Timing in News and Weather Forecasts: Implications for Perception

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Abstract

The theme of the paper was prompted by common academic practice of listening to TV news: the tempo of speech seems to be accelerating. The aim of the research was to find out which of the following prosodic factors is responsible for creating the effect of fast tempo in TV speech: number of words per minute, number of accented words per minute, mean syllable duration, duration of uninterrupted speech unit, duration of pauses, phonation-to-pause ratio. Regional affiliation, genre and gender of speakers were also taken into account. The method consisted in testing these parameters on the authentic corpus of 26 texts produced by nine American newsreaders, normalized at one minute, and processed with Speech Analyser computer program. The results: the rate of delivery corresponds with data on normal articulation rate with regards to average syllable duration, but predictable re-structuring at the microprosodic level affects unaccented syllables shortening. The duration values of intonation units and pauses are exceptional when compared to data on interview, reading and spontaneous talk in English. Preliminary perception test is aimed at answering the question: How much of what the native speakers hear in news is actually perceived as information and how much is just a background noise?

1. Introduction: background

The goal of the present study is to find phonetic facts to account for the subjective impression of accelerating tempo in TV information programmes, news and weather forecasts. We are particularly interested in the techniques of time compression used by professional newscasters whose speech serves as 'an informal standard' of American English pronunciation [1].

In authentic speech analysis there are three aspects to consider:

- measuring tempo (parameters, reference points, ranges previously established for laboratory speech),
- differentiating socially distinctive factors (speaking styles, regional background, gender),
- correlating perception with phonetic facts.

Tempo, or speaking rate, is a complex phenomenon. The overall impression of fast, normal or slow tempo may depend on articulation rate and on proportional duration of silent pauses in speech. The relevant references for a medium range of articulation rate in English speakers are: Goldman-Eisler [2] representing it as being between 4.4 and 5.9 syllables per second, Lindblom [3] reporting the average duration of syllables as ranging between 160 and 200 msec, and Laver [4:542] suggesting, as a rule of thumb, that "a speaking rate of more than 240 words per minute would count paralinguistically as a notably fast speaking rate, and fewer than 160 as a notably slow rate".

Articulation rate, when measured in average syllable duration, can be discriminated for accented and unaccented syllables. Specifically English is the increase of the overall articulation rate at the expense of unstressed syllables shortening [5]. This may also affect the accented/unaccented syllables duration ratio: the higher the values, the more contrastive the accentual patterns are. The necessity to speak fast and clear at the same time may force newscasters to utilize the resource.

Speaking rates were reported to have no significant correlation with speaking styles (formal to casual) but varying, hypothetically, for individual sociolinguistic communities [4: 539-546]. Research on British English dialogue and radio play evidenced that 70% of syllables averaged at 180 ms for both registers [6].With reference to our own experimental data we can state that syllable duration increases with status (189 ms to 213 ms), social class (177 ms to 208 ms) and age (177 ms to 220 ms). Noteworthy is the fact that American English speech is slower compared with the British data: the average articulation rate being 227 ms in monologue and 308 ms in reading. Apart from a difference in the articulation rate the overall impression of slower speaking rate in American speech (in the South, for example) was supported by increase in the duration of pauses [7]. Thus we can assume that prosody may be acoustically diagnostic for social factors but, compared to previous perception tests data on laboratory speech, varying articulation rate values do not go beyond the range of "normal" or "medium" category. Thus on the strength of previous research results we can also assume that, perceptually, variations in articulation rate are not significant unless they are supported by a change in pause duration. This assumption was to be tested on the authentic material of newsreading.

