BEA – A MULTIFUNCTIONAL HUNGARIAN SPOKEN LANGUAGE DATABASE

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Abstract

In diverse areas of linguistics, the demand for studying actual language use is on the increase. The aim of developing a phonetically-based multi-purpose database of Hungarian spontaneous speech, dubbed BEA[2], is to accumulate a large amount of spontaneous speech of various types together with sentence repetition and reading. Presently, the recorded material of BEA amounts to 260 hours produced by 280 present-day Budapest speakers (ages between 20 and 90, 168 females and 112 males), providing also annotated materials for various types of research and practical applications.

1 Introduction

The creation of large speech databases with the help of computer technology has been called the "third revolution in the history of phonetics" in an opening address of a 2011 phonetics workshop at the University of Pennsylvania (http://www.ling.upenn.edu.phonetics/workshop/), the first two revolutions being the introduction of spectrographic analysis and that of computerized speech analysis software. Today, very large written and spoken databases are available in a number of languages; consequently, researchers can find answers to questions that, in the absence of relevant linguistic material, were simply unanswerable earlier on. A philological approach to texts does not have to be restricted to written corpora any more. In diverse areas of linguistics, the demand for studying actual language use is on the increase. Rule-based methods have been replaced by statistical ones in many cases as a result of the need to process very large quantities of data, a fact that has necessarily been accompanied by changes in researchers' attitudes, too.

Contemporary speech databases include structured sets of recordings and can be searched in a number of ways. Most of them are audio recordings but video recordings also exist (e.g. CUAVE: Patterson et al., 2002; Popescu-Belis et al., 2009). Nearly all databases include text files containing various levels of transcriptions of the recorded speech material. Databases can be classified in several ways – in terms of their respective aims, contents, written transcripts, circumstances

[2] The acronym BEA stands for the letters of the original name of the database: BEszélt nyelvi Adatbázis 'Speech Database'.

of recording, etc. (see e.g. Clark and Fox Tree, 2002). Some of them involve read texts, some contain spontaneous speech material, and some include both types of speech. Read materials usually involve parts of books, radio news items, word lists, etc. Spontaneous samples are recorded in laboratories, via telephone, or in field work, or else are selected from programs of the mass media; they may involve dialogues, conversations, narratives, real life situations (or their imitations), game situations, texts recorded using the map task method, etc. (see e.g. Anderson et al., 1991; Hennebert et al., 2000; Ruhi, 2011). Some of the large databases will be mentioned here. The British National Corpus is a collection including 100 million running words (Burnard and Aston, 1998). The London–Lund Corpus contains 50 dialogues and a mere 170,000 words (Svartvik, 1990). The (original) American English corpus CallHome includes 120 dialogues of 30 minutes on average, all of them family conversations via the phone. One of the earliest corpora was the Kiel Corpus, consisting of German spontaneous speech samples (Simpson et al., 1997). The HCRC Map Task is a database of mainly Scottish English speech involving 62 speakers and 18 hours of speech material using the map task (Anderson et al., 1991). The speech corpus of Stanford University called Switchboard (Godfrey et al., 1992; Calhoun et al., 2010) includes 2400 dialogues of 543 speakers (representing a number of American English dialects). TIMIT is used for training speaker-independent speech recognizers and includes 630 speakers reading 10 sentences each (Keating et al., 1994). The CSJ (Corpus of Spontaneous Japanese) contains 661 hours of speech by 1395 speakers including 7.2 million words (Maekawa, 2003). The Verbmobil database (Bael et al., 2007) has been developed with speech technological purposes in mind. Two databases representing seven European languages are EUROM1 and BABEL; their objective is to help the work of experts on speech acoustics, phonetics, digital signal processing and/or linguistics by providing recordings of various read texts (Chan et al., 1995; Vicsi, 2001).

