A comparative analysis of mother-tongue and foreign language speech perception, lexical access and speech comprehension processes of 11- and 12-year-old schoolchildren

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Introduction

Crucial to the success of human verbal communication and cognitive development are several closely interrelated but nevertheless relatively autonomous and complex mental operations which psycholinguists have termed speech processing (perception and comprehension) and speech production. The ability to understand and be understood in a conversation is a seemingly effortless, automatic and spontaneous process, which demands a minimum of one’s cognitive resources. Psycholinguistic literature, however, underlines the active nature of these abilities (Bond & Garnes, 1975; Scovel, 1998); verbal communication consists of consecutive stages of automatic, semi-automatic and conscious mental operations functioning in continuous interaction (Gósy, 2000a). The dissertation analyses the characteristic features of the speech decoding process in first language acquisition and foreign language learning.

1. Processing or decoding speech (henceforth: the decoding mechanism) can be divided into two separate components: perception and comprehension. Speech perception is the term for the recognition and identification of the smallest meaningless units of the spoken language (speech sounds and their combinations). Speech comprehension involves the understanding and interpretation of meaningful linguistic units, e.g. words, sentences and texts (Gósy, 1999:61, 2000a; for further definitions see Pisoni & Sawush, 1975; Clark & Clark, 1977; Garman, 1990; Pléh, 1998; Gósy, 2004).

2. The dissertation analyses speech perception and comprehension within the framework of the three-componential, hierarchical, interactive decoding model. The entire process is represented in terms of interconnected levels of analysis, which also correspond to the degrees of linguistic abstraction (Massaro, 1987; Pisoni & Luce, 1987; Lengyel, 1994). These components work in cooperation to ensure the understanding of the spoken message. The psychological relevance of the model is strengthened by its incorporative nature; in the final comprehension and interpretation of the message extra-linguistic information is also taken into account (Banczerowski, 1994). The test package (Gósy, 1995; Gósy, 1997b) used in the experiment below was compiled in accordance with this theory.

The model is based on the hypothesis of gradual (bottom-up) perception (Gósy, 1990-91; 1999, 2000a; 2005; see Figure 1). That is, the processing of the speech signal starts with a preliminary auditory analysis, which is followed by recognition, identification and interpretation on the following consecutive and interrelated levels: acoustic, phonetic, phonological; syntactic, semantic and association levels, which together compose perception, comprehension and interpretation. Lexical access mediates between the stages of perception and comprehension. The decoding task (involving e.g. the size and character of the input) determines the way these levels are activated (Gósy, 1997a).
The hierarchical, interactive model of the speech decoding process and the corresponding subtests of the GMP test package

3. The model above illustrates all general features of the speech decoding mechanism. One of the central issues in second and foreign language acquisition (SLA) research is whether a single language learning mechanism is flexible enough to cope with differences in external setting (the learning situation, the age and linguistic awareness of the learner, etc.). Do L2 learners use two qualitatively different processing systems for the L1 and L2 or the same perception, comprehension and production mechanisms?

Though several models describing the relationship, the similarities and differences between L1 and L2 acquisition have been outlined in SLA research (see e.g. Krashen, 1981; Skehan, 1989; White, 1989; Gass & Selinker, 1994; Sharwood Smith, 1994) not one details similarities and differences in the L1 and L2 decoding processes. Recent findings suggest that L1 or a previously learned language transfer can occur in all linguistic subsystems of both comprehension and production in the target language, and can have a facilitating/ inhibiting/ modifying effect on L2 acquisition. The likelihood of native language influence is affected by the typological distance between the languages involved and by several interacting non-structural, extra-linguistic factors (Ellis, 1997; Odlin, 1989; Kilborn, 1994; Bárdos, 2002), such as different social and psychological conditions.

