Timing studies of read prose and poetry with parallels in music - a research proposal

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TIMING STUDIES OF READ PROSE AND POETRY WITH PARALLELS IN MUSIC - A RESEARCH PROPOSAL

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Abstract

A research project on timing relations in prose, poetry and music is outlined. In order to gain a deeper understanding of speech prosody, a comparison will be made of timing relations in such activities as reading of poetry and music performance, where there usually is a strong and obvious rhythmic patterning of the produced sound sequences. Also there are interesting parallels to be drawn by comparing the formal notations of prose, poetry and music. Generally, there are no simple relations between abstract notations and produced results, and notations have varied with tradition and particular needs. However, it is a challenge to tie descriptive systems closer to common human constraints in production and perception.

INTRODUCTION

We have recently extended our interest in speech prosody and rhythmical structures in reading to cover analogous phenomena in poetry, and also with an ambition to relate our findings to established knowledge of music structure and music performance, thus adding to the perspective of a common denominator - a common code.

We benefit from our close contacts with the music acoustics group at KTH (Sundberg, Frydén, & Askenfelt, 1983). In a recent article, Carlson, Friberg, Frydén, Granström, & Sundberg, (1987) compared their modelling of music performance with speech. We also rely on earlier work by Goude & Malmström (1968) and Goude, Malmström, Edlund, & Linde (1970), who have investigated the perception of rhythm in poetry and, furthermore, the work on rhythm at Uppsala University by Bengtsson & Gabrielsson (1983).

We thus have a general interest in the acoustic correlates of rhythmic performance in prose, poetry and music. Our main research objective is to model the prosodic structure of fluent speech, including individual variations of reading styles. The degree of rhythmicality, disregarding highly emphatic reading, varies considerably in speech, and is generally perceived at a rather intuitive level. A natural variation of stress pattern and speaking rhythm is essential for good speech synthesis quality.

In this paper, an outline for research will be made, as well as some comparisons between prose, poetry, and music.

The following three levels will form the basis in the comparisons between the three communication forms.

I communication form	II abstract notation	III signal representation
Prose (language theory)	Text (prose)	Speech
Poetry (language and metrical theory)	Text (verse)	Speech
Music (music theory)	Musical notation	Music performance

Table I.

In timing studies, with the focus on objective and subjective measures of rhythmical structures, a number of questions can be formulated, such as: what are the rhythmic entities in speech and music; what is the timing accuracy in the perception and production of a rhythmic pulse in read texts; what is the correspondence between rhythm and meter in read poetry, the relevance of the concept of rising and falling metres (e.g., containing iambic and trochaic feet, respectively), etc.

RHYTHMICAL CONSTRAINTS

How strict are the demands on rhythmic patterns in prose, in poetry and in music? The rhythmical demands in music are high for a number of reasons. In a collective musical performance, e.g., a common rhythm should not be difficult to follow. And, even if the rhythm changes with time, it should at least not be unpredictable.

In prose and poetry the demands are probably less, but there are texts with a strong rhythmicality, which has to be conveyed by the reader. However, it is not very clear what that means in terms of prosodic (durational) properties of the speech signal. Studies are under way.

THE FOOT CONCEPT IN PROSE AND POETRY

A difference between metrical foot (in poetry) and stress foot (in prose) is the formal placement of the starting point of a foot. In poetry, a metrical foot can either start with a strong or a weak syllable (trochaic vs iambic), while in prose the foot always starts with a strong syllable. The difference in durational properties between the two verse feet has been studied in a small pilot experiment (Fant & Kruckenberg, 1986) and will be continued.

RHYTHMIC PULSE ACROSS PAUSES

The rhythmic pattern across phrases (lines) is seldom treated in the analysis of read poetry. In music, the interval between musical phrases is still within the rhythmic pulse, and in the abstract notation it is possible to count the number of rhythmical beats across pauses. In practice, larger deviations may occur at those places, due to phrasing. We intend to look closer at the rhythmic pulse over the whole read poem, with the intention of also incorporating the pauses in the analysis.

