutic traditions of text comprehension, trends developed with cognitive science and artificial intelligence, as well as studies on psychological readability with various dimensions, and research into linguistic text readability with the latest applications in areas such as technical languages and communication research.
    - Readability tests: These include, notably rely on estimates of syllables per word or characters per word: SMOG (Simple Measure Of Gobbledygook); Flesch-Kincaid Readability Test; Fry Readability Formula; Automated Readability Index (ARI); Coleman-Liau Index; Gunning-Fog Index [more]
  - Text translation

**Feasibility**: These modules are all operational but do not necessarily enable any aesthetic enhancement of a text, other than through some conventional re-writing process.

- **Speech focus** (common applications)
    - Alternative voice options (younger, older, male, female)
    - Alternative accent options
    - Alternative emphasis options (dramatic, tragic, comic, gravitas, upbeat/downbeat, etc)
  - Speech-to-Text conversion or voice recognition

**Feasibility**: These modules are increasingly sophisticated. However the only possibility they offer for aesthetic enhancement is through any facilities to modify experimentally the reading voice, notably with respect to emphasis and intonation. It is possible that the text to be so read could be marked up at points which call for such particular emphasis. Clearly the contrast between different styles could be seen as highly controversial, especially when a comic reading is deliberately juxtaposed with one of gravitas in order to undermine the weight of the latter. It is possible that punctuation, or special markup, could be used to enable a more poetic reading. Of particular interest then would be the possibility of substituting rhyming words (synonyms) in the spoken output for selected words from the original text. Yet more complex, in the light of ongoing research combining translation modules, is the possibility of changing the syntax of the spoken output of a sentence in order to enhance a sense of rhyme and meter. This would depend on using portions of the translation module to "translate" from the original syntax to a different syntax structure in the same language.

- **Semantic focus**
  - Brainstorming assistants
    - ParaMind, a commercial brainstorming system using text manipulation.
  - Semantic analysis of text (Intellexer)

- **Semantic summary of text**:
  - Intellexer: Summarizer: summarizes a lengthy text on the basis of a semantic analysis
  - Open Text Summarizer: reads a text and decides which sentences are important and which are not.
  - Automatic Text Summarizer (of Search and Information Extraction Lab of the International Institute of Information Technology): reduces a length text to a specified number of sentences
  - Automatic Text Summarizer (SweSum, by Martin Hassel and Hercules Dalianis, 1999-2003)

**Feasibility**: Semantic summarizers offer the very interesting possibility of being able to condense long legal texts into shorter texts prior to any other modification or form of output. The ability to do this for the 300 page draft EU Constitution would have offered a striking focus for discussion. Clearly the question arises as to whether the summarizing software could offer the option to favour more poetic syntax in the output -- however the user prefers to specify such aesthetic qualities.

- **Visual mapping of semantic associations** (semantic mapping; text visualization; concept mapping):
Feasibility: Semantic mapping is clearly a far more radical step that effectively offers a visual overview of a complex text of any length. Such a map may bear a strong visual resemblance to hypertext poetry. The question is rather a degree of emphasis on aesthetic qualities in the hypertext variant compared to the semantic associations emphasized in the mapping approach, although no work appears to have been done on generating hypertext poetry from semantic maps.

- Hypertext poetry display, known under a variety of names, including cyberpoetry, diagram poems, digital poetry, electronic poetry, hypermedia poetry and web poetry (cf Jorge Luiz Antonio, A Map of Different Digital Poetries, 2001). Typically words or parts of words, in different fonts, are displayed in two or three dimensions, possibly with the elements moving in relation to one another -- and linked or not to sound files.
- Detection of stakeholder "voices" reconciled in text (for or against, checks and balances)

Feasibility: A limitation of semantic maps is the implicit assumption that a higher degree of meaning is to be derived from the spatial distribution of terms rather than from the complex pattern of relationship between the terms -- effectively obscured by their projection into a two-dimensional map. [The issue is reminiscent of that associated with successful mapping of the human genome -- only to find that a significant proportion of variance was in fact inherent in the dynamics of protein folding.] One possibility is to treat the "co-occurrences", detected (and exported) by applications such as Leximancer, as "relationships" of the kind so successfully imported, analyzed and displayed by applications such as NetMap. The latter offers possibilities of generating centrosymmetric displays that can be explored in depth but, from an aesthetic point of view, could be interpreted as types of mandalas (Preliminary NetMap Studies of Databases on Questions, World Problems, Global Strategies, and Values, 2006; Complementary Knowledge Analysis / Mapping Process, 2006).