In other words, there is an interdependence between the first and second languages because acquiring one’s first language gives one a certain "routine" or experience, strategies and metacognitive skills, which can be generalised to subsequent languages, but there are also language-specific constraints in L2 perception and comprehension (McLaughlin, 1990).
Research questions and hypotheses

The dissertation is aiming at gathering empirical evidence about the relationship between the L1 (Hungarian) and L2 (English) decoding mechanisms of the same Hungarian schoolchildren.

1. Are the mental operations of the perception and comprehension of speech driven by universal, general features or language-specific ones?
2. Is there a significant interdependence between the L1 and L2 decoding processes of the same children? Can one expect a positive correlation between the quality of perception and comprehension in the mother-tongue and the foreign language?
3. Does the acquisitional setting (natural or instructed) influence the decoding process to any extent? Can the perception and comprehension of the same language as L1 and L2 be described with similar or different features? (To test this question a group of native English children also participated in the experiment.)
4. Do the children’s L1 or L2 decoding performances reflect the hierarchy of gradual perception and comprehension detailed in the theoretical framework of the study (see Figure 1.)?
5. The investigation also covered some linguistic or extra-linguistic factors and their impact on the decoding process (e.g. age, gender, levels of literacy, grades and achievements in different subjects, the time of exposure to the target language, etc.).
6. What conclusions can we draw from the research findings for the field of psycholinguistics, L1 and L2 acquisition and teaching?

In addition, the study is a detailed description of the perceptual and comprehension processes of children reaching the age at the end of the critical period of language acquisition, the topic of whom has not yet been fully investigated.

According to our hypothesis

1. Apart from universal features of speech processing, language-specific ones are not to be underestimated.
2. Obviously, a significant quantitative difference can be expected between the Hungarian subjects’ L1 and L2 performances, still a lot of qualitative similarities are to be found.
3. The weaker the decoding abilities of a child are in the L1, the lower performance he/she will give in the L2. That is; well-developed L1 perception and comprehension abilities are a prerequisite for successful foreign language acquisition.
4. The effect of the way of L2 development (school setting) is also detectable, e.g. in the development of the L2 mental lexicon.
5. The hierarchical nature of speech decoding is completely reflected in the mother-tongue and maybe in L2.
6. L2 learners tend to map their first language perception and comprehension experience and strategies onto the second language rather than developing new ones adjusted to the features of the target language.
7. Gender, age and other factors interact strongly with the outcome of speech perception and comprehension.

The findings and conclusions of the study may have direct application to first language acquisition and development, language pedagogy and the methodology of language teaching.
Subjects and method

1. Subjects

The subjects of the experiment were 11- and 12-year-old native Hungarian primary school children with normal processing, mental and hearing abilities from a Hungarian provincial capital (Veszprém). At the time of testing (2000-2002) these 200 students were attending either the 5th or 6th grades of junior school and had been learning English mainly at school for at least two years, for the same number of hours each year (thus meeting the requirement for testing). The age difference as well as the difference in time spent studying English as a foreign language between the two tested subgroups was an average of one year. We aimed at testing an equal number of subjects in each age group (100/100) and at the same gender distribution (50% boys and 50% girls). The reason why this particular age group was chosen is that generally by this age basic decoding errors in native language do not occur. Thus we can get a more nuanced picture of the speech decoding mechanism (L1) and implicitly of the general learning processes of children reaching the end of the critical period in language acquisition. The testing of two subgroups with only one year of difference in age offers a comparison of L1 speech decoding abilities at an age when age-specific differences are no longer expected. The choice of subjects was also guided by the fact that research carried out on the operation of the speech perception and comprehension mechanisms near puberty is scarce. In addition, a comparison of the two subgroups provides valuable information on the relationship between native language awareness and foreign language learning and the correlation between success in language learning and classroom hours invested.

A control group of twenty 11-year-old native English speakers from Princethorpe Junior School (Birmingham, UK) took part in the experiment as well. These children had no foreign language experience at the time of testing. Their GM Peng (L1) results can be compared with both the 5th-grade Hungarian children’s GM Peng (L2) results (the same biological age) and the 6th-grade Hungarian children’s L2 results (the same number of years at school). Table 1 summarises the age and gender distribution of the subjects.