As far as is known, a Hungarian database was first compiled by József Balassa at the beginning of the twentieth century; however, the material has been destroyed (see KKA 1994). In the 1940s, at the initiative of phonetician Lajos Hegedűs, dialect recordings started being made with the aim of recording speech, storytelling, magic formulae, etc. at various locations of the country; this material was archived in the late nineties on contemporary data carriers and made suitable for research in the Research Institute for Linguistics of the Hungarian Academy of Sciences (Gósy et al., 2011). The Budapest Sociolinguistic Interview (Budapesti Szociolingvisztikai Interjú, BUSZI) contains tape recorded interviews with 250 speakers (2–3 hours each) made in the late eighties (Váradi, 2003). The material has since been transcribed and encoded in computer files. The Hungarian telephone speech database MTBA is a speech corpus recorded via regular phone and cell phone in order to support Hungarian research and development in speech technology, containing read speech by 500 subjects (Vicsi et al., 2002; Vicsi, 2010). The HuComTech Multimodal Database contains audio-visual recodings (about 60 hours) of 121 young adult speakers that represent North-East Hungary (Pápay, 2011).

Speech databases usually contain some kind of written transcripts along with the recorded sound material. Depending on the area of utilization, such transcripts may be orthographic texts, phonemic (broad) transcriptions, or phonetic (narrow) transcriptions; they can include intonation and other suprasegmental details, etc. Along with individually developed systems, various kinds of universal and/or adaptable software are also available for providing transcripts (e.g. Praat: Boersma and Weenink, 2011; ToBI: Beckman et al., 2007). A complete system is offered by EXMARaLDA (Extensible Markup Language for Discourse Annotation: Schmidt 2009), specifically developed for the annotation of spoken language. The specifics of spoken language transcription, its degree of detail, form, and criteria may vary, depending on the aim or application involved (e.g. Grønnum, 2009; Maekawa, 2003). The fundamental difficulty of annotation resides in the fact that it is usually a single person (phonetician, linguist) who makes the transcription, hence the result unavoidably reflects, even if to diverse degrees, the transcriber's subjective perception (cf. Hunston, 2002). Transcription is a time consuming activity; its total duration includes a first listening to the given portion of text, several runs of repeated listening, preparing the written version of the given portion, its checking with repeated listening again, and correction (if any) by the primary transcriber or by another person.

The aim of the present paper is to provide an introduction to the development, results, and research possibilities of BEA, a spoken language database being developed at the Phonetics Department of the Research Institute for Linguistics of the Hungarian Academy of Sciences. This is the first Hungarian database of its kind in the sense that it involves many speakers, a very large amount of spontaneous speech material, with its transcripts and annotations of various levels, whose recording conditions are permanent and of studio quality. This structured collection of speech materials and their annotations makes directed search and the tabulation of data possible.

2 The development of the BEA database

Phonetic analyses in the strict sense, and linguistic analyses of a looser kind, that is, a multi-aspect research on spontaneous speech, made it necessary to develop a multifunctional database that can serve as a basis for both theoretical and applied studies. On the basis of experiences with existing corpora and databases, the development of BEA began in 2007. The long-term aim was recording speech from 500 speakers with gender and age proportions as well as level of schooling being represented in a balanced manner. In designing the contents (protocols) of the database we took the needs of the above research areas into consideration, we applied the most up-to-date recording techniques available when the data collection was started, and observed sociological factors to some extent (although this was not a primary consideration). At the same time, we started devising the transcription strategies and methods of data search to be made available. The long-term aim here is to provide a fully annotated and structured speech database. (In the development

of this database, the requirements of “Ethical Regulations of Experimental Research in Linguistics Involving Human Subjects” of the Research Institute for Linguistics of the Hungarian Academy of Sciences have been strictly observed in all respects.)

At the time of writing, the total recorded material of BEA is 260 hours, meaning approximately 3,300,000 running words. The shortest recording lasts 24 minutes and 27 seconds, the duration of the longest is 2 hours, 24 minutes and 47 seconds; the average length is 52 minutes. Two recordings are longer than 2 hours while 4 of them shorter than half an hour. There majority of them appear between 40 and 60 minutes (Figure 1).