Listening to news and weather forecasts is a daily routine experience for most of the people (around 80% reported to get the news from TV, not newspapers) but also a very brief one: only three minutes are taken up in the morning format by news read from the studio, normally by a man and a woman alternatively, and about five minutes when a correspondent's report is included. (Incidentally, commercials are just as long).This is probably the time when viewers-listeners have to concentrate their attention. The following cultural comment explains it: "Television sets in America are turned on in much the same way and for the same reasons that radios are, as background music and noise. Life does not stop in either case. Many morning and daytime programs are only viewed intermittently, while other things are going on and demand one's attention. The television set is only watched, in other words, when something interesting is heard" [8].The necessity to focus one's attention is one of the conditions necessary for listening to news. How successful are listeners in taking the message presented at such a (presumably) high rate? What part is played by prosody (pitch and articulation rate) in highlighting the relevant information? By describing these features accurately we can obtain a more realistic perspective for using news in second language teaching.

2. Corpus, method, procedure

Network English is described as a relatively homogeneous dialect that is frequently heard from professional voices on national network news and information programmes. According to Preston and Shuy, newsreaders have been traditionally selected from people either possessing Northern, North Midland or Western accent or specially trained to sound like this [9]. Other sources suggest that "broadcasters with network ambitions have tried to limit the regionalisms of their accent, but (...) local reporters and weather forecasters often retain their regional accents" [10]. Speaking rate variations might be caused by local community habits. This is especially interesting to observe in the case of people with mixed background: a well-known anchor in the Dallas station, for instance, was brought up in Illinois but spent most of her life in Texas.

The corpus includes samples from NBC, one of the three national commercial networks in the U.S.A., recorded in Boston and New York, and samples from two local morning news programmes videotaped in Philadelphia and Dallas. When checked against "A National Map of the Regional Dialects of American English" prepared for the Phonological Atlas of North America [11] the samples were classified into North-East, Midland and South groups. The videotaped corpus of authentic TV speech consisted of 26 items of news and weather forecasts, spoken by 9 people, five men and four women. The sum total for each speaker was normalized at one minute, transcribed and processed with Speech Analyser computer program.

The multi-level analysis of TV speech was done by means of auditory and acoustic (instrumental) analyses. Auditory analysis was carried out by

(a) two Russian University professors of English phonetics (marking intonation unit boundaries, pauses and accents in traditional notation),

(b) three educated native speakers of American English: a lawyer from Boston, MA, a cardiologist from Denver, CO and a theologist from Cleveland, OA (overall speaking rate assessment, rendering news items).

The acoustic parameters are:

(a) for articulation rate
- syllables per second
- syllable duration
- accented syllable duration
- unaccented syllable duration
- accented/unaccented ratio
- words per minute
- accented words per minute

(b) for overall speaking rate
- intonation unit duration
- pause duration
- frequency of pause type
- phonation/pause ratio

(c) for accentual prominence
- Fo max
- Fo min
- Fo interval.

The procedure of the preliminary listening comprehension test was as follows: there were three individual sessions, one for each of the three volunteers, native speakers of American English. The subjects were asked to listen to an audiotaped version of the 26 news items and render the messages, one by one. Each recorded news item was played only once, then the original recording was stopped, and its rendering was recorded. The total time of the original recording was around 10 minutes, an individual session lasted about 40 minutes. The renderings were transcribed and compared with the original tapescript. The words which were repeated or paraphrased by synonyms were counted. The subjects also gave their assessment of the overall speaking rate: they termed the news part "fast" and the weather part "very fast".

All the words which were repeated (or paraphrased) by the listeners proved to be accented in the original tapescript. Fundamental frequency measurements were taken for the words which were successfully reproduced in the renderings.

3. Articulation rate: normal but contrastive for accents

The basic findings are concerned with the articulation rates and the overall speaking rates differences in the parts they play in temporal discourse structuring.

In specialist literature the most common way of showing the difference in articulation rate is through the number of syllables in a time unit: normal tempo: 4 – 5.3 syllables / second, fast tempo: 5.6 – 6.7 syllables / second [2]. Our data give evidence that weather talk is characterized by 5.5 syllables / second, while news presentation is slower – 5.1 syllables / second. We can state that the tempo, according to these parameter values, is marginal for the weather talk, i.e. closer to fast, while news presentation tempo is normal.