<table>
<thead>
<tr>
<th>Class/Age</th>
<th>Gender</th>
<th>Total</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Male</td>
<td>Female</td>
</tr>
<tr>
<td>5th grade (11 year old)</td>
<td>61</td>
<td>47</td>
</tr>
<tr>
<td>6th grade (12 year old)</td>
<td>40</td>
<td>52</td>
</tr>
<tr>
<td>Total</td>
<td>101</td>
<td>99</td>
</tr>
<tr>
<td>English group (11 year old)</td>
<td>8</td>
<td>12</td>
</tr>
<tr>
<td>Total</td>
<td>109</td>
<td>111</td>
</tr>
</tbody>
</table>
2. Method

In order to obtain data on the operations of each hypothetical level of the speech perception and comprehension processes (see Figure 1) the equivalent seven subtests (containing 10 test items each) of two corresponding test batteries, the GMP and GMP Listening to English (henceforth: GMPeng), were used (Gósy, 1995, 1997b, 2000a). Most subtests require subjects to repeat an authentic speech signal recorded on tape, and the evaluation process is the same in each case; the student who repeats every single test item or answers every single test question correctly scores 100%, the one who repeats 9 scores 90%, etc.

The three levels of speech perception are tested by four subtests: 1) acoustic level: the identification of sentences and words masked by white noise, 2) phonetic level: the identification of sentences after pass-band filtration confined to the frequency range of 2,200-2,700 Hz; 3) phonological level: the identification of artificially speeded-up sentences. A fifth subtest, the identification of nonsense words, gives empirical information on serial perception and perceptual segmentation abilities, which are indispensable for both the decoding and production of speech. Lexical access (the speedy and efficient recognition, identification and interpretation of lexical units) mediates between speech perception and comprehension. This interface level is tested by the word association subtest, i.e. by listing in writing within two minutes as many words as possible beginning with the stimulus syllables ma-, ke- in Hungarian and with the stimulus sounds /m/, /k/ in English. The two consecutive levels of speech comprehension are analysed with the help of the following two subtests: 1) syntactic-level: a sentence comprehension subtest, in which subjects must choose from two similar drawings the one which best fits a test sentence. 2) semantic-level: a text comprehension subtest, with a listening exercise followed by answering comprehension questions in writing. This subtest also tests the interpretation level at the top of the decoding hierarchy.

The GMP test results can be evaluated against standardised age-specific assessment scores. For GMPeng, however, only informatory mean test scores are available, which are based on the duration of foreign language study. For statistical analysis the SPSS 9.0 software package was used (confidence level=95%).

A structural outline of the dissertation

Chapter 4 (Results and Discussion) comprises a statistical analysis and comparison of the L1 and L2 processing abilities of the Hungarian test subjects; a description of differences and/or similarities between the two main components (perception and comprehension) of processing speech; and also the impact of certain variables such as age and gender on these mental operations. By analysing the perception and comprehension abilities of a British control group, we also gain insight into the decoding operations and strategies applied when English is not a second but a first language. The chapter concludes with highlighting the outcomes, the major tendencies, similarities and differences of the above comparisons of the related L1 and L2 processes.

In Chapter 5 (Conclusions) all experimental results and tendencies are reviewed in the light of the original research questions and hypotheses and the answers are formulated.

The last chapter of the dissertation (Application) summarises possible directions in further research of the field and the most important implications the findings have on psycholinguistics, L1 and L2 language pedagogy.
New research results and conclusions

The dissertation is aimed at gathering empirical evidence about the relationship between the L1 (Hungarian) and L2 (English) decoding mechanisms of the same Hungarian schoolchildren. A short answer to the main research question; i.e. whether the decoding of L1 and L2 speech units involves identical, similar or completely different processes, is that there is a strong interrelationship between them with a strong influence of the L1 on both processes. In summary of the empirical results of our experiment, the detailed research findings and conclusions of the study are the following:

1. The detailed description of every single level of the decoding process (the comparison of the L1 and L2 performances at the acoustic, phonetic, phonological levels, serial perception, lexical access, sentence and text comprehension, respectively, completed with the comparison of the L2 results of these levels with the English control group’s performance) revealed some general, universal and some language-specific features of the tested mechanisms.