Any output map, however aesthetically enhanced, of course offers the possibility of including hyperlinks to standard text. It may this serve as an aesthetic front-end to such content -- an aesthetically enhanced "executive summary", where the aesthetics have also been used to enhance comprehensibility.

- Text and poetry generators:
  - Text generators:
    - Babble Text Generator [many options, in addition to generating random texts according to analyzed text files, it can apply "filters" such as dyslexia, stuttering, code etc., modifying the output further, notably to assist in producing poetry].
    - Dada Poem Generator [a generator of nonsensical poems based on the traditional approach of looking up dictionaries and sentence syntax definitions].
    - Douglas Adams. Vogon Poetry Generator ["extremely bad poetry", as inspired by the Hitchhikers Guide to the Galaxy].

Feasibility: These applications would only prove to be of value if they could be related to the aesthetic enhancement of the legal text that is the point of departure.

- Poetry generators:
  - Jelks Cabaniss. The Poetry Generator 1995-7
  - Steric Hindrance. Heretical Rhyme Generator
  - Mitsu Kobayashi and Tom McEwen. Haiku Project
  - Ray Kurzweil. Cybernetic Poet (RKCP) (a computer generated poetry system using sophisticated language modeling techniques to automatically generate completely original poetry based on poems that RKCP has "read."), WO 01/033409, Computer Generated Poetry System, 2002
  - Jeff Lewis and Erik Sincoff. Poetry CreatOR 2
  - Sourceforge.net Babelfish Poetry Generator (a feature of the Java AIM Bot which (ab)uses the power of the Babelfish translation facility in order to "turn normal messages into profound poetic statements")
  - Jon Trowbridge. Gnoetry [an on-going experiment in human/computer collaborative poetry composition] (Eric Elshinait and Jon Trowbridge, Gnoetry 0.2 and the Transcendence of the Human Poetic, January 2007)

Feasibility: A great deal of technical work has gone into the development of these applications which in principle is directly relevant to the concern here. However it is not clear the degree to which they can, as they stand, accept as input a legal text in the expectation that the relationships amongst its elements could be aesthetically enhanced in some memorable manner.

- Content augmentation of text (from relevant database)
  - Alternative synonyms/metaphors
    - Virtual Poet (a program that automatically selects words that rhyme with a particular word chosen by the user)
  - Generic variant (substitution of generic terms for specifics in text, eg. "transportation" for "automobile")
  - Association of (illustrative) thematic slogans
  - Association of (illustrative) thematic factoids
  - Insertion of omitted semantic links (systemic relationships between elements of content)

Feasibility: These facilities do not in principle pose major technical problems, once the text has been parsed and subject to...
semantic analysis to identify key concepts and their relationships. It is of course necessary to have an adequate database from which alternative and additional materials can be selected to amend the text.

- **Sound/Auditory focus** (association of melodies to text thematic content)
  - output as background to unmodified text (as converted to audio output)
  - sound "image" of text:
    - ASCII to MIDI conversion [1] [2]
    - ASCII to MP3 (MPEG-1 Audio Layer 3)
    - "text mapper" algorithm converts standard text into numerical values which can be mapped to any composition variable. In addition, this component provides special 'L-system' capabilities for generating fractal text strings which can be mapped to composition variables. A feature of ArtSong Lite, a tool for algorithmically generating and organizing musical materials. Designed as a general-purpose algorithmic composition framework, 'intended' to be inherently devoid of any particular musical style; an electronic-procedural manuscript paper that you can apply to any specific composition problem. User creativity, selection-of, and skill-using the various components, algorithms, composition-variables, control-events, etc., determine musical output.
  - output as coded summary (abstract) of suppressed text -- a "signature tune" for the document