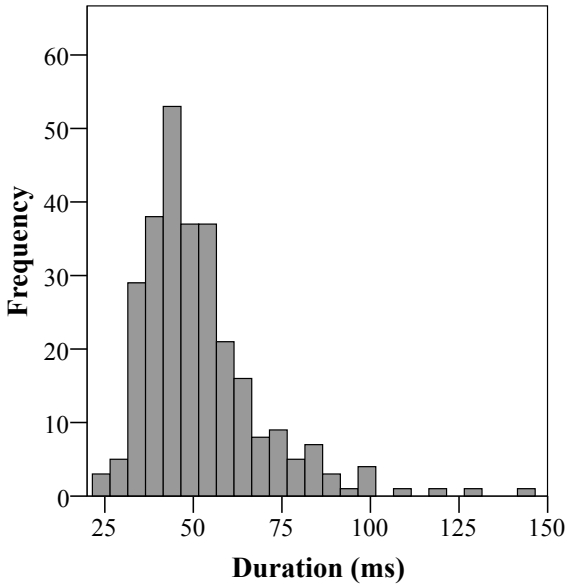

Figure 1. Various durations of recorded speech samples per speaker

2.1 The recording protocol of the BEA database

The database primarily contains spontaneous speech materials, but for the sake of comparisons, it also includes sentence repetitions and read texts. The protocol consists of six modules, labeled narrative, opinion, précis, conversation, sentence repetition, and reading. Various types of spontaneous speech are recorded with each of the subjects. 1. Narratives are about the subject’s life, family, job, and hobbies; they are more or less continuous monologues. 2. Opinions (that are mainly narratives, too) are requested about a topic of current interest, provided by the interviewer. The topics include getting one’s driver’s license, zero tolerance to the consumption of alcohol while driving, prospective price increases, marriage contract, climate change, violence against teachers, traffic in Budapest, home birth, online vs. traditional libraries, animal protection laws, small children’s use of cell phones, reading habits, mountains of debt, no smoking in public places, fat tax. The interviewer tries to make sure that the subject speaks fluently for as long as possible,

but this communicative situation requires that the interviewer also makes a point every now and then; hence dialogue-like situations may also arise. (The interviewer invariably tries to assume a standpoint that is opposite to that of the subject.) 3. Précis (summary of content) is in fact directed spontaneous speech. The subject hears a recorded text and then s/he has to summarize its content in his/her own words. One of the texts is a short item of popular science (174 words; 1 minute and 37 seconds), the other one is a funny story (270 words; 2 minutes and 5 seconds); both were recorded with an average female speaker. 4. In the conversation module, there are three participants: the subject, the interviewer, and a third person. The topics vary, but invariably concern everyday life; they have to differ from that of the opinion module of the same subject. Some conversation topics are: New Year's Eve, wedding experiences, job hunt, drug cultivation in one's home, Easter, marriage vs. cohabitation, secondary school final exams, summer holidays, preparations for Christmas, gas crisis in Europe, school violence, keeping pets in an apartment, the effect of economic crisis on culture, subway construction, legalization of light drugs, theatrical life, students' rights, women's careers, bringing up children, cycling as a form of traffic, concerts, the value of a university degree, etc. Topics for the opinion and conversation modules are selected by the interviewer in accordance with the subject's age, job, and area of interest (based on the narrative module). 5. The material for the sentence repetition module consists of 25 simple or compound sentences (e.g. *A farsangi bálban mindenkinek szép jelmeze volt* 'At the carnival dance, everyone wore nice fancy dresses'). The sentence is read out by the interviewer, and the subject has to repeat it immediately after a single hearing. (If the repetition is unsuccessful, the sentence may be read again by the interviewer.) 6. According to the protocol, the subject finally reads two texts aloud. One of them consists of the 25 sentences that the subject had to repeat earlier, the other one is an article taken from popular science.

2.2 Recording conditions

Recordings are invariably made in the same room, under identical technical conditions: in the sound-proof booth of the Phonetics Department, specially designed for the purpose. The size of the room (not counting the sound damping layer on the walls) is 340x210x300 cm. The degree of sound damping as compared to the outside environment is 35 dB at 50 Hz, and ≥ 65 dB above 250 Hz. The walls of the room are provided with a sound-absorbing layer in order to avoid reverberation. The way to the corridor is closed by double doors, with 30 cm distance in between; both doors can be opened and closed separately and are of a sound damping quality. The inner door has special noise insulation. The recording microphone is AT4040. Recording is made digitally, direct to the computer, with GoldWave sound editing software, with sampling at 44.1 kHz (storage: 16 bits, 86 kbytes/s, mono). The total size of recordings at present amounts to 71 GB; they are archived also on DVDs and on six external HDDs. In 95% of all recordings, the interviewer was the same young woman. The third participant of conversations was a young man or a young woman (researchers of the department).