A general tendency in speech perception is that when, for example, perceptual conditions fail to be ideal (background noise or fast tempo of speech), listeners tend to rely more heavily on the operations of higher level decoding processes even when listening to speech in the L1. In serial perception all tested subjects (irrespective of their first language) found it more difficult to recognise and identify nonsense words containing more than 2 syllables. An obviously language-specific feature of the same level of perception was also detected in this subtest; Hungarian subjects could not cope well with the recognition of nonsense words which had phoneme combinations atypical in Hungarian but typical in English, while English subjects had no difficulty in perceiving diphthongs or consonant clusters. Another universal tendency is to replace nonsense words or only partially recognised sound sequences with an existing word of a similar structure. The Hungarian subjects faced the most difficulties in identifying fast speech segments in both L1 and L2, while the English control subjects had serious difficulties in serial perception. These findings prove that at the age of 11-12 children can still have decoding difficulties at the highest level of perception, but it appears to be language-specific as to which processes of the phonological level are concerned.

During lexical access mainly unmarked lexemes, nouns, short and frequently used words are activated in a semantically organised or a random manner. Research findings also reveal that the majority of the activated items of the mental lexicon are identical at a given age. These findings are especially relevant in the L2, which is probably due to the homogeneous nature of input and teaching material. Typological differences between Hungarian and English can be traced back by examining the markedness of the activated word forms. Markedness is twice as frequent in the agglutinating language, and Hungarian children apparently also transfer this typological feature of the L1 to L2 word associations (markedness in L2 may also be attributed to the methods of teaching).

In L2 sentence comprehension the Hungarian subjects found sentence structures not characteristic of their L1 difficult to understand. Understanding of L1 and L2 texts presents very similar difficulties for all tested groups. At the age of 11-12 the comprehension of the literal meaning of the text and its individual sentences, etc. meets the set standards, but the interpretation of the message of the text is not always appropriate. Text comprehension findings also suggest that the control group, most likely influenced by language-specific factors, relies more often on top-down processing. The Hungarian subjects also depend heavily on this meaning-based processing strategy in completing the L2 task, although they tend to blend it with bottom-up processing, which they dominantly apply to the L1.
To sum up the results of the detailed analysis of each particular level of the decoding process, we can come to the conclusion that the perception and comprehension processes of the Hungarian subjects in both languages are similar to a greater extent than those of the Hungarian and English tested groups. This finding can be attributed to a lot of interrelated factors, e.g. L1 transfer or a higher linguistic awareness level, etc. on the Hungarian children’s part.

2. Some very basic features of the interrelation between the two main components of the speech decoding mechanism (perception and comprehension) and of the efficiency of the lexical access supporting these operations can be easily discerned by comparing the mean results of the test groups in both the L1 and L2 and with those of the control group.

Statistical analysis of the mother-tongue decoding abilities of the Hungarian test group reveal that the lower levels of the L1 decoding hierarchy, i.e. the levels of speech perception, operate routinely, automatically, spontaneously and hence significantly faster and better than the more conscious and slower comprehension component, which depends heavily on contextual and factual knowledge. Lexical access proves to be fast and accurate; the children associate far more words on average than the expected standard of 6 to 7 items. The Hungarian children’s L1 lexical access abilities are significantly more developed than their L2 lexical access. In addition, lexical access proves to be heavily dependent on age in the L1 and/or language learning experience in the L2, as in both cases the 6th graders outperform the 5th graders. The children were not all able to reach the expected 100% standardised age-score at the levels of perception that were tested, but achieved a mean result in text comprehension over the standard (60-70%). In text comprehension, however, individual differences were marked resulting in the most extremely low and high scores.