**Feasibility:** The first option is relatively trivial, however the coding used for the conversion (whether in the selection of octave or instrument, lends itself to experiment with the possibility of user input. It may offer additional advantages of providing emphasis and engaging emotions, as with the skill of ensuring appropriate musical accompaniment to "silent" movies or as in most modern movies. The production of sound "images" is a valuable area for exploration and experiment. Potentially of great interest is the output of a coded sound summary (based on a semantic summary discussed earlier), as explored in sonification experiments with non-text information. A major issue is whether this can be massaged (morphed) in such a way as to preserve semantically invariant patterns and render them in a form which allows for a degree of recognition. Such a facility might be associated with a complex visual image such that a cue could trace out the parts of the pattern being rendered by the music at any one time (by analogy to the "bouncing ball" of karaoke). It would be interesting to determine whether the unique content of legal texts could be recognized (and rendered memorable) by a form of signature tune.

- **Image focus** (direct conversion of multi-page text into a single bitmap image): The examples given here fail to distinguish adequately between conversion between formats (whether text readable as an image or digitised) and conversion of the binary code of many pages of text a single bitmap patterned image. In the case of conventional ASCII (.TXT) code conversions of the first kind exist as follows:
  - JPEG [1] [2] [3]
  - PNG [PHP] [2] [3] [4]
  - GIF [Java] [PHP] [3]
  - BMP?

**Feasibility:** In principle it does indeed appear relatively simple to present (coded) text as a binary image. The issue here is whether the degree of compression would enable patterns of significance to become apparent -- whether or not facilities were used to selectively code the pixelated representation. More interesting are the possibilities of manipulating the resultant pattern in some way, possibly giving it a linear or cyclic dynamic.

- **Poetic transformation of text**
  - development of lyric lines from text
  - user-specified
    - meter and metrical patterns
    - rhythm
    - intonation
    - rhyme and rhyming schemes
    - alliteration
    - assonance / consonance
    - poetic diction
    - forms and genres
  - user-specified model / template

**Feasibility:** As noted earlier extensive work has been done on relevant modules. The challenge is how these can be applied to massage an input text (whether semantically summarized or not) in an aesthetic meaningful way -- without jeopardizing key semantic associations. At issue may user tolerance for a "looser" presentation.

- **Insertion of emphasis**
  - highlighting / colouring selected items
  - "chorus" line (slogan, factoid)

**Feasibility:** This might be considered an extension of content augmentation as discussed above. Clearly this lends itself to user input -- a phase which may usefully precede some of the earlier operations.

- **Setting text/poetry to music/song**
  - musical accompaniment / backing for written (on screen) text presentation
  - musical accompaniment / backing for text-to-speech reading
Musical rendering:

- **music generation:**
  - Virtual Music Composer
  - Jef Allbright. Computer-generated Music [resources]
  - Synth Zone. Computer Generated Music Sites
- **generative music:** whether Linguistic/Structural (music composed from explicit analytic theories), Interactive/Behavioural (without input), Creative/Procedural (music generated by processes that are designed and/or initiated by the composer), Biological/Emergent (non-deterministic music and unrepeatable)
  - Koan Generative Music Engine (Koan Pro, 1994-2007), originally distributed by SSEYO; initiative now continued by Intermorphic
  - MusiGenesis (2005), a program that evolves music by adding randomly-generated notes to a song and letting the user decide whether to keep or delete each one. This process quickly creates a unique piece of music.
- **music generation from images:**
  - Lauri Gröhn has developed Synesthesia software that generates music (midi file) from any
  - A facility also offered by ArtSong Lite
- **conversion of text/poetry into sound/music:**
  - based on manipulation of direct conversion (ASCII/UNICODE to MIDI)
  - based on semantic content
  - symphonic poems or tone poems are pieces of orchestral music, in one movement, in which some extra-musical programme provides a narrative or illustrative element. Clearly this programming element could come from a treaty text

**Feasibility:** Extensive work has been done on music generation. As with generation of poetry, it is unclear to what extent this has been based on an input text as "seed" for the process -- or whether the modules lend themselves to such seeding. Again, the question is how the semantic content gets translated and whether it can be "read" (possibly by analogy with Braille). Generative music, notably as exemplified by the Koan engine, typically works from a user-selected musical seed. It is possible that this approach could be extended to a text seed. The generation of music from images has already been successfully demonstrated. Clearly this offers a way of experimenting with the processing of text images. With respect to the conversion of text/poetry into music, it is possibly that this could be explored as an adaption of text reading applications -- outputting sound rather than voice.