Looking at regional variation we find that southern tempo is slightly slower than northern speakers' tempo but it is still safely packed within the category of "normal" or "medium": 5.1 syllables / second, just as northern and Midland speech: 5.3 syllables / second. Men and women group means are identical: 5.2 syllables / second (Table 1).

Table 1: *Articulation rate (syllables/sec) (genre, region, gender)*

genre	news	5.1
	weather	5.5
region	N-east	5.3
	Midland	5.3
	South	5.1
gender	men	5.2
	women	5.2

And, finally, mean syllable duration feature in information programmes lends itself for comparison with reading. According to John Laver, articulation range in reading is 180 – 200 ms. Our previous work data suggest that American (non-professional) reading is slower – 237 ms [7]. With these reference points to make the boundaries, American TV speech in information programmes appears to be faster than American non-professional reading: 199 ms vs. 237 ms but well within the normal tempo range for British English source.

With a closer look at each group of speakers we find nuances which are insignificant: news are slightly slower than weather forecasts: 202 ms vs. 194 ms, the south slower than the north

and Midland: 205 ms vs. 197 ms and 196 ms, with no gender difference: 200 ms vs. 188 ms (Table 2).

Table 2:*Articulation rate (syllable duration in ms) (genre, region, gender)*

genre	news	202
	weather	194
region	N-East	197
	Midland	196
	South	205
gender	men	200
	women	198

Whatever the nuances, we have to state with confidence that in the domain of the syllable, when averaged over the whole text, no special reserve for compression can be discovered: the articulation rate is normal.
It is more revealing when accented / unaccented syllable duration contrast is found. For American speech it has been reported at 1.6 for reading and 1.5 for talk [12]. In our corpus with average accented syllable duration being 281 ms, and the unaccented being much less – 162 ms, the ratio comes up to 1.8, the result normally reported for British RP speech with its clipped, pointed manner of talking (Table 3).

Table 3:*Accented / unaccented duration ratio (styles)*

reading	1.6 / 1
talk	1.5 / 1
TV info	1.8 / 1

It could be noted that genre and regional variation, however small, tends to show greater contrast in both the groups where tempo is expected to be faster (weather talk) or slower (south) (Table 4).

Table 4:*Accented/ unaccented duration ratio (genre, region, gender)*

genre	news	1.7 / 1
	weather	1.8 / 1
region	N-East	1.6 / 1
	Midland	1.8 / 1
	South	1.8 /1
gender	men	1.8 /1
	women	1.7 / 1

Higher accented / unaccented duration contrast testifies to the fact that, with the average syllable duration kept at the level of normal articulation rate, there is certain restructuring at the microprosodic level: accented syllables become longer at the expense of the unaacented ones, as was shown by Ilse Lehiste in her experiments [5]. There are two alternatives in accounting for the fact: one is that it is a way of quantitative reduction, and the other one is that it is a way of reinforcement, making the accentual pattern of a word more clear and, therefore, facilitating word identity in running speech.

4. Overall speaking rate

The first observation concerns the fact that news and weather forecasts texts are broken into bigger chunks of uninterrupted speech than was reported for other styles. For want of a better term we will use the conventional terminology of ‘intonation unit’, but with certain reservations. An intonation unit is generally agreed to be signalled by a terminal pitch movement, other cues being silent or filled pauses, final lengthening, rhythmic cohesion, change of tempo and pitch resetting [13:35]. In the present study we define an intonation unit as having a terminal pitch movement and an obligatory pause (which for other research works on intonation may prove to be optional).
The average intonation unit in the material under study is 2655 ms, which, compared to 1300 ms in an interview, sounds practically doubled.
A more detailed analysis will throw light on the differences in genres: news items have longer intonation groups than weather talks: 3055 ms vs. 1854 ms. The length of the intonation units increases as we move from north-east through Midland down to the south: 2225 ms, 2664 ms, 3075 ms. The nuances of gender differences are insignificant: 2622 ms for men vs. 2681 ms for women (Table 5).