The order of difficulty of the mental operations to be performed in the L1 appears to be the same for the whole test group irrespective of age and gender. In all cases this order precisely reflects the consecutive stages of the hierarchical speech decoding model introduced earlier (see Figure 1). That is, the acoustic, phonetic and serial perception levels work more automatically and effortlessly than the phonological level and the higher levels of speech comprehension, which require more complex and conscious operations and rely heavily on the co-operation of several levels.

No correlations have been detected in the experiment between L1 perception, comprehension and lexical access in any case. The close interdependence of the particular levels of perception, however, is significant. Successful perception in the mother tongue is primarily determined by the operation of its highest, phonological level.

Analysing the foreign language (English) decoding abilities of the Hungarian test group shows that the L2 speech perception and comprehension results and individual deviations from the mean are more balanced and levelled up. The reason for the finding that individual L2 listening abilities do not show as many variations as in the L1 probably derives from the homogeneity of the language learning environment (the teaching method, the teaching material, the pace of instruction, etc. as well as the uniformity of input and of memory requirements). Foreign language decoding processes are also noticeably less automatic and the students’ L2 performances are significantly lower than their corresponding native language results. (This latter finding also proves that it is not enough to depend solely on mother-tongue decoding abilities, techniques and strategies to understand an L2 utterance.) If we compare the Hungarian test group’s GMPeng results with the expected norm set by Gosy (1997c), our test results correspond to a period of 3 to 4 years of language study (only 35.5% of the tested children have been learning English for that long). The average time spent on language learning is 4.5 years. Neither language exposure duration is considered a very long time, several students were still able to score 100% in various GMPeng subtests. A detailed
analysis reflects low mean results and the frequent occurrence of extreme scores (standard deviation results reaching twice as much as for native speakers of English). Interestingly and in keeping with L1 results, L2 lexical access proves to be unexpectedly fast and accurate. Most tested children associated more words than the set norm, i.e. they can effectively navigate their L2 mental lexicon.

With regard to age and time spent in language learning, a significant improvement in L2 perception abilities but only a slight increase in L2 comprehension is found when comparing the 5th and 6th graders. There are also more differences found in the language processing abilities of boys and girls in the L2 than in the L1. Although the boys’ scores are heterogeneous and frequently lie at the extremes, boys still outperform girls.

However, the above differences are mainly of a quantitative nature, and all tested Hungarian subjects seem to face the same difficulties in L2 perception and comprehension. The order of difficulty of the GMPeng subtests found in our study is identical with that presented in Gósy’s research (1997c) on subjects of the same age. The hierarchy of the decoding mechanism is not reflected fully in the findings above as the Hungarian test group’s perception and comprehension of English are very similar.

The levels of speech comprehension can operate effectively even with the higher (phonetic and phonological) levels of perception working only partially. L2 perception achieves its fullest potential with word-level input, as children tend to focus on meaning rather than form when the task is to process entire sentences. The dominance of top-down processing in the L2 can be explained by several factors; e.g. the structural properties of the English language, the temporal limitations on processing ongoing speech, the qualitative and quantitative influence of previous language learning experience, the underdeveloped L2 verbal short-term memory capacity, etc.

Similarly strong correlations have been detected between L2 perception, comprehension and lexical access in all combinations. Therefore, it is safe to claim that there is a close interdependence and mutual development of foreign language perception and comprehension. In addition, both the ability to access the acquired vocabulary and the size of this vocabulary are likely to determine the operation of these two components and the outcome of the whole L2 decoding process. First language acquisition and the development of linguistic awareness take place in much more heterogeneous circumstances, which more often result in individual differences at the levels of the decoding mechanism. These particular levels are likewise able to operate more independently and autonomously in the L1 decoding process. One can conclude from the above that such an intricate network of connections between all levels of perception and comprehension does not exist in the L1 (including the control group).