3 Subjects

The number of subjects at present is 280; they are all monolingual adults from Budapest, not one of them reported any hearing disorders. At the moment, materials from 168 female and 112 male speakers are available. Their ages range between 20 and 90 years (Figure 2). In the future, as already noted, we will aim at a more balanced representation of age groups.

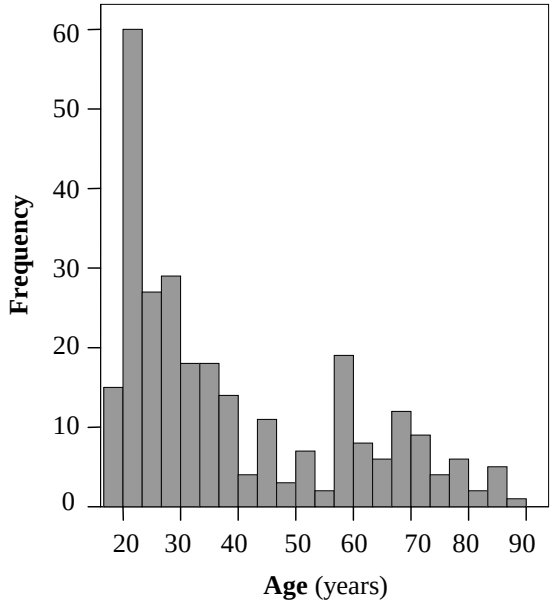

Figure 2. The distribution of BEA speakers by age

The recordings are anonymized (the speakers are given codes); they can be polled without identifying the given speaker. For each recording, the following data are documented: the subject's age, schooling, job, stature (height), weight, whether s/he is a smoker, and the topics of the spontaneous speech modules. Of the current group of subjects, 51 are smokers, 4 are ex-smokers (and 225 are non-smokers). 10 subjects completed 8th grade, 117 completed 12th grade (have taken secondary school final exams), 2 subjects have vocational degrees, and 161 have college/university degrees. Their jobs are extremely varied, including the following: district nurse, engineer, teacher, cleaner, teacher of children with disabilities, car mechanic, stoker, actor, office worker, paramedic, university student, media worker, payroll clerk, singer, housewife, organ builder, civil servant, tailor, physician, information specialist, store man, unemployed person, caretaker, economist, graphic artist, lifeguard, welder, delivery-man, priest, garden builder, poker player, scriptwriter, tile stove builder, nurse, game developer, real estate broker, etc.

The speaker's height and weight may be more or less closely related to his/her speech ('stature harmony', see Gósy, 1999). In some (applied) research and practical

applications (e.g. forensic phonetics), the estimability of weight and stature may be important (Figure 3).