**Related initiatives**

In a blog discussion thread on the theme of a Chess to music translator (Halfbakery, 2004):

This is speculation that a method of converting chess notation to music would produce music that was recognisable as a particular game and that when playing a game it might be possible to hear the game in your head and possibly hear a tune similar to a tune from another game.

Partners in Distance Learning (Patriotism Expressed Through Song) offers courses in which:

The historical and cultural background in connection with writing patriotic songs will be discussed, demonstrated and critiqued. Students will be informed of the principles of setting text to music. How to compose music using centonization and tendency-tone resolution will be explained.

Eva J. Egolf (Digital Storytelling With Music, 2007; Setting Text to Music) advocates to students the use of GarageBand or Audacity software to set text or poetry to music. The text can either be student generated or selected from a work studied in class. Text generated using Song Form (with alternating verses and chorus), Narratives, and Poetry work well. When setting text some musical decisions will have to be made. Egolf notes the following considerations:

1. Mood: The mood of the text will influence which type of musical sounds accompany it.
2. Tempo: The speed of the music is also influenced by the mood. Setting a tempo at the beginning of the song is important in the recording process.
3. Form of the Text: The form of the text will influence the form of the music. The text usually should be finished before trying to write the music to it. The approach to creating music will depend upon whether the text is in song form, narrative, etc.
Roger Alsop (*Enhancing the Emotional Impact of a Text through Electronic Manipulation*) comments on experimental processes taken in creating a musical composition (using the IRCAM Signal Processing Workstation) to be performed in conjunction with a poetry reading:

The result is a text setting in which the composition and the accompanying reading share equal importance in performance....The entire sound track was made up of segments of readings of the text and other vocal utterances by Felix Nobis. These segments were adjusted in the ISPW Max program, using pitch shifting, ring modulating, sampling and delaying algorithms. The resulting modified voice sounds were assembled using the digital audio editing program ProTools to create the final piece.

The goal of this piece is to produce a composition in which the emotional aspects of the text used is reinforced and commented on through computer-based electro-acoustic manipulation.

Words, when uttered, contain certain meanings not related to their lexical meanings. Physical, emotional and mental states affect the manner of utterances and therefore their perceived meaning. These effects are usually in the pitch, timing and spectrum of the utterance, that is, the musical aspects of the utterance. For complex communication differences in pitch, timing and spectrum alone are not as useful as utterances containing meanings agreed upon by the communicants. However it is often the pitch, timing and spectrum of an utterance that is most effective and most noticed when speech is the avenue of communication.

Proposals (probably speculative):

**Ebay-Generator** ([Uebermorgen.com](http://uebermorgen.com)): Proposes ([an contemporary European techno-fine-art avant-garde] conversion of Ebay user profiles into unique songs:

"We will create individual user profiles - based on a large quantity of data from Ebay - and transform these into unique songs. We scan Ebay sellers and buyers for their rating, sold objects, times and frequency of transactions, product sources and further data and automatically (by using custom made data-retrieving and -mining software) transform this data into a structured text. Based on this text we generate Text-to-Music with a special supercollider-application and the lyrics on top with the same text by speech synthesis. The songs will be part of the Ebay-Generator Web-Site (each user can generate text/songs by entering an Ebay-username)". [more]

A Slate or Myslate application is indicated by Michael Kinsley (*Introducing MySlate: It slices, it dices ..., 2000*) as having been proposed within Microsoft "allowing users to listen to musical interpretations of their favorite Slate features (using Microsoft's patented text-to-music software)"

The US Declaration of Independence has long been celebrated with music. *Shakespeare and Company* (Lenox MA), for their 2007 season, propose a rendering of the Declaration of Independencer in the following terms:

Hear the powerful rhetoric that gave birth to democracy in America, delivered with eloquence that Shakespeare would have loved. Inspired by the philosophy and intellectual ferment of Renaissance England, Thomas Jefferson penned a tract as far-reaching and controversial as history itself.