Another remarkable finding is the significant correlation between L1 and L2 abilities in perception, comprehension and lexical access, respectively, i.e. a person with developed speech perception, comprehension and word association in his mother tongue processes foreign language utterances equally well. From this we conclude that mother-tongue speech perception and comprehension experience and abilities (interacting with a host of other factors) are indispensable for efficient and accurate L2 decoding. Therefore, the development (or “cultivation”) of L1 perception and comprehension is clearly necessary even through the 5th and 6th grades. In addition, the significant role of lexical access (the highest correlation rates detected) in both the L1 and L2 suggests that lexical access abilities considerably influence speech perception and comprehension in any language, but to the greatest extent in the L2.

The control group’s mother-tongue decoding abilities, speech processing results show significant differences from those of the Hungarian test group. Operations at the levels of perception are impeded to a greater extent than those at the comprehension levels. Moreover,
although their perception abilities in the L1 are weaker and more heterogeneous than those of the Hungarian subjects, their comprehension abilities are much stronger and more consistent. These findings reveal the relative independence of perception and comprehension processes (as was also seen in the test group’s L1 results), but also the significant impact of lexical access abilities on comprehension. The native English control group’s GMPeng scores not surprisingly exceed the Hungarian test group’s L2 results in each test. Their lexical access abilities do not differ from either the L1 or L2 lexical access abilities of the 12-year-old Hungarian subjects, those who have learned English for a maximum of 5.5 years, but the lexical abilities of the control group are significantly better (2 more words on average) than those of the Hungarian subgroup of their age.

If we rank the subtest performances in order of difficulty, it turns out that text comprehension (an easy task) precedes some lower-level perception tasks restricted to identifying isolated words and sentences, although the former is considered the most complex level of the decoding process and depends greatly on the interaction and the output of the lower ones. The control group’s relatively low perception scores derive from weakness at the phonetic and phonological levels and in serial perception. The latter has a strong impact on the development of an individual’s vocabulary and thus implicitly on the general learning process; it is indispensable for learning to read and write, for learning a new language and also for the development of L1 metalinguistic awareness. The difficulty detected at this perception level is probably due to structural features of the English language and to the control group’s lack of foreign language learning experience. The hierarchy of the decoding mechanism is not reflected fully in the findings above, either. The control group compensates for its perceptual shortcomings by using global, top-down strategies and relying greatly on contextual, semantic cues.

3. The general speech perception and comprehension patterns revealed by the experiment derive from various comparisons of the results: (1) comparing the Hungarian test group’s L1 and L2 processing abilities to find basic differences and similarities between them. An analysis of the English control group’s results enables us to examine two more aspects of the decoding mechanism: (2) whether speech perception and comprehension abilities and strategies depend on the type of acquisition (as a L1 or L2) of the same language and (3) which characteristics of L1 speech perception and comprehension are universal and which are language-specific. Figure 2 summarises both the Hungarian test group’s and the English control group’s L1 and L2 scores at each level of the speech decoding process. The three main data groups in the figure are quantitatively fully independent of one another; yet an obvious similarity between the Hungarian test group’s mother-tongue and foreign language processing abilities and a partial similarity between these and the English L1 data can still be seen.
(1) Figure 2 reflects a relationship between the L1 and L2 perception and comprehension abilities of the Hungarian subjects. The graphs follow the same pattern with the exception of one subtest (filtered sentences). Mother-tongue speech perception operates automatically at every single level at the tested age, while speech perception in the foreign language (at the phonetic level) is not solely determined by L1 experience, because the L2 graph declines at this point. As the English control group’s graph also declines at this stage, one may conclude that the phenomenon can be explained by specific structural and phonemic features of the English language.

(2) Tendencies in the L1 processing abilities of the English control group differ from those in the perception and comprehension of English as a foreign language by the Hungarian subjects at three levels. They are the most complex levels of perception and comprehension: phonological perception (fast sentences), serial perception (nonsense words) and text comprehension.