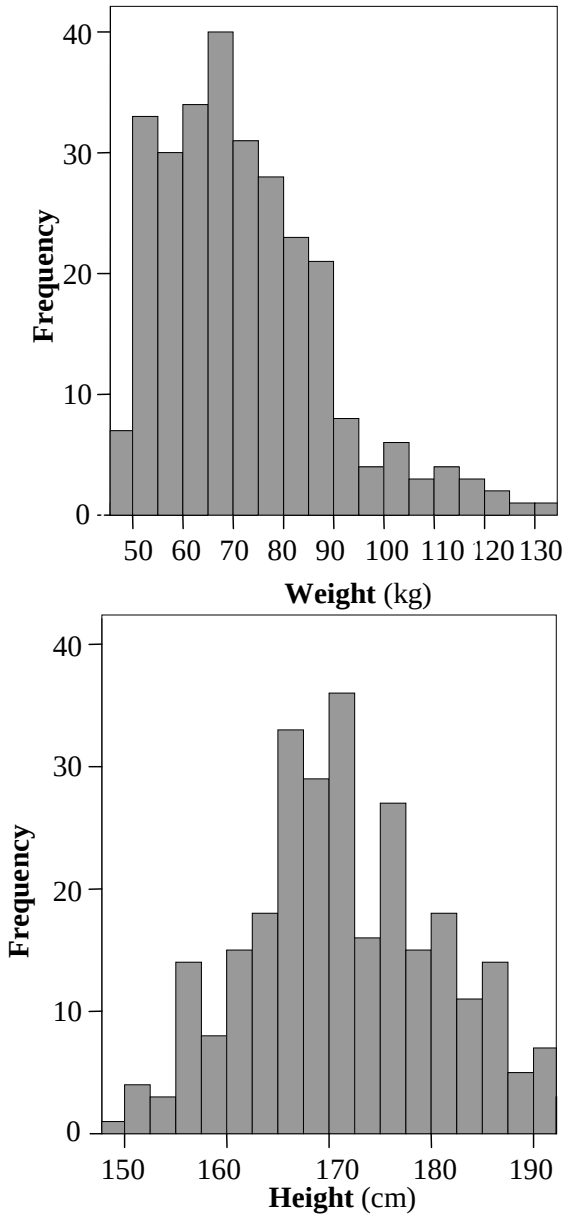

Figure 3. The distribution of BEA speakers by body weight and by stature

4 Transcription and annotation

The transcription of BEA materials is done at several levels. This fact makes it possible for the researcher to choose the most suitable level and use it in her/his

work. Transcripts of the various levels furthermore allow for gradualness from cursory overview to detailed annotation. At present, the following types of transcripts serve linguistic research and speech technology purposes.

1. Primary transcription in orthography but without punctuation. Transcribers use Microsoft Office Word (.doc format). The participants are uniformly abbreviated as A (subject), T1 (interviewer and first conversation partner), T2 (second conversation partner). According to the transcription regulations (see Gyarmathy and Neuberger, 2011), only proper names are capitalized, while phenomena that might be important in later phases are marked: disfluencies (bold), physiological and other nonverbal noises like laughter (exclamation mark), as well as speaking simultaneously (parentheses). The transcription uses emboldening for all nonstandard/erroneous forms; if the speaker does not add any correction, the transcriber adds the expected form in square brackets: *érzezzük* [érezzük] *magunkat* 'we have a grood [good] time'. Disfluency phenomena are uniformly marked: lengthening by doubling the given letter, hesitations (filled pauses) by triple letters (e.g. *öööö* 'er', *mmm* 'mmm'), and pauses, when perceived, by square marks (□) and non-verbal sounds by exclamation marks (!). All disfluency phenomena are written in bold letters. The transcription manual includes rules for transcribing words that occur as colloquially used but not in their dictionary form (e.g. *asszem* instead of *azt hiszem* 'I think'), foreignisms, abbreviations, acronyms, and forms that the transcriber finds unintelligible (enclosed between **) (see Figure 4). Transcriptions furthermore include duration data for the whole recording and for each module separately. Approximately 63% of the BEA database has so far been provided with accompanying primary transcripts.

az azt figyeltem meg hogy ! hogy akik **öööö** mondjuk így vezetgetnek **öööö** □ **öööö** egy-egy pohár alkohollal azok nem nagyon tudják megállni az egy **s** [sört] egy pohár sört hanem akkor betesznek mellé még két unikumot [unicumot] meg ! három pohár **öööö izé mmm** □ mit tudom én **mmm** □ királyvizet és **akkor** ! **akkor** az már nagyon erős

'I I noticed that ! that people who **er** say tend to drive their cars **er** □ **er** with a glass of alcohol or two they cannot easily stop with one **b** [beer] one glass of beer but they add two shots of Unicum and ! three glasses of **er whatsit mmm** □ how should I say **mmm** □ aqua regia and **then** ! **then** that is very strong indeed'

Figure 4. Sample fragment of conversation in primary transcription

Primary transcriptions have advantages and disadvantages. It is a good thing that the whole protocol can be included in a single file (per speaker), and thus words, word boundaries, nonverbal phenomena, etc. can easily be searched (automatically) in the transcript. What is not so good is that the transcript is difficult to synchronize with the sound material: it takes some time and some practice.