**Conversion options (steps)**

1. **Prose to poetry**: Some steps in this process should benefit from past experiments in computer-generated poetry. Examples include:

   For example, a key aspect of the *Gnoetry* software is the ability of a human operator to intervene in the language generation cycle, helping to "guide" the artistic process and to produce a result that is a true collaboration of equals. *Gnoetry*’s user interface allows the human co-author to regenerate text on all linguistic levels (from word to entire gnoem) to make changes to the program’s (blank verse!) analysis of the language corpus, the language corpus itself being a statistical derivation of one or more texts. Analysis renders the text(s) into three-word language tokens which are then awarded or penalized based on their ability to fit into a chosen poetic form (from haiku to sonnet). The results below were not edited post-production; all the language here is machine-made, although there is a not-insubstantial syntactic inheritance from the source texts that has survived the stochastic processes. (Eric Elshtain and Jon Trowbridge. *Gnoetry 0.2 and the Transcendence of the Human Poetic*, January 2007)

   The Kurzweil Cybernetic Poet (KCP) attempts to mimic human creativity by using English in a very well defined stylistic manner. As described by Kurzweil

   KCP is a computer program and it’s provided with an input file of poems written by a human author. The program analyzes these poems and creates a word-sequence model based on the poems it has just read. It then writes original stanzas of poetry using the model it has created. (Kurzweil 374)

   - Break up text provisionally:
     * use punctuation (period, colon, semi-colon) as a first basis for line breaks
* use paragraphs (treaty articles) as a first basis for breaks by verse

* Access user preference option for line constraints:
  * metre, etc (pentameter, hexameter, etc)
  * rhyming
  * rhythm
  * etc

* Apply preferred metric to refine segmentation of text into lines

* Access user preference option for poetic style constraints:
  * rhyming poetry
  * rap
  * free form

* Access user preference for complexity/comprehensibility (readability scales)

* Apply implications of preferred style and preferred comprehensibility
  * rhyming: use rhyming and synonym database to get better matches between potential line terminators, selecting simpler terms if appropriate to comprehensibility preference
  * etc

* Access user preference for acceptable result

* Evaluate results and engage in iteration (repeating selected steps above) if unacceptable to user criteria

2. Poetry text to Voice/Speech: Software developed to provide spoken output from text can (optionally) be used for audio output of the result of the previous conversion. Attention needs to be given to the enunciation of the text as poetry in contrast with the proven use of such applications for prose. Options include the possibility of:
  * switching between a range of voices
  * switching from a younger to and older voice, from male to female, etc
  * use of voices with particular accents
  * use of voices emphasizing: gravitas, drama, humor, tragedy, sarcasm, etc

3. Poetry to Song (or Chant): Several possibilities should be open to consideration by users

  a. Minimal backing: This option would enable the poem to be spoken with a musical accompaniment, with some points of connectivity between the structure of the music and that of the poem. The option should enable a choice to be made between styles of music and the desired aesthetic effect.

  b. Chant form: This option would focus on reducing the verses to a form that would emphasize a highly rhythmic chant. One variant is that used by the Finnish male Shouters Choir. Others include battle and work chants, as well as rap

  c. Simple song: This option would emphasize the configuration of the lines and verses to suit a selected style of song:
    * pop song
    * operatic
    * hymn
    * rap
    * student (drinking) song
    * battle song

  d. Song with chorus: This option would allow an overriding theme to be repeated in chorus form between verses. Users could be offered the option of specifying thematic keywords appropriate to such a chorus

  e. Polyphony: This option would involve one of several variants, notably as a means of handling the perspective of different stakeholders bound together by the text:
    * allowing alternate verses to be sung by different voices,
    * segmenting the verses so that alternate lines (or pairs of lines) could be sung by different voices
    * using several voices singing appropriately in parallel so that their interplay provides a larger aesthetic sense of integration