The accuracy of the Hungarian test group’s perception of L2 (and even L1) utterances is deeply influenced by the tempo of the speech. This factor becomes especially significant in situations when the listener cannot compensate for the distortion of the acoustic stimulus with the help of semantic and contextual cues, because the utterance appears to be syntactically and semantically too complex. This condition is aggravated in a foreign language by the lack of authentic L2 perception experience.

In the case of serial perception (the identification of the sound pattern of new and foreign words and phrases) the situation is reversed. That is, identifying nonsense words was the easiest task for the Hungarian children irrespective of the language used. However, this ability is not universal, as the identification of nonsense words proved the most difficult task for the control group. An explanation should take into consideration the impact of the first language perceptual basis and positive transfer or of the previous language learning experience of and general perceptual awareness in the Hungarian test group.
The Hungarian test group ran into difficulties in both L1 and L2 text comprehension while the English subjects did not. This finding suggests that the control group, most likely influenced by language-specific factors, relies more often on top-down processing. The Hungarian subjects also depended heavily on this meaning-based processing strategy in completing the GMPeng tasks, although they frequently blended it with its counterpart, bottom-up processing, which they dominantly apply to first language perception and comprehension.

3) When comparing the first language decoding mechanisms, the English L1 pattern appears to be different from the Hungarian L1 pattern at 4 levels: filtered sentences (phonetic), fast sentences (phonological), nonsense words (serial perception) and text comprehension.

The above tendencies and graph patterns suggest that the decoding methods of the English control subjects do not resemble either the Hungarian test group’s L2 or L1 perception and comprehension strategies. Nevertheless, the L1 and L2 results of the Hungarian test group are remarkably similar. The findings of this study indicate that with respect to speech perception and comprehension people tend to learn a foreign language under the influence of the mother tongue. This may facilitate or sometimes hinder the acquisition of native-like proficiency in the target language (Menyhárt, 2001b; Vančóné, 2002).

4. During the experiment some other influences on the speech decoding mechanism of such factors as school achievements in the mother-tongue and in the foreign language, reading and writing and spelling abilities in L1 and L2, age and gender and the exposure to foreign language learning were also tested. From among these factors the reading and spelling ability of the children showed the most significant interdependence with the operations of speech perception and comprehension. As low perception skills involve low literacy skills in both the L1 and L2, the development of perceptual skills is useful even at this age of schooling.

5. In summary of the most important findings of the research our conclusions are as follows:

1. Our original hypothesis has been proved as the patterns of decoding speech clearly reveal interdependence between the Hungarian subjects’ L1 and L2 perception and comprehension development (with a nearly identical order of task difficulty, though the mother-tongue results are of course at a higher level than the foreign language results).

2. One can also conclude from this that Hungarian speakers mainly map their first language decoding strategies onto the processing of speech in the L2, although there are examples (similarities with the control group’s GMPeng results) which illustrate that L2-specific features may also influence the outcome.

3. Our test results only partly (in the L1) correspond to the hierarchy of gradual perception and comprehension given in the theoretical framework of this study. Mother-tongue perception appears to be so automatic, effortless, rapid and accurate that it cannot cause comprehension difficulties. But the two components of the decoding process in the L2 are related to such an extent that if perception becomes slower or impeded, and easy access to the higher levels is prevented, the listeners compensate for their difficulties by resorting to top-down processing and inferencing strategies in comprehension.