SPECIFIC RESEARCH PLANS

The data bank material at KTH will be used. Prosodic correlates of different ways of reading, changes in tempo, clearness, emphasis, and speaking level will be investigated. We are presently using a method of correlating subjective ratings of perceived level of stress with durational measures, see a report in this volume (Fant, Kruckenberg, & Nord, 1989). Also recordings of a number of prose readings for a few other languages will be of interest in this perspective. Descriptions of languages as being stress-timed versus syllable-timed will be critically analyzed. Acoustic analysis will test the relevance of these terms.

By using a text-to-speech synthesis program it is also possible to get some indication of the range of variability that exists, which is crucial in the evaluation of analysis results (Carlson & Granström, 1975). Synthesis will also be quite useful in order to test rhythmic entities in poetry reading. In one study, musical notation will be tested as an alternative to metrical patterns on verse material. The naturalness and rhythmic impression of these synthesized verses with their timing pattern generated by means of "performance rules", that are used in the music research at KTH (see above), will be evaluated.

ILLUSTRATIONS

Examples of notation (II) and signal representation (III) of prose, poetry and music, using an excerpt from a Swedish poem (song) by B. Sjöberg (1973) will illustrate the content of Table I.

A poem, rewritten as a prose passage and a phonetic transcription:

Den första gång jag såg dig, det var en sommardag på förmiddan, då solen lyste klar. Och ängens alla

blommor av många hundra slag, de stodo bugande i par vid par.

[dɛnfˣœ̥ʂʈagˈɔŋjɑsˈoːgdɛjdɛvɑɛnsˣɔmɑɖˌɑːpɔfˣœrmˌɪdan...]

The poem with metrical analysis (iambic feet):

⌣ – |⌣ – | ⌣ – |⌣ (-)|| ⌣ – | ⌣ – | ⌣ – |
Den första gång jag såg dig , det var en sommardag
⌣ – |⌣ – |⌣ – |⌣ – |⌣ – |
på förmiddan då solen lyste klar,
⌣ – |⌣ – |⌣ – |⌣ (-)|| ⌣ – |⌣ – |⌣ – |
och ängens alla blommor av många hundra slag,
⌣ – |⌣ – |⌣ – |⌣ – | ⌣ – |
de stodo bugande i par vid par.

Music notation of the song (one note for each syllable):

Den förs·ta gång jag såg dig, det var en som·mar·dag på

förmiddan,då so·len lys·te klar, och äng·ens al·la blom·mor av

mång·a hund·ra slag, de sto·do bu·gan·de i par vid par.

DURATION ANALYSIS OF SPOKEN TEXTS AND PLAYED MUSIC

Duration analyses of spoken text and music perfomance, as described above, was made in a pilot experiment with one of the authors as a subject (LN). (Examples of simulated versions of text and music will be presented at the conference.)

In the first text version the aim was to adhere to the scanned rhythm indicated in the musical version of the poem. The text was sung in a scanned manner and a tapping was afterwards synchronized to what was perceived as the rhythmic pattern. The duration between taps, corresponding to the foot, starting with a strong beat, is marked with "+" in Fig. 1. As can be seen, the pattern is very stable, approximately 500 ms intervals, and the speech has accordingly been forced into a rhythmical pattern.