4. Poetry to music (only): In this variant lyrics would be dropped and replaced by a melodic form in which leitmotivs were appropriately selected to represent the distinct issues

Design considerations

1. Degree of interactivity with user: This can be kept to the minimum with specification of options (as noted above) or extended
to allow the user to approve choices (eg in rhyming or synonyms), and amend or tweak provisional results in a sequence of iterations

2. Resources and insights from poetic and musical traditions: Clearly there is the possibility of orienting the text in the light of musical traditions and styles: Fadas, Reshas

3. In some cases there may be a strong case for embedding slogans in the texts. These could be extracted from a thematic database ("Peace Now", "Health for All by the Year 2000", "Spreading democracy", etc) including lines of fact ("100,000 children dead"). The slogans could (optionally) be offered as a counterpoint to optimistic promises in the main lyrics, where such promises have been broken in the past.

4. The capacity to provide a political orientation to the presentation of the verses or lyrics, or to the style of music, could be of value.

5. Selection of song or music as a template: Given the techniques of morphing images, there is a case for exploring the possibility of allowing the user to specify a song or piece of music as a "template" onto which to project the converted text.

6. Thematic leitmotifs: Under some circumstances there would clearly be a case for allowing the user to specify or select from options a melodic leitmotiv to be associated with a particular phrase (sustainable development", "freedom of information", "human rights", etc) so that their interplay can be highlighted in musical renderings.

7. Systemic issues (feedback loops): As a technical document it is appropriate to assume that a treaty or a declaration is effectively a pattern of checks and balances whose relationship could be traced out schematically (using an appropriate methodology). The merit of the aesthetic relationship between the elements of the converted rendering is that such systemic links can be held by aesthetic devices as mnemonic aids to comprehension of the whole. An excellent example is provided by the Biochemists Songbook whose songs chart out the operation of complex metabolic pathways using popular tunes as a characteristic template for each "cycle".

8. Personalization of international treaties: The assumption is made that a legal text is a rigid text. It is however possible to understand the pattern of links articulated by that text as the focus of the agreement rather than the sequence of words. This is of course evident when the text is translated to another language. In this case the focus is on translation to another medium. There is no reason why aesthetic adaptations, possibly adapted for different cultures and aesthetic preferences, should not carry the same invariance through other means. This even suggests the possibility of allowing end-users to personalize such adaptations of treaties which apply to them so that they are meaningful in their own aesthetic language.

9. Media implications: The possibility that a "dry" treaty should be expressible in poetic form, song or music might focus communication on the media with the "signature tune" of some such treaty. The possibility that it might be "sung" by the signatories would of course be an exaggerated expectation -- it might be sung by the analogue to a "spokesperson", a "policy singer" or poet as has been traditional in a number of cultures.

10. Singularity and danceability: The above options suggest the possibility of producing singing and dancing variants of the EU constitutional treaty. These would be a most significant step in rendering any such document meaningful.

11. Hypertext poetry and related visual possibilities: Further developments include the use of hypertext to position the elements of the poem in two or three dimensions. It offers the possibility of other forms of order and the associated mnemonic possibilities. The elements of the displayed poem may also move. The poem can either involve set words, phrases, lines, etc. that are presented in variable order but sit on the page much as traditional poetry does, or it can contain parts of the poem that move and / or mutate.

12. Animated renderings of institutional programme agreements: Elsewhere a proposal was made to make use of the interactive multi-user SodaConstructor facility that enables animated structures to be built over the web (Animating the Representation of Europe Visualizing the coherenence of international institutions using dynamic animal-like structures, 2004). It was argued that such structures could be generated from a database of the line items of the budget of an international programme. SodaConstructor also offers the facility of associating sounds with the movement of such structures.

13. Sonification of web content and e-mails: This facility has been explored. The issue is the extent to which the sonification highlights new topics in a manner that is relevant to the user and whether this could be adapted to other texts. There are clearly resemblances to the detection of thematic content in emails for the purposes of displaying meaningful adverts (as with Google).