4. Accurate and rapid lexical access abilities both precondition and ensure the precise recognition and identification of the meaningful and meaningless units of the lexicon regardless of the language (L1/L2) used. The development of lexical access strengthens the decoding operations, which themselves become faster and more accurate. Hence, the role of this mediator level in the decoding process should not be neglected in either L1 or L2 development and teaching even at the later ages of schooling.
5. There is indeed an important relationship between L1 and L2 perception and comprehension, implying that the development of mother-tongue processing abilities should be emphasised in second language acquisition. This has implications for SLA theory, language pedagogy and for language teaching (e.g. in selecting the appropriate teaching method and material). Specific features of the first language and cross-linguistic influence should be highlighted not only in the development of L2 speech production and communication strategies but also during the development of perception and comprehension. While L1 positive transfer should be exploited in language teaching whenever possible, L1 negative transfer should be prevented or avoided. This goal can be accomplished by publishing textbooks and developing teaching methods based on the cross-linguistic comparison of the first and target languages concerned in the teaching process.

6. Still, one should not forget that successful L2 perception and comprehension operations are not determined solely by mother-tongue decoding abilities at a given age but that transfer also interacts with a host of other factors in acquisition.

The implications of the research results for psycholinguistics, mother-tongue education and language teaching, and their possible application to the same fields

The detailed description and analysis of the successive levels of speech perception and comprehension and our research findings have important implications for the development of teaching methods and for further research in several areas of applied linguistics.

(1) In the field of psycholinguistics, our empirical data serve as a new database for child language research for those who wish to investigate the language development of the teenage years.

In addition, the analysis of the data points at the general and language-specific features of the decoding process, the similarities and differences of its mechanisms in the L1 and L2. In contrast with speech production, this partly neglected field of human interaction and language development is given more significance.

The compiled data can also be analysed from the point of view of some other research questions of modern psycholinguistics, e.g. the questions concerning the structure and organisation of the mental lexicon in both L1 and L2.

(2) In the field of mother-tongue education and development, our results highlight the importance of the development of decoding skills even after the first years of primary school (also see Gósy and Laczkó, 1987). Improving the L1 speech perception and comprehension abilities of children have positive impacts on vocabulary development and learning in general, as well as learning a new language.

Parents, kindergarten teachers and teachers, etc. should bear in mind that the perception of speech is negatively influenced by background noise or fast speech tempo and parts of the message can be easily misinterpreted or not recognised at all. Listener-centred speech production in both L1 and L2 preconditions successful language acquisition and learning (also see Gósy, 1997a, 2000b).

When analysing the speech comprehension data, we came to the conclusion that age was an important factor in the development of comprehension skills; still, becoming older does not clearly indicate the development of speech processing operations. Teachers should get involved in the development of such skills (and the development of new types of methodology to develop these skills) especially in the case of children with very poor text comprehension abilities (see e.g. Demeter, 1994; Csapó, 1998; Vári, et al., 1998; Báthory,
2000; Cs. Czachesz, 2001; Menyhárt, 2001a). Underdeveloped comprehension abilities impede the general learning process.

(3) Most of the implications above also apply to the teaching of foreign languages. Speech perception and comprehension are one of the main basic skills that are required for successful communication in L2. According to Csapó’s research findings (2001) most children meet the school requirements of learning a foreign language, but there are significant individual differences among students, which are mainly due to extra-curricular factors. According to our findings, the school, the teachers and the teaching methods, etc. can play a much more active role in the development of L2 skills (e.g. taking transfer phenomena or the basic differences and similarities between L1 acquisition and L2 learning into consideration).

The results of the dissertation can draw the attention of teachers to ideas for developing new methods and teaching strategies. As L2 perception and comprehension performances of students appear to be rather low even at the level of secondary and higher education (see e.g. Kontra and Molnár, 1983; Bukta, 2001), the implications of the above experiment, which underline the necessary development of not only listening comprehension but also perception tasks and the development of the necessary skills even in L1, are considerably valuable.

The improvement of L2 speech processing abilities can have a beneficial effect on the level of general and L1 linguistic awareness and metalinguistic and cognitive skills, and thus on the acquisition of other languages as well (Cook, 1995; Bárdos, 2000; Göncz, 2003; Nikolov, 2004).
References


Menyhárt Krisztina. (2001b) Szövegértés egynyelvű és kétnyelvű gyermekeknél. Alkalmazott Nyelvtudomány, I/1. 87-98.


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