2. Annotation. This form of transcription is a kind of visual display of spoken texts and some further pieces of information related to them in a way that the written text and the actual recording can be displayed/listened to simultaneously. This is made possible by software like Praat and Transcriber. Praat is a complex acoustic signal processor, making annotation possible among other functions (Boersma and Weenink, 2011). The Transcriber program has been specifically developed for segmenting, labeling and transcribing spoken texts (see trans.sourceforge.net). Both programs have a user-friendly graphic interface and can use a number of platforms (Windows, Unix) (see Allwood et al., 2003; Weisser, 2003). As these are both English-language software programs, the controller interface (as well as the automatic labels in the case of Transcriber) appears in English. By default, transcribed texts can be stored and managed in .txt/TextGrid data files in Praat, and .trs files in Transcriber.

In Praat, phrases are defined as portions of speech between silent pauses (the latter identified by perceptual and visual information). In addition, turns (turn taking and turn yielding), background channel signals and the various types of pauses are also indicated. Transcription is primarily done in orthography without punctuation. Several types of annotation can be displayed in Praat (for an example see Figure 5).

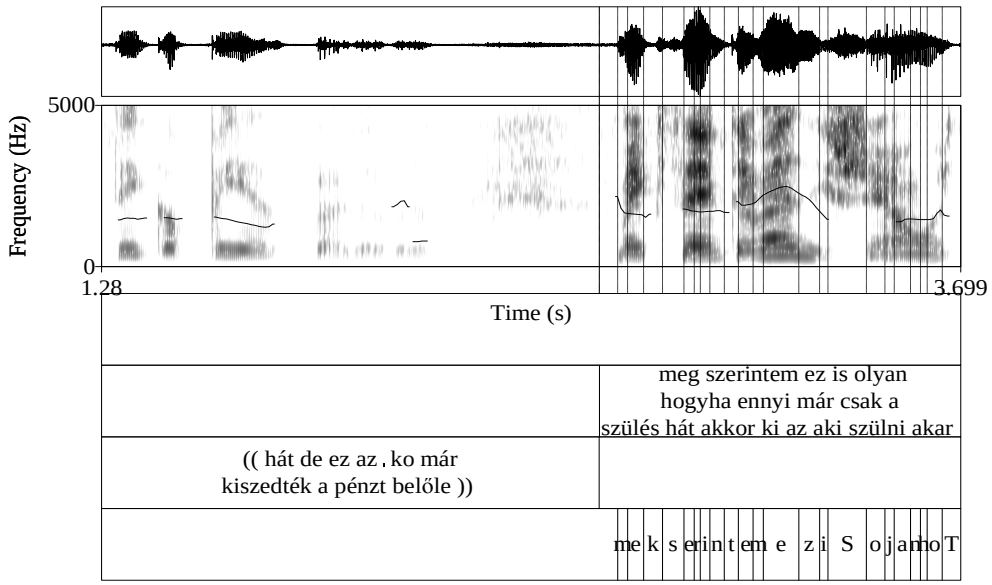

Figure 5. Sample annotation in Praat (the spectrogram shows the speech fragment ték a pénzt belőle meg szerintem ez is olyan hogy ‘took the money out and I think this is again so that’)

The vertical lines shown are segment boundaries. The sound level annotation occasionally uses capital letters (e.g. S stands for [ʃ]); this follows from the use of the automatic segmentation program (MAUS, cf. Beringer and Schiel 2000). Cases

of simultaneous speech, as well as unintelligible or hardly intelligible portions, are indicated by double parentheses. Some 10% of the recordings of the BEA database have been annotated so far in Praat; ten interviews are labeled at the phrase, word, and sound levels.

The Transcriber program allows for the segmentation, labeling and description of speech, especially for speech technology applications. The sound material and the written text can both be simultaneously made visible and audible here, too. The software supports several types of audio files (.au, .wav, .snd). Transcriber is also suitable for the automatic labeling of silent pauses, hesitations, as well as of other, non-speech vocalizations (e.g., coughing, laughing, and other noises) (Figure 6). Segmentation is done in terms of phrases, with their boundaries located at the middle of the silent pause between two phrases (the length of silent pauses is not shown but those thought to be longer than usual are indicated by the label [sil], cf. Gyarmathy and Neuberger, 2011). When the sound file is opened, the bottom of the display shows the oscillogram with single-level labeling below it (this is where vertical lines indicate segment boundaries) and a surface for typing in texts (indicating speakers, topics, etc.) above it (occupying most of the screen). In Transcriber, labeling is done in orthography; but in some cases (e.g. acronyms, foreign words, or old family names) pronunciation can be indicated, too. At present, 40% of all BEA recordings are annotated in Transcriber. There is about 5% overlap between the annotated speech samples of Praat and Transcriber.