Foot duration for two productions of a text
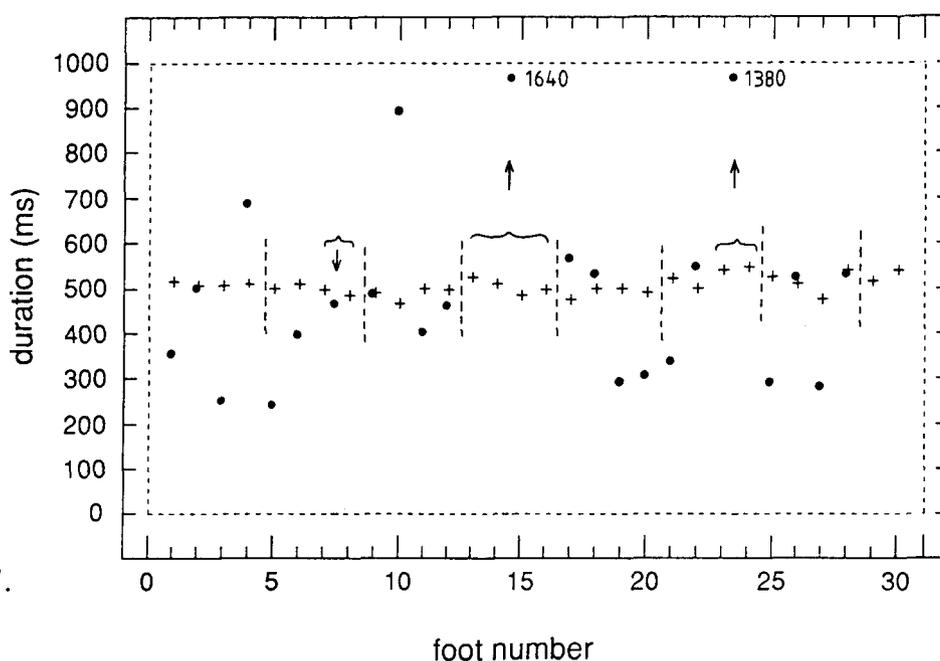
+ rhythmical singing, • prose reading

Fig 1.

foot number

Contrary to this pattern is the foot pattern of the prose-like reading (vowel onset to vowel onset of next stressed syllable), as indicated by "*", where the duration varies much more as a consequence of linguistic context (stress pattern and syntax), allowing for this type of variation.

The song was also played on a keyboard instrument according to the musical notation with a natural, not too exaggerated phrasing. The note-to-note durations are plotted in Fig. 2, not as absolute duration values, but as difference values in relation to the nominal lengths of the notes. A nominal value of 350 ms for one eighth note ($\flat$) was somewhat arbitrarily chosen, with respect to which shortened and prolonged notes appear as negative and positive values. Notes within a bar are connected with a thin line and the notes appearing on beat 1 and 3 in a bar are marked with circles (o) and stars (*), respectively. A typical effect, seen here, is the final lengthening of notes appearing at the end of a phrase (notes number 13, 23, 36, and 46)
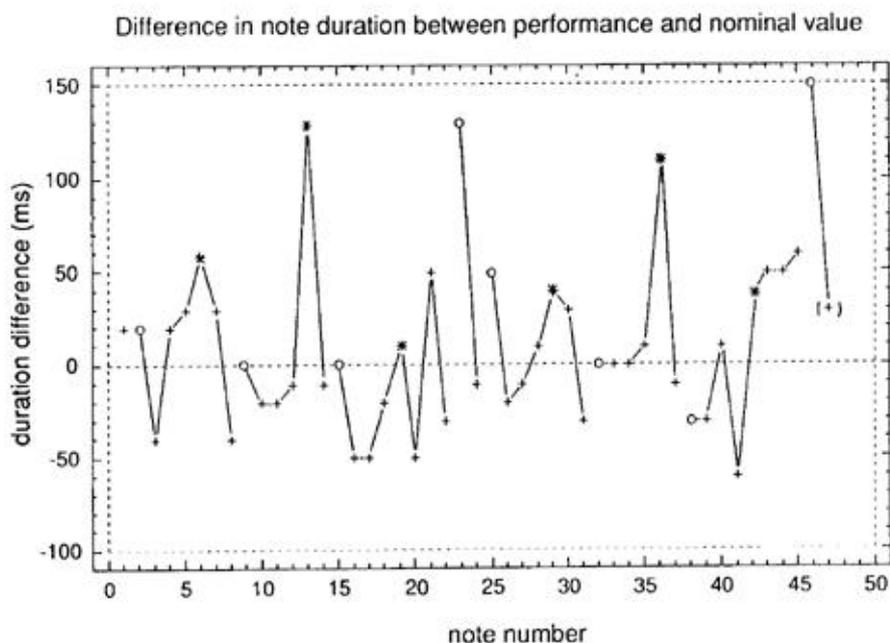
Difference in note duration between performance and nominal value

Fig. 2.

Acknowledgement

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