14. Statistical improbable phrases: Amazon.com notes for user consultation the "Statistically Improbable Phrases", or "SIPs", that arose as the result of scanning the content of books offered for sale. These are the most distinctive phrases in the text of books in Amazon's Search Inside! program. If this finds a phrase that occurs a large number of times in a particular book relative to all Search Inside! books, that phrase is a SIP in that book. SIPs are not necessarily improbable within a particular book, but they are improbable relative to all books in Search Inside!. Clearly this could be the basis for sonification cues, perhaps personalized by the user.

15. Sonification of hit lists and reference book pages: There is a case for exploring the sonification of search engine hit lists so that mouseover triggers comprehensible sonic feedback providing a semantic soundscape of the contents. A similar approach could be taken with reference book pages (eg Wikipedia), effectively giving each page a useful signature tune.

Possible texts for experiment

There are many focal texts that lend themselves to experiment with combinations of the above modules and processes. These might notably include:

- UN Universal Declaration of Human Rights. One example of a simple (non-aesthetic) enhancement of this text is the Universal Declaration of the Rights of Human Organization: an experimental extension of the Universal Declaration of Human Rights (1971)
References


Denis L. Baggi:

Robert S. Boas. DNA and Protein Music. Center for Genomics and Human Genetics, 2002 [resources]

Jordan Boyd-Graber. Semantic Poetry Creation Using Lexicographic and Natural Language Texts, 2000 [text]

Jim Carpenter. LTAG, you're it! 26 December 2006 [text]

Chris Chafe. A Short History of Digital Sound Synthesis by Composers in the U.S.A. [text]

Elizabeth M. Colechio and Sara K. Hartley. The Effects of Lyrics on Melodic Memory. 2003 [text]


Eva J. Egolf:
- Digital Storytelling With Music, 2007 [text]
- Setting Text to Music [text]


Karlheinz Eszl. Computer-aided Composition. 1991 [text]


Tom Hinkle. Symmys. [text; computer-generated poetry]

David Humphrey. Toward a Definition of the Code Poet [text]

Heiko Idensen. Poetry should be made by all: from hypertext utopias to cooperative net-projects netculture - cultural networks [text]

Anthony Judge:
- A Singable Earth Charter, EU Constitution or Global Ethic? 2006 [text]
- Ensuring Strategic Resilience through Haiku Patterns: reframing the scope of the "martial arts" in response to strategic threats, 2006 [text]
- Polarities as Pluckable Tensed Strings: hypercomprehension through harmonics of value-based choice-making, 2006 [text]
- Musical Articulation of Pattern of Tao Te Ching Insights: experimental sonification based on magic square organization, 2003 [text]
- Structuring Mnemonic Encoding of Development Plans and Ethical Charters using Musical Leitmotivs, 2001 [text]
- Knowledge Gardening through Music: patterns of coherence for future African management as an alternative to Project Logic, 2000 [text]
- Aesthetics and Informatics; the art of information for policy-making and community-building, 1999 [text]
- Poetry-making and Policy-making: arranging a marriage between Beauty and the Beast, 1993 [text]
- Aesthetics of Governance in the Year 2490 (Paper for the session on Governance at the 11th World Conference (Budapest, 1990) of the World Futures Studies Federation) [text]

Lazarus Corporation. Text manipulation, cut-up technique and computer generated writing links [text]

Jeffrey Little. The Babble Poems. *Mudlark* No. 22 (2003) (poems written in collaboration with the BABBLE text generator)

Nandy Millan. References on Computer Generated Poetry and Visual Arts [text]

Sergei Petoukhov. Music and genetic code, 2003 [text]
David Rosenboom. Propositional music: on emergent properties in morphogenesis and the evolution of music, 1997


United States Patent:
  - 7184949: Basic poetry generation. [text]
  - 4712174: Method and apparatus for generating text (Jackson D. Minkler, II. Computer Poet Corporation) [text]

Marius Watz. Resources Related to Computer-Generated Writing. 1997 [text]


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