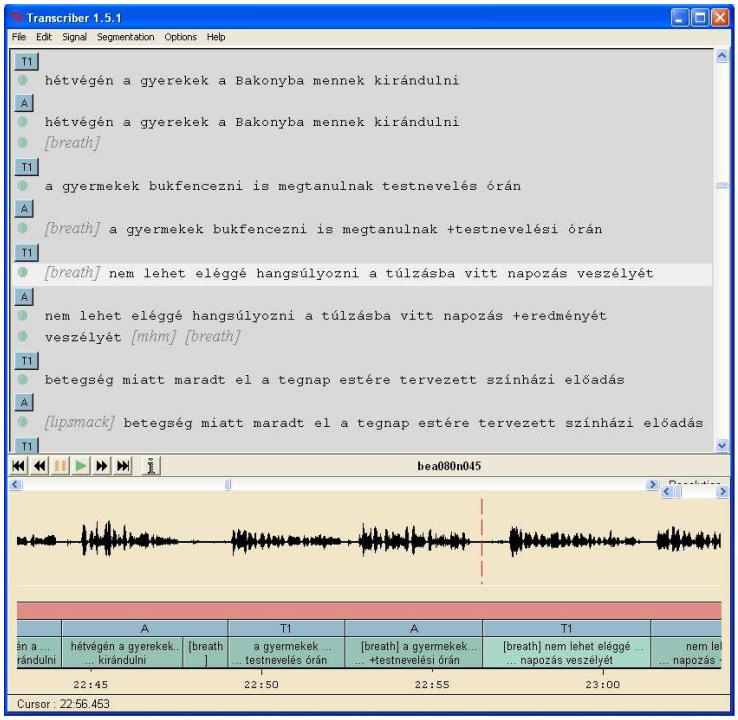

Figure 6. User's interface of Transcriber

References

Ahrens, B. 2005. Prosodic Phenomena in Simultaneous Interpreting: A Conceptual Approach and its Practical Application. *Interpreting* 7(1), 51-76.

Andrews, D. R. 1999. *Sociocultural perspectives on language change in diaspora: Soviet immigrants in the United States*. Amsterdam: John Benjamins.

Barik, H. C. 1972. Interpreters Talk a Lot, Among Other Things. *Babel* 18(1), 3-10.

Barik, H. C. 1973. Simultaneous Interpretation: Qualtitative and Linguistic Data. *Language and Speech* 16(3), 237-270.

Boersma, P. and Weenik, D. 1998. *Praat: doing phonetics by computer* (Version 5.0.1), http://www.fon.hum.uva.nl/praat/download_win.html.

Bóna, J. and Imre, A. 2007. A hangsúlyeltolódás hatása a beszédfeldolgozásra. [The effects of stress shift on speech perception.] *Beszédkutatás 2007.* 75-82.

Collins, B. and Mees, I. M. 2008. *Practical Phonetics and Phonology*. London: Routledge.

Cutler, A. 1980. Errors of stress and intonation. In Fromkin, V. A. (ed.): *Errors in Linguistic Performance. Slips of the Tongue, Ear, Pen, and Hand*. New York–London: Academic Press. 67-80.

Cutler, A. 2008. Lexical Stress. In Pisoni, D. B. and Remez, R. E. (eds.): *The Handbook of Speech Perception.* Malden, MA–Oxford: Blackwell Publishing. 264-289.

Cutler, A., Dahan, D. and van Donselaar, W. 1997. Prosody in the comprehension of spoken language: A literature review. *Language and Speech* 40, 141-201.

Cutler, A. and Ladd, R. D. (eds.) 1983. *Prosody: Models and measurements.* Berlin–Heidelberg–New York–Tokyo: Springer.

Fónagy, I. 1958. *A hangsúlyról.* [On stress.] Budapest: Akadémiai Kiadó.

Goldman-Eisler, F. 1972. Segmentation of Input in Simultaneous Translation. *Journal of Psycholingusitic Research* 1(2), 127-140.

Gile, D. 1995. *Basic Concepts and Models for Interpreter and Translator Training*. Amsterdam, Philadelphia: John Benjamins.