Table 5:*Intonation unit duration (genre, region, gender)*

genre	news	3055 ms
	weather	1854 ms
region	N-East	2225 ms
	Midland	2664 ms
	South	3075 ms
gender	men	2622 ms
	women	2681 ms

Another parameter may be indicative of how much information is squeezed into a unit of time: it is the amount of words spoken in a minute (207 w/min) which for TV information programs proves to be closer to the speaking norm than to the reading norm as reviewed in John Laver’s book [4].
Our search for time compression proved to be more successful in the domain of pause. The four types of pause are: very short – up to 200 ms, short – 201 – 500 ms, unit – 501 – 800 ms, long – 801 – 1200 ms, very long – more than 1201 ms. In most of the information programmes we deal with the two competing pause types: short and very short (Table 6).

Table 6: *Pause distribution (in per cent) (genre, region, gender)*

Group / Pause		short	very short	unit
genre	news	54	40	6
	weather	30	70	
region	N-East	51	45	4
	Midland	26	72	2
	South	61	30	9
gender	men	47	49	4

	women	44	56	

Summing up the genre features in two types of TV information programmes we can give evidence that on the whole the tempo of weather forecasts is faster than in news.

5. Results: implications for perception

To sum up the data relevant for human perception input:
- information programmes are presented at normal articulation rate with mean syllable duration at 202 ms in news and 194 ms in weather, which corresponds to the range of normal tempo values at 5.1 syll/sec and 5.5 syll/sec;
- normal saturation, or normal spread, of verbal information expressed in words per minute, over the speaking time: 204 w/min and 210 w/min;
- accented and unaccented syllables are highly contrasted in length at 1.8/1 and 1.7/1 ratio which may be both a means of unaccented syllable shortening and a way of facilitating word recognition through its accentual pattern.

A challenge to the listener consists in the following:
- uninterrupted speech chunks, intonation units, are very long, twice as long as in interview, for instance: 3055 ms and 1854 ms;
- accented words which are the main information carriers are also doubled in number within the intonation unit, in comparison with spontaneous talk or interview: 5.2 accented words on the average versus 2-3 in other speaking styles;
- pauses are both rare and short, with the average pause being equal in length to a syllable in news and less than a syllable in weather forecasts: 217 ms and 144 ms respectively;
- time compression in TV information programmes results in absolutely specific phonation /pause time ratio: 14/1 in news and 13/1 in weather forecasts.

We should mention prosodic and structural means which help the listener pick out relevant information. These reinforcement techniques are:

- pitch variation which is acoustically correlated with a wide fundamental frequency range of professional newsreaders;
- accentual prominence of words reproduced by the subjects in our test was achieved by duration and Fo contrast between accented and unaccented syllables.

The subjects in the preliminary perception test which we carried out were successful at rendering the message of each information item, although they described the tempo as “fast” and “very fast”. The percentage of words they reproduced successfully varies from 35% in news to 24% in weather forecasts (Table 7).

Table 7: *Words reproduced in renderings (in per cent)*

Subject	1	2	3	Average
News	38.6	36.1	30.2	35.0
Weather	27.7	21.2	23.0	24.0

The test showed the ability of native speakers to receive and process the verbal message adequately, without the visual input, when given a pause to digest.

5. Conclusions

The results suggest that there are ways of temporal speech compression not used in any other speaking styles. Speech-to-pause balance is skewed towards increase of intonation units and decrease of pause time, while syllable time is normal.
Genre, region and gender of speakers may add the flavour of individual style in the manner of nuances which are unable to modify the directionality of the general trend.
Human beings need time to process and predict information in running speech. As listeners we cannot do without pauses. The authentic TV speech which we have analysed seems to challenge our perception capacities. Although perception capacities are reported to be higher than production capacities, in this style they appear to be brought to their limits. The professional broadcasters’ mastery of uninterrupted talk-short pause production and the listeners’ ability to process the information seem to have met. The strategy of the TV viewer-listener watching these programs in actual home environment may be only selective.

6. References

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