Gósy, M. 2002. A hangsúlyeltolódás jelensége. [The phenomenon of stress shift.] In Balázs, G., A. Jászó, A. and Koltói, Á. (eds.): *Éltető anyanyelvünk.* Budapest: Tinta Könyvkiadó. 193-198.

Gósy, M. 2004. *Fonetika, a beszéd tudománya.* [Phonetics] Budapest: Osiris Kiadó.

Hardcastle, W. J. and Laver, J. (eds.) 1999. *The Handbook of Phonetic Sciences.* Oxford: Blackwell.

Kálmán, L. and Nádasdy, Á. 1994. A hangsúly. [The stress] In Kiefer, F. (szerk.): *Strukturális magyar nyelvtan 2. Fonológia* [A Structural Grammar of Hungaran 2. Phonology]. Budapest: Akadémiai Kiadó. 393-468.

Keszler, B. (ed.) 2000. *Magyar grammatika* [Hungarian grammar.] Budapest: Nemzeti Tankönyvkiadó.

Laver, J. 1994. *Principles of Phonetics*. Cambridge: Cambridge University Press.

Lee, T.-H. 1999. Speech proportion and accuracy in simultaneous interpretation from English into Korean. *Meta* 44(2), 260-267.

Levelt, W. J. M. 1989. *Speaking: From Intention to Articulation.* A Bradford Book. Cambridge (Massachusetts)–London (England): The MIT Press.

Mennen, I. 2004. Bidirectional interference in the intonation of Dutch speakers of Greek. *Journal of Phonetics* 32, 543-563.

Nooteboom, S. 1999. The prosody of speech: Melody and rhythm. In Hardcastle, W. J. and Laver, J. (eds.): *The Handbook of Phonetic Sciences.* Oxford: Blackwell. 640-674.

Olaszy, G. 2002. Predicting Hungarian sound durations for continuous speech. *Acta linguistica Hungarica* 49(3-4) 321-345.

Paradis, M. 2000. Prerequisites to a Study of Neurolinguistic Processes involved in Simultaneous Interpreting. A Synopsis. In Dimitrova, E. and Hyltenstam, K. (eds.): *Language Processing and Simultaneous Interpreting: Interdisciplinary Perspectives.* Amsterdam, Philadelphia: John Benjamins. 17-24.

Roach, P. 1992. *English Phonetics and Phonology.* Cambridge: Cambridge University Press.
Romaine, S. 1989. *Bilingualism.* Oxford: Blackwell Publishing.
Rossi, M. 1971. Le seuil de glissando ou seuil de perception des variations tonales pour les sons de la parole. *Phonetica* 23, 1-33.
Shlesinger, M. 1994. Intonation in the production and perception of simultaneous interpretation. In Lambert, S. and Moser-Mercer, B. (eds.): *Bridging the gap: Empirical research in simultaneous interpretation.* Amsterdam: John Benjamins. 225-236.
Spiller, E. and Bosatra, A. 1989. Role of the Auditory Sensory Modality in Simultaneous Interpretation. In Gran, L. and Dodds, J. (eds.): *The Theoretical and Practical Aspects of Teaching Conference Interpretation.* Udine: Campanotto Editore. 37-38.
Szende, T. 1995. *A beszéd hangszerelése. Idő, hangmagasság, hangerő és határjelzés a közlésben* [Time, pitch, volume and boundary marking in utterances]. Budapest: MTA Nyelvtudományi Intézet.
Toury, G. 1995. *Descriptive Translation Studies and beyond.* Amsterdam: John Benjamins.
Vaissière, J. 2008. Perception of Intonation. In Pisoni, D. B. and Remez R. E. (eds): *The handbook of Speech Perception.* Malden, MA–Oxford: Blackwell Publishing. 236-263.
Varga, L. 1985. Intonation in the Hungarian sentence. In Kenesei, I. (ed.): *Approaches to Hungarian. Volume one. Data and descriptions.* Szeged: JATE. 205-224.
Varga, L. 2000. A magyar mellékhangsúly fonológiai státusáról. *Magyar Nyelvőr* 124, 91-108.
Williams, S. 1995. Observations on anomalous stress in interpreting. *The Translator* 1(1), 47-64.